CKF Proof of Evidence on St Edward's School Meadow
(historically known as "The Leasowe"[1])
and now referenced as "land off Oakhurst Rise".

Introduction

The Rule 6 party

The Site

Recent Inspectorate History

The Objections

20 February 2021

[1] Meaning "Pasture"

1. The Rule 6 Team

1.1 My name is Sally Walker. I hold an MA Honours Degree in Natural Sciences from Emmanuel College, Cambridge. I live next to the site and run the Charlton Kings Friends residents' group (CKF) that forms the Rule 6 party. I started training as a (volunteer) Gloucestershire Wildlife Trust habitat surveyor in November 2020.

1.2 I was a senior civil servant, with a 25 year career in national security. I have no legal or planning education; my expertise is solely on the site and the application history. I have studied the evidence of the professional personnel who have supported our case, in detail, and will represent their input. I understand that my first obligation is to the inquiry.

1.3 CKF represents the residents of the local area, core constituents of whom include:

- Those living on the westerly aspect of this site: Charlton Court Road, Oakhurst Rise and the wider Ewens Farm estate (local concerns about access, flooding and sewerage infrastructure, given problems they face on a routine basis)
- Battledown residents to the north and east, Sixways residents to the south
- Wider school community families objecting to the loss of facilities (including the county cross country course and outdoor education opportunities)

1.4 The core group of CKF numbers 30 households. Social media support is around 3000. Community crowd funding has provided CKF with specialist advice on this series of applications. Each consultant has been asked whether they would want to spend their money on the case being put forward, to ensure sensible use of residents' donations.

1.5 The experts in question are:

- Ian Monger BSC (Hons), senior arboricultural consultant at Barton Hyett Associates. Currently appointed by the planning inspectorate as a non-salaried inspector for the determination of TPO appeals.
- Sam Watson (MCIEEM), principal ecologist at Bioscan.
- Dr Nicholas Doggett FSA, MICfA, IHBC, managing director at Asset Heritage Consulting

1.6 Mr Watson continued to support CKF pro bono this spring, travelling to validate any new flora recordings, before input to county records. Gloucestershire County Ecology Recorders and other ecologists also donated their time and virtual expertise during lockdown, through a combination of shared access to GPS tagged photos and videos in DropBox, and ecology community crowd sourcing of opinion and challenge on any less common species claimed.

1.7 The absence of professional witnesses at this appeal is a function of funding only.

2. The site

2.1 The site lies between two nationally listed heritage assets, one Grade II* and one Grade II. It is open and rural land, at the centre of which there is an ice house (disputed as curtilage listed) which makes a significant contribution to the setting of both buildings. The site contains ancient and veteran trees (some of which have been the subject of inspectorate planning appeals focused on visual amenity) and a badger sett large enough to be seen on Google Earth. Important hedgerow down the centre of the site is represented on the earliest OS maps, as is the pond on the northern boundary.

2.2 The site enjoys regular use by St Edwards Primary School and Kindergarten (my three children attended the school and my husband's office overlooked the site). County cross country championships were run across the field from 1957 to 2019, using the ice house as a feature of the uphill course. At the last championships to be held, there were 180 primary aged competitors and their families present, from all county schools.

2.3 The school farm, situated in their grounds adjacent to the site, is dependent on grazing on the site, currently in the form of two paddocks used for Kuni Kuni pigs, alpacas, and goats. Nature studies and forest schools are part of the school curriculum. The school keeps bees on the site, under the supervision of expert beekeepers, with pupils and volunteers maintaining hives and producing school honey, although all queens were lost in June 2020.

2.4 Public benefit is derived from the site from the annual Guy Fawkes event. 3,000 people attend and over £30,000 is raised annually for the local hospice. Also, organic hay from the site in excess of the school's needs is donated to the local Riding for Disabled Association.

2.5 Residences adjoining the field have enjoyed permissive access to the site. Locals, ecology groups and school families use the field, including for lockdown daily exercise and to get to and from school.

2.6 Charlton Manor records include a formal lease between Frederick Dixon-Hartland Esq and George Edwin Hewett Esq for the strip of land along their boundary, from 1887 through to c1947,[2] thereafter unclear.

[2] PoE Lucy Markham (appellant's heritage consultant) to 2019 inquiry, page 99 of 101

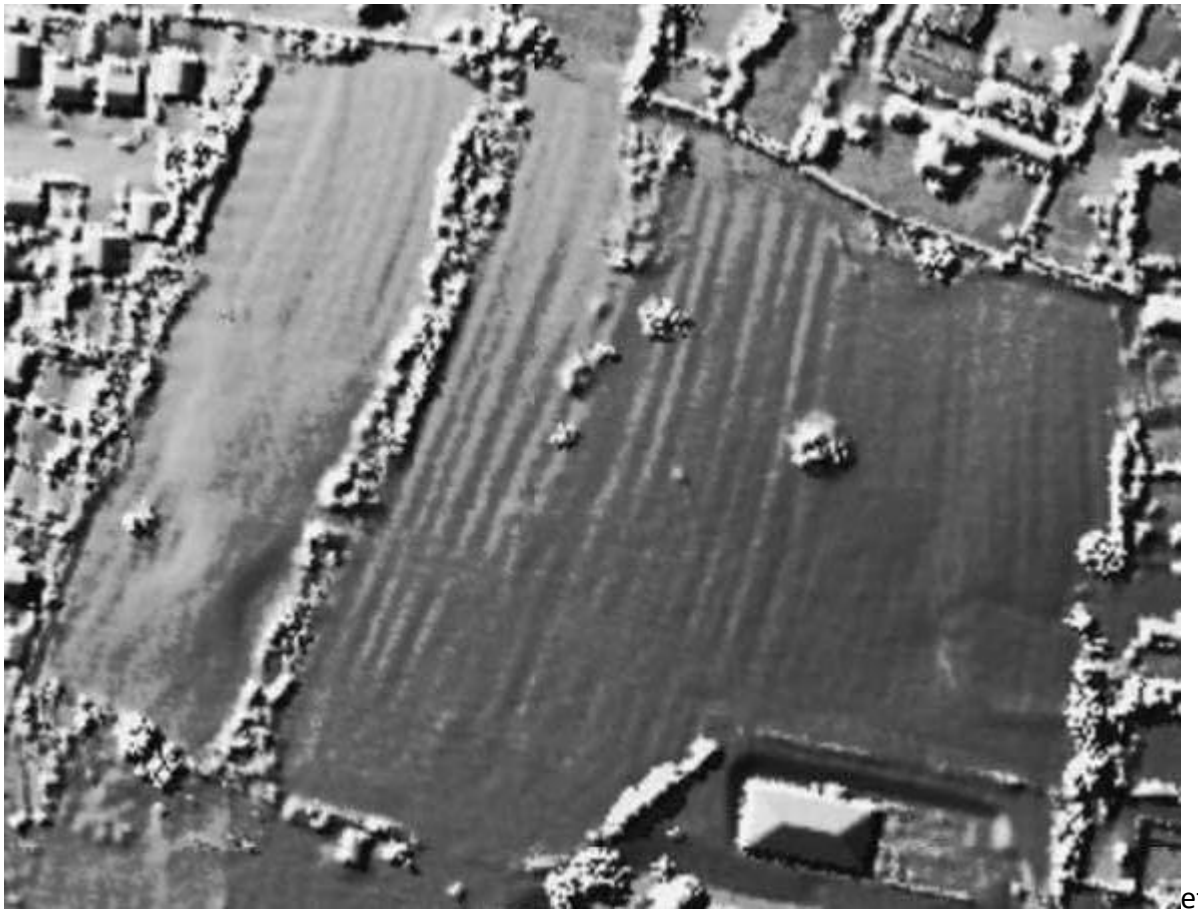 et

Image 0.1: LIDAR of St Edwards Field circa 2004

2.8 CKF made a case for the site to be considered as a Local Wildlife Site in June 2020, to Gloucestershire Wildlife Trust, and based on a their Local Wildlife Site Criteria. The case was supported by technical evidence from Bioscan and county recorders on grassland quality, as well as:

- Lidar maps reinforcing that the land has never been subject to modern agricultural methods (post medieval ridge and furrow can still be seen, image 0.1 above)
- Presence of locally uncommon invertebrate species, some not recorded in the borough since 1975, and a very wide range of other species, derived from GCER records and personal sightings
- The site's contribution to a wildlife corridor being higher ground roughly equidistant between the SSSIs on Leckhampton Hill and on Prestbury Hill.
- The inherent educational value of the site to the community and the school

2.9 The site was designated as a Local Wildlife Site in September 2020.

Inspectorate History

2.10 CKF proofs of evidence draw on the report of Inspector Burden, who inspected the Cheltenham Local Plan and finalised her examination in March 2020, prior to adoption of the local plan in July 2020. Inspector Burden made a site visit to the field, but did not visit either the Grade II* listed Ashley Manor, or the Grade II listed Charlton Manor. Excerpts relevant to site HD4[3] are included at Appendix 0.1 (paragraphs 57 – 59)

2.11 CKF proofs of evidence refer to the Appeal Decision of Inspector Sims. He conducted a site visit to the interior of the Grade II* listed Ashley Manor, and a site visit to the Grade II listed Charlton Manor and its gardens, in addition to visiting the surrounding area. The decision is included in full at Appendix 0.2[4].

Charlton Kings Friends Summary Objections

1. Heritage: This application would cause unacceptable heritage harm (Proof of Evidence: Heritage).

2. HD4: site specific conditions have not been met, including those relevant to the protection of mature trees. (Proof of Evidence: HD4).

3. Loss of Biodiversity: The site will suffer a Biodiversity Net Loss of 11.98% by use of the DEFRA 2.0 Biodiversity Metric. Changes to the site management in recent years need to be factored into claims of future net gain. (Proof of Evidence: Biodiversity Baseline)

4. Failure to avoid harm: Development within a locally designated site cannot be permitted when there will be an adverse impact on the registered features or criteria for which the site was listed, and harm cannot be avoided or satisfactorily mitigated (Proof of Evidence: Local Wildlife Site impact)

5. Failure to avoid harm: There will be unacceptable harm to the badger clan (Proof of Evidence: Badgers)

[3] Report on the Examination of the Cheltenham Plan 2011 – 2031, PINS/B1605/429/2, 17 March 2020

[4] Land at Oakhurst Rise, Charlton Kings, Cheltenham, GL52 6NR, APP/B1605/W/19/3227293, 20 September 2019

date. As a modification to the CP it has been updated (now Table 1) to the position as at July 2019 to take account of more recent monitoring data and reflect the changes resulting from modifications to the CP. It includes housing completions at April 2018[1] [**MM013]**. The updated supply for the CP would provide some 11,632 dwellings for the period 2011 to 2031. With the further changes which I have made as a consequence of changing the mixed use allocation MD2 to a housing allocation (HD9), this includes allocations in the CP (as modified) made through Policy H1 for 583 homes [**MM014**], and through Policy H2 for 350 homes [**MM019**].

56. The availability and deliverability of the sites identified for housing in the CP have been tested through the examination process. Both Policy H1 and Policy H2 are modified to address issues relating to deliverability of the allocated sites. The modifications require a robust transport assessment for each of the allocated sites in H1 and H2 at planning application stage and draw attention to sites which require flood risk to be addressed. They also require sewerage infrastructure constraints to be addressed prior to the occupation of any development. In addition, some changes have been made to the level of provision to be made on sites listed under the two policies to reflect up to date information and site-specific modifications [**MM014, MM019, MM027**]. The trajectory for delivery of allocations and commitments (Table 10 in the submitted Plan) is updated [**MM028**] to take account of changes to the site allocation capacity figures and to update planning commitments.

57. For the residential development allocations, site specific requirements to deal with flood risk issues are added to Policies HD7, and MD4. Requirements relating to biodiversity, landscape setting and heritage environment issues are also included within Policies HD3, HD4, HD7, and HD8. [**MMs 015 – 018, MM023**] These MMs are necessary to ensure that the site allocations have been positively prepared and will be deliverable.

58. Policy HD4 provides for some 25 dwellings on land at Oakhurst Rise. **MM016** provides for a restriction to the area of the site to ensure that new development does not impact on the setting of adjacent listed buildings. A recent appeal decision for some 68 dwellings was found, among other issues, to materially alter the character and appearance of the site harmful to the setting of the listed buildings and to result in a loss of protected trees. The appeal was dismissed.

59. An allocation for some 25 dwellings would considerably reduce the potential for the harmful impacts which were identified in the appeal scheme. A more modest development would enable the interrelationships between the listed buildings, the site and the Ice House to be better addressed and to avoid any harmful impact on the setting of the listed buildings. It would also enable the retention of important trees within the site, and I have made a minor change to the wording of modified Policy HD4 to require the protection of mature trees. In view of the location of the site within the built-up area and the need for residential development within Cheltenham, I find that with an appropriate layout and form of development the issues raised as part of the appeal scheme could be satisfactorily addressed and the allocation is sound

[1] The figures have been corrected following issues raised in response to consultation.

The Planning Inspectorate

Appeal Decision

Inquiry Opened on 20 August 2019

Site visit made on 19 August 2019

by B J Sims BSc(Hons) CEng MICE MRTPI

an Inspector appointed by the Secretary of State for Communities and Local Government

Decision date: 20 September 2019

Appeal Ref: APP/B1605/W/19/3227293
Land at Oakhurst Rise, Charlton Kings, Cheltenham, GL52 6NR

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant outline planning permission.
- The appeal is made by William Morrison (Cheltenham) Limited and The Trustees of the Carmelite Charitable Trust against the decision of Cheltenham Borough Council.
- The application Ref 18/02171/OUT, dated 24 October 2018, was refused by notice dated 22 March 2019.
- The proposed development is described in the original application as 'outline application for residential development of up to 69 dwellings (revision to application reference 17/00710/OUT')
- The Inquiry sat for 4 days on 20 to 23 August 2019.

Decision

1. The appeal is dismissed.

Procedural Matters

Rule 6 Party

2. Charlton Kings Friends (CKF) were represented at the Inquiry under Rule 6 of the Inquiries Procedure Rules.

Outline Application

3. The application and appeal are in outline but with matters of Access, Layout and Scale for consideration in detail at this stage.

Council Consideration, Amended Scheme and Basis of Decision

4. Cheltenham Borough Council (CBC) officers recommended approval of the original submitted scheme for up to 69 dwellings but the Planning Committee refused the application for five reasons related, briefly, to planning policy, trees, heritage, ecology and visual impact. However, this appeal is decided on a fresh and independent appraisal of the cases for and against the proposed development.

5. Following the refusal of the original application, the Applicants, William Morrison (Cheltenham) Limited and The Trustees of the Carmelite Charitable Trust (now the Appellants) amended the proposed scheme and put forward a revised layout for up to 68 dwellings. This was in response to post-Hearing

advice by the Inspector currently examining the draft Cheltenham Plan, proposing a Main Modification (MM) to the allocation of the appeal site for residential development, to reduce the area for built development. To date, the MMs to the emerging Plan are not agreed for public consultation. However, a MM suggested by CBC to the allocation of the site is made public strictly for the purpose of this appeal. I return to this matter of emerging policy in connection with the description of the amended proposal and the issue of the principle of the development, below.

6. CBC did not publish the amended development proposed for consultation. However, the Appellants themselves undertook public consultation on the modified scheme. CBC accepts that this consultation was equivalent to a statutory consultation on the revised application. It was agreed by all parties at the Inquiry that, in the circumstances, the amended scheme should form the basis for the determination of this appeal.

7. I am satisfied that the revision of the proposals is within the parameters of the well-known *Wheatcroft* judgment and that no injustice would result to any party from this approach. Accordingly, I consider the appeal and base my decision on the amended proposal, as described below.

8. Whilst the original application was expressly made in terms of the original scheme for up to 69 dwellings and the modified proposal for up to 68 dwellings, the application was submitted as a modification to a previously refused scheme for 90 dwellings. For the avoidance of doubt, the modified proposal for up to 68 dwellings now forms the basis of this decision on a fresh assessment of its individual merits, in the light of current planning policy and circumstances.

9. Although the matter of layout is for detailed consideration, the description, in terms of 'up to' 68 dwellings, provides an acceptable degree of latitude for adjustment of the internal configuration of the several blocks of dwellings in any future application for approval of the reserved matter of design.

Reasons for Refusal and Other Representations

10. Subsequent to its original determination of the application, CBC subsequently withdrew its fourth and fifth reasons for refusal on ecology and visual impact. CKF, as Rule 6 Party, continue to object on grounds of ecology as well as heritage. All oral and written representations by CKF and other interested third parties are taken into account in this decision.

Planning Obligation

11. The appellants have provided a planning obligation under Section 106 of the Act (as amended) to construct 40% of the dwellings as affordable housing units, in response to adopted policy provisions. The planning obligation has been executed as a deed in compliance with the relevant legal requirements. Its provisions are considered further below in connection with the planning benefits of the proposed development.

Site Visit

12. By agreement with the main and Rule 6 parties, I conducted an accompanied visit to the appeal site with their respective representatives on the day before the Inquiry opened. This was necessary to inform myself properly of the

features of the site and neighbouring Listed Buildings before hearing the evidence. I viewed Ashley Manor from the carriage drive and entered both Ashley Manor and Charlton Manor to observe views from windows facing the appeal site, variously at ground and upper floor levels. I also toured the wider area to observe more distant viewpoints and I drove via the local road network leading to the access point at Oakhurst Rise. It was left open at the start of the Inquiry whether a further accompanied site visit would take place but, by the close, no further site visit was requested or deemed necessary.

Description of the Site and Surrounding Area

13. The principal part of the appeal site is an undeveloped area of land, which extends to 4.29ha. It is located in the eastern part of the Principal Urban Area of Cheltenham, some 2km south east of the town centre, in an elevated position above the town, within Charlton Kings.

14. The site is mainly grassland, divided into two areas by an outgrown hedgerow running approximately north to south and now incorporating a number of large, mature trees. There are other mature trees around and on the site. The area to the west of the hedgerow amounts to about one third of the total site. The site is largely bounded on three sides by the rear gardens of residential properties fronting Birchley Road and Ashley Road to the north and east and Oakhurst Rise to the west. Adjacent to the south are the functional grounds of St Edward's Preparatory School.

15. Currently, the appeal site forms part of the wider St Edward's School grounds, being leased to the School by its owners, the co-Appellant, Carmelite Charitable Trust.

16. The larger, eastern part of the appeal site slopes generally southward and the smaller western area has a relatively steeper gradient to the west.

17. The buildings of St Edward's School lie directly to the south east of the appeal site and include the Grade II* listed Ashley Manor, now the School administration block, facing approximately west and approached via a winding carriage drive from the main London Road. The most northerly School building is a modern nursery block which stands closer than the Manor to the south east corner of the appeal site.

18. Adjacent to the eastern appeal site boundary, occupying one of three large residential curtilages, is the Grade II listed Charlton Manor.

19. A former Ice House, now infilled and identifiable as a mound with trees above, occupies a central position within the eastern part of the site.

20. Some 46% of the trees on the site are subject to Tree Preservation Order (TPO) No1 1981, covering 18 individual and 8 groups of trees.

21. In the central northern part of the site is a large badger sett (BS1) with outlying setts in other parts of the site, including within the hedgerow to the west and at the Ice House to the east.

22. The appeal site also includes two narrow strips of land to the south west within the School grounds to facilitate the connection of drainage runs to the sewerage system.

Description of the Amended Proposal

23. The amended outline proposal now at appeal is for 68 dwellings with access, layout and scale defined in detail.

24. The sole access would be from the end of the present cul-de sac of Oakhurst Rise, in the north western corner of the site.

25. The dwellings would be arranged in groups, pairs and terraces fronting a network of access roads and would range in size from one- to six-bedroom flats and houses in buildings from one to three storeys. The 40% (28 No) affordable units would be distributed throughout the development.

26. The Ice House mound would be left between the west of plots 31-34 and the estate road, as an historic feature with public interpretative information available.

27. The development would include the removal under licence of the main badger sett, which is situated roughly north of proposed plots 48-50 and south of plots 40-42. The proposal includes the creation of an artificial, relocated badger sett near the south west corner of the site.

28. The development, in particular plots 48-50, would require the felling of a protected tree, Ref 3014, from the central part of the site. The trunk of this tree would be removed to the south west of the site and retained as a feature and 'monoxyle' wildlife habitat. All other protected trees would be retained.

29. Toward the south eastern site boundary there would be a water feature, annotated as a 'rill', and a surface water drainage attenuation pond.

30. Compared with the original 69-dwelling scheme, the built development would be arranged to leave a landscaped space south of plots 16-17 in the southernmost part of the site, to the north west of the front of Ashley Manor. There would be a further landscaped space between the easternmost plots 31-34 and the western boundary with Charlton Manor. These aspects of the amended layout were introduced after the submission of the application in response to the post-Hearing advice of the Inspector conducting the draft Cheltenham Plan examination.

Main Issues

31. On consideration of all the written and oral evidence from the Main and Rule 6 parties and other interested persons, including the several statements of common ground, I consider that the main issues in the appeal are:

    i. the acceptability of the proposed development in principle, having regard to adopted and emerging planning policy,

    ii. the potential effect of the development on protected trees,

    iii. the effect the development would have on the settings of neighbouring heritage assets, in particular the listed Charlton Manor and Ashley Manor and the associated Ice House,

    iv. the effect of the development on biodiversity, with particular respect to protected badgers and reptiles on the site,

v. the provision of access and the effects of road traffic that would be generated by the development, and

vi. any benefits of the proposed development and, in particular, its contribution to the market and affordable housing land supply in Cheltenham, in the context of a housing land supply agreed to be less than five years.

32. I also consider matters of flood risk and drainage, visual impact in the vicinity of the Cotswolds AONB, adequacy of community infrastructure and residential amenity (noise and disturbance, education, sports, health care).

Reasons

Principle of Development

Adopted Policy

33. The current statutory development plan comprises saved policies of the Cheltenham Borough Local Plan Second Review 2006 (CBLP) and the adopted Gloucester, Cheltenham and Tewkesbury Joint Core Strategy 2011-2031 (JCS).

34. The appeal site lies within the defined Principal Urban Area of Cheltenham but is not allocated for any form of development. However, neither is the site subject to any policy restriction on development.

35. There is accordingly no objection to the principle of residential development on the appeal site with respect to adopted policy.

Emerging Policy

36. In terms of emerging policy, the whole of the present appeal site is allocated, by Policy HD4 of the draft Cheltenham Plan, for approximately 25 dwellings, to a layout that respects the existing urban characteristics of the vicinity and the character, significance and setting of heritage assets that may be affected by the development, subject also to protection of key biodiversity assets.

37. At the Hearings within the ongoing Examination of the Cheltenham Plan, draft allocation HD4 has been considered in the light of conflicting expert heritage evidence. On consideration of this evidence, the Examination Inspector has issued post-Hearing advice to the Council that:

> *'there is good reason to amend the boundaries of the development area from that proposed in the draft Plan and to require new tree planting around the east and south boundaries to safeguard the settings of both listed buildings. New housing should be located away from the setting of the west elevation of Ashley Manor. This could be achieved through the amendment to the southern boundary of the allocation site so that it continues in a straight line westwards from the rear of the northernmost school building. In addition, to provide an undeveloped buffer between the rear garden boundary of Charlton Manor and the new development, the eastern boundary of the site should be repositioned at least 30 metres west of the rear boundary with Charlton Manor. The Ice House would remain within the confines of the site, but its future could be secured. A MM is required to Policy HD4 to identify the boundaries of the site as suggested above; to identify the level of new housing which could*

realistically be accommodated within the new site boundary; to identify the need for new tree planting around the east and south boundaries of the site; and to require the improvements to the Ice House …… .'

38. It was in response to this advice that the amended 68-dwelling scheme now under consideration was put forward. The Council has meanwhile suggested a MM to Policy HD4 stipulating a 'minimum of 25 dwellings' with a series of additional criteria to constrain any built development in the same terms as the post-Hearing advice and, in addition, to require the long-term protection of mature trees and hedges.

39. However, at the time of the Inquiry, the Examination Inspector had not yet agreed the MMs for public consultation and ultimately all proposed MMs to the draft Cheltenham Plan must be subject to full public consultation before the Inspector reaches any final conclusion on the soundness of allocation Policy HD4 or the draft Plan as a whole.

Conclusions on the Principle of the Development

40. It is evident that, before formulating the post-Hearing advice, the Examination Inspector visited the appeal site but did not find it necessary to enter the adjacent listed buildings. In terms of normal practice, that approach was proportionate to the appraisal of the draft allocation of the site in the local plan, as distinct from a specific application or the current appeal for planning permission now for determination.

41. In the circumstances, whilst the emerging allocation Policy HD4 and the associated post-Hearing advice and suggested MM are material to the present appeal, they can be accorded only little weight, compared with the policies of the current adopted development plan, in this fresh assessment of the amended scheme and the detailed evidence for and against its approval.

42. It follows that, whilst there is no objection in principle to residential development on the appeal site, the proposal now subject to appeal falls to be assessed and determined primarily with respect to the adopted development plan, subject to its consistency with the National Planning Policy Framework (the Framework).

Protected Trees

Policy and Guidance

43. The development plan policy of greatest relevance to the loss of protected trees is GE6 of the CBLP. This resists the loss to development of sound and healthy protected trees of high value with at least ten years of life remaining and which make a significant contribution to the character and appearance of the locality of the site or locality. Policy GE6 expressly provides for retention of trees and planting of new trees in conjunction with development, as well as adequate measures to protect trees during construction. Policy GE6 is cross-referenced to BS5837:2005 for guidance on trees in relation to construction.

44. Policy GE5 of the CBLP is also cited in the refusal of the application as well as in several previous appeal decisions[1] as a development management policy resisting the unnecessary felling of healthy and safe protected trees on

[1] Core Documents E11-13

private land, where they are causing no harm. Policy GE5 applies even to dead trees that are contributing to biodiversity. Notwithstanding the expressed view of the Appellants in connection with this appeal that Policy GE5 is inapplicable as unrelated to new development, it appears to be consistently and appropriately applied in this case, as in previous appeals, as a provision also relevant to development proposals.

45. Policy INF3 of the JCS essentially supports the aims of Policies GE5-6 in terms of avoidance of impact on protected trees and the incorporation into development of measures to mitigate any loss of trees on the site or in its immediate environs.

46. These policies are not entirely consistent with the thrust of the Framework, which makes allowance at paragraph 175 for wholly exceptional circumstances, including public benefit, to justify significant harm even to veteran trees. Any departure from these adopted policies will be subject to consideration in the light of other material circumstances in any event, under section 38(6) of the Act, as amended.

47. Other guidance on trees in relation to construction is contained within the now applicable BS5837:2012 as well as in Natural England and Forestry Commission Standing Advice on protecting veteran and ancient trees.

Loss of Protected Tree Ref 3014

48. Tree 3014 (T11 in the TPO) is a mature oak. It falls within Category B, of moderate quality, in terms of BS5837, due to impaired condition but still with estimated remaining life expectancy of at least 20 Years. That is not to say that it cannot be regarded as a tree of high value in terms of Policy GE6.

49. The tree is not regarded as more than a successional veteran even by CBC, despite displaying some veteran characteristics, due to current absence of longevity. However, it is assessed as having a potential retained life expectancy of at least 40 years by the Appellants and up to 100 years by CBC.

50. The location of Tree 3014, within a private site of over 4ha, constrains its visual amenity value to external receptors, albeit the site is periodically open for public events associated with the adjacent School.

51. Notwithstanding its current non-veteran status and impaired condition however, the tree plainly contributes to the rural character of the site and provides amenity value in terms of the greening of the appeal site. This would be of potential benefit to future residents if the site were ultimately developed in line with draft allocation Policy HD4 of the Cheltenham Plan, which would not necessarily require its removal.

52. On a balanced assessment of the evidence of the main parties to the appeal, Tree 3014 is of high value and its loss would be harmful and contrary to Policy GE6 of the CBLP, as well as to the aims of Policy GE5 of the CBLP and INF3 of the JCS.

53. That harm would be mitigated to some extent due to the 'moderate' categorisation of the tree in terms of BS5837 and by the retention of its trunk as a 'monoxyle' habitat, with relevance also to biodiversity, considered below.

54. It remains, in any event, to take account of the adverse effect of the loss of Tree 3014 in the overall balance of planning considerations in the appeal.

Retained Protected and Veteran Trees

55. It is first appropriate to note the evidence of the Woodland Trust that a significant number of veteran and ancient trees on the appeal site have not been identified as such in the assessment submitted by the arboricultural consultants to the Appellants, including Tree 3014.

56. That assessment is based upon the in-house identification system of the consultants, known as RAVEN[2]. Criticism is based upon the Ancient Tree Inventory of the Ancient Tree Forum and Natural England standing advice for ancient woodland. It turns, in part, on alleged over-reliance by RAVEN, upon the mere size of the tree in assessing its veteran or ancient status.

57. However, it is apparent that the assessment covered all the trees on the site in light of the applicable definition of veteran and ancient trees in the Glossary of the Framework, in terms of age and condition, as well as size, in relation to biodiversity, cultural or heritage value. Furthermore, many trees referenced by the Woodland Trust are retained in the proposal now at appeal.

58. The scheme as a whole, and its measures to protect existing trees in particular, must be considered primarily in relation to the policies of the development plan and the Framework and a realistic assessment of its impacts. I therefore consider it appropriate to proceed on the basis of the agreement between the main parties that the veteran and other trees for retention on the site have been properly identified. The question to be addressed is whether the trees proposed to be retained in the development would be protected effectively.

59. At the Inquiry, it was equally established that there was no substantive dispute among all parties to the appeal that the root protection areas (RPAs) and veteran tree buffers (VTBs) of the trees proposed to be retained in the development have also been correctly defined in terms of BS5837 and Natural England standing advice.

60. It is clear from the detailed amended layout that, in a number of cases, built development would stand relatively close to veteran trees. In some cases, proposed private gardens would extend into the VTB or RPA of a veteran tree and certain elements of construction would take place even potentially among the roots of a veteran tree.

61. For example, a significant part of the RPA of Tree 3007, an oak, would be within the garden of plot 35 at the north east corner of the site. In a further example, a raised walkway and parking bays would occupy about 5% of the VTB of Tree 3018, also an oak, situated towards the north west part of the site. In the case of Tree 3021, an ash, there would be drains constructed within the RPA as well as potential increased public access after development.

62. CBC maintains that these incursions are contrary to the relevant protective planning policies because of their departure from the strict terms of BS5837 and Natural England Standing Advice. However, these advice documents expressly make provision for professional judgement in their application.

[2] Recognition of Ancient, Veteran and Notable Trees

63. In relation to the foregoing examples, the detailed specialist evidence of the Appellants includes assurance that the crown of Tree 3007 covers less than 25% of the RPA, that the raised walkway partly within the VTB of Tree 3018 would be constructed by 'no-dig' methods and its design would have a minimal ground footprint. Drainage works within the RPA of Tree 3021 would be undertaken by 'trenchless' working and 'below-root boring' techniques and a footpath placed relatively distant from the tree itself. Furthermore, permitted development rights applicable to dwellings and their curtilages would not override the safeguarding provided by the TPO.

64. There is no dispute that the foregoing working arrangements are based upon tried and tested methodologies. The question is whether it can be judged, in this particular case, that they would be effective.

65. On balance overall, I am satisfied that the measures proposed to safeguard the long-term welfare of all the retained protected and veteran trees from the potential impacts of the proposed built development have a reasonable prospect of success. However, that cannot be certain. I am persuaded that there would remain some degree of risk to the longevity of the trees concerned, given the relative degree of density of those parts of the proposed development closest to those concerned, leading to greater public access and activity in close proximity.

66. To that extent, with respect to the retained protected and veteran trees, I find the proposed development to be in some conflict with Policies GE6, GE5 and INF3. This potential harm counts in some measure against the approval of the scheme. The degree to which this conflict will affect the overall planning balance will depend on whether a development of the layout and density proposed is acceptable in terms other planning effects.

Heritage Assets

Policy and Law

67. Policy CP3 of the CBLP and SD8 and SD10 of the JCS together provide that development should protect, conserve, sustain and enhance designated heritage assets and their settings and avoid harm to views into and out of areas of acknowledged importance, including with respect to listed buildings.

68. Section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990 (PLBCA) contains a statutory duty to have special regard to the desirability of preserving the setting of listed buildings.

69. Framework paragraph 193 gives great weight to the conservation of designated heritage assets and paragraphs 195-6 consider harm to heritage assets in terms of whether it would be substantial or less than substantial. Paragraph 196 provides that, where development would lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal. The significance of a heritage asset is defined to include its archaeological, architectural, artistic or historic interest, derived not only from its presence but its setting, in which it is experienced. National Planning Practice Guidance (PPG) refers to the extent and importance of the setting to the visual relationship between the asset and proposed development, including that views of or from an asset will play an important part. The PPG also notes that

the contribution a setting makes to the significance of an asset is not dependent upon public access.

70. It is now trite law[3] that this less than substantial harm must be accorded considerable weight in the overall planning balance. However, the judgment in the case of *Shimbles*[4], with reference also to the earlier *Palmer*[5] case, makes clear that, whilst there is no allowance for any sub-categories of harm within the Framework definition, planning judgement must be exercised. That is with regard to the level of the less than substantial harm, the great weight accorded to the conservation of the asset and the extent of the public benefits.

Contribution of the Site and the Ice House to the Settings of Listed Buildings

71. The appeal site was historically and remains in the same ownership as Ashley Manor. Although the land evidently was never part of the managed parkland of the Manor, it had a functional relationship with the Manor as farmland, and as the location of its Ice House, which survives as an historic feature.

72. It is disputed whether there was ever a substantial tree belt along the southern appeal site boundary, visually separating the rural appeal site from the formal grounds of the Manor in views from its front, the approaches over the carriage drive from the south or from further afield. That remains a moot point; but whether or not there has, from time to time, existed such a visual barrier, the historical association is beyond dispute.

73. The present circumstances are that the Manor and the site are intervisible through the current boundary vegetation and direct views are available from at least one north-facing window onto the currently mainly open, eastern part of the site, including the tree-covered mound of the Ice House. I observed this for myself, unlike the Inspector dealing merely with the draft allocation Policy HD4. Moreover, the site, rising to the north, provides a green backdrop to the Manor in distant views.

74. At the more recently constructed Charlton Manor, against the eastern boundary of site, there has been historic variation in the degree to which this boundary has been vegetated and screened. The main entrance to the house is on its south-facing side and its road entrance is to the east. However, its western elevation, directly facing the appeal site contains its ground floor kitchen as well as significant habitable rooms on the first and second floor.

75. The windows of the upper rooms especially afford open views across the appeal site, past the Ice House mound and as far as the mountains of South Wales on the far side of the Severn Estuary. Again, unlike the Inspector examining the draft Cheltenham Plan, I was able to experience these views personally.

76. I recognise an historic and visual association between the appeal site and Ashley Manor and a strong visual interrelationship between the site and Charlton Manor. In terms of the relevant guidance to which I refer above, I consider that the appeal site, with the Ice House it encompasses, contributes

[3] *Barnwell C1/2013/0843; Forge Field [2014] EWHC 1895 (Admin); Forest of Dean [2016] EWHC 421 (Admin); Jones and Mordue []2015] EWCA Civ 1243*
[4] *Shimbles v City of Bradford et al [2018] EWHC 195*
[5] *Palmer v Herefordshire Council and Anr [2016]*

importantly to the historic and current visual setting of both these listed buildings, as designated heritage assets.

77. In the proposed scheme, the Ice House itself would not be directly affected by built development and would potentially be promoted with information on its history and significance as an aid to its public appreciation.

Effect on the Setting of Ashley Manor

78. By avoiding built development in the southernmost part of the site, the amended layout mitigates to some extent the effect of the proposed development on the setting of the west-facing, former Ashley Manor House and its surrounding associated buildings and carriage drive. However, the proposed introduction of new landscape planting, screening that boundary, would obstruct the relationship of the Manor to this part of its setting.

79. Moreover, that part of the development comprising plots 27-30, in the south eastern corner of the site, would intervene prominently in views to the north from the Manor House, including from its interior, impeding appreciation of the historic Ice House and the rural backdrop the site currently provides.

80. I recognise that the main front of the Ashley Manor House does not face directly towards the appeal site and that the character of its immediate surroundings has been altered by the addition of modern school buildings, including that closest to the appeal site boundary and north of the Manor itself.

81. Nevertheless, I consider that these effects on the visual relationship between the Grade II* Ashley Manor and the appeal site would have a very significant adverse impact upon the setting of the Listed Building.

82. Having regard to the statutory duty under s66 of the PLBCA, this would be contrary to the protective aims of Policy CP3 of the CBLP and SD8 and SD10 of the JCS and result in less than substantial harm to the designated asset in terms of Framework paragraph 176.

Effect on the Setting of Charlton Manor

83. The amended scheme avoids built development within 30m of the curtilage of Charlton Manor and provides for intervening landscaping to soften the appearance of the new houses in views from the Manor, as advised by the examining Inspector regarding draft allocation HD4.

84. Be that as it may, the presence of the new built development would still be visible from Charlton Manor and prominent in views available from its important west-facing windows. Distant views would be partly obstructed and, furthermore, the Ice House would be obscured by the intervening dwellings on plots 31-34. The appreciation of the Manor in views from within its setting to the west would be compromised, including for residents and members of the public living in or visiting the proposed dwellings.

85. As in the case of Ashley Manor, I consider that these effects on the visual relationship between the Grade II Charlton Manor and the appeal site would have a very significant adverse impact also upon the setting of this Listed Building. Having regard to the statutory duty under s66 of the PLBCA, the effect of the development on the setting of Charlton Manor also would be

contrary to Policy CP3 of the CBLP and SD8 and SD10 of the JCS and result in less than substantial harm to the designated asset in terms of Framework paragraph 176.

Overall Conclusions regarding Heritage Assets

86. The high significance of Ashley Manor is primarily indicated by its Grade II* listing and the recognition in its statutory list entry as one of the finest villas in Cheltenham. Charlton Manor, although more recent and listed Grade II, is also of high significance, being the first house erected on the Battledown Estate, taking advantage of its elevated position and belonging to the Victorian Gothic Revival, of which it remains a complete and well preserved example.

87. Thus, the harm to the settings of both these designated heritage assets, whilst less than substantial in terms of Framework paragraph 176, is nonetheless also significant. It requires consideration against the significance of the assets themselves as well as that of the level of any public benefit resulting from the development, in the final planning balance, addressed below.

88. I give no significant weight to the prospect of public access to and information upon the Ice House, as a mere an incidental to the development.

Biodiversity

Policy

89. Policy SD9 of the JCS encourages biodiversity enhancement and Policy NE2 of the CBLP seeks to safeguard protected species. These aims are consistent with Framework paragraph 170, which states that planning decisions should contribute to and enhance the natural environment, including by protecting and enhancing valued sites of biodiversity, minimising impacts on and providing net gains for biodiversity. Paragraph 175 also encourages net gains in biodiversity. Paragraph 175 further provides that, where significant harm to biodiversity resulting from development cannot be avoided, or adequately mitigated or, as a last resort, compensated for, permission should be refused.

Badgers

90. The amended development layout proposed would require the removal of the major, central badger sett, Ref BS1, and its replacement with an artificial sett of detailed design for future approval. On the evidence, I am satisfied that this is tried and tested methodology in common use and that the artificial sett could be provided with sufficient chambers to accommodate displaced badgers choosing to use it and constructed to floor and entrance levels high enough to avoid any local flooding.

91. The badger population currently resident and breeding in BS1 would be removed under licence. Badgers are common, subject even to official culling and legislative protection mainly for their welfare and against illegal and cruel persecution. That is not to say that any harm to them would not give rise to a planning objection, just as in the case of any other protected species.

92. Moreover, from the standpoint of CKF, as objectors to the housing scheme as a whole, it is understandable that they submit that the layout ignores the

'avoid-mitigate-compensate' sequence of Framework paragraph 175, in placing built development and access roads so close to BS1 in the first place. However, if the layout is necessary to the development of the site for other reasons, the question becomes whether the mitigation and compensation measures would be effective.

93. In practice, the evidence is that badgers displaced under licence are as likely to remove to outlying setts or create new ones as they are to inhabit the artificial one provided; also, if they inhabit the artificial sett, that they would potentially extend it and add more chambers themselves.

94. Even though this level of compensation is not strictly necessary and direct harm to the protected badgers could be avoided, the remaining badger population would potentially be subject to more human pressure and interference and their present foraging area would be substantially reduced by the presence of the proposed housing. This implies a reduction in the biodiversity value of the site in respect of its currently resident badger population.

Reptiles

95. In response to local concern, the Appellants undertook a reptile survey shortly before the Inquiry. This, visual observation and local information provides little evidence of the presence of protected reptiles, other than a family of slowworms and a single grass snake.

96. The survey is criticised by CKF in terms of its seasonal timing, the hours and number of survey visits made and the size of the 'refugia' used to attract and count any reptiles present. The Appellants pointed out that a greater number of smaller 'refugia' were used to increase the likely count and that the number of visits accorded with accepted practice. At the same time, the Appellants agreed, at the Inquiry, that the timing of the survey had been sub-optimal in comparison with established guidance. However, there is no countervailing evidence to indicate a greater presence of reptiles on the site.

97. It is further evident that only 14 key wildlife species have been recorded on the site, compared with the 20 required for its consideration of a Key Wildlife Site.

98. On balance, I do not consider it likely that protected reptiles are present on the appeal site to justify objection to the amended outline scheme on grounds of harm to such species. I consider that it would be sufficient to require, by planning condition, a full ecological survey and assessment to be submitted, with measures for the protection and management of any protected species found, and its submission to the Council for approval before any development could commence.

Overall Effect on Biodiversity

99. It is possible that some incidental, improvement to biodiversity could result from the positive management of the site, including the retention of the main part of felled Tree 3014 as ecological habitat.

100. On the other hand, CKF determine that there would be a measurable reduction in biodiversity due to the occupation of much of the site by housing development. However, this is calculated using a metric approach, criticised

by the Appellants and not established as accepted methodology, whereas other professional metric assessment would show enhancement.

101. It is my impression that little weight can currently be given to the results of such conflicting metric assessments, at least in as much as they represent evidence to the present appeal.

102. Overall, I consider that the net effect of the proposed development on biodiversity is likely to be either neutral or negative to some degree and certainly not an enhancement as sought by the thrust of current national and local policy. This factor militates to a degree against the appeal proposal.

Access and Traffic

103. The route to the sole access point to the appeal site is over a network of residential access roads via an established housing area, with much on-street parking in place for much of the time. The cul de sac of Oakhurst Rise, which would be extended to form the on-site access roads to the proposed development, has a steep gradient.

104. I acknowledge that there are no technical objections to the route in traffic or highway safety terms, whether with regard to width, gradient or alignment of the carriageways, junction or forward visibility, or existing traffic flows.

105. However, such technical issues are not the only consideration in the assessment of the suitability of the access arrangements for new development. In this case, there are genuine local concerns that the additional traffic from the proposed development, amounting to a likely 30 or so vehicle movements in any peak period, would add to congestion and inconvenience to existing frontage residents.

106. I am satisfied that such an increase in traffic flow would not have a significant impact on the wider highway network.

107. However, it is telling that one resident of Oakhurst Rise has been officially advised that an ambulance required to transport a person with mobility difficulties on a regular basis would no longer attend due to difficulty in parking at the frontage once the road was extended. That is a transient personal matter of relatively little planning weight and might be at least assisted by the provision of an additional turning head proposed within the site. However, it helps to illustrate that the access route, as a whole, is tortuous and far from ideal.

108. Notwithstanding the lack of any objection from the highway authority, this factor militates to some degree against the grant of permission for built development of the scale now proposed for the appeal site.

Benefits

Affordable Housing and the Planning Obligation

109. The Appellants put forward a considerable body of written evidence that there is a particularly acute need for more affordable housing in Cheltenham. It is undisputed that there is identified need for 231 affordable homes per annum, in a range of size and tenure, equivalent to 1,155 from 2014-18, compared with a delivery 182 in that period and only 507, in the past 18 years, 76 of these in Charlton Kings.

110. A contribution of 40%, or some 28 units, of the proposed housing would be secured by the completed planning obligation. At the Inquiry CBC accepted, and I agree, that this benefit carries very considerable weight in the balance of planning considerations.

Market Housing

111. It is common ground that, for the purposes of this appeal, the Cheltenham Borough housing land supply amounts to 4.6 years, calculated with reference to the requirement of the currently adopted development plan in relation to available sites. That is as compared with the minimum five year supply sought by Framework paragraph 73. Accordingly, the proposed development would make a significant, beneficial, 68-unit contribution to the overall housing supply.

Other Benefits

112. There would be a number of other potential benefits, as discussed above, in relation to heritage and biodiversity, but these would not offset negative impacts of the development for the reasons explained in connection with those main issues.

Other Matters

Flood Risk and Drainage

113. I recognise public concern regarding local flooding and drainage issues. However, there is insufficient evidence to show that a detailed scheme could not be satisfactorily drained. Surface water discharge could be limited to existing run-off rates by the attenuation pond indicated on the layout plan, once designed in detail to provide suitable capacity. Foul water would be connected, within the grounds of Ashley Manor, to the main sewerage system, also as indicated on the submitted layout plan. Wider local concerns expressed at the Inquiry regarding the matter of flood risk are outside the scope of this appeal.

Visual Impact

114. The elevated site is widely visible in distant views within the attractive, undulating landscape and its development would have significant visual impact on its immediate surroundings, close to the listed buildings and residential properties, considered above. However, any built development on the site would be relatively well vegetated and enclosed from the wider area. I do not therefore consider that it would cause harm to the appearance and character of the nearby Cotswolds AONB.

Community Infrastructure

115. There is no substantive evidence to justify objection to the introduction by the proposed development of up to 68 households to justify a planning objection on grounds of a lack of community infrastructure with respect to education, sports or health care facilities.

Residential Amenity

116. Details of the design and landscaping of the development are for later determination as reserved matters. At that stage I consider that it would be

possible to ensure, by appropriate design, that there would be no unacceptable harm to the amenity of the new residents or those already living at the surrounding properties, such as by way of noise, disturbance, overlooking or overshadowing. That is in the context of an already largely residential area within the Principal Urban Area of Cheltenham.

Balance of Planning Considerations

Policy

117. At the heart of the Framework is the presumption in favour of sustainable development, which paragraph 11 requires to be applied in planning decisions. Paragraph 11d(i) requires permission to be granted where the development plan policies which are most important for the determination of the appeal are out of date, unless the application of Framework polices that protect areas or assets of particular importance, including designated heritage assets, provide a clear reason for refusal.

118. Footnote 7 to the Framework makes clear that for housing proposals, as in this case, the lack of a five year housing land supply renders development plan housing provisions out of date and causes the balance set down by paragraph 11d(i), now commonly termed the tilted balance, to be engaged.

119. However, Framework paragraph 11d(ii) provides, in the alternative, for granting permission unless any adverse effects of doing so would significantly and demonstrably outweigh the benefits of the development, when assessed against the policies of the Framework as a whole.

Overall Assessment

120. It is established above that the less than substantial harm to designated heritage assets that would be caused by the proposed development carries considerable weight. In my judgement, for the reasons explained above, this harm is of a very significant level and both Listed Buildings whose settings would be harmed are themselves of very high significance. I therefore consider that the less than substantial harm identified amounts to the requisite clear reason to dismiss this appeal, in terms of Framework paragraph 11d(i).

121. However, very considerable weight is also to be accorded to the contribution the development would make to the supply of affordable housing in the face of an acute shortage. The contribution to market housing also carries significant weight, in the absence of a current overall five year housing land supply for Cheltenham. These are the net total of benefits identified in favour of the amended proposal now at appeal.

122. In my overall judgement, the adverse impact by way of the less than substantial harm to the significance of designated heritage assets in this case would alone outweigh these benefits to housing. I therefore consider that dismissal of the appeal is warranted on that ground, with respect to Framework paragraph 11d(ii).

123. Moreover, it is also appropriate to take into account the harms I have identified by way of the loss of a protected tree and the degree of long-term risk to those trees to be retained, the potential net loss of biodiversity and the disadvantage due to the less than ideal nature of the highway access to the

appeal site. I do not consider that these further adverse effects would, either individually or jointly, outweigh the significant benefits to the supply of affordable and market housing. Nevertheless, they do further support the case for dismissal of this appeal.

124. Finally, the weight to be ascribed to the benefit to housing supply is fairly to be regarded as being constrained by the prospect that, even if the present proposal is rejected, there is still potential for the site to be developed in line with an emerging local plan allocation, albeit for a lesser scheme, as well as by the likelihood that, within the foreseeable future, the Cheltenham Plan, currently under examination, will be adopted, with a resultant increase in housing land supply for Cheltenham to above five years. These prospects too, although conjectural and not determinative, still militate against the approval of the current proposal.

Overall Conclusion

125. For the reasons explained, I conclude overall that this appeal should be dismissed.

B J Sims

Inspector

APPEARANCES

FOR CHELTENHAM BOROUGH COUNCIL

Mr G A Grant of Counsel

He called:

Ms L Mulraine Tech Cert (Arbor A) TMAA
Senior Arboriculturalist – Environmental Dimension Partnership Limited

Mr C Morris BA(Hons) BTP MSc(HistCon) PostCertUD
Senior Heritage and Conservation Officer, Cheltenham Borough Council

Mr R Williams BTP MRTPI MRICS
Manging Director – Asbri Planning Limited

FOR WILLIAM MORRISON (CHELTENHAM) LIMITED AND THE TRUSTEES OF THE CARMELITE CHARITABLE TRUST CHELTENHAM BOROUGH COUNCIL - APPELLANTS

Mr S Choongh of Counsel

He called:

Mr A Colebrook MICF MAA MRFS
Associate Director – Forbes-Laird Arboricultural Consultancy Limited

Ms L Markham BA PGDip PGCert MRTPI IHBC
Associate – Montague Evans Charted Surveyors

Mr A Baxter BA(Hons) MA (Oxon) MSc CEcol CEnv MCIEEM
Director – Aspect Ecology

Mr P J Frampton BSc(Hons) TP MRICS MRTPI
Director - Frampton Town Planning Ltd

Mr M Glaze LLB(Hons) Eng Tech MIHE
Associate Director - Cotswold Transport Planning

Mr A de Croos BEng
Associate - Simpson Associates Consulting Engineers LLP

FOR CHARLTON KINGS FRIENDS – RULE 6 PARTY

Mr L Glenister of Counsel

He called:

Mr P Bell BA MA PDD IHBCo
of Asset Heritage Consulting

Mr S T Watson BSc(Hons) MICEEM
Principal Ecologist – Bioscan (UK) Limited

OTHER THIRD PARTIES AND INTERESTED PERSONS

Mrs S Walker
Mr P Walker and
Mr A Walker of Charlton Kings Friends also spoke on their own behalves

Cllr L Savage also on behalf of Mr A Chalk MP for Cheltenham and Cllr M Babbage

Cllr B Fisher

Cllr P McCloskey

Cllr S Harvey

Ms E Gilmartin and
Mr J Taylor on behalf of The Woodland Trust

Mr R Wilbourn on behalf of The Trustees of the Battledown Estate

Mr T R Gander on behalf of Cheltenham Flood and Drainage Panel

Mr D Edwards MICE

Mr M J Bowles – local resident and arboriculturalist

Mrs J Waite – local resident

Mr A Thurlow – local resident

Mrs L Lythgoe – local resident

Mr C Lythgoe – local resident

Mr R Grimshaw

PLANS

Dwg No PL004 Revision A Proposed Block Plan

Dwg No PL005 Revision D Proposed Site Layout

Dwg No PL006 Revision A Indicative Mass Building Plan

Dwg No PL007 Revision A Affordable Housing Distribution

Dwg No PL010 Revision A Indicative Street Scenes

Dwg No PL011 Revision A Indicative Street Scene

Dwg No PL014 Revision A Nolli Plan

Dwg No 38-1036.03-B Tree Protection Plan

Dwg No 19073.101 Landscape Strategy

DOCUMENTS

General and Interested Persons

1 Letter of Notification of the Inquiry

2 St Edward's Schools Trust - letter of support

3 Mr Alex Chalk MP and Cllrs Savage and Babbage - written statement

4 Mr Wilbourn, Trustees Battledown Estate – transcript

5 Mrs Waite – transcript

6 Mr P Walker – transcript

7 Cllr Fisher – transcript

8 Mr Edwards – transcript

9 Mr A Walker – transcript

10 Mr Thurlow – transcript

11 Mrs Lythgoe – transcript

12 Mr Lythgoe – transcript

13 Mr Taylor and Ms Gilmartin, Woodland Trust – transcript

14 Mr Bowles – transcript

15 Mr Gander, CFDP – transcript

16 Planning Obligation

17 Suggested Conditions

18 Scott Schedules

18A Draft suggested MM to Cheltenham Plan allocation HD4

Submissions

19ab CBC Opening and Closing Statements

20ab Appellants Opening and Closing Statements

21ab CKF Opening and Closing Statements

CBC Proofs and Appendices

22abc Ms Mulraine

23ab Mr Morris

24ab Mr Williams

25 *number not used*

Appellants Proofs and Appendices

26ab Mr Colebrook

27abc Ms Markham

28ab Mr Baxter

29ab Mr Frampton

Mr Glaze (Mr Frampton Appendix 4)

Mr de Croos (Mr Frampton Appendix 2)

30abc Mr A Moger BA(Hons) MA MRTPI– Affordable Housing evidence taken as read

CKF Proofs and Appendices

31abc Mr Bell

32ab Mr Watson

CKF Proof of Evidence on St Edward's School Meadow
(historically known as "The Leasowe")
and now referenced as "land off Oakhurst Rise".

Part 1: Heritage Harm

20 February 2021

Ice House reflecting in the windows of Charlton Manor at sunset

1A Unacceptable heritage harm to a Grade II* and a Grade II listed building

1.1 Dr Nicholas Doggett and his colleague Peter Bell (Asset Heritage Consulting), once again advising CKF, have been consistent in their objections over three applications and two appeals (in line with objections raised by Historic England). Like Inspector Sims, they have visited all the heritage assets in question before putting forward opinion on heritage harm. No other consultant has done so, other than Mr Holborrow; Mr Grover did request a site visit to Charlton Manor, after production of his evidence in support of the application, but prior to the inquiry. Lockdown rules precluded this.

1.2 Dr Doggett's professional evidence on the latest application[1] notes:

- Agreement with the 2019 Appeal Inspector's decision, and Historic England's long held view, that the land at Oakhurst Rise forms an important part of the setting of the Grade II* Ashley Manor, both historically, and as it exists today
- The importance of the appeal site to the setting of Charlton Manor, and the significance of site views from e.g. the 2 storey canted bay window.
- The inappropriate use of dense screening, in direct contradiction of Historic England's Good Practice Advice.
- opinion that none of the Inspector's specific concerns relevant to Heritage Assets (decision note paras 67-88)[2] have actually been addressed
- The importance of the wrought iron estate railings along the southern boundary of the appeal site, demonstrating the design intention to include the view to the north and north west, from the Manor's entrance and driveway, (as today)

1.3 The first appeal inquiry focused on an historic "shelter belt" between Ashley Manor and the site, as this had been foundational to ECUS and the appellant's various heritage consultancy reports. No evidence of a shelter belt, historic or otherwise, was provided; old OS maps and other evidence demonstrated completely the opposite.

[1] Appendix 1.1, Asset Heritage Consulting, Reference ND/9686 of December 2020

[2] Appendix 1.2 APP/B1605/W/19/3227293 of 30 September 2019, paragraphs 71-88

Image 1.1 (*plan of the estate and drawing of the Lodge, GS copy transferred from the Hartland collection, Ref 942.41(a)H.17. (GRO.box10.13aGS)*

1.4 It was also agreed at the first appeal that the principal rooms of Charlton Manor have open views westwards across the appeal site, past the ice house mound and as far as the Welsh mountains across the Severn Estuary, not, as then claimed by the appellant, in a southerly direction towards Leckhampton Hill.

1.5 The latest application is silent on methods of enclosure along the southern boundary of the site, as required to secure the school grounds which will be in separate ownership. Despite the appeal decision on the importance of the visual relationship between the site and the Manor House, and the detrimental effect of any screening of that boundary to the relationship of the Manor to its setting, this application shows the enclosure only as a line without explanation (Appendix 1.3 drawing 19216.201 rev A, 04 June 20, methods of enclosure).

1.6 Without this detail, it can only be assumed that further harm to setting is possible from the application as designed.

1B Heritage requirements within Policy HD4

1.7 HD4 requires, to be sound on heritage grounds:

1.7.1 "A layout and form that respects the character, significant and setting of heritage assets". It is common ground that harm arises to the setting of both heritage assets from this layout and form.

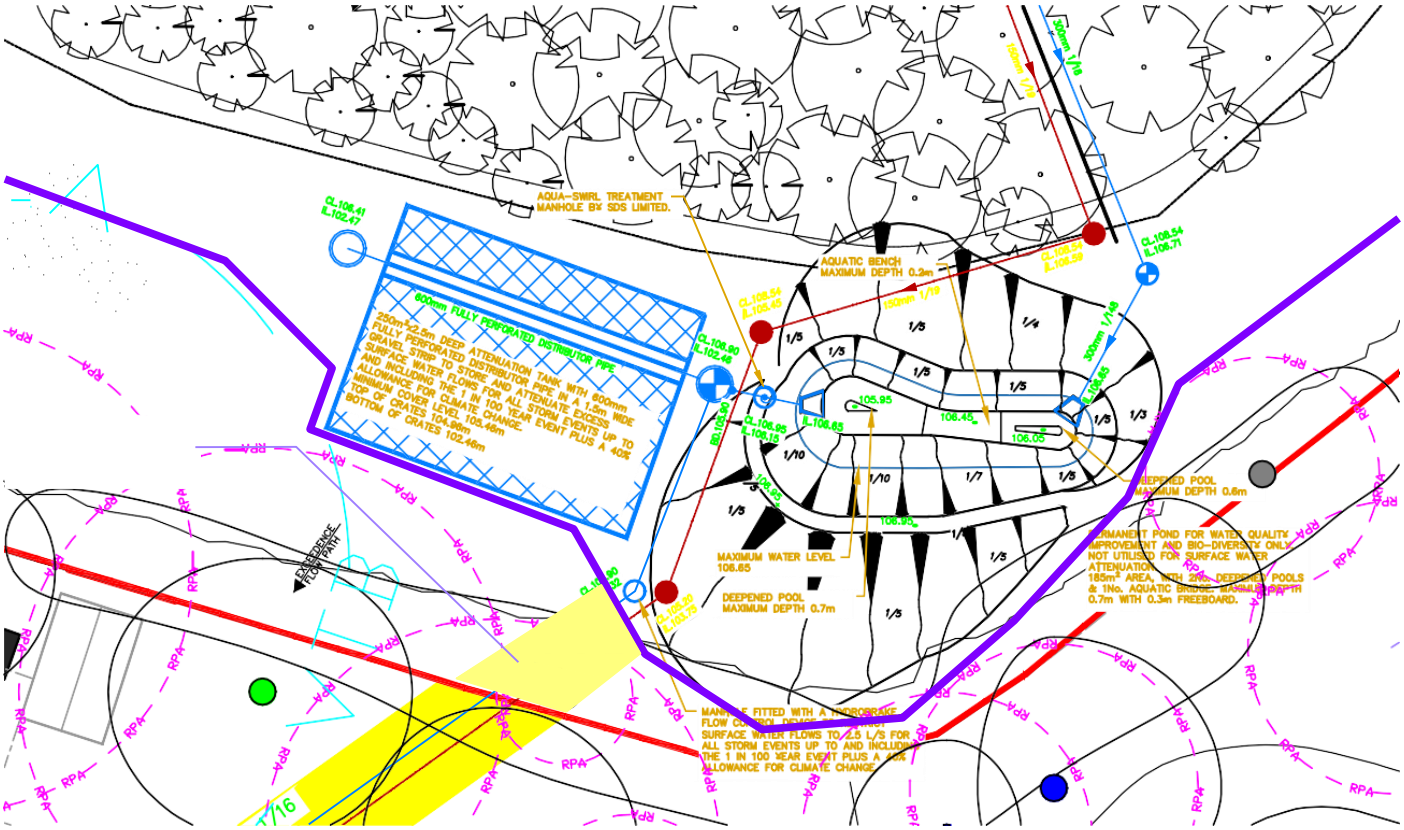

Image 1.2: Extract of Drawing 38-1036.03-F rev F 19th May 2020

1.7.2 "There should be no development south of a straight line westwards from the rear of the northernmost school building."

MM016 required “a restriction to the area of the site to ensure that new development does not impact on the setting of adjacent listed buildings[3]”. The site boundary is in purple, the entrance to a Grade II* listed building is 25.9 metres away, in a south westerly direction.

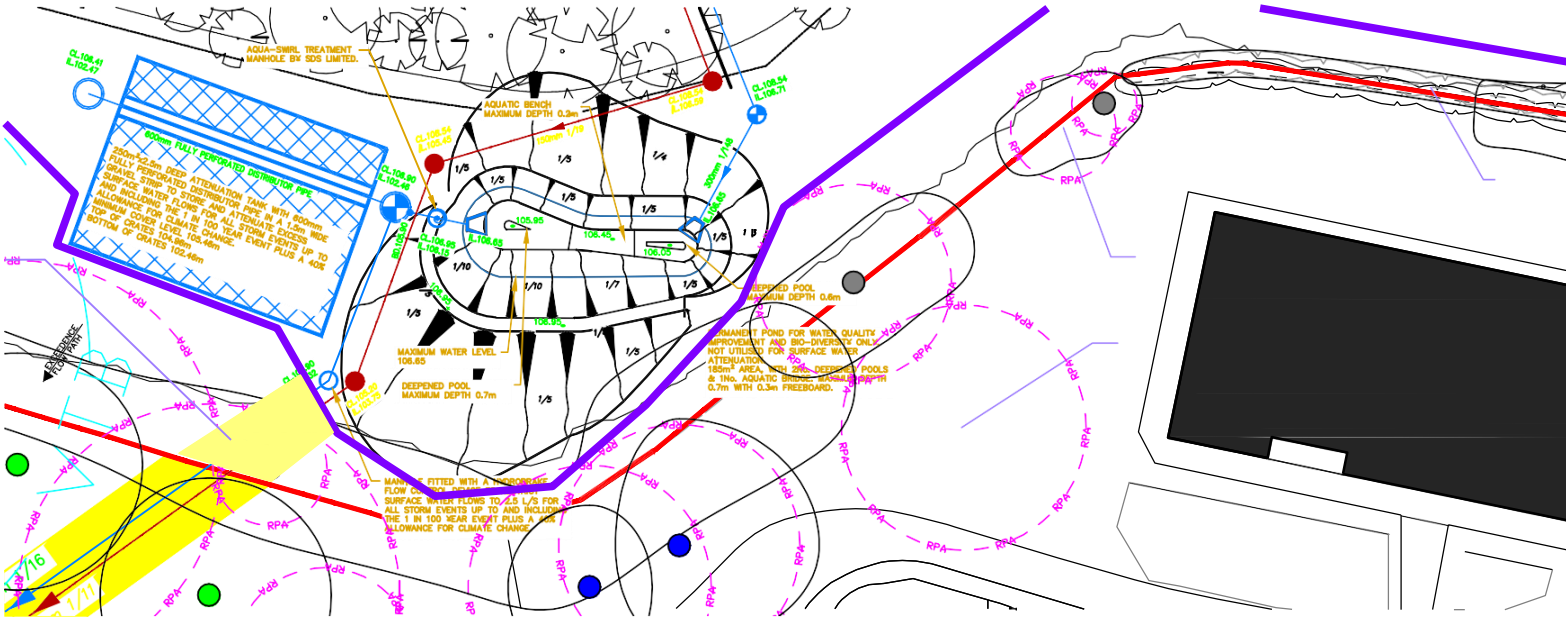

Image 1.3 Extract of Drawing 38-1036.03-F rev F 19th May 2020 including the ‘northernmost school building (Appendix 1.4)

[3] Appendix 0.1 para 57-59

1.7.3 A landscaping buffer should be provided for 30 metres west of the rear boundary with Charlton Manor. An artificial badger sett is being constructed on Charlton Manor's boundary, within this buffer. Successful implementation of the sett requires unspecified "protective measures to minimise disturbance", additional protective fencing and scrub planting. An artificial badger sett is not 'a landscaping buffer', and precludes scrub removal in the future.

1.7.4 Any development on the site should secure improvements to the ice house. None are evident, and badgers are being encouraged to colonise the feature.

Oaklands print c 1840, ice house centre left, hanging in Ashley Manor.

1C Other heritage issues

1.8 This application has badgers re-using and futher establishing the sett under the ice house (CK Proof of Evidence Part 5: Badgers), and would establish a new main artificial sett on the boundary of the Grade II listed Charlton Manor.

1.9 There is no information available on the underground structures of the ice house.

1.10 Original Battledown drains outflow into the field; Charlton Manor's spring water is provided from the field. A photograph of one of the brick bore holes associated with the spring was included in the appellant's archaeological evidence associated with 17/00710/OUT, documented in our badger PoE. The badger clan will be in conflict underground with established infrastructure associated with a Grade II listed building, as well as in conflict with the ice house. This is patently unsound.

1.11 A licence would be required from Natural England for use of machinery on the Grade II listed property (including the stable block and the boundary features), given the close proximity of sett entrances. Future scrub clearance of the ice house would have to be done by hand, or under licence.

1.12 There is inherent conflict between badgers and heritage assets if co-located.

Appendix 1.1: Asset Heritage Consulting, Heritage Statement Reference ND/9686 of December 2020

Appendix 1.2: APP/B1605/W/19/3227293 of 30 September 2019, paragraphs 67-88

Appendix 1.3: Drawing 19216.201 rev A, 04 June 20, methods of enclosure

Appendix 1.4: Drawing 38-1036.03-F rev F 19th May 2020

ASSET HERITAGE CONSULTING

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HERITAGE STATEMENT

In respect of

OUTLINE APPLICATION PROPOSALS FOR 43 DWELLINGS ON LAND AT OAKHURST RISE, CHELTENHAM

LPA REF: 20/00683/OUT

PINS REF: APP/B1605/W/20/3261154

On behalf of

Charlton Kings Friends (CKF)

AHC REF: ND/9686

December 2020

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Asset Heritage Consulting Ltd. Registration No: 07502061

CONTENTS

1.0 INTRODUCTION AND SCOPE OF REPORT

1.1 The purpose of this report, which has been prepared and written by Dr. Nicholas Doggett, FSA, MICfA, IHBC, Managing Director of Asset Heritage Consulting Ltd., on behalf of Charlton Kings Friends (CKF), who are registered as a Rule 6 party for the forthcoming public inquiry, is to provide an analysis of the impact of the outline development proposals for 43 dwellings on land at Oakhurst Rise (hereafter 'the appeal proposals') on the significance of the settings of the adjoining Grade II* listed Ashley Manor and the Grade II listed Charlton Manor.

1.2 A previous proposal, by the same applicants/appellants, for up to 68 dwellings was dismissed on appeal after a four-day public inquiry in August 2019 by letter dated 20 September 2019.

1.3 The adverse impact on the significance of the settings of Ashley Manor and Charlton Manor was key to this dismissal and this issue is also central to the new appeal, the Council's refusal reason (dated 17 September 2020) on the application reading as follows: '*The proposed development would have a significant impact on the setting of nearby listed buildings. The resultant 'less than substantial' harm to these designated heritage assets must be afforded significant weight, and this harm would fail to be outweighed by the public benefits arising from the proposal in the overall planning balance. Policy HD 4 of the Adopted Cheltenham Plan suggests a minimum of 25 dwellings can be accommodated on this site subject to a list of criteria. The proposal for 43 dwellings against the policy requirement of 25 has led to a layout which does not respect the character, significance and setting of heritage assets. The proposal is therefore in conflict with Policy HD4 of the adopted Cheltenham Plan. The development would also be in conflict with Section 66(1) of the Planning (Listed Buildings and Conservation Areas) Act 1990, adopted policy SD8 of the Joint Core Strategy (2017), and paragraphs 193, 194 and 196 of the National Planning Policy Framework (2019)*'.

1.4 It is my professional opinion (my qualifications and experience are set out at **Appendix 1**), that the appeal proposals remain highly damaging to the significance of the settings of Ashley Manor and Charlton Manor and are of such a scale that the

harm they would cause is sufficient to outweigh any 'public benefits' that the appellants will no doubt claim would flow from them.

1.5 As such, I respectfully urge the Inspector to dismiss the appeal proposals.

2.0 ASSESSMENT OF HERITAGE SIGNIFICANCE AND THE LEVEL OF HARM CAUSED BY THE APPEAL PROPOSALS

Assessment of Heritage Significance

2.1 It is absolutely clear from his decision letter that the 2019 Appeal Inspector considered that the land at Oakhurst Rise forms an important part of the setting of the Grade II* Ashley Manor, both historically and as it exists today, noting (paragraph 73) that: '*The present circumstances are that the Manor and the site are intervisible through the current boundary vegetation and direct views are available from at least one north-facing window onto the currently mainly open, eastern part of the site, including the tree-covered mound of the Ice House. I observed this for myself, unlike the Inspector dealing merely with the draft allocation Policy HD4. Moreover, the site, rising to the north, provides a green backdrop to the Manor in distant views*'.

2.2 A similar long-held opinion about the importance of the Oakhurst Rise land to the setting of Ashley Manor can be found in Historic England's letter to the Council of 13 May 2020, itself of course written in context of the September 2019 appeal decision, which notes that '…*whilst the principal elevation faces southwards, the siting of this villa, extensive, rising grounds is of, arguably, equal significance. Ashley Manor is designated as Grade II*, and as such is in the top 8% of listed buildings. Therefore, greater weight should be given to its conservation*'.

2.3 Furthermore, after acknowledging that modern developments at the school '…*have eroded the historically isolated setting of Ashley Manor*', the letter goes on to point out that '…*the house (and associated school buildings) remains positioned within the extent of its historical grounds and the application site forms a key green buffer between the villa and later development to the north. The application site is clearly associated, historically, with the villa and that grounds of this extent would be expected with a high-status property*'.

2.4 From all this, there can be no doubt that great significance lies in the contribution that the open land to the north of Ashley Manor (i.e. the appeal site) makes to its setting as a Grade II* listed building.

2.5 In this connection it is worth noting the use of wrought-iron estate railings along the southern boundary of the appeal site, which shows that views from the house to the north and north-west were from the start intended to be open ones as they still are today. Humphrey Repton, among others, championed the use of estate railings for exactly that reason.

2.6 In my opinion, the appeal site also makes a fundamental contribution to the setting of Charlton Manor (originally known as Simla Lodge – presumably a reference to its airy, elevated position – and later Leasowe before taking its present name), which was first built in 1864, probably to the designs of Henry Dangerfield, Cheltenham Borough Engineer, who laid out the Battledown Estate.

2.7 Indeed, as noted in the Historic England list entry (Charlton Manor was first listed in 1983 at a time when many Victorian houses of this type were not deemed to meet the criteria for statutory listing), the house was the first to be built on the Estate, which can only increase its importance historically.

2.8 It is also the case that, as acknowledged by Grover Lewis (see paragraphs 3.18 & 3.19 of their Heritage Impact Assessment), the rear elevations of the house are at least as important in architectural and historic terms as the front one. This is reflected not only in the architectural detailing and treatment of the rear elevations, but also in the way in which they have been sited precisely where they are to gain maximum benefit of the open views looking south-west and west from the property.

2.9 The main ground- and first-floor rooms of the house are all at the back of the house, their large windows clearly designed to take advantage of the fine views from them over the house's garden, the adjoining fields (the appeal site) and the area beyond, which include the grounds of the school, the Cotswold escarpment and the Black Mountains in Wales.

2.10 In addition to these rooms, there is a two-storey canted bay window projection in the angle between the main rear elevation and the house's rear wing. Internally, this is located near the principal staircase and its original purpose (one which it continues to serve today) was to cast additional light into the staircase area, and particularly on the first floor, to provide additional views out from the house.

2.11 Critically, the importance of these extensive, outward views was acknowledged by the 2019 Inspector, notably at paragraph 75 of his decision letter, where he writes: '*The windows of the upper rooms especially afford open views across the appeal site, past the Ice House mound and as far as the mountains of South Wales on the far side of the Severn Estuary. Again, unlike the Inspector examining the draft Cheltenham Plan, I was able to experience these views personally*'.

2.12 The Inspector's view on how the appeal site contributes in its present undeveloped form to both Ashley Manor and Charlton Manor is then nicely summed up in paragraph 76: '*I recognise an historic and visual association between the appeal site and Ashley Manor and a strong visual interrelationship between the site and Charlton Manor. In terms of the relevant guidance to which I refer above, I consider that the appeal site, with the Ice House it encompasses, contributes importantly to the historic and current visual setting of both these listed buildings, as designated heritage assets*' (my emphasis).

2.13 Unsurprisingly perhaps, the appellants' heritage consultants, Grover Lewis, the fourth such consultancy to be engaged by the appellants in their attempts to develop the site, underplay the important contribution that the appeal site makes to the significance of the setting of Ashley Manor and Charlton Manor (a stance also evident in the Council's Conservation Officer's comments to the case officer dated 7 July 2020), although even Grover Lewis have to concede (paragraph 3.14 of their Heritage Impact Assessment, April 2020) that '*…the application site, with its former icehouse and open aspect, contributes modestly to the wider setting and significance of Ashley Manor*' (see also paragraph 3.10 of that document).

2.14 Grover Lewis adopt a similar position in their assessment of the contribution that the appeal site makes to significance of the setting of Charlton Manor, stating (paragraph 3.19) that '*Whilst the significance of Charlton Manor derives principally from its intrinsic architectural quality and its historical interest, its wider landscape setting, embracing the open land to the immediate west, contributes to its significance*'.

Assessment of the Level of Harm Caused by the Appeal Proposals

2.15 The 2019 Inspector found that the proposals in front of him, including new landscape planting on the boundary between the site and Ashley Manor, which '*…would obstruct the relationship of the Manor to this part of its setting*' (paragraph 78), and their '*…effects on the visual relationship between the Grade II* Ashley Manor and the appeal site would have a very significant adverse impact upon the setting of the listed building*'.

2.16 With reference to Charlton Manor, the Inspector likewise commented (paragraph 84) that '*…new built development would still be visible from Charlton Manor and prominent in views available from its important west-facing windows. Distant views would be partly obstructed and, furthermore, the Ice House would be obscured by the intervening dwellings on plots 31-34. The appreciation of the Manor in views from within its setting to the west would be compromised, including for residents and members of the public living in or visiting the proposed dwellings*', and (paragraph 85) that '*As in the case of Ashley Manor, I consider that these effects on the visual relationship between the Grade II Charlton Manor and the appeal site would have a very significant adverse impact also upon the setting of this listed building*'.

2.17 Taking the effect of the appeal proposals on the two designated heritage assets together, the Inspector went on to conclude (paragraph 87) that '*The harm to the settings of both these designated heritage assets, whilst less than substantial in terms of Framework paragraph 176, is nonetheless also significant. It requires consideration against the significance of the assets themselves as well as that of the level of any public benefit resulting from the development, in the final planning balance, addressed below*'.

2.18 The new appeal proposals are of course reduced in extent from the scheme dismissed in 2019 and the appellants will no doubt therefore seek to argue that their new scheme addresses all the heritage concerns expressed by the 2019 Inspector.

2.19 Certainly, this is the line adopted by Grover Lewis in Section 4.0 of their Heritage Impact Assessment, and following their lead, by the Council's Conservation Officer in his memorandum of 7 July 2020, but it is misleading in the extreme.

2.20 Paragraph 4.2 of the Grover Lewis report states that '*The scheme seeks to address the heritage issues raised by the Council's Conservation Officer and the Inspector at the Public Inquiry in September 2019*' but, given that none of the Inspector's specific concerns are addressed by them or anyone else on the appellants' team, it is simply not possible to understand how this has been done.

2.21 Indeed, rather than actually addressing the Inspector's clearly articulated concerns, or for that matters those expressed by the Council's Conservation Officer in his proof of evidence and at the 2019 inquiry, Grover Lewis take the view that because the housing numbers have been reduced, an 'open' area of land is left in the south-east corner of the site and because extensive tree screening is proposed, the impact on the significance of the settings of Ashley Manor, Charlton Manor and the icehouse[1] is somehow '*minimal*' and '*would be at the low end of less than substantial harm in terms of the NPPF*' (see paragraphs 4.7, 4.9 & 4.11 of their report).

2.22 This is simply not good enough. While it is true that the new scheme is slightly less damaging to the significance of the settings of Ashley Manor, Charlton Manor and the curtilage listed icehouse than that dismissed by the 2019 Inspector given that the assets are not completely hemmed in by development around them as they were previously, this does not make the new scheme acceptable.

2.23 The retention of an area of open land in the south-east corner of the site is an improvement on what was offered before, but as the whole of this site (which has never been developed) is currently open, it is only a very small one.

2.24 Furthermore, the proposed provision of extensive tree screening, made so much of by Grover Lewis for its supposedly beneficial function in forming a '*substantial visual buffer between the listed buildings and the developed parts of the site*', misses the point completely.

2.25 As referred to earlier in this report, the 2019 Inspector clearly regarded the existing (and historic) openness of the site as forming a major element of the significance of

[1] At the time of the 2019 appeal the Council made it clear that it considers the icehouse to be curtilage listed to Ashley Manor. Critically, the 2019 Inspector did not take issue with this view.

the settings of the listed buildings and therefore concluded that the impact of the scheme on that openness would be highly adverse.

2.26 The 2019 Inspector was not persuaded that the proposed tree planting on the eastern and southern boundaries of the site would be an appropriate means of preventing or even mitigating harm and in this regard, I would draw the new Inspector's attention to paragraph 40 of Historic England's 'The Setting of Heritage Assets- Historic Environment Good Practice Advice in Planning Note 3, (2nd edn. December 2017).

2.27 This states that: '*As screening can only mitigate negative impacts, rather than removing impacts or providing enhancement, it ought never to be regarded as a substitute for well-designed developments within the setting of heritage assets. Screening may have as intrusive an effect on the setting as the development it seeks to mitigate, so where it is necessary, it too merits careful design*'.

2.28 Certainly, I can see no reason why the proposed dense belt of new tree planting across the centre of the appeal site should be regarded as compatible with the open views that Charlton Manor currently enjoys across the site towards the Black Mountains, particularly as these views were clearly historically intended.

2.29 Likewise, in their assessment of the impact of the new scheme on Ashley Manor in their letter of 13 May 2020 Historic England note that '*The revised application has removed the new planting, shown along the northern side of this boundary* (i.e. the boundary between the site and Ashley Manor) *on the dismissed scheme. However, a significant tree belt is proposed within a few metres of the boundary which would effectively divorce the visual connection between the carriageway approach to the west elevation of Ashley Manor and its open, green setting beyond. This impact may be demonstrated by some additional analysis of the view presented in Plate 7 (in addition to others) in the Heritage Impact Assessment. We remain very concerned over the visual severance of the open land to the north of Asley Manor*'.

2.30 This assessment of the harm the new scheme causes to the setting of Ashley Manor and its significance is one with which I concur completely.

2.31 In short, it is my considered professional opinion that the new scheme causes considerable and irreversible harm to the significance of the settings of Ashley Manor, Charlton Manor and the icehouse.

2.32 I do not claim that this harm is 'substantial' (the NPPG accompanying the NPPF states that ' *In general terms, substantial harm is a high test, so it may not arise in many cases*' – paragraph, 018 Reference ID: 18a-018-20190723), but for all the reasons set out above (and in the comments of Historic England regarding Ashley Manor) I consider it falls towards the upper end of the scale of 'less than substantial harm', as that term is used in paragraph 196 of the NPPF.

2.33 The appeal proposals thus also fail to meet statutory test set by Section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990 and run contrary to adopted policy SD8 of the Council's Joint Core Strategy (2017).

2.34 I therefore ask the Inspector to take this assessment of harm into account when determining the 'planning balance' as she is required to do by paragraph 11d(ii) of the NPPF and to dismiss the appeal accordingly.

3.0 CONCLUSION

3.1 For all the reasons set out in the body of this report, I am firmly of the view that the appeal proposals would cause considerable and irreversible of harm to the settings of the Grade II* listed Ashley Manor, the Grade II listed Charlton Manor and the curtilage listed icehouse.

3.2 I place the degree of harm caused to these designated heritage assets towards the upper end of the scale of 'less than substantial harm', as that term is used in paragraph 196 of the NPPF.

3.3 The appeal proposals therefore also fail to meet statutory test set by Section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990 and run contrary to adopted policy SD8 of the Council's Joint Core Strategy (2017).

3.4 I therefore ask the Inspector to take this assessment of harm into account when determining the 'planning balance' as she is required to do by paragraph 11d(ii) of the NPPF and to dismiss the appeal accordingly.

APPENDIX ONE

QUALIFICATIONS AND EXPERIENCE

NICHOLAS DAVID BARTHOLOMEW DOGGETT, B.A., Ph.D., Cert. Archaeol., FSA, MCIfA, IHBC, Managing Director of Asset Heritage Consulting:

After reading archaeology and history at the University of Southampton and completing a postgraduate qualification at the University of Oxford I worked for several years as an archaeologist, both in the United Kingdom and abroad. From 1984 to 1988 I was employed on the English Heritage Resurvey of listed buildings in Shropshire, Oxfordshire and Cornwall. From 1988 to 1989 I was a member of the Conservation Team at Bedfordshire County Council before joining South Oxfordshire District Council, where I was head of Conservation from 1991 to 2002, before leaving for CgMs in October 2002, of which I was a Director from 2004.

I left CgMs in November 2010 to establish Asset Heritage Consulting, a specialist heritage consultancy based in Oxford but working across the country.

My doctoral research on 16th-century English architecture was completed in 1997 and has subsequently been published. I am a member of the Institute of Field Archaeologists and the Institute of Historic Building Conservation. I was elected a Fellow of the Society of Antiquaries of London in October 2016.

I am the author of two books and several articles and papers on archaeology, building conservation and architectural history, including contributions to the *Oxford Dictionary of National Biography*, and have given lectures and taught on summer schools on these subjects for Oxford University Department of Continuing Education and many other organizations. I was formerly committee secretary of the Buildings Special Interest Group of the Chartered Institute for Archaeologists and have served for two periods as a committee member of the Oxfordshire Architectural & Historical Society.

In the private sector my clients have included Bournville Village Trust, various Oxford colleges, several Local Planning Authorities, the Metropolitan Police, the Home Office and numerous major house builders. I have also acted as a consultant for Historic England and Cadw on applications for listing, re-grading, de-listing and Certificates of Immunity. I have given evidence relating to the historic built environment at numerous public inquiries and hearings and in court, both for appellants, third parties and local planning authorities.

Heritage Assets

Policy and Law

67. Policy CP3 of the CBLP and SD8 and SD10 of the JCS together provide that development should protect, conserve, sustain and enhance designated heritage assets and their settings and avoid harm to views into and out of areas of acknowledged importance, including with respect to listed buildings.

68. Section 66 of the Planning (Listed Buildings and Conservation Areas) Act 1990 (PLBCA) contains a statutory duty to have special regard to the desirability of preserving the setting of listed buildings.

69. Framework paragraph 193 gives great weight to the conservation of designated heritage assets and paragraphs 195-6 consider harm to heritage assets in terms of whether it would be substantial or less than substantial. Paragraph 196 provides that, where development would lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal. The significance of a heritage asset is defined to include its archaeological, architectural, artistic or historic interest, derived not only from its presence but its setting, in which it is experienced. National Planning Practice Guidance (PPG) refers to the extent and importance of the setting to the visual relationship between the asset and proposed development, including that views of or from an asset will play an important part. The PPG also notes that

the contribution a setting makes to the significance of an asset is not dependent upon public access.

70. It is now trite law[3] that this less than substantial harm must be accorded considerable weight in the overall planning balance. However, the judgment in the case of *Shimbles*[4], with reference also to the earlier *Palmer*[5] case, makes clear that, whilst there is no allowance for any sub-categories of harm within the Framework definition, planning judgement must be exercised. That is with regard to the level of the less than substantial harm, the great weight accorded to the conservation of the asset and the extent of the public benefits.

Contribution of the Site and the Ice House to the Settings of Listed Buildings

71. The appeal site was historically and remains in the same ownership as Ashley Manor. Although the land evidently was never part of the managed parkland of the Manor, it had a functional relationship with the Manor as farmland, and as the location of its Ice House, which survives as an historic feature.

72. It is disputed whether there was ever a substantial tree belt along the southern appeal site boundary, visually separating the rural appeal site from the formal grounds of the Manor in views from its front, the approaches over the carriage drive from the south or from further afield. That remains a moot point; but whether or not there has, from time to time, existed such a visual barrier, the historical association is beyond dispute.

73. The present circumstances are that the Manor and the site are intervisible through the current boundary vegetation and direct views are available from at least one north-facing window onto the currently mainly open, eastern part of the site, including the tree-covered mound of the Ice House. I observed this for myself, unlike the Inspector dealing merely with the draft allocation Policy HD4. Moreover, the site, rising to the north, provides a green backdrop to the Manor in distant views.

74. At the more recently constructed Charlton Manor, against the eastern boundary of site, there has been historic variation in the degree to which this boundary has been vegetated and screened. The main entrance to the house is on its south-facing side and its road entrance is to the east. However, its western elevation, directly facing the appeal site contains its ground floor kitchen as well as significant habitable rooms on the first and second floor.

75. The windows of the upper rooms especially afford open views across the appeal site, past the Ice House mound and as far as the mountains of South Wales on the far side of the Severn Estuary. Again, unlike the Inspector examining the draft Cheltenham Plan, I was able to experience these views personally.

76. I recognise an historic and visual association between the appeal site and Ashley Manor and a strong visual interrelationship between the site and Charlton Manor. In terms of the relevant guidance to which I refer above, I consider that the appeal site, with the Ice House it encompasses, contributes

[3] *Barnwell C1/2013/0843; Forge Field [2014] EWHC 1895 (Admin); Forest of Dean [2016] EWHC 421 (Admin); Jones and Mordue []2015] EWCA Civ 1243*
[4] *Shimbles v City of Bradford et al [2018] EWHC 195*
[5] *Palmer v Herefordshire Council and Anr [2016]*

importantly to the historic and current visual setting of both these listed buildings, as designated heritage assets.

77. In the proposed scheme, the Ice House itself would not be directly affected by built development and would potentially be promoted with information on its history and significance as an aid to its public appreciation.

Effect on the Setting of Ashley Manor

78. By avoiding built development in the southernmost part of the site, the amended layout mitigates to some extent the effect of the proposed development on the setting of the west-facing, former Ashley Manor House and its surrounding associated buildings and carriage drive. However, the proposed introduction of new landscape planting, screening that boundary, would obstruct the relationship of the Manor to this part of its setting.

79. Moreover, that part of the development comprising plots 27-30, in the south eastern corner of the site, would intervene prominently in views to the north from the Manor House, including from its interior, impeding appreciation of the historic Ice House and the rural backdrop the site currently provides.

80. I recognise that the main front of the Ashley Manor House does not face directly towards the appeal site and that the character of its immediate surroundings has been altered by the addition of modern school buildings, including that closest to the appeal site boundary and north of the Manor itself.

81. Nevertheless, I consider that these effects on the visual relationship between the Grade II* Ashley Manor and the appeal site would have a very significant adverse impact upon the setting of the Listed Building.

82. Having regard to the statutory duty under s66 of the PLBCA, this would be contrary to the protective aims of Policy CP3 of the CBLP and SD8 and SD10 of the JCS and result in less than substantial harm to the designated asset in terms of Framework paragraph 176.

Effect on the Setting of Charlton Manor

83. The amended scheme avoids built development within 30m of the curtilage of Charlton Manor and provides for intervening landscaping to soften the appearance of the new houses in views from the Manor, as advised by the examining Inspector regarding draft allocation HD4.

84. Be that as it may, the presence of the new built development would still be visible from Charlton Manor and prominent in views available from its important west-facing windows. Distant views would be partly obstructed and, furthermore, the Ice House would be obscured by the intervening dwellings on plots 31-34. The appreciation of the Manor in views from within its setting to the west would be compromised, including for residents and members of the public living in or visiting the proposed dwellings.

85. As in the case of Ashley Manor, I consider that these effects on the visual relationship between the Grade II Charlton Manor and the appeal site would have a very significant adverse impact also upon the setting of this Listed Building. Having regard to the statutory duty under s66 of the PLBCA, the effect of the development on the setting of Charlton Manor also would be

contrary to Policy CP3 of the CBLP and SD8 and SD10 of the JCS and result in less than substantial harm to the designated asset in terms of Framework paragraph 176.

Overall Conclusions regarding Heritage Assets

86. The high significance of Ashley Manor is primarily indicated by its Grade II* listing and the recognition in its statutory list entry as one of the finest villas in Cheltenham. Charlton Manor, although more recent and listed Grade II, is also of high significance, being the first house erected on the Battledown Estate, taking advantage of its elevated position and belonging to the Victorian Gothic Revival, of which it remains a complete and well preserved example.

87. Thus, the harm to the settings of both these designated heritage assets, whilst less than substantial in terms of Framework paragraph 176, is nonetheless also significant. It requires consideration against the significance of the assets themselves as well as that of the level of any public benefit resulting from the development, in the final planning balance, addressed below.

88. I give no significant weight to the prospect of public access to and information upon the Ice House, as a mere an incidental to the development.

Policy

89. Policy SD9 of the JCS encourages biodiversity enhancement and Policy NE2 of the CBLP seeks to safeguard protected species. These aims are consistent with Framework paragraph 170, which states that planning decisions should contribute to and enhance the natural environment, including by protecting and enhancing valued sites of biodiversity, minimising impacts on and providing net gains for biodiversity. Paragraph 175 also encourages net gains in biodiversity. Paragraph 175 further provides that, where significant harm to biodiversity resulting from development cannot be avoided, or adequately mitigated or, as a last resort, compensated for, permission should be refused.

Post and Rail Fencing

1.2m Height timber post and rail fencing (nailed 3 rail) 125 x 75mm timber fence posts with 38 x 100mm timber rails Posts to be installed at 1.8m centre spacings.

Timber Field Gate

3.9m Universal gate supplied with rail and brace crossing to increase strength. Closure and locking mechanism to be supplied. Gate width to enable maintenance access.

Timber Kissing Gate

Timber gates 1.5m width

Post and Rail Fencing

Metal Estate Railings to Veteran Tree

Estate railing style Deer Park Fencing 1.8m height with vertical jointing posts set 1.1m apart supplied with matching 1800 double locking gates. Permanent Notices to be installed to the railings to discourage access to veteran tree VT3028. For deterrent planting mix to veteran trees refer to landscape strategy drawing MHP 19216.101

Deer Proof Fencing

New woodland belt area to be protected prior to planting with 1.8m Height Deer proof fencing. 230 x 200 mm Mesh size attached to 2.1m x 75mm Ø posts installed at a maximum of 3m centre spacings. Straining posts to be installed every 50m.

Location of maintenance access gate to new woodland planting through deer proof fence

Notes

1) Do not scale directly from this drawing.

2) This drawing is to be read in conjunction with all other relevant MHP drawings and information supplied by other consultants.

3) Hatch patterns displayed on this drawing are indicative only and do not represent actual paving units or material sizes.

4) All tree planting in proximity to buildings to be checked by engineers to ensure foundation detailing is appropriate.

Rev.	Revisions:	Date:	Drawn:	Checked:
A	Amends to drawing	01-07-20	BD	DAL

Project: Land off Oakhurst Rise

Client: William Morrison (Cheltenham) Ltd.

Title: Methods of Enclosure

Drawing number: 19216.201 Rev: A

Status: FOR INFORMATION

Drawn By:	Checked By:	Date:	Scale @ A2:
DAL	PSH	04-06-20	1:1250

Scale

0 10 20 50 100

Land off Oakhurst Rise

Methods of Enclosure

for landscape maintenance and public access to open space areas

N

CHARTERED LANDSCAPE ARCHITECTS mhp

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FLAC

Client
William Morrison
(Cheltenham) Ltd

Instruction
Oakhurst Rise

Instruction ref.
SC38-1036

Dwg title
Tree Protection Plan

Dwg no.
38-1036.03-F

Rev. F Date
19.05.20

Scale
1:500 @ A0

Key

Quality & value grades:

Category A — High
Category B — Moderate
Category C — Low
Category U — Unretainable

Key:

- Trees for retention
- Tree root protection area - RPA (retention trees only)
- Veteran Tree Buffer
- Indicative retained extent of TG3005
- Area NW of 3015 subject to 25m2 incursion (3.5% of total RPA) by vehicular access
- 50m2 compensatory additional protection NE of 3015 (i.e. double the area of incursion to NW)
- Area for construction of no-dig vehicular access NW of 3015 if required by planning condition
- Type 1 tree protection fencing (see inset sketch 1) in primary alignment to protect RPAs
- Additional run of TPF to be installed if no-dig solution NW of 3015 required by planning condition

Dunsbrow House
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CAUTION: THIS DRAWING IS INTENDED TO BE READ IN COLOUR

0m 10m 20m 30m 40m 50m

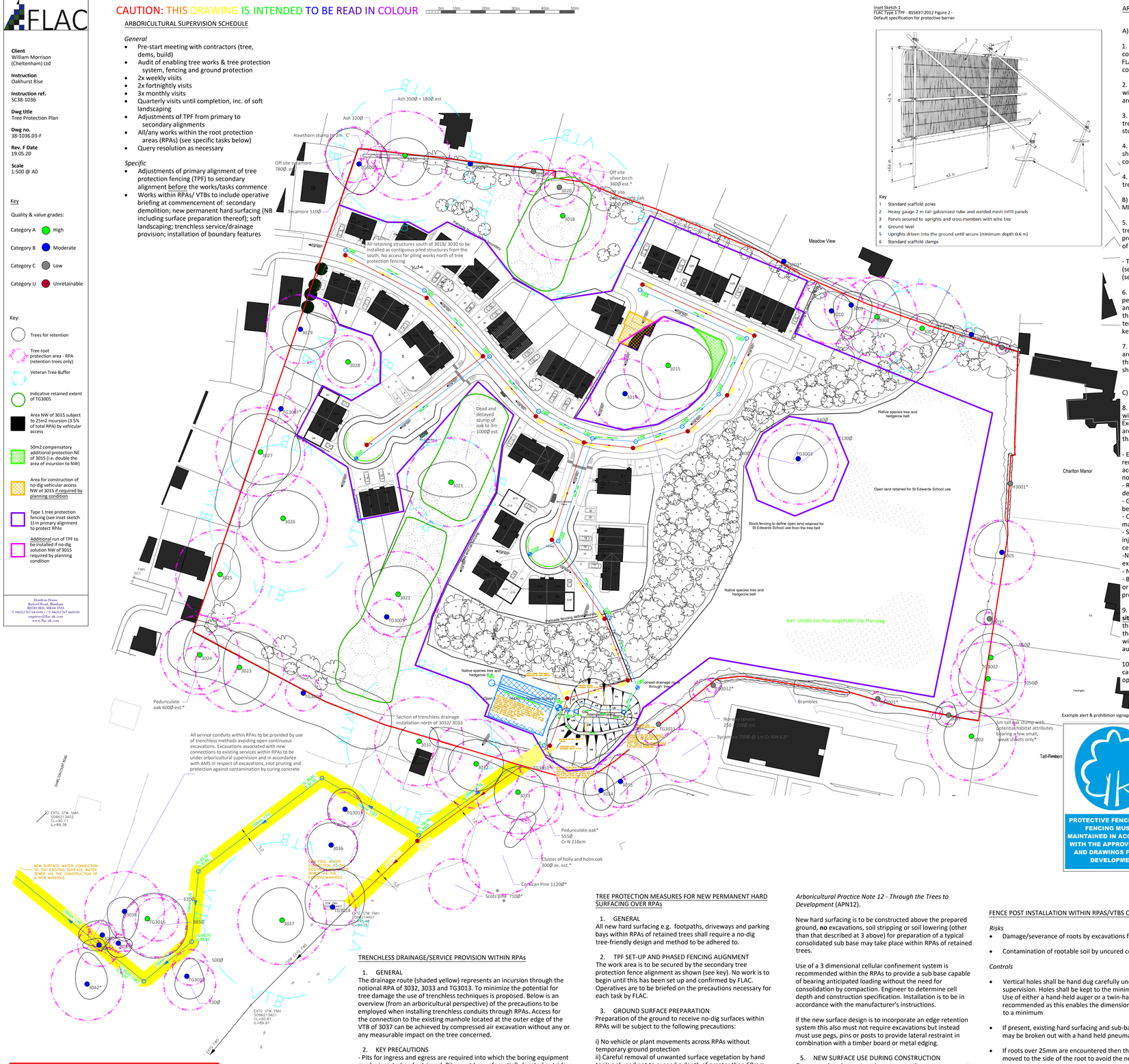
ARBORICULTURAL SUPERVISION SCHEDULE

General

- Pre-start meeting with contractors (tree, dems, build)
- Audit of enabling tree works & tree protection system, fencing and ground protection
- 2x weekly visits
- 2x fortnightly visits
- 3x monthly visits
- Quarterly visits until completion, inc. of soft landscaping
- Adjustments of TPF from primary to secondary alignments
- All/any works within the root protection areas (RPAs) (see specific tasks below)
- Query resolution as necessary

Specific

- Adjustments of primary alignment of tree protection fencing (TPF) to secondary alignment before the works/tasks commence
- Works within RPAs/ VTBs to include operative briefing at commencement of: secondary demolition; new permanent hard surfacing (NB including surface preparation thereof); soft landscaping; trenchless service/drainage provision; installation of boundary features



Inset Sketch 1
FLAC Type 3 TPF - BS5837:2012 Figure 2 - Default specification for protective barrier

Key
1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

ARBORICULTURAL METHOD STATEMENT

A) PRELIMINARY MATTERS

1. Prior to any ground modelling, demolition or construction work on site, the approved tree works (see FLAC dwg. no. 34-1036.02) shall be undertaken by tree contractors (not unskilled personnel).

2. No plant access is permitted for tree work operations within the RPAs or VTBs of retention trees, including areas identified for temporary ground protection

3. All approved tree removals shall be undertaken by tree contractors. Each tree shall be cut down to a low stump

4. Trees for removal within the RPA of retention trees shall have their stumps ground out (also by tree contractors)

4. Stumps from felled trees not in proximity to retention trees can be grubbed out.

B) INSTALLATION OF PHYSICAL TREE PROTECTION MEASURES

5. Following completion of enabling tree works, physical tree protection measures (barriers and ground protection) shall be installed in line with the provisions of BS5837:2012. These measures comprise:

- Tree Protection Fencing (TPF) to BS5837:2012 Figure 2 (see Inset Sketch 1) fitted with all-weather warning signs (see elsewhere on plan)

6. The TPF to be installed on the primary alignment (as per the dwg key) prior to any demolition, ground works and construction operations. It is to be be left in situ throughout the redevelopment process except for temporary repositioning to secondary alignment (see key) under arboricultural supervision by FLAC.

7. If required by planning condition, the vehicular access area NW of 3015 will be installed as a no-dig surface. In this event, an additional run of tree protection fencing shall be provided as shown on this drawing (pink line).

C) PROHIBITIONS & PRECAUTIONS

8. Tree protection fencing and any existing hard surfaces within root protection areas comprise the Construction Exclusion Zone. Within this zone, the following activities are strictly prohibited during primary demolition (other than as described below):

- Excavation / lowering of levels into rootable soil: removal of surface organic matter using hand tools is acceptable; scraping or reduction in depth of topsoil is not
- Removal of existing hard surfaces (= 'secondary demolition': see below)
- Grubbing out of redundant buried structures (see below)
- Operation, transit or storage of plant, and storage of materials, including demolition arisings
- Storage or handling of any chemical substance injurious to trees, including fuels, oils, lubricants and cement washings
-No services/drainage to be formed through RPAs/ VTBs except by trenchless methods
- No level changes within RPAs/ VTBs
- Boundary features must avoid continuous excavations or trenching within RPAs/ VTBs (fences on posts are preferable)

9. The Construction Exclusion Zone shall be established **site-wide** as set out above, and shall remain in place throughout the redevelopment process. No elements of the physical tree protection shall be removed or altered without prior written consent from the local planning authority.

10. Demolition of superstructures within 3m of tree canopies and/ or the construction exclusion zone is an operation with a high potential to damage retention trees ('high-risk operation'), and requires on-site arboricultural supervision by FLAC

11. Within the Construction Exclusion Zone, break-out and replacement of existing hard surfaces and decommissioning of redundant services, including drainage structures, are also high-risk operations and shall be undertaken under site supervision by FLAC

D) METHODS FOR TREE FRIENDLY WORKING

12. Redundant buried structures are preferably disconnected / backfilled and retained in situ; further advice should be sought from FLAC before consideration is given to grubbing them out. Existing hard surfaces within the Construction Exclusion Zone are to be retained and not demolished / removed until completion of primary construction (see Phasing Schedule)

13. The recommendations of BS5837:2012 6.2.4.1 shall be strictly observed throughout the demolition and construction process:

BS5837:2012 6.2.4.1
Planning of site operations should take sufficient account of wide loads, tall loads and plant with booms, jibs and counterweights (including drilling rigs), in order that they can operate without coming into contact with retained trees. Such contact can result in serious damage to the trees and might make their safe retention impossible. Consequently, any transit or traverse of plant in proximity to trees should be conducted under the supervision of a banksman, to ensure that adequate clearance from trees is maintained at all times. Access facilitation pruning should be undertaken where necessary to maintain this clearance

Note In some instances local planning authority consent for pruning might be required

14. No-dig new surfaces shall be constructed in accordance with the principles set out in the Arboricultural Practice Note 12 *Through the trees to development* (APN12) using a 3 dimensional cellular confinement system of appropriate specification to the anticipated loading. The design of the cellular confinement system is to be produced by engineers.

BS5837:2012 7.2 Avoiding physical damage to roots during demolition or construction

7.2.1 To avoid damage to tree roots, existing ground levels should be retained within the RPA. Intrusion into soil (other than for piling) within the RPA is generally not acceptable, and topsoil within it should be retained in situ.However, limited manual excavation within the RPA might be acceptable, subject to justification. Such excavation should be undertaken carefully, using hand-held tools and preferably by compressed air soil displacement.

NOTE Due to the demands that manual excavation places on a development project, and limitations arising from health and safety considerations, it is not realistic to plan for excavation using hand-held tools where there is a need for trench shoring or grading the sides of the excavation to a stable angle of repose.

15. Boundary treatments within RPAs/ VTBs shall preferably comprise timber fences fixed to posts (see risk/control methodology for fence post installation elsewhere on this drawing). Any walls within RPAs/ VTBs will require tree-friendly, non-invasive design avoiding trench footings by, for example, brickwork founded upon pile supported lintels born above the existing ground level, pile hole locations avoiding major tree roots and ground-truthed under arboricultural supervision.

D) EXCAVATIONS WITHIN THE RPAs

16. Excavations within the RPA may proceed only under arboricultural supervision. Personnel must be briefed on the precautions to be taken by the arboricultural consultant at the start of an operation; supervision will be carried out to ensure that the method statement is understood and complied with.

17. No mechanical excavation including lowering of levels shall occur within the RPA.

18. Excavations of the top 600mm associated with any construction activities within the RPA shall be carried out carefully and by hand tools only e.g. spades, shovels, trowels etc, this may include a hand held pneumatic breaker where sub-surface structures are encountered and their removal is essential. Air excavation tools may be employed where operatives have an understanding of the use of these tools in proximity to roots and soil conditions allow. Care must be taken to avoid damage to the bark of parts of roots that will be retained.

E) ROOT TREATMENT

19. Root pruning operations may proceed only under arboricultural supervision.

20. Typically, where roots are encountered they are first assessed primarily for size; roots over 25mm in diameter should be retained (or referred for further arboricultural advice) and those below 25mm in diameter should be pruned at 90 degrees to the direction of the root.

21. Proprietary cutting tools only shall be used to prune roots i.e. secateurs and sharp pruning saws.

22. Should any roots over 25mm be discovered they should only be severed following consultation with the arboricultural consultant with regard to the tree's health and stability.

23. Where roots are to be left exposed for any period of time they shall be protected from the drying effect of wind and sunlight, e.g. wrapped in clean dry Hessian to prevent desiccation.

24. Prior to backfilling retained roots should be unwrapped and surrounded by sharp sand (not builder's sand because of the high salt content which is toxic to tree roots) or another loose granular material before soil is replaced.

25. Any imported topsoil for backfilling must be of good quality and free of contaminants and foreign bodies, it must be well graded and friable to promote good growing conditions and perform as a suitable rooting medium. The topsoil to be used must satisfy the requirements of a multipurpose topsoil as is described within BS3882:2007.

26. All materials, including any new topsoil to replace the hard surface must be close to hand prior to commencement of the works. These works will be carried out to the recommendations of BS5837: 2012 7.2 (see below). Once the works are complete tree protection fence is to be erected around the new open ground.

F) ARBORICULTURAL SUPERVISION & REPORTING

28. All high risk operations (i.e. intra-RPA /VTB) require arboricultural supervision. Additionally ongoing inspection of the tree protection measures shall be provided whilst works are in progress. A schedule of supervision is provided elsewhere on this drawing.

A WRITTEN & PHOTOGRAPHIC REPORT WILL BE PROVIDED WITHIN 5 WORKING DAYS OF EACH MONITORING VISIT

No. Of	
	1
16	
	2
25	
	3
No. Of	

Example alert & prohibition signage for attaching to tree protection fencing

WARNING: RISK OF CRIMINAL PROSECUTION

Many trees on this site are under legal protection by Tree Preservation Order:
Any failure in compliance with the Arboricultural Method Statement that damages the trees could render the developer & contractor liable to criminal prosecution under Town & Country Planning Act 1990

TRENCHLESS DRAINAGE/SERVICE PROVISION WITHIN RPAs

1. GENERAL
The drainage route (shaded yellow) represents an incursion through the notional RPA of 3032, 3033 and TG3013. To minimize the potential for tree damage the use of trenchless techniques is proposed. Below is an overview (from an arboricultural perspective) of the precautions to be employed when installing trenchless conduits through RPAs. Access for the connection to the existing manhole located at the outer edge of the VTB of 3037 can be achieved by compressed air excavation without any or any measurable impact on the tree concerned.

2. KEY PRECAUTIONS
- Pits for ingress and egress are required into which the boring equipment can be inserted and retrieved. Pits must be preferentially located outside of the RPAs
- If it is not possible to place a pit outside of the RPA then it must be located at as close to the periphery of the RPAs as is possible
- Any excavations for pits within the RPAs are to be carried out by hand (please refer to the primary AMS at section D for excavations within the RPA and section E for root treatment within the RPA)
- Pits within the RPA must be kept to the minimum dimensions practicable and any excavations must be carried out under arboricultural supervision
- The thrust boring/pipe jacking must take place at a depth of no less than 1000mm below the existing ground level: this is very important to avoid the principal rooting horizon
- Only water or non phyto-toxic materials are to be used for lubrication to avoid contamination of the rooting area

TREE PROTECTION MEASURES FOR NEW PERMANENT HARD SURFACING OVER RPAs

1. GENERAL
All new hard surfacing e.g. footpaths, driveways and parking bays within RPAs of retained trees shall require a no-dig tree-friendly design and method to be adhered to.

2. TPF SET-UP AND PHASED FENCING ALIGNMENT
The work area is to be secured by the secondary tree protection fence alignment as shown (see key). No work is to begin until this has been set up and confirmed by FLAC. Operatives are to be briefed on the precautions necessary for each task by FLAC.

3. GROUND SURFACE PREPARATION
Preparation of the ground to receive no-dig surfaces within RPAs will be subject to the following precautions:

i) No vehicle or plant movements across RPAs without temporary ground protection
ii) Careful removal of unwanted surface vegetation by hand tools only and not to exceed a depth of greater than 50mm
iii) A blinding of no greater than 100mm of a clean sandy loam topsoil is to be applied to provide flowing contours and neutralize any localized dips and hollows, smoothing out the ground ready for construction
iv) This operation places trees at the greatest risk during no-dig surface construction and accordingly it is advised that FLAC oversees surface preparation as a minimum

4. DESIGN AND CONSTRUCTION PRINCIPLES
New hard surfacing is to be constructed to an engineer's specification with regard to the anticipated loading. The design must be in accordance with the principles set out in *Arboricultural Practice Note 12 - Through the Trees to Development* (APN12).

New hard surfacing is to be constructed above the prepared ground, **no** excavations, soil stripping or soil lowering (other than that described at 3 above) for preparation of a typical consolidated sub base may take place within RPAs of retained trees.

Use of a 3 dimensional cellular confinement system is recommended within the RPAs to provide a sub base capable of bearing anticipated loading without the need for consolidation by compaction. Engineer to determine cell depth and construction specification. Installation is to be in accordance with the manufacturer's instructions.

If the new surface design is to incorporate an edge retention system this also must not require excavations but instead must use pegs, pins or posts to provide lateral restraint in combination with a timber board or metal edging.

5. NEW SURFACE USE DURING CONSTRUCTION
Once completed , construction access to the new permanent hard surfacing can be either excluded by returning the fencing to the primary alignment or used for temporary access with the secondary alignment of fencing in place, a temporary wearing course may be beneficial.

No vehicle or plant movements are to take place upon the new permanent hard surfacing unless they have been designed and constructed to bear the loading adequately.

FENCE POST INSTALLATION WITHIN RPAS/VTBS OF RETAINED TREES

Risks

- Damage/severance of roots by excavations for posts
- Contamination of rootable soil by uncured concrete leachate

Controls

- Vertical holes shall be hand dug carefully under arboricultural supervision. Holes shall be kept to the minimum dimensions possible. Use of either a hand-held auger or a twin-handled post-hole spade is recommended as this enables the dimensions of the holes to be kept to a minimum
- If present, existing hard surfacing and sub-base or other obstruction may be broken out with a hand held pneumatic breaker
- If roots over 25mm are encountered then the post hole shall be moved to the side of the root to avoid the need for root severance
- Roots below 25mm may be cut cleanly against the side of the post hole using sharp secateurs or pruning saw. Roots above 25mm may only be severed following assessment of impact by the arboriculturist.
- Where concrete is to be used to fix the posts in place then the upper metre of holes must first be lined with a heavy-duty, non-permeable membrane, such as a 1000 micron polythene, to protect tree roots from the toxic effects of uncured concrete leachate
- There must be no storage or mixing of concrete within the RPAs of retained trees.

OUTLINE ARBORICULTURAL MANAGEMENT PLAN

General
The tree stock site wide shall require management in the interests of both trees and users of the surrounding land both on and off site. The overarching objectives are as follows:

a. Discharge duty of care obligations owed to residents, visitors and neighbours imposed by both common law and Owners and Occupiers Liability Act
b. Preserve and enhance arboricultural attributes within the constraints of best practice and the controlling statutory protection

The second bullet at (b) captures all trees within the site but this necessarily includes a subset of veteran trees that shall require specific considerations (see sub-heading *Veteran tree management* below)

Tree risk and general management
It is acknowledged at (a) above that reasonable measures must be taken to minimize the risk of tree failures resulting in harm or damage. This shall be achieved by cyclical tree inspections to provide:

c. A risk-assessed and prioritized schedule of tree works recommendations as deemed necessary to achieve an acceptable level of risk
d. A schedule of ancillary works if considered advisable in the interests of sound arboricultural management

Best practice and legislative control
It is acknowledged at (b) above that statutory tree protection is in force and accordingly tree management requires adherence to legislative controls affecting tree works ordinarily by application to Cheltenham Borough Council for consent, this shall be achieved by:

e. Preparation of documentation appropriate for submission to CBC's Trees Section in pursuit of consent to undertake works to trees under statutory tree protection, as necessary

Veteran tree management
The cohort of veteran trees by virtue of their age,size and condition confer attributes of exceptional biodiversity, cultural or heritage value. Maintaining these attributes is a primary objective of the management plan, sitting alongside the general objectives listed above.

Heads of terms for management of veteran trees
f. Condition and maintenance of veteran tree crown radius knee-rail
g. Condition and maintenance of veteran tree deterrent planting
h. Maintenance of land within veteran tree buffers
i. Arboricultural risk-facing inspection and preparation of works schedule for application to CBC
j. Assessment of veteran attributes (i.e. structural and conditional features of ecological potential - please refer to RAVEN) including works advisable in the interests of optimizing habitat
k. Assessment of works advisable in the interests of preservation, for example to prevent major mechanical failures and preserving the oldest parts of veteran trees

Inspection cycles, qualifications and review
l. The first inspection shall take place immediately prior to first occupancy
m. The period between inspections as described above shall be every two years
n. Inspections shall be undertaken by suitably qualified, trained and experienced arboriculturists (i.e. ideally qualified to level 6) with reference to suitable ecologists as appropriate. At each inspection a detailed works specification shall be prepared as required
o. Tree work shall be undertaken by qualified and experienced arboricultural contractors and they shall be briefed by the project arboriculturist prior to commencing works
p. Tree work shall be undertaken in accordance with BS3998:2010 Tree work - recommendations. Care shall be taken to ensure that nesting birds and bats are not disturbed, and that bat roosts are not damaged during tree work. Pre-work surveys for bats shall be undertaken in accordance with BS8596:2015 Surveying for bats in trees and woodland - Guide
q. Cycles of inspection provide an opportunity to review the management plan particularly in light of tree condition and emerging information relating to tree management.

CKF Proof of Evidence on St Edward's School Meadow
(historically known as "The Leasowe")
and now referenced as "land off Oakhurst Rise".

Part 2: Cheltenham Local Plan Adopted Policy HD4

Those issues not addressed elsewhere

Access
Harm to trees

20 February 2021

Part 2: Failure to meet the HD4 criteria not covered elsewhere (access, mature trees and hedgerows)

2.1 The local plan inspector's final examination report[1] noted "an allocation for some 25 dwellings would considerably reduce the potential for the harmful impacts which were identified in the appeal scheme. A more modest development would enable the interrelationships between the listed buildings, the site and the ice house to be better addressed and to avoid **any** harmful impact on the setting of the listed buildings."

2.2 This application is for 43 dwellings, and it is common ground that there is still harmful impact to the setting of the listed buildings.

POLICY HD4: LAND OFF OAKHURST RISE	
Site description	This site is a greenfield site within the existing urban area. However, the site is subject to a number of constraints and therefore the allocation of dwellings on the site has been adjusted to accommodate these.
Site area	4ha
Constraints	☐ Steep gradients across the site ☐ Mature trees and hedges ☐ Adjacent listed buildings ☐ Biodiversity ☐ Heritage assets ☐ Ice House
Site specific requirements	☐ A minimum of 25 dwellings, subject to masterplanning (in accordance with Policy SD4 of the JCS) which demonstrates that the development can be achieved whilst accommodating: ☐ Safe, easy and convenient pedestrian and cycle links within the site and to key centres ☐ A layout and form that respects the existing urban characteristics of the vicinity ☐ A layout and form of development that respects the character, significance and setting of heritage assets that may be affected by the development ☐ Protection to key biodiversity assets and mature trees ☐ New housing should be located away from the setting of the west elevation of Ashley Manor. There should be no development south of a straight line westwards from the rear of the northernmost school building. In addition, to provide an undeveloped buffer between the rear garden boundary of Charlton Manor and the new development a landscaping buffer should be provided for 30 metres west of the rear boundary with Charlton Manor. ☐ Long term protection of mature trees and hedges ☐ Any development on the site should secure improvements to the Ice House

Access for cyclists, pedestrians and those at the edges of the "8-80" policy aspirations[2]

2.3 HD4 requires provision of safe, easy and convenient cycle and pedestrian links, within the site and to key centres

2.4 The application details no provision for cyclists. Inspector Sims described the access as 'tortuous'. Despite discussion of the situation of a seriously disabled Oakhurst Rise resident at the last appeal[3], no provision has been made to accommodate existing, let

[1] Appendix 0.1
[2] Department for Transport, LTN 1/20 of July 2020
[3] Appendix 0.2 Paragraph 107

alone future, access for those less physically able, nor for any separation between pedestrians, cyclists and HGV traffic.

2.5 The entire site will be shut off to vehicular access in freezing conditions, as Oakhurst Rise is routinely unpassable. The road is used for professional mountain bike training; its gradient is (albeit for a short distance) steeper than the hardest climb in the Tour De France, and at the upper limit of top of the range e-bike performance.

2.6 Residents with highways design experience will challenge the application against LTN 1/20 in verbal evidence, as the most recent policy was only shared with CKF this week.

Trees and Hedges

2.7 Separate from the planning history given for development applications, a number of the trees on this site have been the subject of planning inspectorate decisions. The trees have (so far) always won. Inspector Burden specifically reinforced the wording of HD4 with respect to mature tree protection.

2.8 The evidence of Ian Monger, senior arboricultural consultant at Barton Hyett Associates[4] is included in full at appendix 2.1. In summary, he states that "the development proposal still has the potential to cause harm to significant trees. In particular, hydrological changes due to obstruction of soil water flows by new structures may have an adverse impact. Despite protective measures that have been recommended disturbance to the veteran tree *habitats* is likely to occur. There remains a significant risk of permanent damage to high value trees and of deterioration of the irreplaceable habitats of veteran trees."

2.9 He specifically challenges the protection of ancient and veteran tree habitats.

3.10. The concept of a 'relic' veteran tree is not recognised in the Standing Advice, nor in published veteran tree literature or the objections of the ATF and WT. Nor does it appear within the RAVEN methodology itself.

3.11. The 'relic' veteran tree concept focuses on the *'much smaller biological space'* that a veteran tree with a reduced crown and root system may take. But the Standing Advice VTB seeks not only to mitigate damage to a tree's roots (which might still exist beyond a

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calculated root protection area (RPA) or VTB), but also to mitigate direct impacts to soil, ground flora and fungi, the water table and drainage, and from pollution and disturbance to wildlife.

3.12. The application of a VTB to a veteran tree in accordance with the Standing Advice is not a means to *avoid* impacts, but is a means to *reduce* (mitigate) impacts. In this way, a VTB is necessarily precautionary to reduce impacts to an irreplaceable habitat.

[4] Appendix 2.1 Barton Hyett Associates Arboricultural Review, 10 September 2020

3.13. It should be noted that the RAVEN methodology recognises extensive decay, extensive hollowing, crown senescence and retrenchment as additional primary features of veteran trees, but the 'relic' concept then downgrades the degree of mitigation provided by a VTB based on these these very factors. This is akin to 'begging the question'.

3.14. Whereas the Standing Advice would afford trees 3007 and 3021 VTB diameters of 21.8m and 22.8m respectively, they are only provided with VTBs of 15m diameter in FLAC's submission.

3.15. It is of note that FLAC's definition of a VTB for a 'relic' tree on the tree survey and retention plan submitted for the 2018 planning application was *'...a maximum and fixed VTB... of 15m radius'.* FLAC did not adhere to its own definition in that submission. As before, the FLAC submission for the current proposal calculates the VTB of tree 3028 - on the basis of a smaller north-west fragment of the original stem which is alive measured as 740mm diameter - as 15 times the remaining stem diameter, giving a VTB radius of 11m. Any definition of a VTB for a 'relic' tree (whether at a fixed 15m radius or not) has been removed from the current submission.

3.16. I am unconvinced by the concept of 'relic' trees, of FLAC's application of VTBs to them and of how this relates to the Standing Advice on veteran trees.

3.17. While the application of the concept of 'relic' veteran trees has no consequences for tree 3007 in the submitted design, it has significant consequences for potential impacts to 3021. The Standing Advice VTB of 15 times the stem diameter would bring the buildings and gardens of Plots 10, 11 and 13 and the road leading to Plot 10 within the VTB.

And goes on to reference the potential impact on other high value trees, of which Oaks 3014 and 3015 are but two examples:

4.6. Oak tree 3014 has been categorised as a B3 quality tree and has an RPA of 11.76m radius.

However, given that the tree as 40+ years remaining safe useful life expectancy and has some veteran characteristics with the potential to become a veteran the tree appears to be a 'high' value tree within the definition of policy GI3 Trees and Development of the Cheltenham Plan. Oak tree 3015 has been categorised as an A1 quality tree and has an RPA capped at 15m radius.

4.7. The proposal is to isolate the two trees together within an island of open space surrounded by new road to the north, east and south and Plots 29 and 32 to the west. New structural street tree planting will be provided along the road edges.

4.8. A small portion of the periphery of the RPA of 3014 is within the boundary of Plot 30 and meets the foundations of the dwelling. Although RPAs are the standard layout tool when considering trees and development, it is worth underlining that an RPA is the *minimum* area around a tree deemed to contain sufficient roots and rooting volume to maintain a tree's viability. Recent research in to the extent of tree roots of old trees has shown that roots extend well beyond the 'drip line' of the canopy, and beyond the capped 15 metre radial RPA as recommended in BS5837. Using a ground penetrating radar, the roots of a mature oak tree at Burghley Estate were found at 24 metres from the stem[1]. It is therefore anticipated that the proximity of Plot 30 would result in some some root severance/loss, and soil disturbance within this area is inevitable.

2.10 The method statement for the badger sett closure (Proof of Evidence Part 5: Badgers) makes no reference to the fact that the setts to be destroyed are in the root system of a veteran tree (T3028) and of high quality mature oak trees (T3014 and T3015), both claimed as veteran by the Woodland Trust and indisputably notable trees (Appeal Decision Notice, appendix 0.2, paragraph 48 – 52).

2.11 Destroying badger setts and filling in the tunnels by JCB is demonstrably risky to the mature and veteran trees co-located there, and will result in an irreversible change to the overall habitat in each location. It is arguable that this point should have been made elsewhere as a breach of the NPPF on veteran trees but because most consultees were not privy to the confidential badger annex (including Barton Hyett), it has been missed. In any regard, CKF argue that it is demonstrably counter to the policy provisions of HD4 on protection of mature trees and biodiversity assets, as in our statement of case.

2.12 It is common ground that 23% of the central important hedgerow H1 is lost to this proposal.

Appendices:

0.1: Inspector's report paragraphs 43-66
0.2: Appeal decision paragraph 107
2.1: Barton Hyett report f.2622 dated 10 September 2020
2.2: Department for Transport, LTN 1/20 of July 2020

Barton Hyett Associates
Arboricultural Consultants

LAND ADJACENT TO OAKHURST RISE, CHELTENHAM

ARBORICULTURAL REVIEW

Prepared for: Charlton Kings Friends

Prepared by: Ian Monger

10 September 2020

Project reference: F.2622

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CONTENTS:

Instructions

Received from: Mrs Sally Walker, resident of Charlton Manor, Ashley Road, Cheltenham, on behalf of the community group 'Charlton Kings Friends' (CKF).

Terms of reference: to review the submitted outline planning application regarding land adjacent to Oakhurst Rise, Cheltenham (ref: 20/00683/OUT) and provide a statement commenting on the arboricultural elements of the development proposal. This follows a similar instruction for my colleague Paul Barton to comment on a previous application (ref: 18/00710/OUT), which was refused in March 2019.

Scope of work

The scope of my instructions are to:

- visit the application site to familiarise myself with the trees and site context
- review the arboricultural information submitted with the application
- prepare a report giving an independent view of the impacts of the development proposal on the trees at the site.

Documents used to prepare this report

In preparing this report, the following documents (amongst the full suite of submitted documents) have been obtained from the Cheltenham Borough Council website:

- Proposed site plan - drawing no: PL005 Rev B (April 2020)
- Arboricultural report - ref: SC38-1036 (April 2020)
- Landscape Strategy plan - drawing no: 19216.101 Rev F (April 2020)
- The Woodlands Trust consultee comment (June 2020)
- Ancient Tree Forum consultee comment (June 2020)

A copy of Tree Preservation Order (TPO) (No.1, 1981) was also obtained from the Cheltenham Borough Council tree officer.

Summary

The revised planning application for reduced number of dwellings proposed has clearly improved the development proposal in terms of the retention of veteran and protected trees, but the development proposal still has the potential to cause harm to significant trees. In

particular, hydrological changes due to obstruction of soil water flows by new structures may have an adverse impact. Despite protective measures that have been recommended, disturbance to the veteran tree habitats (including soil, ground flora and fungi) during construction and in the site's end-use is likely to occur. There remains a significant risk of permanent damage to high value trees, and of deterioration of the irreplaceable habitats of veteran trees.

1. Introduction

1.1. I am Ian Monger, senior arboricultural consultant at Barton Hyett Associates and a professional arboriculturist. I have 15 years experience working in the arboricultural sector including senior tree officer for a unitary local authority and as an independent consultant (which has included freelance tree officer work for a unitary authority). I am a professional member of the Arboricultural Association. I hold a BSc (Hons) in Environmental Science and Level 3 Technicians Certificate in Arboriculture. I am currently appointed by The Planning Inspectorate as a Non-Salaried Inspector for the determination of TPO appeals.

1.2. I have been asked to provide an independent review of the documents submitted to Cheltenham Borough Council (CBC) in relation to an outline planning application for development of an existing field to the north of St Edward's Preparatory School, to the east of Oakhurst Rise, Cheltenham. The outline planning application is for the construction of 43 dwellings consisting of a mixture of house types and flats. The application seeks approval for the proposal's access, layout and scale but appearance and landscaping are to be a reserved matter.

1.3. A previous outline planning application for 69 dwellings was refused in March 2019. Reasons for CBC's refusal can be summarised as:

- Failure to address constraints and requirements of the land allocation policy within the emerging Cheltenham Plan
- The loss of trees within the site including a significant TPO'd tree and likely deterioration of retained veteran trees
- Impact on the setting of nearby listed buildings

1.4. CBC's additional reasons for refusal on ecology and visual impact grounds were later withdrawn.

1.5. An Appeal against the refusal was dismissed in September 2019. The balancing of planning considerations which led the Inspector to dismiss the Appeal stand on their own. In any case, this new planning application will be considered by CBC on the basis of the details of new proposal, current national and local planning policy and consultation responses. I make some reference to Forbes-Laird Arboricultural Consultancy's (FLAC)

Proof of Evidence to the Appeal where explanation of its tree assessment methodology is missing from the current submission.

1.6. An arboricultural report prepared by FLAC has been submitted with the new planning application. This includes a tree survey, proposed tree retention and removal plan and a tree protection plan.

1.7. This review seeks to provide an independent arboricultural viewpoint on the merits and potential impacts of the proposed development on the site's trees. It is not intended to investigate or question the professionalism or competence of the author of the submitted arboricultural reports. I acknowledge that many aspects of arboricultural consultancy are inherently subjective and that there are numerous interpretations of published guidance, recommendations and standards that can affect the conclusions made on a site.

2. Method of review

2.1. In order to review the planning application and its impact on trees, I began by obtaining the development proposal plans and arboricultural report.

2.2. Following a desktop review of these documents, I made a site visit on 3rd August 2020, where I met Mrs Walker (Charlton Manor) and walked over the site to discuss some particular matters pertinent to this planning application.

2.3. This review has been conducted as a desktop study having studied the amended proposal and the arboricultural report and submitted comments which are available for public viewing on the council's online planning application register.

3. Review of the submitted arboricultural report and objection responses

3.1. The FLAC arboricultural planning submission (ref: SC38-1036, April 2020) consists of a tree survey schedule with a key, 'RAVEN' tree assessment, tree retention and removal plan and an outline tree protection plan. The submission is brief and succinct, dealing with matters arising from the Appeal and how they have been addressed, how the proposal complies with national and local planning policy (including the Tree Preservation Order (TPO) and a matter for resolution by the Planning Committee relating to tree 3015.

3.2. The submission itself provides minimal site-specific description or commentary regarding the impacts of the proposed development. The tree schedule contains all the site-specific details of the trees, including a column labelled 'Proposal' which states whether each tree/ group/hedge is to be retained, partially retained (groups and hedges) or removed in order to facilitate the development.

Veteran/ancient tree categorisation

3.3. The Woodland Trust (WT) and the Ancient Tree Forum (ATF) have submitted detailed objections to the proposal (June 2020), and refer to FLAC's submitted report and to the 'Ancient Woodland, ancient trees and veteran trees: protecting them from development' guidance ('Standing Advice') produced by the Forestry Commission and Natural England. The WT objects on the basis of damage and deterioration of seven veteran trees. The ATF

objects because they assert that the way veteran trees have been identified by FLAC means that trees which should be protected as such by national planning policy have been wrongfully excluded. FLAC has provided detailed responses to each objection (June 2020) which together add a significant degree of additional commentary to the submitted report.

3.4. The objections and subsequent responses focus on disagreements about: the definitions of what is a veteran tree within the national planning policy, policy guidance and published literature, the methodology for assessing veteran trees and the categorisation of the site's trees which follows from these. FLAC's submission uses its in-house 'RAVEN' methodology and identifies 7 veteran trees at the site. The 'RAVEN' methodology, while not as such 'endorsed' by the Appeal Inspector (in the usual sense of the word), was certainly accepted. In contrast, the WT use as their starting point the Ancient Tree Inventory (ATI) to identify veteran trees at the site (which is a source of information 'endorsed' within the Standing Advice (in the usual sense of the word), despite criticism of it from FLAC). The ATF focuses on the characteristics of veteran trees as the starting point. Both the WT and ATF disagree strongly with RAVEN's reliance on tree age/stem size as a starting point.

3.5. The result of the different approaches is that:

- The WT identify five additional trees (3010, 3014, 3015, 3022, 3027) which they believe should have been identified as veteran in the submission
- The ATF identify *at least* two additional trees (3010, 3014) as veteran, with insufficient information on others
- FLAC identify 4 trees (3021, 3026, 3028, 3031) which neither WT nor ATF highlight as veteran trees (albeit the ATF might include these with sufficient information).

3.6. Identifying veteran trees is not a straightforward or simple exercise when very old trees are in question, and there is demonstrably some inherent subjectivity involved which can include perceptions of age, rarity or special landscape context. Therefore, it is not my intention to muddy the waters for CBC with a fourth independent assessment. The FLAC report uses a consistent and transparent methodology in identifying the site's veteran and ancient trees, and so I do not find a sufficient reason to disagree with its findings in this regard.

Application of Veteran Tree Buffers (VTBs)

3.7. The FLAC report and plans include veteran tree buffers (VTBs) around all trees identified as veteran/ancient trees, which includes all those assigned the A3 quality category.

3.8. Three of the veteran/ancient trees 3007, 3021 and 3028 are identified as 'relic' veteran trees in the RAVEN assessment. RAVEN defines a 'relic' veteran tree as one bearing <75% of its former maximum crown volume. FLAC explained the concept of a 'relic' veteran tree within the arboricultural Proof of Evidence to the 2019 Appeal:

> *'3.3.8 Concerning Natural England's veteran tree buffer recommendation, this is clearly a precautionary, rather than evidence-based, protective distance. Whilst as a generality this might be suitable for some trees (albeit not justifiably applied as an absolute), it is the case that many veteran trees simply do not require a protective offset of the magnitude computed by the Natural England method (15 times stem diameter).*
>
> *3.3.9 This is because many veteran trees with a large-diameter stem have lost the greater majority of their original crowns. Because there is an unbreakable, biologically-imperative link between roots and shoots (known as the root:shoot ratio), such trees have a correspondingly compact root system too. Logically, it follows that where a tree occupies a much smaller biological space as a result of significant crown loss, it can be safeguarded by a reduced protective buffer compared to where it does not.'*

3.9. Instead of a VTB of 15 times the stem diameter recommended in the Standing Advice, the RAVEN methodology caps the VTB at 15 metres radius which results in a smaller area/ volume of soil being afforded protection in the site design and construction methodology.

3.10. The concept of a 'relic' veteran tree is not recognised in the Standing Advice, nor in published veteran tree literature or the objections of the ATF and WT. Nor does it appear within the RAVEN methodology itself.

3.11. The 'relic' veteran tree concept focuses on the *'much smaller biological space'* that a veteran tree with a reduced crown and root system may take. But the Standing Advice VTB seeks not only to mitigate damage to a tree's roots (which might still exist beyond a

calculated root protection area (RPA) or VTB), but also to mitigate direct impacts to soil, ground flora and fungi, the water table and drainage, and from pollution and disturbance to wildlife.

3.12. The application of a VTB to a veteran tree in accordance with the Standing Advice is not a means to *avoid* impacts, but is a means to *reduce* (mitigate) impacts. In this way, a VTB is necessarily precautionary to reduce impacts to an irreplaceable habitat.

3.13. It should be noted that the RAVEN methodology recognises extensive decay, extensive hollowing, crown senescence and retrenchment as additional primary features of veteran trees, but the 'relic' concept then downgrades the degree of mitigation provided by a VTB based on these these very factors. This is akin to 'begging the question'.

3.14. Whereas the Standing Advice would afford trees 3007 and 3021 VTB diameters of 21.8m and 22.8m respectively, they are only provided with VTBs of 15m diameter in FLAC's submission.

3.15. It is of note that FLAC's definition of a VTB for a 'relic' tree on the tree survey and retention plan submitted for the 2018 planning application was *'…a maximum and fixed VTB… of 15m radius'*. FLAC did not adhere to its own definition in that submission. As before, the FLAC submission for the current proposal calculates the VTB of tree 3028 - on the basis of a smaller north-west fragment of the original stem which is alive measured as 740mm diameter - as 15 times the remaining stem diameter, giving a VTB radius of 11m. Any definition of a VTB for a 'relic' tree (whether at a fixed 15m radius or not) has been removed from the current submission.

3.16. I am unconvinced by the concept of 'relic' trees, of FLAC's application of VTBs to them and of how this relates to the Standing Advice on veteran trees.

3.17. While the application of the concept of 'relic' veteran trees has no consequences for tree 3007 in the submitted design, it has significant consequences for potential impacts to 3021. The Standing Advice VTB of 15 times the stem diameter would bring the buildings and gardens of Plots 10, 11 and 13 and the road leading to Plot 10 within the VTB.

Arboricultural Impacts Assessment (AIA).

3.18. The FLAC submission lacks detail on the anticipated impacts of the development proposal. The assessment of impacts to trees is confined to a column in the tree schedule that states whether the tree is to be retained or removed, as shown on the submitted tree removal and retention plan.

3.19. The report does not provide comment on potentially damaging construction activities relevant to the site such as alterations in ground levels. While FLAC provided observations on potential hydrological impacts on trees in its Proof of Evidence to the Appeal, no assessment has been provided for the current application. Longer-term end-use indirect impacts on the veteran tree habitats, such as increased light from dwellings is not assessed. Although this may be beyond the remit of an arboriculturist, at least some recognition of potential end-use impacts should be provided for further ecological assessment and design.

4. Review of the development proposal in relation to trees

4.1. The FLAC submission summarises that the design of the proposals allows the retention of tree 3014 and the removal of all construction and gardens from veteran tree buffer zones, which it says addresses the matters arising from the Appeal decision in full.

4.2. The reduced number of dwellings proposed has clearly improved the development proposal from an arboricultural point of view. Trees, including the significant notable and veteran trees, are afforded more open space around them which will reduce the potential for damage and decline. New surface and foul drains within the proposed residential area are accommodated within the new road layout and outside of the RPAs and VTBs of trees.

4.3. There are several aspects of the proposal which are of note:

Retention of protected and veteran/ancient trees

4.4. The new design proposal for the site retains English oak tree T3014. The design also retains all of the trees identified as veteran trees within FLAC's submitted RAVEN

assessment, as well as all trees identified as veteran on the ATI. All individually-protected trees within the TPO will be retained.

4.5. Protected trees (those trees within area A3 of the TPO and present when the TPO was made) within TG3008 at the north-west site boundary would be removed for the new site access and for Plots 1 and 42/43.

Potential impacts of the proposed development

Oaks 3014 & 3015

4.6. Oak tree 3014 has been categorised as a B3 quality tree and has an RPA of 11.76m radius. However, given that the tree as 40+ years remaining safe useful life expectancy and has some veteran characteristics with the potential to become a veteran the tree appears to be a 'high' value tree within the definition of policy GI3 Trees and Development of the Cheltenham Plan. Oak tree 3015 has been categorised as an A1 quality tree and has an RPA capped at 15m radius.

4.7. The proposal is to isolate the two trees together within an island of open space surrounded by new road to the north, east and south and Plots 29 and 32 to the west. New structural street tree planting will be provided along the road edges.

4.8. A small portion of the periphery of the RPA of 3014 is within the boundary of Plot 30 and meets the foundations of the dwelling. Although RPAs are the standard layout tool when considering trees and development, it is worth underlining that an RPA is the *minimum* area around a tree deemed to contain sufficient roots and rooting volume to maintain a tree's viability. Recent research in to the extent of tree roots of old trees has shown that roots extend well beyond the 'drip line' of the canopy, and beyond the capped 15 metre radial RPA as recommended in BS5837. Using a ground penetrating radar, the roots of a mature oak tree at Burghley Estate were found at 24 metres from the stem[1]. It is therefore anticipated that the proximity of Plot 30 would result in some some root severance/loss, and soil disturbance within this area is inevitable.

4.9. A small portion of the north-west part of the notional RPA of 3015 (25m^2 or approx 3.5%) will be impacted by the proposed carriageway turning head, footway and car parking

[1] 'An examination by TreeRadar: http://sharonhosegoodassociates.co.uk/wp-content/uploads/2017/01/Burghley-TreeRadar-report.pdf

spaces for Plot 29. The FLAC report demonstrates that an additional 50m^2 of land contiguous with the RPA can be protected from construction activity. FLAC's assessment is that the incursion would not result in a material adverse impact on the tree, but suggest no-dig construction as an option to reduce the risk of adverse impact further. The feasibility of no-dig construction of highway proposed for adoption depends on whether the Highway Authority accept this construction method as meeting its standards.

4.10. The submitted tree protection plan shows the location of physical protective barriers and the area of road and parking which could be constructed using a no-dig cellular confinement system. A brief working method for installation of the surface is provided on the plan. I am concerned that the locations of the protective barriers leave very little working space for, for example, excavation to achieve levels and any grading that might be required and installation of kerbs and haunching. Additional working space might necessitate slightly greater incursions into RPAs than shown on-plan. But given that the application is for outline permission, more detailed information could be approved at a later stage.

4.11. The isolation of the trees within the open space island, surrounded by hard surfaces with associated drains on the sloping ground above T3015 may alter the local hydrology of the soil, reducing the availability of soil moisture to the trees.

4.12. Alteration of the shallow (max. 0.5m deep) topsoil by the construction of the carriageway to the south and east of the trees potentially could reduce the downward flow of water to the trees, or conversely could lead to containment of water within the RPAs. The shrinkable clay ground conditions might require deeper construction extents than is typical, and no detailed assessment of potential hydrological impacts on the trees has been provided for the current application.

Veteran oaks 3007, 3018, 3026, 3030 & 3031

4.13. The VTBs of veteran oaks 3007, 3018, 3026, 3030 & 3031 are fully respected within the layout in accordance with the Standing Advice. No structures, new surfaces or drains are located within the VTBs. This is a significant improvement on the previous proposal. The feasibility of protecting the VTBs from construction activity is demonstrated.

Veteran ash T3021

4.14. The application of the concept of 'relic' veteran, and the associated VTB which is capped at 15m by FLAC, has consequences for potential impacts to 3021. The capped VTB is respected by the layout except for a small part of the west periphery which is included within the garden of Plot 10. However, the Standing Advice VTB of 15 times the stem diameter (22.8m radius) would bring the buildings and gardens of Plots 10, 11 and 13 and the road leading to Plot 10 within the VTB.

4.15. If CBC accept the concept of a 'relic' veteran tree and the application of a 15m cap on its VTB, this would appear to be contrary to the Standing Advice.

4.16. Obstruction of the downward flow of water through the shallow (max. 0.5m deep) topsoil by structures to the north and north-east could lead to decreased availability of water within the VTB. The shrinkable clay ground conditions might require deeper building foundations than is typical, and no detailed assessment of potential hydrological impacts on the trees has been provided for the current application.

Veteran oak T3028

4.17. The layout design respects the VTB of oak 3028, although rear gardens and the garage of Plot 7 abut the edge of the VTB.

4.18. I am concerned that the location of the protective barrier adjacent to the garage of Plot 7 leaves very little working space. Additional working space, including scaffolding which straddles the protective barrier, might necessitate a slightly greater incursions into the RPA than shown on-plan. But given that the application is for outline permission, more detailed information could be approved at a later stage.

4.19. The tree would become partially isolated between new dwellings, and I am concerned that the fencing specification shown on the tree protection plan is inadequate to protect against ground and dust pollution during construction. A more appropriate specification (including screening barriers) could be approved at a later stage. I am also concerned about indirect impacts such as increased light from dwellings could degrade the habitat. It is not uncommon for isolated areas such as this to suffer from tipping of garden waste and informal access. The submitted landscape strategy identified that the area is not suitable for public access, and that appropriate deterrent planting can help to mitigate some of the

potential indirect impacts. Consideration should be given to securing more detailed information at a later stage.

4.20. Obstruction of the downward flow of water through the shallow (max. 0.5m deep) topsoil by structures to the north and north-east could lead to decreased availability of water within the VTB. The shrinkable clay ground conditions might require deeper building foundations than is typical, and no detailed assessment of potential hydrological impacts on the trees has been provided for the current application.

Protected oaks 3032 & 3033

4.21. The site's drainage outflow to existing off-site connections to the south and south-west is proposed to pass through the RPAs of protected oak trees 3032 and 3033. This is an improvement on the previous application, which proposed drainage through the VTB of veteran oak 3031. The tree protection plan notes that a trench-less technique should be used to minimise damage, and the arboricultural Proof of Evidence provided at the Appeal indicated that trench-less techniques are feasible.

4.22. It is reasonable to accept that more detailed specifications and working methods, which should include on-site arboricultural supervision, can be approved at a later stage.

Proposed Landscape Strategy

4.23. The proposed landscape strategy includes planting of a new native species woodland belt to the south-east of the residential area running from veteran oak 3007 to meet hedgerow group TG3005 at oak 3022. New open space, street and garden tree planting is also proposed. In the long-term, future mature canopies of new street tree and woodland belt planting may meet above the proposed carriageway and provide connectivity to the isolated oaks 3014 and 3015.

4.24. The proposed woodland belt contributes to compensating for the connectivity lost by the severance of the hedgerow group TG3005 for the proposed layout, and would eventually provide a visual screen. However, these benefits will take time to accrue, and the success of tree/woodland establishment depends on the adequate allocation of resources to, and implementation of, a new tree planting management plan. A new 10-year tree

management plan 'heads of terms' document has been submitted which aims to achieve 100% successful establishment of new tree and hedge planting.

4.25. The ground at the site has been shown to be a maximum of 0.5m deep slightly silty clay topsoil over firm to stiff clay. Obstruction of the downward flow of water through the shallow (max. 0.5m deep) topsoil by structures to the north and north-west could lead to decreased availability of water within the planting area.

4.26. The site's documented aspect and ground conditions and my observations on site suggest to me that successful tree establishment, to independence in the landscape, is likely to require a high level of resources over a long period of time. The usual landscape scheme tree replacement condition period of 5 years is likely to be insufficient to secure delivery of an approved detailed scheme in the long-term. A condition for the implementation of the new tree management plan over its full 10-year period would provide a stronger basis to ensure successful establishment of the new trees. If reliance is placed on planning condition(s) for the successful implementation of the detailed landscape scheme, the wording of such condition(s) should be carefully considered.

4.27. Although not a common practice, a Tree Preservation Order (TPO) can be made to protect trees to be planted pursuant to a condition imposed under paragraph (a) of section 197 of the TCPA (planning permission to include appropriate provision for preservation and planting of trees). That is to say, a TPO can be made to protect trees, groups of trees or woodlands *yet to be planted*, but which are specified within an approved detailed landscape scheme. Such an Order takes effect from the time the trees are planted.

4.28. For a tree protected by such as TPO as an individual or within a group of trees (but not woodlands) landowners have a duty to replace a tree which is removed, uprooted or destroyed because it is dead (or in contravention of the Order or because it presents an immediate risk of serious harm). The local planning authority can enforce this tree replacement duty by serving a tree replacement notice. (Enforcement by serving a tree replacement notice is discretionary, can be dispensed with and can be appealed).

4.29. The making of a new TPO to protect at least the new woodland belt as a group (or groups) of trees would provide CBC with a stronger basis on which to ensure the successful establishment of the new trees in the longer-term.

National and Local Planning Policy

4.30. Paragraph 175c of the National Planning Policy Framework (NPPF) states that '*development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists'.*

4.31. In my opinion, while the current proposal is much-improved from the previous proposal, there remains a significant risk that the proposed development could have a negative impact on some of the veteran trees from construction pollution and end-use light pollution, and by changing the soil ecosystem and hydrology that would lead to their premature deterioration.

4.32. CBC's Cheltenham Plan was adopted in July 2020. It makes specific reference to the importance of trees in the local landscape, and contains four policies of relevance to trees at the site:

HD4: Land off Oakhurst Rise

This site-specific policy includes requirements for development proposals for Oakhurst Rise to demonstrate the protection of key biodiversity assets and mature trees and the long term protection of mature trees and hedges.

D3: Private green space

The policy requires that proposals for development within extensive grounds of large properties… where appropriate , will be required to: a) retain mature trees; b) retain and enhance existing landscaping; c) provide new landscaping; d) avoid disturbance of significant habitats.

GI3: Trees and development

Development which would cause permanent damage to trees of high value (Note 1) will not be permitted. (Note 1: 'High value' means a sound and healthy tree with at least 10 years of safe and useful life remaining which makes a significant contribution to the character or appearance of a site or locality).

The proposal includes the removal of mature trees, such common ash 3016, the protected trees within TG3008 and trees within TG3005. Hydrological changes due to obstruction of soil water flows by new structures may have an adverse impact on, in particular, high quality trees 3014 and 3015 and veteran trees 3021, 3028 and 3021. Despite protective measures, disturbance to the veteran tree habitats (including soil, ground flora and fungi) during construction and in the site's end-use is likely to occur. In my opinion, the proposal does not comply with policies HD4, D3 and GI3.

The proposed landscape strategy can provide a net gain in the overall canopy cover at the site and enhance the existing resource. In my opinion, the proposal complies with elements b) and c) of policy D3.

GI2: Protection and replacement of trees

In cases where trees are not protected by a Tree Preservation Order or by being in a Conservation Area, but contribute to the townscape and character of the town, the Council will consider including such trees in a Tree Preservation Order.

Given the difficult growing conditions at the site, the making of a new TPO to protect at least the new woodland belt as a group (or groups) of trees would provide CBC with a stronger basis on which to ensure the successful establishment of the new trees in the longer-term.

5. Conclusions

5.1. My review of the site and the submitted arboricultural report leads me to the following conclusions:

5.2. The application site contains numerous trees that are of high value from a conservation and historical point of view. Seven of these are considered to be veteran trees which provide an irreplaceable habitat and many are important landscape tree features. As such, a precautionary approach should be adopted when designing any development proposals at the site to in order to reduce negative impacts on the trees, their soil, ground flora and fungi, the water table and drainage, and from pollution and disturbance to wildlife. This approach is clearly set out at both the national and local level planning policy.

5.3. The arboricultural information submitted with the planning application is succinct. The FLAC report uses a consistent and transparent methodology in identifying the site's veteran and ancient trees, and so I do not find a sufficient reason to disagree with its findings in this regard. However, it lacks a detailed assessment of the the development impacts to trees and conversely from trees to the development in future years. While FLAC provided observations on potential hydrological impacts on trees in its Proof of Evidence to the Appeal, no assessment has been provided for the current application.

5.4. The concept of a 'relic' veteran tree is not recognised in the Standing Advice, nor in published veteran tree literature or the objections of ATF and WT. Nor does it appear within the RAVEN methodology itself. The application of the 'relic' veteran tree VTB has significant consequences for potential impacts to 3021. If CBC accept the concept of a 'relic' veteran tree and the application of a 15m cap on its VTB, this would appear to be contrary to the Standing Advice.

5.5. The reduced number of dwellings proposed has clearly improved the development proposal in terms of the retention of veteran and protected trees, but the development proposal still has the potential to cause harm to significant trees. In particular, hydrological changes due to obstruction of soil water flows by new structures may have an adverse impact on, in particular, high quality trees 3014 and 3015 and veteran trees 3021, 3028 and 3021. Despite protective measures, disturbance to the veteran tree habitats (including

soil, ground flora and fungi) during construction and in the site's end-use is likely to occur. In my opinion, the proposal does not comply with policies HD4, D3 and GI3.

5.6. Site conditions suggest to me that successful new tree establishment, to independence in the landscape, is likely to require a high level of resources over a long period of time. The usual 5 year landscape scheme tree replacement condition period is likely to be insufficient to secure delivery of an approved detailed scheme in the long-term. If reliance is placed on planning condition(s) to achieve this, the wording of such condition(s) should be carefully considered. The making of a new TPO to protect at least the new woodland belt as a group (or groups) of trees once planted would provide CBC with a stronger basis on which to ensure the successful establishment of the new trees in the longer-term.

6. Recommendations

6.1. I have concluded through my review of the site and the proposed development that there remains a significant risk of permanent damage to high value trees, and of deterioration of the irreplaceable habitats of veteran trees.

6.2. I recommend that a detailed soil analysis and hydrological assessment is carried out in order to understand the soil hydrology and how the proposal would impact the high quality and veteran trees.

Ian Monger
BSc (hons), MArborA.
Senior Arboriculturist

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Department for Transport

Cycle Infrastructure Design

Local Transport Note 1/20

July 2020

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Foreword

As the Prime Minister said when he launched the Government's ambitious plan for cycling in July 2020, cycling will play a far bigger part in our transport system from now on. We need to see significant increases in cycling in our cities and towns, and everywhere else too.

To achieve that, the quality of cycling infrastructure must sharply improve. Properly-protected bike lanes, cycle-safe junctions and interventions for low-traffic streets encourage people to cycle.

Too much cycling infrastructure is substandard, providing little protection from motorised traffic and giving up at the very places it is most needed. Some is actually worse than nothing, because it entices novice cyclists with the promise of protection, then abandons them at the most important places. Poor cycling infrastructure discourages cycling and wastes public money.

In some places, even without much special provision, cycling is already mass transit. Last year in Greater Manchester, for example, as many journeys were made by bike as on the conurbation's entire Metrolink tram system. In central London, bikes made up almost a third of rush-hour traffic. And that was before the COVID19 pandemic, which resulted in large increases as people rediscovered cycling and walking during lockdown.

This updated national guidance for highway authorities and designers aims to help cycling become a form of mass transit in many more places. Cycling must no longer be treated as marginal, or an afterthought. It must not be seen as mainly part of the leisure industry, but as a means of everyday transport. It must be placed at the heart of the transport network, with the capital spending, road space and traffic planners' attention befitting that role.

The guidance delivers on our commitment to boost design standards and improve safety. It sets out the much higher standards now expected, and describes some of the failings common in the past, which will be strongly discouraged in future.

The Government intends that all proposed schemes will be checked by a new inspectorate against the summary principles before funding is agreed, and that finished schemes will be inspected as appropriate to ensure that they have been delivered in compliance with them.

It will be a condition of any future Government funding for new cycle infrastructure that it is designed in a way that is consistent with this national guidance.

The Department for Transport will also reserve the right to ask for appropriate funding to be returned for any schemes built in a way which is not consistent with the guidance. In short, schemes which do not follow this guidance will not be funded.

This guidance has been developed closely with stakeholders so that it reflects the latest developments in cycle infrastructure design, including proven design elements pioneered by Transport for London and by the Cycle Ambition Cities and in Wales under the Welsh Active Travel Design Guidance. I am grateful to our stakeholders for their valuable input into the review process.

It reflects current best practice, standards and legal requirements. Inclusive cycling is an underlying theme throughout so that people cycling of all ages and abilities are considered. The design options include segregation from traffic, measures for cycling at junctions and roundabouts, and updated guidance on crossings, signal design and the associated traffic signs and road markings.

Furthermore, to receive Government funding for local highways investment where the main element is not cycling or walking, there will be a presumption that schemes must deliver or improve cycling infrastructure to the standards in this Local Transport Note, unless it can be shown that there is little or no need for cycling in the particular highway scheme.

The Department will work with the highways and transportation professions to ensure that the guidance is understood by local authorities and their supply chain so that it is embedded in local highways design standards, which will enable people of all ages and abilities to cycle.

The guidance will be reviewed regularly to ensure it continues to reflect the latest developments in cycle infrastructure design practice.

Chris Heaton-Harris MP
Minister of State with responsibility for cycling and walking

1

Introduction

The statutory Cycling and Walking Investment Strategy (CWIS) sets a clear ambition to make cycling and walking the natural choices for short journeys or as part of a longer journey with supporting objectives to increase cycling and walking levels. This guidance supports the delivery of high-quality cycle infrastructure to deliver this ambition and objective; and reflects current good practice, standards and legal requirements.

Inclusive cycling is the underlying theme so that people of all ages and abilities are considered.

Much has changed in the world of cycle infrastructure since LTN 2/08 was published over a decade ago and this guidance has been developed in partnership with a range of stakeholders and experts to ensure it reflects the latest developments in cycle infrastructure design, including proven design elements pioneered in London under Transport for London and in Wales under the Welsh Government.

1.1 Summary of requirements

1.1.1 Local authorities are responsible for setting design standards for their roads. This national guidance provides a recommended basis for those standards based on five overarching design principles and 22 summary principles. There will be an expectation that local authorities will demonstrate that they have given due consideration to this guidance when designing new cycling schemes and, in particular, when applying for Government funding that includes cycle infrastructure.

1.1.2 The guidance contains tools which give local authorities flexibility on infrastructure design and sets a measurable quality threshold to achieve when designing cycling schemes. The Cycling Level of Service (CLoS) at Appendix A and the Junction Assessment tools (JAT) at Appendix B are new mechanisms introduced to set minimum quality criteria. Only schemes with a minimum score of 70% under the CLoS, no critical fails and under the JAT no red-scored turning movements will generally be considered for funding. Where schemes are proposed for funding that do not meet these minimum criteria, authorities will be required to justify their design choices. It still gives local authorities flexibility on design of infrastructure, but sets an objective and measurable quality threshold. Use of these tools is explained in more detail in Chapter 4, Section 4.5.

1.1.3 To effectively apply this guidance those designing cycling and walking schemes should have an appropriate level of of experience and training. An example would be the Institute of Highway Engineers' Professional Certificate & Diploma in Active Travel that allows applicants to demonstrate their experience and produce work to the required standard. For more information please see: www.theihe.org/courses/active-travel

1.2 Purpose

1.2.1 This Local Transport Note provides guidance and good practice for the design of cycle infrastructure, in support of the Cycling and Walking Investment Strategy. The scope of the document is limited to design matters. Further reading on related matters, helpful tools and advice on procedural issues are included in the Appendices. Local Transport Note (LTN) 1/20 replaces previous guidance on cycle infrastructure design provided by LTN 2/08, and accordingly LTN 2/08 is withdrawn.

1.2.2 LTN 1/20 also replaces LTN 1/12: Shared Use Routes for Pedestrians and Cyclists, and accordingly, LTN 1/12 is now withdrawn. See also Chapter 6, Section 6.5.

1.3 Application

1.3.1 The guidance covers England and Northern Ireland. A number of other documents can also be used in Northern Ireland and designers should take advice from the roads authority before initiating any design. Where the text refers to highway authorities for England, the equivalent term in Northern Ireland is road authority. In Northern Ireland the Department for Infrastructure is the sole road authority. The guidance should be applied to all changes associated with highway improvements, new highway construction and new or improved cycle facilities, including those on other rights of way such as bridleways and routes within public open space. Separate guidance is available for Scotland and Wales. In Scotland, the relevant guidance is Cycling by Design published by Transport Scotland and in Wales, the relevant guidance is the Active Travel Design Guidance, published by the Welsh Government.

1.3.2 The CWIS recommends that local authorities prepare Local Cycling and Walking Infrastructure Plans (LCWIPs). This guidance (see Chapter 3) should be applied when identifying the infrastructure required to create good quality cycle networks when preparing the LCWIP or other local network plan for cycling.

1.4 Definitions

1.4.1 The built environment should be accessible to all, including young people, older people, and disabled people. The concept of 'inclusive design' underpins the document, although it is acknowledged that what individual people consider to be acceptable will vary. Design should begin with the principle that all potential cyclists and their machines should be catered for in all cycle infrastructure design.

1.4.2 For the purpose of this document, the term **cycle** refers to the full range of vehicles shown in Figure 5.2 in Chapter 5 and described in the accompanying text, including hand-cranked cycles and cycles that conform to the Electrically Assisted Pedal Cycle Regulations 1983 (as amended). It does not include mopeds, stand-on scooters or other powered two-wheeled vehicles. The terms **cyclist** and **cycling** refer to anybody using a human powered vehicle as described above.

1.4.3 The terms **pedestrian** and **walking** include people using mobility aids such as wheelchairs and mobility scooters designed for use on the footway, and people with physical, sensory or cognitive impairments who are travelling on foot.

1.4.4 The term **cycle lane** has the meaning given in Schedule 1 of the Traffic Signs Regulations and General Directions 2016 (as amended).

1.4.5 For ease of reading the term **cycle track** is used in its widest sense (rather than the legal definition) to describe routes for cycling within the highway boundary that are physically separated from motor vehicles and pedestrians, such as by a kerb, verge, level difference or material delineation. Paths away from the highway that have been designated for cycling are variously described as **cycle tracks**, **cycle paths**, **greenways** and **towpaths**. Off-carriageway cycling provision may either be physically **segregated** from pedestrian facilities or a common surface may be **shared**.

1.4.6 Cyclists and pedestrians are considered to be '**traffic'**, within the meaning of the Road Traffic Regulation Act 1984 and the Traffic Management Act 2004, and therefore duties to manage the road network to secure 'expeditious and safe movement for all traffic' apply to them as well as motorised modes.

1.5 Core design principles

1.5.1 There are five core design principles which represent the essential requirements to achieve more people travelling by cycle or on foot, based on best practice both internationally and across the UK.

1.5.2 Networks and routes should be **Coherent**; **Direct**; **Safe**; **Comfortable** and **Attractive**.

1.5.3 Inclusive design and accessibility should run through all five of these core design principles. Designers should always aim to provide infrastructure that meets these principles and therefore caters for the broadest range of people.

1.5.4 Infrastructure must be accessible to all and the needs of vulnerable pedestrians and local people must be considered early in the process to ensure schemes are supported locally in the long term. The Equality Act 2010 requires public sector authorities to comply with the Public Sector Equality Duty in carrying out their functions. This includes making reasonable adjustments to the existing built environment to ensure the design of infrastructure is accessible to all.

Figure 1.1: Core design principles

Accessibility for all				
Coherent	**Direct**	**Safe**	**Comfortable**	**Attractive**
				
DO Cycle networks should be planned and designed to allow people to reach their day to day destinations easily, along routes that connect, are simple to navigate and are of a consistently high quality**.**	**DO** Cycle routes should be at least as direct – and preferably more direct – than those available for private motor vehicles.	**DO** Not only must cycle infrastructure be safe, it should also be perceived to be safe so that more people feel able to cycle.	**DO** Comfortable conditions for cycling require routes with good quality, well-maintained smooth surfaces, adequate width for the volume of users, minimal stopping and starting and avoiding steep gradients.	**DO** Cycle infrastructure should help to deliver public spaces that are well designed and finished in attractive materials and be places that people want to spend time using.
				
DON'T Neither cyclists or pedestrians benefit from unintuitive arrangements that put cyclists in unexpected places away from the carriageway.	**DON'T** This track requires cyclists to give way at each side road. Routes involving extra distance or lots of stopping and starting will result in some cyclists choosing to ride on the main carriageway instead because it is faster and more direct, even if less safe.	**DON'T** Space for cycling is important but a narrow advisory cycle lane next to a narrow general traffic lane and guard rail at a busy junction is not an acceptable offer for cyclists.	**DON'T** Uncomfortable transitions between on-and off carriageway facilities are best avoided, particularly at locations where conflict with other road users is more likely.	**DON'T** Sometimes well-intentioned signs and markings for cycling are not only difficult and uncomfortable to use, but are also unattractive additions to the street scape.

1.6 Summary Principles

The following summary principles form an integral part of this guidance.

1.6.1 Creating a national default position where high quality cycle infrastructure is provided as a matter of course in local highway schemes requires a long term commitment to deliver the solutions outlined in this document. The 22 summary principles below will help practitioners deliver high quality infrastructure based on the lessons learned from cycle infrastructure delivered to date – both where this has been done well but also where delivery did not meet the outcomes desired.

1) **Cycle infrastructure should be accessible to everyone from 8 to 80 and beyond: it should be planned and designed for everyone. The opportunity to cycle in our towns and cities should be universal.**

   The ability to deliver a right to cycle requires infrastructure and routes which are accessible to all regardless of age, gender, ethnicity or disability and does not create hazards for vulnerable pedestrians. Improvements to highways should always seek to enhance accessibility for all.

Figure 1.2: Accessible cycle infrastructure

2) **Cycles must be treated as vehicles and not as pedestrians. On urban streets, cyclists must be physically separated from pedestrians and should not share space with pedestrians. Where cycle routes cross pavements, a physically segregated track should always be provided. At crossings and junctions, cyclists should not share the space used by pedestrians but should be provided with a separate parallel route.**

   Shared use routes in streets with high pedestrian or cyclist flows should not be used. Instead, in these sorts of spaces distinct tracks for cyclists should be made, using sloping, pedestrian-friendly kerbs and/or different surfacing. Shared use routes away from streets may be appropriate in locations such as canal towpaths, paths through housing estates, parks and other green spaces, including in cities. Where cycle routes use such paths in built-up areas, you should try to separate them from pedestrians, perhaps with levels or a kerb.

Figure 1.3: Dedicated cycle facility in area with high pedestrian flows

3) Cyclists must be physically separated and protected from high volume motor traffic, both at junctions and on the stretches of road between them.

Protection can be achieved either by creating physically separated cycle facilities, or by the closure of roads to through motor traffic using bollards, planters or other physical barriers (with access, Blue Badge holders, buses and so on still allowed). Segregated facilities can be implemented with full kerb segregation or light segregation (for example with wands, stepped kerbs, planters etc.) On roads with high volumes of motor traffic or high speeds, cycle routes indicated only with road markings or cycle symbols should not be used as people will perceive them to be unacceptable for safe cycling.

Figure 1.4: Cycle lane incorporating light segregation with flexible wands

4) Side street routes, if closed to through traffic to avoid rat-running, can be an alternative to segregated facilities or closures on main roads – but only if they are truly direct.

For directness it will often be necessary to mix the two, with stretches of routes on back streets joined to segregated routes on main roads and across junctions where there is no sufficiently direct side street. Routes that are not direct or that see significant volumes of rat-running traffic will not be used and should not be provided.

5) Cycle infrastructure should be designed for significant numbers of cyclists, and for non-standard cycles. Our aim is that thousands of cyclists a day will use many of these schemes.

We also want to see increasing numbers of cargo bikes to replace some van journeys. Cycle routes must be accessible to recumbents, trikes, handcycles, and other cycles used by disabled cyclists.
Many current tracks and lanes are too narrow or constrained to meet these objectives. To allow faster cyclists to overtake, and make room for non-standard bikes, cycle tracks should ideally be 2 metres wide in each direction, or 3 to 4m (depending on cycle flows) for bidirectional tracks though there may have to be exceptions.

6) Consideration of the opportunities to improve provision for cycling will be an expectation of any future local highway schemes funded by Government.

To receive Government funding for local highways investment where the main element is not cycling or walking, there will be a presumption that schemes must deliver or improve cycling infrastructure to the standards in this Local Transport Note, unless it can be shown that there is little or no need for cycling in the particular highway scheme. Any new cycling infrastructure must be in line with this national guidance. The approach of continuous improvement is recognised in both the National Planning Policy Framework and Local Cycling and Walking Infrastructure Plan Guidance. Cycle infrastructure requirements should be embedded in local authority planning, design and highways adoption policies and processes.

7) Largely cosmetic interventions which bring few or no benefits for cycling or walking will not be funded from any cycling or walking budget.

Too many schemes badged as being for cycling or walking do little more than prettify the status quo, such as installing nicer-looking pavements and road surfaces but doing little or nothing to restrict through traffic or provide safe space for cycling. Schemes whose main purpose and/or effect is aesthetic improvement of the public realm must be funded from other budgets.

8) **Cycle infrastructure must join together, or join other facilities together by taking a holistic, connected network approach which recognises the importance of nodes, links and areas that are good for cycling.**

Routes should be planned holistically as part of a network. Isolated stretches of provision, even if it is good are of little value. Developing a connected network is more than lines on a map. It is about taking local people on a journey with you in order to understand who currently cycles, where they go and why they go there and, more importantly, who does not currently cycle and why.

Figure 1.5: Example of isolated cycle lane provision

9) **Cycle parking must be included in substantial schemes, particularly in city centres, trip generators and (securely) in areas with flats where people cannot store their bikes at home. Parking should be provided in sufficient amounts at the places where people actually want to go.**

Cycle parking should be pleasant, sufficient and convenient to allow people to cycle for commuting and utility journeys and to know that there will be both short or long-term parking at their destinations. Cycle parking should consider the needs of all potential users and the range of cycles which will use the facilities. The provision of other services such as maintenance facilities will improve the experience for users and deter cycle theft.

10) **Schemes must be legible and understandable.**

Cyclists, pedestrians and motorists alike must be in no doubt where the cycle route runs, where the pedestrian and vehicle space is and where each different kind of user is supposed to be. Some schemes deliberately create confusion or ambiguity with, for instance, only minimal signs in a paved area to show that cycling is permitted. This is another way of managing cyclist-pedestrian interactions that inhibits cycling and is not suitable for places with large numbers of cyclists and pedestrians.

11) **Schemes must be clearly and comprehensively signposted and labelled.**

Users must feel like they are being guided along a route. They should not have to stop to consult maps or phones. Directions should be provided at every decision point and sometimes in between for reassurance. Signs should be clear, easily visible and legible.

Figure 1.6: Example of wayfinding signs for cyclists

12) Major 'iconic' items, such as overbridges must form part of wider, properly thought-through schemes.

There is sometimes a temptation to build costly showpiece structures in isolation without thinking enough about the purpose they truly serve and the roads and routes which lead to them. We will only support such things when they overcome a major barrier on a desire line which cannot safely be crossed in other ways, and where they form an essential, properly-connected part of a wider network of good, safe routes.

13) As important as building a route itself is maintaining it properly afterwards.

Road markings get dug up by utility contractors, ignored in repaints or just worn away; tarmac is allowed to crack and part; tracks and lanes are seldom or never swept, leaving them scattered with debris and broken glass. In winter, cycle lanes are usually the last place to be cleared of snow and ice, if they are cleared at all. Routes must be properly maintained and swept frequently for debris and broken glass. Route proposals should always include a clear **programme** of maintenance.

Figure 1.7: Poor road surface conditions within a cycle lane

14) Surfaces must be hard, smooth, level, durable, permeable and safe in all weathers.

Surface materials should be easy to maintain, for example asphalt and other materials highlighted in Chapter 15. Materials such as brick and stone should generally be avoided on cycle routes. They are expensive, yet often quickly become dirty, ugly, broken and rough to ride on under the impacts of vehicles and can be slippery in wet weather. Exceptions will be allowed for streets of special heritage value. Level changes on the main route such as raised tables and humps are not necessary if the guidance on reducing traffic volumes and/or creating separated space has been properly followed. Side road entry treatments such as raised tables across the mouth of side roads can reduce the speed of vehicles turning in and out of the junction improving safety for cyclists and can help pedestrians. Materials such as loose gravel should also be avoided.

15) Trials can help achieve change and ensure a permanent scheme is right first time. This will avoid spending time, money and effort modifying a scheme that does not perform as anticipated.

If there is dispute about the impact of a road change, we recommend trialling it with temporary materials. If it works, it can be made permanent through appropriate materials. If it does not, it can be easily and quickly removed or changed. However, it is important that the scheme is designed correctly at the beginning, to maximise the chances of it working.

16) Access control measures, such as chicane barriers and dismount signs, should not be used.

They reduce the usability of a route for everyone, and may exclude people riding nonstandard cycles and cargo bikes. They reduce the capacity of a route as well as the directness and comfort. Schemes should not be designed in such a way that access controls, obstructions and barriers are even necessary; pedestrians and cyclists should be kept separate with clear, delineated routes as outlined in the principles above.

Figure 1.8: Barriers to cycling along a shared-use route (note yellow sign is not permitted in TSRGD)

17) The simplest, cheapest interventions can be the most effective.

Perhaps the single most important tool to promote cycling may be the humble bollard, used to prevent through traffic. It is relatively inexpensive and can be erected quickly. With a Traffic Order in place to restrict use of the road by motor traffic, such low-cost modal filters can increase safety by reducing through traffic, while retaining cycle and pedestrian access. Provided they have real effect, swift, pragmatic interventions are preferred over elaborate and costly ones.

Figure 1.9: Bollards used to create modal filter, preventing through traffic

18) Cycle routes must flow, feeling direct and logical.

Users should not feel as if they are having to double back on themselves, turn unnecessarily, or go the long way round. Often, cycling schemes - when crossing a main road, for instance - require cyclists to make a series of ninety-degree turns to carry out a movement that a motor vehicle at the same location could do without turning at all. Schemes should be based on a proper understanding of how people actually behave rather than how they might be expected to behave.

19) Schemes must be easy and comfortable to ride.

Cycling is a physical effort. Schemes should not impose constant stopping and starting or unnecessary level changes. Traffic calming measures such as road humps are mainly installed to reduce traffic speeds, but if through traffic is no longer present on the street or in the segregated lane, they are not necessary. If traffic calming measures are needed, they should always be designed so that they are not inaccessible to people on tandems and tricycles.

Figure 1.10: Example of kerb-segregated cycle track

20) All designers of cycle schemes must experience the roads as a cyclist.

Ideally, all schemes would be designed by people who cycle regularly. But in every case, those who design schemes should travel through the area on a cycle to understand how it feels - and experience some of the failings described above, to understand why they do not work. The most effective way to gain this understanding is to get out and cycle the route and observe users' behaviour.

21) Schemes must be consistent.

A scheme is only as good as its weakest point. Strenuous efforts should be made to avoid inconsistent provision, such as a track going from the road to the pavement and then back on to the road, or a track which suddenly vanishes.

22) When to break these principles.

In rare cases, where it is absolutely unavoidable, a short stretch of less good provision rather than jettison an entire route which is otherwise good will be appropriate. But in most instances it is not absolutely unavoidable and exceptions will be rare.

Bringing it all together – Making the case for change to get schemes delivered

A clear stakeholder engagement plan to articulate the case for change can take time but will increase political and public acceptance of a scheme at an early stage.

Before any specific proposal is put forward, the ground must be carefully prepared, with the public persuaded of the need for change and an attractive alternative to the status quo laid out that people can get interested in – this should relate proposals to things that affect people's lives directly, not just technical proposals and show why there's a problem to fix. Articulate a clear vision of what you want a place to look like.

Work out every technical aspect of a proposal thoroughly and in detail before you present it, to anticipate and pre-empt likely objections, and get it as right as possible at the beginning. When communicating the proposals be confident about it and absolutely be clear about your intentions, the benefits and disadvantages. Proposals must be clear and unambiguous, as detailed as possible, including good maps and drawings, and frank about the disadvantages, to build trust and discourage misrepresentation.

2

Cycling in context

Cycling in the UK has seen a revival in recent decades in regions that have invested in high quality infrastructure. Based on experience in central London and other major cities, investment in high quality cycle routes could unlock huge potential. It is a form of transport but also an activity for leisure and tourism. For individuals, the immediate benefits include improved physical and mental health. The benefits of investment in cycling therefore extend beyond just transport and environment. Mass cycling requires routes that are accessible to all, and this includes ensuring that the cycle infrastructure does not create hazards that will deter pedestrians. Improvements to roads and paths should always seek to enhance accessibility for all.

2.1 Introduction

2.1.1 This document is about infrastructure design, but it is important to understand the context in which design is taking place. This chapter describes the role of cycling as a means of transport, physical activity, leisure and tourism activity. It looks at some of the benefits that accrue from more people cycling more safely and more often. Careful design, construction and maintenance is required to ensure that cycling is accessible to all potential cyclists.

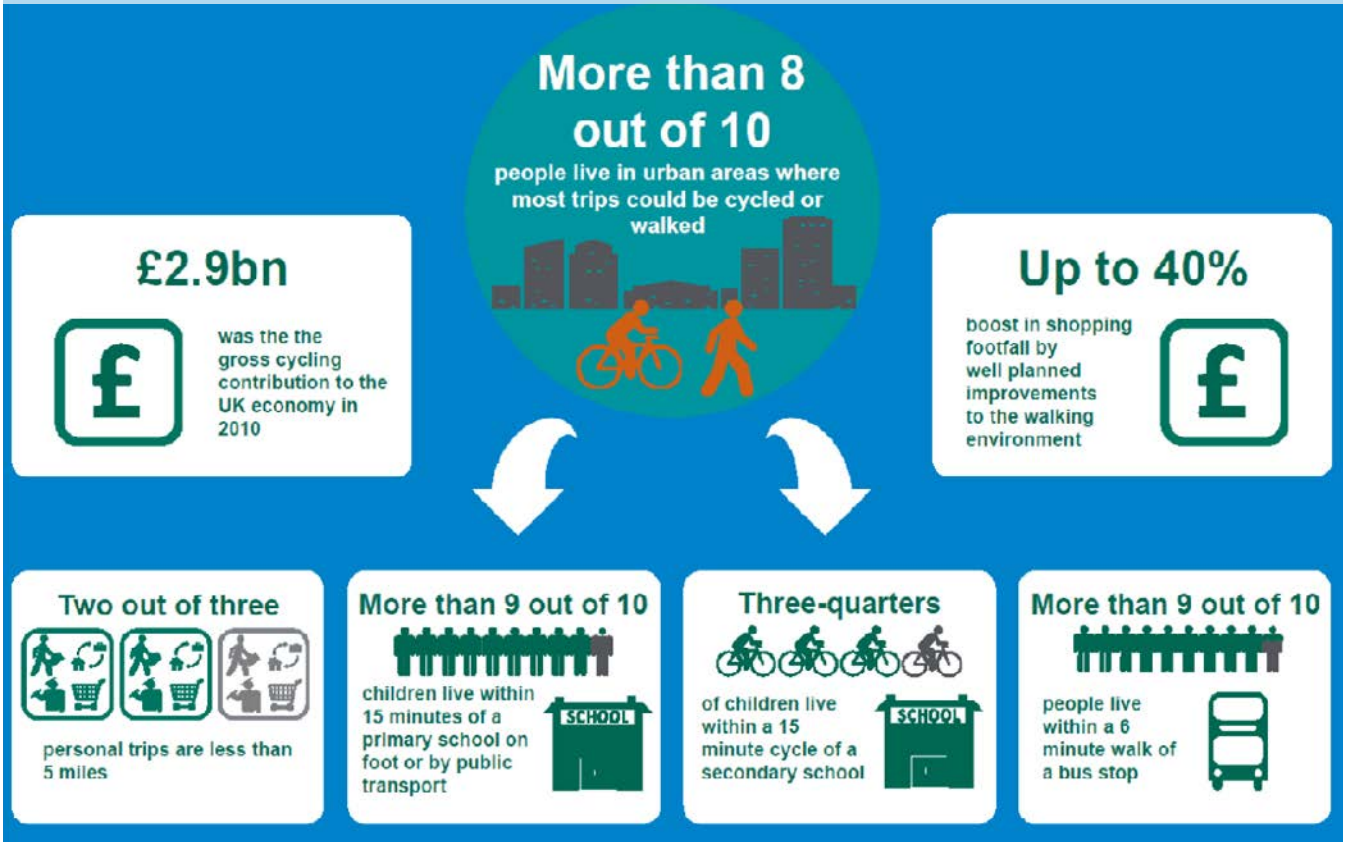
2.1.2 Increasing levels of traffic congestion, air pollution and poor health associated with inactivity require new approaches to transport planning. Towns and cities around the world are embracing cycling as a vital component of their sustainable transport policies.

2.2 The potential for cycling

2.2.1 Utility and leisure cycling facilities and services in the UK are at an early stage of development compared to many other countries, with a huge opportunity for growth (see Figure 2.1).

2.2.2 Recent growth of cycling recorded in central London and other towns and cities following programmes of investment have illustrated that there is significant potential for change in travel behaviour and that more people cycle for everyday journeys[1] where acceptable conditions are provided. Two out of every three personal trips are less than five miles in length[2] – an achievable distance to cycle for most people, with many shorter journeys also suitable for walking. For schoolchildren the opportunities are even greater: three quarters of children live within a 15-minute cycle ride of a secondary school, while more than 90% live within a 15-minute walk of a primary school.

Figure 2.1: Cycling potential baseline statistics, 2016

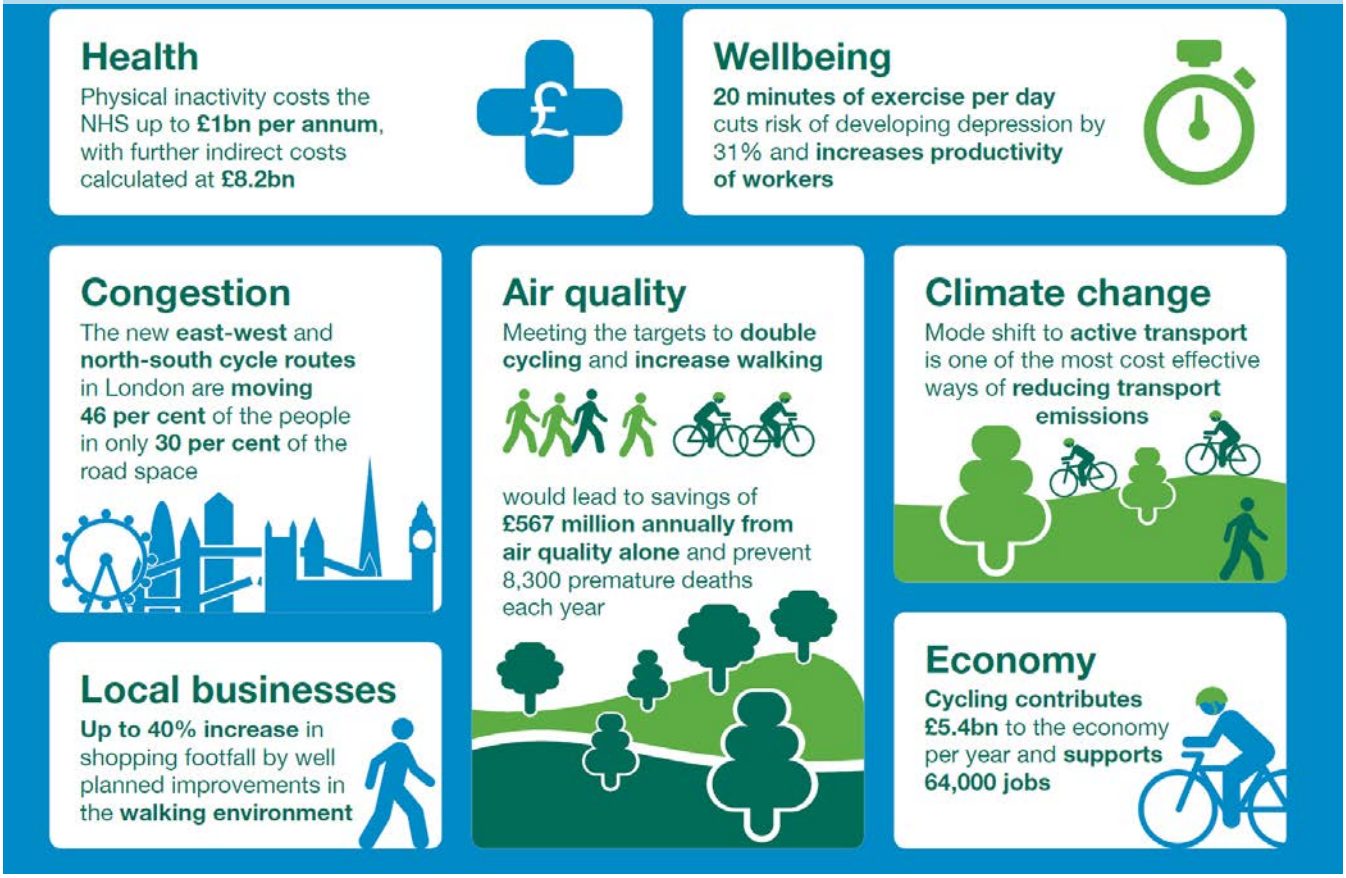


Source: Cycling and Walking Investment Strategy, DfT, 2016

1 Aldred R, Goodman A, Gulliver J and Woodcock J, Cycling injury risk in London: A case-control study exploring the impact of cycle volumes, motor vehicle volumes, and road characteristics including speed limits. Accident Analysis and Prevention, Vol 117, August 2018

2 Transport Statistics Great Britain, DfT, 2016

Figure 2.2: The benefits of cycling and walking investment, DfT, 2018



Source: Government response to Call for Evidence: Cycling and Walking Investment Strategy: Safety Review, DfT, 2018

2.2.3 Cycling for leisure and tourism has also experienced rapid growth. Sustainable tourism can be an important factor in supporting rural economies, and cycling and walking are both very accessible activities to improve public health.

2.3 The benefits of cycling

2.3.1 Enabling more people to cycle will help local authorities to achieve a broad range of positive transport outcomes and wider environment and public health goals. Local land use and transport strategies provide the opportunity for local authorities to plan how to increase cycling to help deliver these goals.

2.3.2 Cycling brings many economic benefits,[3] reducing some of the external costs of congestion and pollution associated with motor traffic, and reducing the healthcare costs associated with physical inactivity and poor air quality.[4]

2.3.3 Cycling improves physical and mental health, reducing healthcare costs and costs of absenteeism. Many people simply find it a pleasurable activity that can be easily combined with the daily journeys that they need to make for other purposes.

2.3.4 There is a growing body of evidence to suggest that cycle and pedestrian-friendly streets can boost footfall and retail sales, helping to revive traditional high streets and town centres by creating more pleasant conditions.[5,6]

3 PJA/University of Birmingham The Value of Cycling: rapid evidence review of the economic benefits of cycling, DfT, 2016
4 Brooke Lyndhurst Investing in Cycling and Walking, Rapid Evidence Assessment, DfT, 2016
5 Brooke Lyndhurst Investing in Cycling and Walking, Rapid Evidence Assessment, DfT, 2016
6 PJA/University of Birmingham The Value of Cycling: rapid evidence review of the economic benefits of cycling, DfT, 2016

Figure 2.3: Effects of cycling investment

Source: Cycling and Walking Investment Strategy, DfT, 2016

2.3.5 As an affordable mode of transport, cycling can be an important way for people to access local services, education and employment. This is particularly the case for those who need to travel when public transport is unavailable.

2.3.6 Successive programmes of investment such as the Sustainable Travel Towns programme, the Local Sustainable Transport Fund, and the Cycle City Ambition Grant programme have yielded positive increases in cycling where new and better infrastructure has been provided.[7]

2.4 Inclusive cycling

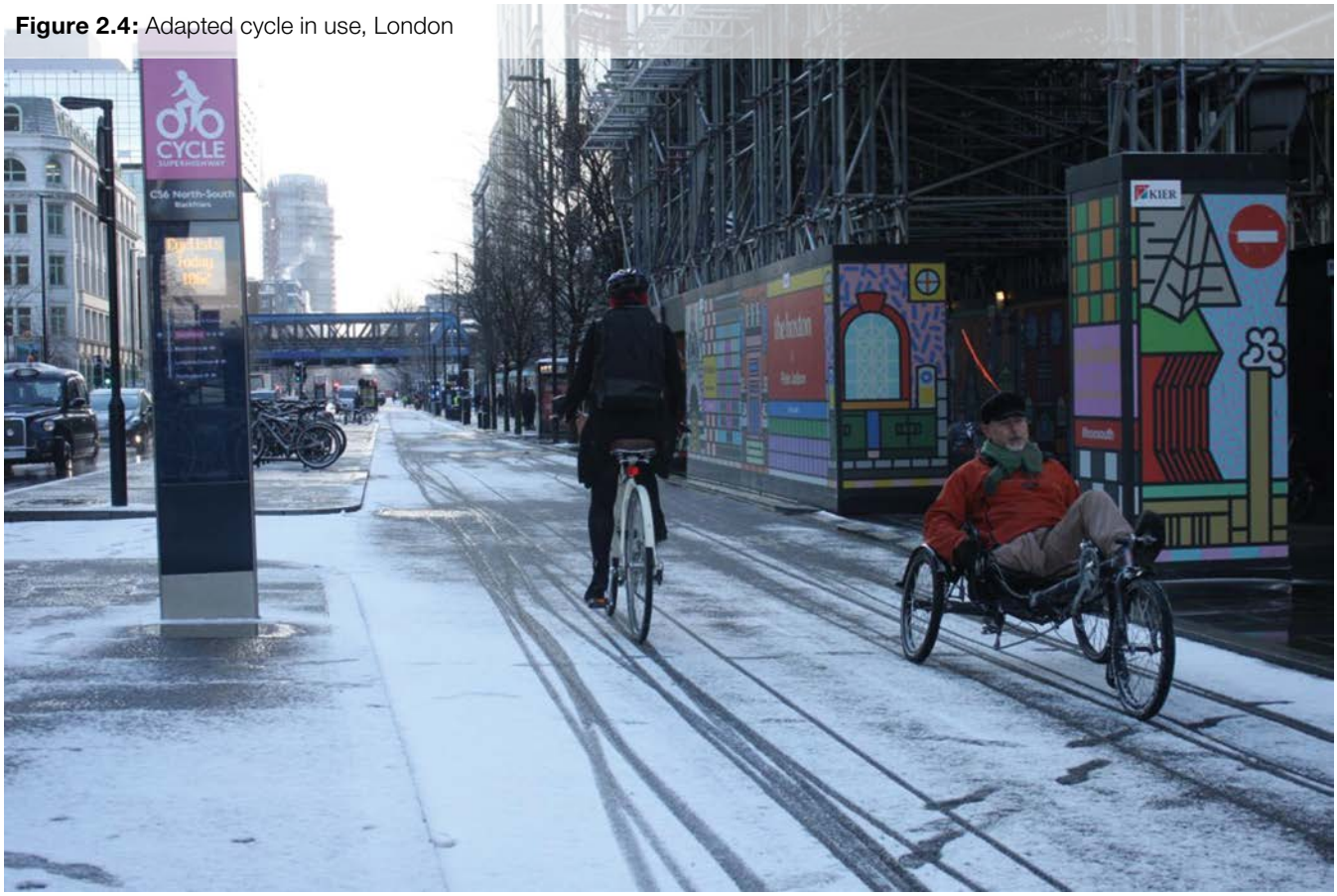
2.4.1 Cycling should be accessible to people of all ages and abilities. The Equality Act 2010 places a duty on public sector authorities to comply with the Public Sector Equality Duty in carrying out their functions. This includes making reasonable adjustments to the existing built environment to ensure the design of new infrastructure is accessible to all.

2.4.2 For many people, a cycle is a mobility aid that helps them get around or carry items or passengers. This does not have to be a specially-adapted cycle – it may simply be a conventional cycle that enables them to travel when they cannot drive, or walk very far, due to a health condition or disability. For other people, an adapted cycle such as a handcycle or a tricycle may be a mode of independent transport that frees them from reliance on assistance from others. A visually impaired person may be traveling on a tandem; parents may be carrying young children in a trailer or specially designed cargo bike.

2.4.3 Data collected by Transport for London[8] found that the proportion of disabled Londoners who sometimes use a cycle to get around (15%) is only slightly less than for non-disabled Londoners (18%), demonstrating that cycling is an important mode of transport for everyone. The role of cycling as an aid to mobility is often overlooked. It can help many people to travel independently, but only if the infrastructure is accessible to a range of cycles used by people with children and disabled people. It is therefore very important to ensure that new cycle infrastructure is designed for use by everyone.

7 Value for Money assessment of cycling grants, DfT, 2014
8 Wheels for Wellbeing, Guide to Inclusive Cycling, 2017

Figure 2.4: Adapted cycle in use, London



3

Planning for cycling

The concept of a connected network is fundamental to transport planning for all modes. Networks comprise nodes (junctions, origins and destinations) and links. Developing an intended network plan follows a process of thinking about the people who make trips, the places that they go to and the journey purpose. This approach provides a sound basis for funding applications and the development of business cases for investment in infrastructure. Technological improvements are providing more detailed information about the movements of people, enabling the volume and spatial distribution of short trips (over distances that could be easily cycled) to be identified. This offers the opportunity to pursue a demand-led approach to cycle infrastructure provision.

3.1 Introduction

3.1.1 This chapter looks at the process of planning local networks for cycling and explains various techniques for applying data to network planning and delivery. It summarises the information in the Department's Local Cycling and Walking Infrastructure Plans[9] suite of guidance.

3.1.2 A network plan is a vital component of infrastructure development, setting out the connections between origins and destinations, providing a basis for prioritisation in investment programmes, and informing design teams about the routes likely to carry higher volumes of cycle traffic.

3.1.3 Planning for cycling should be based around providing a network of on- and/or off-carriageway routes that are suitable for all abilities. Subject to topographical constraints, the aim is to create a densely spaced network (typically with 250m to 1km spacing between routes depending on the density of land use) so that all people can easily travel by cycle for trips within and between neighbourhoods. In addition to this there will be longer distance routes within the local network that may serve leisure, tourism and utility cycling.

3.1.4 The guidance on Local Cycling and Walking Infrastructure Plans (LCWIPs) gives details on the process for developing a local cycle network and prioritising the interventions for implementation. This chapter draws on that guidance to put the various design elements described in subsequent chapters of this document into context.

3.1.5 The LCWIP guidance suggests a six-stage process for developing an Infrastructure Plan as shown in Figure 3.1. These stages are common to all network planning activities regardless of whether they form part of a formal LCWIP or not. Planning a network for walking is part of the process because most of the core destinations are common to both modes, and redesigning streets to accommodate cycle infrastructure also requires accompanying changes to improve the pedestrian environment and mitigate any negative impacts of new cycle infrastructure.

Figure 3.1 LCWIP stages

Stage 1: Determining Scope Geographical extent, governance and timescales
Stage 2: Information Gathering Identify existing patterns and potential new journeys
Stage 3: Network Planning for Cycling Identify origins, destinations and cycle flows. Convert into a network of routes and determine the types of improvements required.
Stage 4: Network Planning for Walking Identify key trip generators, core walking zones and routes, audit existing provision and determine the type of improvements required
Stage 5: Prioritising Improvements Develop a phased plan for future investment
Stage 6: Integration and Application Integrate outputs into current policies and strategies

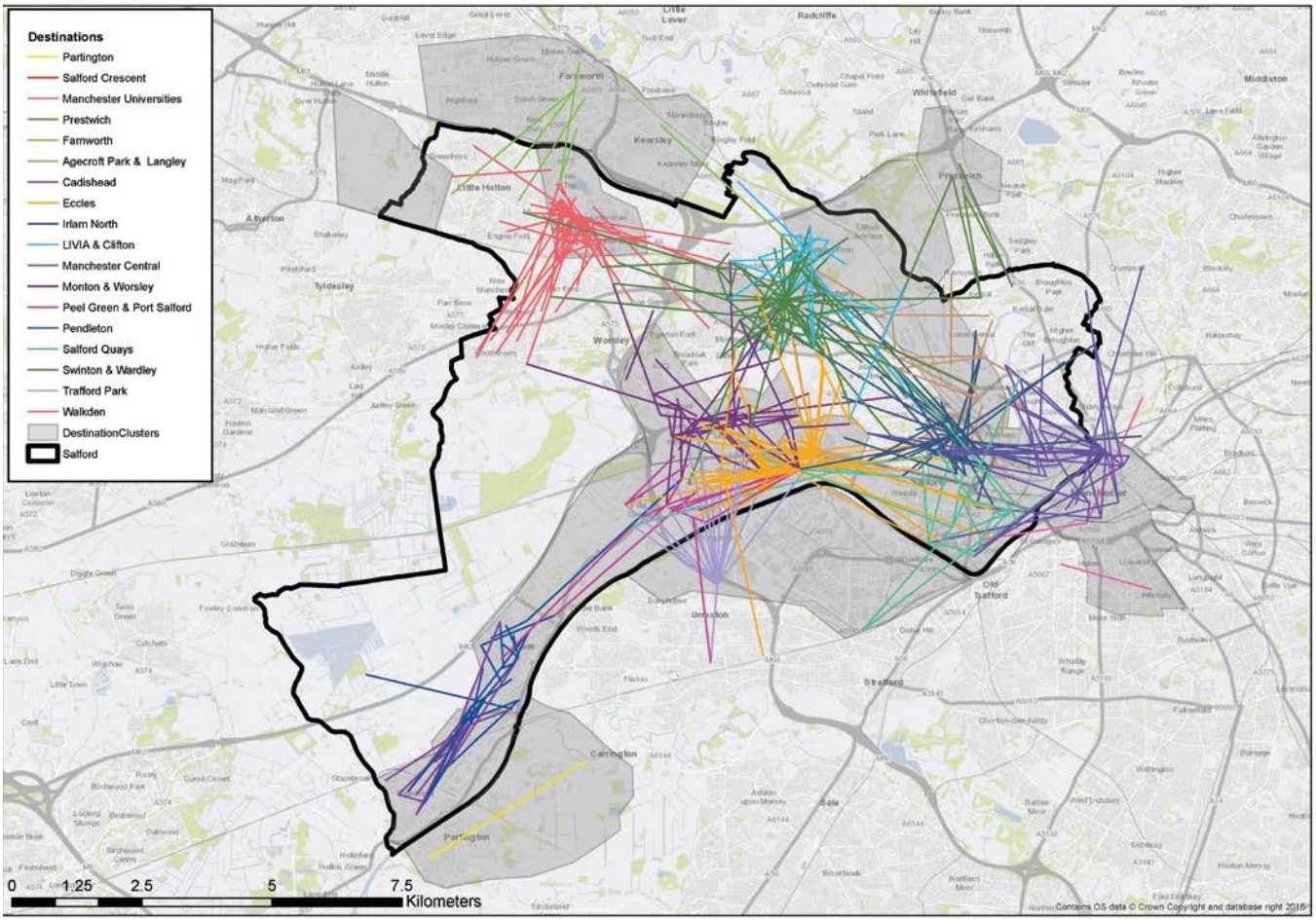
3.2 Demand-based planning

3.2.1 The CWIS is particularly focussed on opportunities to get people to make regular short local trips on foot or by cycle instead of private car, and so networks should ideally be based around enabling those trips. This requires analysis of existing travel behaviour and trip patterns (Figure 3.2) to gain an understanding of local travel demand and which trips might be possible to cycle or walk. This does not rule out opportunities to repurpose existing infrastructure such as former/disused railway lines, so long as these offer good potential to enable local trips by active modes.

3.2.2 The Propensity to Cycle Tool (www.pct.bike) provides analyses of local trips based on Census Journey to Work and school travel data, and includes a 'scenario planning' function to show how trips might increase given the right conditions. The tool also enables the user to allocate the trips to the transport network to build up a picture of the relative cycle flows in different parts of the network.

9 Local Cycling and Walking Infrastructure Plan Guidance and Toolkit, DfT, 2017

Figure 3.2: Analysis of local trip patterns using travel survey data



3.2.3 Some local highway authorities have additional data from area transport models and travel surveys, which can help build up a more comprehensive picture of travel patterns. Any geo-coded spatial data can be imported to Geographic Information Systems (GIS) and displayed in a graphic form that gives viewers an 'at a glance' insight to local travel patterns.

3.2.4 Local transport and land use policies set out the aspirations for a wide range of issues to which cycling can contribute, providing the local spatial and transport planning context for the development of a cycle route network. Local Plans should consider section 9 of the National Planning Policy Framework on "Promoting sustainable transport",[10] including consideration of high quality cycling and walking networks and supporting facilities such as cycle parking, drawing on LCWIPs.

3.2.5 Existing data such as traffic counts, census journey to work information and local travel surveys can help build up a picture of the journeys to focus on. Other issues such as deprivation, public health, links to existing infrastructure and funding opportunities may also be taken into consideration when prioritising which routes to develop first in a programme of network development. When looking at existing patterns of behaviour, it should be borne in mind that some potential travellers may not be represented because they are afraid to travel in existing conditions, or unable to travel because the routes currently available are inaccessible to people riding their type of cycle.

3.3 Stakeholder participation

3.3.1 Engagement with professionals working in transport, planning, traffic engineering and public health within the local authority, and with external organisations is important. This helps to pool local knowledge and is a first stage towards political and public endorsement of the network plan and associated infrastructure schemes. Where the objective of a scheme is wider than transport

10 National Planning Policy Framework, MHCLG, 2019

provision, for example to enable improved public health or access to employment and education opportunities, it is essential that relevant officers and representatives from those sectors are involved from the beginning alongside transportation professionals and advocates to ensure acceptance of the scheme.

3.3.2 Network planning across a whole city or region can be difficult for stakeholders as individuals generally know their patch or regular route, but not other areas. A series of community-based workshops supported by online opportunities can be an effective way to gather local knowledge.

3.3.3 New cycle infrastructure is often delivered within a local policy context of creating better places and healthy lifestyles, and can involve major changes to the look and feel of a street. Communicating the vision behind a scheme is important, particularly as many people who participate in engagement have rarely used a cycle themselves. While it is inevitable that not everybody will welcome changes, those in opposition are often the most vociferous participants and the engagement process should try to build consensus. It should also enable a record of design decisions and the rationale behind them to be developed to help build consensus.

3.3.4 Strong political leadership and a comprehensive evidence base will help to ensure a scheme progresses through to implementation. Typical stakeholders are shown in Figure 3.3.

3.3.5 People in protected groups under the Equality Act 2010 are sometimes inadvertently excluded from engagement because the venues or media used are not accessible. Wheelchair accessible venues, information in easy-read format etc. should always be provided so that everyone can take part. Opportunities for online participation can be helpful to parents of young children and other members of the public who may find it difficult to attend formal meetings, including people with physical, sensory and cognitive impairments. Children and young people are covered by the Equality Act and should be encouraged to participate through appropriate engagement methods.

3.3.6 Scheme promoters should actively seek out groups that may not be aware of the planned scheme and ensure they have the opportunity to comment. This may require a separate process, for example arranging meetings with local disability groups.

3.3.7 Guidance on good practice in engagement is available, for example in the Chartered Institution of Highways & Transportation (CIHT) document 'Involving the Public and other Stakeholders'.

3.4 Components of the network

3.4.1 A local network will typically be made up of various elements:

- Dedicated space for cycling within highways;
- Quiet mixed traffic streets;

Figure 3.3: Illustrative range of stakeholders

Public Interest	Delivery Partners	Other Organisations
› Cycling, walking and equestrian organisations › Groups representing disabled people › Local residents › Local campaign groups › Local schools › Business groups and major employers › Universities › Places of worship › Taxi operators › Freight operators	› Adjoining local authorities › Network Rail › Train operators › Bus operators › Sustrans › Canal & River Trust › Public health bodies › Tourism operators	› Local elected members › Local MPs › Other local authority departments › Local Enterprise Partnerships (LEPs) › Rights of Way Improvement Plan (ROWIP) reference groups › Neighbourhood planning groups › Parish Councils › Police and emergency services › Business Improvement Districts

- Motor traffic free routes;
- Junction treatments and crossings; and
- Cycle parking at origins, destinations and interchanges with other modes

3.4.2 Cycle routes may also fulfil various functions as part of the network:

- Primary routes – between major trip generators;
- Secondary routes – connections into local centres;
- Local access to streets and attractors; and
- Long distance and leisure routes

3.4.3 All elements listed above can form an integrated network. The appropriate design depends on traffic speeds and flows, whether the network is rural, urban or residential, and scheme-specific factors such as the available budget and political support. Further guidance on selecting the appropriate type of cycle provision is given in Chapter 4.

3.4.4 As well as cycle-specific infrastructure, general highway improvements, other capital transport schemes, local traffic management and speed management measures can play an important role in creating conditions conducive to more cycling (see Chapter 14).

3.4.5 There may be more than one way to connect two places in a network. The Route Selection Tool (RST) in the LCWIP guidance offers a way to compare the qualities of each potential alignment.

3.5 Network planning techniques

3.5.1 Mesh density (as shown in Figure 3.4) can be used to analyse the coverage of existing (and planned) cycle routes in order to help identify where there are gaps. It is a simple analysis of the length of cycle route within each kilometre square. In a built-up area, the spacing of routes should typically be 250m – 400m, but this will decrease in outer suburbs where the density of development is lower.

Figure 3.4: Example of cell-based route density analysis

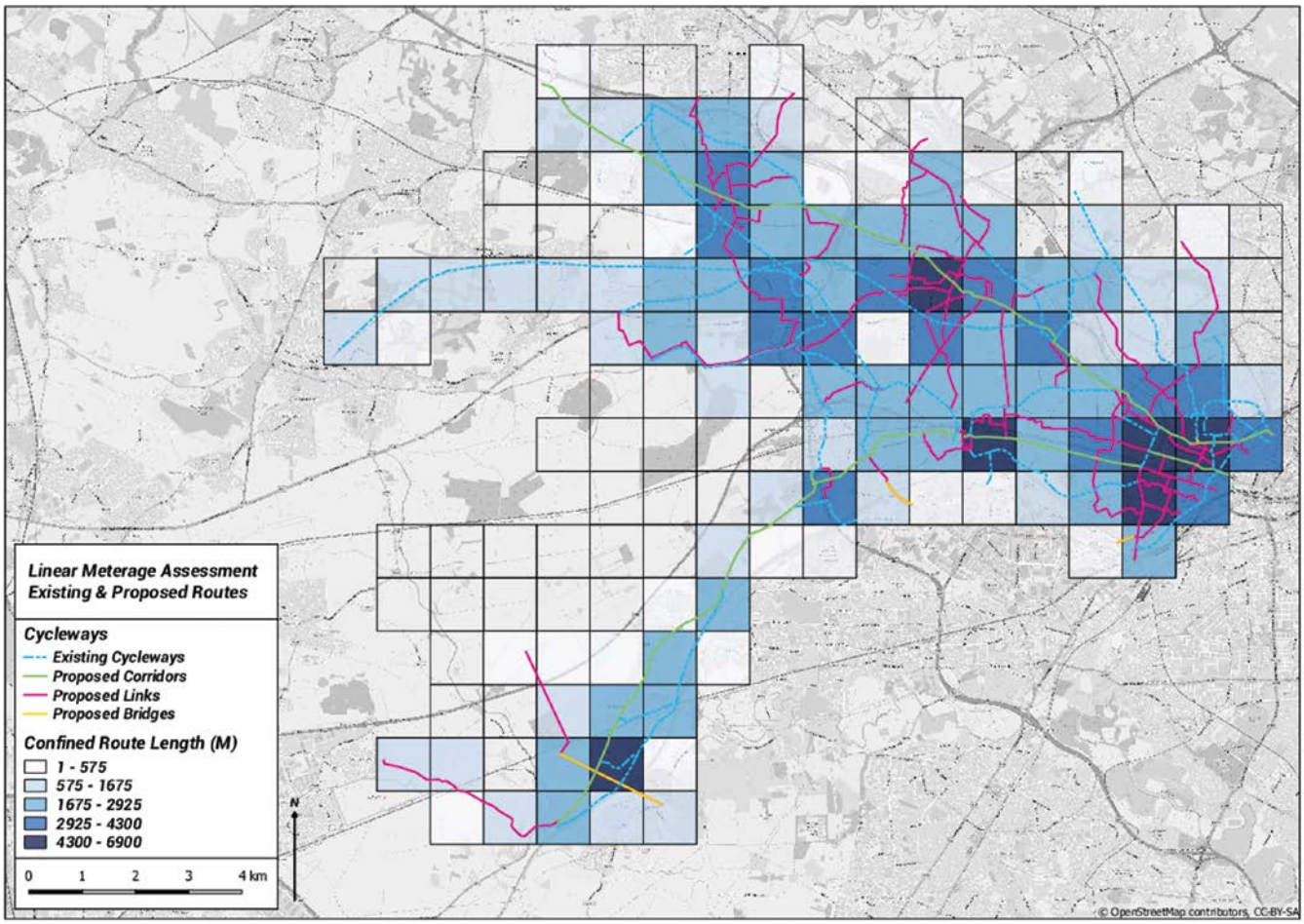
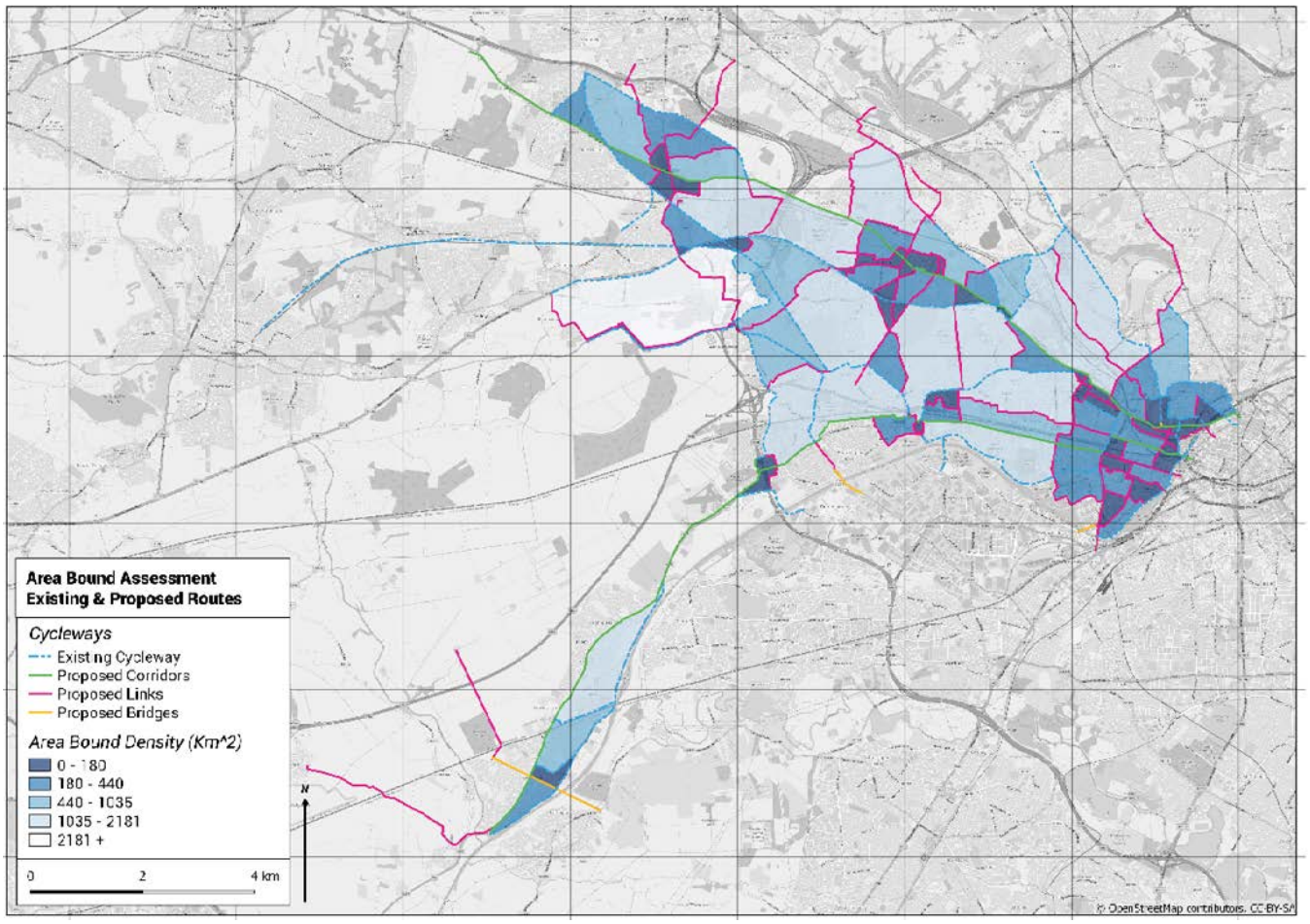


Figure 3.5: Example of an area bound route density map (PJA/Salford Council)



3.5.2 The kilometre squares can be replaced by local areas bounded by the road network; a technique developed by TfL (see Figure 3.5). The density calculation is made with regard to the size of each area.

3.5.3 This can be misleading in hilly topography and other areas where the density of settlement and quality of available routes may be highly variable. A more simplistic approach, of plotting the connections between the main trip attractors and origins (such as major residential areas) can be just as effective and may be all that is required to identify gaps in the cycle network in most towns and smaller cities.

Area based approach to delivery

3.5.4 The local network typically includes all local quiet streets where the speed and volume of traffic is acceptable for on-carriageway cycling. An alternative approach is to consider which streets are suitable for Bikeability Level 2 skills (typically independent travel by a 12 year old child), and then which would require treatment to enable cycling with this level of competence.

3.5.5 An area-based approach, linking areas of low traffic volume with facilities and crossings on busier streets, can be an effective way to build up and link together cycle-friendly neighbourhoods. Comprehensive area traffic management can be used to create these quiet zones. This approach is best suited where there is good connectivity between quieter streets in the network (see Chapter 7, Section 7.1).

3.5.6 Area-based schemes require careful planning and assessment of impacts. Traffic management measures may displace traffic onto neighbouring streets. Access for the emergency services and practicalities such as refuse collection have to be accommodated.

Trials

3.5.7 Trials are one way to get an understanding of potential impacts, and to help demonstrate a potential scheme. A trial may involve temporary barriers and landscaping such as planters that can be installed for a few weeks, or simply coning-off a lane to demonstrate the impact of reallocating space for a cycle lane or track. It is important that local communities are made aware of

trials well in advance, and that they take place for long enough to allow a scheme to settle down as people get used to the new arrangements. It is particularly important to make local disability groups aware of changes, which may impact on their ability to navigate, or to gain access to facilities such as disabled parking spaces. Engagement sessions with local disabled people may help identify and communicate alternative accessible routes. The provision of travel buddies to help visually impaired people learn to adjust to changes along previously familiar routes at the start of trial schemes may be particularly helpful and is recommended.

3.5.8 Trials will require the appropriate temporary or experimental traffic orders where existing legal arrangements on the highway (such as parking, turning, access) are being altered. Trials will also need to comply with relevant legal requirements, including the Traffic Signs Regulations and General Directions (TSRGD).[11]

3.5.9 It is important to monitor behaviour before and during the trial period, and after final scheme implementation. Trials can form an important part of the engagement process, helping to generate local support and explain how the issues encountered might be addressed in the final scheme. Sharing data and experience is important to help build up knowledge of the processes of planning, engagement and participation that result in successful scheme delivery, and which are just as vital as the physical design aspects.

Figure 3.6: Simple mode filters, such as this one in Hackney, help form cycle-friendly neighbourhoods

11 Traffic Signs Regulations and General Directions, DFT, 2016

4

Design principles and processes

Cycle traffic has its own characteristics that are distinct from motor traffic and pedestrian traffic. These should be recognised and incorporated from the outset of the planning and design process. There are five fundamental design principles for all cycle infrastructure that will ensure it is accessible to all. The relative importance of each attribute, and how each is delivered, will depend on the situation in which design is being applied. For example, safety for cyclists is largely determined by achieving separation from busy and fast motor traffic, but this can be achieved in several ways, by provision of separate infrastructure, through removal of traffic from an existing street, or a reduction in traffic speed or volume. There are audit and review procedures that offer a framework to help understand the issues behind the five criteria and how to prioritise addressing them when designing schemes. When designing new highways and improvement schemes, planning for cycling from the outset can ensure that sufficient land is acquired to accommodate the optimum design.

4.1 Introduction

4.1.1 This chapter looks at some of the basic ideas that underpin the design process for cycle route networks. Dimensions to meet the needs of all people able to use a cycle are set out in Chapter 5 and subsequent chapters covering design elements. This chapter includes:

- The basis of designing for cyclists' needs;
- Minimising the effort required to cycle;
- Providing protection from motor traffic in different circumstances; and
- Quality assessment techniques

4.2 Core design principles

4.2.1 There are five principles which represent the core requirements for people wishing to travel by cycle or on foot. Accessibility for all is a requirement that should always be considered in relation to each of the principles. Designers should always aim to provide infrastructure that meets these principles and therefore caters for the broadest range of people. While cyclists and pedestrians share the same underlying design principles, the geometric design requirements for pedestrians and cyclists are not the same, owing to the differential in speed and mass. Geometric requirements are explored in Chapter 5.

4.2.2 When people are travelling by cycle, they need networks and routes that are:

- Coherent;
- Direct;
- Safe;
- Comfortable; and
- Attractive

4.2.3 These design principles are further described below.

Coherent

4.2.4 Cycle networks should be planned and designed to allow people to reach their day to day destinations easily, along routes that connect, are simple to navigate and are of a consistently high quality. Abrupt reductions in the quality of provision for cyclists – such as a busy high-speed roundabout without facilities – will mean that an otherwise serviceable route becomes unusable by most potential users. Sections that do not meet accessibility standards, such as steps on a cycle route, will render a whole journey inaccessible for some people.

4.2.5 Main roads are often the only direct, coherent route available to move between places, but these are usually the roads where people most fear the danger from motor vehicles. Consequently, the provision of adequately safe, attractive and comfortable facilities along these roads is crucial to creating a coherent cycling network.

4.2.6 A cycle route may vary in nature along its length, for example a signed route along a quiet street may continue as a motor traffic free route through a green space, but the connection between successive sections should be obvious. Similarly, a route through a complex junction should be clear to all road users. Direction signs, road markings and coloured surfacing in combination with physical design features can all help to provide coherence.

Direct

4.2.7 Directness is measured in both distance and time, and so routes should provide the shortest and fastest way of travelling from place to place. This includes providing facilities at junctions that minimise delay and the need to stop. Minimising the effort required to cycle, by enabling cyclists to maintain momentum, is an important aspect of directness. An indirect designated route involving extra distance or more stopping and starting will result in some cyclists choosing the most direct, faster option, even if it is less safe.

4.2.8 To make cycling an attractive alternative to driving short distances, cycle routes should be at least as direct – and preferably more direct – than those available for private motor vehicles. Permitting cyclists to make movements prohibited to motor traffic, allowing contraflow cycling, and creating links between cul-de-sacs to enable cyclists to take the shortest route, should be the default approach in traffic management

schemes and new road networks. Area-wide schemes and new developments can enable filtered permeability, allowing cyclists and pedestrians to take more direct routes than motorised traffic.

Safe

4.2.9 Not only must cycle infrastructure be safe, it should also be perceived to be safe so that more people feel able to cycle.

4.2.10 Safety and environmental improvements for all road users can be achieved by reducing motor traffic volumes and speeds, for example by introducing filtered permeability or traffic calming. Reducing motor traffic may also release space to enable the construction of separate facilities for cyclists on links and at junctions.

4.2.11 On busy strategic roads where a significant reduction in traffic speeds and volumes is not appropriate, safety will need to be achieved by providing dedicated and protected space for cycling, which may involve reallocating existing space within the highway (or providing a parallel route). Reallocation will typically involve moving kerb lines and street furniture, and providing well-designed crossings and facilities at junctions where most casualties occur. The potential for conflict between pedestrians and cyclists should be minimised by keeping them separate except in low speed, low traffic environments (see Figure 4.2). Where pedestrians and cyclists share surfaces, sufficient width should be provided to enable users to feel safe by allowing them to see other users and to avoid each other when passing.

4.2.12 Cycle routes remote from roads may have other risks relating to crime and personal security. The risk of crime can be reduced through the removal of hiding places along a route, by providing frequent access points, by providing lighting, and by passive surveillance from overlooking buildings and other users.

4.2.13 Maintenance to address surface defects, overgrown vegetation, fallen leaves, snow and ice will all help to reduce the likelihood of falls and crashes for all people and preserve available width and sight lines for cyclists. Cycle parking should be sited where people using the facilities can feel safe from traffic and crime, and away from pedestrian paths.

Comfortable

4.2.14 Comfortable conditions for cycling require routes with good quality, well-maintained smooth surfaces, adequate width for the volume of users, minimal stopping and starting, avoiding steep gradients, excessive or uneven crossfall and adverse camber. The need to interact with high speed or high-volume motor traffic also decreases user comfort by increasing the level of stress and the mental effort required to cycle.

4.2.15 Adequate width is important for comfort. Cycling is a sociable activity and many people will want to cycle side by side, and to overtake another cyclist safely. It is important that cyclists can choose their own speed so that they can make comfortable progress commensurate with the amount of effort they wish to put in.

4.2.16 Designers should consider comfort for all users including children, families, older and disabled people using three or four-wheeled cycles. Families are more likely to use off-carriageway facilities. Young children may need additional space to wobble or for an accompanying parent to ride alongside.

Attractive

4.2.17 Cycling and walking provide a more sensory experience than driving. People are more directly exposed to the environment they are moving through and value attractive routes through parks, waterfront locations, and well-designed streets and squares. Cycling is a pleasurable activity, in part because it involves such close contact with the surroundings, but this also intensifies concerns about personal security and traffic danger. The attractiveness of the route will therefore affect whether users choose cycling as a means of transport.

4.2.18 The environment should be attractive, stimulating and free from litter or broken glass. The ability for people to window shop, walk or cycle two abreast, converse or stop to rest or look at a view, makes for a more pleasant experience.

4.2.19 Cycle infrastructure should help to deliver public spaces that are well designed and finished in attractive materials and be places that people want to spend time using. The surfaces, landscaping and street furniture should be well maintained and in keeping with the surrounding area. Planting in parks and rural areas should consider the aesthetic and sensory qualities that create attractive vistas and fragrances as well as practical considerations about maintenance.

Table 4-1: Factors affecting cycling effort

Factors	Comments	Design implications
The cycle and rider – speed, mass and acceleration	Energy is required to move from rest to the cyclist's chosen speed, depending on the rate of acceleration and the mass of the rider and cycle. Stopping and then restarting means that significant additional effort is required, over and above maintaining a constant speed.	Routes that are direct and allow cyclists to maintain a steady speed are the most appealing. Designers should avoid layouts which make cyclists stop, slow down, or deviate unnecessarily from their desired route.
Surface quality and resistance	The greater the surface resistance, the harder it is to cycle. This is particularly true for small-wheeled cycles.	Cycle routes should be surfaced in smooth bound materials that are unaffected by weather and are well-maintained at all times of year.
Gradient	The steeper the gradient, the more energy is required to overcome it. Three and four wheeled cycles are affected by excessive camber, making it hard to steer. All cyclists are affected by camber in icy conditions.	Directness of route may need to be balanced with avoiding steep gradients. The Route Selection Tool (RST), used as part of the LCWIP process, can be useful in assessing alternatives. Camber should be adequate for drainage but not excessive, and fall to the inside of bends.
Air resistance	Air resistance can add significantly to the effort required to cycle, particularly for 'city bikes' where the rider is more upright. Cycling into a prevailing headwind, which can be exacerbated by a local microclimate, can increase this effort.	Windbreaks using planting, trees, hedges or fences, can help mitigate the effects of strong prevailing winds.

4.3 The effort required to cycle

4.3.1 The effort required to cycle and to maintain a constant speed is affected by physical conditions and the local environment: surface quality, surface material, gradients, deflections and undulations, and prevailing winds.

4.3.2 Minimising effort should be a key consideration in the design of any infrastructure, so that cycling is a comfortable and pleasant experience. Suggested positive steps to achieve this are shown in Table 4-1. E-bikes (electrically-assisted pedal cycles) also overcome some of these issues by providing a boost in power to assist the rider.

4.4 Protection from motor traffic on highway links

When to protect

4.4.1 Motor traffic is the main deterrent to cycling for many people[12] with 62% of UK adults feeling that the roads are too unsafe for them to cycle on.[13] Providing protected space has resulted in huge increases of cyclists on routes in London,[14] Manchester and other major cities.[15] The need to provide protected space for cycling on highways generally depends on the speed and volume of motor traffic. For example, in quiet residential streets, most people will be comfortable cycling on the carriageway even though they will be passed by the occasional car moving at low speeds.

12 Davies, D, Gardner, G, Gray, C, Harland, G A Quantitative Study of the Attitudes of Individuals to Cycling, TRL Report 481, 2001
13 Walking and Cycling Statistics: England 2017, DfT, 2018
14 London's Cycling Infrastructure Report, London Assembly Transport Committee, March 2018
15 Cycle City Ambition Programme, Baseline and Interim Report, Transport for Quality of Life (for DfT), 2017

On busier and faster highways, most people will not be prepared to cycle on the carriageway, so they will not cycle at all, or some may unlawfully use the footway.

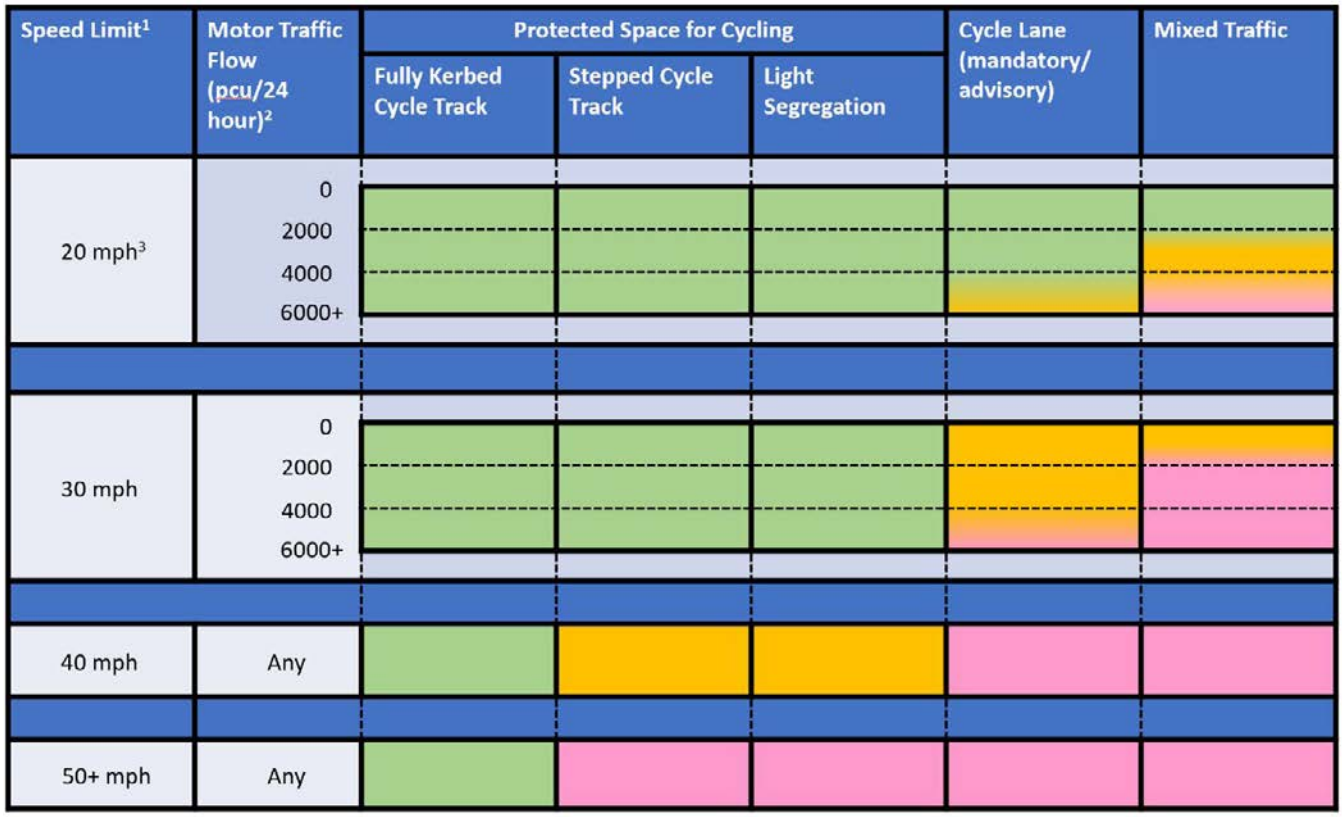
4.4.2 Figure 4.1 summarises the traffic conditions when protected space for cycling (fully kerbed cycle tracks, stepped cycle tracks and light segregation), marked cycle lanes without physical features and cycling in mixed traffic are appropriate.

4.4.3 More detail on the design of these types of cycle infrastructure is given in Chapters 6 and 7.

4.4.4 Figure 4.1 shows that:

- Protected space for cycling will enable most people to cycle, regardless of the volume of motor traffic, although stepped cycle tracks and light segregation are not generally considered suitable for roads with speed limits above 40mph in urban areas. Stepped cycle tracks and light segregation may be appropriate on some suburban and interurban roads with 40mph speed limits where HGV traffic is limited and traffic flows are less than 6,000 PCU per day.
- Although there may be fewer cyclists and pedestrians in rural areas, the same requirement for separation from fast moving motor vehicles applies. A well-constructed shared use facility designed to meet the needs of cycle traffic – including its width, alignment and treatment at side roads and other junctions – may be adequate where pedestrian numbers are very low.
- Reducing the volume and speed of motor traffic can create acceptable conditions for on-carriageway cycling in mixed traffic and should always be considered as it delivers other safety and environmental benefits to streets. This is often the only feasible approach on narrow roads lined by buildings.
- Cycle lanes on the carriageway can be appropriate on less busy roads with lower speed limits, but do not provide any physical protection from motor vehicles and so do not adequately meet the needs of most people on busier and faster roads.

Figure 4.1: Appropriate protection from motor traffic on highways



Notes:

1. If the 85th percentile speed is more than 10% above the speed limit the next highest speed limit should be applied
2. The recommended provision assumes that the peak hour motor traffic flow is no more than 10% of the 24 hour flow
3. In rural areas achieving speeds of 20mph may be difficult, and so shared routes with speeds of up to 30mph will be generally acceptable with motor vehicle flows of up to 1,000 pcu per day

4.4.5 The values in Figure 4.1 are derived from the following guidance: Tables 5.2 and 5.3 in the Design Manual for Bicycle Traffic, CROW Record 28, 2016; London Cycling Design Standards, Chapter 2, TfL 2016 and the Urban Bikeway Design Guide, NACTO, 2012. The numbers are based on the frequency of interactions between opposing vehicles at different speed/flow permutations and user satisfaction surveys (in the research for CROW and TfL design guides) which helped to define the points at which people feel uncomfortable sharing the carriageway.

4.4.6 When cycle tracks or light segregation are used to provide protected space for cyclists this potentially introduces issues for kerbside access for parking and delivery, and additional complications around pedestrian crossing points and bus stops that will need to be addressed during design. Suitable protection will also need to be provided through junctions as well as on links to create a complete, coherent and safe route that is useable by most people. Guidance on the design of junctions is given in Chapter 10.

Protection on highway links in different contexts

4.4.7 Where highway conditions require cycling in a protected space, the design affects the appearance of the street. The additional separation from motor traffic that a cycle track provides can make streets more attractive with better ambience for pedestrians. However, additional street clutter such as signs, coloured surfaces or upstand kerbs also has potentially negative impacts that need to be minimised.

4.4.8 Aesthetic qualities are subjective, but a rationale can be achieved by considering the forms of protection in relation to street functions. Manual for Streets[16] introduced the concept that the primary functions of urban streets are movement (by all modes) and place. The place function considers the street as a destination in its own right, and where people may simply wish to spend time (see Figure 4.2). Design of cycle facilities also needs to be responsive to these considerations. Figures 4.3 and 4.4 illustrate how different approaches can be used in different circumstances.

Figure 4.2: Typical road and street types in the place and movement hierarchy (from Manual for Streets)

16 Manual for Streets, Department for Transport, 2007

Figure 4.3: Edge of city distributor road, Oxford uses a stepped cycle track for separation from motor traffic

Figure 4.4: City centre access road, Norwich, uses a mode filter and vehicle restricted area to provide separation from motor traffic

4.4.9 For streets with a high place value, greater emphasis will need to be placed on the effect on 'place' functions of the chosen method of protecting space for cycling. This includes the needs of pedestrians moving around the area, as well as its visual impact.

4.4.10 Further details on these types of cycle facility are given in Chapters 6 and 7.

4.5 Assessment techniques and audits

4.5.1 Chapter 1 describes the **tools** that should be used as part of the funding process and includes the **Cycling Level of Service** and **Junction Assessment** tools. Assessment techniques offer a framework to ensure that a scheme conforms to good practice and that it is accessible and safe. The assessment may be a simple checklist to prompt designers to consider the issues, or a more complex appraisal process that can help to demonstrate how well a scheme meets various design criteria. An **audit** is typically applied during the various stages of scheme design, including post-opening. A **review** is usually carried out on an existing road or facility in order to assess the current conditions and issues to help inform the design process. In practice these terms are often used interchangeably and further detail of the methodology is given in the source guidance for the various techniques that are summarised below.

Cycling level of service

4.5.2 While minimum dimensions provide a guide to what constitutes adequate cycling conditions, there are other aspects to be taken into consideration, all of which can contribute positively or negatively to the experience of cycling. These make up distinct elements of the five core design principles (see section 4.1) that contribute to an overall level of service within a given situation. These include, for example, the likelihood of coming into conflict with other users and the impact of crowding in busy periods, which affect comfort or safety. Traditionally, traffic engineering places great emphasis on road safety in relation to motor traffic, but as discussed above, this is just one of the design considerations.

4.5.3 A recommended **Cycling Level of Service** (CLoS) tool is provided in Appendix A. This includes a simple scoring assessment based on attributes of the five design criteria, which can be used to identify strengths and weaknesses, and therefore what the design needs to address. The tool includes some factors that are considered to be 'Critical Fails' – results that represent unsafe conditions for cycling which must be addressed (or an alternative route found).

4.5.4 Cycling rarely happens in isolation, and it may be useful to consider adopting a whole street approach, such as TfL's **Healthy Streets Check for Designers**.[17]

4.5.5 Good cycle infrastructure is normally accessible to a wide range of people but an independent **Access Audit** (see 4.5.11) should be carried out to identify any negative impacts on other users such as access to disabled parking bays or potential trip hazards. Within that context, it is still important to meet the cycling design quality, which the CLoS tool measures.

4.5.6 A cycle route may consist of different types of infrastructure along its length. It may therefore be necessary to split the route into consistent sections (in terms of design) and then assess each section independently. It may only be necessary to assess the more problematic sections to analyse the type and severity of the issues, on the basis that the overall quality of the route is determined by its constraints.

Junction Assessment Tool

4.5.7 It is often at junctions that safety risks are highest and the relationships between safety, comfort and directness are more complex. A **Junction Assessment Tool** (JAT) is therefore included in Appendix B which enables designers to assess how well a junction provides for cycling. The JAT examines all potential movements at a junction, not just those that may be associated with a designated cycle route, to identify the potential for conflicts and therefore what measures may be required to reduce them.

Road safety audit

4.5.8 A **road safety audit** is a formal process that can be applied during the design stages and post-construction. It is performed by a qualified team of practitioners who are independent of the design team, solely concerned with highlighting safety issues (for all users) that may need to be addressed. A standard approach to road safety audit is given in the Design Manual for Roads and Bridges (DMRB)[18] that is also commonly applied on local authority roads.

17 Healthy Streets, Checklist for Designers, TfL, 2018
18 DMRB, GG119 Road Safety Audit

4.5.9 A road safety audit will only consider one of the five core design principles (i.e. safety). If a problem is highlighted, the design modification recommended may adversely affect how well the scheme meets the other four principles. For example, if a road safety audit recommends that cyclists should lose priority at a junction as a mitigation measure for an identified risk, this would have an adverse effect on comfort and directness. It is for the designer to decide whether and to what extent to accept the recommendations of the safety audit, taking into account the overall impact on the level of service for cycling. Any decisions should be documented as part of the audit process.

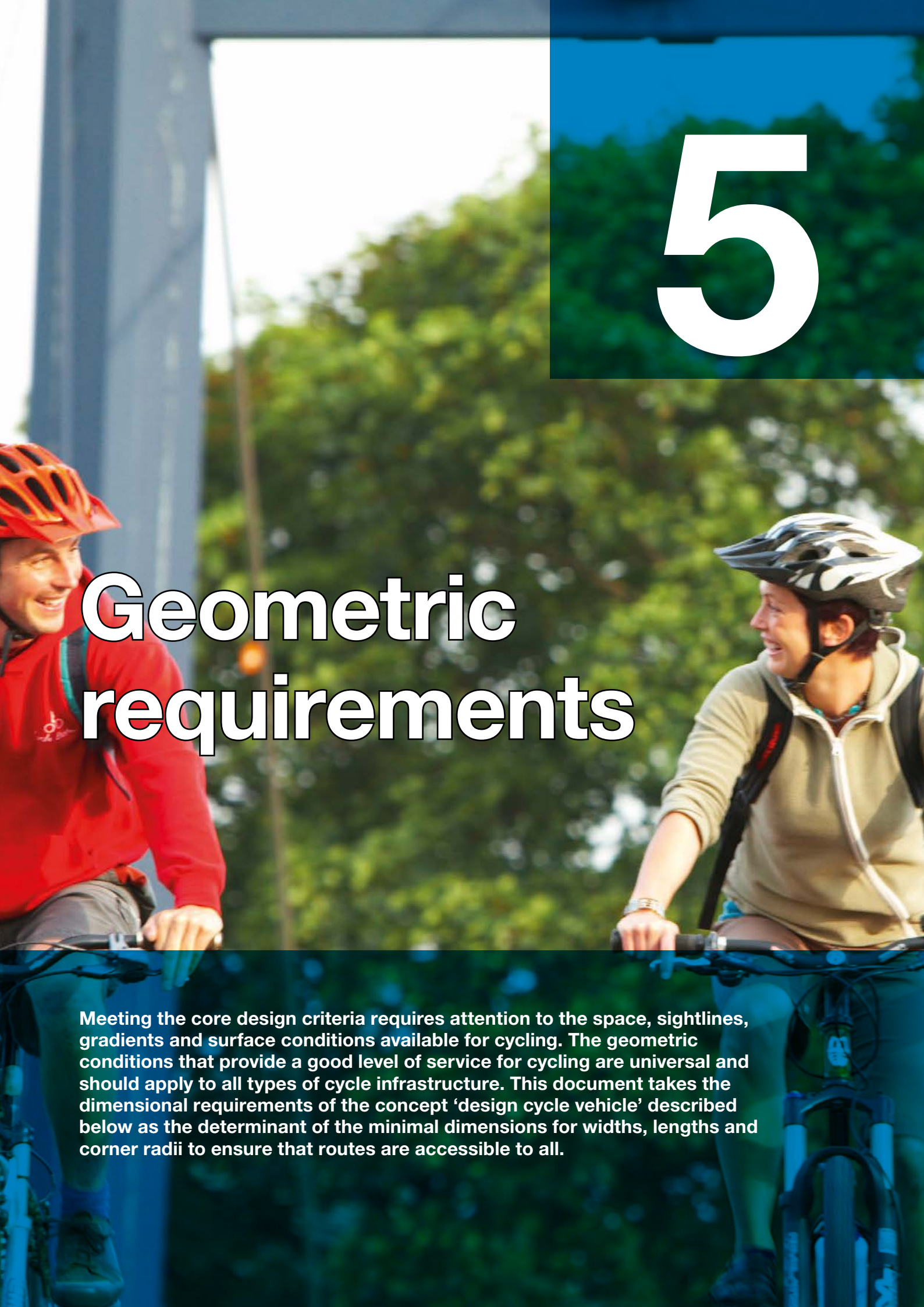
Walking, Cycling and Horse Riding Assessment and Review

4.5.10 DMRB also contains guidance on undertaking a **Walking, Cycling & Horse-Riding Assessment and Review** (WCHAR).[19] Although this is applicable to trunk roads, it provides a good basis for assessing the needs of all users along and across interurban roads.

Equality and access assessments

4.5.11 Local authorities are bound by the Equality Act 2010 in discharging their functions, which includes managing their road networks. Designers should provide infrastructure that is accessible to all, and the dimensions and other features set out in this guidance should help ensure that their designs comply with the Public Sector Equality Duty. An Access Audit should be undertaken of all proposals to ensure that a scheme meets the needs of those with protected characteristics under the Equality Act 2010, particularly people with a disability. The Access Audit (also formerly known as a DDA audit, Disability Discrimination Act Audit or Disabled Access Audit) is an assessment of a building, a street environment or a service against best-practice standards to benchmark its accessibility for disabled people. It may form part of an overall Equality Impact Assessment.

19 DMRB, Volume 5, Section 2, HD42 Cycling, Walking and Horse-Riding Assessment and Review



5

Geometric requirements

Meeting the core design criteria requires attention to the space, sightlines, gradients and surface conditions available for cycling. The geometric conditions that provide a good level of service for cycling are universal and should apply to all types of cycle infrastructure. This document takes the dimensional requirements of the concept 'design cycle vehicle' described below as the determinant of the minimal dimensions for widths, lengths and corner radii to ensure that routes are accessible to all.

5.1 Introduction

5.1.1 This chapter looks at the dimensions that are required to accommodate cyclists on a variety of typical cycles and trailers when travelling at their desired speeds.

5.1.2 Urban cycling speed averages between 10mph and 15mph but will typically vary from 5mph on an uphill gradient to around 40mph on a prolonged downhill gradient and cyclists may be capable of up to 25mph on flat unobstructed routes. There are considerable differences in speed between cycle traffic going uphill and cycle traffic going downhill. For different reasons, in both cases a more generous dynamic kinetic envelope is required.

5.1.3 Designers should aim to provide geometry to enable most people to proceed at a comfortable speed, typically around 20mph.

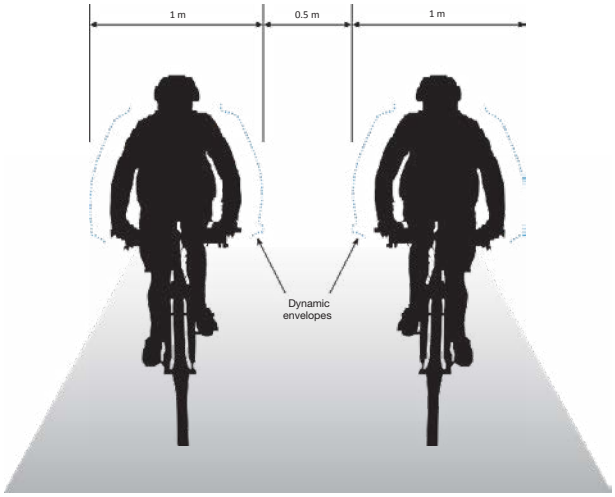
5.2 Dynamic kinetic envelope of the user

5.2.1 A cyclist in motion moves laterally to maintain balance, especially at lower speeds. A typical cyclist is about 0.8m wide at the shoulder (or handlebar) and needs at least 0.2m for balance to keep a straight line when in motion at over 7mph. This gives a typical space profile of around 1.0m for a moving cyclist on a standard bicycle (dynamic kinetic envelope), as shown in Figure 5.1. Tricycles, quadricycles and cycle trailers typically have an axle width of 0.8m (wider for passenger carrying rickshaws) and while they do not wobble to maintain balance they still require adequate clearance to fixed and moving objects.

5.2.2 At speeds less than 7mph the deviation to maintain balance on two wheels can increase by up to 0.8m. It is not uncommon for cyclists to travel this slowly on steeper uphill gradients and therefore they will require more space and separation from faster vehicles.

5.2.3 Cyclists travelling side by side (on a level surface) require a minimum space of 1.0m each plus 0.5m separation between them. Additional width is required to negotiate uneven surfaces and drainage gulleys. This is especially important for riders of 3 and 4 wheeled cycles which can become unstable and uncomfortable if a wheel drops into a gulley or pothole.

Figure 5.1: Dynamic kinetic envelope of cyclists



5.3 Headroom requirement

5.3.1 Signs should ideally be placed so as not to overhang cycle infrastructure but sometimes this is unavoidable. The recommended minimum mounting height in the Traffic Signs Manual for most signs that may overhang cycle tracks is 2.3m (signs may need to be placed higher if visibility is likely to be obscured by other users). Cyclists ideally require a minimum of 2.4m of headroom at underbridges and subways (see Chapter 10). This should be increased to at least 2.7m where an underbridge is longer than 23.0m to allow more natural light. Headroom on bridleways should ideally permit ridden horses rather than requiring a dismount.

5.3.2 At existing structures, lowering the minimum headroom to 2.2m may be acceptable but decisions will need to be taken on a case by case basis, based on relevant factors such as the forward visibility. Where the minimum headroom cannot be achieved (e.g. at a low railway bridge on a cycle track), a warning sign to TSRGD diagram 530A should be provided (see Traffic Signs Manual, Chapter 4, Section 7).

5.4 Dimensions and types of cycle

5.4.1 Figure 5.2 shows the range of dimensions for cycles typically in use. It is important that infrastructure can accommodate the full range of cycles to ensure routes are accessible to all cyclists. Cycle trailers and tricycles are usually about 0.8m wide, but adapted cycles can be up to 1.2m wide. The cycle design vehicle

Figure 5.2: Typical dimensions of cycles

Table 5-1: Size and minimum turning circles of cycles

Type of Cycle	Typical length (m)	Typical width (m)	Minimum turning circle (m)	
			Outer radius	Inner radius
Cycle design vehicle	2.8 (max)	1.2 (max)	3.4 (max)	0.1 (min)* 2.5m (3 and 4 wheel cycles)
Solo upright cycle	1.8	0.65	1.65	0.85
Cycle plus 850mm wide trailer	2.7	0.85	2.65	1.5
Tandem	2.4	0.65	3.15	2.25

*applies only to some cycles that can pivot at very low speeds

referred to in this document represents a composite of the maximum dimensions shown in Figure 5.2 is assumed as 2.8m long and 1.2m wide.

5.4.2 The design, width and length of a cycle has an impact on the turning circle required and therefore the kerb radii that can be negotiated and the required track widths at corners and bends (see Table 5-1). These are the minimum turning radii suitable only for low speed manoeuvres such as access to cycle parking. The minimum radii for curves at typical cycling speeds are given in Table 5-7.

Electrically assisted pedal cycles (E-Bikes)

5.4.3 Electrically Assisted Pedal Cycles (EAPCs) or e-bikes are becoming increasingly popular in the UK. An electric motor provides assistance up to a maximum speed of 15.5mph, reducing the effort required of the cyclist and making it easier to tackle gradients, carry loads or passengers. Electric assist is also increasingly in use for commercial applications such as rickshaws and cargo bikes (see Chapter 12). An e-bike must conform to the Electrically Assisted Pedal Cycle Regulations 1983 (as amended). No licence is required to ride one in England, Scotland and Wales, but a moped licence is needed to ride one in Northern Ireland. E-bike riders must be a minimum age of 14 years old.

5.4.4 E-bikes are generally heavier than ordinary cycles and can be more difficult to balance/handle at low speeds and when stationary. In design terms however, they are considered to be pedal cycles, and can use cycle lanes, tracks and parking spaces in the same way. They do not generally travel at a higher speed than an ordinary cycle, as the motor must cut out above 15.5mph. The geometric requirements given in this chapter are therefore suitable for e-bikes.

5.5 Cycle lane and track widths

5.5.1 Table 5-2 sets out the recommended absolute and desirable minimum widths for different types of provision, including recommended additional width to accommodate higher cycle flows.

5.5.2 The absolute minimum width should only be used for sections where there is a physical constraint on an existing road. Designers should take account of the potential loss of width of usable track due to drainage gullies where these reduce the effective width (as cyclists will avoid overrunning gully gratings).

5.5.3 Where a route is also used by pedestrians, separate facilities should be provided for pedestrian and cycle movements. However, away from the highway, and alongside busy interurban roads with few pedestrians or building frontages, shared use might be adequate (see Chapters 6 and 8). Such facilities should be designed to meet the needs of cycle traffic, however – including its width, alignment and treatment at side roads and other junctions. Conversion of existing footways to shared use should only be considered when options that reuse carriageway or other (e.g. verge) space have been rejected as unworkable.

Table 5-2: Cycle lane and track widths

Cycle Route Type	Direction	Peak hour cycle flow (either one way or two-way depending on cycle route type)	Desirable minimum width* (m)	Absolute minimum at constraints (m)
Protected space for cycling (including light segregation, stepped cycle track, kerbed cycle track)	1 way	<200	2.0	1.5
		200-800	2.2	2.0
		>800	2.5	2.0
	2 way	<300	3.0	2.0
		>300-1000	3.0	2.5
		>1000	4.0	3.0
Cycle lane	1 way	All – cyclists able to use carriageway to overtake	2.0	1.5

*based on a saturation flow of 1 cyclist per second per metre of space. For user comfort a lower density is generally desirable.

Table 5-3: Additional width at fixed objects

Type of edge constraint	Additional width required to maintain effective width of cycle track (mm)
Flush or near-flush surface including low and splayed kerbs up to 60mm high	No additional width needed
Kerbs 61mm to 150mm high	200
Vertical feature from 151mm to 600 mm high	250
Vertical feature above 600 mm high	500

Additional width at fixed objects

5.5.4 Where a cycle track is bounded by a vertical feature, people will not be able to use the entire width as they will naturally be wary of riding immediately next to walls and kerbs. Designers should provide additional width as shown in Table 5-3.

5.6 Cycle design speed

5.6.1 The design speed determines relevant aspects of horizontal and vertical geometry of cycle tracks. The design speeds in Table 5-4 should be used for cycle only tracks and for rural shared use facilities where there are few pedestrians – such routes should be designed as cycle tracks which pedestrians may lawfully use rather than a footway that can be cycled on. Cycle traffic should preferably be separated from pedestrian and equestrian traffic to avoid conflict and allow cyclists to travel at a comfortable speed (see Chapter 6). Where cycling is on-carriageway, it is assumed that the geometry provided for motor traffic will be adequate to cater for all types of cycle.

Table 5-4: Design Speed for off-carriageway cycle routes

Circumstance	Design speed (kph)	Absolute min design speed (kph)
General off-carriageway cycle tracks	30	20
Downhill gradients > 3%	40	N/A

5.6.2 Designers should aim to achieve the design speeds shown above. It should rarely be necessary to restrict cycle speeds on or along highways where the alignment is suitable for motor vehicles. Methods of reducing speed in off-highway and shared use situations, using features such as humps and rumble strips, are discussed in Chapters 6 and 8 respectively.

5.6.3 Deliberately restricting space, introducing staggered barriers or blind bends to slow cyclists is likely to increase the potential for user conflict and may prevent access for larger cycles and disabled people and so should not be used.

5.7 Stopping sight distance

5.7.1 Stopping Sight Distance (SSD) is the distance required for a rider to perceive, react and stop safely. It is measured in a straight line between two points at the centre line of the route, with the line of sight lying within the highway or cycle track boundary. SSDs for cyclists travelling at different speeds are given in Table 5-5. These distances are based on the same perception reaction times and deceleration rates for comfortable and emergency braking as assumed in DMRB TD 9 Highway Link Design.[20]

Table 5-5: Stopping sight distances

Design speed (kph)	Minimum stopping sight distance (m)
40	47
30	31
20	17

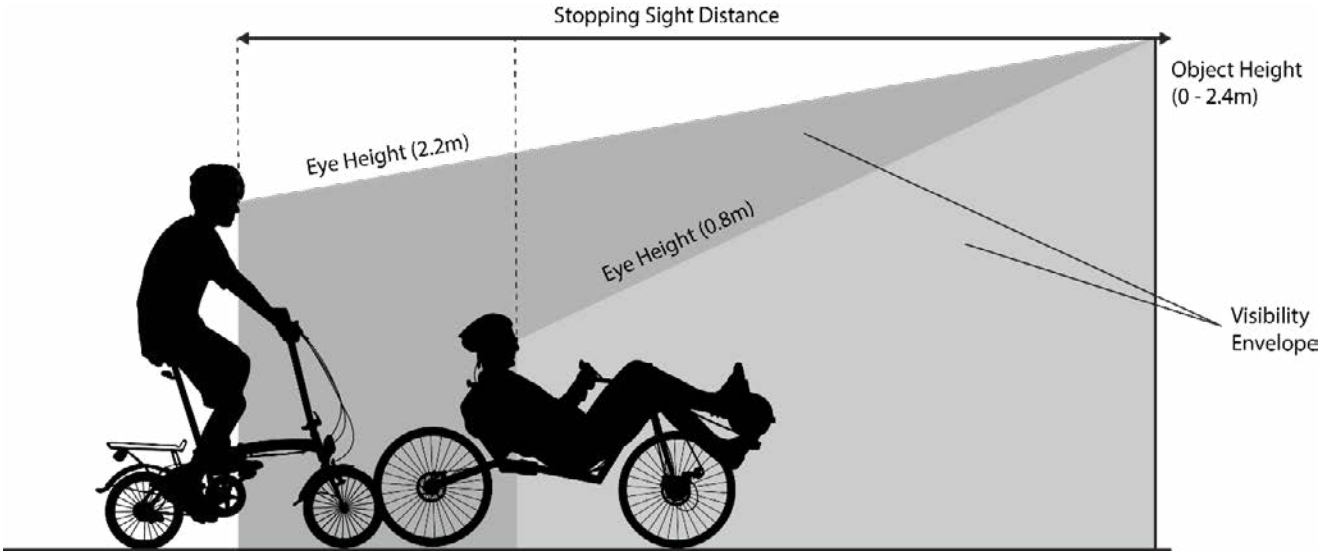
5.7.2 Designers should ensure that objects between the carriageway surface and a height of 2.4m are visible from an eye height in the range of 0.8m to 2.2m. These values accommodate a range of cyclists including recumbent users, children and adults (Figure 5.3).

5.7.3 Isolated objects with widths of less than 300mm may not have a significant effect on visibility. This should be considered on a case-by-case basis, taking account of the actual speeds of cycle traffic.

5.8 Visibility splays

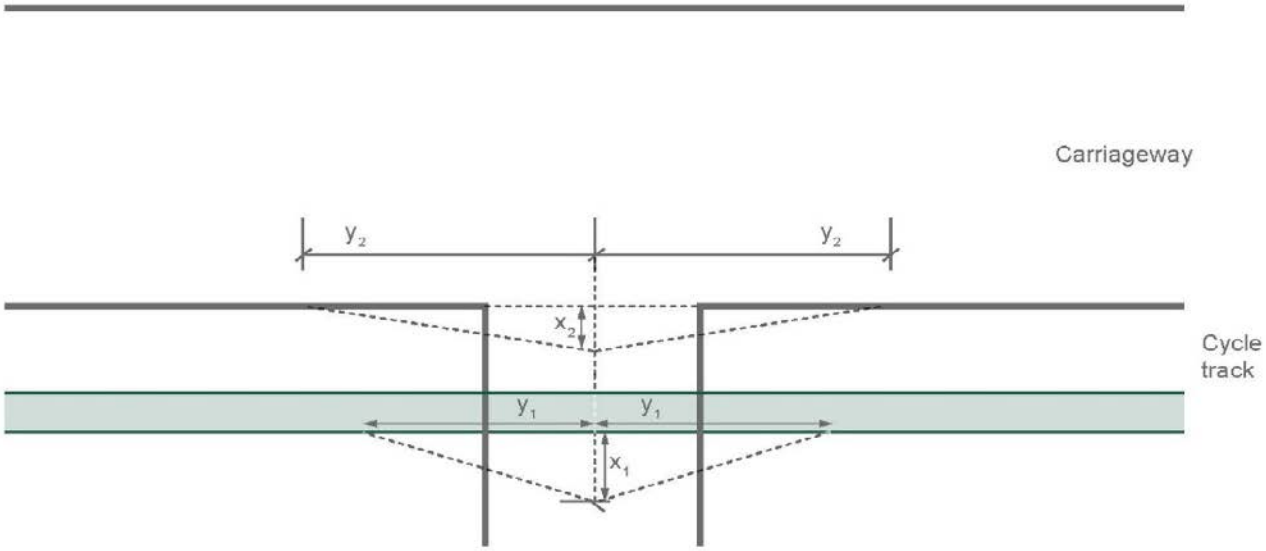
5.8.1 Visibility splays should be provided for motor traffic on the main route approaching a crossing used by cycle traffic. Manual for Streets 2[21] provides advice on calculating y-distances approach to the design speed.

Figure 5.3: Visibility envelope (length is stopping sight distance from Table 5-5)



20 TD 09, Highway Link Design, DMRB – based on an extrapolation of values.
21 Manual for Streets 2: Wider Application of the Principles, CIHT, 2010

Figure 5.4: Visibility x and y distance for a cycle track as the minor arm



5.8.2 Any crossing of a highway or junction between cycle routes should be located such that all users have full visibility as shown in with Figure 5.4. The x distance is in Table 5-6 and y distances are as shown in Table 5-5 (SSD).

5.8.3 The x distance is measured from the give way or stop line, back along the centre line of the minor arm. The y distance is measured on the highway from the centre of the minor arm.

5.8.4 The x distances for cyclists equate to the eye positions for one or two cycle design vehicles. The desirable minimum x distance allows two users to observe the full y distance and both accept the gap in traffic. Designers should seek to improve visibility along the y distance before reducing the x distance.

Table 5–6: x Distances for cycle traffic

Desirable minimum (m)	Absolute minimum (m)
4.5	2.4

5.8.5 For y distances, the major arm being joined may be a carriageway with adjacent footways, a bridleway or footpath, or another cycle track. The y distance on a junction of two cycle tracks is the same as the SSD on the major arm (see Table 5-5). Where the major arm is a highway, the y distance is that identified in the Manual for Streets (based on SSD for motor vehicle speeds). Where the major arm is an equestrian route, the y distance is that identified in Table 3.2 of TA 90[22] Geometric Design of Pedestrian, Cycle and Equestrian Routes.

5.8.6 The y distances should be measured for an eye height of 0.8m to 2.2m for cyclists (see Figure 5.3). The object height shall be taken as between 0.26m to 2.0m in accordance with TD 09 and CD 195 in DMRB.[23]

5.9 Horizontal and Vertical alignment

Horizontal alignment

5.9.1 The guidance in this section is most likely to be applicable when designing new highway infrastructure. A good horizontal alignment will not include diversions or fragmented facilities; it is recommended not to include any obstacles within the route.

5.9.2 Changes in horizontal alignment should be via simple curves, typically circular. Appropriate SSD for cycle traffic should be achieved by providing appropriate radii in both horizontal and vertical planes.

5.9.3 Table 5-7 provides minimum horizontal curve radii which should be used for cycle traffic on cycle routes including shared use facilities alongside rural highways where there are few pedestrians. These radii are based on being able to accommodate the turning

22 TA90 Geometric Design of Pedestrian, Cycle and Equestrian Routes, DMRB
23 CD 195 Designing for Cycle Traffic, DMRB

space required by the cycle design vehicle (i.e. the actual turning radius of the vehicle) and to provide adequate stopping sight distance at typical cycling speeds, enabling the cyclist to maintain momentum and thus reduce the effort required to cycle. Objects such as walls, fences and trees should not be sited close to the cycle track on the inside of bends as this will potentially affect the visibility.

Table 5-7: Minimum horizontal radii

Design speed (kph)	Minimum horizontal radius (m)
40	40
30	25
20	15
10	4

Vertical alignment

5.9.4 It is difficult to alter vertical dimensions on existing routes without major reconstruction. On new build projects and major highway alterations vertical curves should be provided at changes of gradient on the cycle facilities. The desirable minimum length of the vertical curve is determined by the algebraic difference between the gradients, multiplied by a constant K value.

5.9.5 In new construction the minimum sag K value should be 5.0 for comfort, and for stopping sight distance, the minimum crest K value should be 6.0. This will limit vertical acceleration to less than 0.3m/s^2. Values for existing highways will generally be determined by the local topography or existing construction.

5.9.6 The SSD should always be checked because it is affected by the interaction of vertical alignment with the horizontal alignment of the cycle route, the presence of crossfall, superelevation or verge treatment and features such as signs and structures adjacent to the route.

Longitudinal gradient

5.9.7 Unlike motor traffic, human physiology means that people can cycle steep gradients that are fairly short but are not capable of maintaining high levels of effort for longer distances. Cycle routes should therefore, where possible, be designed in such a way that the steepness and maximum length of longitudinal gradients meets the requirements of Table 5-8.

Table 5-8: Maximum length for gradients

Gradient %	Desirable maximum length of gradient (m)
2.0	150
2.5	100
3.0	80
3.5	60
4.0	50
4.5	40
5.0	30

5.9.8 Cycle routes along existing roads and paths will usually have to follow the existing gradient although there may be opportunities for signed diversions onto alternative routes to avoid the steepest uphill gradients, or to reduce gradients through earthworks where sufficient space is available.

5.9.9 As well as the length of the gradient, the speed of travel is another important factor to consider. Steep gradients can lead to high speeds for descending cyclists or low speeds for climbing cyclists, which can create hazards for all users of the route. Stopping distances also increase on down gradients in excess of 3%.

5.9.10 Where height differences at new build sites suggest longer lengths of gradients than those given in Table 5-8 earthworks designs should be adjusted or the horizontal alignment adjusted to limit the length or severity of the gradient. Level sections of 5.0m minimum length can be used between gradients to achieve compliance with Table 5-8.

5.10 Crossfall and camber

5.10.1 Cycle tracks can be constructed with either a crossfall across the whole width or a central camber to help surface water to clear, but in either case the gradient should not exceed 2.5% as this could cause wheels to slide in icy conditions. Three and four-wheel cycles (and children in trailers) are particularly affected by variations in camber that can make steering more difficult and the riding experience uncomfortable. While superelevation is not typically required along a cycle route, negative camber that falls to the outside of a bend should be avoided.

5.11 Edge protection

5.11.1 Gradients present a potential hazard where cyclists could lose control. Designers should carefully consider the combination of horizontal and vertical geometry where gradients are greater than 3%. Unguarded hazards (e.g. fixed objects, steep drops or water hazards) should not be permitted within 4.5m of the route where they would lie in the path of an out-of-control cycle. An example location where a hazard should be guarded is adjacent to the vertical drop to the water at the bottom of an access ramp that approaches a river bank or canal towpath.

5.11.2 Edge protection may be necessary including alongside ramps to overbridges and underbridges (see Grade Separation in Chapter 10).

5.11.3 A crash barrier or safety fence may be necessary alongside roads with speed limits of 50mph or above where there is a physical constraint such as a bridge parapet or steep embankment that places the cycle track immediately alongside the carriageway without a verge or separating margin.

6

Space for cycling within highways

On busier and faster roads, which are usually the most direct routes between places, it will be necessary to provide dedicated space for cycling. Facilities that provide physical protection for cyclists are preferable to cycle lanes. It might be necessary to reallocate some road space from moving and/or parked motor vehicles to allow good quality cycle facilities to be installed. Dedicated space for cycling should continue past bus and tram stops but here and in other places it is essential that the needs of pedestrians are taken into account, particularly disabled people.
Cycle facilities should preferably be located between parked and service vehicles and the footway. Access for these vehicles will need to be considered in any design.

6.1 Introduction

6.1.1 This chapter discusses how to provide for cyclists on busy or high-speed roads. These roads often have a high proportion of HGV traffic, bus routes and kerbside deliveries and car parking to accommodate. Because of this, they can be hostile environments for cycling. Cyclists will therefore benefit from space allocated specifically to them in the form of cycle tracks or lanes within the highway boundary.

6.1.2 A cycle route network will include busier major roads as these are usually the most direct routes between key attractors. Minor road networks are sometimes less well connected (Figure 6.1).

6.1.3 Section 4.4 of Chapter 4 and Figure 4.1 provide guidance on the different types of separation from motor traffic available to provide conditions that enable most people to cycle.

6.1.4 Figure 4.1 shows that protected space for cycling is generally required to create inclusive cycling conditions on busier or faster highway. This can take the form of:

- Fully kerbed cycle tracks;
- Stepped cycle tracks; or
- Light segregation (protected mandatory cycle lane)

6.1.5 Facilities of this type will meet most people's needs, regardless of the volume of motor traffic and cycle traffic. Stepped cycle tracks and light segregation are generally considered less suitable for urban highways with speed limits above 30mph. Stepped tracks typically have no horizontal separation margin between the cyclist and the carriageway, whilst light segregation could be a hazard for motor vehicles moving at higher speeds, particularly powered two-wheelers.

6.1.6 Cycle lanes have been used extensively in the UK, including on major roads with high speeds. However, as they do not provide any physical protection from moving motor vehicles most people will perceive them to be unacceptable for safe cycling on busy or fast roads.

6.1.7 Light segregation adds some protection to a mandatory cycle lane. It can be installed relatively cheaply, for example when routine maintenance and general highway improvements are being carried out. However, low level light segregation can present a tripping hazard to pedestrians and should not therefore be used on pedestrian desire lines.

6.1.8 Cycle tracks and lanes must meet the key design requirements set out in Chapter 5 to enable inclusive cycling, including the dimensions of the cycle design vehicle.

Figure 6.1: In typical post-WW2 developments (a), the main roads are often the only through routes. In more historic areas (b), there may be quiet parallel routes that could be made suitable for cycling (images from Manual for Streets)

Road space reallocation

6.1.9 Creating space for cycling may require the reallocation of space within the highway boundary. Wherever possible, this should be achieved by reallocating carriageway space, not reducing the level of service for pedestrians. Only where there are very wide or lightly-used footways should part of the space be considered for use by cyclists, and the minimum footway widths recommended in Inclusive Mobility[24] should be retained.

6.1.10 Where the footway has (or will have) a peak Pedestrian Comfort Level (PCL) of C or less[25] (21 to 23 pedestrians per minute per m width) space should normally not be taken from it for cycling.

6.1.11 Space may be taken from motor vehicles by reducing the carriageway's width and/or number of lanes. UK practice has generally adopted a standard carriageway lane width of 3.65m (12 feet) but this should not be taken as a preferred value. Narrower lanes may be appropriate, particularly in built up areas, resulting in carriageways that are easier for pedestrians to cross and encouraging low traffic speed without causing a significant loss of traffic capacity. Lanes wider than around 3m are not necessary in most urban areas carrying mixed traffic – see Table 7-2. More advice is given in Manual for Streets 2.

Trials and modelling

6.1.12 The effect of reducing the width and number of general traffic lanes can be assessed using standard traffic modelling software. These techniques may not take into account any local reduction in traffic flow caused by the reduced traffic speed and any shift to cycling and walking. An area-wide multi-modal model may be used to estimate these wider impacts.

6.1.13 Trials may be used to give a real-world indication of the effects of road space reallocation, as shown in the example in Figure 6.2. They also help make a strong statement of the intention to give greater priority to active travel modes, and offer a high-profile way to stimulate feedback in the stakeholder participation process – see also Sections 3.3 and 3.5 in Chapter 3.

Figure 6.2: Newark Street, Leicester – Trial of traffic lane closure and new two-way cycle track taking the place of the coned-off lane

6.2 On-highway cycle tracks

Introduction

6.2.1 Cycle tracks within the highway may be:

- **Fully kerbed cycle tracks**, protected from motor traffic by a full-height kerb, preferably with some buffer space between the cycle track and carriageway; and
- **Stepped cycle tracks** set below footway level, typically protected from the carriageway by a lower height kerb and usually directly next to it.

6.2.2 Cycle tracks within the highway are created through an order made under Section 65 of the Highways Act 1980. Further details on legal procedures are given in Appendix C.

24 Inclusive Mobility – A Guide to best Practice on Access to Pedestrian and Transport Infrastructure, DfT, 2002
25 Pedestrian Comfort Guidance for London, TfL, 2010

Fully kerbed cycle tracks

6.2.3 Fully kerbed cycle tracks may be set at carriageway level, at footway level or at an intermediate height between the two – see Figure 6.3.

6.2.4 The choice of cycle track level should reflect the functional and aesthetic context in which it is being provided, as discussed in Sections 4.2 and 4.4 in Chapter 4.

6.2.5 Carriageway-level cycle tracks in existing streets are usually created by taking space from the carriageway by building a continuous kerbed buffer strip to provide protection from motor vehicles. See Figure 6.4.

Figure 6.3: Cycle tracks with full kerb separation from carriageway

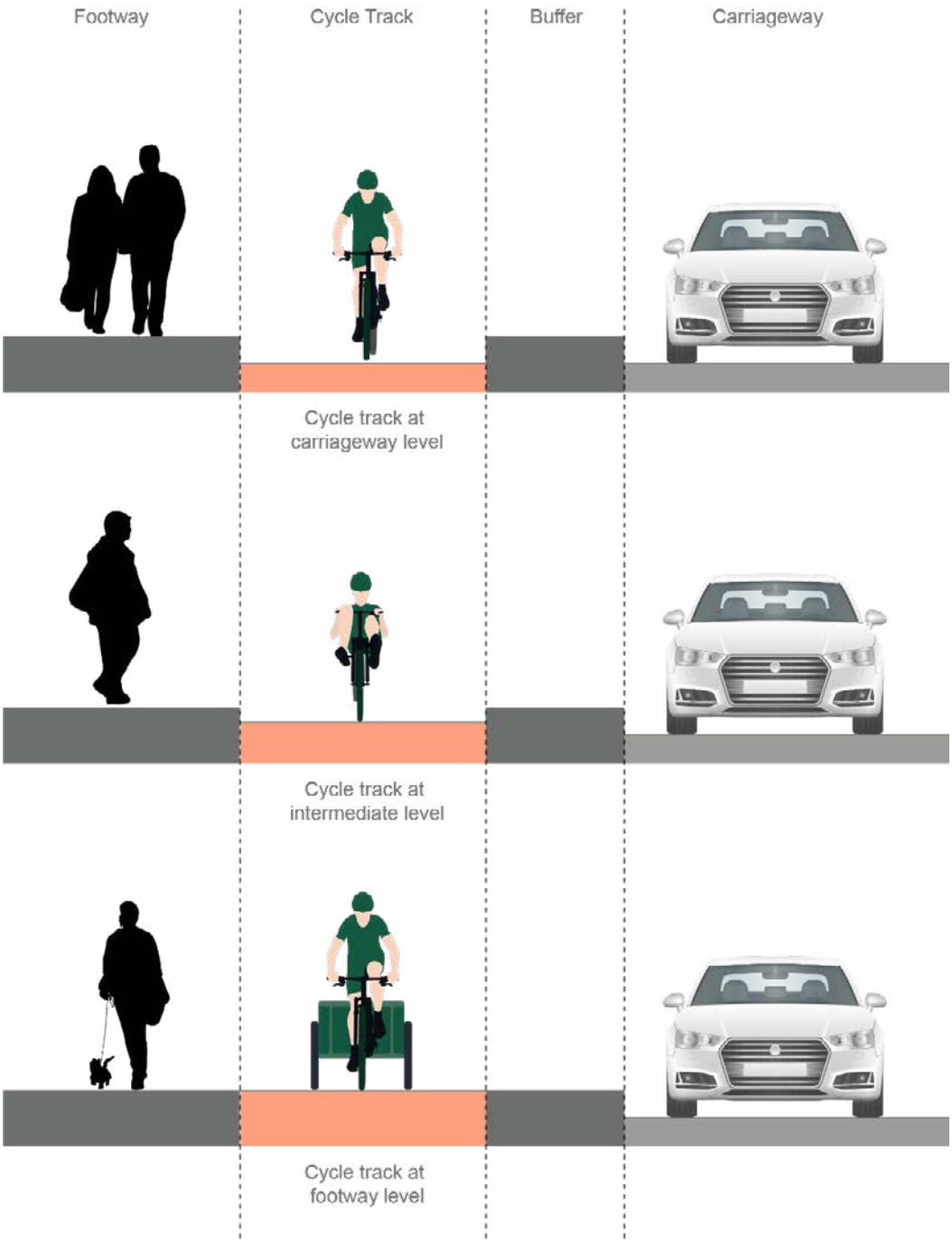


Figure 6.4: Carriageway-level cycle track with continuous kerbs to footway and carriageway

6.2.6 Intermediate level cycle tracks are at a level between the carriageway and existing footway (see Figure 6.5). They, and footway level cycle tracks, may be created by repaving and lowering the footway or preferably by raising the carriageway. A buffer or verge strip should again be provided between the cycle track and carriageway where possible.

6.2.7 Cycle tracks in all forms should be clearly distinguishable from the footway. The preference among visually impaired people is for a level difference between the cycle track and footway as this is the most easily detectable form of separation. Colour and tonal contrast, and different surface materials – for example asphalt on the cycle track and concrete flags on the footway – also help (see Figures 6.6 to 6.8) This is particularly important for footway-level and intermediate-level cycle tracks.

Figure 6.5: Intermediate level cycle track, with level difference to footway and carriageway, London

Figure 6.6: Footway-level cycle track with different surface materials to footway, London

6.2.8 A kerb at least 50mm high or a strip of light coloured material that can be detected with a cane helps visually impaired people to detect and negotiate the track. This could be achieved by using a raised strip which is trapezoidal in cross section, or some other textured material. Simply using a white line road marking to TSRGD diagram 1049B is ineffective, while the thermoplastic raised white line to 1049.1 may also be disregarded by pedestrians and is difficult to maintain. Further advice is given in the Guidance on the Use of Tactile Paving Surfaces.[26]

Figure 6.7: Footway level cycle track with raised trapezoidal strip, London

Figure 6.8: Detail of trapezoidal strip and different surface materials for footway and cycle track

6.2.9 Guidance on cycle track widths is given in Table 5-2 in Chapter 5. This takes into account the volume of cycle traffic and whether the track is one way or two-way. Where cycle tracks are bounded by vertical features such as full height kerbs, the additional width outlined in Table 5-3 should be provided. Fully battered (splay) kerbs offer a more forgiving edge that will not catch pedals and are less likely to throw a shadow across the cycle track, helping to increase the useable width.

6.2.10 The buffer or verge strip between the cycle track and carriageway can vary in width and can contribute positively to the quality of the streetscape, with the potential to accommodate planting and sustainable drainage. If the buffer is of a hard surface and of sufficient width, it provides a place for pedestrians to wait to cross. A width of 1.5m will be sufficient to accommodate users of wheelchairs and mobility scooters.[27]

6.2.11 The buffer or verge also helps protect cyclists from the air turbulence created by passing motor traffic and from debris thrown up from the carriageway.

Table 6-1: Minimum recommended horizontal separation between carriageway and cycle tracks*

Speed limit (mph)	Desirable minimum horizontal separation (m)	Absolute minimum horizontal separation (m)
30	0.5	0
40	1.0	0.5
50	2.0	1.5
60	2.5	2.0
70	3.5	3.0

*Separation strip should be at least 0.5m alongside kerbside parking and 1.5m where wheelchair access is required.

26 Guidance on the use of tactile paving surfaces, DfT, 2007
27 Inclusive Mobility – A Guide to best Practice on Access to Pedestrian and Transport Infrastructure, DfT, 2002

Figure 6.9: Carriageway level cycle track with gaps in buffer strip to access side road – Camden

Minimum recommended separation widths are given in Table 6-1, based on the speed limit.

6.2.12 Wider buffer strips may accommodate a bus stop and shelter, as part of a bus-stop bypass arrangement (see Section 6.6). Wider buffer sections may also be used for kerbside loading and car parking areas, with the buffer providing a zone within which a car door can be opened and passengers disembark safely away from the cycle track.

6.2.13 To enable mobility impaired people to cross the carriageway, regular dropped kerbs should be provided along the buffer strip. Alternatively, gaps in the strip should be provided where the cycle track is at carriageway level. Tactile paving should be provided following the principles of Guidance on the Use of Tactile Paving Surfaces.

6.2.14 Gaps in the buffer strip at side-road junctions are also needed to enable cyclists to enter and leave the protected cycle track space – see Figure 6.9.

Two-way and one way tracks

6.2.15 Fully kerbed cycle tracks alongside the carriageway can be either be two-way or one way. Two-way tracks are usually provided only on one side of the road, but two-way provision on both sides is useful where it is difficult for cyclists to cross major highways. One way tracks are usually provided on both sides of the road, with cyclists travelling in the same direction as other traffic.

6.2.16 Two-way cycle tracks may result in the following problems:

- transitioning between the cycle track and the carriageway is more difficult for cyclists travelling against the flow of traffic;
- the interface between the cycle track and major junctions along the route can be more complex;
- there may be more risks associated with retaining priority over side roads or busy accesses;
- cyclists' accessibility to premises along the route on the opposite side of the carriageway is reduced;
- it is more difficult for pedestrians, especially disabled people, to cross a two-way cycle track where they do not have priority; and
- in some locations, especially rural areas without street lights, cyclists may be dazzled by the headlights of motor vehicles. Similarly, cyclists' use of high-powered lighting can dazzle or be confusing to oncoming drivers.

6.2.17 Providing a one way cycle track on each side of the carriageway addresses most of these issues.

6.2.18 Nevertheless, there are space advantages to two-way tracks. A 3.0m wide two-way track will cater for a significant flow of cycle traffic while allowing faster cyclists to overtake slower cyclists. It will also allow for side-by-side cycling when flows in the opposite direction

are light. A 2.0m wide cycle track will be needed on both sides of the carriageway to enable overtaking and side-by-side cycling (but this width will only cater for two cycles).

6.2.19 Where cycle flows are tidal (with significantly larger flows in one direction during the peak periods), two-way tracks can represent a more flexible use of space than one way tracks. This is because cyclists can move out into the 'opposing lane' within the cycle track to overtake.

6.2.20 Two-way tracks may also be useful where there are many more side roads and greater levels of kerbside activity on one side than the other, or where those conditions can be created, with the two-way track located on the side with less activity. Two-way tracks can be successfully accommodated in complex signal-controlled junctions.

6.2.21 Table 6-2 summarises the opportunities and challenges associated with two-way tracks.

Table 6-2: Two-way cycle tracks: opportunities and challenges

Opportunities	Challenges
Where buildings, active uses and side roads are entirely or largely on only one side (a waterside location, for example)	Can be unintuitive and generate risks associated with motorists and pedestrians not looking both ways when crossing a track
Where kerbside activity or side road access may be reconfigured to take place largely on one side	Potential safety concerns at side roads and accesses
Arterial roads such as wide dual carriageways with infrequent crossings	Complex transitions from one way, with-flow to two-way cycle provision
One way systems and gyratories	Connectivity for cyclists to and from the track can be difficult to manage

6.2.22 Centre line markings 50mm wide to TSRGD diagram 1008 should be applied to two-way tracks alongside highways to remind users that it is two-way and to help distinguish the cycle track from the footway.

6.2.23 One way fully-kerbed cycle tracks may be used in the contraflow direction to general traffic, on either side of the carriageway. They provide a high level of protection from oncoming vehicles that may not anticipate cyclists coming towards them. Further advice on contraflow cycling facilities is given in Section 6.4.

Stepped cycle tracks

6.2.24 Stepped cycle tracks are raised above the carriageway surface but sit below the level of the footway. The height difference from the carriageway should be a minimum of 50mm with at least a further 50mm step up to the adjacent footway (see Figure 6.10).

Figure 6.10: Stepped cycle track, London

6.2.25 Stepped cycle tracks are normally one way and in the same direction of flow as the adjacent traffic lane, although contraflow and two-way stepped tracks might be appropriate in certain circumstances to link up other components of a cycle route network.

6.2.26 The key advantage of stepped cycle tracks is that they provide physical protection from motor traffic in a space-efficient way. They take a similar amount of space to a cycle lane, and allow cyclists to take priority at side road junctions – either by dropping down to become a marked cycle lane or preferably by remaining at the same height past the junction, for example as part of a raised entry treatment (see Section 10.4 in Chapter 10).

6.2.27 Cyclists must be able to join and leave the stepped track at junctions and other locations, including continuing in the same direction, to and from a cycle lane or the carriageway. A flush kerb is preferred at key locations to allow for this transition. An alternative is to use continuous fully battered low-height kerbs with a very gentle slope, at the edge of the cycle track so that cyclists can join and leave at any point along its length, as used by Cambridgeshire County Council and hence known as the Cambridge Kerb – see Section 10.5 in Chapter 10.

6.2.28 If the stepped track is arranged so that it slopes from the carriageway towards the footway, it should be possible to achieve greater kerb heights on both sides. However, this will require additional drainage facilities at the cycle track/footway kerb – see Figure 6.11.

Figure 6.11: Contraflow stepped cycle track, London, showing cycle track draining towards footway

Pedestrian crossings across cycle tracks

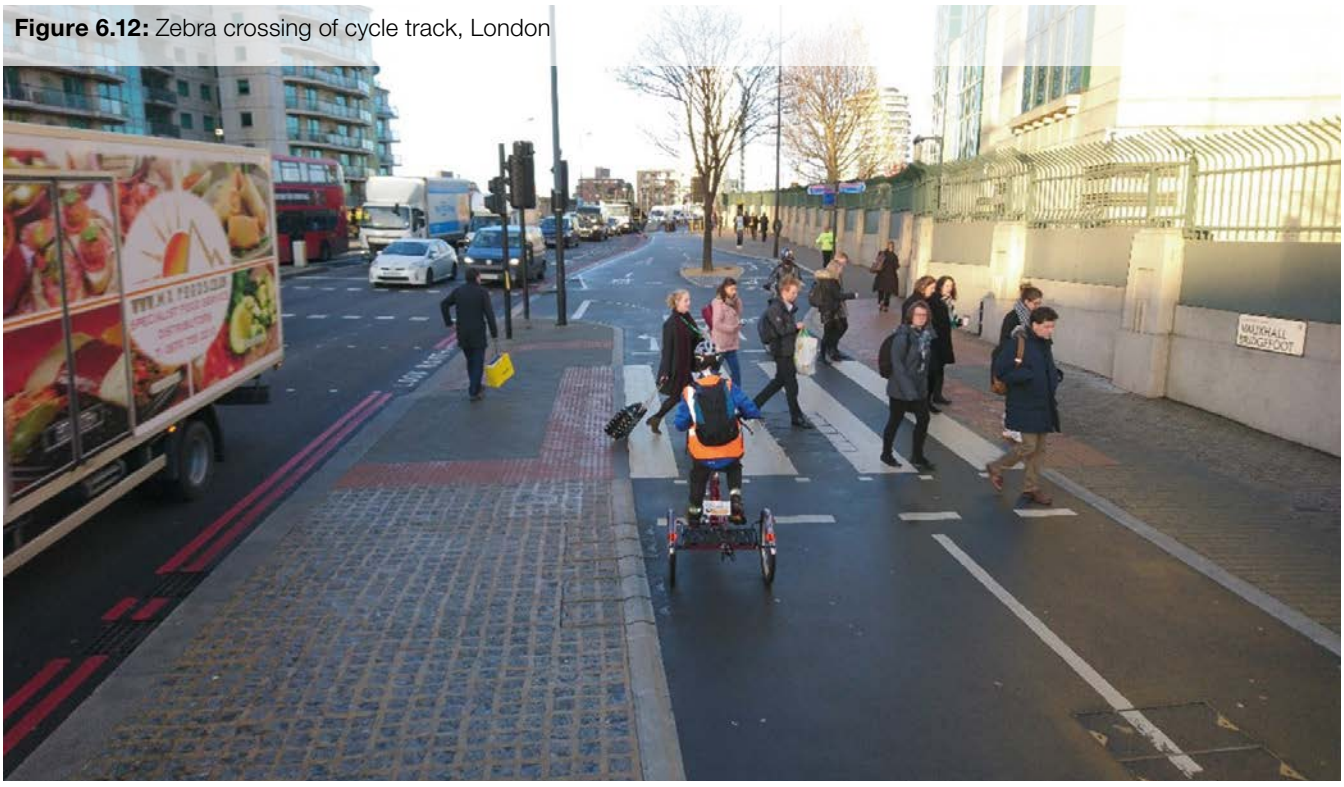
6.2.29 Pedestrians should be provided with sufficiently frequent suitable opportunities and facilities to cross cycle tracks, particularly at locations such as bus stops and junctions. Where cycle flows are relatively light and in one direction, pedestrians can cross in the gaps between cyclists. On tracks that are two-way or with high cycle speed and flow, pedestrians should be provided with formal crossings.

6.2.30 Any level difference between the footway and the cycle track should be removed at the crossing point, either by raising the cycle track to footway level or by the use of dropped kerbs. Tactile paving should be provided to the layout set out in the Guidance on the Use of Tactile Paving Surfaces. Dropped kerbs (or a gap in a buffer strip) will also need to be provided to enable pedestrians to reach the carriageway without difficulty.

6.2.31 Pedestrian priority crossings of cycle tracks can be either zebra or signal-controlled. Zebra crossings create less delay to both pedestrians and cyclists, but signal crossings may be preferred if there are concerns over the willingness of cyclists to slow or stop to allow pedestrians to cross, especially where cycle speeds are high.

6.2.32 TSRGD allows the zig-zag markings and yellow globes to be omitted at Zebra crossings placed across cycle tracks – see Figure 6.12. Humps may be placed in the cycle track to slow cyclists at or on the approach to the crossing.

Figure 6.12: Zebra crossing of cycle track, London



Tactile paving for cycle tracks

6.2.33 Tactile paving should be applied wherever footways/footpaths cross cycle tracks. It is important at transitions to carriageways where a cycle track merges or diverges from carriageway level to footway level (see Chapter 9) so that visually impaired people do not inadvertently follow the cycle track into the carriageway. Detailed advice is contained in Guidance on the Use of Tactile Paving Surfaces. The following paragraphs complement that advice.

6.2.34 Tactile paving should be used where pedestrian routes cross cycle tracks and at crossing points. This paving should be red at zebra and signalised crossings.

6.2.35 The tramline/ladder surface should be used to indicate the start of a path that is divided into two different sides for pedestrians and cyclists. The ribs are orientated in a ladder pattern on the pedestrian side, and tramline on the cyclist side (ribs in the direction of travel) (see Chapter 9).

6.2.36 Ladder and tramline paving can be problematic for some users, particularly near to junctions where there may be many potential route choices and transitions between separate and shared facilities. Wheelchair users may find ladder paving difficult to cross and cyclists may need to exercise appropriate care when moving over tactile paving and other changes in surfacing.

6.2.37 Cycle tracks and footways should be designed to be perceived as wholly separate facilities, even if they are at the same level and alongside one another, so that ladder and tramline paving is not needed. Other visual and tactile cues may be used to identify the footway and cycle track, for example the use of contrasting paving materials, a continuous upstand or raised strip, and cycle symbol road markings to TSRGD diagram 1057.

Traffic signing for cycle tracks

6.2.38 Signs to TSRGD diagram 955 (preferred) or 957 are required to indicate the presence of the track to all users, and to give effect to the traffic order creating the cycle track – advice on sign placement is given in Chapter 3 of the Traffic Signs Manual. Cycle symbol markings to TSRGD diagram 1057 should be placed at regular intervals along cycle tracks. The cycle symbols should be placed in the direction of the flow of cycle traffic, and therefore in both directions on two-way tracks.

6.2.39 Any traffic sign posts should be placed at the interface between the footway and the cycle track so that neither user group is affected and clutter is reduced. Signs may be placed on illuminated or retroreflective bollards – more advice is given in Traffic Advisory Leaflet 3/13: Traffic bollards and low level traffic signs.

Figure 6.14: Cycle track with sign to TSRGD diagram 955

Figure 6.13: Double TSRGD diagram 1057 symbols on one way stepped cycle track, Cambridge

Servicing and car parking alongside cycle tracks

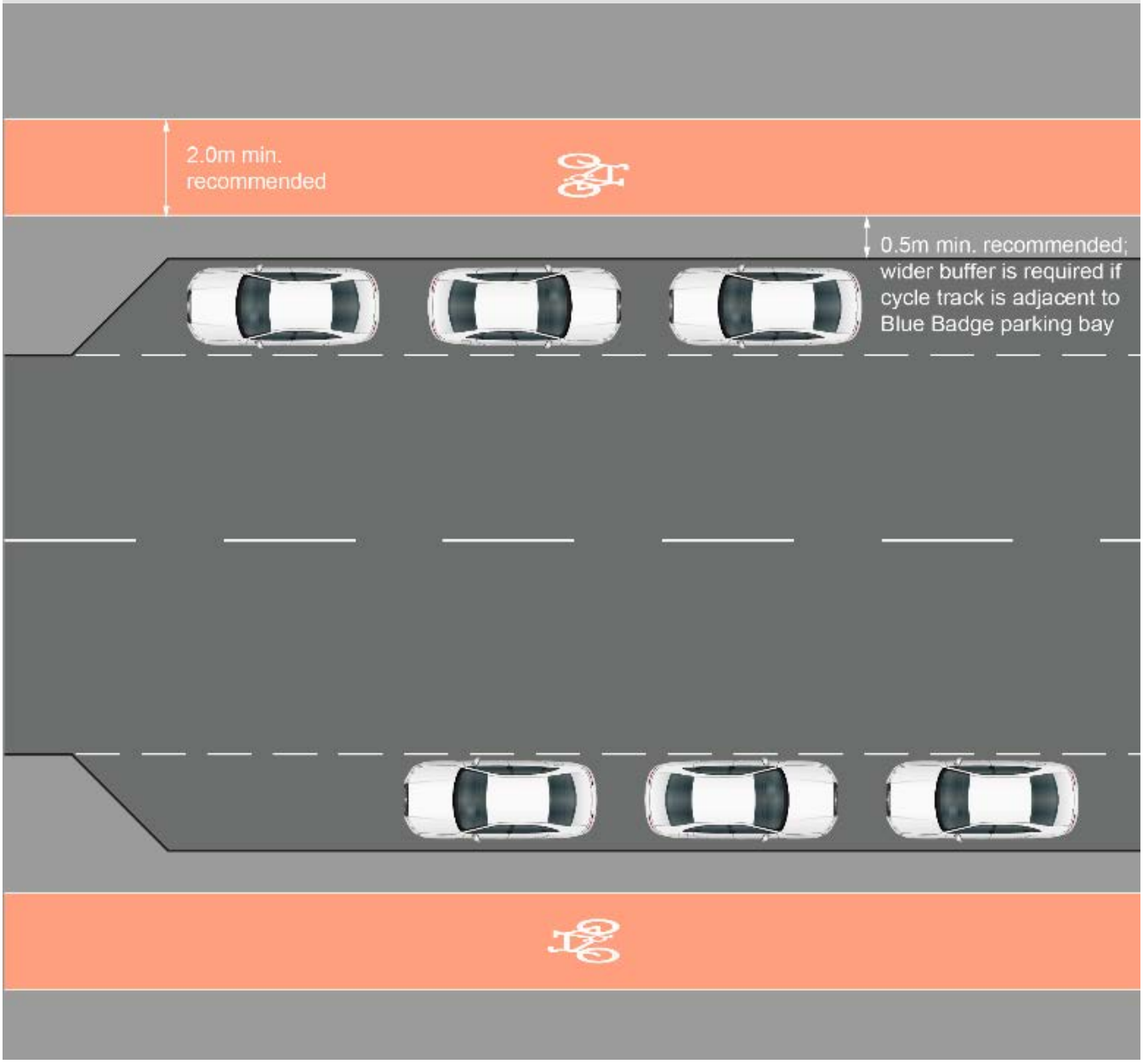
6.2.40 Providing a cycle track between parked vehicles and the footway provides a much higher level of service in terms of safety and comfort than having a cycle lane on the offside of parking/loading areas; and requires no additional width.

6.2.41 The introduction of cycle tracks generally requires servicing activity to take place from the offside of the cycle tracks, including in marked bays, so that goods can be moved across the tracks themselves. Similarly, car parking may need to be provided alongside the cycle track.

6.2.42 Kerbed island separation or light segregation (see Figure 6.15) that provides a buffer zone of at least 0.5m between cyclists and parked vehicles is recommended to minimise risk of collision between cyclists and vehicle doors. A clear, level width of 2.0m is required alongside disabled parking bays to allow users to unload a wheelchair and turn within the space.

6.2.43 Where waiting and loading are restricted, the required road markings should be provided along the kerb at the edge of the carriageway, including along stepped tracks.

Figure 6.15: Inset parking bays alongside one way cycle tracks



Detailed design and maintenance

6.2.44 It is important that cycle tracks are designed to a high quality so that they provide a suitable environment within which to cycle and which can be maintained. Further details are given in Chapter 15.

6.2.45 Fully kerbed cycle tracks should preferably fall from the outer edge to the inside on bends to avoid negative crossfall. Crossfall should be no more than is required for drainage purposes, as steep cambers can cause instability for cycles with more than two wheels. Recommended maximum crossfall is given in Chapter 5.

6.2.46 Stepped cycle tracks should preferably fall towards the footway so that cyclists are not drawn towards motor traffic. This will require drainage to be placed at the kerb between the footway and cycle track as well as between the cycle track and carriageway.

6.2.47 Kerb face or slot drainage is preferable to gullies on a cycle track. If slotted gully gratings are used, the slots should be at right angles to the cyclist's line of travel to avoid the risk of them catching cycle wheels.

6.2.48 Taking cyclists out of the main carriageway will mean that authorities will need to put in place additional means to keep the cycle track clear of debris and free of ice during the winter (see Chapter 15).

6.3 Light segregation

6.3.1 Light segregation describes the use of intermittent physical features placed along the inside edge of a mandatory cycle lane to provide additional protection from motor traffic. This can give a greater perception of safety, which is important in encouraging people to cycle.

6.3.2 The relatively low cost of light segregation means that it can, in appropriate locations (see 6.1.7 and 6.1.8), be considered as a beneficial addition to mandatory cycle lanes.

6.3.3 A variety of features can be used, such as traffic wands, proprietary raised features constructed from PVC or recycled rubber, or other similar objects. The features are intermittent to allow cyclists to enter and leave the cycle lane as necessary, avoiding any impact on drainage and allowing the layout to be cost effective and flexible. Planters may also be used (see figure 6.16) but if so, a plan should be put in place for ongoing maintenance, as without this they are likely to quickly become unsightly, for example due to littering.

6.3.4 Light segregation can be used as a temporary feature to quickly and cost effectively create a protected space for cycling on highways to help prove the case for a more permanent solution such as a fully-kerbed or stepped cycle track. However, it should be remembered that without a Traffic Regulation Order (TRO), the space is not protected from motor vehicles in law.

Figure 6.16: Light segregation using planters and low level features, Camden

6.3.5 Light segregation is generally used to support mandatory lanes for one way cycling but can also be used to protect two-way cycle facilities. The guidance given in Section 6.2 on the benefits and disbenefits of two-way tracks also applies to light segregation.

6.3.6 Light segregation features are not considered to be traffic signs, and therefore require no special authorisation. As with other types of street furniture, Local Authorities will need to satisfy themselves as to the balance of benefits and risks. They should be used on the cyclist side of a mandatory cycle lane marking to TSRGD diagram 1049B, as shown in Figure 6.17, so that the light segregation features physically enforce the restriction on motor vehicles entering the lane.

Figure 6.17: Low level light segregation features adjacent to a mandatory cycle lane

6.3.7 Low level light segregation can present a tripping hazard to pedestrians and should not therefore be used in areas where high numbers of people cross the road, whether that is at a formal crossing place or informally at a point of their choosing. A run of low level features should begin with a vertical feature to alert road users to their presence, particularly motorcyclists, who may lose control if they strike a light segregation feature unexpectedly. The vertical features should be repeated where light segregation is interrupted at a side road or major access. Light segregation should not be used where general traffic is expected to straddle it.

6.3.8 Where regular servicing access is required across light segregation, a local kerbed island may be required – see Figure 6.18.

6.3.9 Where space is limited, car parking bays can be marked adjacent to the light segregation. A buffer strip is preferred to allow for car doors to be opened safely without compromising the safety of cyclists.

Figure 6.18: Local kerbed island for servicing across light segregation facility

6.4 Cycle lanes

6.4.1 Cycle lanes are areas of the carriageway reserved for the use of pedal cycles, as defined in Schedule 1 of TSRGD. Mandatory cycle lanes are marked with a solid line to TSRGD diagram 1049B. Optional upright signs to TSRGD diagram 959.1 may also be provided. Motor vehicles must not enter the lane during its hours of operation – if no upright sign is provided, the lane operates at all times. Advisory cycle lanes are marked with a broken white line to TSRGD diagram 1004 and should not be entered by other vehicles unless it is unavoidable.

6.4.2 The width of cycle lanes should meet the geometric requirements set out in Chapter 5. A 2.0m wide lane allows space for overtaking within the lane and is the minimum recommended width.

6.4.3 Cycle Lanes less than 1.5m wide should not normally be used as they will exclude the use of the facility by larger cycles and are therefore not inclusive. They can also encourage ‘close-passing’ of cyclists by motorists, who tend to judge their road position with reference to the nearside marking.

6.4.4 Cycle lanes are part of the carriageway, therefore a number of factors should be considered:

- Cyclists are not physically protected, and it is important that the traffic conditions are appropriate to the presence of cyclists on the carriageway (see Section 4.2 in Chapter 4).
- The design of cycle lanes needs to consider the movements of both cyclists and other vehicles.

- Nearside lanes can conflict with other kerbside activities such as car parking, loading and bus stops. Designers should aim to minimise interactions with moving traffic and passengers opening car doors by using features such as inset parking and loading bays.
- Cycle lane markings cannot be used with zig-zag markings at controlled crossings, but the zig-zag markings can be placed up to 2m from the kerb to maintain space for cycling and act as the continuation of the cycle lane – see Figure 6.19.

Figure 6.19: Zig-zag markings placed away from the kerb to continue cycle lane, Greenwich

Mandatory cycle lanes

6.4.5 Mandatory lanes are marked with a continuous white line to TSRGD diagram 1049B, which prohibits driving in a cycle lane. Mandatory lanes therefore provide greater legal protection than advisory lanes and are the preferred type of cycle lane.

6.4.6 TSRGD schedule 9 part 6 sets out the exemptions for mandatory cycle lane operation. Accordingly, a TRO is not necessary, unless exemptions are required beyond those included. Mandatory cycle lanes can also operate part-time but this is not recommended, as space for cycling should be available at all times.

6.4.7 The mandatory cycle lane marking prevents driving in the lane. If it is necessary to prevent parking and loading activity, then waiting and loading restrictions will be needed, indicated by the appropriate road markings and signs, supported by a TRO.

Advisory cycle lanes

6.4.8 Advisory lanes are marked with a broken white line to TSRGD diagram 1004 which indicates that other moving vehicles should not enter unless it is unavoidable. Cycle symbols to TSRGD diagram 1057 can be used within the lane to reinforce its meaning.

6.4.9 Advisory lanes should only be used when limitations on the overall space available mean that motor vehicles will sometimes need to enter the cycle lane. Advisory lanes are not recommended where they are likely to be blocked by parked vehicles.

Cycle lanes at side roads

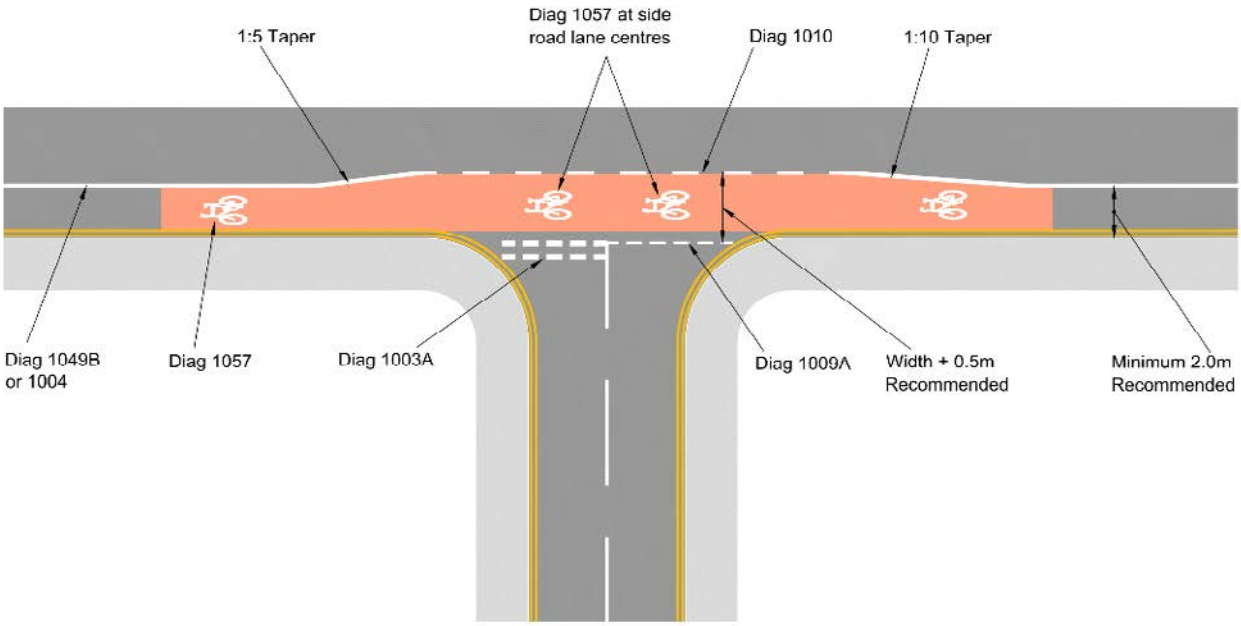
6.4.10 Cycle lanes across side road junctions ensure continuity and help improve cycle safety. Mandatory cycle lane markings must not be placed across a junction mouth, but can be placed across private accesses.

6.4.11 At these locations, mandatory cycle lanes should be replaced by short sections of advisory lane or road markings to TSRGD diagram 1010. Cycle symbols to TSRGD Diagram 1057 should also be placed within the lane at the junction mouth to raise the awareness of drivers to the potential for cycle traffic and help prevent encroachment by vehicles. Coloured surfacing may also be used.

6.4.12 Increasing the cycle lane width locally at side roads as shown in Figure 6.20 can help encourage cyclists to position themselves further from the kerb. This can enable them to avoid vehicles that might be edging into the main road from the side road, or overtaking and then turning left across the front of the cyclist.

6.4.13 Side road entry treatments are raised tables across the mouth of the side road (see Chapter 10) and help reduce the speeds of vehicles turning in and out of the junction, further adding to the safety of cyclists. They also bring significant benefits to pedestrians.

Figure 6.20: Cycle Lane at side road showing optional local widening of cycle lane



Removal of centre lines

6.4.14 Removing the centre line can reduce traffic speeds,[28] but the technique is not suitable for all roads. It may be useful where narrow carriageway widths would not otherwise enable the introduction of cycle lanes.

6.4.15 In addition to providing marked space for cyclists, the lanes have a psychological traffic-calming effect by visually narrowing the carriageway, further helping to reduce speeds. An example is shown in Figure 6.21.

6.4.16 On narrower roads, where oncoming motor vehicles pass each other, one or both vehicles may need to momentarily pull into their respective near-side advisory cycle lanes, with drivers having first checked to see the lanes are clear of cyclists. This arrangement is only suitable on quieter roads, with a maximum two-way motor vehicle flow of around 4,500 motor vehicles a day, or 500 per hour at peak times. With higher volumes of traffic there is a higher risk of conflict with cyclists, and the benefits of the cycle lanes are lost.

6.4.17 On wider roads, the removal of the centre line has been shown to reduce traffic speeds by up to 3mph.[29]

Figure 6.21: Centre line removal, Norwich

28 Manual for Streets, Section 9.3
29 Centre-line Removal Trial, TfL, 2014

Cycle lanes and waiting and loading restrictions

6.4.18 Cycle lanes are only useful when they are clear of parking and loading activity – see Figure 6.22. Cycle lanes should always be kept clear by the appropriate use of parking and loading restrictions. This is particularly important wherever demand for kerbside access is high, for example in town centres.

Figure 6.22: Car Parking in cycle lane, rendering it useless for cycling

6.4.19 Cycle lanes can be designed to continue past parking and loading bays, provided there is a buffer zone of at least 0.5m width between the cycle lane and the bay – see Figure 6.24. The resulting narrowing of the adjacent general traffic lane should not be such as to lead to close passing by motor vehicles. Where there are gaps between parking or loading bays of less than 30m, the cycle lane should not return to the kerb but should continue in the same position in the carriageway.

6.4.20 As noted in Section 6.2, it is preferable to place a cycle track between the parking and loading provision and the footway. This arrangement, shown in Figure 6.15, provides greater protection for cyclists and does not occupy any greater width.

Contraflow cycle lanes and tracks

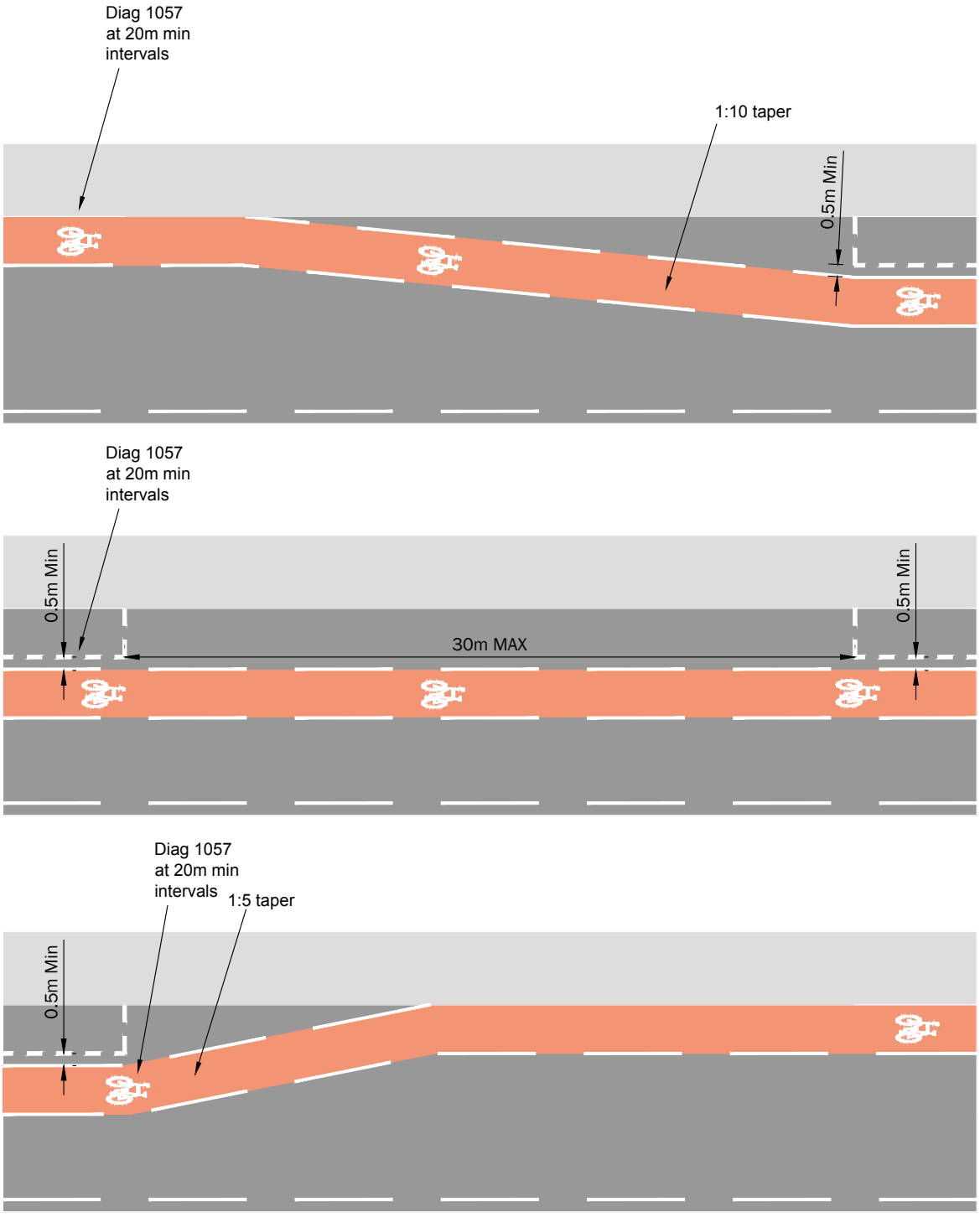
6.4.21 There should be a general presumption in favour of cycling in both directions in one way streets, unless there are safety, operational or cost reasons why it is not feasible.

6.4.22 Cycle lanes and tracks may operate in the opposite direction to motor traffic, although contraflow cycling is also permissible with signs but without a marked lane or cycle track – see Chapter 7.

6.4.23 Contraflow cycle lanes should normally be mandatory, although an advisory lane may be considered where the speed limit is 20mph and the motor traffic flow is 1,000 PCU per day or less.
The entrance to the street for cyclists in the contraflow direction should always be protected by an island to give protection against turning vehicles (see Figure 6.25) where traffic speed and flow is higher.

Figure 6.23: Mandatory contraflow cycle lane passing loading bays with buffer

Figure 6.24: Cycle lane passing parking and loading bays

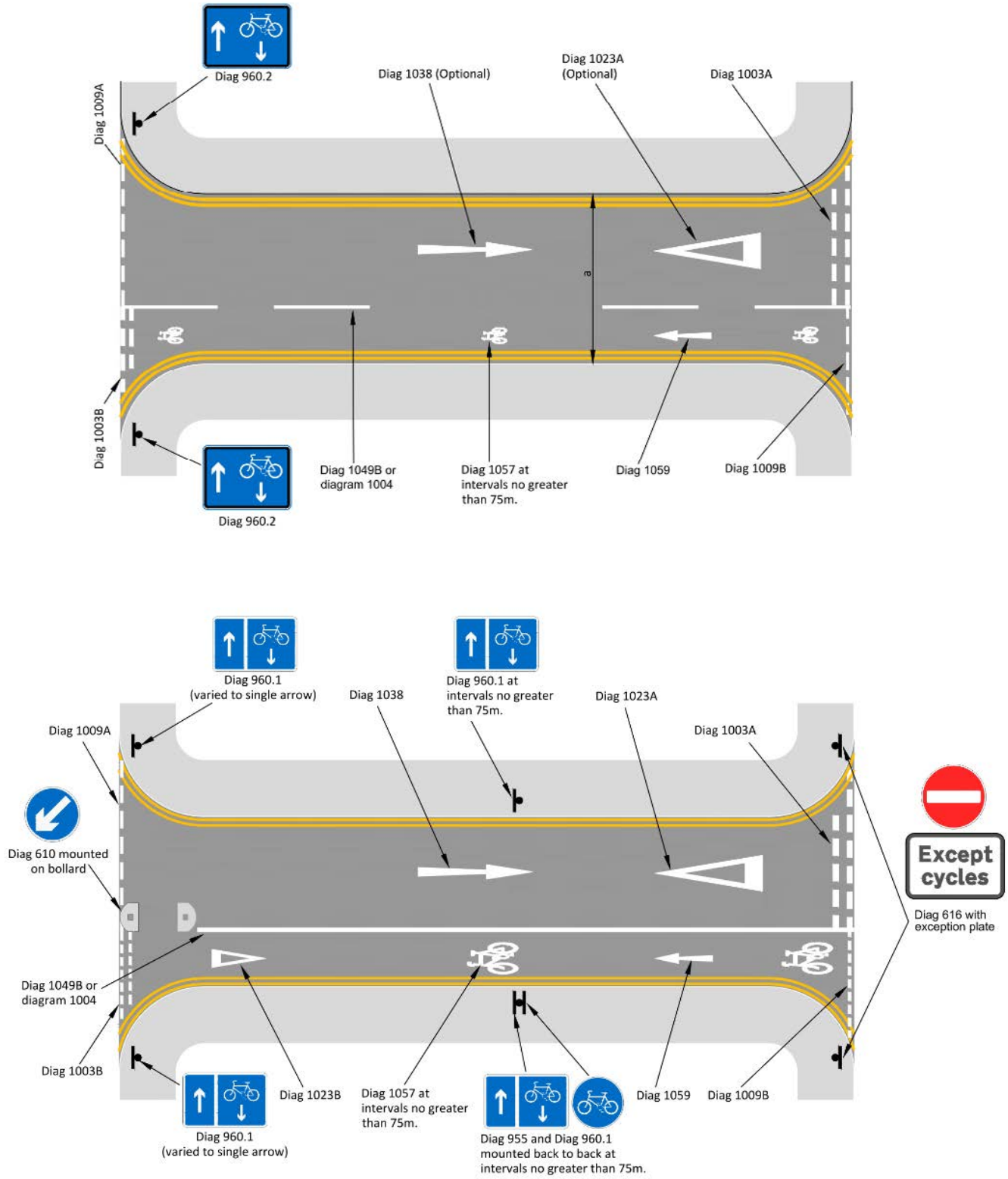


6.4.24 There may be conflicts if other road users are not aware that cycling is permitted in both directions. This could include pedestrians crossing the street and drivers turning into and out of side roads across the cycle track. If necessary, the conspicuity of the cycle lane or track may need to be increased by road markings, signs or coloured surfacing.

End markings

6.4.25 The end of a cycle lane, cycle track or route should not normally be marked by the END marking (TSRGD diagram 1058) as the end of the facility should be obvious. Give way markings to Diagram 1003B should be avoided at the end of a cycle lane – alternative designs should be considered.

Figure 6.25: Contraflow cycle lanes



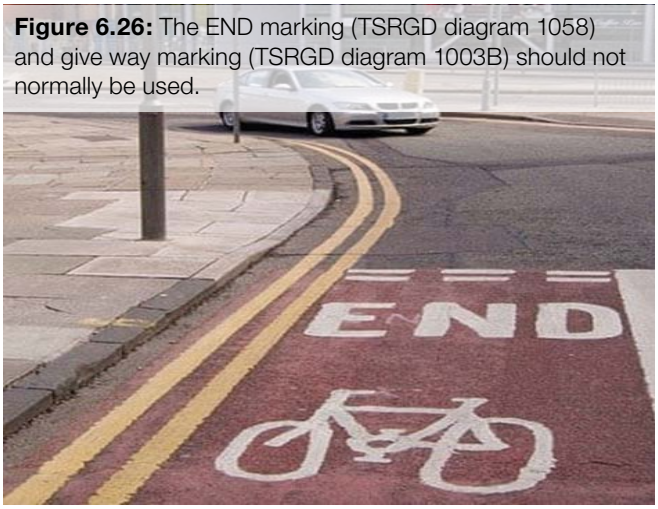


Figure 6.26: The END marking (TSRGD diagram 1058) and give way marking (TSRGD diagram 1003B) should not normally be used.

6.5 Shared use

6.5.1 For the purpose of this document shared use is defined as a route or surface which is available for use by both pedestrians and cyclists. Within the highway, it is normally created by converting the footway using the power in Section 65 of the Highways Act 1980 (see Appendix C). The issues around separating pedestrians and cyclists on off-highway routes are discussed in Chapter 8, section 8.2.

6.5.2 The term 'shared use' has been used to describe both unsegregated and segregated routes, the latter typically being achieved with a white line marking to TSRGD diagram 1049B to separate pedestrians and cyclists. This form of separation is not well observed, and pedestrians walking on or crossing the cycle side can encounter greater conflict than with unsegregated facilities due to the increased cycling speeds that can result from the designation.

6.5.3 White line segregation is not recommended and the term 'shared use' within this document refers only to facilities without any marked separation between pedestrians and cyclists. Where cycle tracks are provided at the same level as a pedestrian route, they should be clearly designed and marked as cycle tracks – see Section 6.2 and Chapter 8.

6.5.4 In urban areas, the conversion of a footway to shared use should be regarded as a last resort. Shared use facilities are generally not favoured by either pedestrians or cyclists, particularly when flows are high. It can create particular difficulties for visually impaired people. Actual conflict may be rare, but the interactions between people moving at different speeds can be perceived to be unsafe and inaccessible, particularly by vulnerable pedestrians. This adversely affects the comfort of both types of user, as well as directness for the cyclist.

6.5.5 Where a shared use facility is being considered, early engagement with relevant interested parties should be undertaken, particularly those representing disabled people, and pedestrians and cyclists generally. Engaging with such groups is an important step towards the scheme meeting the authority's Public Sector Equality Duty.

6.5.6 Shared use may be appropriate in some situations, if well-designed and implemented. Some are listed below:

- Alongside interurban and arterial roads where there are few pedestrians;
- At and around junctions where cyclists are generally moving at a slow speed (see Figure 6.27), including in association with Toucan facilities;
- In situations where a length of shared use may be acceptable to achieve continuity of a cycle route; and

Figure 6.27: Large shared use area at Hyde Park Corner, showing how high levels of cyclist and pedestrian use occur at different times.

- In situations where high cycle and high pedestrian flows occur at different times (also see Figure 6.27).

6.5.7 Recommended minimum widths of shared use routes carrying up to 300 pedestrians per hour are given in Table 6-3. Wherever possible, and where pedestrian flows are higher, greater widths should be used to reduce conflict.

Table 6-3: Recommended minimum widths for shared use routes carrying up to 300 pedestrians per hour

Cycle flows	Minimum width
Up to 300 cyclists per hour	3.0m
Over 300 cyclists per hour	4.5m

6.5.8 Designers should be realistic about cyclists wanting to make adequate progress. The preferred approach for shared use routes is therefore to provide sufficient space so that cyclists can comfortably overtake groups of pedestrians and slower cyclists.

6.5.9 Research shows that cyclists alter their behaviour according to the density of pedestrians – as pedestrian flows rise, cyclists tend to ride more slowly and where they become very high cyclists typically dismount.[30] It should therefore rarely be necessary to provide physical calming features to slow cyclists down on shared use routes, but further guidance on this, and reducing conflict more generally, is given in Chapter 8, section 8.2.

6.6 Cycling on bus and tram routes

Bus lanes

6.6.1 Cyclists are usually permitted to use with-flow and contraflow bus lanes. Whilst not specifically a cycle facility, bus lanes can offer some degree of segregation for cyclists as they significantly reduce the amount of interaction with motor traffic. However, they do not provide an environment attractive to a wide range of people and should therefore not be regarded as inclusive. Some bus lanes also allow taxis and motorcycles to use them, which can significantly increase traffic flows, thereby acting as a deterrent to cycling while also increasing risk of conflict.

6.6.2 Where cyclists are using bus lanes, the lane should be at least 4m wide, and preferably 4.5m, to enable buses to pass cyclists with sufficient room. Bus lanes less than 4m in width are not recommended and widths between 3.2m and 3.9m wide should not be used.

6.6.3 Cycle lanes or protected space for cycling may be provided within or adjacent to bus lanes where the overall width available is 4.5m or more – see Figure 6.28. At bus stops a bus stop bypass or bus boarder arrangement may be appropriate (see 6.6.7).

Figure 6.28: Cycle lane within bus lane, Brighton

Bus gates and bus-only roads

6.6.4 Bus gates are used to control routes and access to bus-only roads by preventing access by general traffic. Nearside bus gates and bus-only roads should by default be accessible by cyclists.

6.6.5 Bus gates may be implemented through the use of rising bollards, traffic signals or simply traffic signs. Where bus activated signals are used without a cycle bypass, it will be necessary to provide a means for cyclists to activate the signals. This may be achieved by a suitable means of detection or a pushbutton unit for cyclists to operate. Care should be taken to ensure push-buttons can be reached by cyclists who cannot dismount, including from a recumbent position.

30 Davies DG et al. (2003) Cycling in Vehicle Restricted Areas: TRL583

Bus and tram stops

6.6.6 Bus routes, and to a lesser extent tram routes, are generally implemented on highways where motor traffic speeds and flows are relatively high and therefore on routes where protected space for cycling or cycle lanes are justified. Cyclists therefore need a means of passing stationary buses and trams without having to come into conflict with faster vehicles on the carriageway. Removing cyclists from the carriageway to pass to the nearside of the bus introduces potential interactions with pedestrians who need to cross the path of cyclists.

6.6.7 Separation from the carriageway can be achieved through the provision of a bus stop bypass, or bus stop boarder. However, bus stop boarders incorporate areas of shared use, which can be difficult for some groups, particularly visually impaired people, to navigate. If a bus stop bypass or boarder is being considered, it is essential that early engagement with visually impaired people is undertaken.

Bus stop bypass

6.6.8 With a bus stop bypass, a cycle track is taken around the rear of the stop – see Figures 6.29 and 6.30. This design has the potential to introduce conflict and severance for pedestrians, which will need to be managed through the application of the design principles set out below and through early engagement with relevant groups.

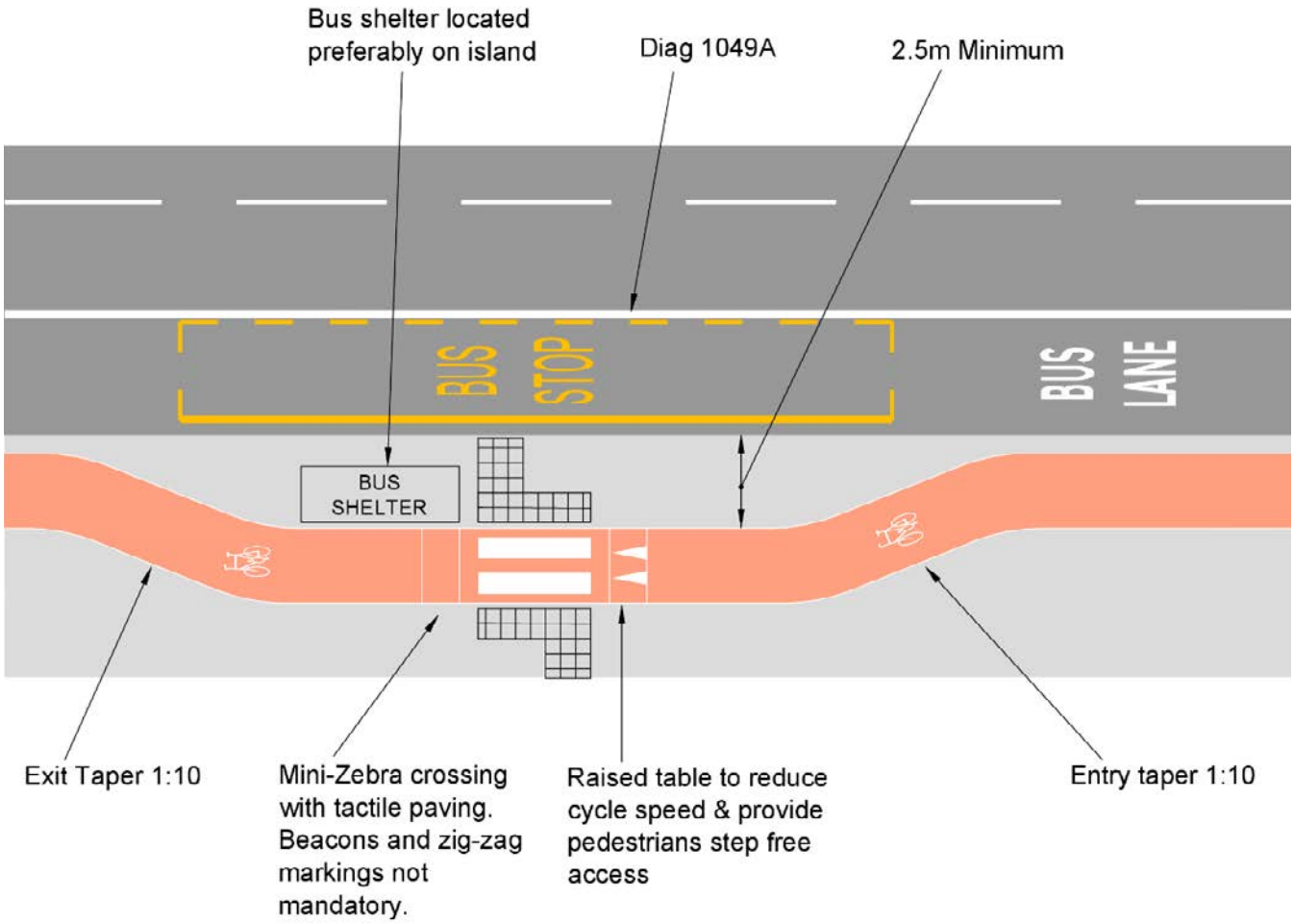
6.6.9 The cycle track is typically at carriageway level, although it should be raised to footway level at the pedestrian crossing points so that cycle speed is reduced at these points of potential conflict.

6.6.10 The island between the cycle track and the carriageway needs to be wide enough for people to stand and wait for a bus and to site a shelter if one is to be provided. The island should be a minimum of 2.5m wide, which will accommodate parents and buggies, visually impaired people with a guide dog or a person using a wheelchair to allow a bus wheelchair ramp to be deployed.

6.6.11 Pedestrian crossing points should be controlled if cycle traffic speed and flow are high. Where a bus/tram stop bypass is being considered, early engagement with relevant interested parties should be undertaken, particularly those representing disabled people, and pedestrians and cyclists generally. Engaging with such groups is an important step towards the scheme meeting the authority's Public Sector Equality Duty.

Figure 6.29: Bus stop bypass, London

Figure 6.30: Bus stop bypass layout



Bus stop boarder

6.6.12 At a bus stop boarder, cyclists are brought up onto a footway-level cycle track which passes between the footway and the edge of the carriageway – see Figure 6.31. This technique is not common, and research is ongoing into the impacts.

6.6.13 If space permits, a contrasting buffer area can be provided between the cycle track and the kerbline which bus passengers can board from and alight onto. To help minimise conflict, the area should have a width of 1.5m to 2.0m with a further footway width of 2.0m to 3.0m behind the bus stop.

6.6.14 Bus stop boarders introduce an area of shared use directly at the point where people board and alight the bus. Because of the potential for conflict this brings between pedestrians and cyclists, this layout is best suited to bus and tram stops with less frequent services and lower passenger and pedestrian volumes. Where a bus/tram stop boarder is being considered, early engagement with relevant interested parties should be undertaken, including those representing disabled people, and pedestrians and cyclists generally. Engaging with such groups is an important step towards the scheme meeting the authority's Public Sector Equality Duty.

6.6.15 Good intervisibility is required between pedestrians (those waiting for a service as well as those passing) and cyclists. This minimises the potential for conflict and the stop should be apparent to cyclists, who will need to be able to adjust their behaviour and speed, particularly when a bus is at the stop. The use of contrasting materials for the footway and cycle track, both in colour and texture, is useful to highlight the difference between the two, to both pedestrians and cyclists.

Figure 6.31: Bus stop boarder at quiet suburban bus stop, Oxford

Interaction with tram tracks

6.6.16 Tram tracks can pose a severe safety problem to cyclists using the carriageway. There are two principal types of incident:

- Skidding of cycle tyres on the smooth surface of the tram track, particularly during wet conditions; and
- Cycle tyres becoming trapped in the rail grooves.

6.6.17 Either of these situations can occur quickly and unexpectedly. Rule 306 of the Highway Code recommends that cyclists take particular care when crossing tram tracks at a shallow angle, on bends and at junctions to minimise the risk of a wheel skidding on or falling into the track. Bear in mind that this may be difficult for cyclists where they are also required to concentrate on motor traffic around them.

6.6.18 It is therefore important that tram systems provide suitable routes and space for cyclists that are separated from the tram tracks. Where cycle routes cross the tracks, they should ideally be perpendicular, or at least 60 degrees to the rails. An absolute minimum of 45 degrees may be considered.

6.6.19 Any cycle routes separate from the tram tracks should also be as direct as possible, both in terms of distance and time, to provide an alternative to remaining on the tram route.

6.7 Coloured surfacing

6.7.1 Coloured surfaces for cycle facilities are not prescribed by TSRGD and have no legal meaning. There is no obligation to use them and they may result in increased maintenance costs. They are included here because they can be useful for emphasising cycle lane markings and to help remind motorists that the surface is either primarily or exclusively for the use of cyclists. They can also help cyclists to follow a route or position themselves in the appropriate part of a carriageway, to remind pedestrians and motorists to look out for cyclists at conflict points, help cyclists to follow a route or position themselves in the carriageway. Coloured surfaces have little or no effect at night.

6.7.2 Where they are applied as an overlay over standard asphalt coloured surfaces can be visually intrusive and lose their highlighting effect where needed most. For best effect coloured overlays should be used sparingly.

Figure 6.32: Bus stop boarder layout

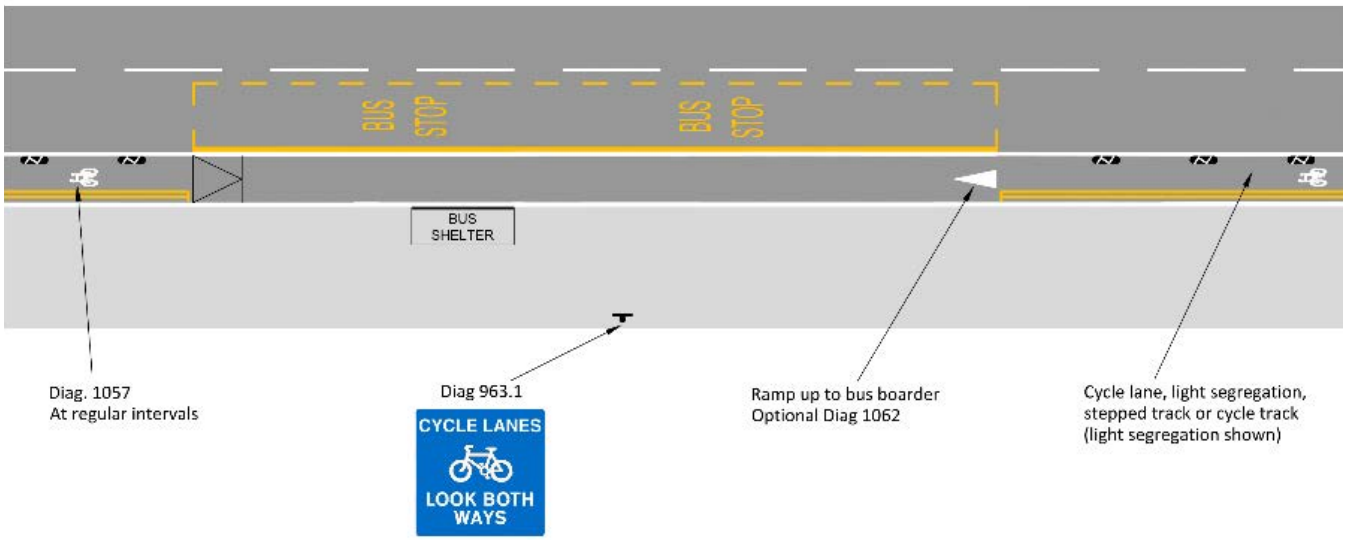


Figure 6.33: Red pigmented asphalt is used for all cycle routes in Cambridgeshire

6.7.3 Overlay materials should be specified and laid with care as they can result in a poor-quality riding surface, particularly if they are poorly maintained. Compared with road markings, the durability of such a surface can be poor, and will vary depending on the materials, colour and the method of application. This needs to be taken into account when deciding if coloured surfaces are necessary, as they add to the costs of maintenance. Any coloured surfacing material should provide adequate skid resistance.

6.7.4 Coloured surfacing may be useful in the following situations:

- Cycle lanes across the mouth of junctions;
- Routes through complex junctions;
- Cycle lanes alongside on-street car parking (in addition to the buffer strip); and
- Advanced stop line reservoirs and their feeder lanes, particularly central feeders

6.7.5 Some authorities have adopted a policy of using coloured asphalt with a pigmented binder for all cycle routes, which brings a consistency of approach and helps to make cycle routes more legible to all road users (see Figure 6.33). Using coloured materials in bulk will tend to make them more affordable.

6.7.6 The choice of colour is a matter for the local highway authority but, in the interests of consistency and simplifying maintenance, a single colour should be used for cycle infrastructure within a highway authority's area. Green and red surfaces are most commonly used.

7

Quiet mixed traffic streets and lanes

On existing streets where the principal function is access to local properties, and on rural lanes where traffic flows are light, there is less need for separate cycle facilities. Achieving lower traffic flows or speeds might require physical and legal measures to control access and motor vehicle speeds. As well as enabling cycling, such measures can bring wider environmental benefits by reducing noise, air pollution and traffic danger. In urban areas the measures may include Home Zones and Vehicle Restricted Areas. In rural areas, Quiet Lanes designation can help drivers to anticipate the presence of cyclists, walkers and equestrians within the carriageway.

7.1 Introduction

7.1.1 Where motor traffic flows are light and speeds are low, cyclists are likely to be able to cycle on-carriageway in mixed traffic, as shown in Figure 4.1. Most people, especially with younger children, will not feel comfortable on-carriageways with more than 2,500 vehicles per day and speeds of more than 20 mph. These values should be regarded as desirable upper limits for inclusive cycling within the carriageway.

7.1.2 Traffic calming and traffic management techniques can be used to help reduce motor vehicle speed and volume to make cycling in mixed traffic less hazardous and more comfortable. Crossings and junction treatments for cyclists at major roads can then help connect local networks of quieter streets. An important element of such streets and lanes is the removal of non-local through-traffic to reinforce the primary function of local access, sometimes called 'mode filtering' such as the example in Figure 7.1.

7.1.3 This Chapter also covers single track rural lanes which may have higher speed limits but where the daily traffic flow is typically much less than 2,500 vehicles per day. The requirement for formal Quiet Lanes designation is fewer than 1000 vehicles per day (see paragraph 7.5.3). There is large variation in motor traffic speed, volume and in the geometry of rural lanes, so any design interventions need to be specific to the local context.

7.1.4 Most cycling on these types of streets and lanes takes place without any special infrastructure for cycling. This chapter assumes that the techniques described will mainly be applied where providing separate space for cycling is not viable due to spatial constraints. In some places such as village centres where alternative routes are not available, it may be difficult to reduce traffic volumes to the level given in Para 7.1.1. At flows of above 5000 vehicles per day few people will be prepared to cycle on-street, however.

7.1.5 Area-wide treatments, such as the Liveable Neighbourhood and Mini-Holland schemes in London, might be trialled with temporary modal filters, and supportive community events to help establish the scheme and to monitor the potential impact on traffic levels and movements. Trials should generally last for at least a few weeks to give the scheme time to settle in as there will always be some uncertainty during the first few days until people become aware of any new restrictions and alter their behaviour.

7.1.6 It is important to use any trials to monitor actual behaviours and impacts accurately. Trial periods can provide the opportunity for supporters and opponents to publicise their views of the temporary changes and the impacts on the wider community. The findings can then be used to modify the scheme as necessary.

7.2 Spatial considerations

Primary and secondary riding positions

7.2.1 In normal traffic conditions, cyclists using the carriageway are advised to ride approximately 0.5m from the nearside kerb, to enable them to avoid gully grates. This is known as the secondary position. On narrower streets, on the approaches to side roads and in other circumstances where it is unlikely that a motorist could overtake safely, cyclists are advised to adopt a primary position in the centre of the traffic lane, as shown in Figure 7.2.

7.2.2 The primary position makes cyclists more visible to motorists approaching from behind. It enables the motorist to appreciate that it will be necessary either to cross the centre line to overtake or wait behind until there is sufficient space. Many people, particularly children, will only feel comfortable adopting the primary position where the speed and volume of motor traffic is very low. Similarly, car drivers are more likely to accept short delays on quiet streets where they are not perceived to be delaying other motor traffic.

7.2.3 Mixed traffic streets should therefore aim to offer conditions where most people would feel confident and comfortable enough to use the primary position when necessary. An overtaking clearance of 1.5m is preferred in free-flowing traffic, and a 1.0m clearance is acceptable on roads with a 20mph limit (see Table 7-1).

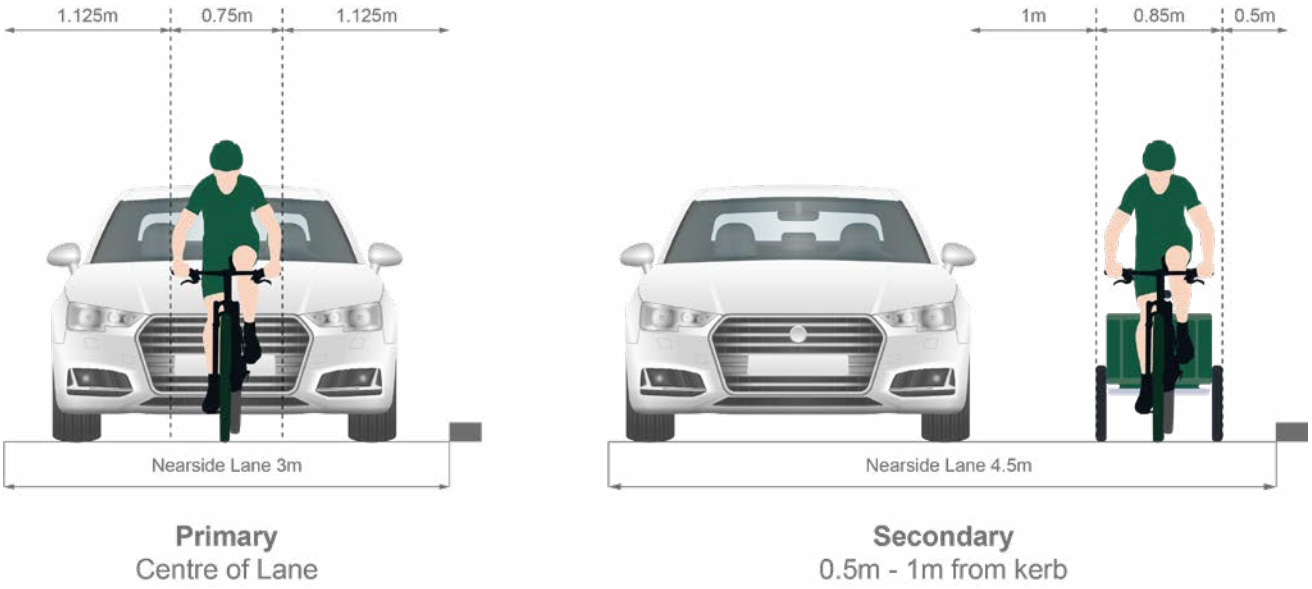
Table 7-1: Minimum overtaking clearances (measured from outside of cyclist's kinetic envelope)

Speed limit	Minimum overtaking clearances (m)	
	Desirable minimum	Absolute minimum
20 mph	1.5	1.0
30 mph	1.5	1.5

7.2.4 Close overtaking can be intimidating and hazardous to cyclists in free-flowing traffic. Only at speeds lower than 30mph might a minimum clearance of 1.0m be acceptable. No values are given for speed limits greater than 30mph because cyclists should be provided with protected space away from motor traffic (see Figure 4.1).

Figure 7.1: Simple modal filters can reduce through traffic while retaining cycle and pedestrian access. The central position enables kerbside car parking to be provided without blocking the facility, and the lockable bollard enables emergency access, Haringey.

Figure 7.2: Primary and secondary riding positions



Carriageway and lane widths

7.2.5 UK practice has generally adopted a standard lane width of 3.65m, which gives a standard single carriageway of 7.3m. However, this width can be unsatisfactory for cycling in mixed traffic as it does not include any allowance for cycle facilities on the carriageway and the lane widths are unsatisfactory. Lanes between 3.2m and 3.9m wide allow motor vehicles to drive alongside a cyclist without crossing the centre line, but without any safety margin for the comfort and protection of cyclists. This will potentially lead to close overtaking behaviour that may endanger the cyclist.

7.2.6 For locations where on-carriageway cycling is appropriate, Table 7-2 sets out minimum acceptable lane widths. This should be viewed in conjunction with Figure 4.1 in Chapter 4 which advises on when it is necessary to separate cyclists from motor traffic. Additional width may be required at sharp bends and at junctions to accommodate turning and larger vehicles.

7.2.7 A highway typically includes several other features (shown in Table 7-3) that may reduce the space available for cycling. Providing sufficient width for these other functions will help to prevent cyclists coming into conflict with other road users.

Critical widths at pinch points

7.2.8 The National Cycle Training Standards recommend that cyclists ride away from the edge of the carriageway to avoid gulleys and to make themselves visible to other carriageway users.

Table 7-2: Minimum acceptable lane widths*

Feature	Desirable minimum	Absolute minimum	Notes
Traffic lane (cars only, speed limit 20/30mph)	3.0m	2.75m	2.5m only at offside queuing lanes where there is an adjacent flared lane
Traffic lane (bus route or >8% HGVs, or speed limit 40mph)	3.2m	3.0m	Lane widths of between 3.2m and 3.9m are not acceptable for cycling in mixed traffic.
2-way traffic lane (no centre line) between advisory cycle lanes	5.5m	4.0m	4.0m width only where AADT flow <4000 vehicles** and/or peak hour <500 vehicles with minimal HGV/Bus traffic.

* these lane widths assume traffic is free to cross the centre line, see 7.2.9 for details on critical widths at pinch points

** While centre line removal is still feasible with higher flows, the frequency at which oncoming vehicles must enter the cycle lane to pass one another can make the facility uncomfortable for cycling.

Table 7-3: Minimum widths of other carriageway features*

Feature	Preferred	Minimum	Notes
Bus lane shared with cyclists	4.5m	3.2m	Avoid widths of between 3.1m and 3.9m to deter close overtaking, especially at pinch points such as central refuges (see 7.2.9)
Bus lane where off-peak parking is permitted	4.5m	4.5m	Allows 1.5m space alongside parked cars.
Buffer zones and verges (kerb segregation feature, hatched area where cycle facility adjacent to parking bays, verge between cycle track and carriageway with 40mph+ speed limit, separation from adjacent footway)	>0.5m	0.5m	Increased separation required where traffic speeds and volumes are greatest.
Car parking bay	2.0m	1.8m	Allow 0.5m buffer to any cycle lane
Disabled parking bay	>2.7m	2.7m	Allow 0.5m buffer to any cycle lane
Loading bay	2.7m	1.8m	Allow 0.5m buffer to any cycle lane.

*Separation strip should be at least 0.5m alongside kerbside parking and 1.5m where wheelchair access is required.

7.2.9 Chicanes and pinch-points should be designed in such a way that cyclists are neither squeezed nor intimidated by motor vehicles trying to overtake. The preferred option is to provide a bypass or alternatively sufficient lane width (more than 3.9m) so that the cyclist can remain in the secondary position and be overtaken safely. Where the lane or cycle bypass is bounded by fixed objects such as full height kerbs, the additional widths given in Table 5-3 should be provided.

7.2.10 When width is insufficient for a bypass, the carriageway width is restricted to prevent overtaking. This will not be desirable over long lengths unless motor traffic volumes are also very low, as cyclists will feel intimidated by vehicles waiting to overtake. Gaps between kerbs (or kerb and solid white centre line) should be a maximum of 3.2m. As noted above, widths between 3.2m and 3.9m may encourage close overtaking by motor traffic at pinch points and should not be used.

7.3 Reducing use by motor traffic

7.3.1 Reducing traffic flow to enable cycling in mixed traffic streets can be achieved through a range of measures involving area-wide treatments across a neighbourhood, usually with enhancements to the appearance of key streets as illustrated in Figure 7.3.

Encouraging through traffic to use main roads can provide benefits for pedestrians and residents, particularly children and vulnerable adults, as well as enabling cycling. This can be achieved through implementing measures such as turning bans and one way streets, and by mode filtering (see paragraph 7.1.5). These measures also have the benefit of making short journeys quicker on foot or cycle compared to driving, providing a disincentive to using a car for short trips. Care should be taken that traffic management measures do not exclude disabled people. Good quality inclusive walking environments should be provided throughout, as set out in Inclusive mobility.[31] Access and car parking for blue badge holders should be retained for these areas. Disabled cyclists who cannot dismount and walk their cycles will need to be allowed access.

7.3.2 Traffic management measures available to help reduce motor traffic on-streets used by cyclists include the following:

- Mode filtering through Traffic Regulation Order (TRO) exemptions
- Vehicle restricted areas (including HGV bans);
- Bus gates and other modal filters;
- Turning bans (with exemptions for cyclists);
- One way streets (with two-way cycle access); and,
- Time based restrictions to access or kerbside parking.

31 Inclusive mobility, DfT, 2005

Figure 7.3: Landscaped quiet street environment achieved through traffic management measures

Mode filtering through exemptions to TROs for cycling

7.3.3 An assessment should be undertaken to review whether cyclists can be safely exempted from turning bans, No Entry and one way restrictions and be permitted access to vehicle restricted areas either at all times or within peak hours.

7.3.4 Permitting contraflow cycling in one way streets and using point-closures to close certain streets to motor vehicle through traffic will generally provide a more direct route for cyclists and should always be considered. On quiet low speed streets, there may be no need for a cycle lane (see Figure 7.4 and Section 6.4), enabling cyclists to use narrow streets in both directions. Where there is good visibility cyclists and on-coming drivers should be able to negotiate passage safely. Contraflow cycling should be signed in accordance with the advice in the Traffic Signs Manual.

7.3.5 Where speed is low in urban areas, contraflow cycling without a dedicated cycle lane has been found to be successful even on narrow streets with on-street car parking. The following minimum carriageway widths are recommended:

- 2.6m with no car parking
- 3.9m based on car passing cycle, no car parking
- 4.6m with car parking on one side of the road
- 6.6m with car parking on both sides of the road

Figure 7.4: Contraflow cycling in a narrow street with no marked lane, Brighton

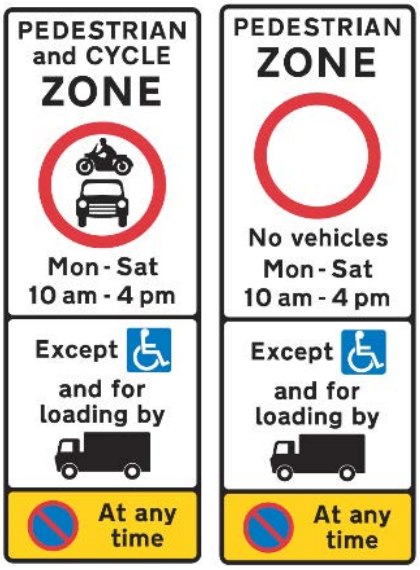
Traffic reduction through control of car parking

7.3.6 Cycling is generally supported by other sustainable transport measures. The control of car parking through charges, limiting capacity or duration of stay can be an important element in reducing private car traffic in central and other urban areas. Ensuring there is sufficient high-quality cycle parking also helps. Parking control can also be used to support workplace travel plans or to protect residential areas from excessive traffic by removing long-stay commuter parking. Removal of on-street car parking spaces may enable space within the highway to be provided to pedestrians and cyclists.

7.4 Cycling in vehicle restricted areas (VRAs)

7.4.1 Vehicle Restricted Areas are used in many towns and cities. Pedestrian Zones or Pedestrian and Cycle Zones are indicated by appropriate traffic signs (Figure 7.5). These zones often form hubs for radial routes to shops, services and employment. Restricting vehicular access in these areas can sever routes for cyclists unless they are exempted from the restrictions. VRAs signed to TSRGD diagram 619 ('No motor vehicles') allow access by cyclists, including those using e-bikes, while zones signed with the 'no vehicles' sign to TSRGD diagram 617 prohibit all vehicular traffic, including cyclists, from entering.

Figure 7.5: Entrance signs to VRAs



7.4.2 VRAs are often important destinations for access to shops and services by cyclists, and for through-cycle traffic. A high street is usually the most direct route across a town centre. Requiring cyclists to travel longer distances via routes around the zone, possibly on heavily trafficked roads, will tend to suppress cycle trips and reduce cycle safety.

7.4.3 There should always be a preference for allowing cyclists to access VRAs unless there is good evidence that this would cause significant safety problems. However, the possible impacts on pedestrians, and disabled people particularly, must be considered carefully. Visually impaired people, in particular, may not feel comfortable sharing a pedestrianised area with cyclists – see Chapters 6 and 8. Where cycling is permitted, most cyclists will usually dismount when pedestrian numbers are greatest.[32] Cycle parking should be provided at regular intervals within the zone (Figure 7.6).

Figure 7.6: Vehicle restricted area with cycle access and parking facilities, Norwich

7.4.4 Experimental TROs can be used to permit cycling on a temporary basis (usually 6 to 12 months) and performance monitored. The temporary order is reviewed at the end of the period prior to the decision to make it permanent or not. Cycling may also be restricted to certain hours, indicated by appropriate signs. As part of this process early engagement with relevant interested parties should be undertaken, including those representing disabled people, and pedestrians and cyclists generally. Engaging with such groups is an important step towards the scheme meeting the authority's Public Sector Equality Duty.

7.4.5 Pedestrian and cyclist flows, street widths, the availability and safety of alternative cycle routes and the demand for cycling through the area should be considered when deciding whether including cyclists in the restrictions is justified. Where they are judged necessary on safety grounds, restrictions on cycling may only be appropriate at certain times of day. For example, permitting cycling before 10am and after 4pm may enable commuter cycling, while avoiding the busiest periods of pedestrian activity. Cycling should not be restricted during any times when motor vehicles are permitted.

7.4.6 Both pedestrians and cyclists may express a preference for clearly-defined cycle routes. However, this can lead to higher cycle speed and greater potential for conflict with pedestrians. Careful urban design can help to create an attractive and functional environment in

32 TRL Report 583 – Cycling in Vehicle Restricted Areas (2003)

which cycle speed is low and pedestrians clearly have priority. The positioning of features such as trees and benches and the use of surfacing materials can suggest a preferred route for cyclists. This approach can help keep cyclists away from areas where pedestrians are likely to be moving across their path, such as near shop doorways, seating areas and children's play areas. Street furniture within VRAs should not compromise visibility to the extent that it becomes hazardous for pedestrians and cyclists.

7.5 Home zones, quiet lanes and other mixed use streets

7.5.1 The design of new residential access streets and redesign of existing streets can create very low speed environments which enable cycling without the need for specific measures (see Figure 7.7). Such streets are mainly used by local residents, their visitors and deliveries and servicing traffic. There is therefore no need to provide geometry that accommodates higher vehicle speed.

7.5.2 Streets can be made attractive with hard and soft landscaping that reinforces the traffic-calming effect of the geometrical layout. Home Zones can be formally designated and signed as prescribed in the Home Zones and Quiet Lanes (England) Regulations 2006, although the principles can be more widely applied on other residential streets, as described in the Manual for Streets.[33]

7.5.3 Quiet Lanes designation was introduced at the same time as Home Zones, and may be appropriate on rural lanes where actual speeds are under 40mph, and motor traffic volumes are less than 1,000 per day. The intention is to indicate to road users that the whole surface of a lane is likely to be used by pedestrians, equestrians and cyclists as well as motorised traffic. DfT Circular 02/2006 gives information about the process and recommended criteria for creating a Home Zone or Quiet Lane.

7.5.4 Some major highways include service roads on one or both sides which provide direct access to dwellings or other types of development while through traffic uses the main carriageway. Such streets are sometimes described as 'boulevards' (see Manual for Streets 2).[34] The service roads can provide good conditions for cycling as long as they meet the basic criteria for traffic volume and speed set out in Figure 4.1 and there is good continuity for cyclists at the start and end of the links and at any intermediate junctions.

7.6 Reducing motor traffic speed

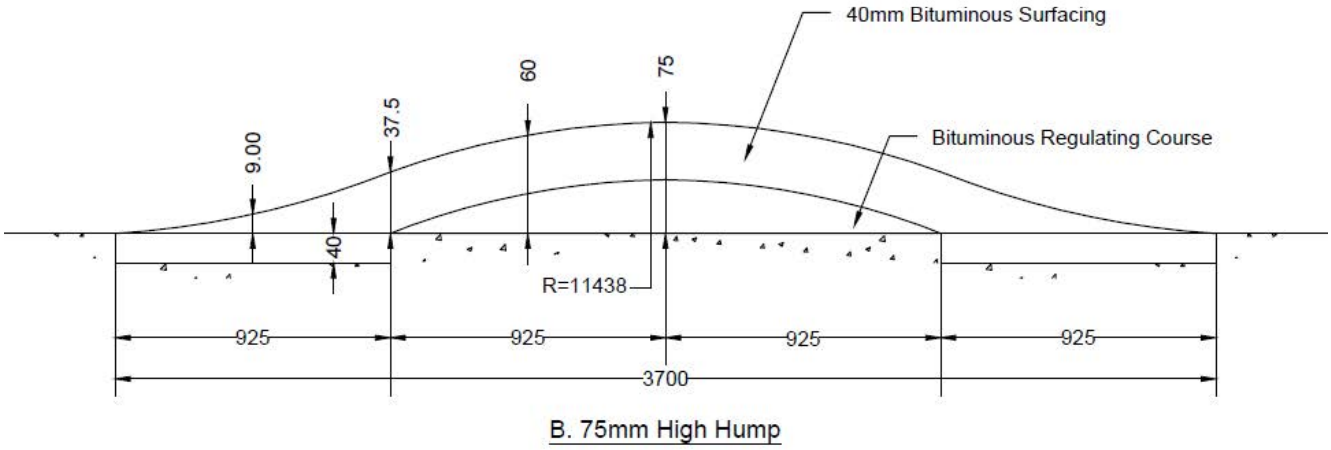
Lower speed limits

7.6.1 20mph is being more widely adopted as an appropriate speed limit for access roads and many through streets in built-up areas, with 30mph limits retained on locally strategic roads. However, changes to the speed limit will have a limited impact unless there is enforcement or physical measures that make it difficult to drive above the speed limit. Gateway features can be used to visually reinforce changes to speed limits at entry points to villages and high streets.

Figure 7.7: Cycle route in home zone, Chester

33 Manual for Streets, DfT, 2007
34 Manual for Streets 2, CIHT, 2010

Figure 7.8: Sinusoidal Ramps (Hump may be round or flat-top)



Traffic calming measures and cycling

7.6.2 Physical traffic calming measures can be horizontal (road narrowing or chicanes) or vertical (speed humps, speed tables and speed cushions). Reallocation of road space through narrowing the carriageway to provide cycle lanes, cycle parking or wider footways can also help reduce traffic speed. Advice on designing traffic calming measures is given in Local Transport Note 1/07: Traffic Calming.

7.6.3 **Road narrowing and horizontal deflection**: Section 7.2 sets out recommended widths at road narrowings to enable cyclists to adopt the primary or secondary positions safely. Kerb build outs may be used to protect car parking bays or to provide areas for cycle parking stands. They should have a tapered approach to reduce the risk of cyclists moving suddenly into the path of following vehicles. The placement of parking bays, bus stops and other built-out features can be used to create chicanes and deflections in straight sections of carriageway to help reduce speed.

7.6.4 Cycle bypasses should be provided alongside horizontal measures such as chicanes or narrowings; the gap should be at least 1.5m wide to accommodate all types of cycle and to allow access by sweeping machinery. Where debris is likely to collect in the bypass at carriageway level, an alternative is to ramp up the cycle lane across the top of the buildout (see Figure 7.3). The bypass should be arranged so that cyclists re-entering the carriageway are protected and not placed in conflict with passing vehicles.

7.6.5 **Vertical deflection features**: Sinusoidal ramps have a smooth transition profile on both sides of the hump as shown in Figure 7.8. They are more comfortable for cyclists and should normally be used where on-carriageway cycling is anticipated. Any difficulties in achieving the sinusoidal profile may be overcome by using preformed sections. These are particularly useful for approaches to flat-topped humps and speed tables. The profile of precast products should be checked to ensure it conforms to current regulations.

Figure 7.9: Trial site in Bristol to provide smoother surface, and similar application in Bruges with setts in a different colour from the adjacent traffic lane.

7.6.6 Flat-topped road humps can be used as pedestrian crossings (formal or otherwise). The requirements for road humps are contained in the relevant regulations.[35]

7.6.7 A separate cycle bypass allows the hump to be avoided altogether (with 1.5m spacing between any kerbs). Where cyclists have no choice but to travel over humps, care should be taken to ensure that the transition from road to hump has no upstand.

7.6.8 Speed cushions are a form of road hump and are therefore subject to The Highways (Road Hump) Regulations 1999. The dimensions allow wide tracked vehicles such as buses, ambulances and HGVs to straddle them. Cushions are not a preferred form of traffic calming on cycle routes because they constrain the ability of cyclists to choose their preferred position in the carriageway and are particularly hazardous to riders of three wheeled cycles.

7.6.9 **Surface Treatments**: Textured surfaces such as block paving and setts can help reinforce speed reduction. They provide a visual and audible reminder that the section of carriageway is a low speed environment. Because these can create high levels of discomfort, in particular for disabled cyclists, older and younger cyclists, they should be used sparingly. Overrun areas can be used around junctions to help visually narrow the entrance to the junction while maintaining access for larger vehicles.

Figure 7.10: Tight kerb radii at residential side street

7.6.10 **Side Road Kerb Radius**: Tight kerb radii at side roads will help to reinforce lower speeds for turning vehicles and offer a better crossing environment for pedestrians and should be used more widely (see Figure 7.10). Side Road Entry Treatments (raised tables across the junction mouth) will also help. Research carried out in London[36] found that such treatments have significant safety benefits, with a 51% reduction in cyclist collisions where they were installed.

7.7 Kerbside activity

7.7.1 Kerbside vehicle parking or loading can be hazardous for cyclists because of the risk of vehicle doors being opened into their path, or conflicts where cyclists must leave the secondary position to pass stationary vehicles.

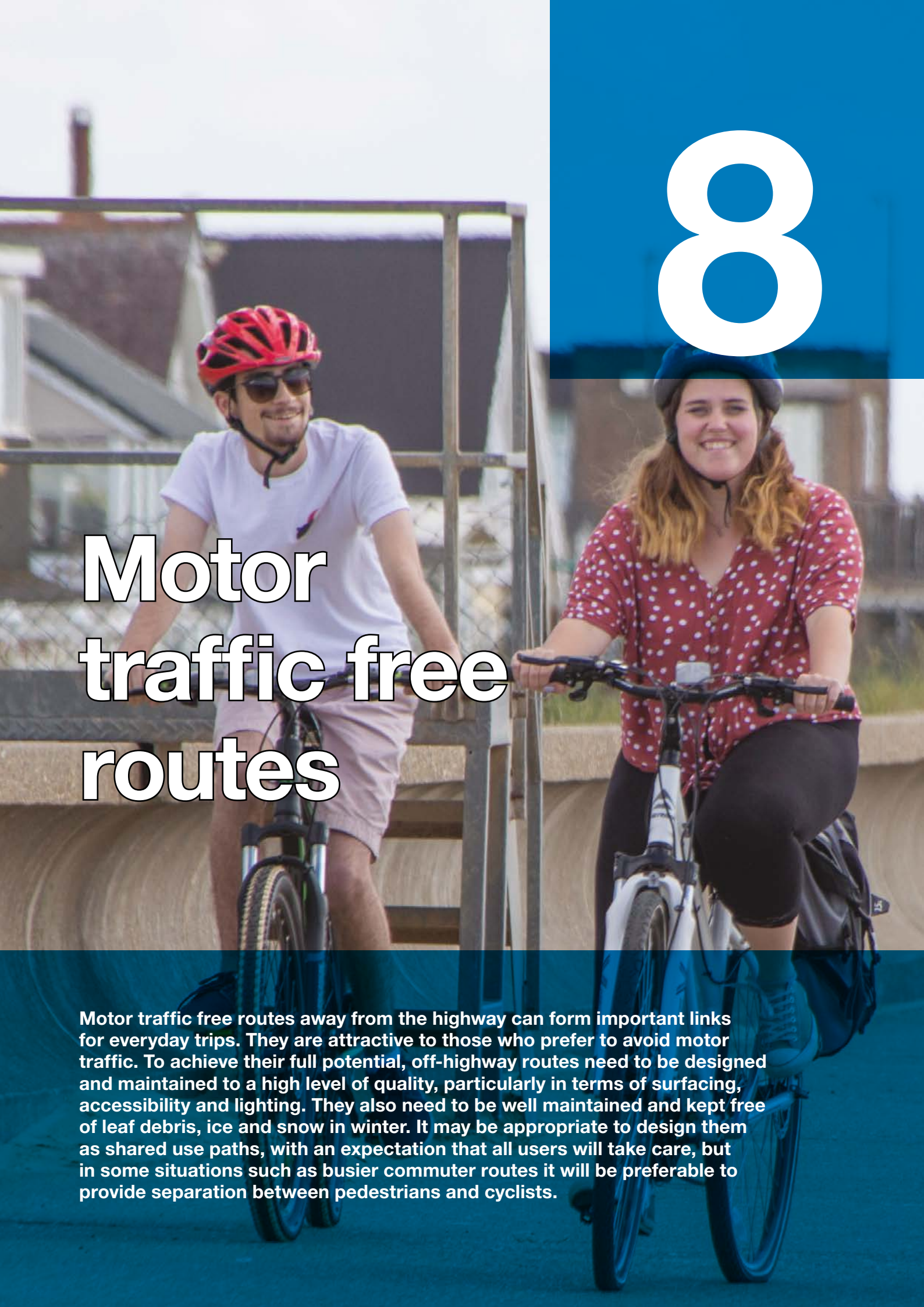
7.7.2 Raised inset bays can be helpful in offering a smooth kerbline along the carriageway of mixed traffic streets which is easier for cycling. When not in use the area offers additional space for pedestrians. Guidance on the design of cycle lanes adjacent to car parking is given in Chapter 6.

7.7.3 The arrangement of parking or bus stops into bays on alternate sides of the road can also help to create a 'chicane' effect that can help reduce traffic speeds (see Figure 7.11). Removal of centre lines alongside parking bays can help discourage close overtaking.

Figure 7.11: Inset loading bay ensures that carriageway remains 'narrow' to reinforce low speeds and provides space for pedestrians.

35 The Highways (Road Humps) Regulations 1999, for England and Wales, and The Road Humps Regulations (Northern Ireland) 1999. In Scotland The Roads (Traffic Calming) (Scotland) Regulations 1994, The Road Humps (Scotland) Regulations 1998, The Road Humps and Traffic Calming (Scotland) Amendment Regulations 1999 and The Road Humps and Traffic Calming (Scotland) Amendment Regulations 2002

36 TRL (2006): Effect of Side Raised Entry Treatments on Road Safety in London



8

Motor traffic free routes

Motor traffic free routes away from the highway can form important links for everyday trips. They are attractive to those who prefer to avoid motor traffic. To achieve their full potential, off-highway routes need to be designed and maintained to a high level of quality, particularly in terms of surfacing, accessibility and lighting. They also need to be well maintained and kept free of leaf debris, ice and snow in winter. It may be appropriate to design them as shared use paths, with an expectation that all users will take care, but in some situations such as busier commuter routes it will be preferable to provide separation between pedestrians and cyclists.

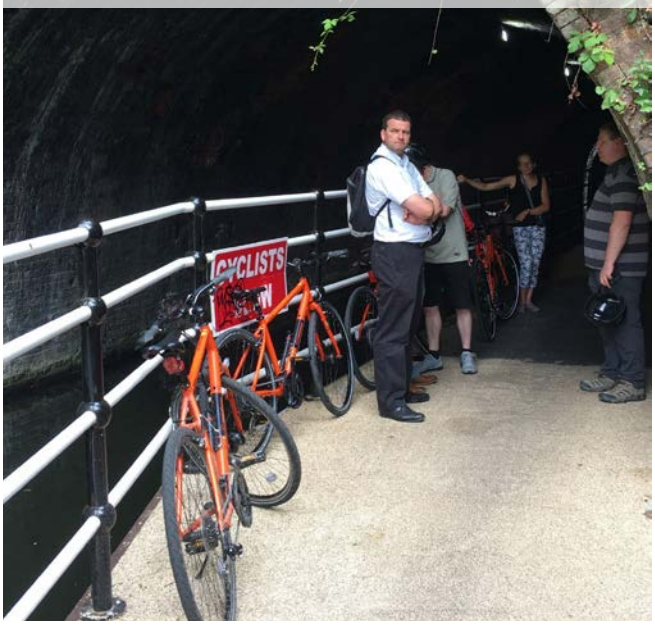
8.1 Introduction

8.1.1 This chapter provides guidance on the design of motor traffic free routes away from highways. These include routes on disused railway lines, through parks and public open space, on canal and riverside towpaths, and public rights of way.

8.1.2 Some key design considerations are listed below:

- With suitable widths and surface materials, off-highway routes can provide a high level of service for utility cycling. They can be attractive to people who may be unwilling or unable to mix with motor traffic and can form essential links within the cycling network. Guidance on width requirements for cycle routes is given in Chapter 5 and on surfacing materials in Chapter 15.
- Off-highway routes should be integrated with the wider network, with clear signing to and from adjacent areas, and properly constructed links between the off-road sections and the adjacent highways. Canal and former rail corridors sometimes bypass central areas and other attractors, so it is important to provide clear waymarking for orientation at access points.
- On some routes access points may be far apart, and the alignment may be separated by level from its surroundings. This may lead to anti-social behaviour, crime and/or the fear of crime. Achieving a good level of social safety should be considered in the design process.

Figure 8.1: Resin bonded aggregate surfacing on widened towpath, Birmingham



- For year-round utility cycling, a sealed surface is necessary (see Figure 8.1), and street lighting should be provided. Where the purpose of the route is primarily for leisure trips, typically in rural areas, these features may be less important. However, loose gravel surfaces can be difficult or inaccessible for people in wheelchairs and some types of adapted cycle.

8.2 Managing user conflict

8.2.1 The potential conflict between pedestrians and cyclists is often a concern when designing routes away from highways. Although there are few recorded collisions between pedestrians and cyclists on shared use paths, the fact that the two user groups travel at different speeds and sometimes in different directions, can affect the level of comfort of both groups. It is a particular concern for visually impaired people. Reference should also be made to Section 6.5 of Chapter 6 when unsegregated off-highway routes are being considered.

8.2.2 Providing sufficient width for the anticipated levels of use will help minimise the risk of conflict between different user groups. Existing heritage features such as canal towpaths should not be excluded from a network solely due to width or headroom restrictions, unless there are serious safety concerns.

8.2.3 Where space and budget allows, the most effective way to minimise conflict and increase comfort is to provide separate routes for walking and cycling. This technique is commonly used on Forestry Commission land and country parks to separate mountain bikers and walkers. It is also used alongside some main roads where the footway and cycle tracks are separated by a grass verge or hedge. Recommended widths are set out in Chapter 5.

8.2.4 Where there is insufficient space to separate the pedestrian and cycle paths, a level difference (preferably 60mm or more) and/or different surface texture should be used to clearly indicate separate surfaces intended for either cycle or pedestrian use, as discussed in Section 6.2.

8.2.5 Where the surface is fully level, a raised strip (trapezoidal in cross section), or some other textured material should be used. The white line road marking to TSRGD diagram 1049B or 1049.1 may be less easily detected by visually impaired people and is unlikely to provide sufficient separation.

8.2.6 As with cycle tracks adjacent to footways, it may be necessary to use ribbed (tramline/ladder) tactile paving to indicate which parts of a route are for pedestrians and for cyclists. Advice is given in Guidance on the Use of Tactile Paving Surfaces.[37]

8.2.7 Where routes intersect with the highway and cross other footways, such as the approach to a toucan crossing, short sections of route that are fully shared between pedestrians and cyclists are often the simplest way to accommodate all movements.

8.2.8 A fully shared surface is preferable to creating sub-standard widths for both pedestrians and cyclists where the available width is 3.0m or less. This allows users to walk or cycle side by side and negotiate the space when passing. Guidance on the number of users that can be accommodated on shared use routes is given in Table 6-3 in Chapter 6.

8.2.9 Prescribed traffic signs to indicate a shared route can also be used away from the highway. Alternative signs with legends such as 'Share with Care' or 'Give Way to Pedestrians' signs may be used but these are not prescribed traffic signs and must not be used on the public highway. Periodic information campaigns can help remind all users to be considerate to others.

8.2.10 In rural and suburban areas, there may be various rights of way and permitted paths away from the highway. The legal status of a route cannot easily be distinguished by its appearance. Many users will be unaware of whether cycling is permitted on different types of path or on access land. Symbols can be used on signs (see Figure 8.2) to help clarify which routes are available to cyclists.

Figure 8.2: Off-highway sign with symbols illustrating permitted users, Lake District National Park

8.2.11 It may be necessary to encourage cyclists to slow at certain points, such as the access to cycle tracks, areas of high localised pedestrian activity, steep gradients and locations where there is the potential for conflict such as junctions and the entrances to subways and bridges, particularly if visibility is constrained.

8.2.12 Measures can be used to reduce cycle speed which are broadly similar to those used for motor traffic, albeit at reduced scale, including horizontal deflection, sinusoidal speed humps and thermoplastic rumble strips. These traffic calming devices will inevitably also introduce potential hazards and discomfort for disabled users (both pedestrians and cyclists). They should be used sparingly and only in response to site-specific problems that cannot be addressed in another way.

8.3 Access controls

8.3.1 Access controls can reduce the usability of a route by all cyclists, and may exclude some disabled people and others riding nonstandard cycles. There should therefore be a general presumption against the use of access controls unless there is a persistent and significant problem of antisocial moped or motorcycle access that cannot be controlled through periodic policing.

8.3.2 Access controls that require the cyclist to dismount or cannot accommodate the cycle design vehicle are not inclusive and should not be used.

8.3.3 Access controls should not be required simply to control cyclists on the approach to a road or footway crossing. It will normally be sufficient to provide good sightlines and road markings so that cyclists clearly understand the need to take care and give way to pedestrians and otherr traffic at such points.

8.3.4 Chicane barriers cannot be used by people on tandems, tricycles, cargo bikes and people with child trailers. They may also be inaccessible to some types of wheelchair and mobility scooter. An access control that requires cyclists to dismount will exclude hand cyclists and others who cannot easily walk. Barriers fitted with plates that are designed to be narrower than motorcycle handlebars will also leave a gap that is narrower than many larger cycles. This will require cyclists to stop and

37 Guidance on the Use of Tactile Paving Surfaces, published by DfT

put a foot down to pass through, which can be difficult when carrying children or heavy luggage.

8.3.5 An alternative method is to provide bollards at a minimum of 1.5m spacing, which allows users to approach in a straight line whilst permitting all types of cycle and mobility scooter to gain access. If access is required by wider maintenance vehicles, a lockable bollard can be used (see Figure 8.3).

8.3.6 Bollards and barriers should contrast with the background and may be fitted with retroreflective material to ensure they can easily be seen in all conditions.

Figure 8.3: Simple removable bollard on cycle track, Scottish Borders

8.3.7 Where it is necessary to control the movement of livestock a cattle grid should be used, in preference to a gate which will cause delay to cyclists. Experience in Cambridge showed that a cattle grid with closely-spaced (100mm) threaded rod bars can be crossed by cycles without undue difficulty (see Figure 8.4).

Figure 8.4: Cattle grid access control, Cambridge

8.4 Junctions on cycle tracks off-highway

8.4.1 Where a cycle track meets another cycle track, it may require some indication of priority, depending on the level of use. Give-way markings are prescribed in TSRGD at a suitable size for use on for cycle tracks within the highway and can also be used at junctions on tracks off the highway. Centre line markings may also be required to help remind cyclists to stay on the left side when turning but can generally be omitted on cycle tracks away from highways. Centre line markings are generally recommended on two-way cycle tracks alongside highways – see Section 6.2 in Chapter 6.

8.4.2 Visibility splay requirements and corner radii for junctions where cycle tracks meet should be provided based on the criteria given in Chapter 5.

8.4.3 An off-highway cycle track will often need to cross a footway at the junction with a carriageway. As with side roads, designers may opt to give priority either to the footway or to the cycle track depending on the relative levels of use.

8.4.4 The footway may continue across the junction as a 'blended footway' with a give-way marking on the cycle track, or the cycle track can be continued through the footway. Appropriate tactile paving such as the blister paving seen in Figure 8.5, should be installed to alert disabled people to the presence of the cycle track.[38] Where it is considered necessary to provide pedestrians with legal priority across the cycle track a zebra crossing may be used.

8.5 Appropriate surface materials

8.5.1 Surface quality affects the comfort and effort required when cycling. Loose surfaces such as gravel or mud make cycling more difficult and can also present a skidding hazard, increase the risk of punctures and make cycles and clothing dirty in bad weather. Cyclists are also affected by ruts and potholes that can throw them off balance and cause loss of control.

8.5.2 Smooth, sealed solid surfaces, such as asphalt or macadam, offer the best conditions for everyday cycling. Cycle routes within the highway should meet at least local minimum standards of construction. Routes away from the highway should also be smooth

38 Guidance on the use of tactile paving, DfT

Figure 8.5: Cycle route crossing a footway, Newcastle

and well-maintained to ensure they play a useful role in the cycle network.

8.5.3 Good quality machine-laid surfaces are of benefit to all cycle users. Smooth surfaces also offer greater accessibility and safety for other potential users such as wheelchair users, mobility scooter users and visually impaired people.

8.5.4 Sealed surfaces should normally be provided within towns, cities and villages and on utility routes from the immediate hinterland. This might include rural cycle routes between villages, for example where pupils might be expected to travel to school.

8.5.5 Outside built-up areas, treatments such as crushed stone have often been applied to off-highway routes for aesthetic, heritage or nature conservation reasons. These treatments are a cost-effective way to create lengthy off-road links, but require more frequent maintenance if they are to avoid becoming uneven and muddy. However, they will generally be unusable by wheelchair users and anyone on smaller wheeled cycles, including small children. Where there is a need to avoid the use of black asphalt, consideration should also be given to other forms of sealed surface such as resin-bound stone.

8.6 Construction details

8.6.1 Traffic free routes require proper construction of each element to ensure that they remain safe and attractive to all users. The elements below are covered in Chapter 15.

- Formation and sub-base.
- Surfaces.
- Edges and verges.
- Ecology.
- Drainage.
- Ancillary works such as lighting, fencing, access controls and landscape features.

8.6.2 More detailed information on the detailed design and construction of traffic free routes is available from Sustrans.[39]

39 Traffic free routes design guide, Sustrans, 2019

8.7 Lighting

8.7.1 In urban areas, highway standard street lighting may be appropriate for off-carriageway routes and will assist in offering a good degree of personal security. Energy consumption and impact on wildlife can be reduced if the lighting is switched off between midnight and 5am when there is unlikely to be much use. Lighting can also be operated by detectors which are triggered by the presence of cyclists and pedestrians.

8.7.2 Low level lighting on bollards or solar LED studs can also be used and will offer some improvement in social safety. Solar lights should not be placed in areas where the tree canopy or adjacent buildings will significantly obscure daylight, although most will work where there is partial shading. The manufacturer's instructions will provide advice on exact requirements for each product.

8.7.3 Further guidance on the design of lighting for off-highway cycle routes is available from Sustrans.

8.8 Maintenance

8.8.1 Traffic free routes quickly become unattractive or unusable when littered with broken glass or dumped refuse and should be included in routine cleansing operations.

8.8.2 Autumn leaf-fall and subsequent leaf mould can be slippery and hazardous if not cleared. Unlike highways, there is no natural sweeping effect from the passage of cyclists and pedestrians. Where a traffic free route forms part of the local cycle network for utility trips it should be prioritised for snow and ice clearance (see Chapter 15).

9

Transitions between carriageways, cycle lanes and cycle tracks

Transitions between on and off-carriageway provision are essential elements of any coherent cycle route network. It is important that the point of transition offers protection from motor traffic and a comfortable and coherent route that cyclists can follow. There should be appropriate definition for all road users to recognise the boundaries between the footway, the cycle track and the carriageway.

9.1 Introduction

9.1.1 A transition is where a cycle track joins the carriageway or vice versa. Transitions between different types of provision pose different hazards for users:

9.1.2 Cyclists can be at risk from motor traffic when joining a carriageway from a cycle track; and

9.1.3 Pedestrians and cyclists can be at risk where cycle tracks and footways merge and diverge.

9.1.4 Attention to design details can help improve safety and create a welcoming environment.

9.2 Cycle track to carriageway transitions

9.2.1 Cyclists leaving an off-carriageway facility to rejoin the carriageway can be at risk of conflict with motor traffic. Careful design and implementation can help to reduce these risks and provide smooth transitions between on and off-carriageway cycle routes.

9.2.2 Where a cycle track merges back to the carriageway, the merge should be designed to reduce the risk of cyclists being hit by traffic from behind whilst also not inconveniencing on-carriageway cyclists (see Figures 9.1 to 9.3).

Figure 9.1: Cycle track joins advisory cycle lane, York

Figure 9.2: Cycle track entry and exit ramps at a signalised junction, Newcastle (Note: double yellow lines not required across transition ramps)

Figure 9.3: Cycle track joins cycle lane after bus stop, Gateshead

9.2.3 Tactile ladder and tramline paving is essential if the footway/cycle track is on a level or shared surface, to ensure that pedestrians do not inadvertently walk into the cycle track. Where there is some physical separation between pedestrians and cyclists this issue might be less likely to arise, and tactile paving may not be required. Each site should be assessed on a case-by-case basis.

9.3 Carriageway to cycle track transitions

9.3.1 Cyclists leaving the carriageway can be at risk of losing control if their wheels hit an upstand such as a kerb, or if they have to slow down to make a sharp turn to join the cycle track. Where cyclists leave the carriageway on link sections, the design should enable them to avoid having to make a sharp turn (See Figure 9.4). This may be achieved with a kerb-build out that is preceded by a section of mandatory cycle lane or taper markings. The build-out may need a bollard to ensure that it is visible to road users. Advice on placing signing on bollards is given in Traffic Advisory Leaflet 3/13: Traffic bollards and lowlevel traffic signs.

9.3.2 Where the cycle track is immediately adjacent to the carriageway, such as stepped tracks or footway-level cycle tracks, the kerb build out may precede the diverge point. Alternatively, protection may be offered simply by the kerbline of the existing verge/footway, with a gentle diverge away from the carriageway.

9.3.3 Transitions between the cycle track and the carriageway should not be across a kerb; the transition should be continuous surfacing course.

9.3.4 Where cyclists leave the carriageway to access a crossing facility they will then need to make a turn, usually of around 90 degrees. This arrangement is known as a `jug handle' turn and may impact on verge or footway space. The preferred arrangement will be for the jug handle cycle track to be at carriageway level so that conflict between pedestrians and cyclists is

Figure 9.4: Cycle lane to cycle track transition

avoided. In some cases, however, it may be necessary due to space or engineering constraints for the facility to be at footway level (Figure 9.5). In such cases the impact on pedestrians will need to be carefully considered.

9.3.5 There will inevitably be some places within existing highways where the ideal transition from the carriageway to the cycle track cannot be achieved due to site constraints. An arrow marking on the carriageway can assist with wayfinding in such circumstances (see Figure 9.7). Where dropped kerbs are used, they must be laid flush with the carriageway surface and should be of sufficient length and width to enable the design cycle to leave the carriageway without making a sharp turn. This arrangement is only suitable for locations where it is unlikely that more than one or two cyclists are ever present at the same time.

Figure 9.5: Jug handle cycle track at footway level

Figure 9.6: Stepped cycle track diverges from carriageway, Gateshead

9.4 Separated cycle track to shared use with pedestrians

9.4.1 Pedestrians and cyclists may find themselves in conflict where areas of shared use connect with areas of separate cycle track and footway. This is especially the case for visually impaired people who rely on tactile paving and kerbs to help interpret and navigate the street.

9.4.2 There are various situations where separate cycle tracks and footways merge into a single shared surface. The most common areas are where width is restricted such as near bus stops, around toucan crossings and at junctions. The change may also occur at the transition from a built-up area to an interurban shared footway where light use is anticipated. Users may be travelling across a shared area in several different directions where they are at junctions or provide access to crossings.

9.4.3 Tactile paving and signs should be used to remind people of the change in conditions. Where a separate cycle track and footway converge into a shared footway for example at a toucan crossing. Ladder and tramline tactile paving should be used as set out in the Guidance on the Use of Tactile Paving Surfaces. Upright signs to TSRGD diagram 956 and 957 are also required (Figure 9.8). Signs may be placed on a bollard or post.

Figure 9.7: Use of arrows to direct cyclists to off-carriageway route, Shepherds Bush

Figure 9.8: Correct use of tactile paving and low kerbs at start of segregated area, Leicester

10

Junctions and crossings

It is essential that the needs of cyclists are taken into account in the design of all new and improved junctions, not just those on designated cycle routes, and that crossings are provided where cycle routes continue across busy highways. Safety is vital, but junctions and crossings should also enable cyclists to negotiate them in comfort without undue delay or deviation. Junctions should be designed to enable cycle movements in all permitted directions. The design of cycle facilities should take into account the volume and speed of motor traffic and the type and size of the junction. At quieter junctions it may be safer to integrate cyclists into the general traffic streams to reduce the number of conflicts but at busier junctions it will be necessary to separate and protect cycle movements. The Junction Assessment Tool (Appendix B) should be used to assess how well junctions meet cyclists' needs.

10.1 Introduction

10.1.1 Providing separation between conflicting streams of traffic (including pedestrian and cycle traffic) is fundamental to improving safety. This Chapter looks at how this is achieved at different types of junctions and crossings. The advice should be read in conjunction with Chapter 6 of the Traffic Signs Manual.

10.2 Network planning considerations

10.2.1 The impact of major junctions on cycle routes should be considered at a network level and with regard to the strategic movement of people and goods. When considered in strategic terms, moving high volumes of pedestrian and cycle traffic through a junction may be a preferred and more efficient use of the available space compared to moving high volumes of motor traffic.

10.2.2 Improving provision for cycling at an existing major junction may require funding, and may cause some increase in delays to other users, but it can be the key to opening areas and routes to cycling. Increasing levels of cycling, through the provision of cycling and other traffic management measures, may have a positive impact on journey times along a route if this leads to a reduction in the level of motor traffic. This may help offset any negative impact on motorised traffic at a single junction.

10.2.3 It may be possible to create quieter parallel routes to avoid a particularly difficult junction altogether. Where this strategy is adopted there may be cyclists who will still need to use the junction for local access and their needs should be taken into account. It may also be possible to design facilities that bypass one or more arms of a junction to reduce the potential for conflict for the cycle trips that use them. See Figure 10.1.

10.3 Design principles and processes

Core design principles

10.3.1 Junctions and crossings should be designed with features to enable inclusive cycling. Junctions and crossings are where most conflicts occur, and the actual and perceived hazards are greatest. Junctions are often the most hazardous and intimidating parts of a journey for cyclists. A junction that does not provide safe facilities may prevent people from cycling through the junction, but may also be the reason that people will not use the remainder of a route.

10.3.2 New junctions should be designed to provide good conditions for cycling in all permitted directions, regardless of whether they are on a designated route, unless there are clearly-defined and suitable alternatives. The provision of inclusive cycle facilities should be

Figure 10.1: Cycle bypass, Castle Boulevard, Nottingham

prioritised at existing junctions where there is a high level of existing and/or suppressed demand for cycling, or a poor casualty record.

10.3.3 The five core design principles (set out in Chapter 4) should be addressed at junctions and crossings as shown in Table 10-1.

10.3.4 A Junction Assessment Tool (JAT) to aid designers is provided in Appendix B. The JAT examines *all* potential movements at a junction, not just those that may be associated with a designated cycle route, to identify the potential for conflicts and should be used whenever new and improved junctions are being designed. This helps to clarify what measures are required to address any conflicts.

Design approaches – junctions

10.3.5 There are two alternative design approaches for junctions:

- Separating cycle and motor traffic streams; and
- Integrating cycle and motor traffic streams

10.3.6 Separating streams will generally be appropriate at junctions along major roads when protected space for cycling is provided on the link(s) (see Chapter 6). Integrating cycle and traffic streams will typically apply where motor traffic speeds and flows are low enough for cyclists to share the carriageway (see Figure 4.1) – i.e. mixed traffic (see Chapter 7). Where cycle lanes are used on the approaches to junctions, designers will need to consider carefully which design approach is appropriate.

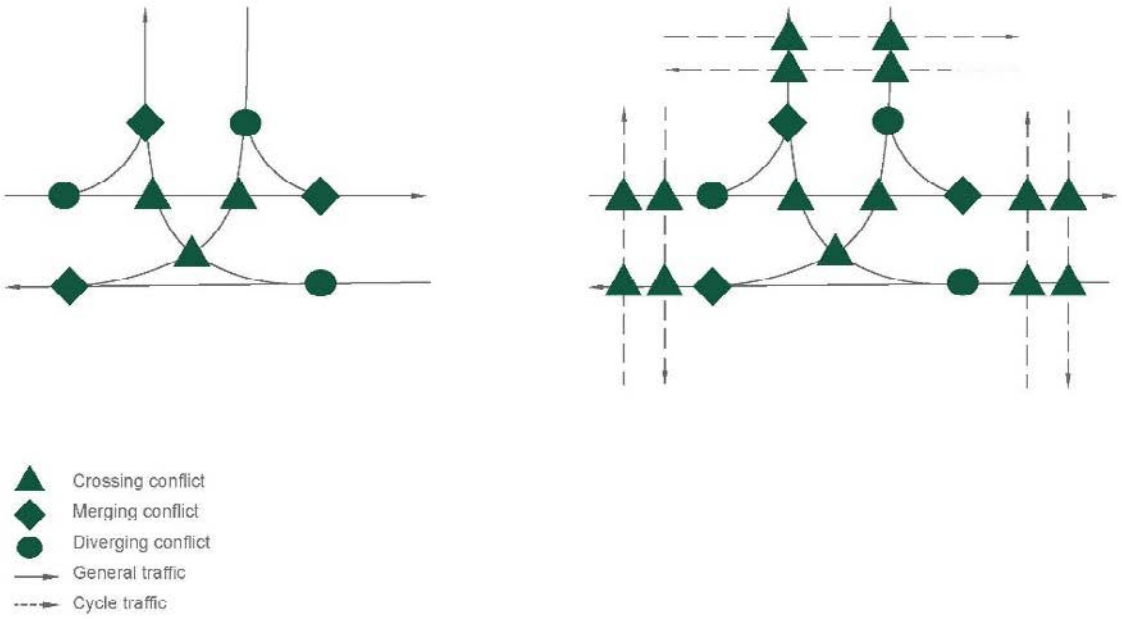
10.3.7 A combination of design approaches may be used at a single junction. For example, cycling in mixed traffic may be appropriate on a very lightly-trafficked arm of a signal-controlled junction which operates in its own stage.

10.3.8 Separating cycle and motor traffic streams will increase the number of potential conflict points to be considered and managed (see Figure 10.2), which may increase the overall time delay at a junction. Integrating traffic streams reduces the number of conflicts but mixes cycle and motor traffic. This is less likely to be appropriate at busier locations or where speeds are higher.

Table 10-1: Application of core design principles to junctions and crossings

Core design principle	Design aspects to consider
Safety	Junctions should be designed to remove or manage conflicts between cyclists, motor traffic and pedestrians by one or more of the following: › separating cyclists from motor traffic and pedestrians in space and/or time; › banning one or more motor traffic movements; › providing priority for cyclists over motor traffic; and/or › reducing the speed and volume of motor traffic movements so that cyclists can safely be integrated with them Designs should identify and reduce conflict with Heavy Goods Vehicles.
Directness	The distance and time required for cyclists to travel through a junction should be minimised. Wherever possible their level of delay should be less than for motor traffic without increasing pedestrian delay. Exempting cycles from turning movements that are banned for other vehicles will significantly increase directness and should always be considered. Cycle crossings at junctions and across links should not be staggered.
Coherence	Junctions should enable and facilitate cycle movements in all permitted directions. These should be made in a legible manner, without requiring people to deviate significantly from their overall desire lines.
Comfort	The occasions when cyclists need to stop or to give way should be minimised. Routes through junctions should ease the passage of cyclists by providing a smooth surface of adequate width, with flush surfaces at transitions, and avoid street clutter.
Attractiveness	Junctions are often important places where people gather and should be designed to suit and enhance their context.

Figure 10.2: Illustration of conflict points at a T-junction with cycle movements on-carriageway (left) and off-carriageway (right)



10.3.9 These approaches can be applied to all types of junction – for example a compact roundabout with low traffic flows can enable cyclists to be safely integrated with motor traffic, whereas larger and busier roundabouts will require cycle flows to be separated out.

10.3.10 Designers should ensure that the space provided for cycling at junctions is sufficient to accommodate the cycle design vehicle so that all types of user can negotiate the junction. This will be particularly critical where cycling is provided for through facilities separated from motor vehicles.

10.3.11 Cyclists should preferably be kept separate from pedestrians through junctions.

Junction capacity modelling

10.3.12 Standard junction modelling software does not easily allow for cycle traffic to be modelled separately from other types of vehicle. It can include cycles as part of an overall mixed traffic stream and, for traffic signals, assess the effect of cycle-only phases or other cycle-specific features (e.g. early-release) on the overall cycle time and junction capacity.

10.3.13 Research carried out by TRL[40] recommends a Passenger Car Unit (PCU) value of 0.2 to assess the impact of cycles as vehicles within a mixed traffic stream, but this is a relatively simplistic approach.

For existing junctions, the impact of cycle traffic on saturation flow (traffic signals) and slope and intercept values (priority junctions and roundabouts) can be measured, which will enable site-specific factors to be taken into account.

10.3.14 At cycle-only stop lines a saturation flow of one cyclist per second per metre of cycle track/lane width has been found to be appropriate. Ignoring any small loss of effective green time at the start, and assuming a green time for the cycle phase of 7 seconds (see 10.3.15), this means that a 2m wide stopline would discharge 14 cycles per signal-cycle, or 840 cycles per hour based on a 60 second signal-cycle time.

10.3.15 A green time of 7s for the cycle phase will often provide enough time to discharge a waiting queue of cyclists. Where demand is high designers should assess whether the green period should be increased, based on the cycle flow and width of the facility. Guidance on timings is given in Tables 10-3 and 10-4.

10.3.16 In situations where cycle numbers are high, it may be necessary to model junctions in more detail. This can be achieved using microsimulation which can model the behaviour of cycles as individual vehicles. Microsimulation models can also model the operation of roundabouts, priority junctions and cycle priority crossings, including parallel crossings. Careful choice of parameters will be necessary to achieve an accurate model, which may vary between time periods.

40 Kimber, RM, McDonald, M and Hounsell, NB Research Report 67 – The Prediction of Saturation Flows for Road Junctions Controlled by Traffic Signals, TRL (1986)

10.3.17 When assessing cycle traffic capacity, the following factors should be considered:

- Suppressed demand for cycling may be significant
- Cycle traffic may peak at different times to motor traffic and may be relatively low outside the morning and evening peak hours
- Cycle traffic is subject to seasonal variation, being higher in the summer months
- The width and capacity of the cycle tracks or lanes approaching the junction may be as significant as the capacity of the junction itself (Figure 10.3)

10.4 Cycle crossings

Introduction

10.4.1 Cycle crossings are mid-link stand-alone facilities to enable cyclists to cross a carriageway that would otherwise form a hazardous or impenetrable barrier on the cycle route network. Crossings may also form part of junction treatments where cyclists are taken off the carriageway. They may be used to connect off-highway cycle routes across a major road and enable connections with quieter street networks via cycle-only access points.

10.4.2 Crossings can be divided into the following types:

- Uncontrolled crossings
  - With or without refuge
- Controlled crossings
  - Cycle priority crossing using give-way markings.
  - Parallel crossing.
  - Signal controlled – Toucan and Cycle Signal Crossings.

10.4.3 Guidance on grade separated crossings is given in Section 10.8.

10.4.4 Table 10-2 provides an indication of the suitability of each type of crossing, depending on the speed and volume of traffic and the number of lanes to be crossed in one movement.

Figure 10.3: Cycle traffic capacity may be an issue at busy junctions (London)

Table 10-2: Crossing design suitability

Speed Limit	Total traffic flow to be crossed (pcu)	Maximum number of lanes to be crossed in one movement	Uncontrolled	Cycle Priority	Parallel	Signal	Grade separated
≥ 60mph	Any	Any					
40 mph and 50 mph	> 10000	Any					
	6000 to 10000	2 or more					
	0-6000	2					
	0-10000	1					
≤ 30mph	> 8000	> 2					
	> 8000	2					
	4000 8000	2					
	0-4000	2					
	0-4000	1					

Provision suitable for most people

Provision not suitable for all people and will exclude some potential users and/or have safety concerns

Provision suitable for few people and will exclude most potential users and/or have safety concerns

Notes:

1. If the actual 85th percentile speed is more than 10% above the speed limit the next highest speed limit should be applied
2. The recommended provision assumes that the peak hour motor traffic flow is no more than 10% of the 24 hour flow

10.4.5 Table 10-2 is a guide only, and individual locations should be assessed on a case-by-case basis. In many situations, reducing the speed of motor traffic using the carriageway will enable additional options for the crossing design to be considered.

10.4.6 In urban areas, placing cycle crossings on raised tables may reduce speeds locally and improve safety. Raised tables must comply with the relevant legislation – the Highways (Road Hump Regulations) 1999, the Road Humps and Traffic Calming (Scotland) Regulations 2002, or the Road Humps (Amendment) Regulations (Northern Ireland) 2007. Outside London, DfT authorisation will be required to place toucan and parallel crossings on road humps. Within London, local authorities may place toucan and parallel crossings on road humps without such authorisation, provided they follow the procedures set out in section 90CA of the Highways Act 1980.

10.4.7 Refuges can be used to divide the crossing movement into stages (Figure 10.4). Refuges should be free of clutter, and at least 3.0m long (in the direction of travel for the cyclist) to protect users, including the cycle design vehicle, wheelchairs and mobility scooters. The refuge should be wide enough to accommodate the cycle design vehicle, and the number of people who may typically wait on them, including pedestrians at toucan and other shared crossings.

Figure 10.4: Parallel crossing with refuge

Figure 10.5: Uncontrolled crossings may not meet the needs of all people

Uncontrolled crossings

10.4.8 Cyclists crossing carriageways, for example where an off-highway route crosses the road, must give way to motor traffic unless a controlled crossing is provided. Cyclists should be able to cross a two-way carriageway via an uncontrolled crossing in lightly trafficked conditions, but at higher speeds and traffic volumes uncontrolled crossings are unlikely to meet the needs of all users (see Table 10-2 and Figure 10.5).

10.4.9 Where uncontrolled crossings are being considered the delay to cyclists may be assessed by counting the number and frequency of gaps between vehicles which meet the minimum cycle crossing times given in Table 10-3.

10.4.10 Uncontrolled crossings may be provided with warning signs to TSRGD diagram 950 to warn drivers that cyclists may be crossing ahead. Designs can make use of contrasting paving materials, street furniture and changes in carriageway width and level to highlight the crossing area. In slow traffic speed environments, these features can encourage drivers to stop for cyclists, even though they are not required to in law.

Cycle priority crossings

10.4.11 A cycle route crossing a lightly trafficked street may be given priority over traffic on the carriageway by using give-way markings to TSRGD diagram 1003. The cycle track crossing should be placed on a hump, as illustrated in Figure 10.6, but this is not a requirement. A parallel crossing may now be used as an alternative (see Figure 10.7), which also provides a crossing for pedestrians.

Parallel crossings

10.4.12 The parallel crossing is similar in form and application to a zebra crossing, but with a separate parallel cycle crossing alongside the zebra crossing. The layout is prescribed in TSRGD diagram 1001.5, and includes yellow globes, a controlled area indicated by zig-zag markings, and a give-way line (See Figure 10.7). Drivers must give way to pedestrians and cyclists using the crossing. It provides a more demand responsive and lower cost solution compared to signalised facilities. Parallel crossings can be used on links and on the arms of priority-controlled and roundabout junctions.

10.4.13 Parallel crossings provide a legal priority to pedestrians and cyclists. The use of globes and zig-zag markings enhances the visibility of the crossing to drivers, compared to a cycle priority crossing. They are therefore more suitable at sites with higher traffic flows and speeds (see Table 10-2).

10.4.14 As with zebra crossings, parallel crossings may be divided into two parts by a central refuge or median. This is likely to improve the ease of use of the crossing for both pedestrians and cyclists as they only need to watch for oncoming traffic in one direction (see Figure 10.4).

Figure 10.6: Cycle priority crossing

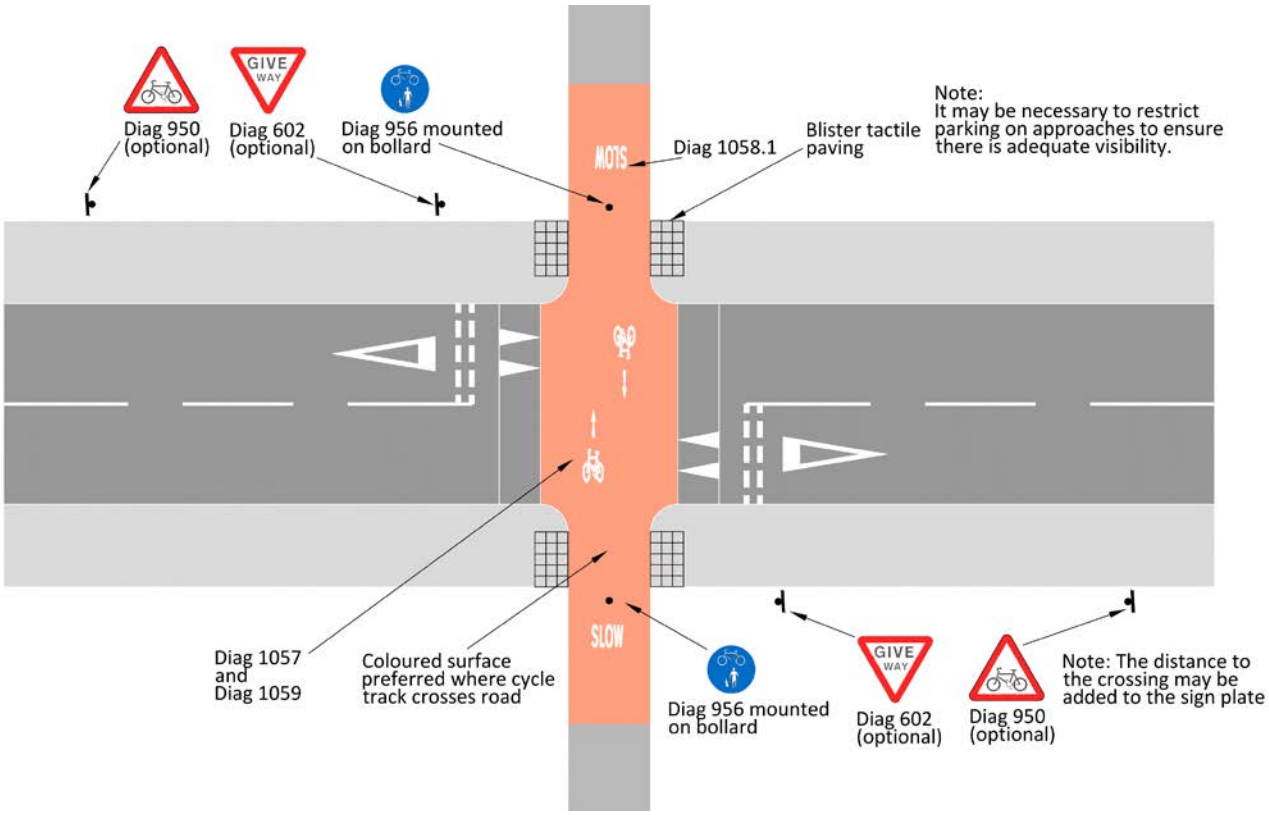


Figure 10.7: Parallel crossing, Hackney

Toucan crossings

10.4.15 Toucan crossings are signal-controlled crossings shared between pedestrians and cyclists, with no separation between the two types of user. They may be installed at junctions or as stand-alone crossings. Zig-zag markings must not be placed at toucan facilities at junctions.

10.4.16 Toucan crossings can use nearside or farside pedestrian/cyclist signals, but not a combination of both. Farside pedestrian and cycle signal heads are prescribed in TSRGD diagrams 4003.5 and 4003.6, nearside toucan signal heads are prescribed in TSRGD diagram 4003.7. High level repeater signals to TSRGD diagram 4003.7A may also be used with nearside signal heads. Farside signals may be fitted with countdown timers.

10.4.17 Toucan crossings should be used where it is necessary to provide a shared facility, for example when there are space restrictions or where there is a shared use path or area leading to the crossing. As they incorporate shared use facilities, where such a crossing is being considered, early engagement with relevant interested parties should be undertaken, including those representing disabled people, and pedestrians and cyclists generally. Engaging with such groups is an important step towards meeting the local authority's Public Sector Equality Duty.

10.4.18 Minimum crossing times at toucans are defined by walking speeds. Advice on timings is given in Chapter 6 of the Traffic Signs Manual.

10.4.19 On wider roads and at busier junctions, a staggered toucan crossing is often used to combine pedestrian and cycle movements and minimise delay to motor traffic. However, negotiating a staggered refuge

can be highly problematic and sometimes impossible for those using non-standard cycles. It can also give rise to additional conflict with pedestrians in the confined space available (see Figure 10.8). At pedestrian refuges, pedestrian guardrailing should not be installed as a default choice. The advice on the use of pedestrian guardrailing in Local Transport Note 2/09: Pedestrian Guardrailing, and Chapter 6 of the Traffic Signs Manual, should be considered.

Figure 10.8: Toucan crossing with stagger – can be highly problematic

10.4.20 Where it is necessary to stagger pedestrian crossing facilities, a separate single stage crossing for cyclists should be provided (see Figure 10.9), or alternatively an angled crossing on a wider central refuge (see Figure 10.10).

Signal controlled cycle facility

10.4.21 A signal-controlled cycle facility may be provided where a cycle track is connected across a road or an arm of a junction. The crossing may be for cyclists only, but can be provided adjacent to a pedestrian crossing facility which may be useful where separate but parallel routes exist. The pedestrian and cycle crossings do not have to operate with the same signal timings.

10.4.22 The pedestrian crossing is signalled in the usual way, and the cycle facility is indicated using signals to TSRGD diagrams 3000.2 or 3000.2A, and markings to TSRGD diagram 1055.3. Cyclists generally travel faster than pedestrians and the cycle crossing should preferably operate as a single stage, without the need for cyclists to wait on refuges in the middle of the carriageway. This can be achieved by setting the cycle crossing outside any pedestrian crossing refuges. On two-stage crossings a straight or angled alignment at the refuge should be provided for cyclists even if the pedestrian crossing is staggered (see Figures 10.9 and 10.10).

Figure 10.9: Single-stage straight-over cycle crossing next to multi-stage staggered pedestrian crossing, South Gloucestershire

Figure 10.10: Two-stage angled crossing with cycle signals on the central island (Norwich)

10.4.23 The design of the cycle crossing should make it clear that it is not to be used by pedestrians. The footway and cycle track on the approach to the crossing should be paved in contrasting materials and preferably at different levels, separated by a kerb.

10.4.24 When provided as part of a junction, or as a stand-alone facility, signal controlled cycle facilities must not be marked with a controlled area indicated by zig-zag markings.

10.4.25 However, a stand-alone pedestrian crossing (puffin or pedex) provided alongside a signal controlled cycle facility will require a controlled area in the usual way. Sufficient space will need to be provided between the crossing and the cycle facility to accommodate this, noting the flexibility in the number of zig-zag marks that may be provided. Where this is not possible, the Department may consider authorising a controlled area to be placed in a layout that encompasses both facilities.

Signal timings for cyclists

10.4.26 At junctions where no specific facilities for cyclists are provided, adjustments to signal timings for cyclists may nevertheless be beneficial, particularly at larger junctions, or where a junction arm has an uphill gradient. Timings should be validated on site and adjusted where necessary to ensure the available clearance time for cyclists is correct.

10.4.27 Cycle phases at junctions should have a minimum green duration of 7s, but longer green times may be necessary where cycle flows are high.

10.4.28 The minimum duration of a cycle stage (green period plus clearance time) should be sufficient to enable a cyclist to clear the junction when setting off from rest. This applies to both junctions and crossings.

10.4.29 Cyclists crossing the stop line at the end of the phase losing right of way may be travelling more slowly than motor traffic and have the potential to conflict with traffic starting to move in the phase gaining right of way.

10.4.30 For signal crossings the distance to the conflict point should be measured to the far side of the crossing.

10.4.31 Cyclists' speeds and their ability to move off are greatly affected by gradients. Design parameters for cycles at traffic signals are shown in Table 10-3. These have been used to calculate the intergreen times in Table 10-4,[41] taking into account cyclists' slower speed and allowing for gradients.

Table 10-3: Design parameters for cycles at traffic signals

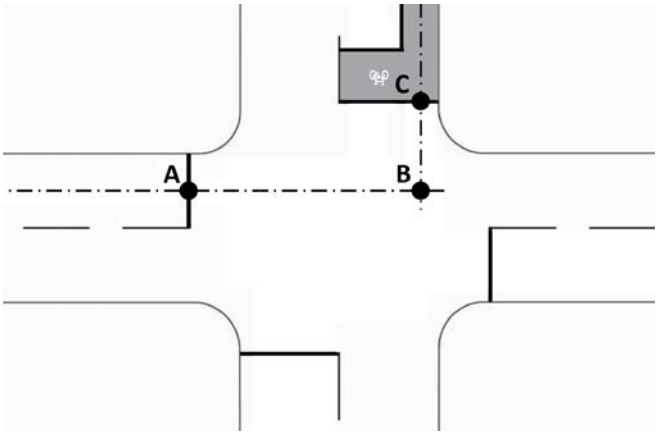
Parameter	Value	Notes
Acceleration	0.5 m/s2	< 3% uphill gradient
	0.4 m/s2	≥ 3% uphill gradient
Design speed	20 kph	< 3% uphill gradient
	15 kph	≥ 3% uphill gradient
Length of cycle	2.8m	Cycle Design Vehicle

Table 10-4: Intergreen timings to accommodate cycle traffic

Difference in distance to conflict point from closing cycle phase and opening traffic phase (AB minus BC on Figure 10.11)	Uphill gradient of 3% or more	Flat, downhill or uphill gradient of less than 3%
1-3	5	5
4	6	5
5-9	6	6
10-14	8	7
15	8	8
16-18	9	8
19-21	10	9
22-23	11	9
24-27	11	10
28-33	13	11
34-36	14	12

10.4.32 Figure 10.11 shows how the difference in distance to the conflict point (B) from the cycle phase losing right of way, and the phase gaining right of way is measured, as the distance AB minus the distance BC.

Figure 10.11: Distances to potential conflict point



41 Taken from Parkin. J (2018): Designing for Cycle Traffic – International Principles and Practice. ICE, London

10.5 Priority junctions

10.5.1 Priority, or give-way junctions are the most common type of junction.

Priority junctions in mixed traffic

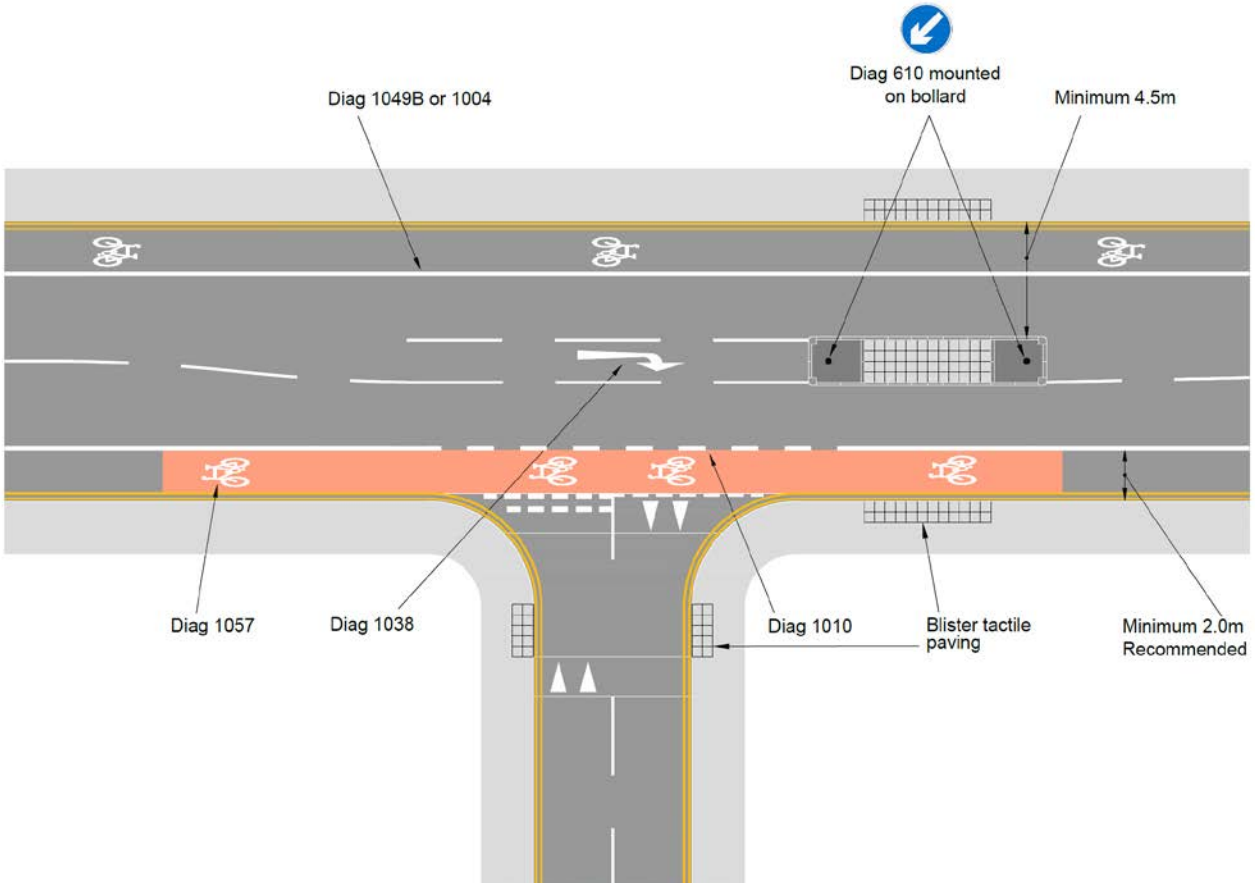
10.5.2 Where cycling takes place in mixed traffic the key issues relate to the safety and comfort for cyclists going straight ahead on the major arm while motorised traffic turns in or out; and the safety, comfort and directness for cyclists when turning into and out of the minor arm.

10.5.3 Any turn that involves crossing multiple lanes of traffic in one movement is likely to be difficult for most cyclists, particularly where motor traffic speeds and volumes are high. Therefore, in all cases, speed reduction through and on the approaches to junctions, and on turning, are recommended as measures that will benefit both cyclists and pedestrians.

10.5.4 The following features may be considered to help achieve this:

- Reducing all movements through a junction to a single lane;
- Adopting lane widths that allow cyclists to comfortably take either the secondary position or (when traffic flows and speeds are low) the primary position (see Chapter 7);
- Tight corner radii and raised entry treatments or wider junction tables that slow vehicles at the conflict points;
- Banning one or more turning movements that conflict with major cycle flows (and ensuring that the conflict is not simply transferred elsewhere);
- Providing refuges to allow cycles to cross junctions and to turn in more than one stage, but being careful to avoid creating pinch points;
- Changing priorities at junctions to give priority to a heavy cycle flow, possibly requiring a change of layout; and
- Providing road markings to highlight the presence of cyclists to other road users, such as cycle symbols to TSRGD diagram 1057, lines to TSRGD diagram 1010 and advisory cycle lanes, as well as coloured surfacing (Figure 10.12).

Figure 10.12: Right turn refuge, cycle lanes, cycle symbols and side road entry treatment at priority junction



10.5.5 Many of these design features are also beneficial when cycle facilities are provided off-carriageway, as outlined below. Guidance on designing cycle lanes at priority junctions is given in Section 6.4.

10.5.6 Where a designated cycle route via minor streets needs to cross a major highway at a staggered junction, a right-left stagger is preferred so that the right turn manoeuvres are made on the minor road.

Priority crossings of cycle tracks at side roads

10.5.7 In urban areas, where protected space separate from the carriageway is provided for cycling, it is important to design priority junctions so that wherever possible cyclists can cross the minor arms of junctions in a safe manner without losing priority. This enables cyclists to maintain momentum safely, meeting the core design outcomes of safety, directness and comfort.

10.5.8 Taking cyclists off the main carriageway creates additional points of conflict, as indicated in Figure 10.2, and so careful consideration must be given to how these conflicts are managed and minimised.

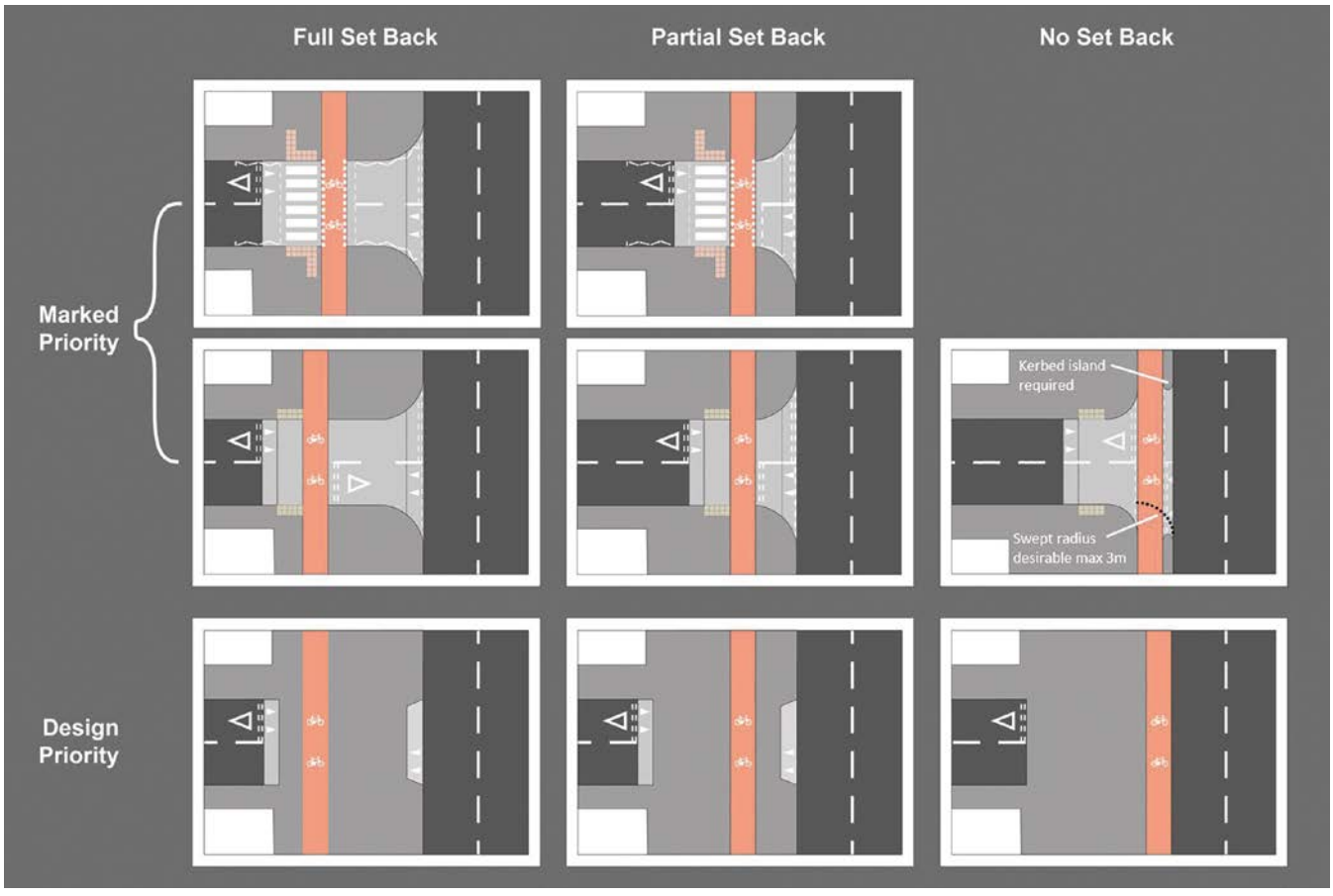
10.5.9 In rural areas, and where the speed limit is greater than 40mph, it will not normally be appropriate in safety terms to provide simple priority across side road junctions. Further guidance on designing non-priority cycle crossings of side roads is at the end of this Section.

10.5.10 Figure 10.13 shows options for providing for cycle priority at side roads in urban areas. These have been classified by position of the cycle facility relative to the major road kerbline.

- Full set back – at least a car length (5m) from the kerbline;
- Partial set back – less than a car length from the kerbline;
- No set back – at the kerbline

10.5.11 They have also been classified according to whether full legal priority is given over traffic leaving and entering the side road, or whether effective priority is achieved through design, where changes in surfacing and minimal (if any) road markings are used to distinguish the cycle crossing from the main carriageway. Both approaches may be used, with the choice

Figure 10.13: Priority crossings of cycle tracks at side roads*



* Note – yellow globes at parallel crossings omitted for clarity.

depending on factors such as the context and the available budget.

10.5.12 In all cases, it is preferable in safety terms that cycle tracks crossing side roads are one way in the direction of traffic on the main carriageway. Drivers are less likely to be aware of cyclists travelling in the other direction when turning into and out of the side road. Nevertheless, these conflicts can be managed by making the crossing conspicuous and reducing the speed of turning traffic.

Full set back, marked priority crossing

10.5.13 This type of side road crossing is sometimes called a 'bent-out' crossing, where a cycle track is inset from the main road carriageway at a distance that enables a car to stop if a cyclist is crossing. Effectively, this is a crossroads junction of the minor arm with priority given to the cyclist using standard give way markings. It is suitable where traffic flows on the minor arm are up to around 2,000 PCU/day. If the cycle track on the approach to the crossing is already far enough from the kerbline to enable a driver to stop at the crossing, it may not need to be 'bent out'.

10.5.14 This type of crossing requires sufficient space at the junction to accommodate the required geometry and may therefore be more difficult to achieve in built-up areas where there are no verges. It can be used on two-way tracks, but the problems set out in Section 6.2 should be noted.

Figure 10.14: Full set back, marked priority (bent-out) crossing, Enfield

10.5.15 The crossing should preferably be raised and paved in a material which contrasts with the carriageway and which is the same as the cycle track on either side, to emphasise the priority movement, as shown in Figure 10.15.

10.5.16 The give-way markings for general traffic should preferably be set at least 5.0m back from the major road kerbline to allow space for one car to wait. Tight corner radii should be used, preferably no more than 4.0m, and 6.0m at most. Give way triangle road markings to TSRGD diagram 1023A may be used to reinforce the requirement for drivers to give way.

10.5.17 This arrangement reduces the likelihood of the cycle track crossing being blocked by cars waiting to turn out of the junction.

10.5.18 This layout does not provide any specific facility for pedestrians. A parallel crossing placed in the same position as the give way markings would benefit both user groups, and is suitable for crossing a busier minor arm.

10.5.19 Where the cycle route is bent out towards the building line it may mean that the desire line for pedestrians cuts across the cycle track, which can introduce conflict with cyclists. If there is insufficient space to provide a clear route for pedestrians an alternative design should be considered.

Partial set back, marked priority crossing

10.5.20 This arrangement may also be used where the set-back into the junction is less than 5.0m, as shown in Figure 10.16. It requires clear visibility to the crossing from the main road.

10.5.21 This arrangement should be used with caution and only where traffic volumes and speeds are low. The requirement for drivers to give way to cyclists when turning , through the use of road markings, will also tend to reduce the speed of through traffic.

10.5.22 Vehicles waiting to turn out of the junction tend to block the cycle crossing and so this arrangement should only be considered where traffic flows on the minor arm are very light, typically less than 2,000 PCU/day, and where there are frequent gaps in traffic on the major arm so that there is minimal queuing on the side road.

10.5.23 A parallel crossing may be preferable instead, provided there is sufficient setback to accommodate the minimum requirements for zig-zag markings. This has the advantage of providing pedestrians with priority across the mouth of the junction without deviating from their desire line.

Design priority, no setback

10.5.24 This approach is suitable for one way tracks travelling in the same direction as the adjacent traffic lane, as shown in figure 10.17. Drivers must give way to cyclists when leaving the side road, but there is no priority for cyclists over traffic turning in.

10.5.25 This arrangement may be used at stepped cycle tracks which continue past the mouth of a side road junction with no change of material or level. Motor vehicles entering and leaving the side road will pass over a slight rise. A chamfered kerb may assist with this, as pioneered in Cambridgeshire – see Figure 10.19.

Figure 10.15: Full set back, marked priority (bent-out) crossing

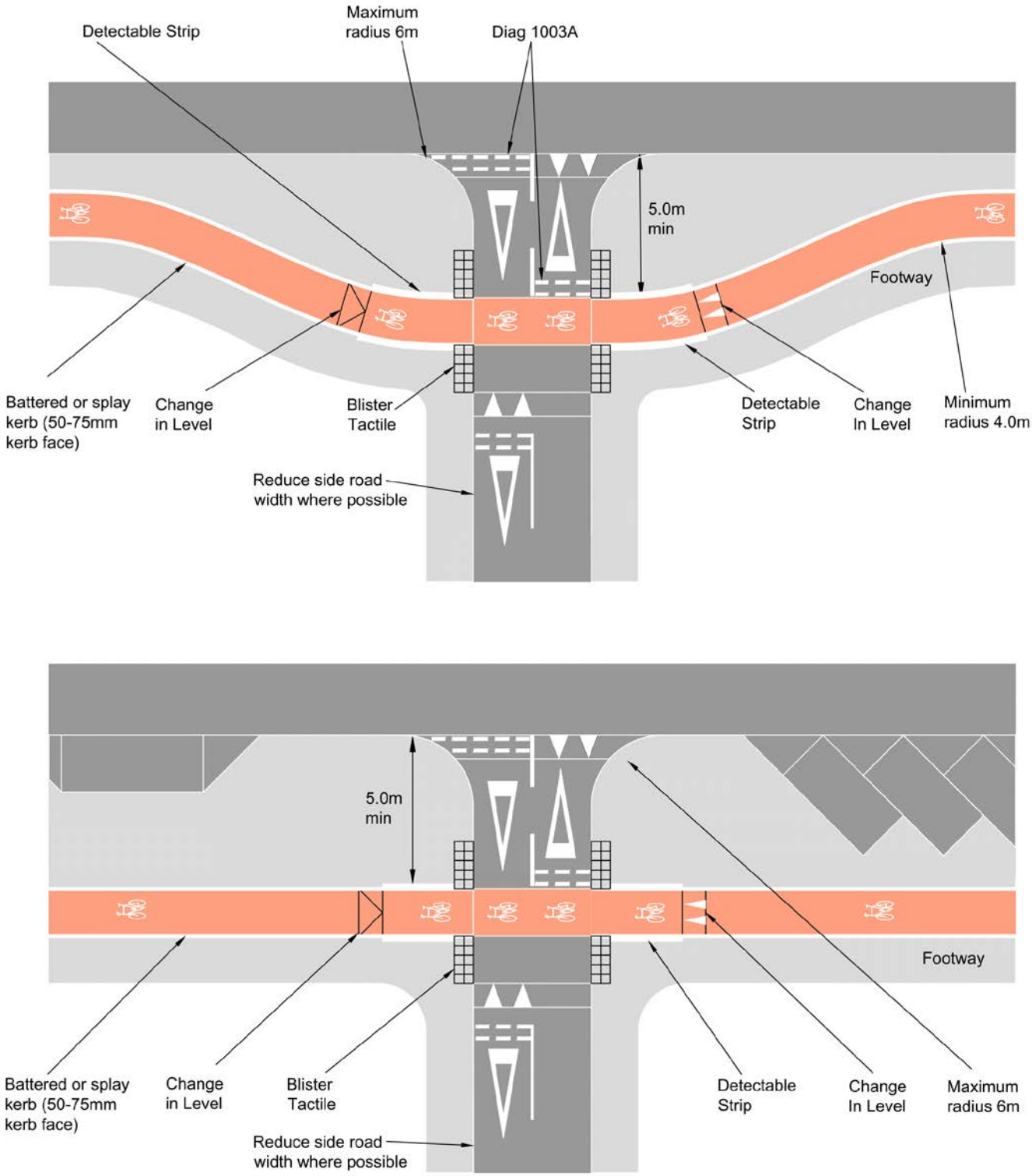


Figure 10.16: Partial set back, marked priority crossing, Hillingdon

Design Priority, full and partial setback

10.5.26 Priority for cyclists and pedestrians across minor side-road junctions can also be achieved through design priority, where the mouth of the junction is redesigned to emphasise the continuity of the footway and cycle track. The technique has not yet been widely applied in the UK, but could be considered for two-way and preferably one-way cycle tracks across minor accesses.

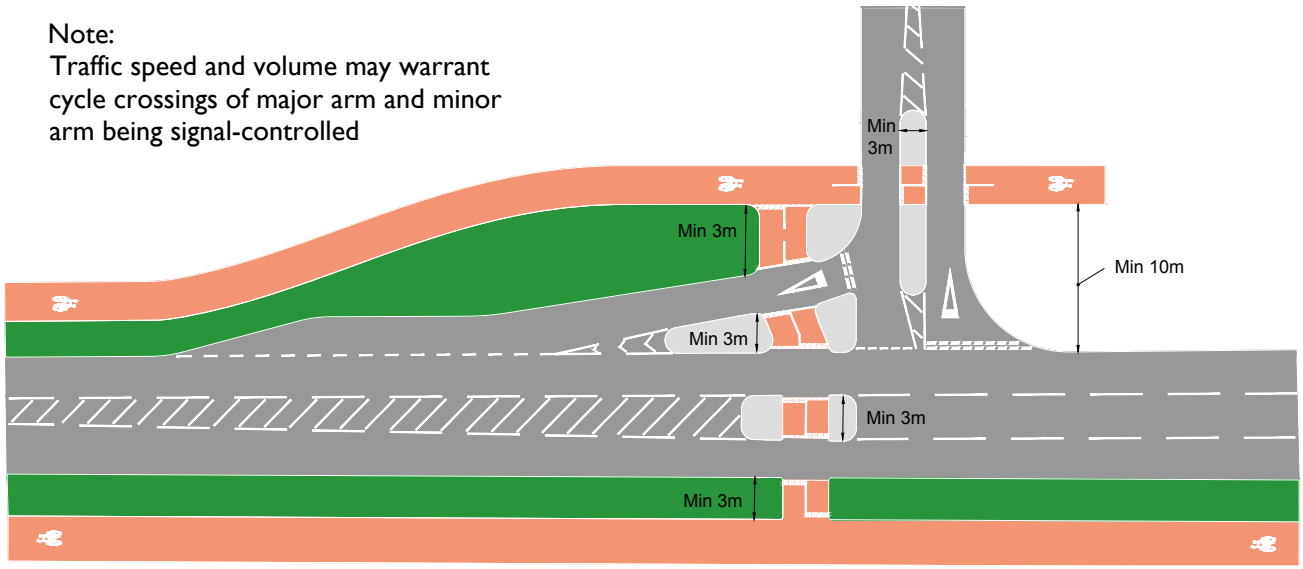
10.5.27 The use of markings to diagram 1055.3 at unsignalised junctions is not permitted in TSRGD. Alternative markings may be used, such as broken lines to diagram 1010 and cycle symbols to diagram 1057.

No Set Back, Marked Priority Crossing

10.5.28 Give way markings can be applied close to the edge of the carriageway between narrow kerbed islands to indicate that cyclists passing the junction have legal priority over traffic turning in and out of the side road.

Figure 10.17: No setback crossing with design priority,– Bournemouth

Figure 10.18: Cyclists give way on minor arm



10.5.29 The positioning of cyclists close to the edge of the carriageway means that they are more visible to vehicles turning into the minor arm and the cycle track is unlikely to be blocked by vehicles waiting to turn out of the junction.

10.5.30 This arrangement is typically used in conjunction with carriageway-level kerbed cycle tracks but can also be used with light segregation and cycle lanes. It can be used on two-way tracks, but the problems set out in Section 6.2 should be noted.

Non-Priority Crossings of Cycle Tracks at Side Roads

10.5.31 Where the speed limit is greater than 40 mph it will not normally be appropriate in safety terms for cyclists to be given priority over turning traffic at priority junctions.

10.5.32 At busier junctions where traffic flows are such that cyclists would experience significant delay in waiting for a gap to cross the minor arm, consideration should be given to providing a signal controlled or grade-separated crossing.

10.5.33 Where cyclists need to give way, the point at which they cross the minor arm should be set well back from the edge of the major carriageway so that they are able to ascertain when vehicles are about to turn into the junction. The desirable minimum set back distance is 10m, or the tangent point if the corner radius exceeds 10m. It should be measured from the kerbline of the nearside diverging lane if present (see Figure 10.18).

10.5.34 At rural junctions where the cycle track crosses a side road with less than 2000 AADT, there should be no marked priority for either cycle traffic or traffic using the minor arm, and a minimum set back distance of 5m may be used.

Figure 10.19: The 'Cambridge Kerb'

10.6 Signalised junctions

Introduction

10.6.1 The safety, comfort, directness and coherence of cycle routes can be improved through remodelling or introducing signal control at junctions, particularly where signal timings can be changed to reallocate time from motor traffic to generate time savings for cyclists. Guidance on minimum green and intergreen times are given in Section 10.4. The advice in this section should be read in conjunction with Section 12 of Chapter 6 of the Traffic Signs Manual.

10.6.2 However, introducing more complex traffic signal stages may increase overall delays, particularly during off peak periods, compared to give-way junctions and roundabouts. Sometimes there are benefits in removing traffic signals or providing cycle bypasses of signals, for example across the head of a T-junction. The needs of all users, including pedestrians, will need to be considered when making any such changes.

10.6.3 Traffic signals are typically installed at busier junctions where facilities that separate and protect cyclists from motor vehicles will normally be required (see Figure 4.1).

10.6.4 Advanced Stop Lines (ASLs) are unlikely to be adequate by themselves to encourage most people to cycle through major junctions. Further guidance on the design of ASLs for use at quieter signalised junctions is given below.

10.6.5 Types of cycle facilities at traffic signals, generally in descending order of protection for cyclists, include:

- Cycle bypasses;
- Separate cycle phases;
- Cycle and pedestrian-only stage;
- Hold the left;
- Two stage right turns;
- Cycle gate;
- Early release; and
- Advanced stop lines.

Cycle signals

10.6.6 TSRGD prescribes two types of signal heads to control traffic consisting solely of pedal cycles. Those to TSRGD diagram 3000.2 have 200 mm diameter aspects, with the amber and green aspects being cycle symbols. TSRGD diagram 3000.2 may incorporate either a full red aspect or a red cycle symbol aspect. Where compliance with the red signal is an issue, the red cycle aspect may help reinforce the message to cyclists. It also allows other traffic to recognise the phase as applying only to cycles.

Figure 10.20: LLCS used to control cycle-only movements on a cycle track (Battersea)

10.6.7 Signals to TSRGD diagram 3000.2 are sometimes referred to as high level cycle signals (HLCS). They may only be used to control a cyclist-only movement on a segregated cycle track or approach to a junction.

10.6.8 Low level cycle signals (LLCS) are prescribed in TSRGD diagram 3000.2A, in two different variations, both with 100 mm diameter aspects.

10.6.9 The Regulations allow considerable flexibility in how LLCS are used (see Figures 10.20 and 10.21):

- on their own to signal segregated cycle movements,
- as repeater signals mounted on the same post as traffic signals to TSRGD diagram 3000
- as repeater signals mounted on the same post as full size cycle signals to TSRGD diagram 3000.2; or
- as an early release function mounted on the same post as full-size cycle signals to TSRGD diagram 3000.

10.6.10 Unlike standard signals to TSRGD diagram 3000, the minimum requirement is for one cycle signal per approach. This may be full size or low level, but low level is likely to be more visible in the cyclist's eye-line. They must be placed in conjunction with a stop line to TSRGD diagram 1001, placed in advance of the signal. Depending on the layout and context of the junction it may be appropriate to provide both types at the primary signal location and to provide an HLCS as a secondary signal beyond the stop line.

Figure 10.21: A LLCS used as a repeater beneath an HLCS (London)

10.6.11 Where the use of LLCS is proposed, any existing signal equipment will need to be checked to ensure it is using Extra Low Voltage (ELV) and that the signal aspects are LEDs. Older installations may require equipment upgrades to enable the installation of LLCS. Advice on timings is given in Chapter 6 of the Traffic Signs Manual.

10.6.12 LLCS must not be used as repeaters when the associated traffic signal includes a filter arrow as the LLCS cannot be direction-specific. Where an approach is signalled with an Indicative Green Arrow, for example to enable an early cut-off sequence, an LLCS repeater may be fitted to the primary signal as the indicative arrow is placed only on the secondary signal head.

10.6.13 The signs to TSRGD diagrams 612 and 613 (no left turn, no right turn) and TSRGD diagram 606 (white-on-blue directional arrow) (see figure 10.22) may all be varied to between 95 and 110 mm in diameter for use as regulatory box signs with LLCS. Where used, the restriction should apply to all traffic, including cycles. If the movement is "except cycles" the signals to TSRGD diagram 3000 should have standard box signs with exception plates. This is not required for the associated LLCS as the movement is permitted to cyclists.

Figure 10.22: Regulatory signs for use with cycle signals

TSRGD diagram 606:

TSRGD diagrams 612 and 613

10.6.14 The green cycle aspect prescribed in TSRGD diagram 3001.4 can be used, either together with LLCS or as an alternative, to provide priority through an 'early release' for cyclists. This works in a similar way to a green arrow filter, giving cyclists' a few seconds head start before the main traffic flow. The aspect can be mounted below the full green, to the left or to the right. A 4-in-line arrangement is generally used, as placing the aspect to the left or right of the full green may result in cyclists assuming they can only move in those directions.

Figure 10.23 'Cycle Filter' signal used for an early release, Cambridge

Cycle bypasses

10.6.15 Where space and the level of pedestrian use allow, it is often possible to provide a section of cycle track that enables cyclists to bypass the red signal (see Figure 10.24). This arrangement is used to allow cyclists to turn left, or to continue straight ahead across the head of a T-junction. Any such proposals need careful design, as it is essential that the needs of pedestrians, and particularly disabled people, are taken into account. Wherever possible it should be achieved by reallocating carriageway or verge space rather than by taking space from the footway.

Dedicated cycle phase

10.6.16 Where a cycle track or cycle-only on-road provision, such as a contraflow lane, enters a signal-controlled junction, cyclists can be provided with a dedicated phase (see Figure 10.25). The signal aspect to TSRGD diagram 3000.2 or 3000.2A can be used, or a combination of both.

10.6.17 Cycle-only phases may be demand dependent, preferably using appropriate detection or push buttons to TSRGD diagram 4003.6 or 4003.8. Care should be taken to ensure push-buttons can be reached by cyclists who cannot dismount, including from a recumbent position.

10.6.18 Separate cycle phases can be useful:

- Where cyclists can undertake a manoeuvre not permitted to general traffic, and which is not shared with pedestrians, such as travelling between the carriageway and a cycle track; or
- Where cyclists need to be separated from other traffic for safety reasons – for example in a 'Hold the Left' arrangement (see Figure 10.27); or
- Where a two-way cycle track passes through a junction.

Figure 10.24: Cycle bypass of signals, Oval, London. Cyclists may turn left at the signals onto a shared use path.

Figure 10.25: Separate cycle phase, Camden

Cycle and Pedestrian-Only Stage

Full toucan stage

10.6.19 Toucan facilities can be provided at signal junctions, either in a walk-with-traffic configuration, or as a full toucan stage. However, to accommodate this it is necessary to provide shared use facilities around the junction and therefore it is unlikely such an arrangement would be suitable where pedestrian and cyclist flows are high. Parallel cyclist and pedestrian facilities are likely to be more appropriate than a toucan stage, to reduce the need for shared use. If a full toucan stage, with associated shared use, is being considered it is essential that local accessibility groups are involved at an early stage. Any shared use areas should be indicated with tactile paving to the recommended layouts and colours in the 'Guidance on the Use of Tactile Paving Surfaces'.

10.6.20 Toucan facilities may use nearside signals to TSRGD diagram 4003.7, or farside aspects to TSRGD diagram 4003.5 with a push button to TSRGD diagram 4003.6 or 4003.8. Farside and nearside signals must not be combined in the same installation. Nearside signal aspects can be obscured by those waiting, and supplementary signals to TSRGD diagram 4003.7A may be useful at busy sites.

Circulating Cycle Stage Junction

10.6.21 This layout enables cyclists to make all movements, usually in a clockwise direction, around a junction during a single stage, subject to its duration. The cycle stage is normally associated with a full pedestrian stage (all-red to general traffic). Only a few examples of this type of junction have been constructed in the UK at present (Figure 10.26) and therefore any new installations should be monitored closely so that any necessary adjustments to the layout may be made post-opening.

Figure 10.26: Circulating Cycle Stage Junction, Waltham Forest

10.6.22 Cycle tracks on either side of the carriageway on all arms feed into parallel signalised pedestrian and cycle crossings which operate simultaneously. Zebra crossings should not be provided across the cycle tracks in association with the signalised pedestrian crossings of the carriageway to prevent any confusion, particularly for visually impaired people.

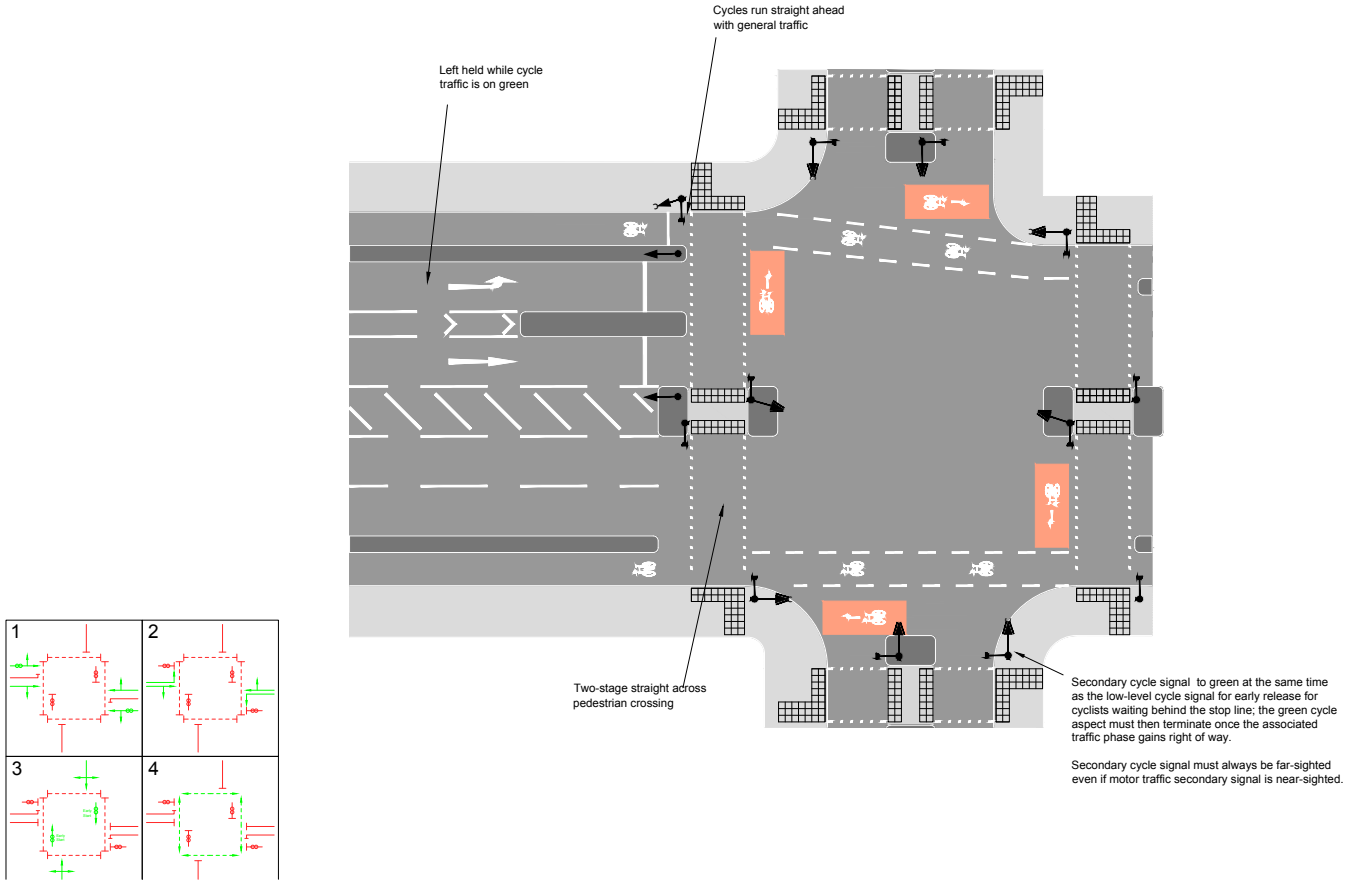
10.6.23 The duration of the cycle and pedestrian stage should at least be the time taken for a pedestrian to cross the longest arm and preferably the time required for a cyclist to make the longest right turn movement.

10.6.24 This technique may be appropriate where the space or time for separate stages or a hold-the-left turn arrangement is not possible, or would make the junction staging overly complex. The overall cycle time should be kept as short as possible so that delays to pedestrians and cyclists are minimised. Allowing the pedestrian/cycle stage to run more than once in the overall signal cycle would further reduce wait times and should be considered.

Hold the left

10.6.25 In this arrangement, a nearside cycle track is given a dedicated green signal while conflicting general traffic turning across the cycle track – typically the left turn but also any opposing right turn – is held on a red signal. The turning motor traffic only receives a green signal when cyclists are held on a red signal. This removes potential for 'left and right hook' conflicts between cyclists and motor traffic. The layout is shown in Figure 10.27.

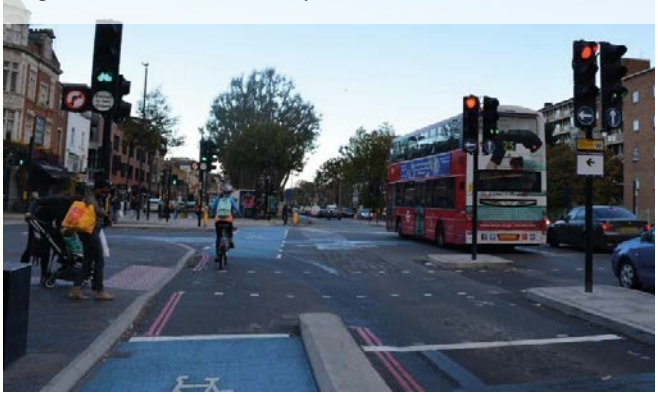
Figure 10.27: Hold the left layout (also showing 2-stage right turn)



10.6.26 Depending on the geometry of the original site, this design may require additional space for splitter islands between the various movements and to mount the required signal heads and so may be difficult to accommodate at some locations. It also makes the method of control more complex, which may reduce junction capacity, although this can be mitigated by banning some turns.

10.6.27 If a right turn for cyclists is permitted at the junction, a two-stage right turn facility as described below should normally be provided to avoid having to run the separate cycle approach in its own stage.

Figure 10.28: Hold the left junction, London



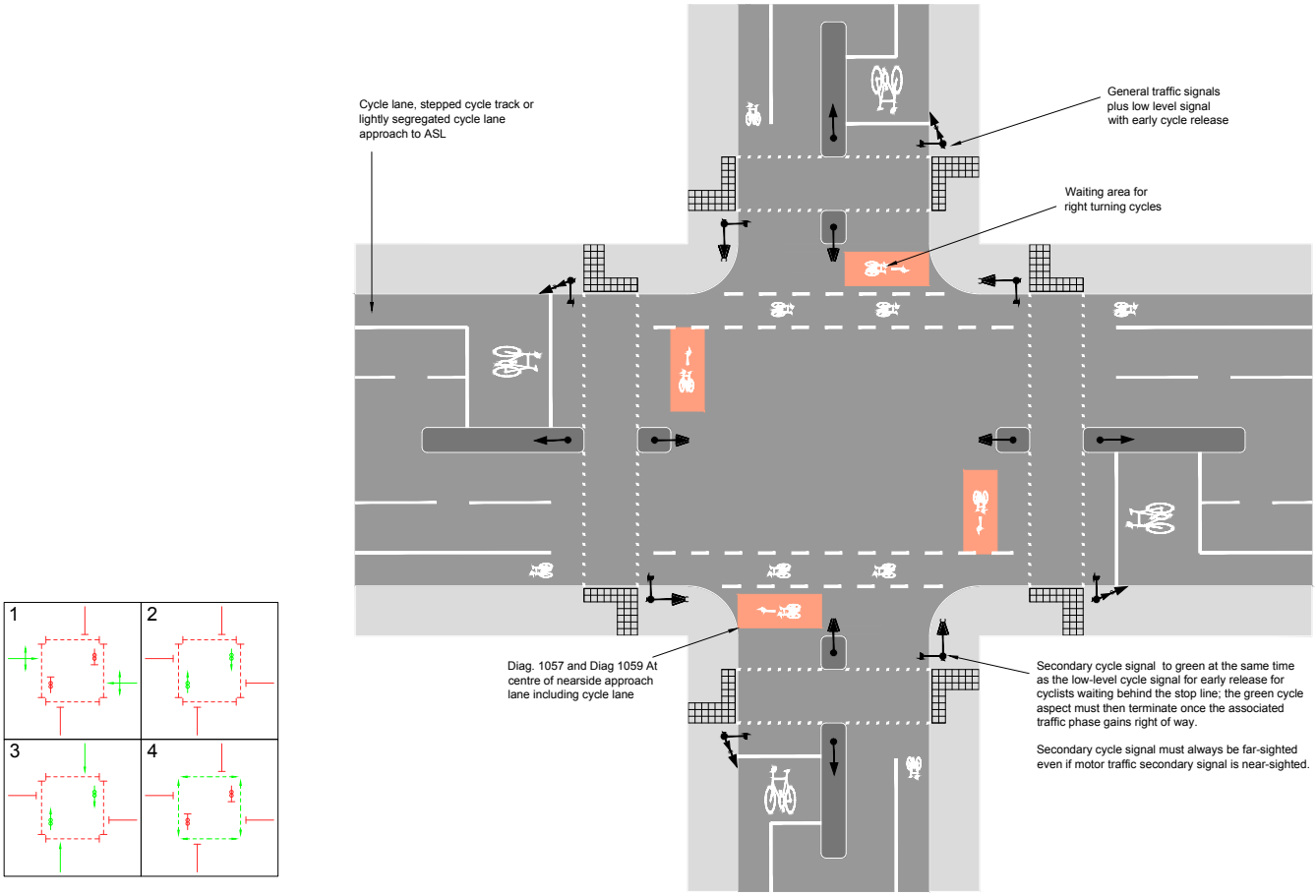
Two stage turns

10.6.28 The two stage turn arrangement enables cyclists to turn right without having to move to the centre of the carriageway (Figure 10.29). It can be of benefit on a multi-lane approach where the speed and volume of motor traffic makes a conventional right turn manoeuvre difficult for cyclists, even with an advanced stop line.

10.6.29 Provision is made for cyclists to pull in to an area of the carriageway in advance of the stop line and pedestrian crossing (where present) on their left, and to wait there until that junction approach has a green signal. At that point, cyclists make a straight across movement to complete their right turn. The waiting area is indicated by cycle symbols to TSRGD diagram 1057 and a right turn arrow to TSRGD diagram 1059.
A coloured surfacing patch may also be used to highlight the waiting area.

10.6.30 Two stage turns do involve additional delay for cyclists compared to turning right from the centre of the junction in mixed traffic, and are therefore less suitable for junctions with long signal cycles, although the method of control should be designed to ensure as short a wait period as possible. Intergreen periods should be calculated to take into account cyclists

Figure 10.29: Two stage right turn



moving off to complete their turn. The size of the area provided for cyclists to wait to complete the turn should be large enough to accommodate the cycle design vehicle and the total number of cyclists that are expected to make the turn at peak times.

10.6.31 Two traffic signs to support a two-stage turn layout have been designed. One informs cyclists to make a right turn in two stages. If the right turn is otherwise banned to cyclists (i.e. they must not turn in the conventional manner) an 'except in two stages' box sign may be placed on traffic signals to accompany a sign to TSRGD diagram 612 (Figure 10.30). These signs require special authorisation and designers wishing to use them should contact the Department in sufficient time to ensure this is obtained before the scheme is installed.

10.6.32 Cyclists waiting to complete the right turn in advance of the stop line must be able to see a secondary signal on the far side of the junction in order to know when it is safe to proceed. This may include a cycle priority signal to TSRGD diagram 3001.4 to give an early release to cycle traffic waiting to complete the turn, thus reducing conflict from left turning motor traffic.

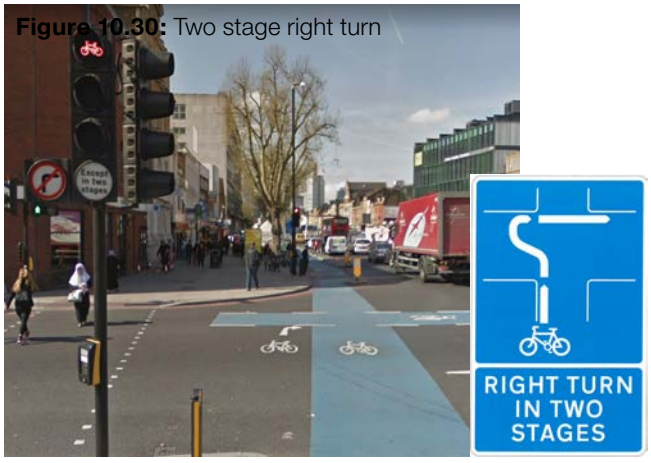
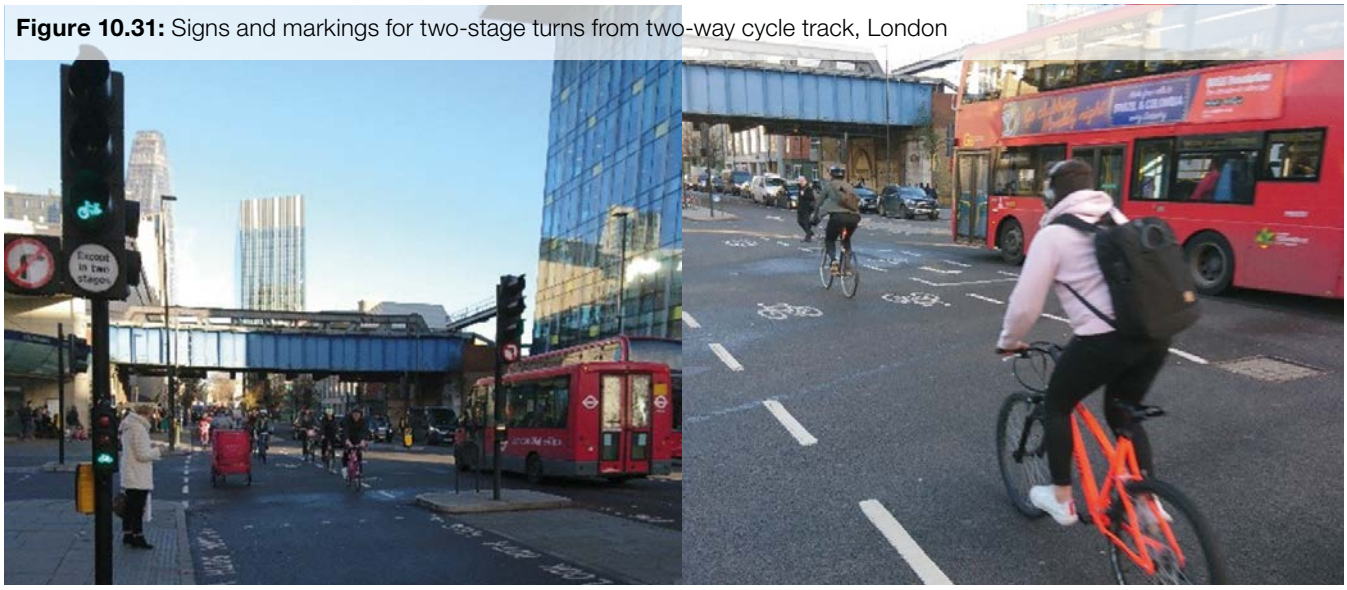


Figure 10.30: Two stage right turn

10.6.33 Two stage turn arrangements are usually provided with hold the left layouts and can also be used to enable cyclists to turn right and left from two-way tracks – see Figure 10.31.

Figure 10.31: Signs and markings for two-stage turns from two-way cycle track, London



Cycle gate

10.6.34 A cycle gate provides a reservoir area with separately controlled entry points for cyclists and motor traffic. Cyclists and motor vehicles are held in the reservoir at a second set of signals, at different stages in the signal cycle – see Figures 10.32 and 10.33.

10.6.35 Unlike an advanced stop line, the controlled access to the reservoir means that cyclists do not have to travel through the junction at the same time as motor vehicles. It also eliminates the conflict that can occur when cyclists reach an ASL just as the signals change to green. They can provide time and space to move away from a junction ahead of motorised vehicles.

Figure 10.32: Cycle gate, Southwark Bridge, London

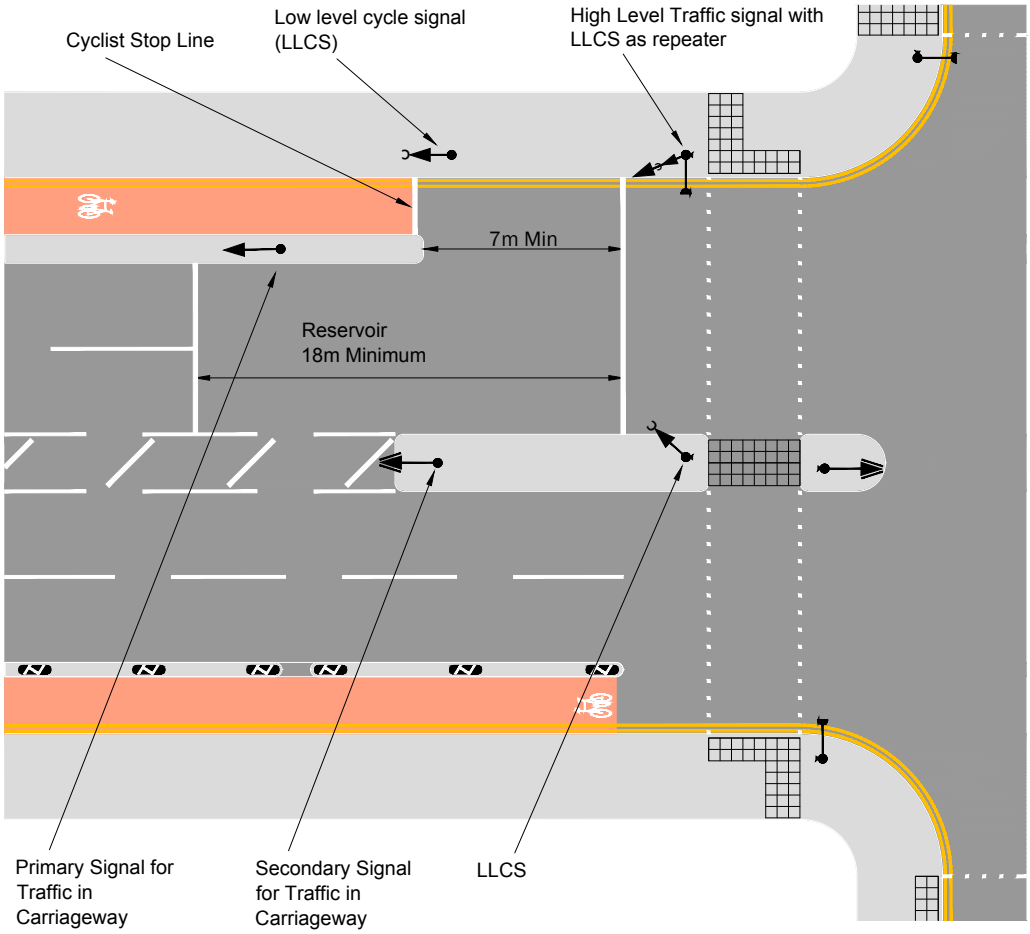
10.6.36 Cycle gates require a substantial amount of space in terms of road width and depth of reservoir. Although they may help at sites where there is a large amount of left-turning motor traffic, they can be confusing if the design or operation leads cyclists to assume the first green light gives permission to proceed into the junction itself, instead of to the second stop line. The disadvantage of this arrangement is that cyclists are always required to stop, either at the cycle entrance or the second main stop line, affecting directness and comfort. The arrangement can also be confusing with a green light to proceed quickly followed by a red light at the second stop line. Cycle gates can be useful where there are a large number of left-turning motorised vehicle movements, or 'scissor movement' conflicts. They require a substantial amount of space in terms of road width and depth of reservoir.

10.6.37 The reservoir should not be marked in such a way as to make it appear like an ASL – for example, it should not have coloured surfacing or be marked with cycle symbols. To avoid potential problems with see-through, the recommended minimum separation between the two stop lines for general traffic is 18m, as shown on Figure 10.33. This ensures signals can be clearly associated with each stop line.

10.6.38 The timings of the three sets of signals on each arm are shown in Figure 10.34 and are such that:

- The reservoir is clear when the cycle signals go green so that cyclists can move to the front of the area
- The signals controlling the exit from the reservoir go green in advance of those on the general traffic entry, to give cyclists in the reservoir a head start. LLCS can be used at this stop line to give an additional early release.

Figure 10.33: Cycle gate layout

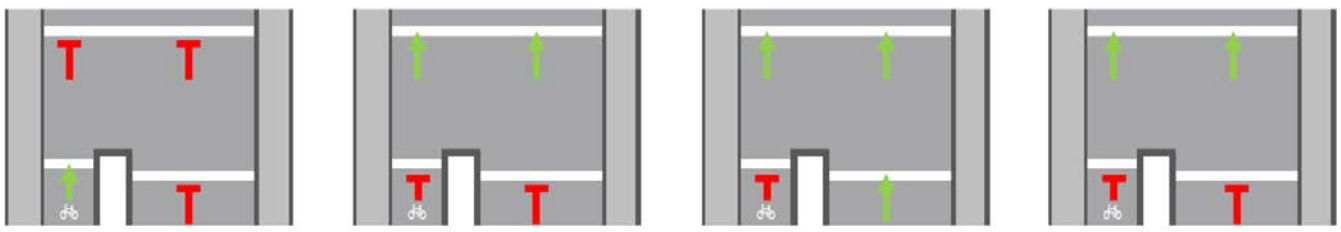


Early release

10.6.39 LLCS used in this way are programmed to turn green a few seconds before the main traffic. This enables cyclists to establish themselves within the junction ahead of the release of general traffic, in order to reduce the risk of potential conflicts between cyclists and turning traffic. LLCS are generally used with an ASL, allowing cyclists to position themselves in front of the traffic queue and gain maximum advantage.

10.6.40 The early release phase should be long enough to allow cyclists to travel beyond the left turn conflict point before other vehicles reach that point. Experience so far suggests an early start phase of 4 seconds gives cyclists good priority without unduly delaying traffic. Designers may start with this as a default value, but should confirm this is suitable through on-site observations once installed, and adjust if necessary. A longer advance green time may tempt cyclists into turning right across oncoming traffic. An early start phase of less than 3 s is not recommended.

Figure 10.34: Cycle gate signal sequence



Stage 1 – cyclists enter reservoir

Stage 2 – cyclists (and any trapped vehicles) enter junction from reservoir

Stage 3 – general traffic enters reservoir and all vehicles continue to enter junction from reservoir

Stage 4 – traffic clears reservoir

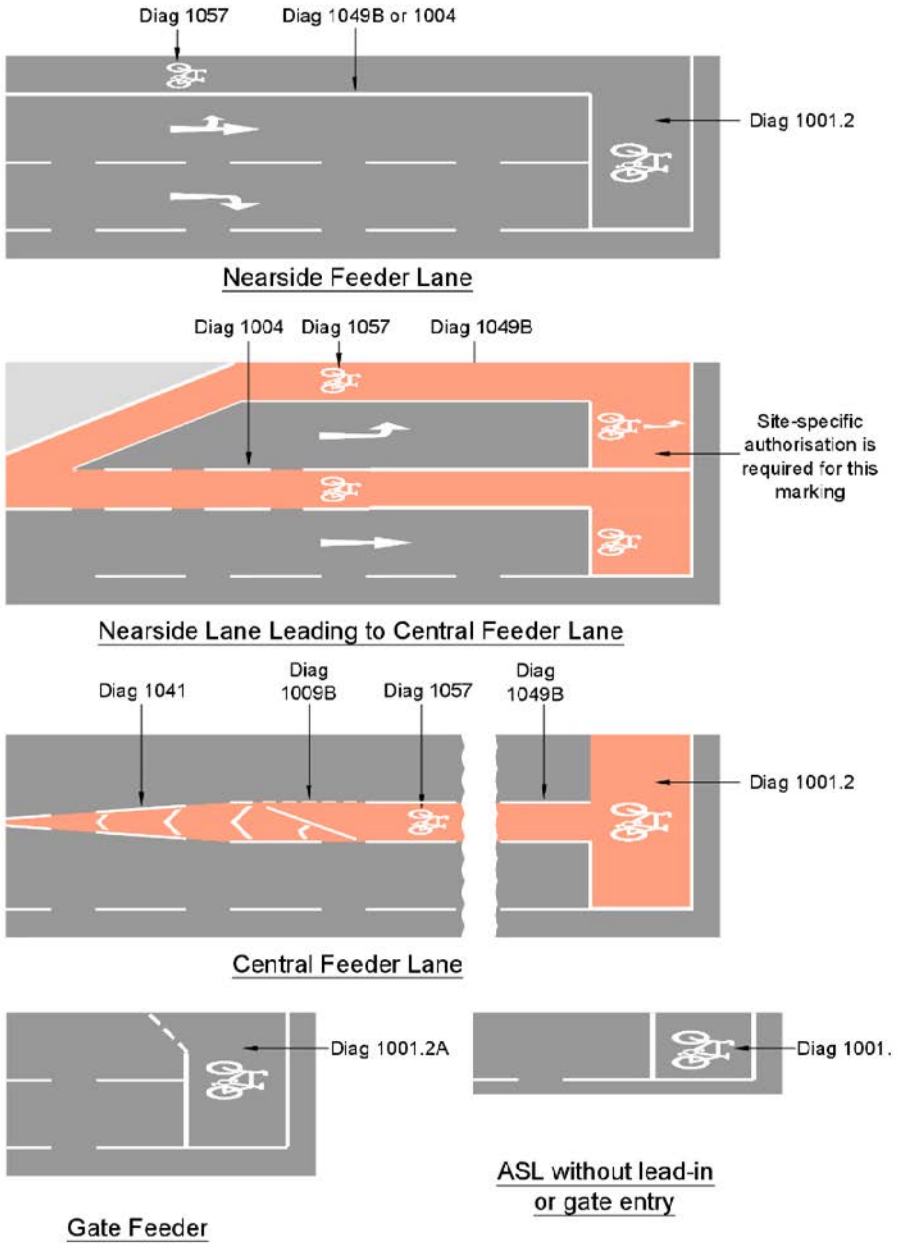
10.6.41 Although early release reduces conflicts at the start of the green period, it does not overcome other problems associated with advanced stop lines since it only benefits those at the stop line at the start of the green period.

Advanced stop lines (ASLs)

10.6.42 An ASL enables cyclists to take up the appropriate position in the waiting area between the two stop lines, for their intended manoeuvre ahead of general traffic, before the signals change to green. Figure 10.35 shows the typical arrangements of ASLs. Vehicles other than pedal cycles must stop at the first stop line when signalled to do so. Cyclists may cross the first stop line at any point, whether or not an approach lane or gate is provided, but must stop at the second.

10.6.43 ASLs do not remove conflict with motor vehicles and are therefore unattractive to less confident cyclists. Moreover, they do not resolve all problems at traffic signals even for more confident cyclists. ASLs only provide benefit to cyclists on a signal approach when the traffic signals are on red. They have little value on approaches that are free-flowing for most of the cycle, and/or with multiple lanes, as cyclists will find it difficult to manoeuvre themselves into an offside lane to make a right turn.

Figure 10.35: Typical arrangements for ASLs



10.6.44 ASLs should therefore only be considered to meet the full accessibility needs of most people on a junction approach which meets the following criteria:

- traffic flows of less than 5,000 PCUs per day;
- there are no more than two traffic lanes;
- the approach is on green for no more than 30% of the cycle time; and
- there is a nearside protected route to the ASL that is of sufficient width to accommodate the cycle design vehicle.

10.6.45 Three types of ASL are prescribed, TSRGD diagrams 1001.2, 1001.2A and 1001.2B. TSRGD diagram 1001.2 incorporates an advisory or mandatory cycle lane, provided to enable cyclists to enter the reservoir. TSRGD diagram 1001.2A replaces the approach lane with a diagonal "gate" marking. TSRGD diagram 1001.2B has neither approach lane nor gate, but consists of two stop lines placed parallel to each other.

10.6.46 Approach lanes are not required if TSRGD diagram 1001.2B is used, but they will enable cyclists to easily pass queuing motor traffic on the approach to the stop line. They should be at least 2.0 m wide to accommodate the cycle design vehicle. ASLs to TSRGD diagram 1001.2B may not be accessible to all, for example, three and four wheeled cycles and child cyclists may not be willing or able to overtake, especially when vehicles are already queuing.

10.6.47 Approach lanes are usually provided on the nearside. Where there are high numbers of left turning vehicles mixing with cyclists going ahead or right, central or offside feeder lanes between the general traffic lanes could be considered. However, such lanes involve riding between motor traffic streams and are therefore not usually considered safe by less confident riders and people with younger children. Where provided they should be at least 2.0m wide.

10.6.48 In some circumstances, it may be appropriate to split the ASL so that cyclists making a particular movement are encouraged to wait in part of the ASL box. This will require DfT authorisation.

10.6.49 ASLs may now be provided at standalone signal crossings as well as at junctions. They may be appropriate where cyclists need to take up a particular position in the carriageway, whether to make a turn downstream of the crossing or for another reason. The general comments made above regarding the suitability of ASLs also apply in this situation.

10.7 Roundabouts

Introduction

10.7.1 Roundabouts account for around 20% of all reported cyclist killed or seriously injured (KSI) casualties,[42] and roundabouts designed to standard UK geometry can be hazardous for cyclists. They usually have flared entries and exits with two or more lanes and wide circulatory carriageways which are often unmarked, lead to high differences in speeds and inherent conflicts between cyclists and motor vehicles. The relatively smooth path for motor vehicles helps increase capacity but can result in high traffic speeds through the junction, particularly on large diameter roundabouts outside urban areas where traffic is free-flowing.

10.7.2 Finding a safe position to ride around the wide circulatory carriageway may be difficult. Cyclists are at risk of not being noticed by drivers entering or leaving the junction at relatively high speeds. Roundabouts with a dedicated left turn slip lane to increase traffic capacity pose an additional hazard for cyclists, both where the lane diverges and on the merge at the exit, where a cyclist travelling straight ahead or turning right will leave the roundabout between two fast moving traffic lanes.

10.7.3 Normal roundabouts with flared geometry and no additional cycle facilities are unsuitable for most people wishing to cycle and can pose a high risk even for experienced cyclists. New roundabouts on all-purpose roads should be provided with cycle facilities as recommended in this guidance, unless there are clearly-defined and suitable alternative routes.

10.7.4 Roundabouts that are designed to enable inclusive cycling can offer advantages over traffic signals if cyclists can keep moving through the junction with no loss of momentum.

10.7.5 There are two ways to accommodate cyclists more safely at roundabouts (depending on traffic conditions, as described in Figure 4.1):

- *Roundabouts with protected space for cycling* – Where traffic volumes are high, and at roundabouts with high-speed geometry, provide protected space for cycling away from the carriageway, preferably with cycle priority or signal-controlled crossings of the roundabout entries and exits (or grade separation); or

42 Pedal Cycling Road Safety Factsheet, DfT, March 2018

- *Roundabouts for cycling in mixed traffic conditions* – Compact or Mini-roundabouts, where traffic volumes and speeds are (or can be made) low, and the lane widths are narrow so that with other traffic cyclists can safely share the single lane entries, exits and the circulatory carriageway in the primary position.

10.7.6 At existing normal roundabouts the options for improving conditions for cycling are:

- Remodel the junction as a Compact Roundabout, with or without protected space depending on motor traffic volumes and speeds;
- Provide protected space for cycling around the junction, with suitable crossings of each arm;
- Provide grade separated cycle tracks around and/or across the junction;
- Introduce signal control to the roundabout, with protected space or other suitable facilities for cycling; or
- Replace the roundabout with a signal controlled or other form of junction, with appropriate cycle facilities.

10.7.7 Cycle lanes on the outside of the circulatory carriageway should not be used, even on compact and mini-roundabouts, since cycle lanes offer no physical protection and cyclists using them are very vulnerable to 'left hook' collisions when motor vehicles are exiting the junction.

Roundabouts with protected space for cycling

10.7.8 Roundabouts with higher traffic flows and speeds should have protected space for cycling, both around the junction and on all approaches and exits, so that cyclists do not need to cycle in mixed traffic.

10.7.9 The design of the protected space should reflect the local context, as described in Chapter 4, Section 4.4. Fully-kerbed cycle tracks will often be appropriate. As with all cycle tracks they will need to be able to accommodate the anticipated volume of cycle traffic and the cycle design vehicle.

Figure 10.36: Footway-level cycle track around large roundabout, Harrow

10.7.10 Two-way cycle tracks reduce the distance cyclists need to travel when making right turns. However, where cyclists have priority over the roundabout entries and exits, one way circulatory cycle tracks have the advantage that they would only approach from the right, i.e. in the same direction as motor traffic on the roundabout, meaning that drivers are more likely to be aware of them.

10.7.11 Median islands should be provided on the roundabout arms to achieve deflection and provide refuges for cycle and pedestrian crossings.

10.7.12 The preferred type of cycle crossing of the roundabout entries and exits should follow the guidance given in Section 10.3. In urban areas, parallel crossings may be appropriate, and have the advantage that they give immediate priority to cyclists and pedestrians, and reduce delays to motor traffic unless the numbers crossing are high. They can also be placed close to the circulatory carriageway and so provide a reasonably direct route for both types of user. A suggested layout for a roundabout with one way off-carriageway cycle tracks and parallel crossings is shown in Figure 10.37.

Figure 10.37: Roundabout with one way cycle tracks and parallel crossings

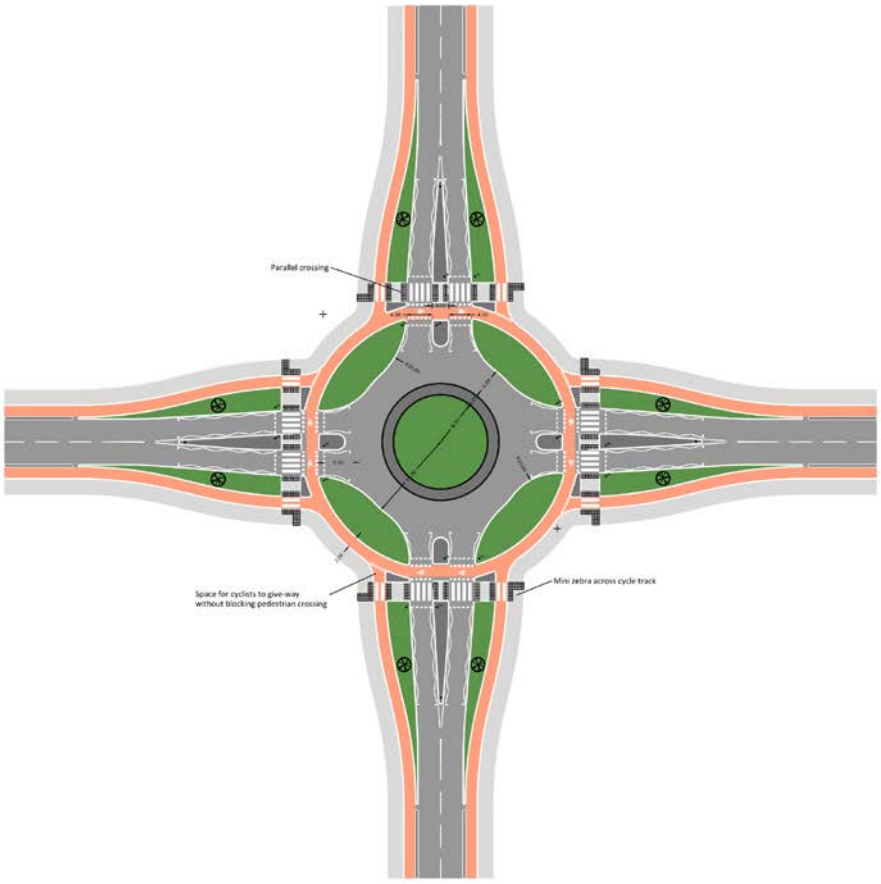
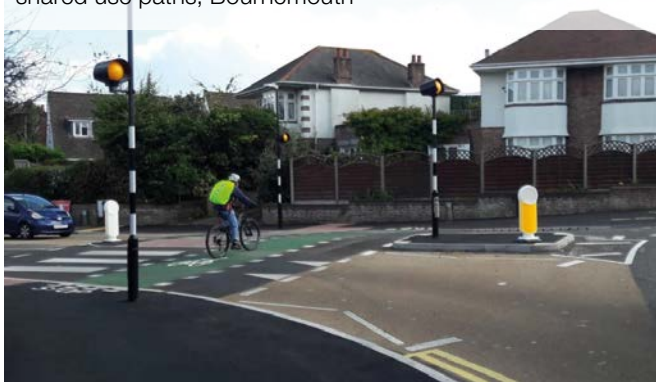


Figure 10.38: Roundabout with parallel crossings and shared use paths, Bournemouth



10.7.13 Where motorised traffic has higher flows and speeds, signalised crossings will be necessary. These will need to be placed as close as possible to the outside of the circulatory carriageway to minimise any deviation in the path of cyclists. The distances required can be assessed using microsimulation. Advice on siting crossings on the approach and exit to a roundabout is given in Chapter 6 of the Traffic Signs Manual.

10.7.14 Uncontrolled crossings, where cyclists need to give way to vehicles entering and exiting the roundabout, should only be used at lower traffic flows and speeds and where there are no more than two traffic lanes to be crossed, as shown in Table 10-2. Uncontrolled crossings at roundabout exits should be situated beyond the end of the exit flare and a minimum of 10m from the circulatory carriageway so that people waiting to cross can differentiate between vehicles exiting and continuing to circulate the roundabout.

10.7.15 As with all crossings, there should be no stagger between the crossings for cyclists of the roundabout entry and exit.

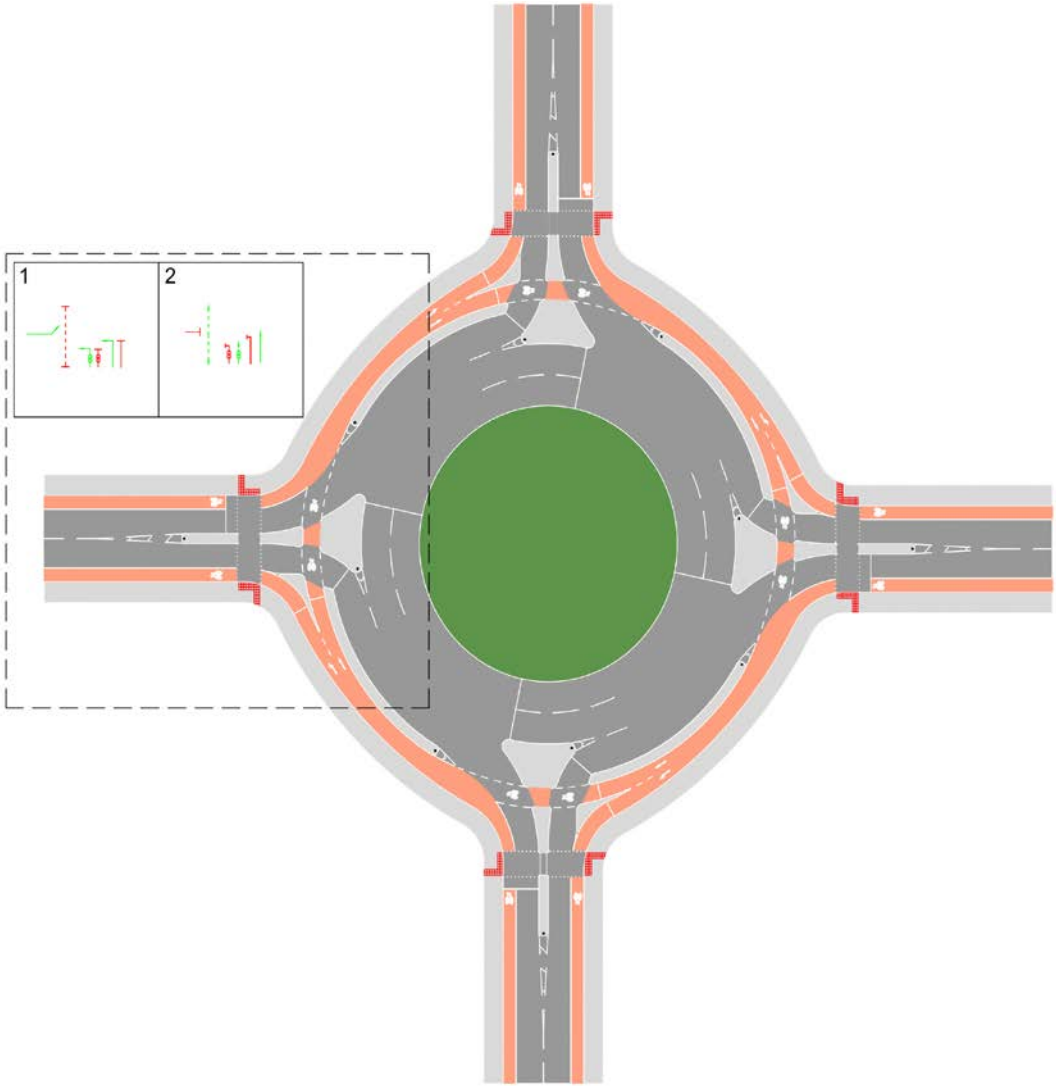
Signal-controlled roundabouts

10.7.16 The introduction of signal control to roundabouts, particularly large normal roundabouts, will provide opportunities to improve conditions for cycle traffic.

10.7.17 Signalisation has been shown to improve safety even where no dedicated facilities are provided,[43]

43 Kennedy J and Sexton B Literature review of road safety at traffic signals and signalised crossings, TRL, PPR 436, 2009

Figure 10.39: Carriageway-level cycle track used with 'hold the left' traffic staging



although there can still be a significant conflict between cyclists and left turning vehicles and on multi-lane approaches. Even when large roundabouts have been signalised they are likely to remain a deterrent to most people wishing to cycle. They should therefore not be regarded as inclusive unless protected space for cycling is provided.

10.7.18 At signalised roundabouts there are three suitable approaches to providing for cycle traffic at-grade. These are:

- Provide facilities on-carriageway at the signalised nodes, so that cyclists are separated and protected from conflict with motor traffic;
- Provide a cycle track around the junction with signal-controlled crossings of the roundabout entries and exits, as part of the overall junction control; and
- Provide a cycle track across or around the central island, with crossings of the circulatory carriageway and the roundabout entries and exits as necessary, as part of the overall junction control

On-carriageway facilities at the signalised nodes

10.7.19 Separate stages for cyclists at the signalised nodes mean that they only proceed when there is no conflict with motor traffic.

10.7.20 One way of achieving this is to use a 'hold the left' arrangement where left turning general traffic is held on a separate red signal while all circulating traffic (cycles and motor vehicles) are given a green signal. Motor traffic turning left to leave the roundabout is given a green aspect at the same time as traffic entering the roundabout, so that each signal node still operates efficiently, with two stages (see Figure 10.39).
An example is shown in Figure 10.40.

Figure 10.40: Queens Circus roundabout, Battersea

10.7.21 For the reasons given in Section 10.6, simply introducing ASLs at the signalised nodes of a roundabout will rarely create conditions that enable most people to cycle and should not be regarded as an inclusive approach.

Cycle Track around the signalised roundabout with crossings

10.7.22 Cycle crossings of the roundabout entries can be integrated with the junction control so that cycle traffic can cross while circulatory traffic is receiving a green aspect. Detection equipment should be provided to enable cycle traffic to call a green signal when required.

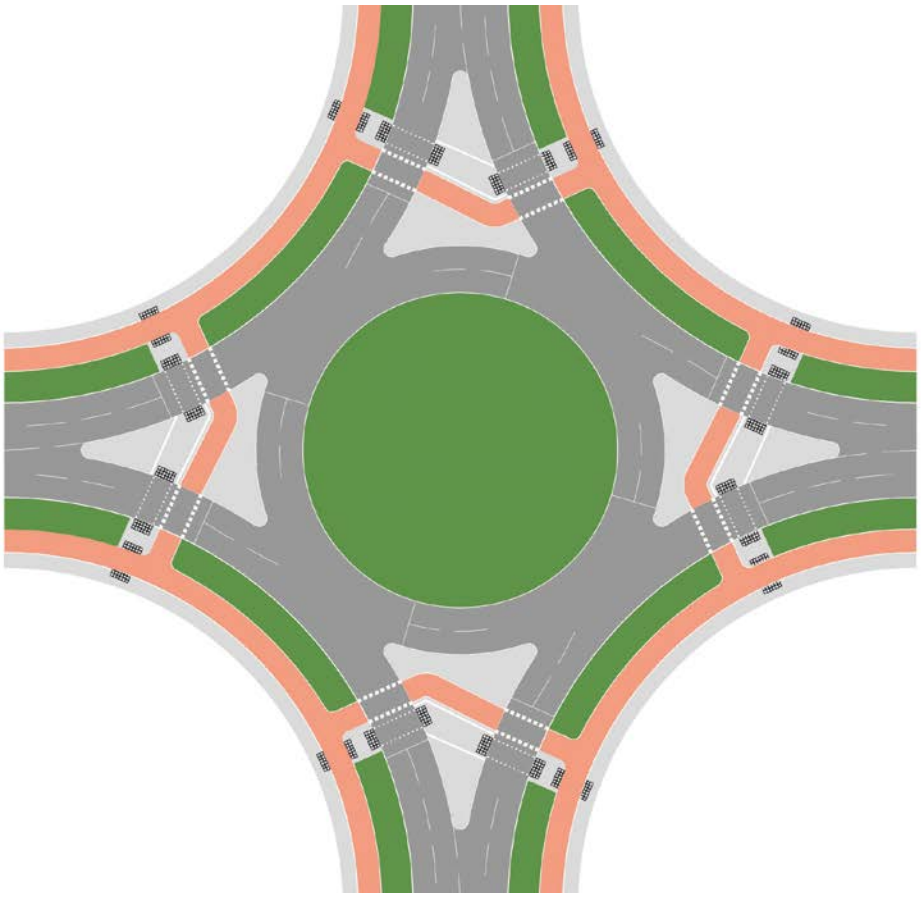
10.7.23 Where the red period for traffic entering the roundabout is not long enough to enable a minimum green to be provided for cycle crossing movements (as given in Table 10-3), an alternative stage of an appropriate length should be provided on demand.

10.7.24 Separate cycle crossings of the roundabout exits will also be needed, which should be as close as possible to the circulatory carriageway, as discussed above. Short-term motor traffic queuing back from the crossing onto the circulatory carriageway may be acceptable at the end of the red period, depending on the progression of traffic platoons around the junction.

Cycle track across or around the central island

10.7.25 In some locations, particularly where the roundabout is large, it may be helpful to provide direct routes for cycling across or around the central island, as shown in Figure 10.41.

Figure 10.41: Cycle track and crossing routes through a larger signalised roundabout



10.7.26 Cyclists will often be able to travel to and from central islands without reducing junction capacity by crossing the roundabout entry while circulating traffic has a green signal and crossing the circulatory carriageway while entry traffic has a green signal. This will involve some delay for cyclists, as they will have to wait a whole signal cycle to reach and then leave the central island. Signalised roundabouts often run on a short cycle time, however which will reduce the delays.

Figure 10.42: Cycle and pedestrian route across Belgrave Roundabout, Leicester

10.7.27 A preferable solution is to introduce a third stage on demand at the signalised node where both the entry and exit are held on red, while cyclists can cross to and from the central island in one diagonal movement (Figure 10.43).

Figure 10.43: Parliament Square – diagonal cycle crossing of signalised gyratory node

Roundabouts with cycling in mixed traffic

Compact roundabouts

10.7.28 Compact (sometimes known as Continental style) roundabouts[44] have a tighter geometry that is more cycle friendly than most existing UK roundabouts (see Figure 10.44). As the geometry encourages lower speeds, cyclists can use the carriageway to pass through the roundabout in the primary position. Motorists are unable to overtake cyclists on the entry, circulatory carriageway and exit lanes because of their limited width.

10.7.29 Compact roundabouts without protected space for cycling should only be used in conditions where cycling within the carriageway is appropriate on the approaches to the junction (see Section 4.2) and are generally suitable for a total junction throughput of up to around 8,000 PCUs/day. At higher flows or speeds, protected space will be required on compact roundabouts.

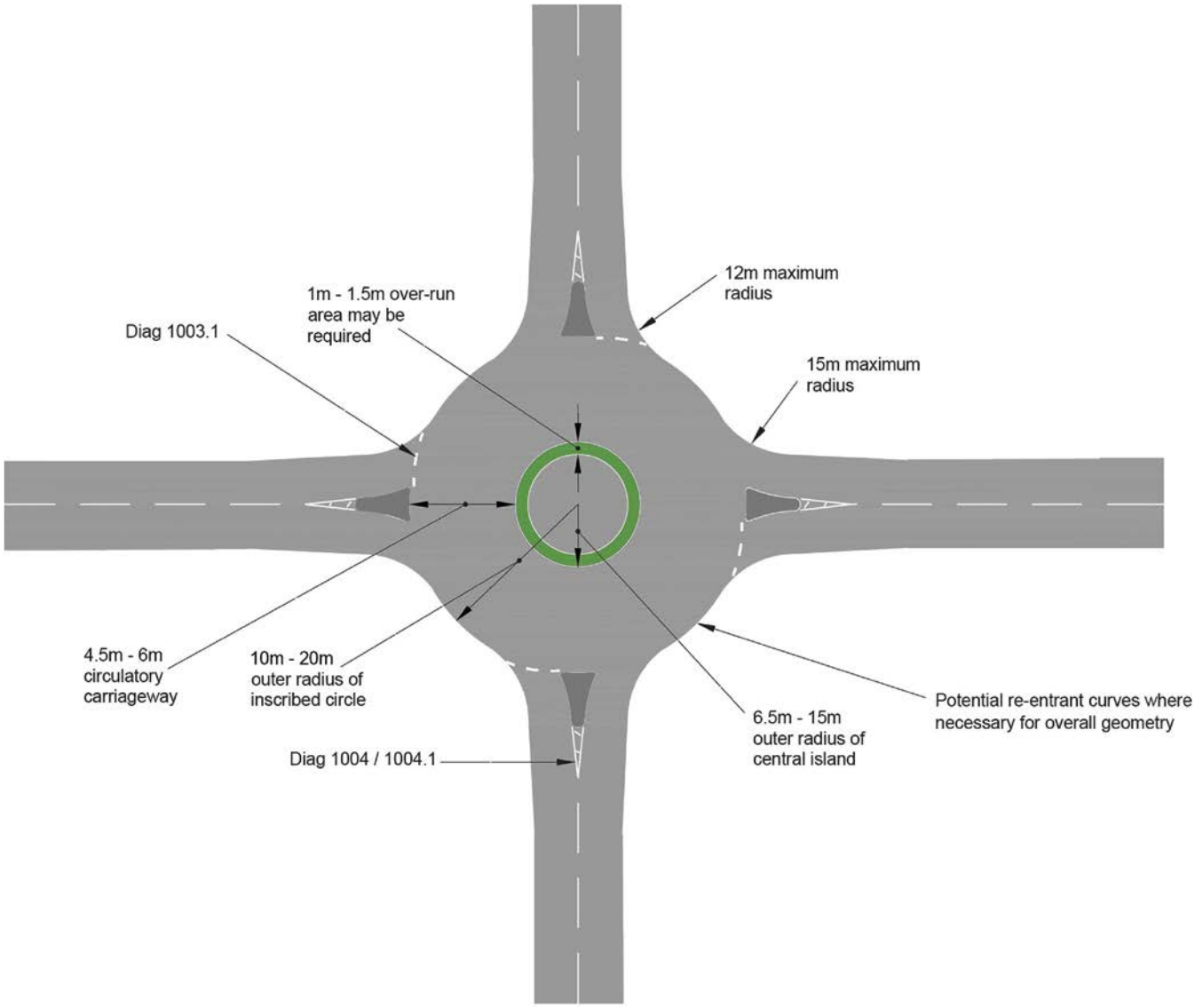
Figure 10.44: The Perne Road Roundabout in Cambridge after remodelling to compact geometry

10.7.30 Compact roundabouts have arms that are aligned in a radial pattern, with unflared single lane entries and exits, and a single lane circulatory carriageway (Figure 10.45). It may be necessary to have short sections of ‘re-entrant curves’ on the outside of the circulatory carriageway where the outside kerbline is concentric with the central island.

10.7.31 Deflection is therefore greater than with normal roundabouts and the design can be used as an effective speed reducing feature. Cycle symbols to TSRGD diagram 1057 may be placed on the entries, exits and circulatory carriageway in the primary position.

44 See DMRB TD16/07 for definition of Compact roundabout

Figure 10.45: Compact roundabout geometry



10.7.32 Compact roundabouts will tend to have a lower traffic capacity than conventional roundabouts, and can be assessed using traffic modelling software.

Mini-roundabouts

10.7.33 Mini-roundabouts can work well for cycling in a mixed traffic environment (see Section 4.2) when traffic speeds and volumes are low and can provide an alternative to priority junctions since traffic on all arms is required to give way.

10.7.34 Mini-roundabouts must be indicated using road markings to TSRGD diagram 1003.4 and upright signs to TSRGD diagram 611.1.

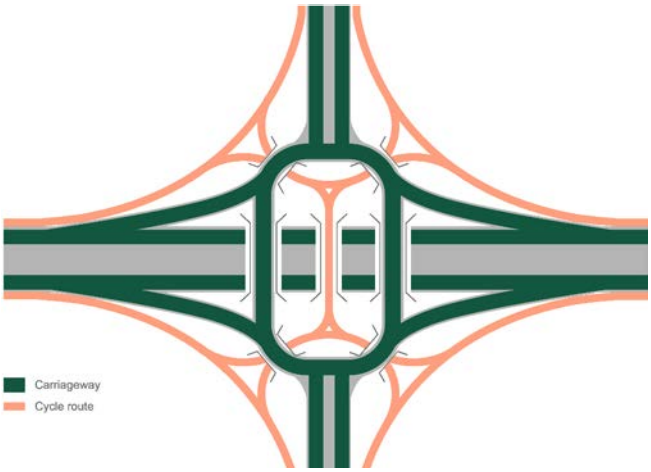
10.7.35 They should be designed to reduce speeds at the junction using tight geometry, with single lane approaches and exits so that cyclists and motor vehicles pass through the roundabout in a single stream (see Figure 10.46). To be comfortable for cycling, the inscribed circle diameter should not be greater than 15.0m. Cycle symbols to TSRGD diagram 1057 may be placed in the primary position to guide cyclists and to alert motorist to their presence.

10.7.36 Mini roundabouts on busier four or more arm junctions, and double roundabouts can be uncomfortable and less safe for cyclists using the carriageway.

10.7.37 At larger and busier mini-roundabouts, off-carriageway protected space for cycling should be provided.

Figure 10.46: Mini-Roundabout on designated mixed traffic cycle route, London

Figure 10.47: Schematic arrangement of grade separated junction



10.8 Grade separated crossings and junctions

Introduction

10.8.1 Separating cycle movements vertically across links and at junctions, as well as at obstacles such as rivers and railways, can provide a high level of service because cyclists are removed from any conflict with motor vehicles and are not required to stop or give way. This approach is more likely to be suitable on larger roads with higher speeds.

10.8.2 However, grade separation can involve cyclists in changes in level and a deviation from their overall desire line, is costlier than at-grade provision and may be difficult to retro-fit into existing junctions due to space and cost constraints. There can also be concerns over personal security on grade separated routes, particularly underbridges and subways.

10.8.3 Wherever new grade separated junctions are being designed, provision should be made for any cycle facilities to continue so that cyclists do not need to change levels more than is necessary. Figure 10.47 shows a schematic arrangement for a major dual carriageway passing beneath a roundabout with cycle tracks on the main line passing through underbridges on circulatory carriageway and across an overbridge of the main alignment.

10.8.4 Grade separation can also be an attractive and comfortable option for cycling at major at-grade junctions. It should be considered as an option where there is a conflict between heavy cycle and motor traffic flows and the topography means that steep ramps are not necessary, as seen in Figure 10.48.

10.8.5 Careful attention should be given to the need to maintain routes in good condition, particularly the lighting and drainage of underbridges which could otherwise become unattractive and a potential location for anti-social behaviour.

Figure 10.48: Cycle and pedestrian route grade separated from carriageway, Arnhem, Netherlands

10.8.6 New overbridges can be designed as major features along a route and may become attractors in their own right (Figure 10.49). They are generally cheaper than constructing new underbridges beneath existing highways and other barriers.

Figure 10.49: Diglis Bridge, Worcester

10.8.7 However, underbridges have the advantage that cyclists can build up speed on the downward ramp, which helps to carry them up the other side. Overbridges with uphill approach ramps require more effort to cross.

10.8.8 Under- and overbridges will normally be used by both pedestrians and cyclists. Separate provision is preferred to enable each type of user to travel at their chosen speed, as shown on the example in Figure 10.50. This will have implications for the width of the bridge structure as discussed below.

Figure 10.50: Covered pedestrian/cycle bridge across railway tracks, Cambridge

Bridge widths

10.8.9 The minimum effective width of cycle tracks across and through under- and overbridges should be determined based on the forecast level of use following the guidance given in Table 5-2. Overbridges for cyclists are usually also used by pedestrians and a footway should be provided – 2m is the minimum recommended width. Where space is constrained so that shared use is necessary, reference should be made to Chapter 6, Section 6.5 for the minimum effective width.

10.8.10 Bridges and subways are usually bounded by vertical features that reduce the useable width (see Table 5-3) which mean that an additional 0.5m is required at the edge of the cycle track.

10.8.11 Designers should consider providing more than these minimum widths to increase the attractiveness of the facility and (for underbridges) the amount of natural light in the structure. The additional cost of providing a more generous structure will not be proportionate to the increase in its width.

10.8.12 The overall desirable minimum widths between walls/parapets for over- and underbridges are therefore:

- 5.5m separate provision (2m footway, 3m cycle track, 0.5m clearance on one side)
- 4m shared use (3m useable width, 0.5m clearance on both sides)

10.8.13 Cycling can still be permitted on existing structures, including subways, that do not meet these dimensions depending on the level of use, but structures with a width less than 5m overall should normally be shared use. It may be necessary to take steps to encourage courteous behaviour by all users at shared use bridges – see Chapter 8, Section 8.2.

Parapet height at overbridges

10.8.14 A parapet height of 1.4m is recommended on new overbridges where the cycling surface is immediately adjacent to it (1.8m if equestrians also use the bridge). It should be noted that Highways England now specify a minimum parapet height of 1.5m for new structures on trunk roads. However, the lower 1.4m height is acceptable for cyclists on other roads.

10.8.15 On existing structures, an absolute minimum parapet height of 1.2m may be acceptable on cycle tracks, subject to a risk assessment; and is always acceptable where a footway or barrier is next to the

parapet. Designers should consider the likelihood of high crosswinds and the overall proposed alignment of the cycle track relative to the parapet when determining these risks. Further guidance on the assessment of parapet heights is given in AASHTO guidance.[45]

Headroom

10.8.16 Headroom at new underbridges and covered overbridges should meet the desirable minimum clearance for cycle routes of 2.4m, as given in Chapter 5. Where an underbridge is longer than 23m the desirable minimum clearance is 2.7m to increase natural light (see below).

10.8.17 An absolute minimum headroom of 2.2m may be acceptable at existing structures. When deciding whether a headroom below desirable minimum is acceptable designers should consider the forward visibility to the underbridge offered by the vertical and horizontal geometry. Signs to TSRGD diagrams 530A and 530.2 should be used to warn of the low headroom.

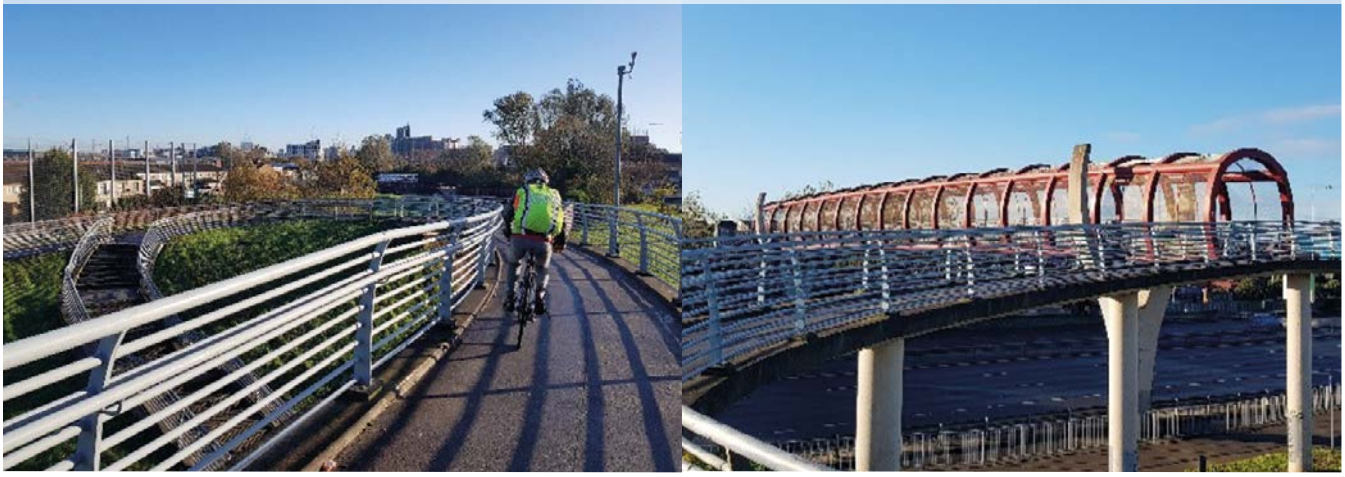
Improving natural light in underbridges

10.8.18 Underbridges should be designed to maximise natural light and user perceptions of safety, for example by using increased headroom, keeping the approaches to the structure straight and at the same level as the natural ground and providing splayed wingwalls and openings in the structure above (see Figures 10.51 and 10.52).

Figure 10.51 Underbridge near Cowley on Oxford Bypass with at-grade approach, wing walls and clear sightlines

Figure: 10.52 Underbridge (cycle and pedestrian-only) with divided carriageway above to create opening – Lund, Sweden

Figure: 10.53: Overbridge with curved ramp approach, Belfast



45 Determination of appropriate railing heights for bicyclists, NCHRP 20-7 (168), AASHTO, 2004

Alignment of cycle tracks and ramps

10.8.19 The horizontal and vertical alignment of cycle tracks through grade-separated structures and any ramps on their approaches should follow the recommendations given in Chapter 5.

10.8.20 Where ramps are in a zig-zag arrangement, horizontal curves should be provided at the ends of the ramp sections with a minimum radius of 5m, so that cyclists can maintain momentum. An example of a more generous curved approach ramp is shown in Figure 10.53.

10.8.21 Ramps will normally be used by both cyclists and pedestrians and gradients should be suitable for wheelchair users and other disabled people. It is preferable that ramps consist of a separate footway and cycle track. As noted in Table 5-8, a gradient of 5% should be regarded as the desirable maximum for slopes of up to 30m in length and will often be optimum for limiting the diversion distance while ensuring the ramp is easy to climb. An absolute maximum of 8% should be used for ramps.

10.8.22 Shallower gradients should be used where possible and the approach to the structure is on the desire line, such as where a cycle track alongside a road is gently raised to bridge level.

10.8.23 Ramps of 5% gradient and above should be divided into sections that do not exceed 10m in length, and with intermediate resting places at least 2m long.

10.8.24 Stepped ramps should not be provided because they are inaccessible for cyclists and mobility impaired people.

Wheeling ramps

10.8.25 Wheeling ramps can be provided to enable cycles to be rolled up or down a flight of steps that interrupt a cycle route, such as Figure 10.54. While they are better than simply requiring people to carry their cycle up and down stairs, they are not inclusive; they do not cater for non-standard cycles and are inaccessible to many people.

10.8.26 They will therefore only form part of an inclusive system if an alternative facility is provided which will cater for all users – see Figure 10.55.

Figure: 10.54: Wheeling Ramp, Cambridge Station

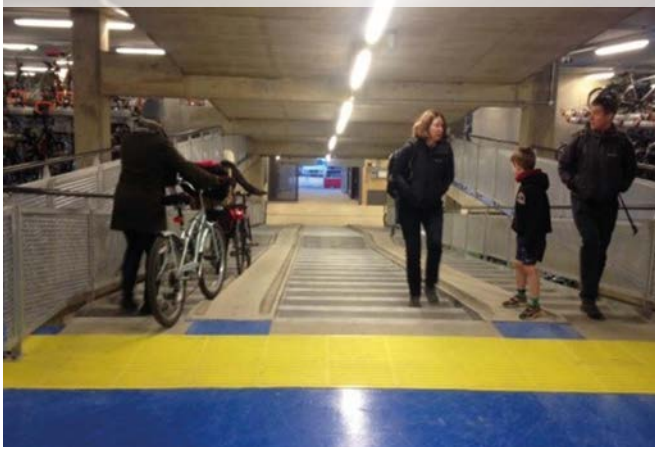


Figure 10.55: Cycle lift and wheeling ramps, Utrecht Station – most people use the ramps on the stairs because they are quicker but the lift meets the needs of people who cannot use them. (Note that the road markings do not comply with UK regulations.)

11

Cycle parking and other equipment

Cycle parking is an essential component of cycle infrastructure. Sufficient and convenient residential cycle parking enables people to choose cycling. At the trip end, proximity to destinations is important for short stay parking, while for longer-stay parking security concerns can be a factor. As with other infrastructure, designers should consider access for all cycles and their passengers. Additional equipment and services enhance the quality of experience and convenience of cycling, making it accessible and attractive to more people.

11.1 Introduction

11.1.1 This chapter covers design of parking facilities and other ancillary services such as cycle maintenance hubs. Cycle parking should be provided at the following locations:

- Places of residence;
- Interchanges with other modes of transport;
- Short stay destinations such as shops and cafes; and
- Long-stay destinations such as for work and education

11.1.2 Cycle parking is integral to any cycle network, and to wider transport systems incorporating public transport. The availability of secure cycle parking at home, the end of a trip or at an interchange point has a significant influence on cycle use.

11.1.3 On-street cycle parking can be a cost-effective 'quick win' that is easy to deliver. Parked bicycles provide evidence of demand and patterns of use and can form part of a monitoring regime. Supporting features, such as on-street toolkits and pumps, supplement cycle infrastructure and cycle parking by recognising the specific needs of people who cycle and providing a strong visual symbol of cycling within the transport environment. These supporting features are explained at the end of this chapter.

11.1.4 Space for cycle parking should be considered at the earliest possible stage of a scheme design or building development.

11.2 Cycle parking – general principles

11.2.1 The fear or direct experience of vandalism and theft deters cycling. This includes lack of convenient space to keep a bike in the home, which can be particularly problematic in apartments, and for disabled cyclists who need easy access for their cycle. A proportion of people that experience cycle theft stop cycling altogether.[46] Investment in new routes and infrastructure may not reach its full potential if cycle parking security is not considered at the planning and design stages. Cycle parking provision should consider all types of cycle vehicle and all types of cycle user.

11.2.2 Personal security within cycle parking areas may also be a concern if the parking is remote and not overlooked by adjacent buildings. Cycle parking, and routes to and from it, should be clearly marked, overlooked, well-maintained, well-lit and integrated into the built environment.

Short stay parking

11.2.3 For short stays, users will be most concerned with convenience of access while having a safe place to secure their cycle. Cycle parking located close to shop fronts will generally provide good passive surveillance. Small clusters of stands close to main attractors are preferable to one central 'hub', although in retail malls, a central facility on the ground floor of a car park or near the main pedestrian entrance to the mall may be the optimum location. Proximity is also essential for disabled cyclists who may be unable to walk very far.

Longer stay parking

11.2.4 Security is the primary consideration for longer stay parking. Many users will be willing to trade some convenience for additional security such as CCTV coverage, shelter from weather and secure access (i.e. not open to the passing public). However, there is a limit to how far people will be prepared or be able to walk to the final destination, so secure parking in railway stations, education buildings and workplaces should still be close to the main entrances and easy to access from the local cycle route network (see Figure 11.1).

11.2.5 Similarly cycle parking in dwellings must be convenient, either in the home, within the building or in the immediate vicinity.

11.2.6 Specific areas should be set aside for three-wheel cycles (Figure 11.2), which are problematic to secure to traditional upright hoops, in the most accessible parts of a large cycle park so that they can also be used by disabled people with adapted cycles. Accessible cycle parking should normally also be placed close to accessible car parking spaces. Isolated cycle stands for short-term parking should be configured to bear in mind the length of cargo bikes and tandems, and the width of tricycles and side-by-side cycles.

46 Bryan-Brown, K and Savile, T Cycle Theft in Great Britain, Transport Research Laboratory, 1997

Figure 11.1: Relationship between cycle parking duration of stay, location and ancillary facilities[47]

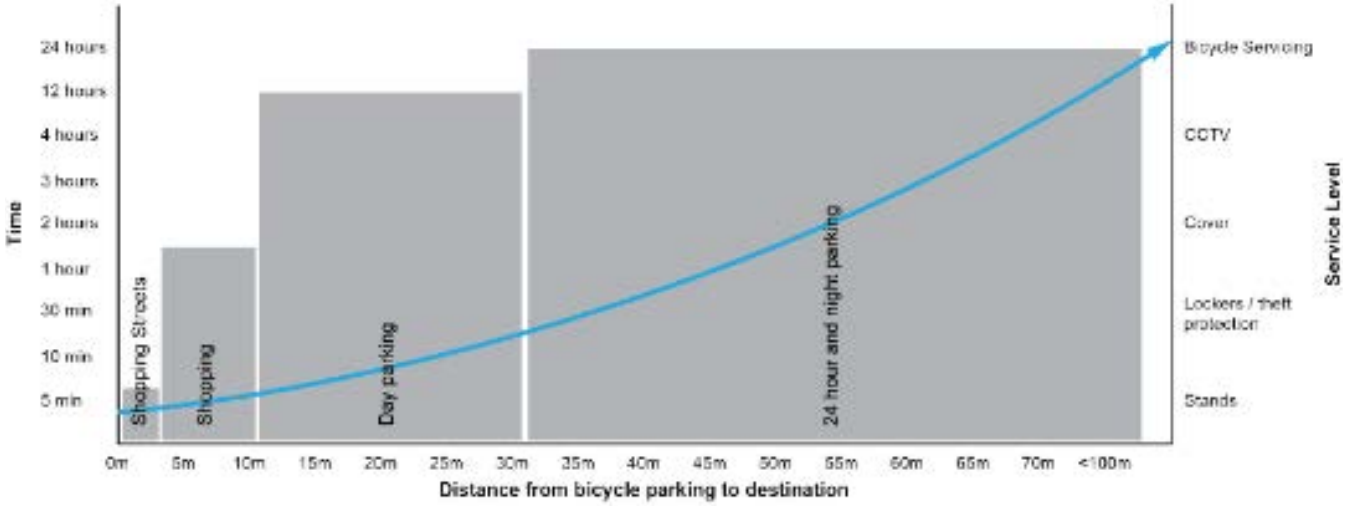


Figure 11.2: Designated area for cargo bike and tricycle parking at Malmö Central railway station, Sweden

11.3 Quantity of cycle parking

11.3.1 A local authority may set out minimum or preferred capacity standards and acceptable types of cycle parking in local planning guidance for new developments. In the absence of any local guidance or standards, Table 11-1 suggests typical minimum cycle parking capacities for different classes of land use.

11.3.2 As with car parking, a proportion of the cycle parking (typically 5%) should be provided for non-standard cycles to accommodate people with mobility impairments.

11.3.3 Data gathered for Local Cycling and Walking Infrastructure Plans and other planning documents may be helpful when predicting the potential growth in cycling and understanding the demand generated by typical local trip patterns. This may enable a more considered approach, with a variation in standards related to location as well as type of land use. An example of this approach can be seen in the research base for London's cycle parking standards.[48]

11.3.4 Spare capacity should always be provided to cater for growth and turnover. The effect of new infrastructure should also be factored into any decisions about planned reserve capacity of cycle parking facilities.

11.3.5 Regular surveys of the numbers of cycles parked and the locations being used can help inform decisions about how much cycle parking to provide in new developments and where additional capacity is required at existing sites. Monitoring and consultation can include:

- Surveys of existing cycle parking – existing public spaces, private spaces and "fly-parking";
- Engagement with businesses and organisations to understand how customer and visitor patterns vary across the day, week or year;

47 Active Travel Wales Design Guide, Welsh Government, 2013 (based on original research undertaken by TfL)
48 Cycle Parking: Part of the London Plan Evidence Base, Mayor of London/TfL, 2017

Table 11-1: Suggested minimum cycle parking capacity for different types of land use

Land use type	Sub-category	Short stay requirement (obvious, easily accessed and close to destination)	Long stay requirement (secure and ideally covered)
All	Parking for adapted cycles for disabled people	5% of total capacity co-located with disabled car parking.	5% of total capacity co-located with disabled car parking.
Retail	Small (<200m²)	1 per 100m²	1 per 100m²
	Medium (200-1,000m²)	1 per 200m²	1 per 200m²
	>1,000m²	1 per 250m²	1 per 500m²
Employment	Office/Finance (A2/B1)	1 per 1000m²	1 per 200m²
	Industrial/Warehousing (B2/B8)	1 per 1,000m²	1 per 500m²
Leisure and Institutions	Leisure centres, assembly halls, hospitals and healthcare	Greatest of: 1 per 50m² or 1 per 30 seats/ capacity	1 per 5 employees
	Educational Institutions	–	Separate provision for staff and students. Based on Travel Plan mode share targets, minimum: Staff: 1 per 20 staff Students; 1 per 10 students
Residential	All except sheltered/elderly housing or nursing homes	–	1 per bedroom
	Sheltered/elderly housing/ nursing homes	0.05 per residential unit	0.05 per bedroom
Public Transport Interchange	Standard stop	Upon own merit	–
	Major interchange	1 per 200 daily users	–

- Engagement with local cycling representative groups to understand existing problem locations – either where absence of parking is an issue, or where there are ongoing security concerns. Police liaison may also be helpful regarding the latter;
- Engagement with local pedestrian and accessibility groups to understand where fly-parking presents an obstruction or hazard;
- Reviewing existing trip generators and the ability to access them easily by cycle – locations more easily accessible by cycle may justify an increased level of provision of cycle parking; and
- Introducing temporary cycle parking stands as a trial measure and monitoring use.

11.4 Cycle parking types and dimensions

11.4.1 Just as the location and comprehensiveness of cycle parking varies with the type of destination served, so does the appropriate form of parking provided. Common types are described below.

Front wheel support

11.4.2 Concrete 'slots' or metal hoops that support only the front wheel and do not enable the frame to be secured should not be used for public cycle parking. Many cycles are fitted with quick release wheels, and this type of support increases the risk of theft.

Sheffield stand

11.4.3 The preferred and most common form of cycle parking is a tubular metal stand anchored into the ground at two points, sometimes known as a "Sheffield stand" (see Figure 11.3). These can be used as standalone cycle stands in small shopping streets (two cycles per stand), in small shelters typically with 5 or 6 stands, and in large quantities in rows.

11.4.4 The advantages of a tubular stand are security, relative cost-effectiveness, and stability for locked bikes. Two-point locking enables both wheels and the frame to be secured to the stand, increasing the amount of time required to steal a bike and thus decreasing the chances of a quick, opportunistic theft. Two-point locking also reduces the risk of single components being stolen, e.g. a wheel, as both wheels, and the frame, can be secured more easily.

11.4.5 An "M-profile" stand is a variant of a Sheffield stand also supports two-point locking and makes theft even more difficult by reducing the ability for the locked bike to be moved. The 'M' shaped stand offers better support to small-wheeled bikes and children's bikes.

Positioning

11.4.6 Cycle stands require at least 0.6m clearance to walls, and a clear space of 1.0m in front to enable the bicycle to be wheeled into position. A distance of at least 1.0m between stands enables bicycles fitted with panniers or child seats to gain access. Other types of cycle are longer and wider and will require additional space (see Figure 11.3 and Table 11-2).

11.4.7 Cycle stands placed too close to a wall or fence will inhibit two-point locking and consequently the bike may be more likely to fall over. Cycle stands placed too close together will reduce capacity by preventing the usual practice of one Sheffield stand being used for two cycles (one each side). Where cycle stands are placed immediately adjacent to a carriageway there is a risk to cyclists stopping and wheeling bikes into and out of the stand. Designers should consider the speed and volume of local traffic when assessing this risk. The position of other existing or proposed street furniture, such as bus shelters or benches, should be taken into account. Stands should not be placed where they obstruct the flow of pedestrian traffic or reduce available footway width for pedestrians beyond the recommended minimum.

11.4.8 The table below gives recommended and minimum dimensions where Sheffield stands are placed in a parallel or "toast rack" arrangement. Note that where provision is required for three-wheeled cycles, lateral spaces between stands should be increased to at least 2.0m.

Figure 11.3: Standalone Sheffield-stand able to accommodate a cargo bike in Waltham Forest, London

Table 11-2: Recommended and minimum dimensions for banks of Sheffield stands

	Recommended	Minimum
Bay length (length of cycle parked on a stand)	2m	2m
Bay length (tandems, trailers and accessible cycles)	3.0m	2.5m
Access aisle width (if larger cycles use the end bay only)	3m	1.8m
Access aisle width (if large cycles use internal bays)	4m	3m
Edge access aisle + one bay to the side	5m-6m	3.8m-5m
Central access aisle + one bay to each side	7m-8m	5.8m-7m
Spacing between stands	1.2m	1.0m
Gap between stand and wall (part of bay width)	700mm (typical wheel diameter)	500mm

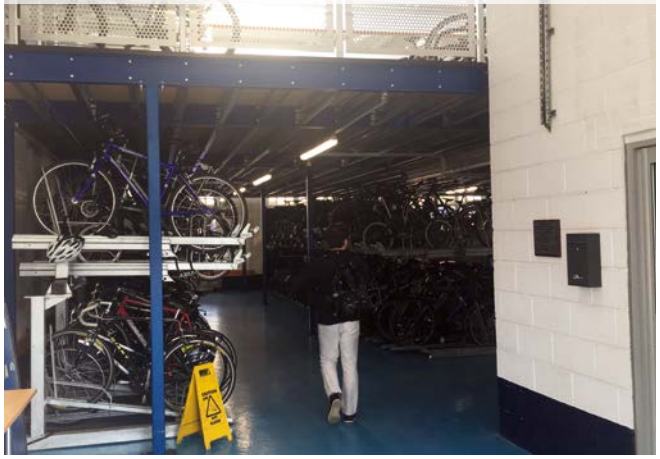
Two-tier stands

11.4.9 Two-tier racks can be used to provide additional density, offering around a third more cycle parking capacity in the same footprint. However, two-tier cycle racks are typically optimised for a "standard" two-wheeled, two-m-long cycle.

11.4.10 Additional provision for three-wheelers, tandems, recumbents and other "non-standard" cycles should also be provided where two-tier racks are in use.

11.4.11 Two-tier stands require a ceiling height of at least 2.7m (see Figure 11.4), so may not fit in all older buildings or basement parking areas of new developments. Some users will find it difficult to lift their bike from the floor onto the tray of the upper tier, although the mechanisms to lift the stands into position are spring loaded or gas-assisted.

Figure 11.4: Example of two-tier cycle racks at Sheffield station



Cycle hubs

11.4.12 A cycle hub is any location where cycle parking is provided in great numbers, generally within a building, and often co-located with maintenance facilities, cycle hire, changing rooms, lockers, showers or retail units (see Figures 11.5 to 11.9). Cycle hubs may be restricted to key or pass holders, or general access. Restricted use facilities that charge a fee may be more economically viable, but the social impact of fly-parking by those unwilling or unable to pay may have to be borne in mind. Cycle hubs may also include pumps and repair tools required for quick on-the-go cycle maintenance. It is important that cycle hubs are regularly maintained to ensure that all equipment is working correctly. Robust tool stations (see Figure 11.9) designed for public installations are readily available.

Figure 11.5: Public cycle hub at Cambridge station. Note the wheeling ramp to access cycle parking upstairs: such ramps may not be suitable for "non-standard" cycles, but here dedicated parking provision for these is available at ground level, and generally well-respected

Figure 11.6: Secure cycle-hub (pass holders only) at Coventry station

11.4.13 A simple cycle shelter can provide an elevated level of service by keeping parked cycles under cover, and can still be co-located with an air pump and tool set.

Figure 11.7: Multi-purpose cycle hub within a railway platform: secure lockers for regular users, plus covered stands to accommodate ad hoc users and Northern Rail's "Bike-n-Go" cycle hire vehicles

Figure 11.8: Canvas cycle shelter at the Department of Mathematics, University of Cambridge

Figure 11.9: Air pump and repair tools at Bedford station

11.5 Cycle parking in town centres

11.5.1 Cycle parking in town centres is most likely to cater for shoppers or those undertaking social or leisure activities. Short stay parking should be located on-street rather than in hubs or shelters. Unplanned or badly planned cycle parking of this type in town centres has the potential to distract from visual amenity at best, and present an obstruction at worst.

11.5.2 Extra care should therefore be taken to position cycle parking in locations that do not impinge on key pedestrian desire lines, but are still sufficient in volume and convenience of location to be of use to cyclists. The position of other existing or proposed street furniture, such as bus shelters or benches, should be taken into account. Stands should not be placed where they obstruct the flow of pedestrian traffic or reduce available footway width for pedestrians beyond the recommended minimum. Bespoke or higher-quality designs may help minimise the visual impact of cycle parking.

11.6 Interchange facilities

11.6.1 Cycling increases the reach of public transport services, and the combination of cycling and public transport helps people to make journeys that are too long to cycle. Cycling generally provides reliable journey times between the home and station, little affected by peak time traffic congestion. A high proportion of the UK population lives within 2 miles of a railway station.

11.6.2 Cycle hubs are generally the most appropriate form of cycle parking at public transport stations (see 11.4.12). At smaller, unstaffed stations or tram stops, the absence of passive surveillance will be of concern to users who will need to leave their cycle locked up for prolonged periods. Even at busier stations this may be a concern. The chosen location should be covered by CCTV.

Figure 11.10: Small cycle hub at Ealing Broadway offering CCTV secure parking and cycle hire

11.6.3 Park & Ride sites may attract users to cycle to them and are often expressly set up to enable this. Cycle hub-style parking facilities (covered, secure) would be the most appropriate solution at most Park & Ride sites because of their more remote location.

11.6.4 Some authorities also encourage park-and-cycle, where people drive to a Park & Ride, a Park & Choose site or a dedicated Park & Cycle site, and cycle the rest of their journey (either by taking their cycle from the car, or collecting their cycle from a locker or secure parking facility). Park & Ride is often financed solely via revenue from fares, and therefore local authorities may choose to charge a fee for secure overnight cycle parking. At Park & Cycle sites, the need to store cycles securely overnight suggests that a cycle-hub solution is more appropriate than uncovered and unsecured stands.

11.6.5 Bus stops should also be considered as locations where cycle parking has potential to fulfil a role as an intermodal option (Fig 11.11), particularly in less dense suburban and rural locations where bus routes may be further from people's homes or places of work. High-quality interurban bus routes or limited stop express routes may draw users from a further catchment than the traditional 5 or 10-minute walking distance hinterland normally assumed for bus services. Central bus hubs will also have a large catchment area where the choice of routes may be significantly better than what is available within walking distance from a residential area.

Figure 11.11: Cycle parking at interurban bus stop in Humberside

11.7 Workplace facilities

11.7.1 The advantage of workplace cycle parking is that it can be incorporated within a site's secure perimeter, or located close to main entrances for natural surveillance (see Figure 11.12).

Figure 11.12 Cycle parking clearly marked at workplace basement entrance, Birmingham

11.7.2 Places of work where staff need to wear special clothes will already have changing, shower and locker facilities, but the design of new or refurbished office buildings should consider similar features to support cycle commuting. While people who commute short distances may well be able to do so without wearing specialist cycling clothing, those riding longer distances will appreciate changing rooms and lockers, preferably with facilities to dry clothing.

11.8 Residential facilities

11.8.1 It is good practice to provide dedicated cycle parking within new development as outlined in the NPPF in the same way as car parking is provided. Many people choose to keep their cycle inside their house or flat for security. However, the absence of internal cycle storage may lead to the blocking of internal circulatory spaces and stairwells, which inhibits evacuation and rescue in the event of fire or other emergency. New developments should always therefore provide dedicated ground floor cycle storage.

11.8.2 In areas where existing houses and flats are accessed by steps, or have no outside storage space for cycle sheds, on-street cycle parking may be more practicable (see Figure 11.13). This potentially presents problems of security and exposure to the elements.

Figure 11.13: Secure on-street "Cycle Hangar" in Hackney, London

11.8.3 On-street cycle parking "hangars" can be retro-fitted to a street or within an estate, and are normally only available to registered key-holders. Cycle hangars provide a dedicated place to park a cycle securely outside the curtilage of an existing building and not on the footway. Cycle parks are commonly located underground in residential blocks (see Figure 11.14).

Figure 11.14: Basement cycle parking in residential development, London

11.9 Ancillary equipment

11.9.1 Ancillary equipment can help remove some of the barriers to cycling and give a positive message that cycling is a legitimate and valid form of transport.

11.9.2 Footrests (Figure 11.15) at traffic signals or other locations where cyclists need to stop and wait can assist with moving off again, as can a handrail for "clipped in" cyclists to hold rather than putting their foot down.

Figure 11.15: Integrated footrest and handrail on the Farum to Copenhagen cycle route. Note the route branding and waymarking incorporated into the feature.

11.9.3 Air pumps and toolkits can also be located across the network and at rest stops to further increase the convenience to potential cyclists.

11.9.4 Digital cycle counters (Figure 11.16) showing a real time total of cyclists per day or per year provide a strong visual nudge that cycle infrastructure is a serious part of the transport system, and communicates to cyclists that they are valued. They provide evidence of the level of use of a facility, which can be useful in discussions with decision makers.

Figure 11.16: Real time cycle counter in Manchester

12

Planning and designing for commercial cycling

Public cycle hire schemes are increasingly being offered in urban areas as an option for short journeys. Like other forms of public transport, cycle hire schemes require space to operate and a degree of regulation. The outsourcing of business services, growth in e-commerce and fast food delivery has driven an increase in cycle logistics. While this brings benefits of a reduction in light goods vehicles on the roads, it also brings challenges in establishing convenient locations for micro-consolidation hubs and accommodating larger cycles on cycle infrastructure. The increasing availability of electrically assisted pedal cycles is helping to extend the range of hire bikes and cycle logistics into areas beyond city centres.

12.1 Public cycle hire

12.1.1 A wide variety of business models are in use throughout the UK to offer 'public bikes' for hire. These can be traditional cycle hire from a staffed location, automated docked systems offering trips between fixed docking stations, and dockless systems where bikes may be activated by smart-phone for door to door trips within a geo-fenced area.

12.1.2 Regardless of the means of operation, most public bikes are stored on-street and need highway space to be allocated. Docked systems also require local planning permission to install the equipment. An electrical supply is required, along with cycle parking docks and additional space for the terminal. A bank of 10 docked cycles will therefore take up about twice as much space as 10 parked cycles. There is usually a need to redistribute docked bikes throughout the day as certain journeys are more popular and in response to 'tidal' trips during commuting hours, and so docking stations will also need adequate space for maintenance vans to load and unload bikes.

12.1.3 Dockless bikes can be left anywhere (within areas of operation agreed between operators and local authorities), but in practice these also typically require some redistribution. Parking for docked and dockless bikes can take up slightly more space than Sheffield stands because the cycles are not locked together, so a single cycle will typically take up at least 1.0m width. Bikes left on footways are hazardous to pedestrians, particularly visually impaired people. Providing dedicated parking areas for the bikes can help, but may reduce some of the 'door to door' convenience that attracts users to the scheme.

12.1.4 All systems normally require premises for back-office operations and cycle maintenance. These offices may also be a 'hub' for other related activities such as public cycle parking, repair and maintenance services or cycle logistics (see Cycle Parking in Chapter 11).

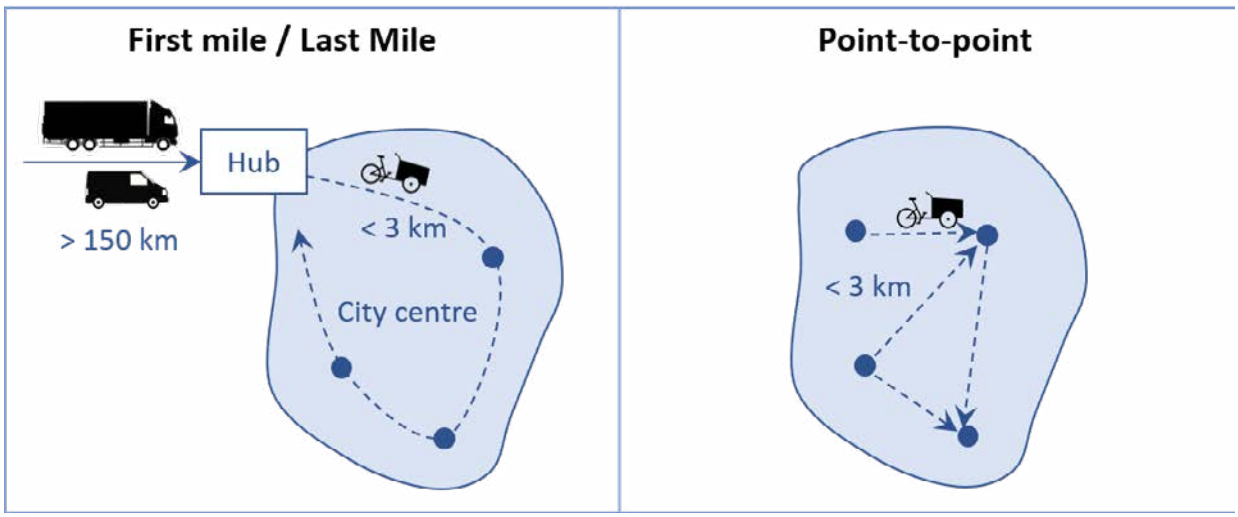
12.1.5 Including cycle hire as a service on pre-payment cards or mobile apps for public transport can further assist with integration of cycling with public transport. The ability to 'turn up and go' using a bank card or app allows the systems to be easily available to new and occasional users.

12.1.6 Many public bike schemes in the UK and elsewhere are dependent on revenue support to maintain them. Before investing capital expenditure on docking stations and other permanent infrastructure, the local authority should be satisfied that there are long-term revenue funding arrangements in place. These issues should be thoroughly explored during feasibility studies and risks addressed in the procurement procedures.

12.2 Cycle freight

12.2.1 Manual and electrically assisted pedal cycles (e-bikes) are increasingly used as an efficient and low polluting method to move items within urban areas. This may be as part of a delivery logistics chain, business to business supplies, express local delivery, or other services such as food delivery.

Figure 12.1: Typical cycle logistics models



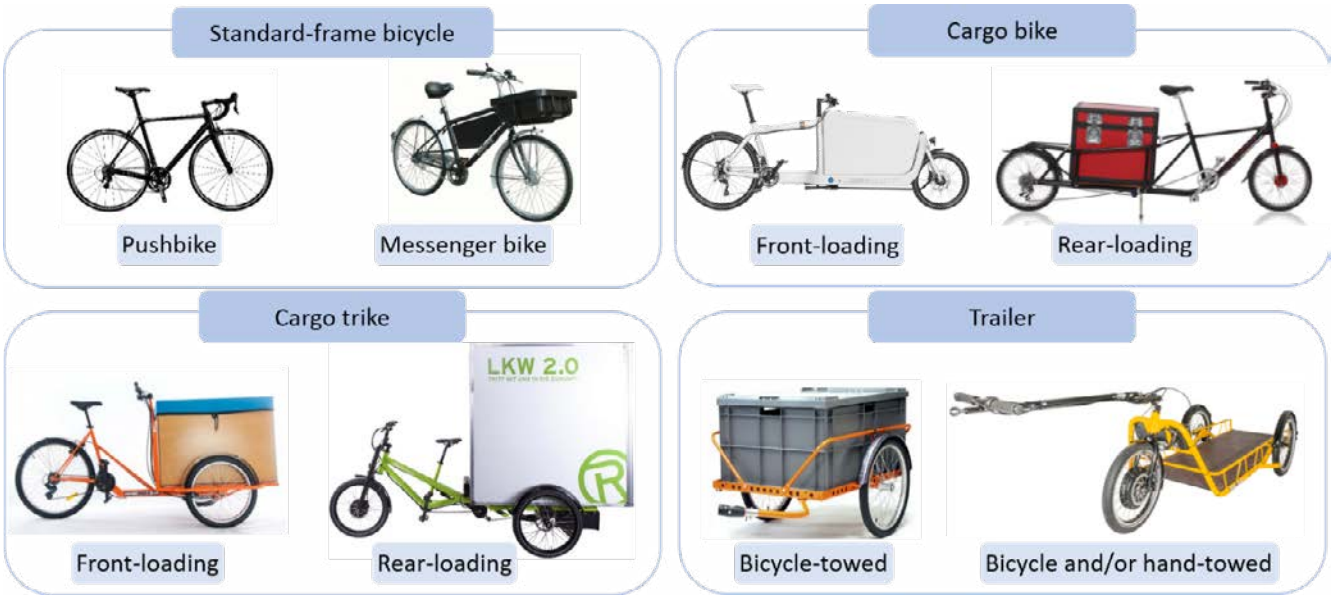
12.2.2 Commercial operators are also attracted by the ability of cycles to move quickly through congested areas and ease of parking whilst loading and unloading. It is important that the cycle infrastructure can accommodate the range of vehicles.

12.2.3 Cycle freight logistics is most efficient within areas of high density land use as illustrated in Figure 12.1. An additional infrastructure requirement for freight may be the introduction of micro-consolidation centres for first/last mile delivery services to enable interchange with longer distance freight such as vans or lorries. Finding suitable space for logistics consolidation in high density central areas can be challenging. Consolidation centres can take up as little space as two standard car parking spaces, and may be on-street, in existing car parks, or in commercial premises but also need access for vans/lorries to pick up and drop off. In some cases, the cycle-freight operation centre may be combined with other businesses such as a cycle shop, café or cycle hire centre.

12.2.4 Logistics operations will also typically require adequate space for cycles to be stored securely when not in use. This is normally the office from which the business operates (for smaller concerns) or a local distribution centre (for large freight operators).

12.2.5 A range of cycles are in common use (see Figure 12.2) and can be accommodated within the parameters of the 'design vehicle' described in Chapter 5. E-bikes enable riders to work for longer, overcome hills and carry greater loads. E-bike operations also require recharging facilities although this is generally done overnight between shifts.

Figure 12.2: Typical range of cycles



13

Traffic signs, road markings and wayfinding

Traffic signs and road markings must comply with the Traffic Signs Regulations and General Directions, or be authorised by the Secretary of State, when used within the highway, but the legislation allows for considerable flexibility in their use. There is a balance to be struck between providing enough signs for people to be able to understand and follow cycle infrastructure and ensuring that the signs themselves do not create confusion or street clutter. Routes on other rights of way not on the highway can use customised waymarking.

13.1 Principles

13.1.1 The first part of this chapter covers the requirements for traffic signs, road markings and signals. Traffic signs, road markings and signals for use on the public highway are prescribed in the Traffic Signs Regulations and General Directions (TSRGD). All signs erected on the highway must comply with TSRGD or be specially authorised by the Secretary of State. Advice on sign design is given in the Traffic Signs Manual (TSM) and designers should refer to this. The second part of this chapter considers signing issues for cycle routes that are not on the highway.

13.1.2 Designers should always question whether new signs are needed at all, and whether existing signs and posts can be re-used when introducing signs for cycling.[49]

13.1.3 Some cycle facilities require appropriate signs and/or road markings to give effect to Traffic Regulation Orders. Other signs are used to provide information, warn of hazards and give directions.

13.1.4 Many signs that relate to cycle infrastructure are prescribed at smaller sizes than those used for general traffic, but use of these needs to be balanced against the requirement for signs to be visible and legible at cycling speeds. Some key principles are applicable everywhere:

- Signing should be kept to the minimum to reduce street clutter and maintenance costs;
- The size of a sign and x-heights should be appropriate to ensure it can easily be read by cyclists and/or drivers depending on the purpose and location of the sign; and
- Sign posts and lighting columns should not be placed within a cycle track or footway wherever possible (other than signs mounted on bollards). Ideally posts should be 0.5m clear of the riding surface but if this cannot be achieved, they should be placed at the back of the cycle track or footway.

13.1.5 TSRGD offers a flexible approach to information and direction signs, enabling highway authorities to create signs appropriate to local circumstances within an overall framework of design elements. This helps minimise the need for special authorisation of non-standard signs.

13.1.6 There is freedom to install locally distinctive signing (such as wooden signs) on routes away from highways, although standard road signs may be used, which can aid consistency and maintenance. Signs away from highways should be accessible to all and follow the guidelines set out in Inclusive Mobility.[50] In general, symbols and diagrams can be understood by a wider range of people and are therefore more inclusive than written material.

13.2 Mounting heights and positions

13.2.1 Where signs are erected above footways and cycle tracks, adequate clearance is required for pedestrians and cyclists. A minimum height of 2300 mm for pedestrians and 2400 mm for cyclists is recommended – see Chapter 1 of the Traffic Signs Manual. Signs on bollards are typically mounted at least 0.8m high to ensure they can be easily seen, and signs on walls placed at a height of 1.5m.

13.2.2 Sign posts should be placed at least 0.5m from the carriageway and cycle track edge, but no more than 1.0m from the route to ensure that they are visible to users. Where bollards are placed in cycle tracks a clear width of 1.5m is required for access by the full range of cycles.

13.3 Regulatory signs

13.3.1 Advice on design and use of regulatory signs is given in Chapter 3 of the Traffic Signs Manual. Traffic Regulation Orders (TROs) made under the Road Traffic Regulation Act 1984 require regulatory signs and markings to give them effect and enable enforcement (see Appendix C). A one way or two-way cycle track within the highway can only be created under the Highways Act 1980.

13.3.2 Most orders relate to on-carriageway restrictions, such as speed limits, cycle exemption from 'no entry' or banned turns, and restrictions on car parking and motor vehicle access.

13.3.3 Where necessary, cyclists can be exempted from prohibitions on movements such as no entry, no left turn and no right turn, through use of the appropriate plate ('Except Cycles' or 'Except Buses and Cycles'). This must be reflected in the TRO.

49 Traffic Signs Manual: Chapter 1, DfT
50 Inclusive Mobility – A Guide to best Practice on Access to Pedestrian and Transport Infrastructure, DfT, 2002

13.4 Informatory signs

13.4.1 The CYCLISTS DISMOUNT sign to TSRGD diagram 966 should not normally be used – on a well-designed facility, it is very rarely appropriate and represents a discontinuity in the journey, which is highly disruptive. It should only be used in situations where it would be unsafe or impracticable for a cyclist to continue, or at the complete termination of a route, for example at a railway station forecourt. It should be borne in mind that some people with mobility impairments will be unable to dismount. There will seldom be justification for using the sign where a cycle route crosses or joins a carriageway, and the alternative permitted variant 'CYCLISTS REJOIN CARRIAGEWAY' may be more appropriate (see Figure 13.1).

13.4.2 Designers should design or modify schemes to ensure that its use is avoided. For existing signs, it is recommended that authorities review locations and consider alternative provision to enable cyclists to proceed without dismounting, such as the use of the 'CYCLISTS REJOIN CARRIAGEWAY' alternative. Where the sign's use appears unavoidable, designers should be able to defend their decision and why it cannot be avoided.

13.4.3 The END OF ROUTE sign to TSRGD diagram 965, and the END marking to TSRGD diagram 1058, are not mandatory, and should be used sparingly. As with CYCLISTS REJOIN CARRIAGEWAY, where their use appears unavoidable, designers should be able to defend their decision and why it cannot be avoided. When deciding whether to use them, consideration should be given to the purpose they are meant to serve. If the end of the route is obvious, they are redundant. If the cycle route cedes priority on ending, GIVE WAY signing is used instead. See also Chapter 6 on use with cycle lanes.

Figure 13.1: A positive instruction should be used where a sign is necessary to indicate the end of a route.

13.5 Road markings

13.5.1 Advice on the use of road markings is given in Chapter 5 of the Traffic Signs Manual. They are used to indicate prohibitions, delineate carriageway space or crossing points, and provide information to assist with wayfinding such as direction arrows. Half-size versions of give way markings and centre line markings are prescribed for use along cycle tracks.

13.5.2 The road marking to TSRGD diagram 1049B is used to indicate mandatory cycle lanes, and to TSRGD diagram 1004 to indicate advisory cycle lanes – see Chapter 5 of Traffic Signs Manual. Markings such as direction arrows are less obtrusive than upright signs and can be a valuable aid to cyclists, especially at transitions between on and off-carriageway routes and to mark the path through complex junctions. Markings may either supplement or replace upright signs, subject to the requirements of TSRGD.

13.5.3 Road markings should always be well-laid and clear. They require regular maintenance to ensure they remain legible. Advice on maintenance is given in UK Road Liaison Group's document 'Well-managed Highway Infrastructure: A Code of Practice'.

13.6 Direction signs and markings within the highway

13.6.1 As well as showing the destination, and its direction and distance, direction signs can also help with orientation so that the user can work out their location.

Distance and time units

13.6.2 Distances must be expressed in miles, fractions of miles and yards as set out in TSRGD. Estimated journey times in minutes may be shown on cycle and pedestrian signs. Time and distance must not be shown on the same sign.

13.6.3 An average speed of 10mph provides a baseline for calculating cycle journey times but this needs to be modified to take account of any steep or long hills on a route. Local authorities should check actual journey times when developing a sign schedule. Beyond four to five miles, journey time estimates will become more inaccurate and distances should be used instead.

13.7 Direction signs

13.7.1 TSRGD allows flexibility for direction sign designs on cycle routes. The smaller x-height of 25mm may be used for direction signs. This size may be suitable for quiet and low speed off-road routes, but not for higher speed sites.

13.7.2 Local route branding patches may be used on direction signs as well as National Cycle Network branding. Identification numbers of routes may include capital letters. If not a national or regional route, the route number and patch may be in any contrasting colour. This allows route branding to be used on cycle route signing.

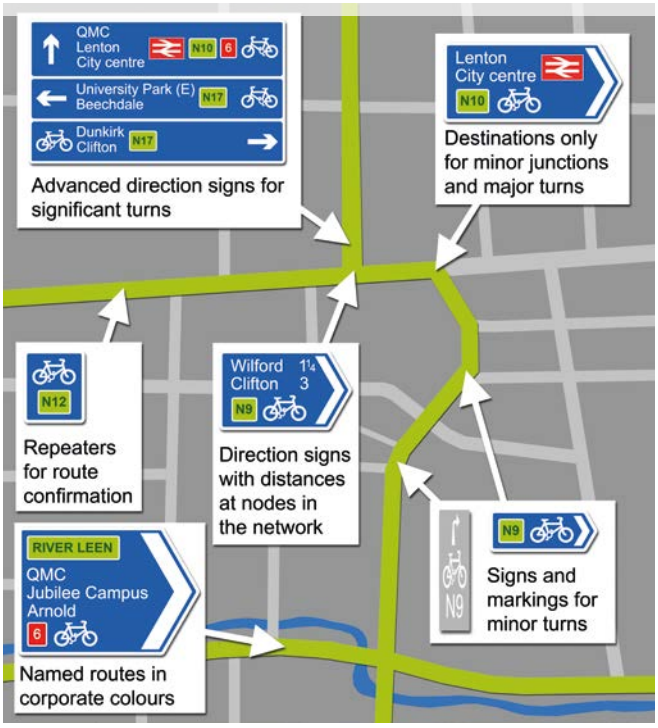
13.7.3 Signs should preferably be placed on existing street furniture to reduce the need for additional posts. Where cycling is on-carriageway the signs may be incorporated into general traffic signs, as illustrated in Chapter 7 of the Traffic Signs Manual, thereby reducing street clutter. Advance direction signs may be used ahead of the junction to warn and allow cyclists to position themselves for a manoeuvre, together with flag-ended signs at the junction. Route confirmatory signs after a junction help confirm that the correct route has been chosen.

13.7.4 Direction signs are provided to guide route users, but they may also have the side-effect of promoting the route, making potential users aware of it. Signing the links to/from/across the route as well as along it can help to promote more use. Local route branding using colour coding or a numbering system can be applied to direction signs as shown in Figure 13.2.

13.7.5 The presence of a signed route may create an expectation in users that that route will provide a certain level of service. Poor provision will undermine trust in the signed network. Designers need to be mindful of the quality of any signed link and capabilities of the intended users. Poor maintenance will also deter users, for example if signs are twisted or missing, leading to issues with navigation. See Chapter 1 of the Traffic Signs Manual for advice on sign mounting and maintenance.

13.7.6 Direction signs may be more necessary in back street or traffic free routes than on busier roads, where direction signs for general traffic can provide for cyclists and pedestrians. Links to a route from surrounding origins such as residential areas and from the route to nearby destinations will need to be signed. A route provides for a range of journeys along its length and the corridor it serves.

Figure 13.2: Example of local branding applied to different sign layouts



13.7.7 A map-type explanatory sign can be used where the cycle route leaves the carriageway on a different alignment to that of on-carriageway traffic (Figure 13.3). Note that this sign required DfT authorisation.

Figure 13.3: Map type sign, London

13.8 Direction signs for off-highway routes

13.8.1 Direction signs for off-highway routes do not have to comply with TSRGD, but should still include information about distances, destinations and direction. (see Figure 13.4). A consistent approach to design and branding will assist with this.

Figure 13.4: Locally branded signs on off-highway route

Figure 13.5: Off-road signs, Lake District National Park

13.8.2 In rural areas, cycling is permitted on certain types of public path, bridleways, byways and roads used as public paths, as well as permissive routes on private land. Signs can aid people's understanding of where they may or may not cycle – see Figure 13.5.

13.9 Preparing a signing schedule

13.9.1 A signing schedule will need to be prepared to work out what direction signs are required and where to place them. It is important to cycle the route in both directions to consider where to place signs that will be visible to users, and to consider what signs to and from adjoining routes will be required. When undertaking the site investigation, existing street furniture such as other sign posts, bollards or panels of guard rail should be noted where this could provide a place to mount a sign. Some highway authorities also permit direction signs to be placed on lamp columns.

13.9.2 The signing schedule is typically set out in tabular format. The coordinates of each location can be recorded by taking photographs with a GPS enabled camera and plotting these on a base map on which the proposed position of the sign can be illustrated. It should also be noted whether the sign will be placed on existing street furniture or a new pole, and whether any existing signs are to be removed. The compass orientation of the sign should be recorded together with the content (destinations, direction and distance) and pattern style of the sign (using the TSRGD reference number). Commercial packages are available to design signs and when these are used, an illustration of the proposed sign can also be included. GIS can be used to record and share this information.

13.9.3 Most built-up areas will have important primary destinations such as the Town Centre and secondary destinations such as District Centres already in use on road signs which should form the basis of the signing strategy. Local destinations such as schools, shopping parades or attractions can be signed from within a mile or at the junction of the cycle route and the spur to the destination. Specific cycle route signing may not be needed where the route is already signed for motor traffic.

13.10 Orientation

13.10.1 Area maps can be helpful to understand, and to provide a general overview of, the local area, especially for those making longer journeys. Off-road routes in railway and canal cuttings can be quite isolated, making it harder to work out distances and locations without the aid of a map.

13.10.2 Information totems offer a way to display on-street maps. They may be associated with cycle hire docking stations, cycle parking stands or placed at regular intervals and at strategic points where a route choice must be made. The advantage of maps is that they can tell the reader where they are in relation to their destination and isochrones can be used to provide an estimate of cycling times. Research and trials for the Legible London mapping (used on cycle hire and pedestrian signs) informed the design of the mapping to include:

- Orientation of the map in the same direction as the viewer is facing;
- Street names on the map;
- Sketches/photos of significant buildings and other landmarks; and
- Isochrones showing typical walk/cycle times

13.11 Branding cycle routes and networks

13.11.1 Many local authorities have branded their cycle route networks, and TSRGD allows for branding patches to be placed on direction signs. Branded routes are generally longer linear routes radiating from a town or city centre. Typically, in a large city, these radials might extend three to five miles into a suburb or even link neighbouring towns. Radial routes usually pass through several important local destinations such as district centres and public transport interchanges. In this way, they can be likened to bus, tram and train routes and a similar mapping style can be applied to the totems (see Figure 13.6), helping cyclists to measure their progress along a route.

13.11.2 Standard cycle route direction signing should be used wherever possible, as prescribed in TSRGD. This will reduce costs by avoiding the need for special signs authorisation, and ensure consistency across neighbouring networks. In some towns and cities, and on the National Cycle Network, routes use a numbering system, while in other towns colour coding is used. Where a route logo is to be incorporated as part of a branding patch on direction signs, it is important to remember that TSRGD requires the standard cycle symbol to be included on the signs, and incorporating a

Figure 13.6: Information totems and maps in London

cycle symbol into the logo will merely be repeating existing required information.

13.11.3 It is important to remember that route identifiers such as numbers and colours are of little benefit without an accompanying map. Signs with numbers on are not by themselves very informative without destinations.

13.11.4 Route names can be of benefit when they relate to the local geography such as a river valley, but again the branding should ideally be accompanied with information about the local destinations. Leisure trails are a destination in themselves and may be included as 'places' in local signs.

13.11.5 On-street, digital and paper maps should reflect any branding and naming of routes that are on the signs.

13.12 Signing for roadworks

13.12.1 Roadworks can introduce additional hazards for cyclists such as uneven surfaces, slippery metal plates, narrow traffic lanes and the construction vehicles themselves. Temporary signs and markings can be used to highlight issues to other road users, while markings and traffic cones or wands can be used to create protected space for cycling[51].

13.12.2 One of the main issues for cyclists at roadworks is that traffic lanes are narrower than usual and often bounded by vertical features such as fencing and bollards. In combination with close overtaking by motor traffic, this can be intimidating. Guidance on appropriate lane widths and associated techniques to help enhance cyclists' safety is in Table 13-1.

Figure 13.7: Warning signs and temporary markings at construction site

Table 13-1: Lane widths at roadworks

Lane width	Implications
<3.2m	Consider 20mph speed limit.
3.2m to 3.9m	To be avoided
3.9m+	Wide enough for all vehicles to overtake on lower speed roads (20mph)
4.25m+	Wide enough for all vehicles to overtake on higher speed roads

13.12.3 Where portable traffic signals are in use, it is important that the signal timing allows cyclists to get through the roadworks before the opposing traffic is released. This should be checked on site when the lights are in operation as gradients or uneven surfaces may make cyclists travel more slowly than usual. Long lengths of roadworks (over 100m) can be particularly problematic and it may be better to try to split the works into shorter sections if cyclists are using the carriageway. Guidance on minimum green times for cyclists is given in Chapter 10, Section 10.4.27.

13.12.4 Temporary road closures for motor traffic usually permit pedestrian access unless there are safety concerns and are often accessible by bicycle. Permitting cycle access is often a safer option than a diversion onto a longer or busier route, provided this does not introduce conflict with pedestrians.

51 Safety at Street Works and Road Works – a Code of Practice, DfT, 2013

14

Integrating cycling with highway improvements and new developments

There are significant and cost-effective opportunities to provide cycle infrastructure during the construction and maintenance of highway works, particularly in new developments. This is recognised in the National Planning Policy Framework and the Local Cycling and Walking Infrastructure Plan Guidance. It is important that cycle infrastructure requirements are embedded into local authority planning, design and highway adoption policies and processes. This will ensure that good quality cycle infrastructure is delivered in all new developments, new highways and highway improvement schemes.

14.1 Introduction

14.1.1 This chapter covers the delivery of new and improved cycle infrastructure as an integral part of general highway improvement and maintenance work and in new developments.

14.1.2 Appropriate cycle facilities should be provided within all new and improved highways in accordance with the guidance contained in this document, regardless of whether the scheme is on a designated cycle route, unless there are clearly-defined and suitable alternatives.

14.1.3 With appropriate policies and processes in place, most schemes for cycle traffic will be delivered alongside other highway works and as part of new developments. There are opportunities to specify and enforce the requirement for a good standard of cycle provision to developers and contractors through planning briefs, supplementary planning guidance and contract procurement documentation, as appropriate.

14.1.4 The requirements should include the provision of new cycle routes connecting to and through developments and enhancing the provision for cycling when making alterations to links and junctions on existing highways. It will not usually be acceptable to maintain an existing poor level of service when undertaking highway improvement schemes. More modest but still effective improvements can be achieved as part of highway maintenance – for example when road markings are being renewed.

14.2 Policy background

14.2.1 The National Planning Policy Framework (NPPF)[51] sets out the national policy context for land use planning and states that planning policies should:

- '*provide for high quality walking and cycling networks and supporting facilities such as cycle parking (drawing on Local Cycling and Walking Infrastructure Plans)'* (Para 104d).

14.2.2 The NPPF also states that applications for development should:

- *'give priority first to pedestrian and cycle movements, both within the scheme and with neighbouring areas'* (Para 110a).

14.2.3 The NPPF in Para 91 sets the overall requirement that planning policies should *'aim to achieve healthy, inclusive and safe places'* and that this can be achieved by promoting social interaction and healthy lifestyles through layouts and easy connections that encourage walking and cycling.

14.2.4 Local Cycling and Walking Infrastructure Plans (LCWIPs) are described in more detail in Chapter 3, and supported by the NPPF. They offer a well-founded process for local authorities to identify how cycling and walking networks should be provided and improved across a wide area.

14.2.5 The LCWIP guidance states that they should be incorporated into local authority policies so that appropriate consideration is given to cycling and walking in all local planning and transport decisions.

14.2.6 LCWIPs should expressly consider planned new developments, both in terms of the additional demands they will create for cycling and walking and more significantly how new and improved highway infrastructure created and funded by development can contribute to these networks. This can be achieved through the Community Infrastructure Levy, Section 106 contributions and Section 278 highway agreements.

14.2.7 Where local authorities have developed a future cycling network through an LCWIP it will enable them to seek meaningful and worthwhile contributions from new developments rather than ad-hoc and isolated measures which do not enable active travel journeys beyond the site.

14.2.8 The LCWIP guidance also notes that opportunities should be taken to embed the requirements of cyclists and pedestrians in other transport schemes, such as junction improvements or maintenance works. When maintaining, improving or creating new highways, authorities should therefore treat walking and cycling with the same importance and consideration as motorised transport.

14.2.9 It should also be noted that the Network Management Duty placed on traffic authorities by the Traffic Management Act 2004 to manage their road networks with a view to securing 'expeditious movement for all traffic' includes pedestrian and cycle traffic.

14.3 Providing for cycling in new developments

Planning processes

14.3.1 New housing development provides a major opportunity to create new and improved cycle infrastructure.

14.3.2 LCWIPs should be undertaken by local authorities to plan the wider cycle network across an area. These network plans should reflect the demand for new cycle journeys created by planned development to key locations such as town centres, employment hubs and schools; as well as the potential for new links to be provided through a site to connect existing places (see Figure 14.1).

14.3.3 Relevant LCWIP proposals should be reflected in area- and site-specific plans and documents such as *Supplementary Planning Guidance*, a *Development Framework Document* or an *Area Action Plan*. These will inform the overall requirements for the development, including:

- the principal points of connection to the wider cycle network
- any requirements for off-site cycle route improvements
- general principles of the on-site cycle network
- general requirements for other cycle infrastructure such as cycle parking.

14.3.4 New highways are normally promoted, funded, designed and built by the private sector as part of new developments. Local highway authorities should use their development control powers to approve technical

Figure 14.1: Integration of planned development in a future network – Melton Mowbray

designs to enable people to use cycles for everyday journeys. New highways (including cycle tracks) created within a development will normally be offered for adoption to the highway authority under Section 38 of the Highways Act 1980 (see Appendix C).

14.3.5 The planning and design of the site accesses, the internal network and any off-site highway improvements will usually be informed by the Transport Assessment (TA) for the new development. This is used to forecast the all-mode travel demands of the site and assess their impact on the surrounding network. It should be noted that smaller developments which fall below the normal thresholds to provide Transport Assessments should still be required to provide and/or contribute towards new and improved cycle infrastructure.

14.3.6 It is important that the TA does not overestimate motor traffic travel demands, which could make it difficult to provide well-designed cycle infrastructure, particularly at the site access points. Travel demand forecasts should take into account the potential for the increased levels of cycling that will be enabled by high-quality cycle facilities, both on- and off-site.

14.3.7 New developments that have important destinations within them, such as schools and retail centres, should be provided with cycle and pedestrian links to adjacent residential areas and local cycle routes so that residents can cycle to the new facilities. Similarly, large new residential developments should offer external links to adjacent employment, education, administrative, transport interchange and retail destinations.

14.3.8 Planning conditions can require that specific cycle parking and cycle routes are provided, and specify the standard that should be met within the new site for planning permission to be formally granted. Reference may be made to a design code which is usually prepared by the development team and agreed with the local highway authority. The local authority must provide a reason for the conditions – such as fulfilling the policies set out within a local cycling strategy, meeting the cycle parking standards in local planning guidance, or contributing to the schemes in the LCWIP.

14.3.9 Planning obligations or agreements (Section 106 agreements) can also be used. Planning obligations apply to the land rather than the developer, including future users, and are often used to secure funding to mitigate the negative impacts of the development. This might for example be by providing improved crossings or cycle routes in the locality, or providing infrastructure elsewhere to compensate for a loss of green space.

14.3.10 Since 2010, planning authorities have also been able to use the Community Infrastructure Levy (CIL) to 'pool' charges made on various new developments. This is as an alternative to Section 106. The advantages of CIL are that it can be charged on any residential development and all developments over 100m sq. (with some exemptions) and that the money levied can be spent to improve infrastructure across the whole local area, not just that related to the development site. The amount of the levy is set by the local authority each year and is directly related to the size of development. This gives planners and developers more certainty about the amounts involved for a given development.

Planning the network

14.3.11 Manual for Streets provides guidance on the planning of transport networks for new developments and generally recommends that they are well connected to their surroundings with a choice of routes. In some cases, however, it may be appropriate to provide fewer accesses and routes for private cars to give priority to sustainable modes of transport (filtered permeability) – see Chapter 7.

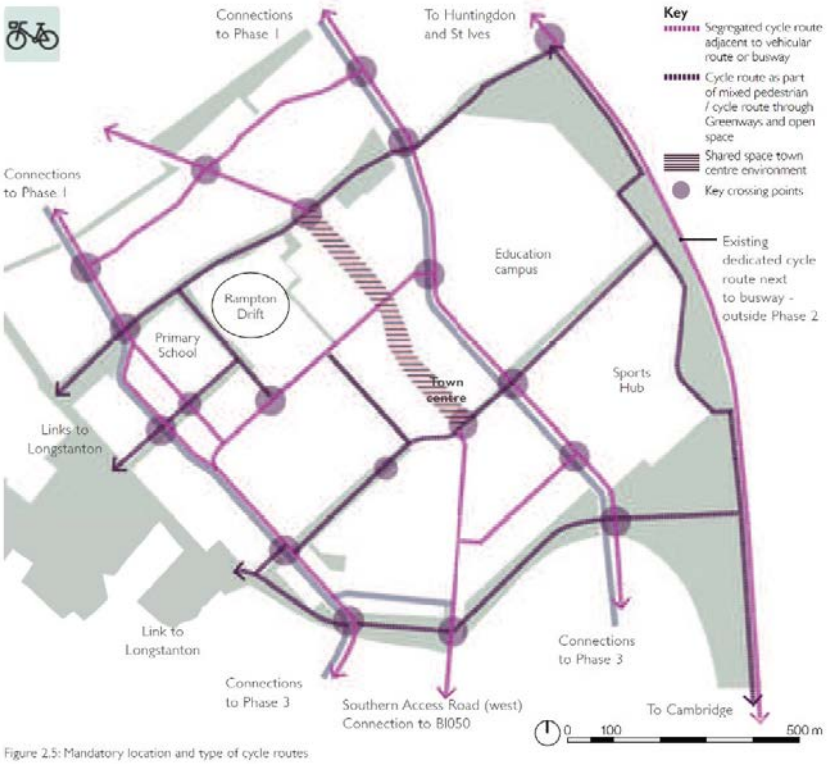
14.3.12 Cycling facilities should be regarded as an essential component of the site access and any off-site highway improvements that may be necessary. Developments that do not adequately make provision for cycling in their transport proposals should not be approved. This may include some off-site improvements along existing highways that serve the development.

14.3.13 Within larger sites it will be necessary to plan a network of cycle routes that connect all parts of the development. This network should follow the principles set out in Chapter 3. The opportunity of designing a wholly new highway network means there should be a presumption of providing a densely-spaced network with around 250m between designated cycle routes.

14.3.14 Cycle networks within new developments should generally be made up of the elements listed in Chapter 3, Section 3.4, i.e.:

- Dedicated space for cycling within highways (Chapter 6)
- Quiet mixed traffic streets (Chapter 7)
- Motor traffic free routes (Chapter 8)
- Junction treatments and crossings (Chapter 10)
- Cycle parking at origins, destinations and interchanges with other modes (Chapter 11).

Figure 14.2: Proposed cycle network, Northstowe phase 2, Cambridge



14.3.15 Networks need to meet the five Core Design Principles set out in Chapter 4:

- Coherent;
- Direct;
- Safe;
- Comfortable; and
- Attractive

14.3.16 This means that while cycle routes across a development should form a legible and high-quality grid of routes, the nature of the routes may change along their length – for example a designated route along a quiet residential street may lead into a motor traffic free route through a green space – see Figure 14.2.

Designing the network

14.3.17 The design of cycle facilities within new highways constructed in developments should adhere to the guidance given in the relevant chapters contained in this document. Typically, there are few constraints preventing designers from meeting desirable geometric standards and so the expectation is that high quality cycle facilities should be provided in all new developments.

14.3.18 Design codes for new developments may be useful documents which establish the dimensions, layout and the materials palette for different types of route, including walking and cycling-only links. A design code will help ensure a consistent approach is taken across the site and at different phases of development where growth takes place over several years. Design codes are typically prepared by the development team and approved by the highway authority.

14.3.19 A cycle network plan should be included in the design code, setting out what type of route (off-carriageway cycle track, on-carriageway, or greenway) will be provided in each location as part of the overall layout. The design code should include typical cross-sections for the different types of route. This level of detail is important so that decision-makers and designers are all clear about the quality of the facility that is to be provided.

14.3.20 During the detailed design and delivery stages, development control and highways staff should have oversight and review of designs to ensure that they are being delivered as intended. New residential development should follow the principles in the Manual for Streets.

Main streets

14.3.21 Many large new developments will provide new main streets or spine roads and these will often be the most direct route through the site, typically serving facilities at the centre of the new community such as shops, schools and employment. It is therefore important that they are suitable for all members of the community to cycle along and across.

14.3.22 The speed and volume of motor traffic on these routes will often mean that protected space for cycling is required (see Figure 4.1), as well as regular crossing facilities. Designers should follow the guidance given in Chapter 6 to provide high quality provision for cycling.

Figure 14.3: Poor quality provision for cycling in a housing development – no priority at side road, compounded by barriers

14.3.23 Bus-only routes, or new tram routes, should include a parallel cycle track.

Figure 14.4: One way footway level cycle track past bus stop, North-West Cambridge development.

14.3.24 The highway cross-section will typically incorporate many requirements appropriate to the context, such as street trees, verges and car parking, but the need for these features should not lead to the omission of the cycle infrastructure.

Quiet streets and cycle streets

14.3.25 Most residential streets in new developments, including smaller schemes, will be suitable for cycling in mixed traffic as the speed and volume of motor traffic will be low. However, in cases where streets serve a larger area of development designers may need to make traffic forecasts of the internal links to ensure that on-carriageway cycling is suitable for most people, based on Figure 4.1. Where volumes are considered too high it may be necessary to introduce some filtering of the network to create acceptable conditions and give priority to cycling and walking.

14.3.26 As recommended by Manual for Streets, the minor street network should create a series of reasonably direct and well connected routes for cycling, rather than forming a convoluted layout of curved streets and cul-de-sacs.

14.3.27 Although the minor street network should all provide good cycling conditions it may be appropriate to designate some streets as important cycle routes, for example those which lead directly to an off-highway route through a green space. These 'cycle streets' could be indicated through changes in paving material, planting or other design changes so that they are understood as being principally for cycling (see Figure 14.5).

Motor traffic free routes

14.3.28 Many large developments, particularly garden towns and villages, provide significant areas of new open space for the benefit of residents. These areas provide opportunities to create new cycling and walking routes between different parts of the development and to the areas beyond the site. Such facilities should not be seen as only for recreational use, but should be designed in accordance with the advice in Chapter 8.

14.3.29 They should be reasonably straight and form a connected part of the overall network, and with a cross-section that meets the level of use that is expected, preferably with separate provision for walking and cycling (see Figure 14.6). Routes should be well lit, hard surfaced and well-drained so that they are useable at all times and seasons.

Figure 14.5: Illustration of a cycle street

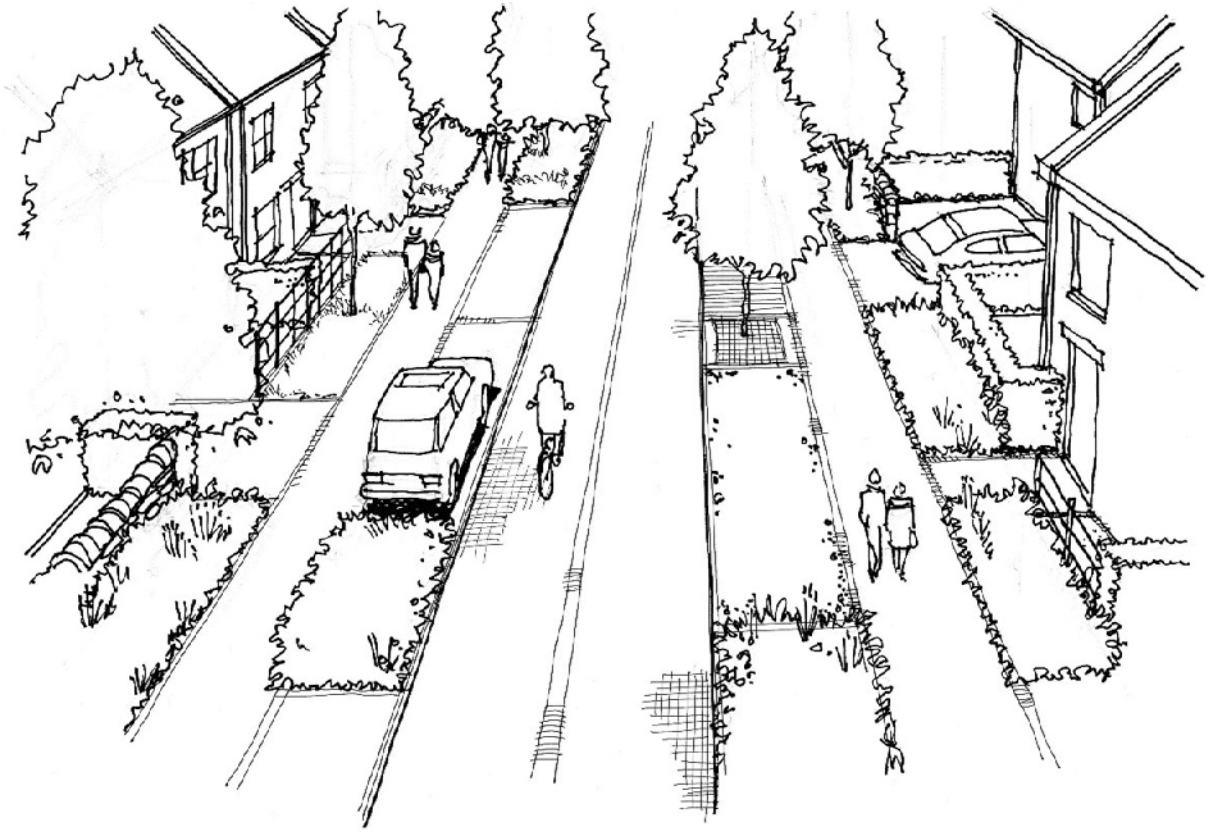


Figure 14.6: Traffic free route in new housing development, Lewisham

14.3.30 In some cases it will be necessary to provide substantial infrastructure to achieve these traffic free routes – see Figure 14.7.

14.3.31 Designers should consider the personal security issues that may be associated with cycle routes away from buildings. Routes with 'active frontage' overlooked by buildings are preferred, as shown in Figure 14.8.

Figure 14.7: Proposed bridge connecting the Northstowe development to a nearby village

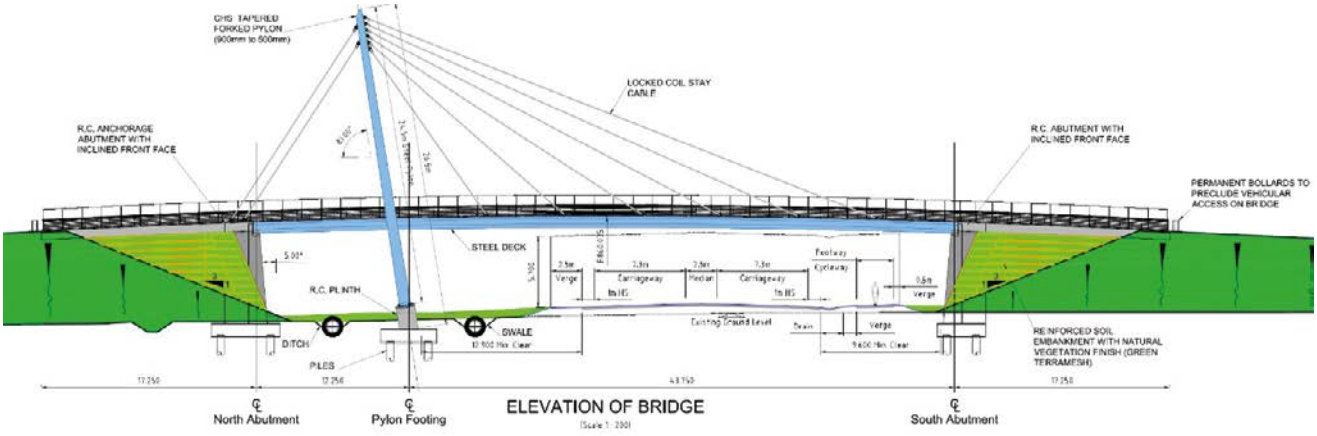
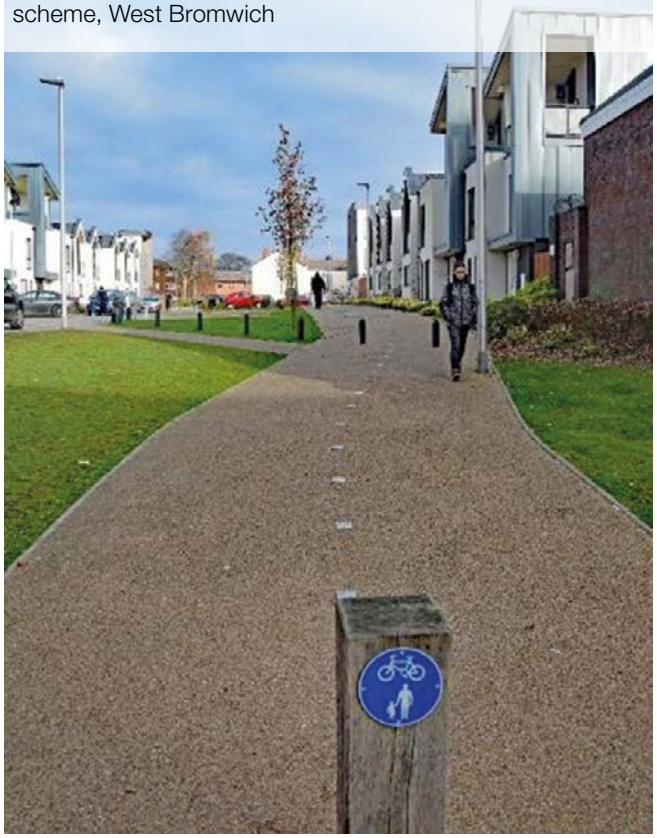


Figure 14.8: Off-highway cycle route in new residential scheme, West Bromwich



14.4 New highways and improvement schemes

14.4.1 Manual for Streets (2007) set out a generic process for all highway schemes, as shown in Figure 14.9.

Figure 14.9: Highways, overall improvements process

14.4.2 Further details on this process are given in Chapter 3 of Manual for Streets, but in terms of providing for cycling, the key steps are:

- Objective setting;
- Design; and
- Auditing.

14.4.3 Schemes to build new or improved highways will have a prime objective – for example to reduce congestion or to provide access to a new area of development. It is still important that authorities consider how a new scheme can add to or improve existing walking and cycling networks.

Objective setting

14.4.4 To meet the objectives of the CWIS and to deliver LCWIPs, authorities should always include the objective of enhancing provision for cycling and walking, and translate this into specific and measurable outcomes; for example, making a suitable link from a residential area to a school. This will enable the emerging designs to be assessed against local policies and design guidance.

14.4.5 There is sometimes a tension between objectives, for example between increasing motor traffic capacity, accommodating kerbside activities and providing for pedestrians and cyclists. There is a growing body of evidence demonstrating that rapid growth in cycling and walking levels can occur once safe and attractive conditions are created. Monitoring schemes before and after implementation can help demonstrate the benefits such as collision reduction and improvements in air quality.

Design

14.4.6 New and improved highways will need to strike an appropriate balance to best meet the various design objectives that have been set, including the needs of people using cycles as set out in Chapter 4.

14.4.7 When new highways are being planned, careful consideration of walking and cycling must be done at an early stage in the planning and design process to ensure that sufficient land is available to meet infrastructure requirements – in particular the need for separation from motor traffic as set out in Figure 4.1, and space at junctions to provide comprehensive solutions. Where schemes are in development and land take is already fixed, authorities should still incorporate cycle facilities meeting the guidance in this document as far as is possible. This may require some rethinking of the space and provision given to motor traffic.

Auditing and risk assessment

14.4.8 Authorities should consider audit and review techniques that could be used to check how well a design meets the objectives that were set for it. The various audit techniques and their application are described in Chapter 4.

14.5 Local authority design guides and standards

14.5.1 Local authorities are responsible for setting their own design standards for their roads.

14.5.2 DfT recommends that local authorities follow the advice contained in Manual for Streets 1 and 2 when developing their standards. These stress the importance of placing a high priority on meeting the needs of pedestrians and cyclists, so that growth in these modes of travel is encouraged.

14.5.3 Authorities should review their design guidelines to ensure that they are consistent with this LTN so that developers' design teams are aware of what is expected of them, so that they will include appropriate measures for walking and cycling as a matter of course.

14.5.4 Similarly, where local authorities have prepared standards which they themselves use for the design of new highways and highway improvements, these documents should be updated to take account of this LTN.

15

Construction and maintenance

Routine and seasonal maintenance plays a major role in cycle safety. Cyclists are particularly vulnerable to defects and debris on the surface which can destabilise the rider. Maintenance costs can be minimised through careful design and selection of construction materials. Regular inspections enable maintenance work to be cost effectively programmed and prioritised. Cycle track construction can be more lightweight than the carriageway but needs to be of robust materials that offer a long-lasting safe and comfortable riding surface. Winter maintenance of cycle tracks differs from the carriageway due to the lightweight construction of the track and the mechanics of the de-icing process.

15.1 Introduction

15.1.1 This chapter considers maintenance of cycle facilities from the perspective of design and construction. While it includes some commentary on routine maintenance, more detailed sources of advice on this aspect are in the further reading and references.

15.1.2 Careful design and selection of construction methods and materials will reduce the long-term costs of maintenance. Cycle-only routes and shared facilities do not require the same construction strength as carriageways, but do need to be able to withstand maintenance vehicles where these are used. There is no natural 'sweeping effect' from passing cyclists as there is on the carriageway, and limited crushing action from bicycle tyres. Cyclists are more directly affected by hazardous surfaces so routine and winter maintenance of cycle tracks requires a different approach to that used on-carriageways.

15.2 Construction materials

15.2.1 Surface quality affects the comfort and effort required when cycling. Loose surfaces such as gravel or mud can also present a skidding hazard, increase the risk of punctures and make cycles and clothing dirty in bad weather. Cyclists are also affected by ruts and potholes that can throw them off balance. Smooth, sealed solid surfaces offer the best conditions for everyday cycling.

15.2.2 Good quality machine laid surfaces will appeal to a wide range of users from people on lightweight racing cycles through to child cyclists. Smooth surfaces also offer greater accessibility and safety for other potential users such as wheelchair users, mobility scooters and blind and partially sighted people.

15.2.3 Sealed surfaces should normally be provided within towns, cities and villages and on commuter routes from the immediate hinterland. This might include rural cycle routes between villages, for example where pupils might be expected to travel to school.

15.2.4 Cobbles and setts are uncomfortable for cycling, although in heritage areas a 2.0m wide virtual cycle lane can be created using setts or cobbles that have been sliced or planed to create a smoother surface. Most local highway authorities specify that cycle routes within the highway must adhere to local minimum standards of construction. There is much greater variation in quality on routes away from the highway.

15.2.5 Outside built-up areas, treatments such as crushed stone may be applied to off-highway routes for aesthetic, heritage or nature conservation. These treatments are a cost-effective way to create lengthy off-road links but will be less accessible.

15.2.6 Cycle tracks require proper construction of each element:[52]

- Formation and sub-base;
- Surfaces (including transitions, see Chapter 9);
- Edges and verges;
- Ecology;
- Drainage; and
- Ancillary works such as lighting, fencing, access controls and landscape features.

Formation

15.2.7 The sub-grade must provide stable conditions on which the track can be formed (usually present already within highways). Away from the existing highway this can be simply done by compacting the natural ground, but where the ground is contaminated or unstable, a capping material may be required. Geotextiles (felt, polypropylenes or plastic grid systems) can be used to add stability.

15.2.8 Cyclists and pedestrians do not create a high loading requirement, but where vehicles and machinery are to be used for construction and maintenance, the formation must be able to support these. All vegetation must be removed with the top soil. Decomposing matter can lead to voids and subsidence. 'No-dig' construction may be required in places of ecological or archaeological significance.

Sub-base

15.2.9 The sub-base provides the main load-bearing layer, helping to distribute loads evenly across the path. Existing stable surfaces such as disused railway lines or roads will generally not require thick sub-base, while less stable environments such as clay will require a thicker base.

52 Sustrans Design Manual, Chapter 6. Detail design of traffic free routes, Sustrans, 2014 (draft)

15.2.10 Typical cycle tracks will have a 150mm sub-base layer which can also cope with occasional use by maintenance vehicles. Type 1 aggregate (stone and dust mix) is normally used and can be supplemented with plastic grid for additional strength.

15.2.11 The type of stone used should reflect local acidity conditions to avoid changes to pH of adjacent soils when water percolates through the sub-base. Maximum stone size must be no greater than half of the thickness of the sub-base layer. To ensure a smooth surface the sub-base should be compacted and levelled with a roller to a tolerance of 10mm.

Surfacing

15.2.12 Sealed surfaces are more expensive to install; however, this additional cost is more than offset by reduced maintenance requirements over the whole life of a scheme. While there may be initial concerns about disturbance to the natural environment or the appearance, these can be addressed through choice of materials and the overall reduced impact on wildlife due to reduced maintenance following construction. These issues may need careful explanation during discussions with local stakeholders.

15.2.13 The base (binder) course is recommended to be a 60mm layer of asphalt concrete with a coarse stone size overlain by a 20mm smooth asphalt riding surface. An 80mm single-layer (AC14) construction with 14mm stones is also commonly used. A paving machine should be used to create a smooth riding surface.

15.2.14 Spray and chip surfacing offers a sealed surface with a more natural appearance than black bituminous surfacing, and provides more grip in icy and wet conditions. A 6mm rounded profile stone should be used, to avoid creating a puncture hazard. The loose gravel surface takes several weeks to bed in on cycle routes and may need some sweeping. The surfacing can only be applied in dry and warmer conditions (usually May to October). An increasing range of products based on recycled rubber or plastic is also available to provide a similar effect to tar spray and chip.

15.2.15 Concrete can be used as a base and wearing course that provides additional strength. This may be required to accommodate farm vehicles or HGV access for example. The joints should be smooth. A brushed surface provides skid resistance without the uncomfortable corrugation of a tamped surface.

15.2.16 Block paving can offer a reasonable surface and different coloured blocks can help delineate the cycle path although it will require greater effort to cycle on than bituminous surfacing. Paving slabs are less suitable due to lower skid resistance and the likelihood of rocking and cracking. Tactile paving blocks (as opposed to tactile paving slabs) can be used to avoid cracking and lifting where vehicles need to overrun for maintenance.

15.2.17 Non-standard surfacing material (such as tiles) are sometimes introduced in public realm schemes. Designers should ensure that the skid resistance value is adequate for cycling in both dry and wet conditions.

15.2.18 Unbound surfaces are generally unsuitable for utility cycling and in practice have proven to require regular maintenance and repair, being prone to erosion on gradients and easily damaged by horses. Further advice on construction is available from Sustrans and other organisations.

Edges and verges

15.2.19 Concrete kerbs or timber/concrete edgings often form a part of highway construction standards. Edgings are less frequently required on tracks away from the highway due to the simpler characteristics of the path. Edging may be required in more formal settings such as parks and public realm schemes, or to reinforce construction such as preventing the movement of block paving, or wash out of the base in areas prone to flooding.

15.2.20 The verges adjacent to off-road paths act as natural drainage, absorbing the run-off from the sealed surface. French (stone) drains may provide additional absorption if required. Vertical features such as hedges and walls reduce the useable width, so ideally a mown grass verge or low, slow growing plants should be provided for 1.0m immediately next to the path.

Hedgerows and fences

15.2.21 Hedgerows should be set back at least 1.0m from the path and maintained in such a way that they do not overhang, encroach across, or drop thorns on the path (new plants adjacent to cycle tracks should be non-thorn varieties). A fence height of 1.5m will be sufficient for stock control and enable most adult cyclists to see over the top. Barbed wire fencing should be attached on the stock side of any posts. Network Rail requires at least 4.0m clearance between the operational railway line and fences. Weldmesh fencing offers lower security than palisade fencing but is less visually intrusive.

15.2.22 Fencing may also be required to protect path users from steep drops, water or high-speed traffic immediately alongside the cycle path.

Drainage

15.2.23 Paths should be constructed with crossfall or camber, as set out in Chapter 5, with drainage falling to the inside on bends. If drainage gulleys are used, grates should use patterns that will not catch bicycle wheels. The path itself should not be lower than the adjacent natural ground because water will then have no escape route.

15.2.24 Paths in wetland, adjacent to rivers or in cuttings prone to flooding, can be built on a causeway to make the path more resilient. However, an understanding of the potential impact on drainage and ecology is required. In some cases, a boardwalk may offer the better ecological solution.

15.2.25 Simple ditches or swales alongside the path will help avoid surface water run-off from flooding into adjacent areas. UPVC filter drains set in a stone bed can help water to percolate more slowly however, will require maintenance as they can become blocked by roots from vegetation. Regular inspection pits can help to isolate the location of blockages to ease maintenance. Pipe gradients should be between 1:15 and 1:50. Soakaways can be used to divert collected water back into the natural water table.

15.2.26 Culverts can offer a more cost effective and less visually intrusive option to bridges where a cycle track crosses a small stream or drainage feature.

15.3 Lighting

15.3.1 Within urban areas standard street lighting is usually designed to cover footways and cycle tracks as well as the carriageway. People using tracks alongside unlit carriageways may be blinded or dazzled by the lights of oncoming vehicles, particularly on tracks alongside highspeed rural roads. Drivers may also be confused when seeing cycle lights approaching on their nearside. These hazards can be reduced by, for example, locating the track further away from the carriageway edge, or by providing with flow cycle tracks alongside both sides of the carriageway.

15.3.2 Cycle routes across large quiet parks or along canal towpaths may not be well used outside peak commuting times after dark, even if lighting is provided. In these cases, a suitable street lit onroad alternative that matches the desire line as closely as possible should be considered. Subways should be lit at all times, using vandal resistant lighting where necessary. It is not expected that routes outside built up areas used primarily for recreation would normally need to be lit except where there were road safety concerns, such as at crossings or where the track is directly alongside the carriageway.

15.3.3 Where an off-carriageway track requires lighting, the designer needs to consider the proximity of an electricity supply, energy usage, and light pollution.

15.3.4 The Highways Act 1980, section 65(1) contains powers to light cycle tracks. Technical design guidance may be found in TR23, Lighting of Cycle Tracks (ILE, 1998).

15.4 Importance of maintenance

15.4.1 Poorly maintained cycle and pedestrian surfaces are hazardous and unattractive to users. Potholes, debris, fallen leaves, poor drainage or snow and ice can all increase the likelihood of a collision or fall. Routes that form part of the highway are generally included within the local authority highway maintenance regimes for cleansing and repair, but routes in parks and on other public rights of way may have much more variable arrangements.

15.4.2 The most important routes within a local network may be away from the highway and will potentially require more frequent inspection and maintenance than other off-road environments due to their status within the cycle route network. Accumulations of mud, fallen leaves, overgrown vegetation and low overhanging branches can be hazardous. Where surfaces are allowed to significantly deteriorate, cyclists will use nearby carriageways that offer better conditions or will stop cycling altogether.

15.4.3 In May 2018 the UK Roads Liaison Group (UKRLG) updated its guidance on the construction, maintenance and management of footways and cycle routes to reflect current good practice. The guidance supports the 'Well Managed Highway Infrastructure' code of practice of the UKRLG. The documents recognise the various ways in which maintenance is considered:

- Selection of design and construction materials;[53]
- Reviewing risk (including seasonal risks) and risk-based maintenance regimes;[54] and

53 Asset Management Guidance for Footways and Cycleways: Pavement Design and Maintenance, UKRLG, 2018
54 Asset Management Guidance for Footways and Cycleways: An Approach to Risk Based Maintenance Management, UKRLG, 2018

- Maintaining a level of service that is attractive to users.[55]

15.5 General maintenance considerations in design

15.5.1 Some civil engineering factors will impact directly on costs and feasibility of construction such as:

- Local topography and site layout;
- Presence of utilities and other assets; and
- Ground conditions or construction and condition of any existing paths and tracks.

15.5.2 Planners and designers should check layouts with engineers at an early stage to ensure that the proposed solution can feasibly be constructed and still meet the design requirements for acceptable levels of user service and comfort.

15.5.3 The layout information should typically include:

- Plan location and dimensions;
- Levels and vertical dimensions;
- Location of other assets, e.g. structures, lighting, signs etc;
- Location of utilities; and
- Location of street furniture.

15.5.4 From this the designer should seek to ensure that:

- There is adequate depth of construction/natural ground to accommodate the pavement construction/ treatment;
- There is adequate surface profile for efficient drainage;
- There is adequate clearance to other assets/furniture;
- The gradients and radii are appropriate for safe and comfortable use; and
- The works do not impact subsurface utilities (it may for example be more cost effective to build a cycle track up on top of an existing surface rather than excavate).

15.5.5 Information on the site layout may be available from existing records or may be gained from an initial site appraisal and topographic survey. Designers should also consider whether the cycle track will be disrupted by access for utilities works. In new build situations, utilities should be placed in the verge rather than beneath the cycle track or footway.

15.5.6 Poor drainage will potentially lead to ponding or erosion on the surface or a weakening of the sub-surface. It is generally possible and desirable to tie-in any new cycle track drainage to the existing carriageway drainage. This will require knowledge of the location and capacity of the existing systems. Significant new schemes may offer opportunities to introduce sustainable urban drainage systems (SuDS).

15.5.7 If it is likely that vehicles will overrun a surface (such as where there are frequent kerbside deliveries), designing features that can either withstand occasional heavy loading or prevent vehicle access can help save on future repair costs.

15.5.8 The design should be of sufficient width and strength to accommodate maintenance vehicles such as mechanical sweepers and access platforms for lighting replacement.

15.5.9 Upstands and ironwork can cause skid hazards to cyclists, they should be flush with the riding surface and of materials or design that provides adequate skid resistance. Drainage gulley slots can potentially trap wheels and should be perpendicular to the line of travel.

15.5.10 Damage from tree roots can quickly make a surface unrideable. Selection of deep-rooted species and use of tree pits can prevent this problem in new build situations. Where there are established trees, it may be necessary to build-up the surface or align the cycle route away from the trees. Fallen leaves can be very slippery, especially on corners, and should be cleared regularly during the autumn and winter.

15.6 Routine maintenance

15.6.1 Routine maintenance including regular sweeping is important to ensure that routes remain safe, comfortable and attractive to users at all times of the year (see Table 15-1). For local authorities, regular maintenance is a more sustainable approach that will help reduce costs over time by avoiding the need for complete reconstruction.

55 Footways and Cycle Routes Research – Task 3 Cycle Service Levels and Condition Assessment

Table 15-1: Typical maintenance programme for off-road routes

Issue	Activity	Notes	Frequency	Time of year
Cycle track surface	Winter maintenance	Consider importance as utility route	As necessary	Winter
	Inspection	Staff undertaking maintenance works can also carry out site inspections (but not structures – see below) to avoid need for extra visits	Every time site visited. Minimum of 4 visits per year.	Early spring, mid summer, early and late autumn (before and after leaf fall)
	Repairs to potholes etc.	Reactive maintenance in response to calls from public, plus programmed inspections	As necessary	n/a
	Sweeping to clear leaf litter and debris	Combine with other activities if possible	Site specific	n/a
	Cut back encroaching vegetation on verges		Once a year	November, and when sweeping takes place.
	Programmed maintenance, such as resurfacing	The need for remedial work will depend on the condition of the cycle track. Unbound surfaces may require more frequent maintenance.	As necessary	n/a
Drainage	Clear gullies and drainage channels etc.		Twice a year	April, November
Vegetation	Verges – mow, flail or strim	To include forward and junction visibility splays	n/a	May, July and September
	Grassed amenity areas	Include with verge maintenance	n/a	n/a
	Control of ragwort, thistles and docks etc.	See Weeds Act 1959 and Wildlife and Countryside Act 1981. Hand pull, cut or spot treat as necessary.	Before seeding	July or as appropriate
	Cut back trees and herbaceous shrubs	If necessary, allow for annual inspection of trees depending on number, type and condition	As necessary	July
Signs	Repair/replace/clean as necessary	Maintenance will largely depend on levels of local vandalism	n/a	n/a
Access barriers	Repair/replace as necessary	Maintenance will largely depend on levels of local vandalism	n/a	n/a
Fences	Repair/replace as necessary	Dependent on licence arrangements with landowner	n/a	n/a
Structures, including culverts	Inspections	Carried out by suitably qualified staff	Visual inspection every 2 years and detailed structural inspection every 6 years	n/a
Seating sculptures etc.	Maintain or repair	If present	n/a	n/a
Other	Varies	Scheme-specific issues such as Sites of Special Scientific Interest, interpretation and information measures, disability access etc.	n/a	n/a

15.6.2 The most heavily used parts of the cycle route network should be prioritised for maintenance. This may be determined through monitoring of use or by a definition of strategic, secondary and local access routes within a formal cycle network plan. Local stakeholders may also be a valuable source of information about specific problems. When authorities adopt an area-wide risk-based approach they will also need to consider the age and present condition of the facility when prioritising routine maintenance so that deteriorated surfaces can be repaired.

15.6.3 Seasonal maintenance may include clearing sand and beach debris in coastal areas, clearing leaf fall, clearing flooding debris alongside rivers and keeping routes free of snow and ice.

15.6.4 Further detail on assessing maintenance priorities is included in the UKRLG guidance.

Appendices

Appendix A: Cycling Level of Service Tool

Key requirement	Factor	Design principle	Indicators	Critical	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Cohesion	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.	1. Ability to join/leave route safely and easily: consider left and right turns		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		
	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		
	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		
Directness	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		

Key requirement	Factor	Design principle	Indicators	Critical	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
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		
	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)		
	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.		
	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%		

Key requirement	Factor	Design principle	Indicators	Critical	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Safety	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, such as at junctions.	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		
			10. Motor traffic speed on sections of shared carriageway	85th percentile > 37mph (60kph)	85th percentile >30mph	85th percentile 20mph-30mph	85th percentile <20mph		
	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		
	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 track; 85th percentile motor traffic speed max 30mph.		

Key requirement	Factor	Design principle	Indicators	Critical	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Safety		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.		
	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		
	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.		
	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.		

Key requirement	Factor	Design principle	Indicators	Critical	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Comfort	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		
		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 closelyjointed blocks undisturbed by turning heavy vehicles.		
	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		
	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		

Key requirement	Factor	Design principle	Indicators	Critical	0 (Red)	1 (Amber)	2 (Green)	Score	Comments
Attractiveness	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 therefore more likely to be used.	21. Lighting		Most or all of route is unlit	Short and infrequent unlit/ poorly lit sections	Route is lit to highway standards throughout		
			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		
	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		
	Minimise street clutter	Signing required to support scheme layout	24. Signs informative and consistent but not overbearing 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.		
	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		
							Audit Score Total	**0**	**0**

Appendix B: Junction Assessment Tool

1. Introduction

As junctions pose the greatest risk of collisions to all road users, they require close attention to create conditions which will attract a wide range of new users. Fear of motor traffic in the current highway environment is a major factor preventing the uptake of cycling by a broader range of people.[56]

The Junction Assessment Tool (JAT) is an adaptation of a similar tool in the 2014 London Cycling Design Standards (LCDS), and is intended to be used at the design stage as well as for the assessment of existing junctions. It follows the same themes as the critical junctions assessment in the Route Selection Tool, but looks more closely at how a cyclist would move through a junction.

The tool has been expanded to be more explicit for a range of junction types and to aid its use by practitioners who may lack experience in objectively considering cycle safety and perception of cycle route quality. The outputs and methodology are similar to the LCDS tool.

A junction assessment should consider ALL potential cycle movements through a junction. It is not sufficient to plan a cycle route as a linear corridor from A to B if joining or leaving it midway is problematic, dangerous or impossible. However, there may be some situations where not all movements at a junction need to be considered if some are not permitted for cyclists (e.g. at the ends of a motorway slip road) or if some turning movements are banned (although an exemption for cycles should always be considered).

2. Scoring cycle movements and the overall junction

The junction assessment should be represented graphically by colour-coding each movement red, amber or green.

Movements designated as red are the most uncomfortable or unsafe for cyclists, and so on:

- Red: where conditions exist that are most likely to give rise to the most common collision types, then the movement should be represented on the plan as a red arrow
- Amber: where the risk of those collision types has been reduced by design layout or traffic management interventions, then the movement should be coloured amber
- Green: where the potential for collisions has been removed entirely, then the movement should be coloured green

56 Pooley, C, Tight, M, Jones, T, Horton, D, Scheldeman, G, Jopson, A, Mullen, C, Chisholm, A, Strano, E & Constantine, S 2011, **Understanding walking and cycling: summary of key findings and recommendations**. Lancaster University, Lancaster

‘Green’ should be taken to mean suitable for all potential cyclists; ‘red’ means suitable only for a minority of cyclists (and, even for them, it may be uncomfortable to make). Green movements will exceed the standards that have typically been achieved in the UK to date.

To aid option appraisal and a comparison with existing provision, proposed schemes should be assessed numerically by giving a score of 0, 1 and 2 to the red, amber and green movements respectively.

In addition, any banned movements for cycling (shown on the diagram in black with a cross at the end) will also score zero.

An overall percentage score for the junction should be derived by dividing the total score for all of the possible movements with the maximum possible score, if all were coded green.

The worked example below, taken from Section 2.2.7 of the London Cycling Design Standards shows how this is done.

3. Applying the tool

Criteria for the types of collision, conflicts and conditions which would be scored 0,1 or 2 are listed in the red-amber-green tables below.

The first section of the table gives criteria for all junctions, and should be applied in conjunction with the section specific to the type of junction (e.g. priority junction) under consideration.

Where a movement would meet criteria falling into more than one scoring band (e.g. red and amber) the worst score should be taken – i.e. meeting any red criterion means the movement is scored as red.

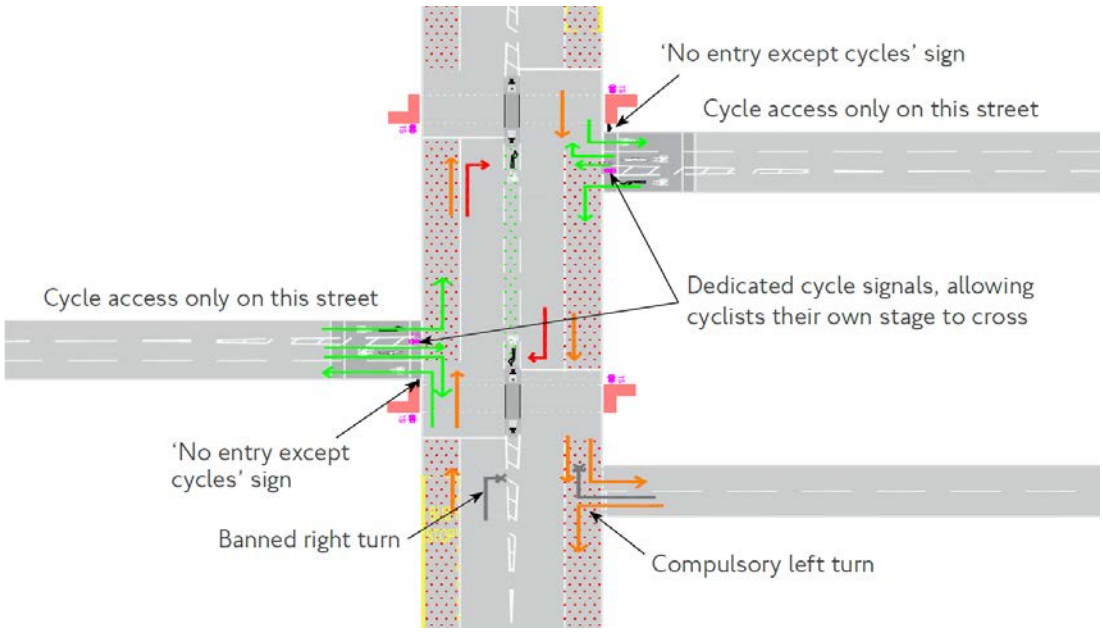
4. Worked example

This example shows a busy high street crossed by a cycle route on offset side streets that are closed to motor vehicles. Traffic signals hold general traffic on the high street in both directions to allow a separate stage for cycle movements only.

Cycle movements out of the side streets are all shown with green arrows as they can take place unopposed during that stage. Cyclists on the high street turning right into either side street have to cross two lanes of general traffic and then look for a gap in a further two lanes of oncoming traffic. The presence of the right turn-pocket is helpful but without separation in time and space this movement is still difficult and should be marked as red.

Cyclists moving along the high street can do so within a bus lane and so this movement is shown as amber as they do not have to mix with the main traffic flow. The other side street to the south has banned movements for all vehicles including cyclists and so this is shown as black with a cross at the end.

The overall junction score is 24/40, or 60%.



5. Junction assessment tool scoring criteria

Conditions relate to cycling in mixed traffic unless otherwise indicated. Figure 4.1 in the guidance offers general advice on when segregation from motor traffic is preferred.

Type of junction	Cycle movement being assessed	Suitable only for confident existing cyclists, and may be avoided by some experienced cyclists Conditions are most likely to give rise to the most common collision types Score = 0	Likely to be more acceptable to most cyclists, but may still pose problems for less confident or new cyclists The risk of collisions has been reduced by design layout or traffic management interventions Score = 1	Suitable for all potential and existing cyclists The potential for collisions has been removed, or managed to a high standard of safety for cyclists Score = 2
Any type of junction	Any movement	› Cycle movement in potential conflict[57] with heavy motor traffic flow.[58] › 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. › Pinch points on junction entry or exit (lane width 3.2m-3.9m). › Cycle movement affected by very poor surface quality utility reinstatement, gully positioning, debris.	› Cycle movement in potential conflict with moderate traffic flow.[59] › 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[60] 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.

57 'In potential conflict with' means where heavy motor traffic movements cross or run alongside cycle movements without being separated physically and/or in time

58 Heavy traffic flow = > 5000 motor vehicles per day and/or HGV and bus flow > 500 per day

59 Moderate traffic flow = 2500-5000 motor vehicles per day and/or HGV and bus flow 250-500 per day

60 Low traffic flow – < 2500 motor vehicles per day and/or HGV and bus flow < 250 per day

Type of junction	Cycle movement being assessed	Suitable only for confident existing cyclists, and may be avoided by some experienced cyclists Conditions are most likely to give rise to the most common collision types Score = 0	Likely to be more acceptable to most cyclists, but may still pose problems for less confident or new cyclists The risk of collisions has been reduced by design layout or traffic management interventions Score = 1	Suitable for all potential and existing cyclists The potential for collisions has been removed, or managed to a high standard of safety for cyclists Score = 2
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).[61]	› Central refuge allowing two-stage cycle movement crossing one traffic lane at a time.	› Cycle movement made via crossing of major arm with dedicated cycle signals or cycle priority.
	Left turn from major arm		› Side road entry treatment (table across minor arm).	› Continuous footway and cycle track across minor arm.
	Right turn from major arm	› 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).	› 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.
	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).	› Off-carriageway cycle track or stepped cycle track alongside major arm, crossing minor arm with priority over turning traffic.[62]

61 Where there is a continuous gap of at least 10s in both major road traffic streams every 60s, a score of 1 will be appropriate

62 A cycle priority side road crossing would score 1 instead of 2 if the flow of traffic entering and leaving the side road is moderate or high (see notes 3 and 4)

Type of junction	Cycle movement being assessed	Suitable only for confident existing cyclists, and may be avoided by some experienced cyclists Conditions are most likely to give rise to the most common collision types Score = 0	Likely to be more acceptable to most cyclists, but may still pose problems for less confident or new cyclists The risk of collisions has been reduced by design layout or traffic management interventions Score = 1	Suitable for all potential and existing cyclists The potential for collisions has been removed, or managed to a high standard of safety for cyclists Score = 2
Crossroads – as T junction plus: In addition to and notwithstanding any of the above "any junction" conditions	Ahead from minor arm	› Heavy opposing traffic movements with no physical refuge (including ghost island junction).[63]	› Protected pocket refuge for ahead cycles allowing two stage movement, crossing one lane at a time.	› Cycle movement made via crossing of major arm via dedicated cycle signals or cycle priority.
Traffic Signals *In addition to and notwithstanding any of the above "any junction" conditions*	All movements	› Single or multiple queuing 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[64] 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.	› Cycle movement has no potential conflict with motor traffic, e.g. dedicated cycle stage, conflicting traffic movement held or banned.
	Right turn		› Two-stage right turn via ASL or marked area in front of stop line.	› Two-stage right turn with physically protected waiting area.

63 Where there is a continuous gap of at least 10s in both major road traffic streams every 60s, a score of 1 will be appropriate

64 7.5m deep ASLs are preferred

Type of junction	Cycle movement being assessed	Suitable only for confident existing cyclists, and may be avoided by some experienced cyclists Conditions are most likely to give rise to the most common collision types Score = 0	Likely to be more acceptable to most cyclists, but may still pose problems for less confident or new cyclists The risk of collisions has been reduced by design layout or traffic management interventions Score = 1	Suitable for all potential and existing cyclists The potential for collisions has been removed, or managed to a high standard of safety for cyclists Score = 2
Roundabouts *In addition to and notwithstanding any of the above "any junction" conditions*	All movements	› Any type of roundabout with high traffic throughput.[65] › Normal roundabout with multi-lane flared approaches. › Any type of roundabout with annular cycle lane marked on the circulatory carriageway.	› Compact roundabout or raised mini roundabout with no more than moderate traffic throughput.[66] › 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.	› Off-carriageway cycle track with crossings of entries and exits with signals or cycle priority.

65 Heavy traffic throughput: >8000 motor vehicles per day and/or HGV and bus flow > 800 per day

66 Moderate traffic throughput: ≤8000 motor vehicles per day and/or HGV and bus flow ≤ 800 per day

Appendix C: Legal issues

These notes are for guidance only. Practitioners will need to obtain their own legal advice before acting on information provided in this appendix.

Descriptions and definitions

Cycling may be legally permitted in several different places:

- On the Highway
- On a Cycle Track
- On a Bridleway
- On a Restricted Byway (formerly Road Used as a Public Path)
- On a Byway Open to All Traffic (BOAT)
- On paths within some public parks, open spaces or across private land
- On canal and river towing paths

Different laws apply to the creation of the different types of cycling provision. Most cycle routes form part of the highway or public rights of way networks. Definitions of the most common types of provision are given below:

Highway: This is defined as “a way over which the public has the right to pass and repass, and may be any way, court, alley, footpath, bridleway.” While most ‘highway’ forms part of the road network, other types of route can still form part of what is legally termed maintainable highway.

Carriageway: A way constituting or comprised in a highway (other than a cycle track), over which the public have a right of way for passage of vehicles. [Highways Act 1980 (S329)]. Cycle lanes are part of the carriageway.

Cycle Track: A way constituting or comprised in a highway, over which the public have the following, but no other, rights of way; a right of way on pedal cycles (other than pedal cycles which are motor vehicles within the meaning of the Road Traffic Act 1988) with or without a right of way on foot. [Section 329(1) Highways Act 1980; the words in brackets were inserted by section 1 of the Cycle Tracks Act 1984 and updated by the Road Traffic (Consequential Provisions) Act 1988]. Cycle tracks may be newly constructed or created through conversion of a footway or footpath.

Footway: A way comprised in a highway, which also comprises a carriageway, over which the public has a right of way on foot only [Section 329(1) Highway Act 1980]. Footways are the pedestrian paths alongside a carriageway, referred to colloquially as the pavement. Driving a vehicle (including cycling) or riding a horse on a footway is an offence under the Highways Act 1835.

Public Rights of Way: These comprise Footpaths, Bridleways, Restricted Byways and Byways Open to All Traffic. All public rights of way are highways and are shown on the Definitive Map held by local highway authorities, which is required to be constantly reviewed and updated.

Footpath: A highway over which the public have a right of way on foot only, not being a footway [Section 329(1) Highways Act 1980].

Bridleway: A right of way on horseback (or leading a horse), foot and bicycle. The Countryside Act 1968 gave cyclists a right to use bridleways; however, they must give way to pedestrians and equestrians. There is no penalty for failing to comply. Since the bridleway forms part of the highway it remains for case law to establish whether the offending cyclist could be said to be 'furiously driving a carriage on a highway so as to endanger life and limb', see Highways Act 1835. There may occasionally be a local byelaw to prohibit cycling on a particular bridleway.

Restricted Byways: Are generally open only to pedestrians, cyclists, horse-riders and horsedrawn vehicles and replace the former category of **Roads Used as Public Paths (RUPPs).** Created by the Countryside and Rights of Way Act 2000 (S48).

Byways Open to All Traffic (BOATs): Are open to motorised traffic, but are used by the public mainly for the purposes for which footpaths and bridleways are used. They rarely have a sealed surface and are generally used in a similar way to restricted byways and bridleways. The definition was created under the Wildlife and Countryside Act 1981 (S66).

Towing Path: The towpath alongside a canal or river. There is no general statutory right to cycle on a towpath in England and Wales (although some sections may also be public rights of way). Cycling may be permitted (or prohibited) through a byelaw.

Cycleway and Cycle Path: Neither of these terms has any legal definition but they often describe continuous cycle routes (usually away from the carriageway) that may be formed by any permutation of the above.

Transport device definitions

Cycle: A pedal cycle is defined as 'a bicycle, a tricycle, or a cycle having four or more wheels, not being in any case a motor vehicle' (Section 192(1) of the Road Traffic Act 1988 (c.52)). In law, a cycle is considered a 'vehicle' as a consequence of the Ellis v Nott-Bower judgment in 1896. A cycle is also considered a carriage by section 85 of the Local Government Act 1888.

Electrically Assisted Pedal Cycles (EAPCs): Electrically assisted pedal cycles, often known as e-bikes, are defined in the Electrically Assisted Pedal Cycle Regulations 1983 (as amended). They can legally be ridden where pedal cycles are allowed, but only by someone aged 14 years or more. They are not classed as motor vehicles for the purposes of road traffic legislation.

Manual powered wheelchairs and mobility scooters: These are defined as 'invalid carriages' in law, and there are three classes:

Class 1 – Manual, self-propelled or attendant propelled wheelchairs.

Class 2 – Powered wheelchairs and mobility scooters with a maximum speed of 4 mph.

Class 3 – Powered wheelchairs and mobility scooters with a maximum speed of 8 mph

Invalid carriages can be used on footways, footpaths, bridleways or pedestrianised areas, provided that they are used in accordance with prescribed requirements. Users of invalid carriages have no specific right to use a cycle track, but they commit no offence in doing so unless an order or local by-law exists creating one.

Class 2 wheelchairs and mobility scooters are intended to be used predominantly on footways. Class 3 wheelchairs and mobility scooters are intended for use on footways and along roads. They can travel at up to 8 mph on roads, but must be fitted with a switch that reduces their top speed to 4 mph for use on footways.

Powered invalid carriages are not classed as motor vehicles for the purposes of road traffic legislation (Road Traffic Act 1988, section 185(1)). However, the Vehicle Excise and Registration Act 1994 requires that Class 3 wheelchairs and mobility scooters are registered with the Driver and Vehicle Licensing Agency for road use. They are exempt from vehicle excise duty, but are still required to display a valid (nil duty) tax disc.

Motor vehicle: For use on public roads, motor vehicles must be registered and fitted with a registration plate or plates. They must also be insured and taxed for road use, and they can only be operated by someone in possession of a driver's licence. Motor vehicles cannot normally be used on footways, footpaths or cycle tracks.

Creating cycle tracks

Creating a cycle track within the highway boundary. Procedure – Highways Act 1980

There are two ways in which this can be achieved. Either all or part of the existing footway is converted to a cycle track, or a new cycle track can be constructed alongside the footway.

Section 21 of the Road Traffic Act 1988 makes it an offence to drive or park a motor vehicle wholly or partly on a cycle track, and the making of a Traffic Regulation Order (TRO) is therefore no longer required to control such use. A TRO may be required if the intention is for the cycle track to be one way only, as the default is for two-way cycling. This situation could apply on stepped cycle tracks, for example. However, if vehicular rights for private access existed prior to the conversion of a footway to a cycle track, these are not necessarily extinguished on creation of the cycle track.

Public consultation is not a mandatory requirement, however, engagement with those likely to be affected is strongly recommended, particularly groups representing disabled people.

Converting a footway to cycle track: To create a cycle track using part or all of an existing footway (or extending the kerbs into the carriageway) the Highway Authority must first 'remove' the existing footway under Section 66(4) and then 'create' the cycle track under Section 65(1). The process need not involve physical construction work other than the erection of signs.

Creating a new cycle track: A local authority may create a new cycle track "in or by the side of a highway" under section 65(1) of the Highways Act 1980. This would apply where the sole purpose of widening the footway is to create a cycle track, i.e. the footway is not altered.

The creation or conversion of a cycle track is normally completed by a resolution of a Highway Authority committee, regardless of whether any actual construction is required or if it is simply a change of status of an existing footway. There needs to be clear evidence that the local highway authority has exercised its powers, which can be provided by a resolution of the appropriate committee or portfolio holder etc. to ensure that a clear audit trail has been established.

Highway authorities also have a general power of improvement under the Highways Act 1980, which allows them to create, alter or remove footways without the need to seek planning consent.

Creating a cycle track outside the highway boundary. Procedure – Town and Country Planning Act 1990 and Highways Act 1980

If there is no suitable public space within the highway boundary, then the adjacent land (i.e. not existing highway land) could be used. The land must be acquired from the owner (by Compulsory Purchase Order or dedication) to enable use by pedestrians and cyclists.

General powers to acquire land are provided by the Highways Act 1980 s239. Local authorities may resolve to exercise compulsory purchase powers, either to improve the highway or to promote countryside access. The former is more commonly known, but the latter does provide opportunities to create facilities for leisure that have a low utility component. More information is available in the latest edition of 'The Compulsory Purchase Procedure Manual66.

Creating cycle tracks in new development – dedication of land to the highway. Procedure – Highways Act 1980 and Town and Country Planning Act 1990

Sections 37 and 38 of the Highways Act provide the means for land to be dedicated as public highway. The Act does not refer to the nature of the use, simply referring to dedicating a "way as a highway" and may therefore be for any function acceptable to the Highway Authority e.g. footway, cycle track, carriageway etc.

Agreements under Highways Act 1980 S38 between developers and highway authorities will include confirmation that the developers are the owners of the land, and through the S38 agreement, are dedicating the land, shown on development plan drawings, to the highway maintainable at public expense. Such plans/drawings invariably indicate the nature of the works to be undertaken and, therefore, the future use of the land e.g. bridge, carriageway, cycle track etc. that establishes the status of each element as additions to the highway network.

The dedication as highway is often confirmed by the signing of the S38 agreement before the physical completion of the carriageway, footway, cycle track etc. This enables the Highway Authority to exercise its various powers to do works within the highway and complete any outstanding construction works in the event of the failure of the developer to complete their obligations under the agreement. This also indicates that the dedication to the highway is not dependent on works being carried out by the landowner prior to that dedication.

Where a cycle track is to be created by the Highway Authority, consent under the Town and Country Planning Act 1990 will often be required for the change of use and engineering works to create the cycle track.

Converting an existing footpath to a cycle track: Procedure – Cycle Tracks Act (CTA) 1984 (as amended) to convert all or part to shared use

An existing urban footpath or alleyway may be suitable for shared use by cyclists and pedestrians. This is typically a maintainable highway not adjacent to the carriageway and not on the definitive map, with or without a cycle prohibition order (which may be in the form of a byelaw). The new Order could allow cyclists to use part or the entire width of the footpath. Rural footpaths are more likely to be recorded as rights of way on the definitive map, but broadly the same procedures apply.

Under the CTA, a Highway Authority may designate "any footpath for which they are highway authority", or part of it, as a cycle track. There is no differentiation in it being a definitive footpath (appearing on the definitive footpath map), or an urban footpath (surfaced highway as found in urban areas and created after the drawing up of the definitive map). Any footpath which forms part of the highway, whether or not surfaced or maintained by the Highway Authority, is a footpath for the purposes of the CTA and should be converted by its application.

To convert all or part of an urban footpath maintainable as highway or a public footpath recorded in the rights of way map to a cycle track, a Cycle Tracks Order must be made under Section 3 of the CTA and the Cycle Tracks Regulations 1984 (SI1984/1431). Detailed advice on the conversion of footpaths is contained in Circular Roads 1/86 (Background to the Cycle Tracks Act 1984 and the Cycle Tracks Regulations 1984).

If the land is not owned by the Highway Authority, it must ensure that the landowner has consented in writing [CTA s3]. Any land lying outside the width of the existing footpath which needs to be acquired for the purposes of constructing the cycle track must be dedicated to/ purchased by the Highway Authority to enable widening to take place.

Public consultation is a mandatory requirement for conversions carried out under the 1984 Act. The Regulations specify that, before making the order, a local highway authority has to consult:

a. one or more organisations representing persons who use the footpath involved or who are likely to be affected by any provision of the proposed order;

b. any other local authority, parish council or community council within whose area the footpath is situated;

c. those statutory undertakers whose operational land is crossed by the footpath; and

d. the chief officer of police for the police area.

Where the footpath crosses agricultural land, the authority will need to obtain consent from the land owner(s). If there are no objections or objections are withdrawn, the order can be confirmed by the local highway authority. If there are un-withdrawn objections, the order can be confirmed by the Secretary of State, who may decide that a local public inquiry is first required.

In practice, the Cycle Tracks Act is often not used, even though it was intended to help local authorities to rationalise existing rights of way to permit cycling more widely. Walking advocates, such as The Ramblers, oppose many applications due to the loss of the footpath from the definitive map (and subsequently from published O.S. maps).

Dealing with objections to the Orders can be costly to the local authority, and any unresolved objections result in a Public Inquiry. The option to create a new cycle track alongside an existing footpath is therefore often preferred by local authorities as a pragmatic method.

The CTA 84 s3(10) (as amended) states that the local authority has the power to carry out any physical works necessary. Any change of use, that would have constituted development within the meaning of the Town and Country Planning Act 1971, is deemed to be granted under Part III of that Act. Any existing byelaw prohibiting cycling would need to be reversed.

Creating a cycle route using permissive rights:

A landowner may give permission for cyclists to use land occupied by a definitive footpath to avoid the use of the Cycle Tracks Act or because they wish to retain control of the land. The path then becomes a ‘permissive path’ for cycling.

Permissive rights are useful where a landowner is willing to allow public use but does not want a permanent right of way to be created. Where the landowner is willing to allow a permanent right of way, he or she can dedicate the land as public highway, and this is a useful alternative in some cases.

A commonly used permissive agreement is where the local authority (or another party) purchases an interest in the land, constructs a path and then allows the public to use it. The land interest can be:

- freehold, which gives a permanent interest; or
- leasehold, which gives an interest for the period of the lease, e.g. 125 years; or
- licence, which comprises permission to construct and permission for the public to use.

The Department does not encourage the use of permissive rights by licence, because licences can be withdrawn at short notice and at any time. Where a local authority owns a footpath, or where the footpath is maintained at public expense, the preferred option would be to introduce higher-level rights for users by upgrading it to a Cycle Track, Restricted Byway or Bridleway. Otherwise, permissive rights based on a leasehold or freehold interest might be appropriate.

Sustrans has created numerous permissive rights routes that have worked satisfactorily. The interests are largely freehold or leasehold – licences are generally avoided, because of their poor security of tenure. Sustrans can advise on the implementation of permissive agreements.

Creating a new cycle track parallel to an existing footpath

Local authorities can create new cycle tracks under s65(1) Highways Act 1980. New footpaths, bridleways or restricted byways can be created under sections 25 or 26 of the Highways Act 1980, either through agreement or by using compulsory powers. A route might also be dedicated for use as a cycle track if there is a precedent of sustained use by cyclists. Creating a cycle track on a new alignment might require planning approval if it is outside the highway boundary.

In this case, the footpath is not converted but the surface is widened, such that a cycle track is created alongside and separate from the existing footpath. The use of the Cycle Tracks Act does not therefore apply.

In these circumstances, segregation by some form of physical delineation (kerb, surfacing) is appropriate because cyclists have no legal right to cycle on the original section of footpath. This practice is sometime used to avoid objections that the cycle track will result in the removal of a footpath from the definitive map (see note on CTA above).

Any byelaw or order prohibiting cycling on the adjacent footpath should be removed prior to (or in parallel with other procedures) for the creation of a cycle track. This may not be strictly necessary as the cycle track is alongside the footpath, but the presence of any form of prohibition, supported by signs to give it effect, will appear illogical and lead to confusion over user rights.

If the Highway Authority does not own the land, they will need to purchase it (compulsorily if required) or achieve a dedication as highway from the owner. The wording of any dedication is usually along the lines of (the landowner) ‘hereby freely dedicates the land shown coloured pink on the attached plan to the highway maintainable at public expense’. It is up to the local Highway Authority to determine what modes are permitted. The plans used for the transaction/dedication agreement could be extracts from the scheme plans. No further action is required to formally create the footway/additional carriageway to give the police the power to enforce relevant offences under the Road Traffic Regulation Act 1984.

Cycle track which terminates at the rear of a footway and conversion of the footway crossing (to enable cyclists to reach the carriageway) Procedure – Highways Act 1980

If the cycle track order ends at the back of the footway, it is necessary to create a short section of cycle track in the highway to join the carriageway. The footway should be converted by using the powers available under the Highways Act 1980. There are no requirements in legislation for a cycle track to be of a minimum length or travel in any direction relative to the carriageway. This may be interpreted as permitting the conversion of the short length of footway necessary to achieve a crossing of the carriageway. This may be either straight across, or may link two routes in a staggered arrangement or to reach a point where there is good visibility to ensure a safer crossing.

Figure: Example of off-road cycle track along line of a footpath, that crosses the footway to join the road. This type of route can also cross minor roads with priority for the cycle track, using a flat top road hump. (Photograph by Adrian Lord)

Footways, footpaths and cycle tracks on private land that are not part of the public highway. Procedure – varies

A 'footway' outside the highway boundary has, by definition, no highway status and cannot, therefore, be treated as a footway as defined by the Highways Act 1980. This situation could arise where the footway (and accompanying carriageway) was originally created by a housing authority but not subsequently adopted as public highway. Similarly, it might occur in the case of a development that allows public access, but the means of access are not adopted as highway e.g. on a business or retail park.

Such routes should be dealt with as a permissive route, or through an agreement with the owner for the route to be adopted as highway, to enable creation of a route using one of the methods above. Such cases are complex and should be dealt with locally on a case by case basis. Chapter 14 of the Sustrans Design Manual outlines common forms of permissive agreements.

Footbridges and underpasses. Procedure – Cycle Tracks Act 1984 or Highways Act 1980

The procedures employed will be based upon the circumstances under which these features were created. Where these are not clear, local and professional judgement will be required as to whether the footbridge or subway acts as a footpath or a footway.

Path (Bridleway) Creation. Procedure – Highways Act 1980 s26

Section 30(1) of the Countryside Act 1968 gives the public the right to ride a bicycle on any bridleway, but cyclists must give way to pedestrians and persons on horseback. The act places no obligation on the Highway Authority to improve the surface to better accommodate cycle use. The Highways Act provides powers to create bridleways by means of a public path creation order.

Creating a new cycle track adjacent to a bridleway. Procedure – TCPA and GPDO

This process is similar to widening a footpath as described above, but the highway is adjacent to a bridleway and not a footpath.

Conversion of a footpath alongside a watercourse/river/canal. Procedure – varies

Cycle tracks created alongside a watercourse by the conversion of a public footpath will inevitably require engineering works, if only in the form of signs. In addition to the use of the Cycle Tracks Act or planning approval (if access is based on permissive rights), it may be necessary to obtain consent under the Water Resources Act 1991 – contact the Environment Agency for more information. In some regions and in most circumstances, the agreement of the Internal Drainage Board will be required where any work impacts upon its operations.

Cycling is permitted on most towpaths owned and maintained by the Canal & River Trust, and they frequently work closely with local authorities to improve routes for cyclists and pedestrians. In the case of footpaths alongside canals, the Canal & River Trust's powers to introduce a byelaw prohibiting cycling take precedence over any highway rights. It is therefore recommended that contact be made with their local office to agree the best means of achieving and maintaining cycle access.

Appendix D: Image list and credits

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Fig 10.22	DfT TSRGD
Fig 10.23	PJA
Fig 10.24	WSP
Fig 10.25	PJA
Fig 10.26	WSP
Fig 10.27	PJA
Fig 10.28	PJA
Fig 10.29	PJA
Fig 10.30	PJA
Fig 10.31	WSP
Fig 10.32	WSP
Fig 10.33	PJA
Fig 10.34	PJA
Fig 10.35	PJA
Fig 10.36	PJA
Fig 10.37	Cambridgeshire CC
Fig 10.38	Lucy Marstrand
Fig 10.39	PJA
Fig 10.40	WSP
Fig 10.41	PJA
Fig 10.42	PJA
Fig 10.43	PJA
Fig 10.44	Cambridgeshire CC
Fig 10.45	PJA
Fig 10.46	PJA
Fig 10.47	PJA
Fig 10.48	PJA
Fig 10.49	Sustrans
Fig 10.50	PJA
Fig 10.51	PJA
Fig 10.52	PJA
Fig 10.53	Paul Hogarth Company
Fig 10.54	PJA
Fig 10.55	Wheels for Wellbeing
Chapter 11 Title	DfT
Fig 11.1	PJA
Fig 11.2	PJA
Fig 11.3	PJA
Fig 11.4	PJA
Fig 11.5	PJA
Fig 11.6	PJA
Fig 11.7	PJA
Fig 11.8	PJA
Fig 11.9	PJA
Fig 11.10	PJA
Fig 11.11	PJA
Fig 11.12	PJA
Fig 11.13	PJA

Figure number	Credit/source
Fig 11.14	PJA
Fig 11.15	PJA
Fig 11.16	PJA
Chapter 12 Title	DfT
Fig 12.1	WSP/Element Energy
Fig 12.2	WSP/Element Energy
Chapter 13 Title	PJA
Fig 13.1	PJA
Fig 13.2	Transport Initiatives/ Nottingham City Council
Fig 13.3	PJA
Fig 13.4	PJA
Fig 13.5	PJA
Fig 13.6	PJA
Fig 13.7	PJA
Chapter 14 Title	Cambridgeshire CC
Fig 14.1	PJA/Leicestershire CC
Fig 14.2	Cambridgeshire CC
Fig 14.3	PJA
Fig 14.4	Cambridgeshire CC
Fig 14.5	PlaceOnEarth
Fig 14.6	PJA
Fig 14.7	Cambridgeshire CC
Fig 14.8	Sandwell BC
Fig 14.9	DfT – Manual for Streets
Ch 15 Title	Andy Pickett

ISBN 9780115537134

CKF Proof of Evidence on St Edward's School Meadow
(historically known as "The Leasowe")
and now referenced as "land off Oakhurst Rise".

Part 3: DEFRA Metric Calculations (Summary Proof, Detailed Appendices)

and Future Biodiversity Value

20 February 2021

3A: The DEFRA metric shows a strong BNL (Bioscan) and a marginal BNG (Aspect).

3.1 The specialist evidence of Bioscan's principal ecologist, Sam Watson MCIEEM, is included in the form of a first metric calculation[1] and a revised calculation[2], following correspondence with the appellant's ecologist[3], with supporting detail if required in examination.

3.2 It is common ground that the Defra 2.0 metric is an acceptable tool for calculation of biodiversity net impact.

3.3 It was previously uncommon ground that biodiversity net gain is required, although CKF note the Government has confirmed its consultation proposal on the Environment Bill that a net increase in biodiversity will be required, and the Bill is in the Commons report stage[4]. At the last appeal the inspector considered that biodiversity enhancement was "sought by the thrust of current national and local policy" [5]

3.4 Bioscan submitted their biodiversity metric calculation on 29 July 2020, as part of the application consultation. Time had been given to the subject of metric evidence at the 2019 inquiry as even then it was clearly the direction of travel for the ecology industry. Aspect were successfully using the metric to support their evidence at an inquiry that started 26 August 2020[6], but had chosen not to submit the relevant data for this application.

3.5 Bioscan calculated the impact of the application as a loss of 10.95 biodiversity units (from 34.32, to 23.37), or a loss of 31.90%.

3.6 Aspect submitted their own calculations[7] based on more detailed data available to the appellant. Bioscan responded with revised calculations, including use of the appellant's data on habitat type, and acceptance (while disputed) of the claim that the grassland would be retained not, as originally stated, recreated. The resultant metric outcome shows loss of 4.21 biodiversity units, an 11.98% reduction.

3.7 Errors in the Aspect methodology were highlighted as follows:

- Contrary to Aspect's assessment of grassland habitat that "a low connectivity score is therefore appropriate, the habitat is not considered to fall within local strategy[8]",

[1] Appendix 3.1: Bioscan reference SW20/E1986/EPL1 of 29 July 2020
[2] Appendix 3.2: Bioscan reference SW20/E1986/EPL2 of 11 September 2020
[3] Letter sent by email only 10 August 2020, Aspect to CBC senior planning officer
[4] https://services.parliament.uk/bills/2019-21/environment.html
[5] Appendix 0.2, para 101 - 102
[6] Aspect website: "Inspector finds in favour of Aspect's evidence" (*calculated under the DEFRA 2.0 metric)*, case number APP/Y0435/W/20/3251121
[7] Appendix 3.3: TN10 dated 7 August 2020
[8] Appendix 3.3 para 2.4

GWT state that the grassland is part of a strategic network in their letter of 1 September.

Gloucestershire Wildlife Trust

The site lies within a gap in grassland ecological network connectivity. Enhancement to grassland habitat within this area would benefit the ecological network and with appropriate management the quality of the grassland on this site could be enhanced within a relatively short time. Irrespective of the LWS selection panel decision, it is Gloucestershire Wildlife Trusts view that any development on this site should provide a strong commitment to biodiversity net gain and a strong management and maintenance plan for both the grassland and veteran tree features on the site.

Kind regards

[redacted]

Dr Juliet Hynes

Gloucestershire Nature Recovery Network Coordinator

Image 3.1: GWT letter of 1 September 2020

- Aspect assign the hedgerows a high strategic multiplier[9] which accounts for significant difference between their results and those of Bioscan. This position is in contradiction of their evidence to previous applications; namely that the hedgerows "are poorly connected to the wider area" and (given the majority of H1 was to be removed at this stage)" a "decrease in vegetative cover, the impact of which would be low in the local and wider context"[10].
- The existing pond on the northern boundary, and the new attenuation pond, are claimed to be "within an area formally identified in local strategy such that it is of high strategic significance[11]", in contrast to evidence submitted one month earlier,[12] which stated that the pond was in poor condition, and its loss to the proposals would be of "minor-negligible ecological significance".
- Area calculations on grassland do not acknowledge the ground disturbance required for earthworks for the attenuation pond and crates, and artificial badger sett creation.
- 0.461km of new native hedgerow is also added into Aspect's data[13], with no supporting evidence.
- Domestic hedgerows (H3-6) have been included in Aspect's habitat assessment despite being off site (H3, H5), off site and no longer present (H4) or predominantly wire boundary (H6). Aspect assert this has no impact on the calculation; Bioscan note the inclusion of these as native hedgerows introduces a 0.338 unit uplift in the metric.

3.8 CKF and Bioscan have found no evidence of the 'local strategies' claimed for ponds or hedgerows being of increased significance. GWT were unaware of the site before it was brought to their attention by CK Friends in June 2020, and despite a county wide habitat mapping exercise underway, the site is correspondingly greyed out on **all** the many GWT county wide habitat maps referenced in policy SD9 demonstrating zero data and therefore by default, zero strategic importance.

3.9 It can only be concluded that the biodiversity metric as run by Bioscan is correct, and this application has clear biodiversity net loss.

3B. Future Biodiversity Value

3.10 Residents were first informed of an ambition to develop the site in January 2017.

3.11 The first police reports of wildlife crime were made separately by school teachers and Oakhurst Rise residents, from January 2017 (timeline at appendix). One

[9] Appendix 3.3 para 2.8
[10] Ecological Appraisal EA17 rev 2 July 2017, para 3.22 and 4.8
[11] Appendix 3.3 para 2.10 and para 2.22
[12] TN11: Assessment of Compliance with Joint Core Strategy Policy SD9 of 17 August 2020, para 4.4 "**Other habitats:** These include an ephemeral pond, tall ruderal, and scrub. They make a relatively limited contribution to the overall biodiversity of the site, as they are small in extent, and/or in poor condition and lacking appropriate management, and therefore their loss to proposals would be of minor-negligible ecological significance."
[13] Appendix 3.3 para 2.23

concerned the removal of an area of hedgerow protected by TPO, including the bat and bird boxes therein, and generated local media coverage. The other two concerned use of machinery in close proximity to the badger sett.

3.12 The meadow has always been cut infrequently but at least annually. Occasional tracks were also cut to allow children to explore the site. This stopped in 2017. The change of management was noted in the appellant's ecology evidence. Examples of Mr Baxter's statements to the 2019 inquiry[14] include:

- [*In 2016*] "The grassland that covers the majority of the site is short and regularly managed" (para 4.4.8)
- "by mid 2017 it appears that the frequency of the management of the site reduced and it became overgrown" (para 4.4.9)

3.13 A timeline documenting ecological management concerns from January 2017 onwards is attached at Appendix 3.1

3.14 CKF note site management correlates to planning milestones; there has been no evidence of ecological management since 2017. This is in direct contrast to previous site management by the school, who employ a full ground staff and have contracts with specialists for arboricultural services.

3.15 The Framework Management Plan claims it will "improve" the quality of the retained grassland by requiring (para 3.8) "regular grass cuttings (with removal of arisings)" to be followed by (para 3.9) long term conservation management "based on a cut in mid July with the hay bailed and removed." Return to the arrangements that have been in place for decades are offered as potential enhancement to a much reduced area of local wildlife site, and cannot be seen to compensate for the significant negative impact of the development itself.

Appendices

Appendix 3.1: Review of submitted ecological appraisal, Bioscan SW20/E1986/EPL1 of 29 July 2020
Appendix 3.2: Addendum ecological response, Bioscan SW20/E1986/EPL2 of 11 September 2020
Appendix 3.3: Technical Briefing Note TN10: Biodiversity Impact Assessment Using DEFRA Biodiversity Metric 2.0 Calculation Tool of 7 August 2020, paras 2 to 2.29
Appendix 3.4: Timeline of Habitat and Maintenance Changes 2016 - 2021

[14] Ecology PoE, Baxter, July 2019 CD H1

Ecological surveys Environmental Impact Assessment Protected Species Expert Witness Appropriate Assessment Legal and Policy Compliance
Management Planning Environmental Planning Guidance Habitat Creation and Restoration Biodiversity Audit Strategic Ecological Advice
Wetland Conservation Sustainable Drainage Systems Integrated Constructed Wetlands Ecosystem Services Species Conservation

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29th July 2020
Our ref: SW20/E1986/EPL1
Planning application ref: 20/00683/OUT

Dear Ms Pickernell,

Land off Oakhurst Rise, Cheltenham – Review of Submitted Ecological Appraisal

Following receipt of the ecological appraisal report produced by Aspect Ecology in support of the recently re-submitted planning application for the above site, I have been instructed by the Charlton Kings Friends (CKF) to comment on the likely ecological impacts of the revised scheme.

Biodiversity loss

You may be familiar with my involvement in this site as part of the 2019 planning appeal at which I presented evidence to the Inquiry that led, in part, to the Inspector's dismissal of the appeal. A particular focus of the Inspectors deliberations regarding ecology, was the assessment I undertook of the net effect of the proposal on biodiversity based on the application of a recognised biodiversity metric[1]. Ultimately the Inspector in his decision found that "*the net effect of the proposed development on biodiversity is likely to be either neutral or negative to some degree and certainly not an enhancement as sought by the thrust of current national and local policy*".

Shortly before the close of the Inquiry, Natural England published a beta version (i.e. consultation draft) of their new metric (Metric 2.0) for review by the industry. Despite reference to this being made in oral evidence at the Inquiry, the applicant's ecologists have once again elected not to apply any form of metric to the conclusions in their current ecological appraisal in respect of the revised scheme. Given the current direction of travel of Government policy (towards mandating use of such metrics to demonstrate delivery of at least 10% 'Net Gain'), and the prominence of this issue at the previous appeal, at best, this seems an oversight.

It has therefore fallen to us, on behalf of CKF, to repeat this exercise for the revised scheme now before you. The attached Figures 1 and 2 show the pre and post construction habitats which I have entered into the new metric. The output from inputting these data into the metric is provided in Tables 1 and 2 below. In summary, based on the Metric 2.0, the development would result in a loss of 10.95 biodiversity units (from 34.32 to 23.37), or a loss of 31.90%. By this measure the revised scheme provides no greater protection of biodiversity on the site than the previous scheme and, as the Inspector found previously, continues to fly in the face of national planning policy and guidance which requires development to not

1 https://www.warwickshire.gov.uk/biodiversityoffsetting

only protect biodiversity but to go further and deliver "*net gains for biodiversity*"[2]. It is similarly not compliant with local planning policies such as policy SD9 of the Joint Core Strategy[3], which also require the protection and enhancement of biodiversity as part of development proposals. Relevant parts of this state (emphasis added):

"1. The biodiversity and geological resource of the JCS area will be protected and enhanced in order to establish and reinforce ecological networks that are resilient to current and future pressures. Improved community access will be encouraged so far as is compatible with the conservation of special features and interests

...

5. Development within locally-designated sites will not be permitted where it would have an adverse impact on the registered interest features or criteria for which the site was listed, and harm cannot be avoided or satisfactorily mitigated

6. Harm to the biodiversity or geodiversity of an undesignated site or asset should be avoided where possible. Where there is a risk of harm as a consequence of development, this should be mitigated by integrating enhancements into the scheme that are appropriate to the location and satisfactory to the Local Planning Authority. If harm cannot be mitigated"

Habitat assessment

As part of my evidence to the Inquiry, reference was made to the Gloucestershire Key Wildlife Sites (KWS) selection criteria. At that time, 14 'key species'[4] had been identified in the grassland, close to the threshold of 20 needed for the site to be of sufficient diversity to be designated as KWS. As part of my current appointment by CKF I have revisited the site in 2020 in order to continue to catalogue the ecological interest present, focusing in particular on the floral diversity of the grassland. A further seven species have been recorded in the grassland in 2020 (see table 3) bringing the total to a minimum of 21. On the basis of this, not only has the site recently been formally put forward to the KWS selection panel for designation as a KWS, but, moreover, it is clear that the appellants ecological consultants have once again failed to accurately represent the true ecological value of this site. Indeed, they have now failed in both 2019 and 2020 to record many of the floral species present, and as a direct consequence, have materially undervalued the diversity and therefore value of the grassland. On the facts, the site clearly has significant ecological value and certainly well above the "*site context*" frame of geographical reference that is suggested by Aspect in their report.

Conclusion

The revised scheme does not overcome the inescapable fact, as previously found by the appeal inspector, that the site is of higher valued than the appellant's ecologists claim, and that as a consequence the proposed development would, notwithstanding the revisions made, still result in a demonstrable and significant loss of biodiversity, contrary to a raft of national and local planning policies. It has fallen to CKF, via ourselves, to document the value of the site in an accurate and properly representative manner and to expose omissions made by the appellant's ecologists and on which flawed assessments have been made. In

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2 Paragraph 170 of the National Planning Policy Framework

3 Other polices include NE2 and NE3 of the adopted Local Plan (2006).

4 As listed on Table H5c of assessment criteria H5.2.

the process of doing so, it has become apparent that the site in fact exceeds the qualification criteria for designation as a Key Wildlife Site, underlining that the impact of the scheme should be assessed in the context of the site being of at least District and more likely County (i.e. Gloucestershire) value for biodiversity. In light of these matters, there can be no other conclusion than significant harm to biodiversity would occurr due to the proposed development, and with the backdrop of the previous Inspectors comments, it is clear that this planning application should be refused.

Regards
FOR AND ON BEHALF OF BIOSCAN (UK) LTD

[redacted]

Samuel Watson MCIEEM
Principal Ecologist

Key

- Site boundary
- Semi-improved, neutral grassland - 3.42ha
- Dense, continuous scrub - 0.21ha
- Scattered scrub 0.08ha
- Hedgerows - 0.58ha
- Pond - 0.003ha
- Wall - 0.004ha

Base mapping is from Aspect - Habitats and Ecological Features, drawing ref: 5487/ECO2 dated April 2020

DO NOT SCALE

Title

Existing habitats

Project	Client
Land off Oakhurst Rise	Charton Kings Friends

Drawing No.	Revision	Project No.
Figure 1	A	E1986

Drawn	Checked	Date
SW	SW	July 2020

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st Rise,

Oakhurst Rise

The Meadows

Meadow View

Barbican

Scale bar 1:5

Key

- Site boundary
- Neutral grassland - 2.16ha
- Development - 1.29ha
- Scrub/young tree planting - 0.49ha
- Retained trees - 0.35ha

DO NOT SCALE

Title

Post development habitats

Project	Client
Land off Oakhurst Rise	Charlton Kings Friends

Drawing No.	Revision	Project No.
Figure 2	A	E1986

Drawn	Checked	Date
SW	SW	July 2020

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Drawing title: Site Plan

Table 1 - Pre-development baseline

	Habitats and areas			Habitat distinctiveness		Habitat condition		Ecological connectivity			Strategic significance			Suggested action to address habitat losses	Ecological baseline
Ref	Broad Habitat	Habitat type	Area (hectares)	Distinctiveness	Score	Condition	Score	Ecological connectivity	Connectivity	Connectivity multiplier	Strategic significance	Strategic significance	Strategic position multiplier		Total habitat units
1	Grassland	Grassland - Other neutral grassland	3.42	Medium	4	Moderate	2	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same broad habitat or a higher distinctiveness habitat required	27.36
2	Heathland and shrub	Heathland and shrub - Bramble scrub	0.21	Medium	4	Moderate	2	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same broad habitat or a higher distinctiveness habitat required	1.68
3	Woodland and forest	Woodland and forest - Other woodland; mixed	0.08	Medium	4	Moderate	2	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same broad habitat or a higher distinctiveness habitat required	0.64
4	Woodland and forest	Woodland and forest - Other woodland; broadleaved	0.58	Medium	4	Moderate	2	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	Same broad habitat or a higher distinctiveness habitat required	4.64
		Total site area ha	**4.29**											**Total Site baseline**	**34.32**

Table 2 – Post-development baseline

Post development/ post intervention habitats																
						Ecological connectivity			Strategic significance			Temporal multiplier		Difficulty multipliers		
Proposed habitat	Area (hectares)	Distinctiveness	Score	Condition	Score	Ecological connectivity	Connectivity	Connectivity multiplier	Strategic significance	Strategic significance	Strategic position multiplier	Time to target condition /years	Time to target multiplier	Difficulty of creation category	Difficulty of creation multiplier	Habitat units delivered
Grassland - Other neutral grassland	2.16	Medium	4	Good	3	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	15	0.586	Low	1	15.19
Urban - Suburban/ mosaic of developed/ natural surface	1.29	Low	2	Good	3	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	5	0.837	Low	1	6.48
Woodland and forest - Other woodland; Young Trees planted	0.49	Medium	4	Poor	1	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	25	0.410	Low	1	0.80
Woodland and forest - Other woodland; broadleaved	0.35	Medium	4	Good	3	Low	Unconnected habitat	1	Area/compensation not in local strategy/ no local strategy	Low Strategic Significance	1	32+	0.320	Medium	0.67	0.90
Totals	**4.29**														**Total Units**	**23.37**

Table 3 – Cumulative KWS species list

Scientific name	Common name
Species recorded in 2019	
Carex spicata	Spiked sedge
Centaurea nigra	Lesser knapweed
Conopodium majus	Pignut
Galium verum	Lady's bedstraw
Lathyrus pratensis	Meadow vetchling
Leontodon hispidus	Rough hawkbit
Leucanthemum vulgare	Oxeye daisy
Lotus corniculatus	Common bird's-foot-trefoil
Lotus pedunculatus	Greater birds-foot-trefoil
Luzula campestris	Field wood-rush
Potentilla sterilis	Barren strawberry
Primula veris	Cowslip
Tragopogon pratense	Goat's beard
Trisetum flavescens	Yellow oat-grass
Species recorded in 2020	
Carex flacca	Glaucous sedge
Hyacinthoides non-scripta	Bluebell
Hypochaeris radicata	Cats-ear
Primula vulgaris	Primrose
Ranunculus bulbosus	Bulbous buttercup
Rhinanthus minor	Yellow rattle
Viola riviniana	Common dog violet

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11th September 2020
Our ref: SW20/E1986/EPL2
Planning application ref: 20/00683/OUT

Dear Ms Pickernell,

Land off Oakhurst Rise, Cheltenham – Addendum Ecological Response

Following the submission of my previous report in respect of the above site and planning application (ref: SW20/E1986/EOL1, dated 29th July 2020), I am aware that two further submissions have been made by the applicants ecologist's dated 10th and 17th August 2020, and an online comment has also been submitted by the county ecologist, Gary Kennison, dated 14th August 2020. I have also been made aware of a more recent submission by the Gloucestershire Wildlife Trust (GWT), dated 1st September.

I have been instructed by Charlton King Friends (CKF) to comment on these new submissions, which I do below.

Metric-based assessment of biodiversity loss

Assessment of biodiversity loss using Defra Metric 2.0

I thank the applicant's ecologists Aspect for providing accurate measurements for each habitat type on the site, which CKF were, of course, unable to obtain from the submitted drawings due to their PDF format, although it is noted that the estimates were nevertheless within an acceptable error margin of the actual totals. I see no reason to disagree with the figures that have now been provided, although I note there is a discrepancy between the site area on the application form of 4.29ha and the total reached by Aspect of 4.12ha.

In the light of these area measurements, I have updated the Metric 2.0 assessment and discuss the results below. Several important points of clarification need to be made about the input parameters first, however.

i) I note the comment by Aspect Ecology that in Bioscan's Metric 2.0 assessment "*It is assumed that all habitats will be lost and re-created*". I have not been party to discussions regarding the development of the landscape strategy or the proposals for enhancement. In keeping with parties that are outside of the application team, I have had to rely upon the information submitted as part of the application, in this instance the ecological mitigation and enhancements drawing (ref: 5487/EC04) included in the submitted ecological appraisal report (ref: 5487 EcoAp2020 vf /DW). In respect of the two largest blocks of grassland on the site, this drawing

states "*Creation of new grassland habitats"* [underline added]. I concluded (not entirely surprisingly) from this that the existing grassland would be removed and replaced. I thank Aspect Ecology for clarifying the position and note that any suggestion therein that the development would deliver 'new' grassland, cannot, therefore, be correct and any apparent 'benefit' of grassland creation from the scheme should be discounted in the planning balance as a result.

However, in light of the need to create an artificial badger sett in the grassland in the southwest corner of the site, I do question whether in this area any retention of extant resource would be practically achievable, given the ground disturbance required. This means that the only block of grassland that could in reality be retained (rather than recreated) is that on the east side of the development. The result of this is that approximately a quarter (1.06ha) of the existing grassland would actually be retained under the proposals, with some 0.85ha of grassland removed and recreated. I have factored this correction into the revised metric assessment detailed below.

ii) With regard to the suggested re-categorisation of the habitats in the baseline metric assessment, there is little need to debate this point in terms of metric outputs as there is no change in the distinctiveness score between 'other mixed woodland' (Bioscan categorisation) and 'scrub' (Aspect categorisation). In other words, the proposed re-categorisation results in no (zero) change to the assessed unit score. I am content to use either category, noting at the same time that the description in the Ecological Appraisal report[1] refers to scattered scrub (together with 'scrub') as being 'bramble'. The proposed re-categorisation therefore fails to reflect the fact that this area of 'scattered scrub' is in fact a small copse of trees (see Photo 1) and I maintain that 'other mixed woodland' would therefore be more appropriate.

In the absence of an accurate description of this habitat in the ecological appraisal, I have based my assessment of the parameter 'condition' on my own visits to the site. It is clear that the condition of this habitat is being hampered by the extensive badger activity in this area which is restricting the development of the ground flora. As such, based on the combination of these two factors, i.e. the poor ground flora but presence of mature trees, I consider a condition assessment of 'moderate' to be justified.

Even if the 'condition' of this habitat in the Metric is reduced to 'poor' (as Aspect suggest), the result is to only reduce the biodiversity unit value of this area from 0.64 to 0.32 a change of 0.32 units. The need to argue for such a small change is a symptom of the desire by Aspect to achieve every possible fraction of a unit out of disputed tweaks to the input parameters to engineer an output figure that approaches the threshold of acceptability in policy terms. This itself reflects that this is a development proposal that is innately damaging to the on-site biodiversity resource and that inadequate compensation is proposed for such damage. Even if the suggested tweaks are accepted, they have the result of no more than scraping the site's performance over the 'zero' line: the metric calculation Aspect have submitted shows an overall 0.48 unit increase on the site. However the clear direction of travel of national and local planning policy is towards biodiversity net gain being measured as a policy compliant material consideration only where a 10% net increase is demonstrated – indeed this is set to become a national mandatory requirement in the Environment Bill and, pre-empting this, has already been adopted by many

[1] Aspect Ecology ref: 5487 EcoAp2020 vf /DW, dated April 2020

local authorities[2]. At its highest, Aspect Ecology's own assessment shows that the proposed development falls far-short of this target and in fact delivers no meaningful net gain[3].

iii) There has been no error in the assessment by Bioscan of the condition of the hedgerows H1 and H2 – both are assigned a value of 'moderate' in the pre-development (0.58ha) assessment and 'good' in the post-development (0.35ha) assessment.

iv) The inclusion by Aspect of hedgerows H3 to H6 as 'Native hedgerow' in the metric is patently incorrect and should be amended. These are ornamental hedgerows which have 0 (zero) biodiversity units. Inclusion of these as native hedgerows introduces a 0.338 unit bias that should be discounted. Correcting the overall output for this further exposes the claim of net gain as a fallacy.

v) There is no native hedgerow planting proposed by the landscape strategy or shown on the ecological enhancement drawing, and thus the inclusion of 0.461km of native hedgerow creation in the Metric should be removed.

A further element of the Metric assessment undertaken by Aspect that requires more detailed scrutiny is the justification for their application of strategic multipliers.

Strategic multipliers

In their assessment, Aspect Ecology have assigned some habitats a 'strategic location' multiplier, the suggestion being, it is assumed, that these habitats are located in an area that has been formally identified as being strategically important for that habitat. The two 'woodland' habitats (i.e. hedgerows H1 and H2), are noted to be assigned the 'within area formally identified in local strategy' assessment. The suggested rationale for this is outlined at 2.8 of Aspects submission[4], which states –

"*Hedgerows H1 and H2 are considered to qualify as Priority Habitat and the local BAP, as such these habitats are considered to be within an area formally identified in local strategy such that they are of high strategic significance."*

This appears to be a wilful misconception of the function and purpose of strategic multipliers within the Defra metric. The suggestion being made is that simply because the hedgerows meet the criterion for status as a national priority habitat that they are automatically strategically located. A priority hedgerow is a hedgerow that contains 80% or greater native species, a criterion met by most hedgerows in Britain. Conversely 'strategically located' is a function of the location of the hedgerow, for example as part of a wider network or connecting two designated sites. It is entirely possible, as is the case here, for a hedgerow to be a priority habitat but outside of a strategic location, or indeed in an ecologically isolated setting.

[2] See for example https://www.cherwell.gov.uk/news/article/624/council-ramps-up-biodiversity-target

[3] This is also demonstrably below the 10% currently required by several planning authorities and which is the amount likely to be required under the upcoming Environment Bill.

[4] Aspect Ecology ref: 1005487/012.let.CBC.ep, dated 10th August 2020. Technical Briefing Note TN10, dated 7th August 2020.

If additional evidence of this was required, the Metric 2.0 user guide[5], published by Natural England (extract included at Appendix 1) states -

"5.30. The idea of strategic significance works at a landscape scale. It gives additional unit value to habitats that are located in preferred locations for biodiversity and other environmental objectives…Strategic significance utilises published local plans and objectives to identify local priorities for targeting biodiversity and nature improvement, such Nature Recovery Areas, local biodiversity plans, National Character Area[14] objectives and green infrastructure strategies".

The guide goes on to state –

*"In the absence of a locally or nationally relevant strategic documentation indicating areas of significance for biodiversity, the value of **1** should be used in pre and post development calculations".*

Aspect provide no evidence for the site being within an area formally identified as strategically important for hedgerows or woodland and a score of 1 (i.e. no multiplier) should therefore have been applied.

There is similarly no evidence provided by Aspect for the existing or proposed ponds being located within a strategically significant location.

Conversely, the comments by the Gloucestershire Wildlife Trust (GWT) (see Appendix 2) confirm that the grassland is in fact strategically located. GWT state "*The site lies within a gap in grassland ecological network connectivity*". Is it therefore appropriate to assign to the neutral grassland on site a strategic significance of *at least* 1.1 (i.e. location ecologically desirable but not in local strategy).

Metric outcome

Having corrected the above errors, the metric assessment undertaken by Aspect should show a 4.21 loss of biodiversity units, equivalent to a 11.98% reduction (output included at Appendix 3). This is patently in conflict with national and local policy on the avoidance of net less of biodiversity.

<u>Published metric assessment</u>

It is noted that both Aspect Ecology and the County Ecologist raise a query as to the benefit of the metric assessment because it is in the process of beta testing. This fact is highlighted in my original submission[6] and is not disputed. It is though noted in Aspects submission of 10th August[7] at 1.3 it states "*It is considered that the most appropriate metric to use for the site is the Defra Biodiversity Metric 2.0 Calculation Tool*". Any suggestion then that this metric is not a recognised and acceptable assessment tool is incorrect. The Defra 2.0 metric is widely and increasingly used to guide planning decisions throughout England and to assess the performance of proposals against the framework of national and local policies that seek to avoid net biodiversity loss and deliver net gain, and is on course to be mandated for such use upon the passing of the Environment Bill into law.

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5 Ian Crosher, Susannah Gold, Max Heaver, Matt Heydon, Lauren Moore, Stephen Panks, Sarah Scott, Dave Stone & Nick White. 2019. *The Biodiversity Metric 2.0: auditing and accounting for biodiversity value. User guide* (Beta Version, July 2019). Natural England

6 Bioscan letter ref: SW20/E1986/EPL1, dated 20th July 2020

7 Aspect Ecology ref: 1005487/012.let.CBC.ep, dated 10th August 2020. Technical Briefing Note TN10, dated 7th August 2020

Neither Aspect nor the County Ecologist have evidenced their assertion that use of the Defra 2.0 metric might give rise to error. One means of testing this might be through the application of an alternative published metric, such as those that preceded the general and widespread adoption of the more recent Defra 2.0 model. For the avoidance of doubt on this point, Bioscan have also, therefore, undertaken this exercise utilising the metric published by Warwickshire County Council[8] and which was employed as part of the 2019 appeal evidence.

The output from this exercise is attached at Appendix 4 and this shows a 7.33 loss of biodiversity, equivalent to -22.9%. This does not suggest an inconsistent result would be obtained by any other metric and again underlines that the proposals are patently in conflict with national and local policy on the avoidance of net less of biodiversity.

Conclusion

Having applied two established metrics to the proposed development, one of which is planned by Government to form the official and mandated tool for measuring biodiversity net gain in future planning decisions, it is clear that, by either measure, significant and demonstrable net loss of biodiversity would occur on this site. Aspect seek to rebut such conclusions by little more than bland repetition of a wholly subjective and unevidenced position shown to be untenable on the facts. Their case is not to engage with the facts but to sow uncertainty by advising that allowances be made for differences in subjective expert opinion and 'gut feeling' and seeking to discredit the application of what are now well-established quantitative methods.

There are of course cases where subjective opinion and quantitative metric outputs will be at odds with each other, and Bioscan are in the vanguard of advocating that care should be used when applying metric-based systems. In this case, however, the veracity of Aspect's competing assessment has to be viewed in the context of the many errors and inconsistencies that have been exposed in their assessments since the commencement of the planning debates over this site, including before the current application. I can confirm that the metric outputs discussed above align with the expert professional subjective opinion of not just myself, but of other highly experienced ecologists within Bioscan, and those views have consistently been found to be on the right side of the facts. Aspect's efforts to disregard any assessment technique that does not give them the answer they seek falls short of the requirements for rigorous and robust assessment of the impact of development proposals on biodiversity - requirements that are not only required by industry best practice in general but that form the thrust of national planning policy demands. Any suggestion that application of established metrics is not valid for the purposes of assessment of compliance with biodiversity net gain policies runs flat contrary to the direction of travel of government and local planning policy and in that context alone should be rejected if a legally safe planning decision is to be made.

KWS assessment

I have reviewed the submission by Aspect Ecology (dated 17th August 2020) in which they attempt to critique the basis on which the site has been put forward for designation as a Key Wildlife Site (now called Local

[8] https://www.warwickshire.gov.uk/biodiversityoffsetting

Wildlife Sites LWS). I am also now in receipt of the submission from GWT dated 1st September 2020 which confirms the site was formally designated a LWS at a meeting of the selection panel on 1st September 2020. There can be no further question that the site does meet the criteria for this status, and the attribution of LWS status also puts beyond any doubt that Aspect's assertion that the grassland is of no more than 'site' value is wrong.

The designation of the site as a LWS is welcome confirmation by an independent panel of third parties of what the facts on the ground have consistently pointed towards throughout my involvement in this site, and brings into play an additional raft of policy considerations that are failed to be met by the current proposals. In the event that Aspect continue to dispute the award of LWS status, I make the following points on their claims that the appropriate criteria were exceeded:

Minimum species threshold

To meet one of the criteria for KWS designation, the grassland needs to contain at least 20 species from those listed in the KWS handbook as being representative of semi-natural grassland. To date 22 species have been recorded. In their submission of 17th August 2020, Aspect attempt to discount the inclusion of four of these species in their letter to Dr Juliet Hynes; bluebell, barren strawberry, primrose and common dog violet. The basis for this is that, in their option, these are "*likely closely associated with the hedgerows and marginal woody vegetation…Accordingly, these should be discounted from the list such that number of relevant KWS grassland species*". Such a statement is erroneous, as Aspect would know if they had spent their time onsite analysing the grasslands in the correct manner, and the very basis for it flawed.

In the first instance, the KWS handbook, published by the GWT, specifically includes these four species in the list of those representative of a semi-natural grassland.

Secondly, and in the event further evidence of the grassland (as well as woodland) affiliation of these species was needed, I need do no more than pick one of a number of sources that confirm this association. The Natural England (formerly English Nature) research report published on the assessment of the condition of lowland grassland Sites of Special Scientific Interest[9] also lists all but barren strawberry as being indicators of higher quality mesotrophic grassland (extract provided at Appendix 5).

There can be no argument that these species can and should be included in the list of indicator species that confirm that the site meets, indeed, exceeds the threshold for KWS-level interest. Any attempt to discount them artificially and erroneously skews the assessment. The bald fact is that Aspect failed to record these species yet now attempt to present a case for them to somehow be set aside as not valid as grassland species. This cherry picking of the facts and data is indefensible and should be rejected.

Other matters

In addition to several other factual inaccuracies in their correspondence to the GWT regarding the LWS assessment, Aspect also assert that "*there is no realistic mechanism*", to secure the future and management of the site other than through development. I do not agree with this position. Aspect have not identified any

[9] Robertson, H & Jefferson, R (2000) *Monitoring the condition of lowland grassland SSSIs* England Nature Research Reports No 315 Part 2.

credible risk to the continued management of the grassland in the absence of development. The land has been in its current form since the early 1800s and there is no record of it having ever been subject to agricultural improvement or chemical treatment. LiDAR imagery also shows relic ridge and furrow through the meadow supporting the case that it has also never been mechanically cultivated. Moreover, and most significantly of all, CKF are fully committed to this site, seeking to secure it as a resource for residents. Crucially, they have ample capability to undertake any necessary targeted management.

Comments by Gary Kennison

Much of the content of the correspondence submitted by the county ecology officer, Gary Kennison, takes a lead from the reports submitted by Aspect Ecology and can therefore be viewed in tandem with the responses above. It is, though, unclear why Mr Kennison, even in his most recent submission disagrees with GWT in respect of the site meeting the criteria for designation as a KWS. He appears to have decided this from a single site visit of unknown duration and thoroughness at a somewhat less than optimal time of year (August). This stands against the clear case on the facts, as confirmed by GWT and their decision to formally designate the site, that the site has significant ecological value and that the impact of the development should be measured against this.

Conclusion

Throughout this and previous applications, Bioscan has acted on behalf of CKF to ensure that the ecological interest of the site is properly and accurately recorded. The process has consistently exposed factual errors and inaccuracies in the work undertaken by the applicant's ecologists, Aspect Ecology. The fund of knowledge now collected by Bioscan (and which ought to have been properly documented by Aspect) has been sufficient to lead to the formal designation of the site as a Local Wildlife Site. Yet, Aspect Ecology seek to undermine this fact by discounting relevant facts on the basis of flawed assumptions.

What is placed beyond dispute by the cumulative evidence is that the current proposal would result in the significant and demonstrable net loss of biodiversity on the site. It would accordingly fail the relevant tests of local and national planning policy and should be rejected.

Regards
FOR AND ON BEHALF OF BIOSCAN (UK) LTD

Samuel Watson MCIEEM
Principal Ecologist

Photo 1

Appendix 1

metric systems being used. It is understood that Cheltenham Borough Council and Gloucestershire County Council do not currently have a metric system in place. It is considered that the most appropriate metric to use for the site is the Defra Biodiversity Metric 2.0 Calculation Tool. The Defra 2.0 tool is referenced in the Environment Bill and sets the new standard for metrics, employing a more sophisticated approach than other local metrics to date (e.g Warwickshire), with many more parameters included. Defra 2.0 includes a larger range of habitat types; more guidance on difficulty and time to target condition for each habitat type; is prepopulated with distinctiveness, time to target condition and difficulty scores; includes new distinctiveness scores (0-8) to include very high and very low; includes new condition scores (0,1,1.5,2,2.5,3); includes two new elements 'Connectivity' and 'Strategic Significance'; includes

'accelerated succession'; includes off-site habitat options and takes account of proximity to the impact site.

1.4. This technical briefing note provides a summary of the results of the Defra Biodiversity Metric 2.0 Calculation Tool and justifies the choice of habitat definitions, distinctiveness, target habitat condition and ecological connectivity where appropriate.

2. Biodiversity Impact Assessment

2.1. This section references and discusses the habitat categories and their condition assigned from the drop down menus of the Biodiversity Impact Assessment Calculator (see Appendix 5487/1 attached).

Existing Site Habitats (Pre-development)

2.2. The existing habitats within the application site as recorded during the most recent habitat surveys as shown on Plan 5487/BIA1 attached. The below sets out the habitat categories used in the impact calculator, their condition in line with assessment criteria set out within Technical Supplement Document[3] and survey results, distinctiveness and connectivity and how these relate to Plan 5487/BIA1.

Site Habitat Baseline

2.3. **'Grassland – Other neutral grassland' – Condition 'Moderate'.** This habitat is mapped as Semiimproved Grassland on Plan 5487/BIA1. The most recent survey work undertaken assessed the grassland to be of site level value being dominated by grass species including False Oat-grass *Arrhenatherum elatius* and Yorkshire-fog *Holcus lanatus* with a low diversity of common and widespread species (albeit occasional indicators of lowland meadow habitat were infrequently recorded including Meadow Vetchling *Lathyrus pratensis*, Lady's Bedstraw *Galium verum* and Bird's-foot Trefoil *Lotus corniculatus*). An area had also recently been heavily grazed by Alpaca and goats. The most recent survey work undertaken by Aspect Ecology recorded 12 Key Wildlife Site (KWS) species between 2019 to 2020. Giving consideration to all of the information available

[3] Natural England July 2019 '*The Biodiversity Metric 2.0 auditing and accounting for biodiversity. Technical Supplement Beta Edition*'

and in accordance with assessment criteria set out within technical guidance[1], it is considered that the grassland is currently in a moderate condition.

2.4. The habitat type is auto-generated a 'medium' distinctiveness score within the Defra 2.0 metric, according the guidance set out within the Technical Supplement Document[1], a low connectivity score is therefore appropriate. The habitat is not considered to fall within local strategy such that it is of low strategic significance.

2.5. **'Heathland and shrub – Mixed scrub' – Condition 'Poor'.** This habitat is mapped as dense scrub and scattered scrub on Plan 5487/BIA1. Several areas of dense and scattered scrub dominated by Bramble *Rubus fruticosus*, Blackthorn *Prunus spinosa* and Wild Plum *Prunus domestica* where recorded to have encroached out from boundary hedgerows. The scrub supports a low species diversity is relatively small in extent such that it is not considered to represent an important ecological feature and the condition of the habitat, in line with the assessment criteria set out within the Technical Supplement Document is considered to be poor.

2.6. The habitat type is auto-generated a 'medium' distinctiveness score within the Defra 2.0 metric, according the guidance set out within the Technical Supplement Document, a low connectivity score is therefore appropriate. The habitat is not considered to fall within local strategy such that it is of low strategic significance.

2.7. **Woodland and Forest – Other woodland; Broadleaved – Condition 'Moderate'.** This habitat is mapped as hedgerows H1 and H2 on Plan 5487/BIA1. Both 'hedgerows' were recorded to be mature in nature, up to 8-10m high and wide in nature, with hedgerow H1 recorded to be 512m wide with a number of standard trees. As such, the categorisation of these hedgerows as 'Other woodland; Broadleaved' is considered appropriate given their maturity and coverage. Both hedgerow H1 and H2 are considered to qualify as Priority Habitat whilst hedgerow H1 is also considered to be species-rich and likely to qualify as 'Important' under the Hedgerow Regulations 1997. However, the habitats are not currently actively managed and there is a lack of species diversity recorded within hedgerow H2 such that in line with the assessment criteria within the Technical Supplement Document a 'Moderate' condition is considered appropriate.

2.8. The habitat type is auto-generated a 'medium' distinctiveness score within the Defra 2.0 metric, according the guidance set out within the 'Technical Supplement Document, a low connectivity score is therefore appropriate. Hedgerows H1 and H2 are considered to qualify as Priority Habitat and the local BAP, as such these habitats are considered to be within an area formally identified in local strategy such that they are of high strategic significance.

2.9. **Lakes – Ponds (Non- Priority Habitat) – Condition 'Poor'.** This habitat is mapped as ephemeral pond on Plan 5487/BIA1. The pond recorded on site is considered to be ephemeral and likely to be dry for periods of the year. No aquatic vegetation has been recorded within the pond with species from the adjacent grassland present instead. As such and in line with the assessment criteria within the Technical Supplement Document, the pond is considered to be no more than poor condition.

2.10. The habitat type is auto-generated a 'high' distinctiveness score within the Defra 2.0 metric, according the guidance set out within the 'Technical Supplement Document, a medium

connectivity score is therefore appropriate. The habitat is considered to be within an area formally identified in local strategy such that it is of high strategic significance.

Site Hedge Baseline

2.11. **'Native Hedgerow' – Condition 'Poor'.** This habitat is mapped as hedgerows H3-H6 on Plan 5487/BIA1. The 'Native Hedgerow' habitat category has been used as a proxy input in place of 'Hedge Ornamental Non-native' which is considered to be a more accurate habitat category for the hedgerows in question. However due to an error in the Defra 2.0 metric (beta) the use of the ornamental non-native hedgerow category results in a 'check data' error message on the results tab.

2.12. The hedgerows are relatively short sections, largely comprised of ornamental species associated with the adjacent off-site residential properties with the dominant species comprising Cherry Laurel *Prunus laurocerasus,* Leyland Cypress *Cupressus x leylandii* and Holly *Ilex aquifolium.* Given the short length, species-poor nature and dominance by ornamental species the condition of such hedgerows is considered to be poor.

2.13. The habitat type is auto-generated a 'low' distinctiveness score within the Defra 2.0 metric, according the guidance set out within the 'Technical Supplement Document, a low connectivity score is therefore appropriate. The habitat is not considered to fall within local strategy such that it is of low strategic significance.

Habitat Creation (Post-development)

2.14. The proposed newly created habitats within the application site have been measured and inputted to the impact calculator. Proposed habitats are shown on Plan 5487/BIA2 and described further below.

Site Habitat Creation

2.15. **'Heathland and shrub – Mixed scrub' – Condition 'Good'.** This habitat represents proposed boundary planting as shown on Plan 5487/BIA2. This habitat will expand, enhance and reinforce existing, retained hedgerows with the use of species including Holly and Butcher's-broom *Rucus aculeatus* alongside further native shrubs. These mixes have been chosen for their benefit to biodiversity and will be managed appropriately going forward such that it is considered within seven years (as pre-determined by the Defra metric) the habitat can reach a 'good' condition.

2.16. The habitat type is auto-generated a 'medium' distinctiveness score within the Defra 2.0 metric, and according the guidance set out within the Technical Supplement Document, a low connectivity score is therefore appropriate. The habitat is not considered to fall within local strategy such that it is of low strategic significance.

2.17. **'Urban - Woodland – Condition 'Good'.** This habitat represents proposed woodland belt as shown on Plan 5487/BIA2. The new woodland belt will form the eastern edge of the proposed development and will connect to existing tree cover and hedgerows to the north and west. A range of native species are proposed including Field Maple *Acer campestre,* Downy Birch *Betula pubescens*, Hornbeam *Carpinus betulus,* Hazel *Corylus avellana*, Hawthorn *Crataegus monogyna,* Spindle *Euonymus europaeus,* Holly, Pedunculate Oak *Quercus robur* and Wild Cherry *Prunus*

avium. The woodland will be subject to appropriate management going forward such that is considered a 'good' condition can be achieved in the future.

2.18. The habitat type is auto-generated a 'medium' distinctiveness score within the Defra 2.0 metric, according the guidance set out within the Technical Supplement Document, a low connectivity score is therefore appropriate. The wooded belt is considered likely to qualify as Priority Habitat and the local BAP once established, as such this habitat is considered to be within an area formally identified in local strategy such that they are of high strategic significance.

2.19. **'Urban – Suburban/ mosaic of developed/ natural surface' – Condition 'Good'.** This habitat represents proposed gardens, proposed grass forming road verges within the developed area, landscape planting and proposed buildings and hardstanding as shown on Plan 5487/BIA2. Landscaped areas will be subject to ongoing maintenance and aftercare. Although not specifically designed for the benefit of wildlife, the grassland and landscape planting within public areas will be managed such that it is maintained in a 'good' condition going forward and will likely contain some herb species which could offer a nectar source for invertebrates, whilst amenity gardens are also considered likely to offer similar opportunities.

2.20. The habitat type is auto-generated a 'low' distinctiveness score within the Defra 2.0 metric, according the guidance set out within the Technical Supplement Document, a low connectivity score is therefore appropriate. The habitat is not considered to fall within local strategy such that it is of low strategic significance.

2.21. **'Lakes – Ponds (Non-Priority Habitat)' – Condition 'Good'.** This habitat represents the proposed pond as shown on Plan 5487/BIA2. The pond will be designed in line with ecological principles whilst also helping attenuate surface water run-off. The pond will have two deepened pools connected by an aquatic bench to provide two constant areas of permanent water for aquatic species. The sides of the pond will have varied gradients between 1 in 3 and 1 in 10, with the more shallow bans providing a wider draw down zone which can support higher floristic diversity. It is therefore considered that the pond will achieve a good condition within five years (as determined by the Defra metric).

2.22. The habitat type is auto-generated a 'high' distinctiveness score within the Defra 2.0 metric, according the guidance set out within the Technical Supplement Document, a medium connectivity score is therefore appropriate. The habitat is considered to fall within local strategy such that it is of high strategic significance.

Site Hedge Creation

2.23. **'Native Hedgerow' – Condition 'Moderate'.** This habitat represents new native hedgerow planting which will comprise species including Box *Buxus sempervirens*, Hornbeam, Silver Birch *Fagus sylvatica* and Privet *Ligustrum sp.* and will be managed sensitively going forward such that it is considered within 5 years (as pre-determined by the Defra metric) the habitat can reach a 'moderate' condition.

2.24. The habitat type is auto-generated a 'low' distinctiveness score within the Defra 2.0 metric, according the guidance set out within the Technical Supplement Document, a low connectivity score is therefore appropriate. The habitat is not considered to fall within local strategy such that it is of low strategic significance.

Habitat Enhancement (Post-development)

2.25. The habitats to be retained and enhanced within the application site have been measured and inputted to the impact calculator. Proposed enhanced habitats are shown on Plan 5487/BIA2 and described further below.

Site Habitat Enhancement

2.26. **'Grassland – Other neutral grassland' – Condition Change 'Moderate - Good'.** This habitat represents proposed wildflower grassland at Plan 5487/BIA2. It is proposed that areas of the existing semi-improved grassland will be retained and enhanced through introduction of additional wildflower species and bringing the area into sensitive ongoing management practices. Consideration will be given to laying of wildflower turfs in areas where the ground is disturbed whilst over-seeding with locally appropriate native species will be used where an existing grassland sward is established. It is calculated that a good condition can be achieved within 15 years.

2.27. **Woodland and forest – Other woodland; broadleaved' – Condition Change 'Moderate – Fairly Good'.** This habitat represents the existing hedge (hedgerows H1 and H2) as shown at Plan 5487/BIA2. These hedgerows are largely due to be retained and will be enhanced with a native Hawthorn hedgerow restoration mix to restore and establish a dense and robust edge to this feature. Where necessary undesirable vegetation such as Sycamore may be removed to encourage new growth of native species. Selective replacement of young Ash *Fraxinus excelsior* may also be undertaken[4].

Habitat Biodiversity Impact Calculator Assessment Score Results: *Quantitative net gain*

2.28. With the condition of the existing habitats currently present within the site and with the habitats to be created or enhanced as part of the proposals (as justified above) inputted into the impact calculator, the Habitat Biodiversity Impact Score for the proposals is a **net gain of 0.48 units** which equates to a **1.47% net gain**. The Hedgerow Biodiversity Impact Score for the proposals is a **net gain of 1.34 units** which equates to a **396.78% net gain**. This has been demonstrated through the Defra Biodiversity Metric 2.0 Calculation Tool as shown at Appendix 5487/1, which demonstrates the deliverable net gain at the site.

2.29. The beta testing version of the metric is recognised to substantially under value proposed woodland creation, and accordingly it is anticipated that a further increase in net gain would be reported under the final metric when this is released.

Qualitative – Tangible

[4] Ash die back to be considered such that other native species may be selected

Appendix 3.4: Timeline of habitat and maintenance changes 2016 - 2021

30 January 2017: Police called (school teacher) to prevent Sumo Stratascan from encroaching on badger setts.

2nd February 2017: Police wildlife officer attended (called by school parent teaching forest school) to prevent JCB excavating near sett entrance. Police warned those responsible (incident 224 5/02). Also reported to RSPCA.

10th March 2017: weekend removal of part of protected hedgerow (TG3008), including bat and bird boxes. Police reports made by Oakhurst Rise residents (incident number 125 25/02), local media coverage.

July 2017: no annual hay cut for first time in residents' memory.

2 June 2018: field cut prior to planning committee visit, including incursions over the badger set (cubs still in residence due to drought). Police and RSPCA reports made by Oakhurst Rise residents (police incident number 167 5/6). Cuttings left in situ.

August 2019: field cut and baled. Bales stacked by appellant morning of 19th August (inspector's site visit).

June 2020: unexplained loss of all queen bees and newly hatched queens from the St Edwards school hives. Hives removed from site.

July 2020: Hay cut postponed by Aspect[15] "cutting of the grassland was further placed on hold to benefit GWT". County ecologist visits site for the first time.

9 September 2020 "With this survey and assessment work complete the annual hay cut of the grassland has been rescheduled for the near future. A minor delay to the cutting of the grass poses no threat to the wellbeing of the grassland ecosystem".

Mid December 2020: School contractors arrange mowing, leaving the grass in situ to rot.

Early 2021: Local ecology groups lift as much grass as possible by hand, affording some protection to the most species rich on the eastern field, around the ice house.

[15] Technical Briefing Note TN13, 9 September 2020 (para 2.3)

CKF Proof of Evidence on St Edward's School Meadow
(historically known as "The Leasowe")
and now referenced as "land off Oakhurst Rise".

Part 4: Ecological harm to a local wildlife site and biodiversity assets protected in HD4

20 February 2021

4. Failure to follow avoid – mitigate – compensate hierarchy with respect to Biodiversity Assets and impact on a locally designated site

Policy SD9(5): Development within locally designated sites will not be permitted where it would have an adverse impact on the registered features or criteria for which the site was listed, and harm cannot be avoided or satisfactorily mitigated.

The site

4.1 This site is not an SSSI. **It is a local wildlife site**. At the last appeal Mr Watson[1] noted that "by reference to aerial photography evidence, the site has a long history of being pasture or hay meadow. The site is a classic example of the increasingly rare survival of fields that have escaped the rigours of post-war agricultural intensification by virtue of its location at the urban fringe.. a not uncommon characteristic of Britain's few surviving grasslands with an elevated conservation value". Within the Cheltenham Borough, it is one of only six local wildlife sites.

4.2 As the appellant's ecologist noted in email to GWT on 7 August 2020, "the purpose of Key Wildlife Sites is to capture habitats which are special in terms of their ecological quality. If this were not the case, low value habitats could be designated".

4.3 The site was confirmed as passing the LWS selection criteria on 1 September 2020 being "a good selection of habitats and species, exceptionally well placed to offer educational opportunities"[2]. GWT have been asked to assess the grassland quality over the spring of 2021, to add to their visit at a suboptimal time of year (August 2020) and independently review Bioscan's view that the grassland approaches MG5 habitat.

4.4 The species data presented to GWT as part of the LWS process was a <u>significant</u> improvement on the understanding of grassland, when compared with the data compiled by Aspect and submitted with previous planning applications, and to Inspector Sims at the appeal in 2019, when only 12 of these species had been recorded. [The appellant's ecologist have failed to survey the grassland across the growing season, choosing late July 2019 and suboptimal early August 2020[3].]

4.5 GWT acknowledged a number of indicators of unimproved neutral grassland, a resource "for which we only have 1677 hectares recorded in the county (0.6% of the county by area)

[1] CD H4 Ecology POE S Watson Rule 6 para 4.2.2

[2] Appendix 4.1 Gloucestershire Wildlife Trust letter of 1 September 2020

[3] Technical briefing note TN09: Results of Botanical and NVC Survey 5 August 2020, para 7 "the survey was undertaken towards the end of the optimal period of grassland botanical survey work (*1 August 2020*), and as such species which appear early in the season may not have been visible. However, the species lists are bolstered by an additional survey undertaken in July 2019 (*on the 18th, just 2 weeks earlier in the year, producing an evidence base of 12 species)*"

4.6 Aspect refuted the local wildlife designation strenuously[4]. On 7 August they stated "the site does not meet any of the listed criteria" (for a local wildlife site). In striving to make their case they dismissed the site's value for learning completely, stating[5] that "little use of the grassland is made for educational purposes.. This would not be a resource the school would turn to for grassland botanical studies". The first statement is not true, the second demonstrates a profound lack of understanding of primary school education.

The Harm to Specific Biodiversity Value

4.7 Working on the principle that the NPPF requires first consideration of avoiding outright harm, and then consideration of mitigation or compensation, there is plainly significant harm to main breeding and satellite badger setts from this application (those destroyed and relocated).

4.8 There is plainly significant harm to the existing grassland (it is common ground that at least 47% is lost). GWT requested that the ladies' bedstraw north of the ice house was retained in situ, without success.

4.9 It is common ground that 23% of the central, important, hedgerow will be lost.

4.10 A slow worm population including males, females and juveniles has been recorded across the site with the largest number being present in the north eastern corner of the site. Grass snakes are visited regularly by children. Harm is difficult to specify without a baseline of data, but locals report such routine reptile sightings that the results of the single reptile survey done over 7 days in July 2019 during a heat wave[6], in contravention of standing advice to avoid the summer months, lack credibility. What is clear is that badgers (slow worm predators) are now being moved into the location of the main slow worm habitat, necessitating the translocation of the reptiles and increasing the risk of predation of the remaining population.

4.11 Critically, and missing completely from the application, is any evaluation of harm with respect to the site's educational value. There is significant impact on value for learning and the range of species present, from the outset of development, with most mitigations being suggested as long term improvements. The school farm becomes non-viable without direct access to grazing and safe access for primary school children. The site is fenced off in its entirety during the development. The only reasonable conclusion is that harm to the designated features of the local wildlife site is significant, and most likely permanent.

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[4] Appendix 4.2, TN08: Assessment of the Site against Gloucestershire Wildlife Site Criteria, 7 August 2020

[5] TN08: paragraph 5.8

[6] Ecology POE, Baxter, 2019 (para 4.4.14): the methodology advises that (*reptile*) surveys are optimally carried out in April, May and September. The advice to avoid July and August is based on the risk that higher temperatures at this time of year could lead to a reduced effectiveness of the surveys… [*34 degrees was the highest temperature recorded during the mid point of this survey in late July 2019, the average for the month 21 degrees*] … with careful surveying, I consider a survey at this time of year to be effective.

4.12 The most common answer to 'what will you miss about the school' in the 2018 year 6 leavers' group was "the field". Cross country, forest school, hearing tawny owls hooting, seeing toads, slow worms, grass snakes, roe deer, foxes, the very occasional day roaming badger, or 'peace and tranquility' (their words). One pupil petitioned the Carmelites (change.org) against the development citing the wildlife of the site, generating 800 signatures.

4.13 The proposed mitigation strategy is that there will be greater diversity in a smaller area; but basic biology kicks in. Given the existing presence of 22 grassland species moths not found anywhere else in Cheltenham borough, every common type of butterfly prolific in the central hedgerow, red listed birds already use the site including all 3 woodpeckers and multiple birds of prey, there are fox cubs, toads, grass snakes, common newts, roe deer and their fawns - and an ecosystem can only survive if it has sufficient space, the question is "how?".

Compensation

4.14 Major earthworks are required in the north eastern corner of the site and on the southern boundary. The whole grassland sits on heavy clay soil. Trenches cut to a depth in 2017 and refilled are still clearly visible and collapsing further due to sub surface spring changes. The damage can be highlighted during the site visit if required. Allowing site machinery and earthworks on this land will eradicate, not improve, the existing herb cover.

4.15 Compensation for the badger harm is provided in the form of a relocated artificial sett. As the later proof of evidence (CKF: Badgers) details, this is fundamentally flawed.

4.16 Moving the badgers brings them into conflict with the slow worms, so an (unspecified) translocation of the slow worm population is also required (to precede the creation of the artificial sett, which has to precede closure of the main sett, all of which needs to be successfully demonstrated before building work could start.

4.17 Despite requests to retain Ladies Bedstraw in situ, attempts will be made to translocate plugs from north of the ice house to the retained grassland, but there are no protected areas of grassland during the development.

4.18 Primary ecological recovery is claimed from the creation of new woodland planting; but as the site has shown over the last two centuries at least, a clay bank is surprisingly resistant to new trees; drought isn't kind to this hillside. And the deer need grazing if they are to survive in situ. Not normally an ecological consideration, but their breeding cycle on the site is yet further illustration of the value of the species range present under the LWS criteria.

Value from and survival of the Local Wildlife Site area

4.19 GWT requested conditions be in place such as conservation covenant but none has been offered.

4.20 Residents will be excluded from the local wildlife site, by design. A residents' levy will be used to fund a maintenance company to undertake the required and specialised future grassland management, but residents themselves will gain no benefit. The inevitable conflict this will create is a significant risk to the management arrangements that are essential to any claims of biodiversity net gain, or to compensate for the wider ecological impacts of the proposal.

4.21 There is no pedestrian or vehicular access to the grassland available from Oakhurst Rise. Without this provision, the proposed framework management plan[7] is severely compromised.

4.22 Aspect's technical assessment of the site against Local Wildlife Site Criteria[8] states that "the site does not meet any of the listed criteria… This is largely due to **the small size** and suburban nature of the site, a lack of historic management, **a lack of public access**, and a lack of species diversity. It isn't clear how the key wildlife site can be too small, but also be successfully reduced in size by nearly 50%!

4.23 Given the current public, charitable and county schools' use of the location, in keeping with its LWS designation, a plan that further reduces access to the land cannot be beneficial; it is notable that this reduced access is only required because of the exceptionally limited amount of grassland being retained.

4.24 The SSSIs in the county only survive with active and extensive volunteer support; a new management company is unlikely to prioritise specialised ecological maintenance of a small parcel of grassland, especially when the legal liabilities of mixing children and health and safety risks become part of their commercial risk register.

Appendices:

Appendix 4.1 Gloucestershire Wildlife Trust letter of 1 September 2020
Appendix 4.2, Excerpts, TN08: Assessment of the Site against Gloucestershire Wildlife Site Criteria, 7 August 2020
Appendix 4.3: Framework management plan, TN12, 7 September 2020

[7] Appendix 4.3
[8] TN 08 para 1.3

Gloucestershire Wildlife Trust

Gloucestershire Wildlife Trust
Robinswood Hill Country Park
Reservoir Road
Gloucester
GL4 6SX

info@gloucestershirewildlifetrust.co.uk
www.gloucestershirewildlifetrust.co.uk
Telephone: 01452 383333

Registered charity number: 232580
Registered in England number: 708575

Planning
Cheltenham Borough Council
Municipal Offices
Promenade
Cheltenham
Gloucestershire
GL50 9SA

1st Sept 2020

20/00683/OUT | Outline application for 43 dwellings including access, layout and scale, with all other matters reserved for future consideration | Land Adjacent To Oakhurst Rise Cheltenham Gloucestershire

Dear Sir/Madam,

I am writing to provide Gloucestershire Wildlife Trust's (GWT) comments regarding the biodiversity mitigation proposed in application 20/00683/OUT.

The grassland on site has been assessed in the applicant's ecological report as of poor quality semi natural grassland. However, there are as they mention, a number of indicators of unimproved neutral grassland, a resource for which we only have 1677ha recorded in the county (0.6% of the county by area). Though these indicators are in some cases infrequent in the sward, they and the historic of lack of agricultural improvement of the site, do suggest that if the site were to be more appropriately managed, e.g. appropriately timed annual hay cut and removal of the arisings, the site would be likely to develop to a more unimproved grassland quality.

The ecological report enhancement measure EE2 talks of grassland creation, however, in the response to Friends of Charlton Kings (20_00683_OUT-ECOLOGY_BRIEFING_NOTE_ON_BEHALF_OF_THE_APPLICANT-1076642.pdf) the consultant clarifies that existing grassland will be retained and enhanced. GWT would endorse the retention of the grassland intact and enhancement of the sward through local provenance seed. The ladies bedstraw is not widespread across the site, being mainly in a couple of large patches to the north west of the ice house. Attempt should be made to preserve this in situ.

The largest area of retained grassland, being retained for school use, will not have public access. This gives greater confidence that under enhancement and correct management a more species rich sward should develop. It should be made clear to residents that this area has no public access and fencing should be such to ensure it is not easy to gain access. Management should consider the requirements of both the enhancement of plant species diversity but also the maintenance of invertebrate species recorded on the site such as chimney-sweeper moth and five spot burnet moth.

The site has been confirmed to pass the Local wildlife Site (LWS) selection criteria by the Gloucestershire LWS selection panel (01/09/2020) on the grounds of Value for Learning, being a good selection of habitats and species exceptionally well-placed to offer educational opportunities by its proximity to a school. The mitigation plan will enable the continuation of part of the site to meet the same criteria, however, GWT would like to see conditions in place such as a conservation covenant to ensure the undeveloped area of the site is secured for biodiversity in perpetuity.

For areas accessible to residents the outcome of grassland enhancement is of lower confidence as access by dog walkers is likely to result in nutrient enrichment and compaction.

GWT's view that the mitigation and enhancements for the habitats and species recorded on site are adequate to achieve no net loss of biodiversity.

Kind regards

Dr Juliet Hynes

Nature Recovery Network Coordinator

aspect ecology KWS

Assessment

Project: Land Adjacent to Oakhurst Rise, Cheltenham

Technical Briefing Note TN08: Assessment of the Site Against Gloucestershire Local Wildlife Site Criteria

Date: 07 August 2020

1. Executive Summary

1.1 Aspect Ecology has carried out a review of the above site in relation to the Gloucestershire Key Wildlife Site (KWS) Selection Criteria, which have been developed by the Gloucestershire Wildlife Sites Partnership.

1.2 In order to potentially qualify as a KWS on the basis of grassland habitat, a site must meet at least one of nine General Criteria, such as diversity or value for learning. In addition, any site must be subject to detailed botanical survey work to identify the plant communities present (using the National Vegetation Classification NVC methodology) and identify the presence of any species listed as occurring on grasslands of high conservation concern in Gloucestershire. The site must fit one of the listed plant communities AND have above a threshold of the listed species of conservation concern in order to potentially qualify as a KWS.

1.3 A review of the site against the General Criteria has been carried out below, which finds that the site does not meet any of the listed criteria. This is largely due to the small size and suburban nature of the site (being surrounded on three sides by housing and on the fourth side by a school), a lack of historic management, a lack of public access and a lack of species diversity.

1.4 The site has been subject to detailed botanical survey work by an experienced botanist in August 2020, which finds the site is considered to have the closest affinity to NVC community MG1a, which is a grass-dominant, species-poor community typical of fields subject to infrequent management. Correspondingly, the site therefore must contain at least 20 of the listed species of conservation concern. The survey identified 12 species which therefore falls well short of the threshold of 20.

1.5 In summary, detailed botanical survey work coupled with a review of the General Criteria finds that that site is not of elevated value. Accordingly, in our opinion it does not meet the required criteria for designation as a KWS. Indeed, should it be designated it would serve to de-value the series as a whole through the inclusion of a non-key site.

2. Introduction

2.1 It is understood that the land adjacent to Oakhurst Rise, Cheltenham has been put forward by Charlton Kings Friends (CKF) as a potential Gloucestershire Key Wildlife Site (KWS), on the basis of its grassland habitat. This is set out in correspondence from Bioscan dated 29 July 2020.

2.2 Aspect Ecology has been commissioned to carry out a review of the potential of the site to qualify as a KWS. This review is set out below.

3. Process of Designation

3.1 The methodology for selection of KWS is set out in Part 1 of the Gloucestershire Key Wildlife Sites Handbook[3], and is summarised below.

Gloucestershire Wildlife Sites Partnership

3.2 During 1976-1977, the Gloucestershire Wildlife Trust conducted a habitat survey of the county. As part of this work, approximately 300 sites were surveyed which were identified as being of ecological significance within Gloucestershire and formed the first Key Wildlife Sites. The Gloucestershire Wildlife Sites Partnership was set up in January 2010 to oversee the Key Wildlife Sites system.

Site Selection Panel

3.3 From within the Wildlife Sites Partnership, the handbook stated in 2015 that a panel would be appointed to apply the LWS selection criteria and decide whether a candidate site should be designated as an LWS. As stated in section 1.10 of the handbook: "*The operation of the Site Selection Panel is heavily dependent on the carrying out of regular KWS surveys, both of potential new sites and existing KWS*."

[3] 1 GCER (July 2015) Gloucestershire Key Wildlife Sites Handbook Part 1 v4.5 Final

- Area A: False Oat-grass *Arrhenatherum elatius* dominant vegetation, which comprises the vast majority of the site;
- Area B: Tor-grass *Brachypodium pinnatum* dominant vegetation, which forms small stands mainly in the north of the site;
- Area C: Yorkshire-fog *Holcus lanatus* dominant grassland, which occupies a small part of the western portion of the site.

5.4 Analysis of the survey data finds that the majority of the site (Area A) is considered to have the closest affinity to NVC community MG1a, which is a grass-dominant, species-poor community typical of fields subject to infrequent management. Small areas of the grassland (Area B) are considered to represent an intermediate between MG1a and CG4c, based on the localised dominance of Tor-grass, but lack many of the calcareous species typically associated with CG4. A small part of the western portion of the site (Area C) is considered to represent a transition between MG1 and MG9, with a somewhat greater forb cover, but remains species-poor.

5.5 In all cases, the average number of species recorded per quadrat is lower than the averages for the described NVC communities, suggesting that the areas are relatively poor examples of their type.

5.6 Forb cover in the quadrats is very low at typically 5 – 10%. This reflects the habitat as a whole which is grass dominated at a cover which greatly exceeds the description of MG1(26a) in the UK Habitat Classification Field Key as "vegetation with over 50% grass cover".

5.7 A total of 12 species of local interest, according to the KWS selection criteria, were recorded within the site, which therefore falls well short of the 20 required for selection. It is understood, that records of additional KWS species are present, although these were not collected as part of systematic surveys of the site. While some early species may be present which would not have been recorded during the current survey, the absence of others being re-recorded during the current survey reflects the very small number of individuals of such species which may be present. Given that they cannot be readily re-recorded, as they are represented at such a low frequency in the sward (and they are not rare species), it follows that they contribute little to nothing to the conservation interest of the grassland. Accordingly, these species would not be expected to be recorded during snapshot surveys carried out for KWS selection. Rather, the criteria thresholds reflect numbers of indicator species which would be expected to be able to be readily recorded during KWS surveys.

General Criteria

5.8 A review has been carried out of the site against the General Criteria set out in Part 2 of the KWS selection criteria handbook. This is summarised below and set out in full in Annex 5487/2.

- **Size or Extent** – does not meet the criteria as it is small in size and does not contain any exceptional or large species populations.
- **Diversity** – does not meet the criteria as survey work has confirmed the site is not diverse beyond the context of the site itself.

- **Naturalness and Typicalness** – does not meet the criteria as it located in a suburban location and survey work has confirmed it does not contain a notable vegetation structure, notable habitats beyond the context of the site itself, a notable mosaic of habitats or support significant populations of notable species.
- **Rare or Exceptional Feature** – survey work has confirmed no rare or exceptional features are present;
- **Fragility** - survey work has confirmed the habitats within the site are not of importance beyond the context of the site i.e. below the county context, and therefore the criteria is not applicable to the site.
- **Recorded History or Cultural Associations** – not applicable as the site has not been subject to historic/long-term/traditional management practices.
- **Wildlife Corridors and Other Connected Habitats** – does not meet the criteria due to enclosure of the site by houses on three sides and a school on one side.
- **Value for Appreciation of Nature** – does not meet the criteria as there is no public access to the site and views into the site from the surrounding dwellings would be distant and obscured by trees.
- **Value for Learning** – the adjacent school does have access to the field although at the present time, little use of the grassland is made for educational purposes. Given the currently herb poor nature of the sward, it is considered that this would not be a resource the school would turn to for grassland botanical studies.

5.9 Based on the review carried out, the site does not meet any of the General Criteria.

6. Summary

6.1 A review has been carried out to determine whether the site may meet the identified criteria to qualify as a KWS. The review has been informed by survey work carried out at the site including habitat survey, botanical survey and faunal surveys.

6.2 In order to potentially qualify as a KWS, a site must meet at least one of the General Criteria set out in Part 2 of the KWS Handbook, AND, in relation to grassland sites, confirm to one of the listed NVC communities AND contain a number of listed species above a particular threshold (from a list of species occurring on grassland of highest conservation concern is Gloucestershire). Where sites may qualify on the basis of these criteria, the site is put forward to the Gloucestershire Wildlife Sites Partnership Site Selection Panel for consideration as a KWS.

6.3 The review finds that the site does not meet any of the nine General Criteria, whilst detailed botanical survey work carried out in August 2020 finds that the majority of the site is considered to have the closest affinity to NVC community MG1a, which is a grass-dominant, species-poor community typical of fields subject to infrequent management. Only 12 listed notable species were recorded and therefore the site falls well short of meeting the threshold of 20 species for MG1 grasslands. The botanical survey has been carried out by an experienced botanist with a detailed report presented. As set out in the KWS handbook Part 1 at paragraphs, 3.5 and 3.6, surveys not carried out by suitable experienced professionals should be considered to be unreliable, whilst as stated in paragraph 3.4, data acquired under trespass should be disregarded.

6.4 In conclusion, detailed botanical survey work, coupled with a review of the General Criteria finds that the site, in our opinion, does not meet the required criteria for designation as a KWS. Indeed, should it be designated it would serve to de-value the series as a whole through the inclusion of a non-key site.

Framework Management Plan

Project: Oakhurst Rise, Cheltenham

Technical Briefing Note TN12: Framework Management Plan for Restoration of Retained Grassland and Associated Habitats

Date: 07 September 2020

1. Introduction and Background

1.1 Aspect Ecology is advising the applicant on ecological matters relating to the site at Land Adjacent to Oakhurst Rise, Cheltenham. The site is proposed for residential development and associated landscape enhancements (planning application ref: 20/00683/OUT). The site is subject to a recent LWS designation.

1.2 Under the proposals, which are to develop only part of the site, an opportunity is available to restore the retained area of existing grassland shown edged red on the accompanying plan to herb rich meadowland. The details of how this is to be carried out will be secured by way of a planning condition, to require the drafting and implementation of a Grassland Management Plan (or similar description). This will be attached to a grant of planning permission requiring the submission of the Management Plan for the approval of the LPA. The submission of the Management Plan pursuant to a planning condition will become available for public consultation. The Management Plan will also secure the management of the other associated habitats within the site.

1.3 The purpose of this note is to set out a framework for the Management Plan.

2. Structure for Management Plan

2.1. The management plan will be structured using a similar series of headings to the following:

1) Introduction
2) History to the site
3) Existing ecological baseline
   a. Botanical survey data
   b. Faunal survey data
   c. Fungi, lower plants and other groups
4) Management overview
   a. Aims and objectives
   b. Areas covered by the management plan
   c. Site tenure
   d. Responsibility
   e. Management structure
   f. Ecological constraints

5) Soil testing
6) Meadow Restoration prescriptions (capital works)
7) Pond creation (capital works)
8) Ongoing conservation management of meadow
9) Ongoing conservation management of other habitats
    a. Pond
    b. Trees
    c. Hedgerows and scrub
    d. Refugia and hibernacula
10) Conservation management prescriptions for faunal species groups
    a. Bats
    b. Badgers
    c. Reptiles
    d. Amphibians
    e. Birds
    f. Invertebrates
11) Control of invasive species and weeds
12) Management to prevent public access (land edged red)
13) Funding arrangements

3. Considerations for inclusion in grassland restoration prescriptions

3.1. Soil testing will be undertaken to assess existing nutrient levels within the soil and levels of compaction. Assessment of phosphorous levels is particularly important for grassland restoration. This will inform future restoration management actions.

3.2. At the present time, a rank closed grassland sward dominates the meadow. In order to open the root mat, a close grassland cut will be undertaken followed by light to moderate scarification through harrowing to break up the thatch and root mat. It may be necessary to harrow a number of times.

3.3. Timings of grass cuts will consider the life cycles of resident invertebrate species (e.g. timing of caterpillar food plants). Of particular relevance, is the spring abundance of Pignut *Conopodium majus* at the site which acts as the food plant for Chimney Sweeper Moth *Odezia atrata*. Other species should also be considered such as Five-spot Burnet Moth *Zygaena trifolii* the foodplant for which is Bird's-foot Trefoil *Lotus corniculatus*.

3.4. Harrowing can be detrimental to grassland fungi, particularly waxcaps that are associated with a moss layer. The presence of any grassland fungal interest will be reviewed prior to harrowing.

3.5. Harrowing will have the effect of activating the existing seedbank which is present allowing any herbs which persist in the soil which have been suppressed by the thick root mat to germinate.

3.6. Post harrowing, natural germination of meadow forbs will be assessed and, if necessary, will be supplemented with an appropriate neutral grassland herb rich native seed mix. This will be preferentially sourced from a local meadow or should this not be available, from a commercial supplier and will be sown post harrowing. Yellow rattle will be included as a component in the mix to suppress subsequent vigorous regrowth by coarse grasses. Sowing will be timed so that germination is successful e.g. in spring, when subsequent rainfall is likely. Otherwise watering will be necessary.

3.7. Currently, some vestigial grassland interest is present, with a number of herb species reduced to just a single specimen or small numbers of individuals e.g. Ox-eye Daisy, while other herb species are patchy within the sward such as Ladies Bedstraw. Turfs and plug plants of Ladies Bedstraw from 2 patches to the north west of the ice-house will be translocated into the area of meadow (land edged red).

3.8. Aftercare will be undertaken involving regular grass cutting (with removal of the arisings) e.g. every 2 – 4 weeks, during the period the restored sward establishes. Regard to invertebrate food plants will be taken (as per section 3.3 above). In particular, invertebrate lifecycles will be considered and areas of uncut sward may be required to be retained. Supplementary weed suppression will be undertaken as necessary with details of the methods to be employed set out in the full Management Plan.

3.9. Long term conservation management will be based on a hay cut regime of a cut in mid-July post flowering and seeding with the hay bailed and removed. An additional early spring cut in late April or early May and/or an early autumn cut in mid to late September will control vigorous grasses. Alternatively, the meadow could be lightly grazed post the hay cut in July (but not before) until the end of October. Regard to invertebrate food plants will be taken (as per section 3.3 above). Climate change is driving changes in flowering dates. For long term management, the timing of hay cuts will be adjusted to align with climate driven changes to flowering dates.

3.10. As part of the above, consideration will be given to the faunal interests present including reptiles, Badger and invertebrates, with appropriate safeguards put in place.

4 Consultation

4.1. Gloucestershire Wildlife Trust has been consulted on the drafting of this Framework Management Plan and their comments have been fully incorporated into this final version (see Appendix 1).

5 Conclusion

5.1. A management plan based on the above framework will lead to the development of a botanically species rich meadow while its associated habitats e.g. hedgerows, scrub, pond and trees will also be managed to maximise their ecological potential. Benefits for faunal species will also be incorporated with funding for ongoing conservation management of the habitats secured as part of the development proposals. In conclusion, these prescriptions will provide a varied resource for wildlife that secure and enhance the interest of the Local Wildlife Site.

Plan 5487/RGR1

Location of Retained Grassland for Restoration

Key:

Retained Grassland for Restoration

aspect ecology

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Land Adjacent to Oakhurst Rise, Cheltenham	PROJECT
Location of Retained Grassland for Restoration	TITLE
5487/RGR1	DRAWING NO.
-	REV.
September 2020	DATE

Appendix 5487/1:

a) Consultation response from Gloucestershire Wildlife Trust on the Framework Management Plan dated 07 September 2020; and

b) subsequent follow up email correspondence of the same date

Gloucestershire Wildlife Trust
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Reservoir Road
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GL4 6SX

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Telephone: 01452 383333

Registered charity number: 232580
Registered in England number: 708575

William Morrison (Cheltenham) Ltd
113-115 Pillar House Bath Road
Cheltenham
GL53 7LS

7th Sept 2020

Dear Sir,

Advice on the content of Framework Management Plan for St Edwards Prep School Meadow Local Wildlife Site under planning application 20/00683/OUT.

This advice is limited to the Framework Management plan only and should not be taken as an endorsement of the planning application itself by GWT.

Comments on section 2 - Structure for Management Plan:

As an outline, the headings cover the range of management issues present at the site.

Comments on Section 3 - Considerations for inclusion in grassland restoration prescriptions:

3.1 Agree soil nutrient testing is required, assessment of phosphorous level is particularly important for grassland restoration.

3.2 Timing of grass cuts should consider the life cycles of resident invertebrate species (e.g. timing of caterpillar food plant) to avoid wiping out site population. If necessary, leave some areas uncut for invertebrates to complete their lifecycle. Harrowing can be detrimental to grassland fungi, particularly waxcaps that are associated with a moss layer. Be clear that there is not grassland fungal interest before undertaking harrowing and if there is, adjust the management appropriately.

3.4 It is preferable to retain what is already on site. If the residual seed bank is not sufficient, seed sourced from a local meadow would be preferable to seed from a commercial supplier to maintain local genetic integrity.

3.6 As in 3.2 invertebrate life cycles need to be considered. Some areas of uncut grass may be required, though food plants need to be present in uncut areas. Details should be given on method of weed suppression.

3.7 Climate change is driving changes in flowering dates. For long term management, the timing of hay cut may need to move to align with climate driven changes to flowering dates.

Kind regards

Dr Juliet Hynes

Nature Recovery Network Coordinator

Alistair Baxter

From: Juliet Hynes <juliet.hynes@gloucestershirewildlifetrust.co.uk>
Sent: 07 September 2020 16:25
To: Alistair Baxter
Subject: RE: Oakhurst rise/St Edwards Prep School field

Dear Alistair, Thank you for the revised version of the Framework Management Plan (FMP) and the acknowledgment that these comments refer to the FMP only. Gloucestershire Wildlife Trust confirms that the prescriptions within the revised draft of the FMP should result in securing and enhancing the biodiversity interest of the retained areas of the Local Wildlife site.

Kind regards
Juliet

Dr Juliet Hynes
Nature Recovery Network Coordinator
Gloucestershire Wildlife Trust
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From: Alistair Baxter <alistair.baxter@aspect-ecology.com>
Sent: 07 September 2020 16:01
To: Juliet Hynes <juliet.hynes@gloucestershirewildlifetrust.co.uk>
Subject: RE: Oakhurst rise/St Edwards Prep School field

Dear Juliet,

Thank you for your response of today's date in regard to the draft Framework Management Plan (FMP). We have taken on board all of the Trust's points and incorporated these into an updated FMP. I would be grateful for confirmation that as a result GWT can now endorse the FMP and its conclusion that *"these prescriptions will provide a varied resource for wildlife that secure and enhance the interest of the Local Wildlife Site"*. We understand that this would not be taken as an endorsement of the planning application itself by GWT.

Regards

Alistair Baxter
Director
t: 01295 279721 | m: 0787 6232615 | e: alistair.baxter@aspect-ecology.com

CKF Proof of Evidence on St Edward's School Meadow
(historically known as "The Leasowe")
and now referenced as "land off Oakhurst Rise".

Part 5: Badgers

20 February 2021

5. Badgers[1].

5.1 Badger habitats are noted as being of local relevance in the adopted local Plan.

LEGALLY PROTECTED SPECIES

10.11. The *Countryside and Rights of Way Act 2000* and the *Conservation (Natural Habitats &c.) Regulations 1994* legally protect certain species and their habitats. Other species are protected under their own legislation, for example the *Protection of Badgers Act 1992*. Of particular relevance to Cheltenham are the habitats of the barn owl, badger and bat. This list is not exhaustive and other habitats may also be relevant.

5A: HARM

5.2 It was common ground at the 2019 appeal[2] that "the loss of sett BS1 would be of high importance to the local Badger population as this is a main sett and is likely to be a key breeding site". Setts BS2, BS4 and BS5[3] would also be destroyed as part of this application. The three sett entrances to be destroyed associated with BS4 are part of the habitat of veteran tree 3028, being directly underneath the tree canopy. BS1 and BS5 are within the RPAs of mature oak trees 3014 and 3015 (both disputed as veteran by the Woodland Trust).

[1] Appendix 5.1 Confidential Badger Annex, April 2020
[2] Appendix 5.2, Proof of Evidence in respect of Ecology & Nature Conservation 2019 inquiry, Alistair Baxter
[3] Appendix 5.1 para 3.3.3

5.3 Closure of the setts is documented in the confidential badger annex (section 4.6.6); "this would involve the use of a digger or similar to trace back (where possible) and excavate the tunnel systems and any chambers. The setts would then be backfilled (if practicable) or in-filled.

5.4 There is no protection documented for veteran and mature trees affected by this process; either trees will be harmed or the badger relocation is at significant risk.

5B: COMPENSATION

5.5 No attempt has been made to avoid the loss of the main sett in this new scheme, despite a slightly smaller number of homes. The last resort compensation in this application once again requires creation of a new artificial sett, this time on the boundary of a listed building, and encourages use of the currently unused sett BS3 associated with the ice house.

5.6 In reviewing compensatory measures at appeal, Mr. Baxter's evidence noted the requirements to avoid direct disturbance to any artificial sett, or loss of foraging grounds, and that mitigation required the appeal site to remain "permeable to badgers"[4].

5.7 There is 2m high deer proof (impermeable) wire fencing along the majority of the sett's western boundary, although this is not acknowledged in the badger annex[5]. There is one non-residential route out of the site for badgers, although an attenuation pond will be dug in that location

5.8 47% of current grassland foraging on site will be removed. No compensatory foraging is provided. The sett closure method statement requires all badgers to be excluded from the vicinity of setts BS1 and BS4 (Appendix 5.1 para 4.6.6 "Proofing"), but drawing 5487/BS2 rev C of April 2020 (Mitigation and Enhancements)[6] omits this detail.

5.9 As previously, the school grounds are claimed as compensatory foraging. This is not valid. First, they are already present, but as badgers carry toxioplasmosis, schools are duty bound to act if badgers start using grounds as latrines, particularly from areas used routinely for sport and outdoor education by very young children (aged 2 and upwards). There is a high risk of badgers being excluded from any foraging beyond their small enclosed area.

5.10 The proposed artificial sett would be in conflict with the slow worm populations identified on the site, which would therefore need to be relocated prior to the badger relocation (and in addition to the relocation of Ladies Bedstraw, presumably to somewhere other than near the badger sett). Moving populations of protected species around the site to accommodate different

[4] Appendix 5.2, paragraphs 6.4.1 and 6.4.5
[5] Appendix 5.1 paragraph 3.3.9
[6] Appendix 5.3

species being relocated is patently lacking in credibility, introduces extensive delays and uncertainties to the build (given the different windows for the sequenced activities required) and raises serious questions about the viability of the whole plan, from an ecological perspective and for any delivery of housing prior to 2024.

5C: ADEQUACY

5.11 With regard to the sett location, there are no 30 metre buffers from sett entrances prescribed, in either location[7].

5.12 Best practice referred to by Mr Baxter, provided by Natural Resources Wales within the publication 'Badgers, a Guide for Developers, 2018, notes that licences would be required in future for:

- Use of very heavy machinery within 30 metres of any entrance to an active sett
- Use of lighter machinery (particularly for any digging operation) within 20 metres,
- Light work such as hand digging or scrub clearance within 10 metres

5.13 If the badgers colonised the suggested locations, this licensing requirement affects:

- the credibility of the framework management plan suggested for the grassland into which the badgers have been inserted (routine mowing is required; the usual grassland management of this site respected a 30 metre mowing restriction around badger sett entrances until all cubs have vacated, then 20 metres)
- maintenance on parts of the Grade II listed Charlton Manor, and machine use in neighbouring domestic gardens
- scrub clearance from the ice house, other than by hand.

5.14 Also required for successful relocation are:

- Free draining soil (*the proposed location is on dense clay)*
- Avoidance of artificial light (*the sett is directly in the line of Charlton Manor security lighting and lighting from other adjacent properties*)
- That the sett is built as close to the original as possible and in a quiet location *(noise reducing features are noted but not specified)*
- That a 30 metre exclusion zone is included around the sett entrances *(presumed not possible, appendix 5.3)*
- That scrub cover is planted *(this within the area claimed to be both retained and improved grassland, and 'landscaped buffer' to limit harm to the setting of a listed building)*

[7] Appendix 5.3, 30m buffer zones

- Avoidance of chemicals and fires within 20m of sett entrances (*the AMS is situated on the boundary of a regularly used fire pit and swimming poo*l)

5.15 The relocation of the badger clan assumes re-use of satellite sett BS3 (associated with the ice house). Any underground activity in this location will risks unacceptable harm to its infrastructure, and therefore unavoidable further disruption and harm to this badger clan.

5.16 The artificial sett would be in direct conflict with one of the brick lined bore holes to the Charlton Manor spring water supply; it is not sound to put badgers somewhere they will drown.

5.17 Image 5.0 and 5.1 below highlight these features have been evident since the 2017 archaeological survey on this site. They were raised and acknowledged in closing remarks at the 2019 inquiry. The fabric of Charlton Manor's spring water supply (and Victorian drains from Ashley Road properties, which exit through the field) are at risk from badgers colonising in this location; it is patently unsound, environmentally and ecologically speaking.

Conclusion

5.18 Inspector Sims concluded[8] that even with a successful artificial sett, "the remaining badger population would be potentially subject to more human pressure and interference, and their present foraging area would be substantially reduced by the presence of the proposed housing. This implies a reduction in the biodiversity value of the site in respect of its currently resident badger population".

5.19 Since that time the local plan has been adopted, noting the specific importance of badgers to Cheltenham. The site has been designated as a local wildlife site with specific reference to value for learning and diversity of species; loss of badgers from this site would be harmful to the designation criteria applied to the site. The new application is demonstrably impermeable to badgers, constraining foraging further than the last application, and with a fundamentally flawed proposal for the location of the artificial sett.

5.20 The proposal is unsound and not policy compliant.

[8] Appendix 0.2, para 94

Image 5.0 Brick bore hole located in trench 1 (to Charlton Manor spring water supply), appellant's submission 17/00710/OUT

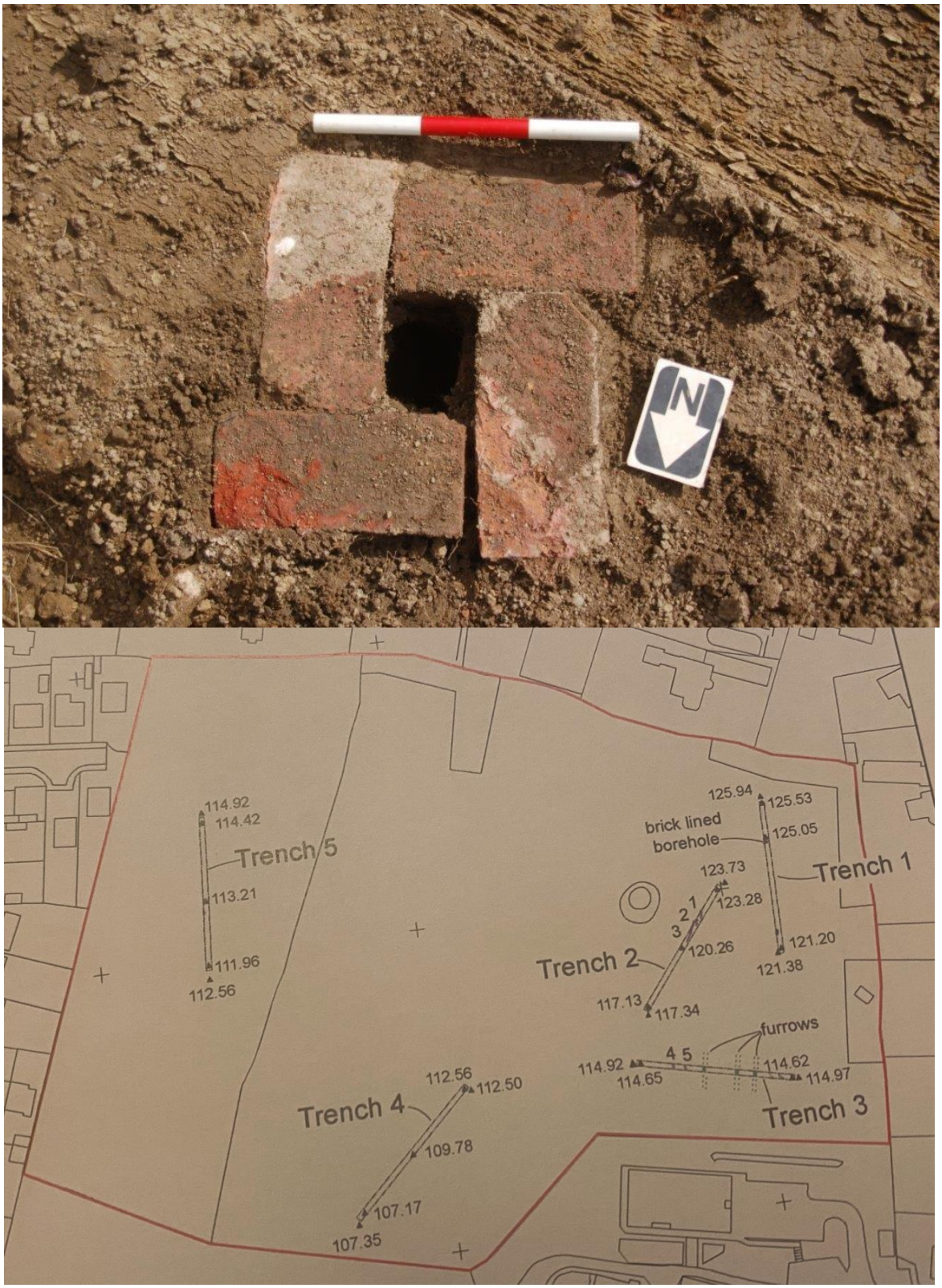

Image 5.1 Archaeological trench diagram, appellant's submissions, 17/00710/OUT

Appendix 5.1 Confidential Badger Annex
Appendix 5.2 Ecology Proof of Evidence, 2019 appeal
Appendix 5.3 Drawing 5487/BS2 rev C of April 2020 with added approximate 30 metre exclusion zones (including all development) from proposed new sett entrances

Land off Oakhurst Rise, Charlton Kings,
GL52 6NR

Confidential Badger Appendix

April 2020

Quality Management	
Client:	William Morrison (Cheltenham) Ltd
Project:	Land off Oakhurst Rise, Charlton Kings, GL52 6NR
Report Title:	Confidential Badger Appendix
Project Number:	ECO-5487
File Reference:	5487 ConApp 2020 vf
Date:	23/04/2020

Confidentiality

This report may contain sensitive information relating to protected species. The information contained herein should not be disseminated without the prior consent of Aspect Ecology. All records of Badger setts must remain confidential. Where this report is circulated publicly or uploaded to online planning portals, reference to Badger setts must be redacted and any maps pertaining to the locations of Badger setts removed from the document.

Legal Guidance

The information set out within this report in no way constitutes a legal opinion on the relevant legislation (refer to the relevant Appendix for the main provisions of the legislation). The opinion of a legal professional should be sought if further advice is required.

Liability

This report has been prepared for the exclusive use of the commissioning client and unless otherwise agreed in writing by Aspect Ecology no other party may use, or rely on the contents of the report. No liability is accepted by Aspect Ecology for any use of this report, other than for the purposes for which it was originally prepared and provided. No warranty, express or implied, is made as to the advice in this report. The content of this report is partly based on information provided by third parties. Unless otherwise stated, information obtained from any third party has not been independently verified by Aspect Ecology.

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1. Introduction

1.1. Background & Proposals

1.1.1. Aspect Ecology was initially commissioned by William Morrison (Cheltenham) Ltd in September 2018 to provide ecological consultancy services in respect of the proposed development of land at Oakhurst Rise, Cheltenham, centred at grid reference SO 965216. Aspect Ecology has continued to provide input on ecological matters, and in March 2020 Aspect Ecology was commissioned to undertake an update overview survey of the site incorporating an update survey for Badgers.

1.1.2. The proposals are an outline application for residential development of 43 dwellings – access, layout and scale not reserved for subsequent approval.

1.2. Site Overview

1.2.1. The site is dominated by a grassland field, bisected by a substantial hedgerow. Hedgerows are also situated along the western boundary and sections of the northern, eastern and southern boundaries. A number of trees, including mature and veteran trees, are also present on-site. Residential properties bound the site to the north, east, and west, whilst St Edward's Preparatory School and grounds bounds the south of the site.

1.3. Purpose of the Report

1.3.1. This report documents the methods and findings of the Badger presence / absence survey work, and desktop study, carried out in order to establish the existing status of Badger within the site, and subsequently provides an appraisal of the likely effects of the proposals on Badger. Where necessary, avoidance, mitigation and compensation measures are recommended so as to safeguard Badger. The results of this up-to-date assessment supersedes the previous, now out of date, third party survey work and assessments.

2. Methodology

2.1. Previous Survey and Assessment

2.1.1. The site and surrounding habitats have previously been subject to a range of ecological surveys and assessments undertaken by a third-party consultancy between 2016 and 2017, the findings of which provide the context to this report. The survey and assessment directly relevant to Badger include:

- Badger Survey (All Ecology: Revision 2, November 2017)

2.2. Desktop Study

2.2.1. In order to compile further background information on the site and its immediate surroundings Gloucestershire Centre for Environmental Records (GCER) was contacted with data requested on the basis of a search radius of 0.5km.

2.3. Badger Survey[1]

2.3.1. A detailed Badger survey was undertaken on the 16th November 2016 to establish the level of Badger activity on site and in the immediate surroundings; the methodology for which is detailed within a Badger Survey report prepared by the third-party consultancy[2]. Aspect Ecology undertook an update Badger survey on 11th October 2018 to confirm the status of Badgers at the site, with further surveys conducted in May 2019, July 2019, and April 2020. The surveys comprised two main elements. The first element involved searching for evidence of Badger setts. For any setts that were encountered, each sett entrance was noted and mapped. The following information was recorded:

- Number and location of well used / active entrances; these are clear from any debris or vegetation and are obviously in regular use and may, or may not, have been excavated recently;
- Number and location of inactive entrances; these are not in regular use and have debris such as leaves and twigs in the entrance or have plants growing in or around the edge of the entrance; and
- Number of disused entrances; these have not been in use for some time, are partly or completely blocked and cannot be used without considerable clearance. If the entrance has been disused for some time all that may be visible is a depression in the ground where the hole used to be and the remains of the spoil heap.

2.3.2. The second element involved searching for signs of Badger activity such as well-worn paths and push-throughs, snagged hair, footprints, latrines and foraging signs, so as to build up a picture of any use of the site by Badger.

2.4. Survey Constraints and Limitations

2.4.1. Densely vegetated habitats within the site have the potential to reduce the detectability of field signs for faunal species such as Badger. A detailed survey was able to be completed and whilst dense scrub vegetation is present within the site, it is considered that the

1 Based on: Mammal Society (1989) '*Occasional Publication No. 9 – Surveying Badgers*'
2 All Ecology (Revision 2, November 2017): Badger Survey

survey results provide an accurate baseline to assess the potential for impacts on Badger under the development proposals.

3. Results and Evaluation

3.1. Relevant Legislation

3.1.1. Badger receive legislative protection under the Protection of Badgers Act 1992. The legislation aims to protect the species from persecution, rather than being a response to an unfavourable conservation status, as the species is in fact common over most of Britain. It is the duty of planning authorities to consider the conservation and welfare impacts of development upon Badger and issue permissions accordingly.

3.1.2. Licences can be obtained from Natural England for development activities that would otherwise be unlawful under the legislation. Guidance on the types of activity that should be licensed is laid out in the relevant best practice guidance. [3, 4]

3.2. Desktop Study

3.2.1. Information returned from the GCER included two records of Badger from within the site dated 2017. An additional record of Badger was also returned from GCER located approximately 290m south-east of the site, dated 2017.

3.2.2. Survey work carried out by a third-party consultant in 2016 identified the presence of Badger within the site; the results from which were presented in a `Badger Survey` report and submitted to inform a planning application (17/00710/OUT). The report has been reviewed as part of the assessment of use of the site by Badgers, and details on the methodology, results and assessment drawn at the time can be found within the report listed at paragraph 2.1.1.

3.2.3. Survey work carried out by Aspect Ecology in in October 2018, May 2019 and July 2019 monitored the use of the site by Badgers, the status of known setts, and checked for the presence of any new setts. The results from the October 2018 survey were presented within a confidential appendix to Aspect Ecology's report entitled Ecological Appraisal dated October 2018, submitted to inform a planning application (18/02171/OUT).

3.3. Field Survey

Setts

3.3.1. Two Badger setts were recorded on-site during the 2016 Badger survey; an active main sett (BS1; see Plan 5487/BS1) located within a line of trees extending down from the northern site boundary and an inactive annexe sett (BS2) located within hedgerow H1. Dung pits, snuffle marks and Badger trails were also recorded across the site.

3.3.2. Update survey work undertaken by Aspect Ecology since October 2018 has recorded a total of 5 Badger setts; the status of which, other than the main sett (BS1), has changed throughout this period. The locations of each sett are shown on Plan 5487/BS1, and described below based on the most recent survey undertaken in April 2020:

- **BS1** – At the time of the survey the main sett BS1 (see Plan 5487/BS1) had 15 sett entrances in active use with fresh spoil and/or bedding material present. A further 6 entrances had reduced activity levels, with no fresh spoil or bedding and leaf litter

[3] English Nature (2002) '*Badgers and Development*'
[4] Natural England (2011) '*Badgers and Development: A Guide to Best Practice and Licensing*', Interim Guidance Document

accumulated within the entrance. In addition, 13 inactive entrances were present, not in recent use, with considerable leaf litter and plant growth around the entrances. At least three collapsed and disused entrances are present. A well-worn path network connected the tunnel entrances and extended in multiple directions from the sett.

- **BS2** - comprises two inactive entrances which have relatively open tunnel entrances, but containing significant debris and with no recent spoil heaps or bedding. At least two disused entrances are present as well as additional tunnels utilised by Rabbit. A well-worn path passes next to one of the tunnel entrances and connects to the main sett BS1 as well as the west of the site. Considering the close proximity to the main sett, sett BS2 is likely to be an annexe or subsidiary sett; albeit was inactive at the time of survey.
- **BS3** - has a single inactive entrance situated ~55m east of the main sett above a mound with trees and scrub: the mound is associated with an icehouse. Sett BS3 is likely to be a subsidiary or outlier sett; albeit was inactive at the time of survey.
- **BS4** – A single inactive entrance, partially obscured by part of the fallen trunk of tree T16. A small amount of leaflitter and natural debris has collected in the entrance. Sett BS4 is likely to be a subsidiary or outlier sett; albeit was inactive at the time of survey.
- **BS5** – Two entrances are present adjacent to a tree and within an area of scrub, both appear active due to having clear entrances and a small amount of spoil outside one entrance. The sett is located ~19m south of sett BS1, and therefore may be an extension of BS1. However, for the purposes of the report, it will be considered a separate subsidiary sett.

3.3.3. The active setts BS1 and BS5 and inactive setts BS2 and BS4 are located at least partly within the proposed development footprint and would therefore be directly impacted by construction. As such, it is proposed that setts BS1, BS2, BS4 and BS5 be permanently closed to facilitate the proposals.

3.3.4. The loss of sett BS1 would be of high importance to the local Badger population as this is a main sett and is likely to be a key breeding site for the Badger clan, and suitable alternative locations for main sett construction are often limited. As such, it is considered that, without mitigation, the loss of this sett to the proposals would significantly negatively affect Badgers within the local area. Therefore, an Artificial Main Sett will be created within the north-east of the site, prior to development commencing, to compensate for the loss of BS1 (see Chapter 4). The closure of sett BS1 will require a development licence from Natural England (see Chapter 4), for which a detailed method statement to safeguard the local Badger population would be produced.

3.3.5. The loss of sett BS5 would be of low importance to the local Badger population as this is a subsidiary sett which are not continuously active or typically used for breeding activities. Should BS5 be considered an extension of sett BS1, it would not alter the assessment of importance for BS1 set out above.

3.3.6. As setts BS2 and BS4 are inactive, no Badgers would be affected by its closure and therefore its loss is considered to be of negligible importance to the local Badger population. Sett BS3 is situated underneath a group of trees which will be retained under the proposals. Nevertheless, this sett is inactive and therefore any impact on the sett as a result of the proposals is considered to be of negligible significance.

Foraging and Commuting

3.3.7. Well-worn Badger paths cross the site in all directions, extending from the main sett BS1 and following the site boundaries and central hedgerow. Badgers also appear to exit the site at several locations on all of the site boundaries. Dungpits have been recorded at different locations at the site, although during the April 2020 survey dungpits were recorded at the northern end of hedgerow H2, on its eastern site, adjacent to a well-worm

path. Evidence of Badger foraging was recorded at the northern end of hedgerow H1, at the eastern site boundary, and near to sett BS5.

3.3.8. The site currently offers some foraging habitat for Badgers in the form of semi-improved grassland, hedgerows and scrub. ~1.7ha of the grassland will be lost to the proposals, as well as sections of hedgerow. However, an ~1.0ha area of green space will be retained in the east of the site around inactive sett BS3, which will continue to provide an on-site foraging resource and connectivity to off-site habitat. In addition, further retained green space accessible by Badgers will be present in the south of the site where new wetland habitat is proposed. A new wooded belt separating the development from the green space will include fruit and nut bearing scrub species, which will offer foraging opportunities for Badger. It is therefore considered that the loss of some potential foraging habitat under the proposals will not have a significant effect on the local Badger clan.

3.3.9. Well-worn Badger paths are present along the central hedgerow (H1), and at the site boundaries. The majority of hedgerow H2 and H1 will be retained under the proposals. The loss of sections of these hedgerows is considered to be of low importance in terms of Badger commuting opportunities, as the hedgerows do not form part of wider linear features extending beyond to the north of the site, being fragmented by existing development. Push-throughs were recorded on the northern and western site boundaries leading to residential gardens, a number of which will be lost. However, the potential loss of connectivity to these gardens is considered unlikely to have a significant impact on the local Badger population, as the proposals include the creation of a number of new residential gardens within the site which will likely be utilised by Badgers in the long-term.

3.3.10. Push-through points have been recorded along the southern boundary of the site, as well as off-site snuffle marks to the south of the site. This indicates that Badger routinely travel to and from the grassland adjacent to the south of the site. The construction of an Artificial Main Sett (see Chapter 4 below) within enhanced green space in the north-east of the site, will therefore maintain existing commuting opportunities to off-site habitats. In addition, the retained and enhanced semi-natural habitats, which would be delivered by the proposals, are intended to ensure that where the Badger's clan territory may be encroached by the development, the ability for Badgers to continue to move within the landscape would not be significantly affected.

3.3.11. In order to safeguard Badgers during the site preparation and construction works, a number of mitigation measures are detailed within Chapter 4 below. Subject to the implementation of such measures, it is considered that the conservation status of the local Badger population will be fully safeguarded under the scheme.

4. Mitigation

4.1.1. Setts BS1 and BS5 are the only active Badger setts within the site, as of the April 2020 survey, that will be directly affected by the proposed development of the site; setts BS2, BS3, and BS4 are inactive. So as to safeguard Badgers under the proposals, a number of key considerations have been taken into account when designing the masterplan for the site. These include:

- Potential for direct disturbance to the sett;
- Maintenance of links with other existing setts;
- Potential for loss of foraging grounds;
- Maintenance of links to off-site foraging grounds; and
- Outline mitigation strategy.

4.2. Potential for direct disturbance to the sett

4.2.1. Badgers can be sensitive to disturbance, although it is well known that only certain forms of disturbance normally affect social groups. For example, Badger setts are often found in railway embankments and road verges which appear not to have a significant disturbance effect on the social group. Such disturbance is referred to as habitual disturbance and Badgers are well known to be largely unaffected by this form of disturbance. Habitual disturbance can take a number of forms from loud noises to bright lights to passing traffic.

4.2.2. In contrast to habitual disturbance, Badgers are generally intolerant of direct acute forms of disturbance. Such direct disturbance usually takes the form of sett interference in some manner, such as through digging within close proximity to a sett, movement of people or bicycles over the top of a sett or dogs entering or disturbing a sett. However, such disturbance in proximity of setts may not affect some Badgers.

4.2.3. This tolerance is reflected in the legislation and licensing procedures that are applied to Badgers, which are almost entirely based around protection of the sett itself, i.e. limiting direct disturbance to Badgers.

4.2.4. Badger setts BS2, BS3, and BS4 are inactive and therefore regardless of whether they are lost or retained are not considered further in terms of disturbance to a sett – although see 4.2.8 and `update survey` below. Badger setts BS1 and BS5 are the only active setts that would be disturbed under the proposals. The proposals have evolved since the 17/00710/OUT and 18/02171/OUT applications, with greater retention of ecologically valuable habitats, resulting in more confined development layouts. The retention of the active Badger setts, sett BS1 in particular, in its entirety would further reduce the developable area and therefore also the number of proposed dwellings; public benefit arising from the proposals and feasibility of the development would decrease as a result. Indeed, the fairly central positioning of Badger setts BS1 and BS5 currently within the site, with retention of immediately adjacent foraging grounds and corridors through the site would likely reduce the development area to such an extent that the site would be undevelopable.

4.2.5. Retention of Badger setts BS1 and BS5, given their extent of use and current positioning, are therefore not compatible with the development of the site; particularly given the presence of ecologically valuable habitats which are sought to be retained under the proposals in accordance with adopted local plan planning policies CP3, GE5, GE6, and NE3, and Joint Core Strategy Policies SD9 and INF3, as well as paragraphs 174b) and 175a) of the

2019 National Planning Policy Framework. The development of the site therefore requires the unavoidable loss of Badger sett BS1.

4.2.6. In order to safeguard Badgers, active setts will be permanently closed under a Natural England licence prior to the commencement of works. An outline mitigation strategy for the closure of the setts is provided herein, and the closure of the main sett BS1 will require the creation of an Artificial Main Sett (AMS) to compensate for its loss. The creation of artificial setts is a tried and tested technique for providing Badgers with an alternative main sett, and this is routinely licensed by Natural England. As such, subject to the proper placement of the artificial sett, there can be a reasonably high degree of confidence in the success of this mitigation strategy.

4.2.7. The positioning of the AMS has been extensively considered. To locate the AMS off-site may result in its creation outside the territory of the Badger clan which utilises the site and/or could result in a loss of links to foraging grounds and any nearby setts. The creation of the AMS on-site is therefore more desirable, and ideally within easy access to retained semi-natural habitats and existing links to off-site foraging grounds. Accordingly, the AMS will be constructed in the north-east of the site, in an area of retained grassland, from which Badgers will be able to access the remainder of the green open space at the site (see Plan 5487/BS2) including areas with enhanced foraging opportunities, such that although foraging areas and commuting paths are intersected by the development proposals, the ability for Badger to continue to move within the landscape would not be significantly affected. The maintenance of links with other existing setts and foraging grounds is discussed further below.

4.2.8. Finally, as the use of setts by Badgers is a dynamic process, it is strongly recommended that a check survey be undertaken of all setts prior to construction work beginning, in order to verify that the level and location of any Badger activity has not significantly altered (see *Update Survey* below).

4.3. Maintenance of links with other existing setts

4.3.1. The development has the potential to isolate Badgers at the site by obstructing current push-throughs to any existing setts in the local area. Accordingly, the proposals retain a large extent of green open space in the east and south of the site, with a wooded belt centrally to the site and additional hedgerow and shrub planting within the development, thereby maintaining access to links to any existing off-site setts. Links to other existing setts in the local area will therefore be maintained under the proposals.

4.4. Potential for loss of foraging grounds

4.4.1. Given its relatively small size, the grassland and hedgerow sections that would be lost as part of the proposals represent a limited foraging resource to Badgers. Therefore, while Badgers may currently utilise the development site for some limited foraging opportunities, the local population is unlikely to rely upon these. The proposed inclusion of native fruit and nut bearing species within new hedgerows, tree and shrub planting, as well as the wetland habitat and new residential gardens, in combination with the retained mature hedgerow habitats, will maintain opportunities for foraging Badgers at the site. The incorporation of fruit-bearing species within the new landscape planting will provide an additional, seasonal foraging resource for Badgers at the site.

4.5. Maintenance of links to off-site foraging grounds

4.5.1. Badgers are known to forage some distance from their setts, especially if they have richer foraging grounds elsewhere. Badgers typically travel further to reach foraging grounds which provide a higher return for less foraging effort. Particularly favoured food items are earthworms[5], which provide a rich protein source and are most readily obtained from short sward grassland. On this basis, the maintained ground of St Edwards Preparatory School which lies immediately to the south of the site is likely to be a key foraging ground for the local Badger population. Other foraging opportunities would be afforded by grassland fields further to the east and accessible gardens in the local area, and the grassland fields further to the east.

4.5.2. The proposals have the potential to isolate the Badgers from likely key off-site foraging habitats. The positioning of the AMS in the ~1.0ha of retained green open space in the east will enable Badgers easy access to the green open space in the south and adjacent school grounds (see Plan 5487/BS2), as well as push-throughs at the eastern boundary and part of the northern boundary to any foraging grounds beyond. Links to off-site foraging grounds will therefore be maintained under the proposals.

4.6. Outline Mitigation Strategy

4.6.1. In the UK, Badgers receive statutory protection under the Protection of Badgers Act 1992. The legislation aims to protect the species from persecution, rather than being a response to an unfavourable conservation status, as the species is in fact common over most of Britain. It should be noted that the legislation is not intended to prevent properly authorised development. Accordingly, paragraph 175a) of the 2019 NPPF which seeks avoidance, mitigation, or as a last resort compensation, should significant harm occur to biodiversity as a result of development, is not relevant in respect of Badgers. Indeed, specific provisions within the legislation enable licences to be granted to facilitate lawful development. The presence of Badger within the site does not therefore prohibit development, nonetheless, due care and attention with respect to this species will be required and an appropriate mitigation strategy, which follows Natural England's standing advice closely, is set out herein to avoid and/or mitigate harm to Badgers and to compensate for the loss of a main Badger sett, in accordance with the spirit of paragraph 175(a) of the 2019 NPPF.

4.6.2. **Update Badger Survey.** As the use of setts by Badgers is a dynamic process and new setts can appear at any time or disused setts become reinstated, it is strongly recommended that a check survey be undertaken within 3 months of site preparation / construction works commencing, in order to verify that the level and location of any Badger activity has not significantly altered and to inform the licence application.

4.6.3. **Artificial Main Sett Creation.** The Artificial Main Sett (AMS) is to be created in the north-eastern corner of the site within retained/enhanced green space. The design and specification of the AMS will be based on the recommendations presented at the West Midlands CIEEM conference in 2014. As per these recommendations the AMS will be of adequate size although may not be a like-for-like replacement, as it is anticipated to be naturally expanded by the Badger clan. The precise location and specific design of the AMS will be determined by a competent ecologist, post-planning, but will incorporate the following details in terms of layout, dimensions and materials, and construction.

[5] https://www.woodlandtrust.org.uk/blog/2016/06/what-do-badgers-eat

Layout

- The sett is to have a minimum of 3 entrances with different heights and orientation to promote airflow;
- Entrances to face away from development and towards vegetation;
- Some nesting chambers to be interconnected;
- Chambers to have internal measurement of ~1m^2, and 400mm in height;
- Inclusion of blind ended tunnel(s) for future expansion;
- Chambers to be covered with topsoil to depth of 1m.

Dimensions and Materials

- The artificial sett is not to exceed coverage of an area greater than 25m^2, although a working area of 20mx20m will be required to store materials and plant at the time of the construction of the sett.
- The walls of each chamber will utilise half round wooden stakes (~600mm in length and ~100mm in diameter), estimated at 25 stakes per chamber, whilst the roof of each chamber will be formed from 18mm plywood measuring 1200mm by 1200mm.
- Twin-walled drainage pipes with an internal diameter of 300mm will be used to connect chambers and form entrances.
- Estimated 80 tonnes of soil required to cover AMS to a depth of 1m.

Construction

- An excavator will clear an area approximately 14m in length, 20m in width and 0.5m in depth, under ecological supervision, removing any turves carefully for re-use.
- The sett is to be constructed by hand, and with the use of hand tools, after which the excavator will infill the area around the chambers and pipes with previously excavated soil to the top of the posts (~350mm deep).
- Each chamber will be capped with the plyboard, and secured to the wooden posts with nails.
- The AMS is to be covered with sufficient topsoil to a depth of 1m, with the top dressing provided by any additional soil and turves excavated at the start of construction.
- Construction estimated to take 2-3 days.

4.6.4. **Artificial Main Sett Baiting.** To encourage the uptake of the AMS, a period of baiting with a suitable food mix will be undertaken immediately following completion of the AMS. Suitable amounts of bait will be placed just inside the tunnel of each of the newly created entrances by a suitably qualified ecologist; attracting Badgers to the entrances and encouraging further exploration. The suitably qualified ecologist will return to the AMS every two to three days to put out additional bait and remove excess old bait which may not have been eaten. The AMS will undergo monitoring during the baiting phase using

motion sensitive video camera traps and hair traps/sticky tape to establish the level of usage occurring, if necessary.

4.6.5. A minimum baiting period of 10 days will be undertaken before the BS1 (the main sett) can be closed (see `sett exclusion exercise` below). If Badgers have not been confirmed as occupying the AMS after 10 days, baiting will continue. Natural England will be contacted for further advise if, after 20 days, it has not been possible to confirm use of the AMS by Badgers. Once it has been established that Badgers have located to the AMS, or following advice from Natural England, the exclusion and closure exercise of sett BS1 can begin.

4.6.6. **Sett Exclusion Exercise.** In order to allow the full and permanent closure of setts BS1 and BS5 an exclusion exercise will be undertaken under a Natural England development licence, as described below.

- **Timing** - In terms of timing of the exclusion exercise, Badgers are most sensitive to disturbance during the winter and spring, due to breeding activities and the potential presence of young, as summarised in Table 4.1 below. Accordingly, it is proposed that the exclusion exercise be undertaken between July and November, following the grant of licence, thereby avoiding the period of high sensitivity.

Table 4.1: Summary table of seasonal sensitivity of Badgers to disturbance (L = Low Sensitivity, M = Moderate Sensitivity, H = High Sensitivity)

Month	J	F	M	A	M	J	J	A	S	O	N	D
Sensitivity to disturbance	H	H	H	H	M	M	L	L	L	L	L	H

- **Installation of Badger Gates** - Badger gates will be installed at each of the entrances of the setts. These vertically swinging gates will be of sturdy construction, with a frame extending into the ground/tunnel entrance to prevent Badgers forcing access around the edges.
- **Proofing** - In order to ensure that Badgers do not dig around or otherwise gain access back into the sett once the one-way gates are in place, it is proposed to proof the area immediately around the setts using heavy, strong mesh (e.g. chain-link mesh) which, where possible, will extend at least 2m from the existing entrances and if necessary, vegetation will be cut down to ground level to allow for thorough proofing. This proofing should be firmly secured to the ground by way of wooden stakes, metal pegs or similar to prevent the proofing from being lifted.
- **Monitoring of Badger Gates** - Upon installation of the Badger gates, the gates will be set to allow one-way passage outwards from the setts only. As per Natural England guidance the Badger gates must remain continuously in position for a minimum period of 21 days following the last sign indicating possible access by Badgers into the setts and until immediately before action is taken to close or destroy the sets. During this period, the gated sett entrances will be monitored at least once every three days, by placing sticks and hair traps (double sided tape) on the entrances to monitor any use by Badgers during this period. In addition, where practicable, sand will also be used which would be smoothed over the sett entrances and either side of the gates to reveal Badger footprints. If deemed necessary motion-activated video camera traps will also be positioned to record activity at the setts.
- **Sett Closure** - Once it is ascertained that all Badgers have been excluded (i.e. 21 days without any evidence of re-entry), the gates will be set to remain closed. The

setts will be formally closed under the direction of the licence holder (or other ecologist named on the licence). This would involve the use of a digger or similar to trace back (where possible) and excavate the tunnel systems and any chambers. The setts would then be backfilled (if practicable) or in-filled and confirmation given that it was safe for construction works to proceed within the area, which would commence as soon as possible after the sett closure.

4.6.7. **General Construction Safeguards.** In order to safeguard Badger should they enter the site during construction works, the following measures will be implemented:

- Any trenches or deep pits within the site that are to be left open overnight will be provided with a means of escape should a Badger enter. This could simply be in the form of a roughened plank of wood placed in the trench as a ramp to the surface. This is particularly important if the trench fills with water;
- Any temporarily exposed open pipes (>150mm outside diameter) should be blanked off at the end of each working day so as to prevent Badgers gaining access as may happen when contractors are off-site;
- Any trenches/pits will be inspected each morning to ensure no Badgers have become trapped overnight. Should a Badger become trapped in a trench it will likely attempt to dig itself into the side of the trench, forming a temporary sett. Should a trapped Badger be encountered a suitably qualified ecologist will be contacted immediately for further advice;
- The storage of topsoil or other 'soft' building materials in the site will be given careful consideration. Badgers will readily adopt such mounds as setts. So as to avoid the adoption of any mounds, these will be kept to a minimum and any essential mounds subject to daily inspections with consideration given to temporarily fencing any such mounds to exclude Badgers;
- The storage of any chemicals at the site will be contained in such a way that they cannot be accessed or knocked over by any roaming Badgers;
- Fires will only be lit in secure compounds away from areas of Badger activity and not allowed to remain lit during the night;
- Unsecured food and litter will not be left within the working area overnight.

5. Conclusions

5.1. An active main Badger sett and an active subsidiary sett, and three inactive setts, have been recorded within the site. The positioning of the active setts within the site is such that their retention, with immediately adjacent foraging grounds and corridors through the site, would likely reduce the development area to such an extent that development of the site would be unfeasible.

5.2. The presence of Badgers within the site has been fully considered within the development constraints of the site, and strategies explored to minimise harm to the Badger sett and disturbance to Badgers. A strategy has been devised incorporating the creation of an artificial main sett in a suitable location on-site, with maintained links to foraging grounds and other setts, and access to enhanced foraging resources. An approach is to be undertaken to demonstrate use of the artificial sett, before closure of the existing sett is commenced.

5.3. In conclusion, the development proposals have sought to minimise impacts and subject to the implementation of appropriate avoidance, mitigation and compensation measures, the status of the Badger clan within the site will be maintained. Accordingly, the proposals are considered to accord with the Cheltenham Borough Local Plan, relevant provisions of adopted Policy SD9 of the Joint Core Strategy, policy HD4 of the emerging Cheltenham Plan, and the spirit of paragraph 175(a) of the 2019 NPPF.

Plan 5487/BS1:

Badger Sett Locations

Badger Sett Status

Sett	May-19	Jul-19	Apr-20
BS1	Active	Active	Active
BS2	Inactive	Inactive	Inactive
BS3	Absent	Inactive	Inactive
BS4	Absent	Active	Inactive
BS5	Absent	Absent	Active

Key:

- Site Boundary
- Semi-improved Grassland
- Tree
- Veteran Tree (see Baseline Tree Survey prepared by FLAC, August 2018)
- Hedgerow
- Dense Scrub
- Scattered Scrub
- Ephemeral Pond
- Wall
- Wooden Post & Wire Mesh Fence

Badger Activity

- BS1 Main Sett
- BS2 Annexe/Subsidiary Sett
- BS3,BS4, BS5 Subsidiary/Outlier
- Badger Path
- Foraging Scrape
- Dung Pit

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Land Adjacent to Oakhurst Rise, Cheltenham	PROJECT
Badger Survey Results May 2019, July 2019, and April 2020	TITLE
5487/BS1	DRAWING NO.
B	REV.
April 2020	DATE

Plan 5487/BS2:

Mitigation and Enhancements

Push-throughs to off-site habitats retained

Links to retained setts maintained

Relocated Badger sett with protective measures, as appropriate, to minimise disturbance

Retained boundary vegetation providing corridors for commuting

Wet grassland providing new foraging opportunities for Badgers

New landscape planting incorporating a proportion of native fruit and nut yielding species to provide new foraging opportunities

Key:

- Site Boundary

Landscaping

- Retained Trees
- New Tree Planting
- New Hedgerow Planting
- New Shrub Planting
- New Ornamental Planting
- New Amenity Grassland
- New Wildflower Grassland
- New Attenuation Pond

Badgers

- Potential Commuting Corridors for Badgers

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Oakhurst Rise, Cheltenham	PROJECT
Mitigation and Enhancements	TITLE
5487/BS2	DRAWING NO.
C	REV.
April 2020	DATE

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6.3 Size of sett

6.3.1 Reason for refusal 4 states that a 'large' Badger sett is located in the north of the site. The 2018 survey recorded that this comprises a 'main' sett[26] of some 7 active entrances with a further 15 entrances showing reduced activity levels. The 2019 update survey recorded a similar activity pattern with 9 active entrances and a further 27 entrances showing varying signs of activity. I would agree that the sett is moderately large in nature but would emphasise that it is not atypical with setts of such a size regularly encountered in the landscape. As such, I would not consider it exceptional in terms of size, as the largest of setts can exceed some 75 entrances[27] (see Appendix 5487/9).

6.4 Appropriateness of the Mitigation

6.4.1 Best practice guidance on protected species, including Badgers, is published by Natural England in the form of standing advice (see Appendix 5487/10). In formulating the mitigation strategy for Badgers at the site, and in spirit of paragraph 175(a) of the NPPF:2019, care has been taken to follow where appropriate the principles of the standing advice with a strategy devised to avoid and/or mitigate harm to Badgers and to compensate for the loss of a main Badger sett. This is set out in the Confidential Badger Appendix (CD A61) which accompanied the planning application and contains a detailed consideration of a number of factors including:

- Potential for direct disturbance to the sett;
- Maintenance of links with other existing setts;
- Potential for loss of foraging grounds;
- Maintenance of links to off-site foraging grounds.

6.4.2 I comment on pertinent elements below:

6.4.3 **Avoidance** – Alternative schemes were considered to enable retention of the main sett BS1, but these would significantly compromise the ability of the appeal site to

[26] Badgers typically maintain a hierarchy of setts within their territory in order or main, annex, subsidiary and outlier setts.
[27] Badgers: Neal and Cheesman. Poyser. 1996

deliver housing in what is a national housing crisis[28] and as such were rejected by the developer and their architects. The loss of main sett BS1 is of moderate significance at the local level, prior to mitigation. Annex sett BS2 has been recorded as inactive across surveys in 2018 and 2019 and accordingly I consider its loss to the proposals is of negligible significance. The single entrance subsidiary or outlier sett BS3 was recorded to be inactive in 2018, active in May 2019 and inactive in July 2019. This will be retained as part of the proposals. The newly created sett BS4 is a single entrance sett of low importance. It is retained under the appeal proposals.

6.4.4 The implementation of standard construction safeguards (see Confidential Badger Appendix at CD A61) will avoid harm to Badgers during construction and can be secured through a Construction Environmental Management Plan.

6.4.5 **Mitigation** – The layout has been designed to ensure the appeal site remains permeable to Badgers, so that the species is able to access new areas of green open space within the appeal site, potentially gardens to new residences, and off-site foraging grounds and other existing setts. In this regard I would highlight that it is the maintenance of access to the short sward grassland areas to the south which is the key ecological requirement for the species. While some foraging resource is afforded by harvesting invertebrates from long sward grassland, the Badger's preferred staple food source is that of earthworms *Lumbricus terrestris*[29], which are most readily obtained from short sward grassland. The appeal proposals will not interrupt access to these offsite resources.

6.4.6 In addition, areas of green open space within the appeal site will afford enhanced foraging potential for Badgers, compensating for the overall reduction in accessible grassland within the appeal site while the landscape scheme will include fruit bearing species e.g. Crab apple, which will provide an additional seasonal foraging resource.

6.4.7 **Compensation** – it is not infrequent to encounter scenarios where the loss of a main Badger sett cannot be avoided. In such, scenarios it is best practice to provide mitigation by way of an artificial sett.

[28] *"The housing shortage isn't a looming crisis, a distant threat that will become a problem if we fail to act. We're already living in it".* Fixing our Broken Housing Market. White Paper to Government. February 2017
[29] https://www.woodlandtrust.org.uk/blog/2016/06/what-do-badgers-eat

Badger sett location with Natural England 30m buffer zones marked up and 1.8mdeer fencing added from enclosures documentation for the application

Grade II listed stable block within 20m of sett

Black line = 1.8m deer fencing (Additional plan, methods of enclosure, 2 july 2020)