Newport, Isle of Wight

Cycle Permeability Study

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Creative Interpretation

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Terms

Key terms used in the report:

Carriageway – The part of a highway which vehicles are permitted to use (as are pedestrians).

Dropped kerb – An area where the kerb height is lowered to allow vehicles, cycles or pedestrians to cross between the carriageway and footway. Dropped kerbs typically still have a small “upstand” (vertical edge) while full flush kerbs give a smooth transition between footway and carriageway.

Filtered permeability – restricting the modes which can use a street, or section of a street. Typically used to permit walking and cycling but restrict motor vehicle use, creating access only arrangement for vehicles but permeable connections for active travel.

Footway – The part of a highway separate from the vehicle carriageway for use by pedestrians only.

Link – A section of cycle route or carriageway.

Shared use – In context of this report used to define space shared between pedestrians and cyclists.

Creating a positive environment for cycling

Why cycle?

Cycling has many benefits for the individual and society at large, which are well documented elsewhere. In brief the main benefits of cycling (particularly cycling for transport) are:

Better health – Cycling brings significant health benefits, helping individuals but also leading to significant government savings in healthcare costs and private sector savings through improvements in productivity and reductions in absenteeism.

Low emissions – Cycling creates virtually no emissions, direct or indirect; even e-bikes have very low energy use.

Affordability – Cycling provides increased independent travel options at a low cost for many people. For someone who relies on walking as their main mode of travel it can open up a wide range of additional destinations that can be easily reached.

Space efficient – Car-based transport systems are very space inefficient, requiring a network of routes plus parking provision at both ends of the trip. Requirements for cycle networks and parking provision are much more modest. Switching even a fairly small proportion of total travel from cars to cycles could free up significant amounts of land for other uses.

Who cycles?

All sorts of people cycle, some as a leisure or sports activity, some for everyday transport.

12.3% of adults on the IOW cycle at least once per month – well below the England average of 17.1. Most are cycling for leisure, though 5% cycle for travel. Among more regular cyclists cycling for transport is more common, 2.4% of people cycle 3 or more times a week for transport while only 0.9% do so for leisure. [1]

In the UK men cycle significantly more than women. Making three times as many trips and cycling over four times the distance.[2]

80% of cyclists holds a driving licence and 1 in 5 drivers cycles at least once a month.[3]

Many disable people are able to cycle and hence dramatically improve their independent mobility. Some disabled people use specially adapted cycles (which highlights a need for inclusive design of

[1] https://www.gov.uk/government/statistics/walking-and-cycling-statistics-england-2016
[2] https://www.gov.uk/government/statistical-data-sets/nts06-age-gender-and-modal-breakdown
[3] https://www.gov.uk/government/news/drivers-and-cyclists-agree-lets-look-out-for-each-other

cycling provision) while others use an ebike or conventional cycle. Many people who can only walk a short distance can cycle much further.

Who wants to cycle?

Sustrans' Bike Life report (2017) found 53% of people would like to start riding a bike or cycling more.

In places with more widespread utility cycling and extensive protected cycle infrastructure women typically cycle as much as men, suggesting there is likely to be significant latent demand amongst women in the UK.

How many journeys could be cycled?

Around 2/3 of journeys undertaken by cycle are between 1 and 5 miles long. These are distances most people are able to cycle in a reasonable time. On average an adult makes 9 out of 425 journeys of this length by cycle. Source: [4]

The town of Goes in The Netherlands is a similar size to Newport and achieves a cycling modal share of 50% of journeys under 7.5km. [5]

Britain has lower cycling levels than almost all of the EU28 countries, with only Cyprus and Malta having lower levels of cycling. In the UK 69% of people never cycle, compared with just 13% in The Netherlands, 18% in Denmark and 21% in Finland. [6]

Why the environment for cycling matters

As part of the British Attitudes survey people are asked if they agree it is too dangerous to cycle on the roads. Over the last 5 years, an average of 62% have agreed it is too dangerous. The figure is higher still among non-cyclists (69%) and is higher for non-drivers than drivers. [7]

If more people are to be encouraged to cycle then the environment needs to be one that is safe and feels safe, and provides convenient opportunities to reach a range of destinations. Isolated cycle routes are of limited use for cycling as transport, routes need to be linked into a network of high quality cyclable streets and tracks.

What do people need

Most people prefer to cycle away from traffic or in streets that are lightly trafficked. This is typically more pronounced among women and those cycling with children. There is some evidence that

[4] https://www.gov.uk/government/statistical-data-sets/nts03-modal-comparisons
[5] https://bicycledutch.wordpress.com/2016/02/23/goes-cycling-city-of-the-netherlands/
[6] https://www.cyclinguk.org/article/campaigns-guide/cycling-levels-in-european-countries
[7] https://www.gov.uk/government/statistics/walking-and-cycling-statistics-england-2016

older people also have stronger preferences for traffic-free environments than the population at large.

78% of people support building more protected roadside cycle lanes even where this could mean less space for other road users. Even among residents who don't ride a bike the figure is 74%. [8] The average that people want government to be spending on cycling is £26 per person per year, compared to current expenditure of around £3 per year.[9]

Routes and networks

Often when we talk about cycling infrastructure we talk about routes, typically following an existing road or a former railway line. These routes can be really important, especially when they link two places with a large number of destinations. However, the number of people who live and work on or immediately adjacent to such a route will typically be limited. Creating more routes and ensuring they are linked together is one part of ensuring a cycling network can viably be used for a range of trips. In addition, measures can be taken to ensure that streets around cycle routes are as cyclable as possible, allowing people to cycle around their local area and connect into nearby routes.

Assessing what we have

This study aims to examine the network we already have, in terms of dedicated cycle infrastructure and the street network. It aims to categorise and map the cyclability of local streets with a view to identifying missing pieces in the jigsaw that will make up a comprehensive mesh network of cyclable streets and tracks, as well as identifying opportunities for creation and improvement of key cycle routes. Streets are classified based on their cyclability at a range of levels, focused primarily on the needs of people who currently do not cycle, or only do so occasionally (perhaps as a leisure activity on an old railway route). In addition we investigated other factors that affect the permeability of Newport when cycling, such as physical barriers and one-way streets.

Overview of methodology

Every local authority maintained street in the parish of Newport was surveyed for the study. Virtually all survey work was carried out by bicycle. This was a hybrid/town bike, of the type typically used for everyday utility cycling. A cycling style was adopted that attempted to reflect the way less confident cyclists tend to use the road. Cycling pace was modest. In general riding in primary position was avoided (since many people do not feel confident adopting this position) though a rolling-risk-assessment did lead to primary position being adopted in some situations as any other option was deemed too high-risk. Positioning was generally somewhere between a safe

[8] https://www.sustrans.org.uk/sites/default/files/file_content_type/bike-life-2017-summary-report.pdf
[9] https://www.sustrans.org.uk/sites/default/files/bike_life_newcastle_2015.pdf

secondary riding position and the kerb-hugging position that less confident cyclists (and some more confident ones) often adopt. This enabled the researcher to experience the street environment as many users will find it, rather than as a confident, skilled and experienced cyclist might.

A few streets were surveyed by car (all of them rural roads, generally with high vehicle speeds and very difficult cycling conditions) and some on foot (typically in very central areas) though these were generally cycled as well.

Data was recorded on a series of variable for each street (or street segment in the case of long/complex streets):

Vehicle Speed

An estimate typical vehicle speed band for the street. A handheld radar speed measuring device was used to record speeds of passing vehicles. Given the number of streets covered it was not possible to conduct a full speed survey, rather a mixture of measured free-flowing speeds along with surveyor observations were used to rate each street.

Traffic Volume

This was estimated (again in bands) for each street based on short duration counts, observations and local knowledge.

Close-Pass Risk

Each street was assessed for the risk of vehicles attempting to overtake unsafely. The assessment was made on the basis of typical observed widths. Very long narrow segments were also scored as a risk factor, as vehicles following a cyclist for a long period of time without being able to pass can be intimidating and drivers will sometimes attempt to overtake even if it is virtually impossible to pass. Intermittent parked cars were normally ignored in calculating widths.

Additional factors

Other factors which can affect cycling safety and comfort were also recorded as follows:

- Wide side road junctions
- Kerbside activity with no buffer (for example end on or angled parking, significant pedestrian movements including incursions into the carriageway
- Parked cars (continuous lines of parked cars were ignored, and remaining road width was assessed for close-pass risk)
- Visibility problems
- Traffic calming causing stops or problematic deviation (either horizontal or vertical)

A surveyor ranking was also recorded, based on the perception of the street's suitability for cycling. Additional notes could also be made by the surveyor as required.

Recording of cul-de-sacs

During the survey process it was realised that short residential cul-de-sacs could be simple categorised as low speed, low flow streets, and other variables did not need to be recorded as in practice they had minimal impact. Cul-de-sacs were all still surveyed in case of specific features of note, such as pedestrian/cycle links or commercial premises affecting the use of the street.

Key factors not measured

Two important factors were intentionally excluded from the data collected:

Surface quality

The standard of a road surface can have a significant impact on the cyclability of a street. For example potholes can cause discomfort, wheel damage and accidents; cracks can crab a bicycles wheel and cause stability problems; undulating surfaces can cause discomfort and make keeping a straight course difficult. However, Island roads are in the process of being brought up to a common standard so any classification on this basis would only be valid for a short period of time. As such no analysis was made. In some areas streets not maintained by the local authority were surveyed and use of these may be more difficult than their ranking suggests. The former prison roads form the majority of this category.

Gradients

All other things being equal, flat roads are more cyclable than hilly ones. New cyclists are likely to prefer flatter cycling, and a large hill can be a key factor in determining whether someone will consider cycling a particular journey. However, in many hilly areas in countries with better developed cycling infrastructure cycling levels are still high, and not just among the super-fit, which suggests terrain is less of a barrier than traffic conditions. In addition the rise in the quality and number of electric bikes in use means that options for easy cycling exist for many more people in hilly areas.

Gradient most certainly needs to be considered when planning cycle routes and networks, however there is no reason to simply write off hilly areas as not being suitable for cycling, or infrastructure investment. On this basis no analysis of gradient was carried out and this should be considered in addition to the data produced by this study; gradient data is readily available from various sources.

Some "marginal" streets may require more work to make them cyclable if they also feature steep or long climbs.

Scoring and weighting

Each issue was assigned a score. These were heavily weighted to volume and speed of vehicles as these are the most significant factors affecting cyclability.

Speed	0-20	20-30	30-35	35+
	1	2	3	4
Volume*	Low (<1000)	Moderate (1000-2000)	Significant (2000-5000)	Heavy (5,000+)
	1	2	3	4
Close pass risk	No	Yes		
	0	0.5		
	No	Occasional	Frequent/Major	
Wide side roads	0	0.1	0.2	
Kerbside activity	0	0.1	0.2	
Parked cars	0	0.1	0.2	
Visibility	0	0.1	0.2	
Traffic calming	0	0.1	0.2	

* Vehicles Per Day (2 way equivalent, for one-way streets observed volumes were doubled)

The total score for a street is calculated by adding all the individual scores together. Streets were then ranked based on the following categories, again, based principally on the combination of volume and speed of traffic, however scores from other areas can tip a street into the next category. Close pass risks and the four additional factors start to become more significant issues midway through the classification, where they can make a critical difference to a street with moderate volumes and speeds.

Score	Class	Suitable for
<3	1	All users
<4	2	Most users
<4.5	3	Able users
<6	4	Confident users
>=6	5	Very confident users

Class 1 will be low-traffic, low-speed streets. These streets will generally be suitable for users who would ordinarily only cycle in traffic-free environments, such as off-road cycle tracks.

Class 2 may have slightly higher speeds OR slightly higher levels of use by motor vehicles. They will be useable by most ability levels, but may be less comfortable and less confident users may be less likely to cycle if too much of their journey is on these streets.

Class 3 may combined slightly higher volumes and speeds of traffic, Factors other than speed/volume may tip a street which would otherwise be class 2 into this category. Some people will not cycle on roads at this level, others will seek to avoid them but they may be acceptable if they form a small proportion of a route.

Class 4 may have high traffic volumes or high speeds, or a combination of moderate volume and speed. Less confident users are unlikely to use these streets. Moderately confident users may use them but are unlikely to be encouraged to cycle if they have to use them. Even confident users will often prefer to seek alternatives.

Class 5 will have combinations of high traffic volume and speed and many users will not cycle on these streets. Even confident users are likely to feel uncomfortable and may be deterred from cycling as much as they might if they have to use these streets.

Limitations

The nature of the survey process means that only a "snapshot" view of each street is gained during the survey process. Local knowledge can help reduce the impact of this, allowing the surveyor to account for known issues that may not be observed directly at the time of the survey. This can mean some streets may be misclassified based upon non-typical traffic volumes being observed for instance. It is important to consider the process as a starting point in the classification of streets, and if improved information becomes available the data can be updated, improving the accuracy of the map. It is also important not to rely on data collected for detailed planning for particular streets. In such cases full speed and traffic flow surveys will be needed to make a more robust and detailed assessment.

Dedicated cycle infrastructure

Various dedicated cycling infrastructure exists in Newport, with a mixture of ages, quality and type. We include in this category shared use routes for walking and cycling. Protected cycle infrastructure (separated from motor traffic) has been mapped and added to the network of streets. Where this is adjacent to a road it has been shown as an additional parallel route, and the road has been ranked in its own right, ignoring the parallel infrastructure. The main route of this kind is the shared path alongside Fairlee Road. This is not a high quality route (hence some will choose the road instead) and does not run the full length of the road, hence the decision to treat each separately.

Unprotected cycle infrastructure (cycle lanes, advanced stop lines etc.) is treated as part of the highway design and may affect the score for a street segment. This sort of infrastructure can sometimes be beneficial, but sometimes can cause more problems than no provision. There is also little evidence that it encourages people to start/re-start cycling in the way protected infrastructure does.

Barriers to cycling

In addition to the issues noted above which affect the cyclability of streets, the permeability of the town is affected by various other barriers.

Physical Barriers

During the survey work a range of physical barriers to cycling were recorded. These are listed in appendix 1.

Gates

Two gated roads were noted, on Elm Grove and Victoria. Both gates cover the full width of the carriageway and make no provision for cyclists. Footway space is limited, and dismounting and using the footway is not an option for some cyclists and inconvenient for others. In addition a gate is employed at the entrance to Newport Quay from Hillside. Narrow gaps are provided at either end, but of a width which restricts accessibility for people cycling.

Barriers and bollards.

In various locations chicane barriers, bollards and similar measures have been introduced to other control vehicle use of cycle routes or to slow cyclists. Obstacles like this can create single vehicle cycle accidents, make cycling more stressful and prevent access completely for some users, particularly those with trailers, tandems, trikes, handcycles and other specialist cycles. According to research by Wheels for Wellbeing, inaccessible cycling infrastructure is the single biggest difficulty faced by disabled cyclists in the UK[10].

One-way streets

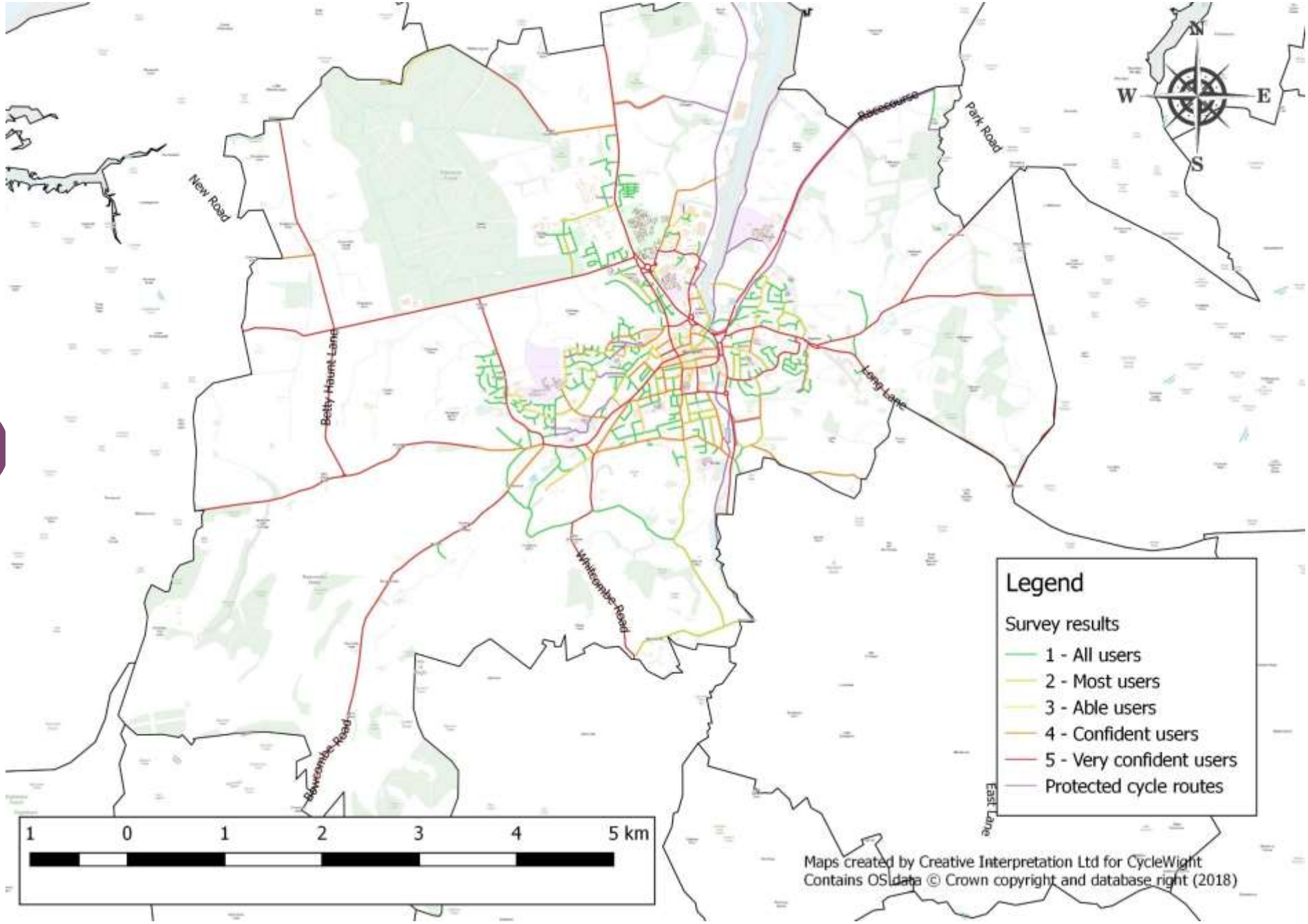
Many streets in Newport are one-way, and (with the exception of Little London) these restrictions apply to cycling. This creates significant problems for permeability of the town, especially in the central area where a significant proportion of streets are one way. Routes can be lengthened significantly by one-way systems, and people are often forced to use busy or fast moving roads. Two-way cycling is likely to be of even more benefit around the town centre, where cyclists are likely to want to visit a diversity of local shops, cafes etc. While parking and walking is sometimes an option, where a cycle is being used as a mobility aid or to carry goods this may not be a viable

[10] https://wheelsforwellbeing.org.uk/wp-content/uploads/2017/11/v2-Nov-2017.pdf

option. Most one-way streets have been made so in an attempt to deal with issues caused by massive increases in traffic on historic streets, and were introduced at a time when the needs of people cycling was barely considered in transport planning terms. Contraflow cycling is very common in several European countries and is becoming much more widespread in the UK. It can help improve permeability and make cycling a real option for more people.

Cyclability maps

All the streets surveyed have been mapped with “heatmap” colour coding from green (suitable for all) to red (only usable by very confident users). Maps for Newport at various levels (from the whole parish to the central area) are shown on the following pages. The next section addresses issues by area and more detailed area maps are included in each section. An online version of the map can be viewed at http://tinyurl.com/cyclability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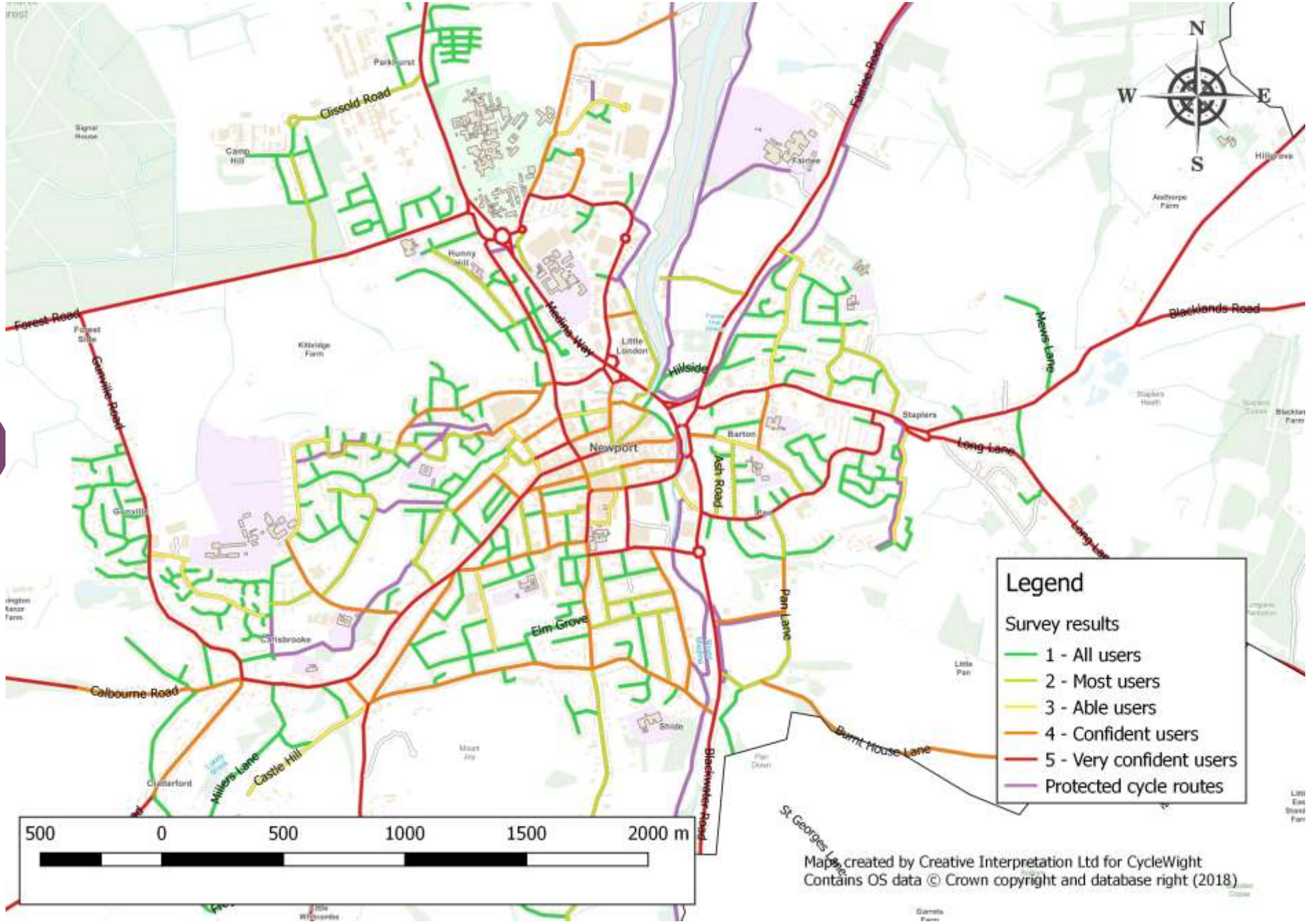
New Road
Betty Haunt Lane
Ryde Road
Park Road
Long Lane
Whitecombe Road
Bowcombe Road
East Lane
Legend
Survey results
1 - All users
2 - Most users
3 - Able users
4 - Confident users
5 - Very confident users
Protected cycle routes
1 0 1 2 3 4 5 km
Maps created by Creative Interpretation Ltd for CycleWight
Contains OS data © Crown copyright and database right (2018)


N
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Cissold Road
Forest Road
Gunville Road
Calbourne Road
Castle Hill
Millers Lane
Elm Grove
Newport
Hillside
Medina Way
Fairlee Road
Blacklands Road
Mews Lane
Long Lane
Ash Road
Pan Lane
Burnt House Lane
Blackwater Road
St Georges Lane
Carisbrooke
Shide
Staplers
Barton
Little London
Hunny Hill
Camp Hill
Parkhurst
Fairlee
Legend
Survey results
1 - All users
2 - Most users
3 - Able users
4 - Confident users
5 - Very confident users
Protected cycle routes
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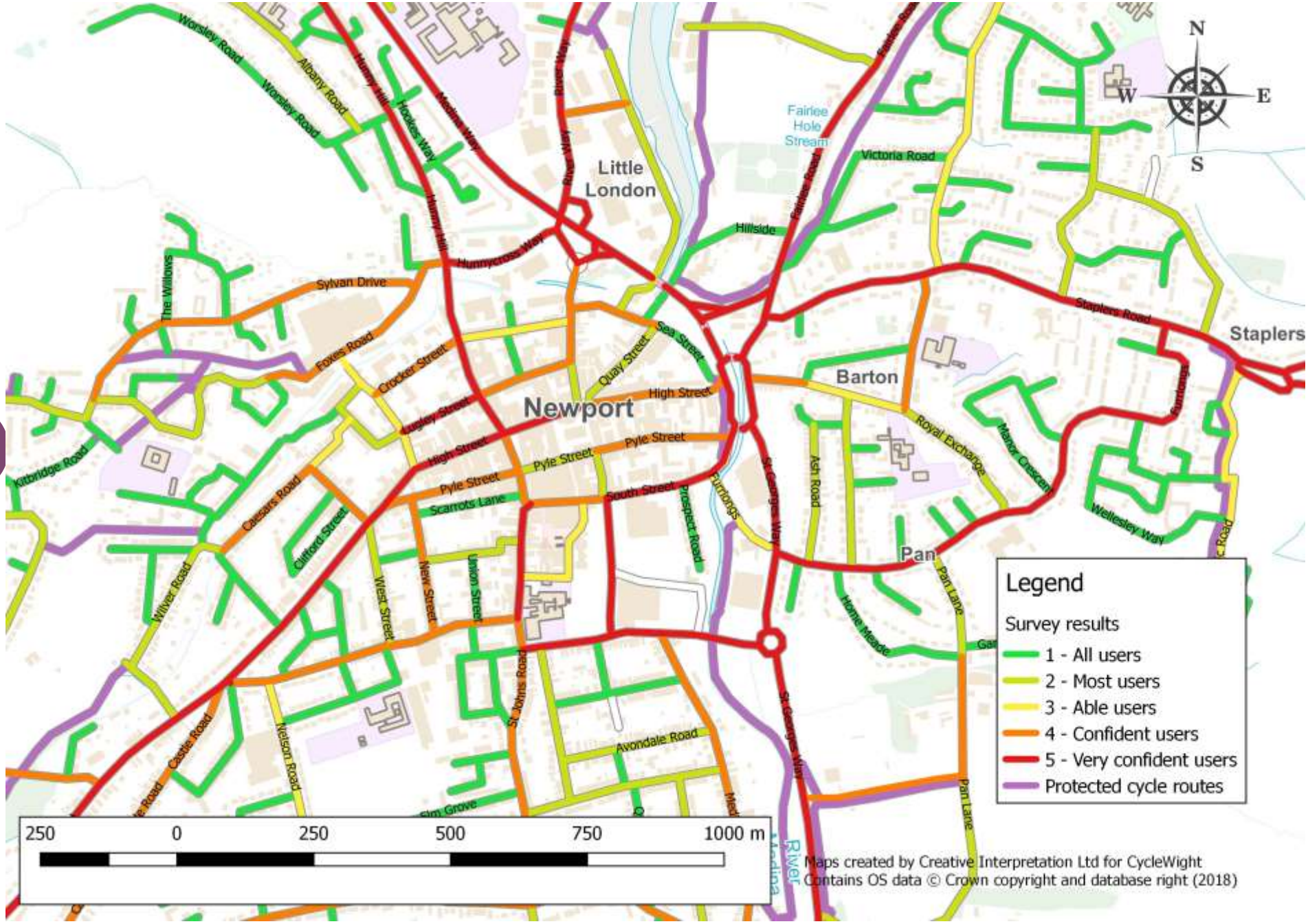
Maps created by Creative Interpretation Ltd for CycleWight
Contains OS data © Crown copyright and database right (2018)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Barton
Staplers
Pan
Fairlee Hole Stream
River Medina
Worsley Road
Albany Road
Hunny Hill
Hookes Way
Medina Way
Hunnycross Way
Victoria Road
Hillside
Fairlee Road
Staplers Road
Sylvan Drive
The Willows
Foxes Road
Crocker Street
Quay Street
Sea Street
High Street
Lugley Street
Pyle Street
Scarrots Lane
South Street
Prospect Road
Furlongs
St Georges Way
Ash Road
Royal Exchange
Manor Crescent
Wellesley Way
Kitbridge Road
Caesars Road
Clifford Street
Wilver Road
West Street
New Street
Union Street
St Johns Road
Avondale Road
Elm Grove
Nelson Road
Castle Road
Pan Lane
Home Meade
Legend
Survey results
1 - All users
2 - Most users
3 - Able users
4 - Confident users
5 - Very confident users
Protected cycle routes
250 0 250 500 750 1000 m
Maps created by Creative Interpretation Ltd for CycleWight
Contains OS data © Crown copyright and database right (2018)

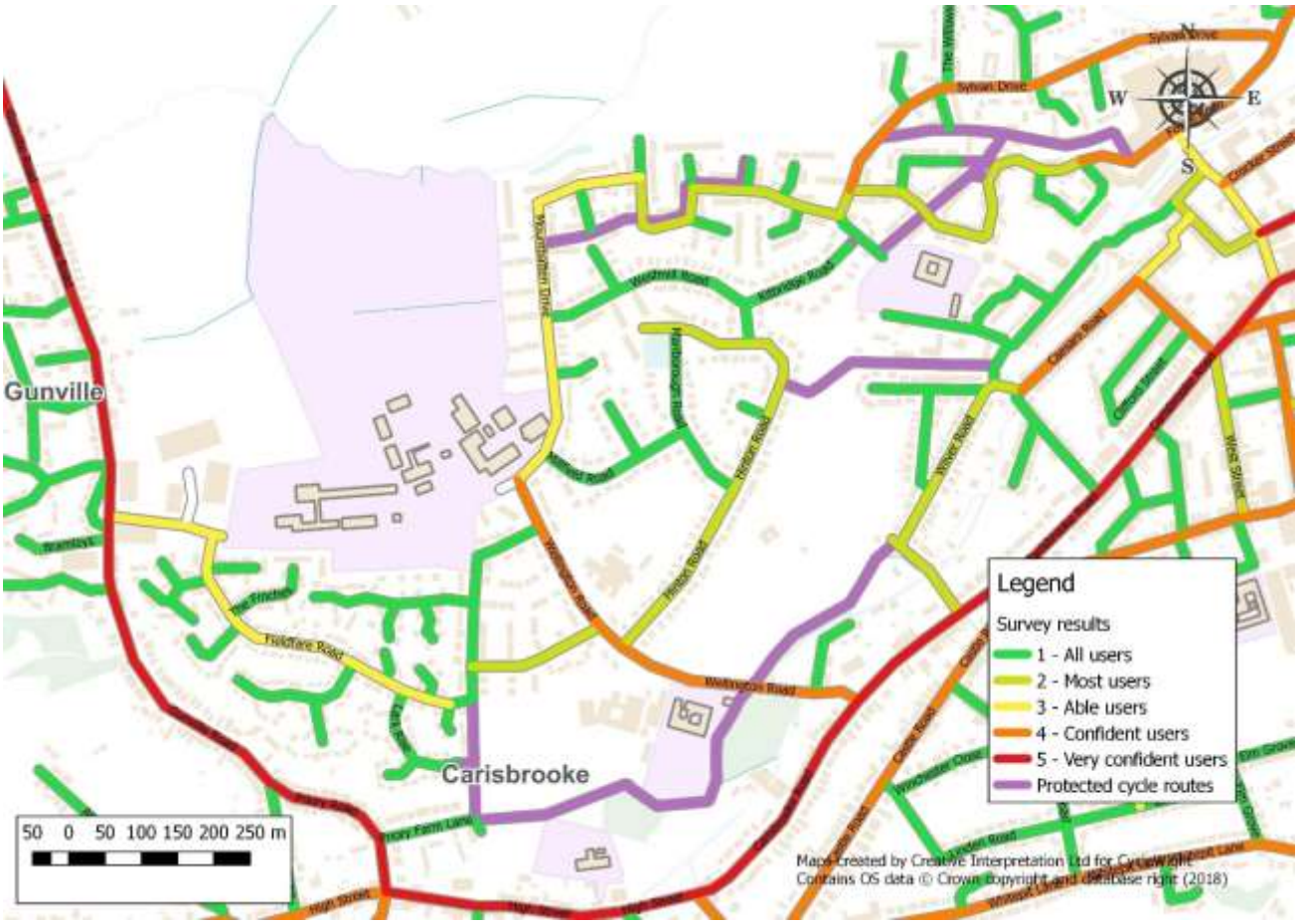
Issues by area

This section takes the town area by area, showing more detailed map extracts and describes some of the key issues in specific areas. Identifying specific neighbourhoods within the town can be slightly arbitrary, as far as possible sensible units bounded by main road have been used. In each section some ideas for change are also outlined. Some suggestions of major projects that could be brought forward, as well as cumulative small improvements, are outlined later in the report.

Gunville

Gunville Road provides a significant barrier between most residential streets in Gunville and Carisbrooke, with high speeds and fairly high volumes of traffic. Those in the streets to the west need to use Gunville Road it to access routes into Newport. Permeability within the estates to the west is poor, with these being laid out as a series of long cul-de-sacs that have no/low pedestrian/cycle permeability between them. In the event of further development to the west, some of these cul-de-sacs could be re-joined, possibly only as pedestrian and cycle links, shortening journeys within the estates and to/from other locations. This could also facilitate access from areas such as Ash lane to destinations in Newport without having to use the worst sections of Gunville Road.

Carisbrooke/Newport West



Carisbrooke High Street provides a difficult cycling environment and is likely to be a significant factor in dissuading residents of Carisbrooke Village from cycling. There is an off-road link from Priory Farm Lane leading into Newport, but accessing this from the village is very difficult. The route itself is a useful link but width is substandard in places, surfacing is not ideal and barriers at various locations cause difficulties. The newer housing estates to the north of the village and extending towards central Newport are generally more cyclable but with some key streets which are more difficult.

Fieldfare Road is not ideal for cycling. It carries a relatively high amount of traffic; traffic calming aimed at reducing speed and rat-running also has a negative impact on cycling but significant amounts of through traffic still uses the street. It is currently the only link through this estate for people cycling. The Finches and Nightingale Road have a pedestrian link between them which could be widened to provide an alternative, quieter route, but would require land from an adjoining property. A link here could create an alternative to Fieldfare Road.

It would appear likely that land at Taylor Road will be developed in the near future. Should this road be used as a through route, consideration should be given to making Fieldfare Road access only.

However, it is also important to consider the potential for Mountbatten Drive and Sylvan Avenue to become more heavily used as a through route if this road is opened up. However this road is treated, an opportunity exists to create a safe cycling route along this section, either through not using Taylor Road for through traffic or by creating a high-quality parallel cycle route.

Wellington Road presents a permeability barrier between the estates either side. On various routes north-south travel along Wellington Road is required. The road is busy with buses and school traffic at many times, carries a fairly high volume of traffic at other times, has parked cars and traffic calming which causes problems for cyclists and has carriageway widths that can encourage close passing. The road also acts as a barrier to safe cycling to the three schools along its length. Total highway width appears sufficient to allow for creation of protected cycling facilities which would improve permeability and connect the schools into local off-road routes and quieter local streets.

The estates radiating from Mountbatten Drive and Sylvan Drive mostly comprise fairly cyclable streets. The most problematic streets are Mountbatten Drive and Sylvan Drive themselves. These combine to form a long distributor road, which also appears to still carry a moderate amount of through traffic seeking an east/west route around Newport.

The older, southern part of Mountbatten Drive is excessively wide and vehicle speeds can be high. People travelling south have to cycle up a moderate gradient, which in combination with higher vehicle speeds and intermittent parked cars can make this section more difficult than it could be. Some simple measures such as prohibiting parking on the east side of the road except in laybys and marking a wide advisory cycle lane on the same side of the road could help improve the situation. Ideally the main carriageway should be narrowed, with extra space given over to a combination of cycling and walking facilities. Carisbrooke College could usefully be connected to the Sylvan Drive estates and associated off-road links via this street if its quality was improved.

An off road link exists parallel to the northern end of Mountbatten Drive and part of the eastern section of Sylvan Drive. This route provides some benefit, however links with surrounding cul-de-sacs could be better, being laid out for pedestrian rather than cycle access. The crossing of Sylvan Drive is not ideal, with limited visibility in some directions. The crossing of Juniper Close is poor, with cyclists having to cede priority to a very minor cul-de-sac and change level. The route has a buffer strip adjacent to the road, unfortunately this is not utilised for the level change at driveway crossovers, meaning the shared pedestrian/cycle route changes level, even though the buffer zone has adequate space for the change in level for vehicles. At St Augustine's Road, the route turns into the cul-de-sac and ends. It would appear the route was designed to continue and join Petticoat Lane and then follow the route of Petticoat Lane into Newport. However, there is no link between St Augustine's Road and the junction of Petticoat Lane and Sylvan Drive. Without this section the

route makes little sense, since cyclists have to re-join the carriageway at a point where no transition is provided. In practice most will simply use the main carriageway.

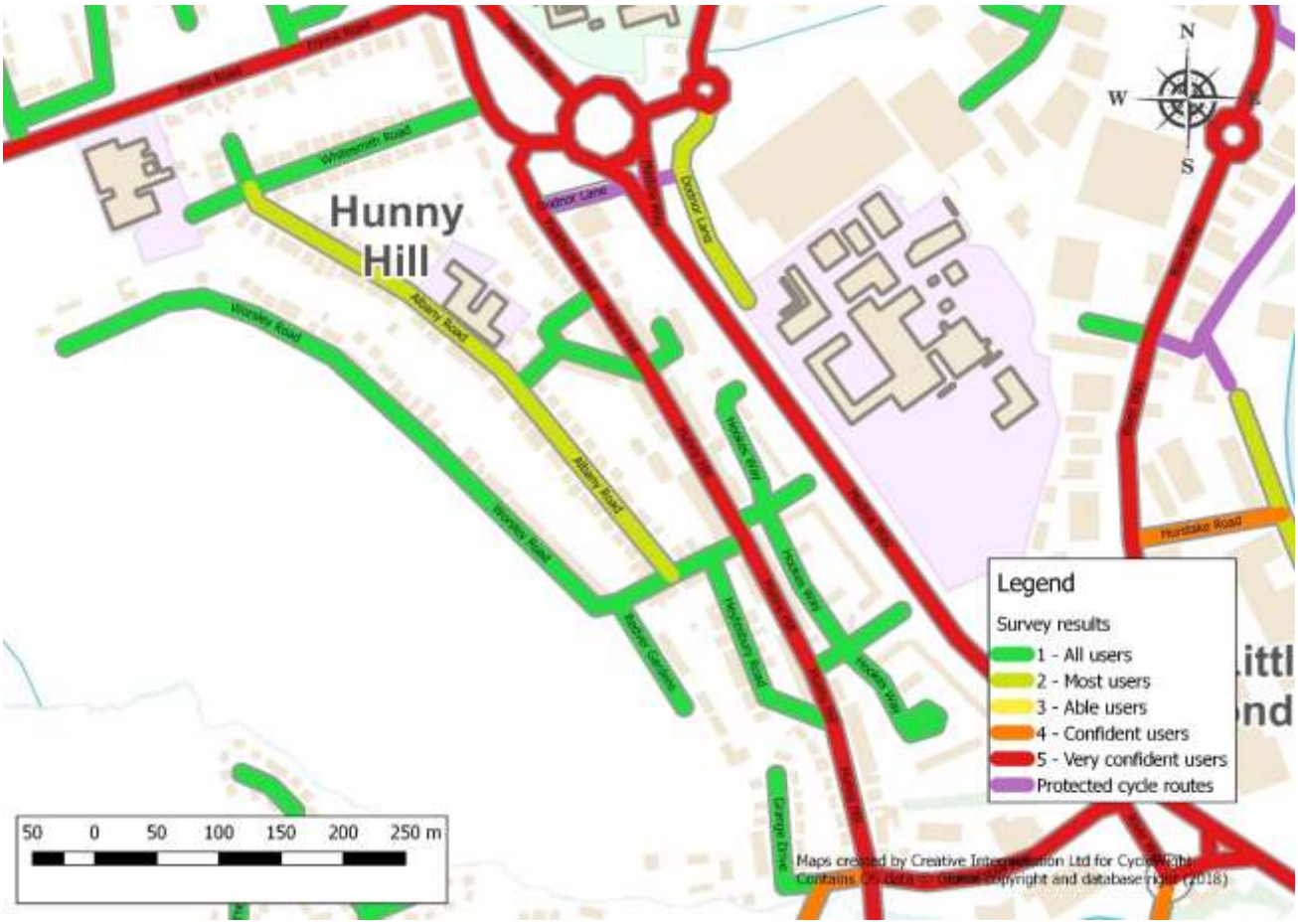
The older, eastern end of Sylvan Drive provides the poorest cycling environment on this street with fairly high volumes of traffic and high speeds (speeds in excess of the 30mph limit were frequently observed). To some extent this is mitigated by the parallel Petticoat Lane route, however access to this route is poor. At the northern end it is gated with only a narrow access, unclear access from the main carriageway and no signage to indicate it is a cycle route. The end of the Limes has no formal link to the route, but this would appear fairly easy to create. Birch Gardens does have a link which could provide a useful connector to Maples Drive/The Willows. Sycamore Gardens also connects with this route, but via an ambiguous link which appears to only have public footpath status but when approached from Petticoat Lane presents as part of the cycle route.

There is a link at the end of the Kitbridge Road cul-de-sac which appears to be open to people cycling, however this is configured poorly for access, with dropped kerbs not aligning and chicane barriers used as access control. This route was observed being used by multiple people cycling.

This then connects with a new shared path linking to Petticoat Lane. This route is marred by poor detailing which makes it unsafe in several areas. Transitions at roads are poor, with full height kerbs in several places, frequent obstruction by parked cars, poorly placed traffic calming measures and poorly configured and located bollards.

There is a short shared link from Hinton Road into the recreation ground and on to Westminster lane. This is unusable by some cyclists due to the use of narrow barriers. It also includes a section along a private road which is poorly surfaced and is only signed from the Hinton Road end.

Hunnyhill

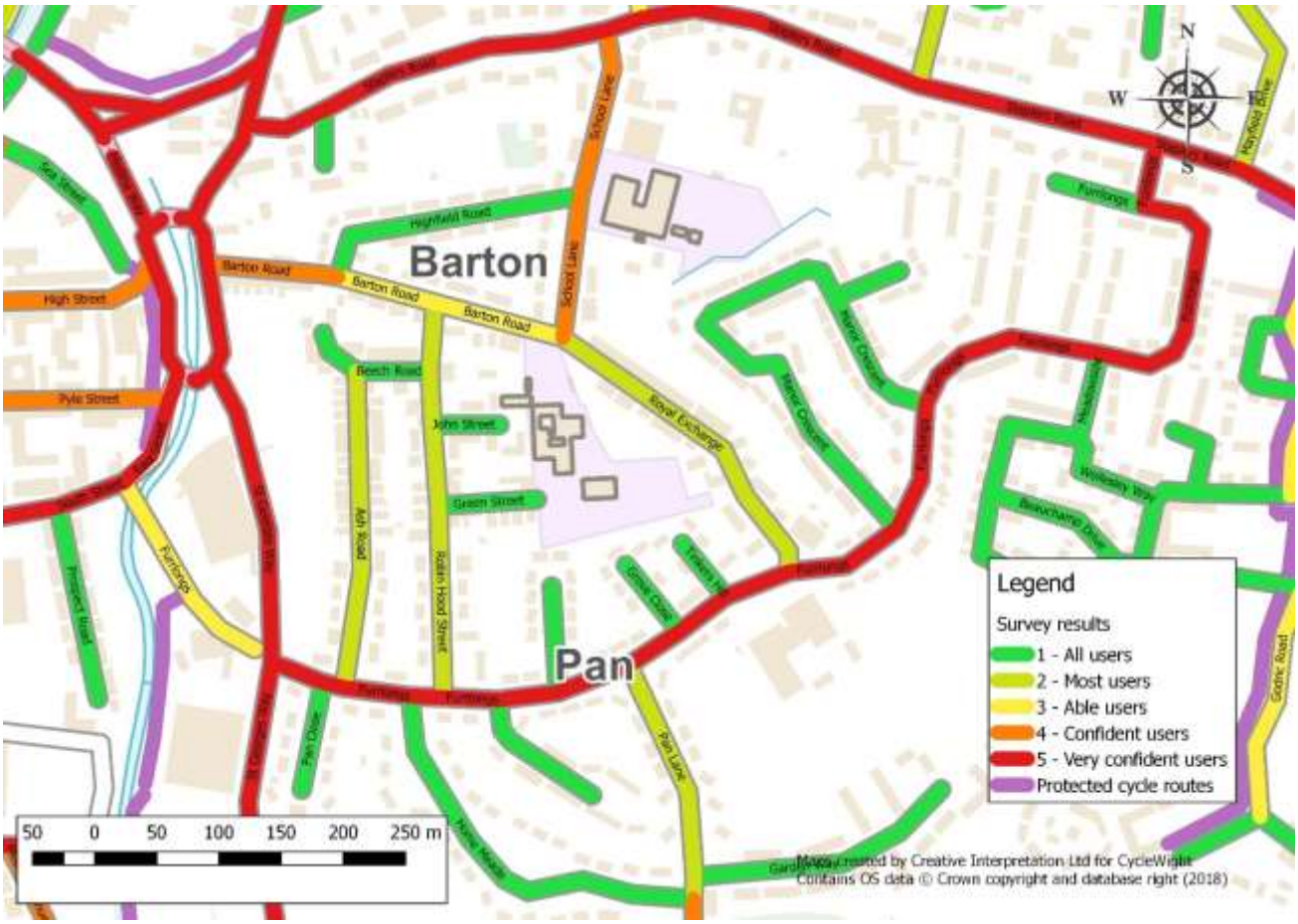


Hunnyhill itself provides a poor cycling experience. It carries high levels of through traffic, often travelling at speeds in excess of 30mph and has various other hazards. The steep incline makes the position significantly worse travelling north. The surrounding roads are relatively cyclable (if steep in some cases) but connectivity with other areas is via Hunnyhill. Highway width is limited, so improvements would require significant changes to the function of the street (such as removing all through traffic) or creation of a parallel north-south route, for example between Hookes Way and Medina Way, and linking into the existing street network, with creation of one or more safe east-west links across Hunnyhill for cyclists.

Staplers

Staplers Road and Fairlee Road provide the boundary to the Staplers estates, and do not provide a good environment for cycling. Most of the streets between these two roads are readily cyclable, though Cross Lane/Halberry Lane is less than ideal. The former railway line provides a useful traffic-free link into Newport and helps mitigate against the poor environment provided by Fairlee Road, however, connectivity between the road network and this route is poor, and the route itself requires upgrades in various places. Improving these links could significantly improve the number of trips Staplers residents make by bike. Permeability of the area is good on foot, but less so by bike. A series of pedestrian links provide direct walking routes, and in several cases could potentially be upgraded to allow them to be used be people cycling. A good example is the link between Cooper Road and Halberry Lane. This would allow access between the former railway line via Victoria Road or Gordon Road to most of the roads to the east with minimal deviation from a direct route and only requiring cycling small section of Halberry Lane.

Barton & Pan



Most of the streets on the Pan estate radiate off of Furrlongs, which provides a poor experience for people cycling, with fairly high traffic volumes; parked cars; kerbside activity; numerous junctions, often wide, and traffic calming which disrupts smooth cycling. At either end Furrlongs meets roads which are even less suitable for cycling. Barton Road and Royal Exchange provide the other main access, however sections of this route are one-way and most of the route doesn't score highly in terms of cycleability.

As a planning condition, the developers of Bluebell Meadows have to upgrade the existing pedestrian only link from the Lower end of Furrlongs along the south side of the Coppins Bridge Car Park and continuing to the southern end of Royal Exchange. If delivered to a high standard this route could be a very useful additional link. The link itself needs to be of a high standard, as do junction treatments and links to surrounding streets. In particular provision needs to be made for people on cycles to be able to use Royal Exchange in both directions between Furrlongs and the new route, the St George's Way end of the route needs to link properly into the town centre, including an appropriate crossing of St George's Way, crossings of Robin Hood Street and Ash Road need to be designed to prioritise cycle and pedestrian access and surrounding streets need to be well linked in to the route.

Various one-way streets cause problems for cycle permeability:

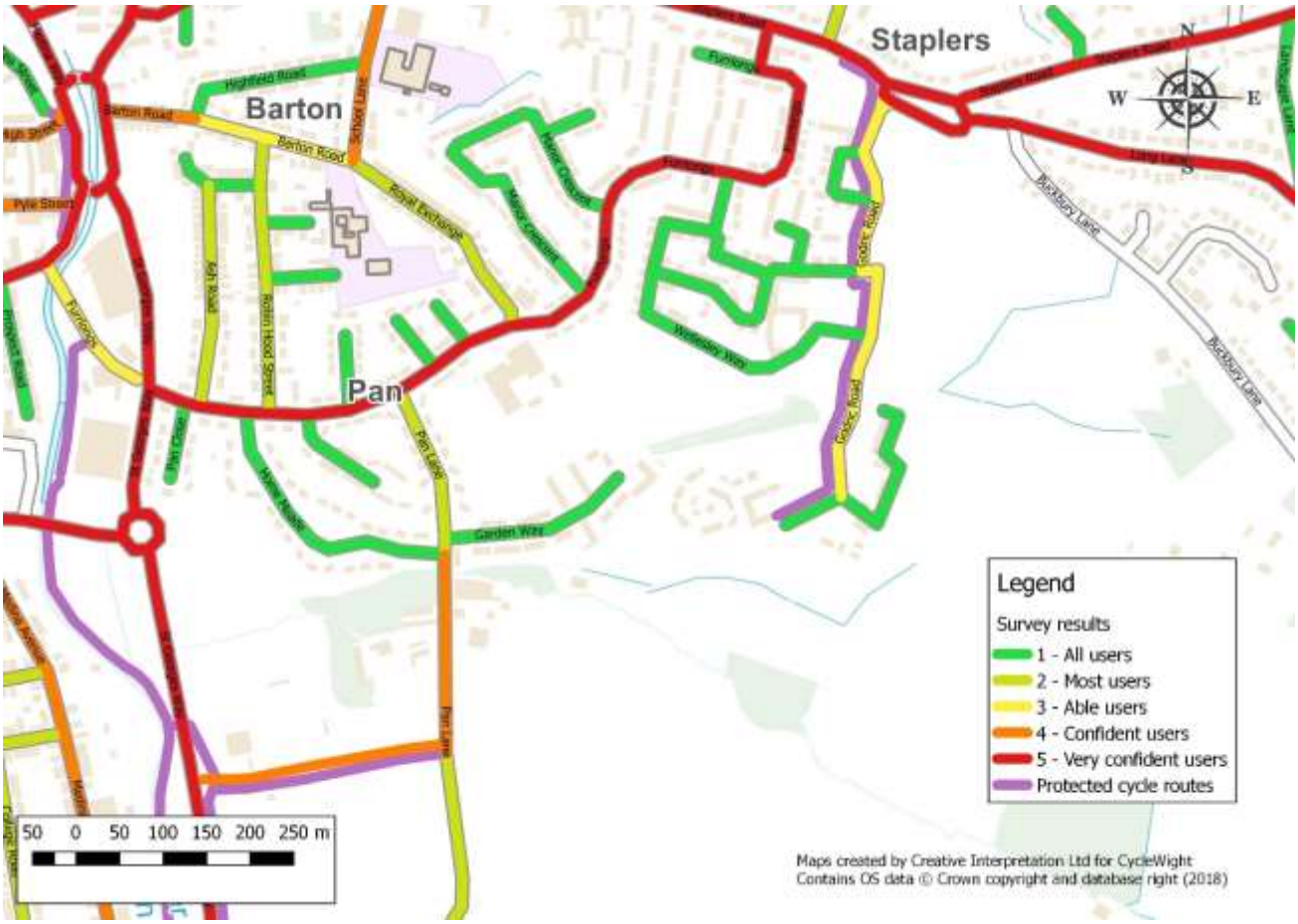
Barton Road. This acts as a barrier between Pan/Barton and the town centre, as well as NCN 23. It would be possible to remodel this road (with some land-take from Barton Green) to continue to allow one-way vehicle access and two way cycling, and reconfigure the Coppins Bridge crossing to allow cycle use.

Royal Exchange. Two-way cycling could probably only be safely facilitated for much of this road if vehicle traffic volumes were dramatically reduced. While it provides a significant vehicle access to Pan it is unlikely to be suitable. However, the section between the planned shared-use path mentioned previously could be redesigned to facilitate safe two-way cycling, to allow the new link to connect with Furrlongs.

Manor Crescent. The impacts here are local to the street in question, where residents have to either push their bike (if they are able) or take an elongated route due to the one-way restriction. Many residential streets of similar widths operate as two-way streets, and it would appear that two-way cycling could be permitted with a simple signed solution.

There is an existing link between Manor Crescent and the Royal Exchange/Barton Road junction which is used by people on foot (and probably cycling), but has a “No Cycling” sign erected at the Royal Exchange end. This link is used for vehicle access and would appear to be suitable for cycling. The land is owned by Sovereign Housing Association and may have some highway rights, although it is neither adopted highway nor a definitive right of way. In conjunction with two-way cycling in Manor Crescent and Barton Road this could open up new links between the north-east of Pan and the town centre and National Cycle Network.

Bluebell Meadows



At the time of writing Bluebell Meadows was still under construction, so some aspects of the site are unclear. The spine road through the site (Godric Road) is being laid out with a 3m wide shared path alongside, however the utility of this route is compromised as it is interrupted by multiple road crossings, where it appears the track will consistently lose priority and in several cases sharp turns are required to cross roads. Cycle permeability across the development and between the development and the adjacent Pan Estate appears to be limited to all-vehicle routes. Original plans for Meadowside would have seen a filtered link hear allowing through access by cycle, but this has now been redesigned and only a pedestrian link is provided. There would still appear to be an opportunity to create a cycle link here, and the rationale for its removal is unclear. The proposed upgrade of the Garden Way to Furrlongs link to cyclable standard has also been dropped. Again, there still appears to be an opportunity to create this link in the future, as well as a link to Wellesley Way. Collectively this has created a situation where the only cycle access points appear to be Pan Lane (at a junction with very poor visibility) and Staplers Road. Ironically the new link proposed through Pan will not enable cyclists to reach the new estate.

Shide and St Johns.

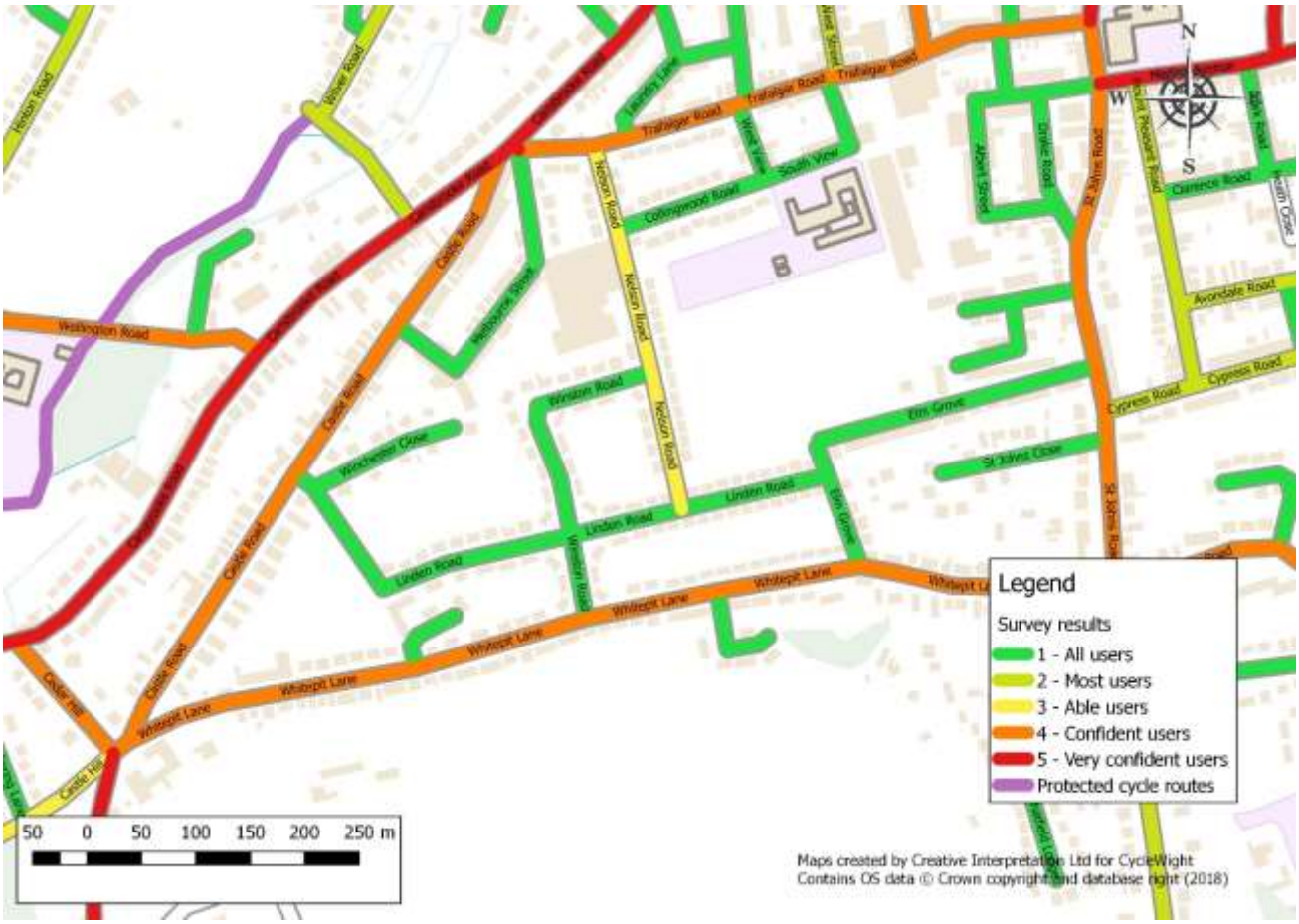
This area consists of a grid network of streets which are reasonably cyclable, bounded on all sides by more difficult streets. Medina Avenue to the east acts as a rat-run for drivers avoiding St George's Way and St George's Approach for journeys from the south into Newport. Driving styles are often inappropriate for what is principally a local residential street. This road used to be the main road into Newport, but when its function was replaced by a new road it remained open to through traffic. As such it now provides a relief road for the relief road.

St John's Road and Shide Road also provide more difficult cycling environments, and this is compounded by the fact they are on significant hills. To the north, Medina Avenue is fast moving and heavily trafficked and provides a barrier to accessing the town centre area by bike.

The section of Medina Avenue which runs north-south could have traffic restraint measures introduced to reduce use of this road as a through route and slow vehicles down. The presence of a builders merchant and car showroom on this stretch mean that some accommodation must be made for access by large vehicles, but a scheme could be introduced which would permit this occasional access while still restoring the character of the street to a primarily residential place. This could be coupled with measures to modify the character of the eastern end of Shide Road to give it a higher sense of place, reduce traffic speeds and improve the safety and convenience of the

cycle track crossing. This would connect the whole Shide area into NCN 23 through a safe network. Connecting this zone into the town centre area is also important, and this could be achieved through creation of a safe route alongside Church Litten and modifications to the Medina Avenue junction.

Nelson Road Estate



Again, most of the residential roads in this zone are reasonably cyclable. Nelson Road provides something of a barrier, with traffic volumes and type of vehicle adversely affected by the presence of the bus depot. Permeability within this zone is relatively poor, with a relatively low density of streets and poor connectivity between them. One simple change that could improve this is the reconfiguration of the Elm Grove filtered permeability scheme to allow cyclists to pass through. Nine Acres lane could potentially be widened and upgraded to facilitate cycle access and two way cycling could be facilitated in East View, South View and West View. Altogether this would improve permeability, provide a significant traffic-free link and facilitate good connectivity with the town centre area with minimal need to use Trafalgar Road.

The roads bounding this zone provide a fairly poor environment for cycling. Castle Road is used as a short cut buy through traffic, and is one way, restricting mobility for cycles. Whitepit lane could be improved through use of more cycle-friendly traffic calming and junction arrangements. Trafalgar

Road carries fairly high volumes of traffic, is one-way in part and creates overtaking risk in a number of places.

Town Centre

Few streets in the centre of Newport offer a good level of cyclability and those that do tend to be fragments, disconnected from other cyclable streets. One way streets cause significant additional problems and remove the option to use some better quality cycle streets in one direction. Turn restrictions and other restrictions prevent cyclists taking a direct route in some areas. Reducing the number of restrictions on direction of travel for cyclists is a key part of improving the permeability of the town.

A number of traffic-free cycling links are provided at the edges of this area, including National Cycle Network (NCN) routes 22 and 23 which cross the town, one E-W and the other N-S. However the ability to move around the town on leaving these routes, and the ability to connect between the various routes is significantly hampered by the quality of the town centre environment.

NCN 22 uses significant stretches of street classed as grade 4 or 5, overly compromising its ability to act as an all-abilities route. However, with changes to a few streets a revised east-west link could be created, using Sea Street, Crocker Street, Mill Street and the quieter end of Foxes Road. This would

provide an improved NCN 22 route, better access between Carisbrooke and NCN 23, and improve access from various locations into the town centre.

NCN 23 has a better route across town, however it is compromised by some poor junction arrangements and narrow cycle lanes in the Coppins Bridge area and the narrow and intermittent contraflow lane through Little London. Little London serves a highly significant purpose as a cycle route, yet this function doesn't appear to be afforded a high enough priority, with through traffic still being permitted and prioritised over people cycling. This area would benefit from a redesign to provide a high quality walking and cycling environment befitting its high utility value and harbourside status.

The central area would benefit significantly from a reduction in the number of streets used for through traffic movements, allowing the majority of streets to be treated as areas with high place value, with motor vehicle use being restricted to access only (by restriction or simply by design). This would create a network of streets which could be easily cycled, improving access to the town and also creating new opportunities for through routes. These streets would also be generally more liveable, and have the walking environment improved too.

Rural areas

Most of the rural roads in the area provide a very poor environment for cycling. The main roads typically see moderate to high volumes of traffic and high speeds. Many have widths which encourage close passing of people cycling. There are several ways these roads can be dealt with:

1. Creation of cycle infrastructure alongside the road. This may be using adjoining land, highway verge or through reducing the width of the main carriageway. In some situations sharing existing pedestrian space may be appropriate, but simply designating footways and cycle routes rarely gives a result of the necessary quality to meet the needs of users and can lead to a less safe and convenient environment.
2. Modification of the road to remove and/or slow traffic. This could include closing some roads to through traffic, changing speed limits, narrowing roads etc.
3. Creation of parallel alternatives. In some instances an alternative route can be provided for cyclists, for example linking Wootton to Newport via the old railway line. However, consideration needs to be given as to the directness and suitability of an alternative route, and whether it serves all the same origins/destinations as the current road route.

Burnt House Lane and Blacklands Road are examples of rural lanes which are currently used as short cuts or rat-runs where through traffic might more appropriately be moved onto more suitable surrounding roads, allowing these routes to be used for local access, walking, cycling and horse-riding.

Cowes Road demonstrates the limitations of providing an alternative cycle-route between two settlements. The former railway route provides an excellent option for many cyclists moving between Newport and Cowes, but for many the detour to use this route would be significant, and Cowes Road also has a significant number of businesses and dwellings along and around it, which the cycle track is unable to service. Therefore both routes are used by people cycling, despite the poor environment Cowes Road provides.

Hospital/Riverway/Dodnor/College

This area is a major employment zone and significant trip attractor, yet cycling links to, and within, the area are limited. National Cycle Network route 23 (NCN 23) provides a good link between Newport/Cowes and the eastern side of the zone, but the cycling environment from here on is poor. The hospital is surrounding by roads hostile to cycling and there is no sensible cycling route between the town centre and college and hospital. Roads around the area are heavily trafficked by a range of vehicles, including the largest HGVs.

A number of changes could be made to improve the situation, and open up cycle commuting to work and college to many people in this area, allow hospital visits to be made by cycle and also provide links from surrounding residential areas.

1. New route from hospital to Newport Quay. A route could be created from the Bargemans Rest, parallel to Medina Way, using land that currently comprises highway verge. This would link the town to the college, then onward to the hospital. Some re-engineering of the B&Q roundabout would be required to create a safe crossing for cyclists but there is ample space to do this. The route could then continue alongside Medina Way as far as Hewitt Crescent, providing links to the hospital and multiple points and a link to the prison estate to the north of the hospital. Provision of a suitable crossing point could also connect the prison and prison estates on the opposite side of Medina Way. With the cooperation of the hospital, an additional route could be provided from the B&Q roundabout to run parallel to Dodnor Lane, providing improved access to premises on Dodnor Lane, Daish Way, Dodnor Park and Monks Brook.
2. Provision of a link between Monks Brook and NCN 23. The route and Monks Brook lie within approximately 30m of each other. If agreement could be reached with the landowner a link could be provided at modest cost, connecting this end of the estate with the off-road network.
3. Extension of the link between NCN 23 and Bishops Way to Daish Way. This is a continuation of the same right of way and an upgrade to this section would provide a high-quality route which is already clearly used on an informal basis.

Collectively these measures would make all areas of this zone accessible by cycle with minimal need to cycle on the main roads. Further measures could be added in to increase permeability further in the longer term.

HMP Isle of Wight

Following the closure of Camp Hill Prison, redevelopment of the site and development of surrounding land is anticipated in the future. The council has suggested this site could deliver 1,300 new homes and 6,000 jobs. As such sustainable transport links to and within this site are likely to be highly important, but redevelopment like this also provides an opportunity to integrate world-class active travel infrastructure from the outset. Links with the town centre and existing main cycle network will be vitally important. Development here could also provide an opportunity to upgrade the existing prison estate roads and provide additional cycle connections between the various estates.

Parkhurst Forest

The forest is a key site for outdoor leisure activities, situated so close to Newport. It is a popular place for leisure cycling, but access to the Forest is very difficult. North-South cycling around this area has already been highlighted as an issue for other users, and measures to improve this situation, if designed correctly, could also help provide improved links to the Forest.

Key School Sites

Carisbrooke Schools

Carisbrooke has a number of schools in close proximity, which according to recent planning applications have very low numbers cycling to school (students and staff), with lack of safe routes highlighted as a key factor. Many of the surrounding roads are cyclable, and there is an existing off road route from Priory farm Lane to Wilver Road, and plans for a new Greenway providing a high quality off road route between Newport and Gunville. One of the biggest barriers to cycling is Wellington Road, where most of the schools are located, including two secondary schools. This road could be reengineered to provide a greater sense of place, a high quality cycle route along its length, and still maintain its role as a significant link for vehicle traffic. This would require a comprehensive approach, but would appear achievable within the exiting highway boundaries and would help tie together an extensive range of cyclable streets and off road routes.

Medina College

Medina College and the adjacent leisure centre and theatre are served by an off-road link from Island Harbour and Newport Quay, though this link is unlit and designed for leisure rather than utility use. The site is close to the old railway line and shared use route alongside Fairlee Road but neither connects to the site without having to use Fairlee Road itself which provides a poor

environment for cycling. This restricts access to the site from Staplers, Pan and Wootton. There appears to be sufficient highway width to modify the section of Fairlee Road between Halberry lane to create one way cycle tracks on either side of the road, linking to the entrance to the Medina College/Leisure Centre.

One Way Streets

Newport has a high number of one-way streets, particularly around the town centre. These form a significant permeability barrier.

Contraflow cycling can usually safely be permitted on one way streets. Depending on layout, traffic volumes and traffic speed this can be with contraflow lanes or tracks or unconstrained (using only signage). In many areas two-way cycling in one-way streets is now the norm, or is becoming so, with exceptions for streets where there are real safety issues with contraflow cycling

The following table lists each one way street and outlines the likely potential for introducing two-way cycling. It should be noted that this is not based on comprehensive survey or assessment of these streets, but rather acts as a precursor to such work, suggesting which streets may be a higher priority for further investigation.

Town Lane	Would require junction changes at South Street to permit two way operation
Manor Crescent	Could be made two-way for cycles without contraflow lane
Terrace Road	Could be made two-way for cycles with or without contraflow lane
Whitepit Lane	Major barrier to east-west movements around the south of Newport. Difficult to restore two-way cycling safely without removing car parking. Significant gradient to cycle against traffic flow.
Banner Lane	Could be made two-way for cycles without contraflow lane
Catherine Terrace	Could be made two-way for cycles without contraflow lane
South View	Could be made two-way for cycles without contraflow lane or turned into cul-de-sac with East View becoming an access only lane/walking and cycling route.
Scarrots Lane	Could be made two-way for cycles without contraflow lane
Castle Road	Two way cycling could be introduced if traffic flows were reduced (to access only levels) and breaks in parking were provided.
Pyle Street	A contraflow track could be provided in the west end, though the junction with High Street may prove problematic, parking may need to be modified/removed and footways may need to be realigned.
Lugley Street	Could be made two way for cycling, with contraflow lane or track.
Royal Exchange	Could be made two way for cycling in the top section to create a link to the planned new shared use route.
Barton Road	This would require widening at the junction with Coppins Bride Roundabout and widening/conversion of the pedestrian crossing to a Toucan crossing. Barton Road is very narrow, but only for a short section, with good visibility, and flows are light enough to allow for give and take between opposing flows.
Crocker Street	Could be made two way for cycling with minor re-engineering and removal of on street parking
Orchard Street	Could be made two way for cycling, though bus station area problematic. Section to Church Litten park could be made two-way, with continuation into the park.
St James Street	Cyclists can use contraflow bus lane which is not ideal but at least traffic flows are low. Lake of ability to continue to Upper St James Street is a problem. Upper St James Street could be made two way with loss of parking. A partial solution would be a contraflow cycle lane from Chapel Street, with removal of around 5 parking spaces and relocation of loading bay.
Albert Street	Could be made two-way for cycling without contraflow lane.
Bignor Place	Could be made two-way for cycling without contraflow lane, possibly combined with footway improvements on Trafalgar Road.
Trafalgar Road	Could be made two way for cycling. Previous attempts have led to response that the corner with St James Place is not safe, with large vehicles turning. Making section to Bignor Place/Union Street two-way would improve the situation, and allow for through cycling via Bignor Place and terrace Road. However, detailed

	investigation of the junction in question may reveal solutions to allow two-way cycling along the
Church Litten	There is ample carriageway width to retain the current number of traffic lanes and implement a two-way cycle track to facilitate contraflow cycling and safe with-flow cycling. Junctions would need to be remodelled, especially at the South Street end.
Hearn Street	Unlikely to be safe for two-way cycling with current traffic flows and parking.
Mill Street	Could be made two way for cycling if either closed to through traffic or traffic flow substantially reduced.
Caesars Road	Limited options for safe two-way cycling due to bends and level of parking provision.
West Street	Section north of Cross Street could be made two way, especially if junction mouth was remodelled and flows/speeds reduced slightly.
New Street	Section between Cross Street and Chapel Street could be made two-way with creation of short section of segregated contraflow cycle track. Section from Cross Street to Scarrots Lane could be made two way with narrowed all vehicle carriageway and contraflow cycle lane. Would benefit from parking switching sides in addition.
High Street	Two way cycling could be created with a major reworking of the street, based on pedestrian>cycle>motor vehicle hierarchy. On street parking would need to be removed. Should the lower High Street have vehicle traffic removed as part of Newport junction improvement works this would provide an ideal opportunity to introduce two-way cycling to this stretch.
Holyrood Street	Could be made 2 way for cycling with loss of on street parking. Would also allow space to widen footways.

Improving permeability

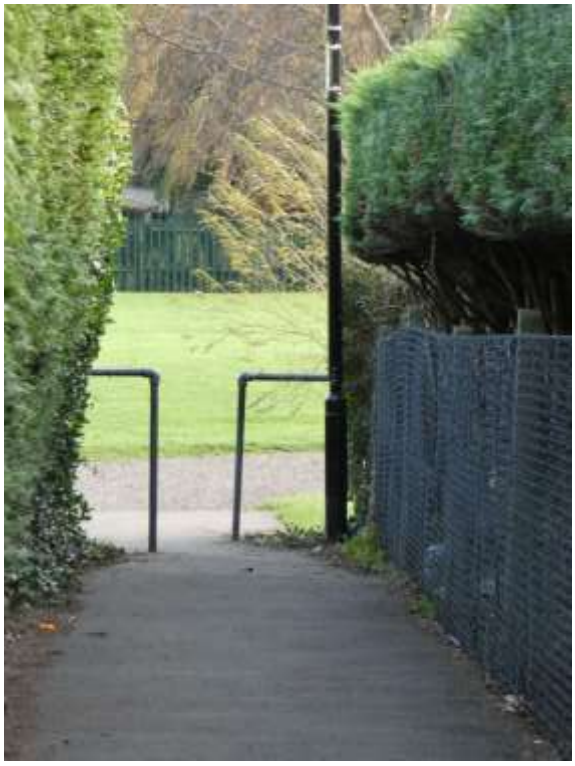
There are various ways the town can be made more cyclable by people of all abilities. A key part of this is making changes to street design and use to rebalance streets towards people walking and cycling. Various potential ways of doing this have been highlighted throughout the report. Measures might include:

- Filtered permeability (restricting vehicle access but not walking and cycling).
- Converting pedestrian only links to allow people to cycle as well.
- Allowing contraflow cycling in one-way streets wherever this can be facilitated.
- Changing street layouts to keep through traffic to key main roads, allowing the rehumanising of many town centre streets.
- Addition of dedicated cycling infrastructure in key locations, particularly alongside major roads.
- Creating new links to allow shorter cycling distances or create safe access to new locations.
- Ensuring new developments build-in effective provision for cycling, design and constructed to a high standard, to meet the needs of a whole range of types of cycling.

Appendix 1 – Physical Barrier Photo Survey

The following table shows the most significant physical barriers, such as gates and bollards, identified within the study area.

	Meadowside/Wellesley Way. Cul-de-sac had been used as temporary entrance to new development. Later closed off with bollards and more recently fenced with no provision for people cycling.
	Carisbrooke shared path, junction with Wellington Road. Chicane barriers with 1.4m gap and creating significant accumulation of leaves and other debris.

	Opposite side of Wellington Road, 1.5m between barriers.
	Shared path from Hinton Road into Victoria recreation ground. Chicane barriers spaced 1.6m apart but creating pinch point <1.3m wide.

	Filtered permeability at end of Kitbridge Road. Chicane barriers set <1.2m apart
	Hazel Close. Shared path joins road with no corresponding dropped kerb and “bolt on” speed hump in line. Triangle of bollards creates difficult environment to navigate, and makes it difficult to approach “tram line” tactile paving straight on.

	Shared path junction with Snowberry Road. Planning Permission drawings show a raised table at this crossing point, which has not been built, leaving full height kerbs both sides of the junction. Nothing to prevent parking across the junction. Offset triple bollard arrangement adds a further hazard.
	Shared path spur to Snowberry Road. Offset triple bollards difficult to negotiate. No dropped kerb provided to transition to/from carriageway.

	Shared path spur to Snowberry Road. Triple bollard arrangement as used elsewhere on this stretch is particularly difficult to negotiate when cycling uphill.
	Petticoat Lane, junction with shared path to Snowberry Road. Offset bollard with 1.5m space between bollard and lamp post. Located very close to junction at a point where people will be turning.
	Petticoat Lane, junction with Sylvan Drive. Path width is only 1m next to gate. Guardrail provides additional barrier in transition between carriageway and shared use route. No signage indicates this is a shared route from this end.

	Westminster Lane. This filtered permeability scheme is regularly used by cyclists, but in fact all vehicles (including cyclists) are prohibited from using Westminster Lane except for access. This would appear to be an anomaly which should be corrected. The barriers erected at one end are <1.1m apart.
	Elm Grove is gated to create two cul-de-sacs. No through route is available for people cycling.

	NCN junction with Shide Road. An array of large bollards have been placed at the junction. The left hand gap in the picture is <1m wide, while the right hand one is 0.7m wide. There is no adjacent dropped kerb, requiring a sharp right then left turn to use the dropped kerb for the adjacent vehicle entrance.
	Shide Path. Newly installed barriers. Gap between barrier and low wall is <1.3m.

	Shide Path/Connies Way. Narrow bridge (1.3m) with cyclists dismount sign.
	Connies Way, link to St Georges Way. 1.9m gap between barriers, on slope.
	Pan Lane. Two sets of chicane barriers forming a filtered permeability scheme. Wide spacing (4m and 4.5m) makes them less of an access barrier than some. Wooden set only have reflectors on one side. No dropped kerb provision is made at junction, continuing on Pan Lane requires four 90 degree turns

	NCN 23, Blackhouse Quay. 1.5m between barriers. Path width <1.2m alongside barriers. Situated on a steep slope. Negotiating the barriers on a standard bicycle is too difficult for some users in either direction, travelling uphill is particularly difficult. Even skilled users lose significant momentum.
	NCN23, Riverway. 1.2m between posts, path curves away either side, so many users are turning as they pass through. Vehicles often parked immediately adjacent to track, or on track.

	NCN23, Riverway (shared route heading towards Blackhouse Quay). Each gap is ca. 1.6m on a 90 degree turn. Sign overhangs path at rider head height.
	Victoria Road is gated to create two cul-de-sacs. No through route is available for people cycling.
	Fairlee Tunnel. 1.5m gap between barriers. Barriers are very difficult to see in some lighting conditions.

	Newport harbour/Hillside. Gaps either side are <0.9m with an additional barrier having been placed on one side which otherwise would have had a gap of ca. 1.5m.
	Newport Harbour/Seaclose Park shared path. Path width 0.8/0.7m either side of central bollard. Width between bollard and sign post 1.3m. Located on a moderately steep slope, very close to the junction.

	NCN 23 Stag Lane. Bollard placed at turning point. Gap between path edge and bollard is 1.3m. Fences create narrowing of available width, and turning space is inadequate without the bollard. Identical arrangement on the opposite side of the junction.
	NCN23 Dodnor Creek. Double bollards placed at either end of bridge. Surface undergoes significant transition from bridge deck to track which can easily create balance problems. Gap between bollards is 0.9m. Between bollards and bridge parapet is ca. 1m.
	Chain Lane/Crocker Street. Filtered permeability scheme. Cyclists are not prohibited on this link, but they are not provided for either, with no dropped kerb and no parking restriction at the junction.

	Hunnyhill/Dodnor Lane underpass. Chicane barriers on west side of underpass, spaced 1.8m apart. 0.8m gap between edge of one barrier and drain gulley. 1m gap between other barrier and low wall.
	1.5m from end of underpass route to guardrail opposite. No transition to the carriageway is provided

Appendix 2 - Key Guidance on intentional physical barriers to cycling

Department for Transport Guidance on cycle infrastructure is now very dated. The main national guidance (LTN 02/08) is now 10 years old and UK practice has moved on significantly since then. Transport for London's London Cycling Design Standard takes a more comprehensive and up-to date approach and should be seen as a more suitable benchmark for current practice. Almost all guidance on this topic starts from a point of using barriers should be a last resort where other options can be shown to be inappropriate, there is a demonstrable need for them, and they are implemented carefully to avoid negative impacts on various users, particularly people with disabilities.

Summary of key points from guidance

London Cycling Design Standards, 2014

- Cycle infrastructure should be designed in a way that is inclusive both of larger types of cycle and various models used by disabled people. It is recommended that the concept of 'the inclusive cycle' is embraced – meaning a recognition that, because of the size of many non-standard types of cycle and the possible limitations of riders, a more forgiving environment is required.
- There is no need to design a network capable of carrying thousands of inclusive cycles at once but it is important that infrastructure is tolerant of non-standard users and does not exclude or disadvantage them.
- Key assumptions that should be made in inclusive design for cycling are as follows:
    - A width of at least 1.5 metres is needed for any cycle gap or access control point.
    - Minimum turning circles need, at the very least, to follow LTN 2/08 guidance – this states that the longest model, a tandem, needs 2250mm around a fixed point and 3150mm for a full turn. Given the likely future use of cycle infrastructure by an even greater range of cycles…it is recommended that design allows for these parameters to be significantly exceeded in practice.
- Physical barriers, such as A-frames and chicanes, are not generally recommended. The costs, benefits and disbenefits of introducing them must be made clear in any design process. Consultation with user groups should be informed by clear and accurate information about what the options are and by the obligation to maintain access for people with protected characteristics under the Equality Act 2010.

- Barriers are only acceptable as a last resort, where the problems that they are intended to deal with are shown to remain after applying other measures.
- Barriers or chicanes are not recommended as speed control measures. Where they are used, the gap must provide at least 1.5 metres of clear width to allow all types of cycle to pass. The stagger between openings needs to be designed in a way that allows people in wheelchairs and those using larger types of cycle to turn and proceed. Barriers and chicanes may not only slow cyclists but also cause congestion on the route, which may lead to further conflict.

Manual for Streets, 2007

- in general, networks should allow people to go where they want, unimpeded by street furniture, footway parking and other obstructions or barriers
- Cycle access should always be considered on links between street networks which are not available to motor traffic. If an existing street is closed off, it should generally remain open to pedestrians and cyclists.
- Cyclists prefer direct, barrier-free routes with smooth surfaces. Routes should avoid the need for cyclists to dismount.

Interim Advice Note 195/16, Cycle Traffic and the Strategic Road Network, 2016

- A good horizontal alignment will not include diversions or fragmented facilities. Obstacles within the route shall not be permitted with the exception of bollards to prevent motor traffic access
- In most cases, a single bollard is sufficient to prevent motor traffic from entering routes for cycle traffic.
- The gap between posts and other physical constraints shall be no less than 1.5m so as to prevent access by cars while retaining access by cycles.
- Bollards shall be aligned in such a way that enables a cycle design vehicle to approach them in a straight alignment.
- There are many categories of cycle used on cycle routes. The width of a standard cycle is 0.6m and the typical width of a cycle that may be used by people with certain types of disability is 1.2m.
- The dimension of the cycle design vehicle shall be assumed as 2.8m long and 1.2m wide.

- For most cyclists, a speed of 12kph or more is required to ride comfortably in a straight line without a conscious effort to maintain balance. Above 12kph the amount of deviation is 0.2m; this deviation from a straight line means a cyclist's dynamic envelope is 0.2m wider than the cycle design vehicle width dimension.

A guide to inclusive cycling, Wheels for Wellbeing, Nov 2017

- Where bollards or kerb upstands are used across a pathway to prevent access to motor vehicles the minimum distance between two bollards, or gaps between kerb upstands, should be no less than 1.5m.

- Many cyclists cannot dismount and push/wheel their cycle. Sections of the road network that are not continuous, or that require the cyclist to make awkward manoeuvres or dismount, pose a significant barrier for disabled cyclists. This is particularly so for handcyclists, where it is not an option for the rider to get off and walk at a barrier or hazard and also applies to many people who use a cycle as a mobility aid. It is wrongly assumed that a cyclist can always lift their cycle over a barrier. Access control measures and barriers that prevent access to motorbikes, mopeds and scooters also prevent access to inclusive cycles4

- It is not recommended to have any barriers along a path that is used by cycles.

- We encourage all local authorities to adopt either Highways England's cycle design vehicle or the London Cycling Design Standards' (LCDS) inclusive cycle concept when designing, or outsourcing the design of, all cycling infrastructure

Cycle Infrastructure Design, Local Transport Note 2/08, 2008

- At low speeds, cyclists are prone to wobble and deviate from a straight line. For most cyclists, a speed of 7 mph (11 km/h) or more is required to ride comfortably in a straight line without a conscious effort to maintain balance. Above 7 mph, the amount of deviation, i.e. the additional width needed when moving, is 0.2 metres. Below this, deviation increases – at 3 mph deviation is typically 0.8 metres. Hazards such as uneven gully gratings may cause cyclists to deviate from their chosen line. Additional width for cyclists is recommended where such hazards exist.

- Failure to provide the room a cyclist requires can make some routes inaccessible or difficult to use, particularly for disabled cyclists, tandem or trailer users and parents transporting young children by bicycle.

- The CYCLISTS DISMOUNT sign to diagram 966 is another overused sign. On a well designed cycle facility, it is very rarely appropriate. The sign is possibly the least favoured among

cyclists – each time it is used, it represents a discontinuity in the journey, which is highly disruptive.

- In general, the sign should only be used in relatively rare situations where it would be unsafe or impracticable for a cyclist to continue riding.
- If it looks as if the sign might be needed, practitioners should first check to see whether the scheme design could not first be modified to make its use unnecessary. In general, the sign should not be used where a cycle track joins a carriageway directly.
- Where the sign's use appears unavoidable, practitioners should be able to defend their decision and explain why it cannot be avoided by design.
- Bollards are the preferred method of access control for larger vehicles, spaced a minimum of 1.2 metres apart, preferably 1.5 metres.
- Bollards should ideally be placed at least 5 metres from any bend or junction, so that riders can approach them straight on.
- Where there is potential for conflict, it may be better to widen the route or address visibility issues rather than install controls. If this is not possible, it may be appropriate to introduce measures to slow cyclists down, such as rumble surfaces, humps, or staggered barrier arrangements (barriers should be considered last).
- Staggered (chicane) barriers are used, the arrangement should be designed to slow cyclists rather than force them to dismount. Chicane layouts should provide gaps of at least 1.5 metres between barriers and walls, and at least the same distance between barriers. Tandems, tricycles and child trailers require at least 2 metres between consecutive barriers.
- Barriers and access controls need to be clearly visible

A Guide to Controlling Access on Paths, Sustrans, 2012

- The use of physical barriers should be avoided wherever possible and should never be introduced where such barriers would discriminate unlawfully against people with disabilities, or where barriers would prevent rightful access or passage.
- It is important to note that there is a tendency to use access controls to slow or stop cyclists at the end of a path for safety reasons – actual or perceived. This can be inappropriate use and there are other techniques available to achieve the same outcome e.g. signing; marking on the paths; putting a 'wiggle' into the path alignment; speed humps; chicanes.

- Chicanes can be varied considerably to allow for different levels of restriction, primarily through varying the depth between the elements of the chicane. A depth of 2.0m will accommodate all cycles, pedestrians and wheelchairs, but even at this depth is likely to exclude the largest mobility scooters and will be awkward for some cyclists.
- A depth of 3.0m will accommodate all cycles, pedestrians, wheelchairs and mobility scooters.
- It is best practice to have the first barrier of the chicane on the nearside of the path, to encourage the greatest speed reduction before cyclists enter the chicane. The barriers themselves do not have to overlap…designs with a free view width between the barriers can be easier for cyclists to negotiate, while still having a significant speed reducing effect.

Cycling by Design, Transport Scotland, 2010

- If staggered (chicane) barriers are used, the arrangement should be designed to slow cyclists rather than force them to dismount.
- Chicane layouts should provide gaps of at least 3.0 metres between barriers and walls to permit access by tandems, tricycles and child trailers.
- Tonal contrast banding and night-time reflectivity will normally be required.
- Chicanes should be placed at least 5.0 metres from any bend or junction, so riders can approach them straight on.

Design Guidance, Active Travel Wales, 2014

- A single bollard, and clear sight lines will be effective in many locations. Double rows of bollards, with a minimum spacing of 1.50m can reduce cycle speeds and prevent motor vehicle access, whilst retaining better permeability for users than chicane barriers.

Making Streets Safer: A Guide to Filtered Permeability, City Infinity, 2017

- Cycles need more than their footprint within which to operate. When being used, they have a dynamic envelope and because they are wheeled, sudden changes in level are not conducive for safety and comfort. Key points to remember are;
    - Cycles are vehicles designed for speed.
    - Cycles need space to slow down and turn.
    - Cycles can have more than two-wheels.
    - Huge variety in cycle configuration.

    - Cycles can be mobility aids.
    - People's mobility can change over time.
    - Not everyone can dismount.
- Good modal filter designs will take the following into account;
    - At least 1.5m clear space between bollards.
    - Odd numbers of bollards used.
    - Passively safe bollards.
    - Allow full turns to be made before having to pass bollards.
    - Physical bypasses to cater for design cycle.
    - Good visibility to see other people walking and cycling.