sustrans

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Bristol & Bath Railway Path - Trinity Street to Clay Bottom

Technical Feasibility Study

August 2020

About Sustrans

Sustrans is the charity making it easier for people to walk and cycle.

We are engineers and educators, experts and advocates. We connect people and places, create liveable neighbourhoods, transform the school run and deliver a happier, healthier commute.

Sustrans works in partnership, bringing people together to find the right solutions. We make the case for walking and cycling by using robust evidence and showing what can be done.

We are grounded in communities and believe that grassroots support combined with political leadership drives real change, fast.

Our vision

A society where the way we travel creates healthier places and happier lives for everyone.

Our mission

We make it easier for people to walk and cycle.

How we work

We make the case for walking and cycling by using robust evidence and showing what can be done.

We provide solutions. We capture imaginations with bold ideas that we can help make happen.

We're grounded in communities, involving local people in the design, delivery and maintenance of solutions.

What we do

Join us on our journey. www.sustrans.org.uk

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Revision	Description	Author	Check	Date
V1	First Draft	Chris Dyer	Holly Mullen	10/02/2020
V1.1	Update	Chris Dyer	Will Haynes	12/02/2020
V2	May Amends	Chris Dyer	Alex Bottrill	27/08/2020

Executive Summary

The Bristol and Bath Railway Path is a 23km shared use path between Bristol and Bath along a former railway line. This project is focused on a 2.5km section of the path, between Trinity Street and Clay Bottom in Bristol, with the aim of increasing the range of user groups using the path, in line with the Community Vision for the path and Sustrans' vision of 'Paths for Everyone'. The path currently serves as both a heavily used transport corridor, as well as a popular linear park space, with each of these producing unique demands on how the path functions.

This technical feasibility study will sit alongside multiple stages of community engagement to inform and direct the design process for the project, to ensure that viable and supported solutions are produced in line with the aims of the project.

Despite originally being a double track railway line for much of its length, the corridor in which the path sits has since developed with some considerable topographical and ecological constraints which limit the feasibility of some design solutions.

Segregated provision would be deemed an ideal technical solution for the path length, with a minimum suitable corridor of 8m for the flows seen on the path to meet guidance. This would consist of a 4m cycle path, 3m pedestrian path and a 1m central buffer. However, this provision would only be feasible along three sections of the path, totalling 630m, due to width, ecological and topographical constraints. Of this length 210m would include the complete loss of the green corridor, causing a substantial change in the look and feel of the path, as well as considerable negative ecological impacts. Reduced width segregation (a 5.5m wide corridor consisting of a 3m cycle path, 2m pedestrian path and a 0.5m central buffer) could be achievable in places where ideal-width segregation is not possible, however opportunties for this are still severely limited, with long sections of path where this could not be achieved and only fairly short sections where this reduced width segregation is feasible, involving substantial ecological loss.

Whilst segregated provision is unfeasible for much of the path length, widening of the path to a average width of 4.5m from 3m is feasible for considerable sections of the path (1.5km in total). Whilst this may not be the ideal solution in capacity terms, this option would still be a significant improvement for users of the path, by increasing their comfort and allowing a wider range of activities than are currently possible on the path. This includes social cycling/walking/wheeling (side by side) and parents walking/cycling alongside their children.

In addition to these design options there are locations along the path in which localised widening could take place where available widths are increased for too short a length to realistically provide traditional segregation. These places could allow for more creative designs, including placemaking features.

A Preliminary Ecological Appraisal (PEA) has been completed, with results from this influencing the findings of this report. However, further ecological surveys will be required with the possibility of further constraints not identified in the PEA being identified within these additional surveys.

It is acknowledged that the budget of the project will not allow for all of the feasible technical design options evaluated in this report to be taken forward to delivery. Whilst this report highlights the feasibility, or otherwise, of technical design options, the detail and combination of designs taken forward will be steered by the community-led design process taking place through multiple stages of community engagement, alongside the expertise of the design team.

1. Introduction and Context

The Bristol and Bath Railway Path is a 23km shared use path between Bristol and Bath, utilising the alignment of a disused railway line. The route makes up part of Route 4 of the National Cycle Network (NCN).

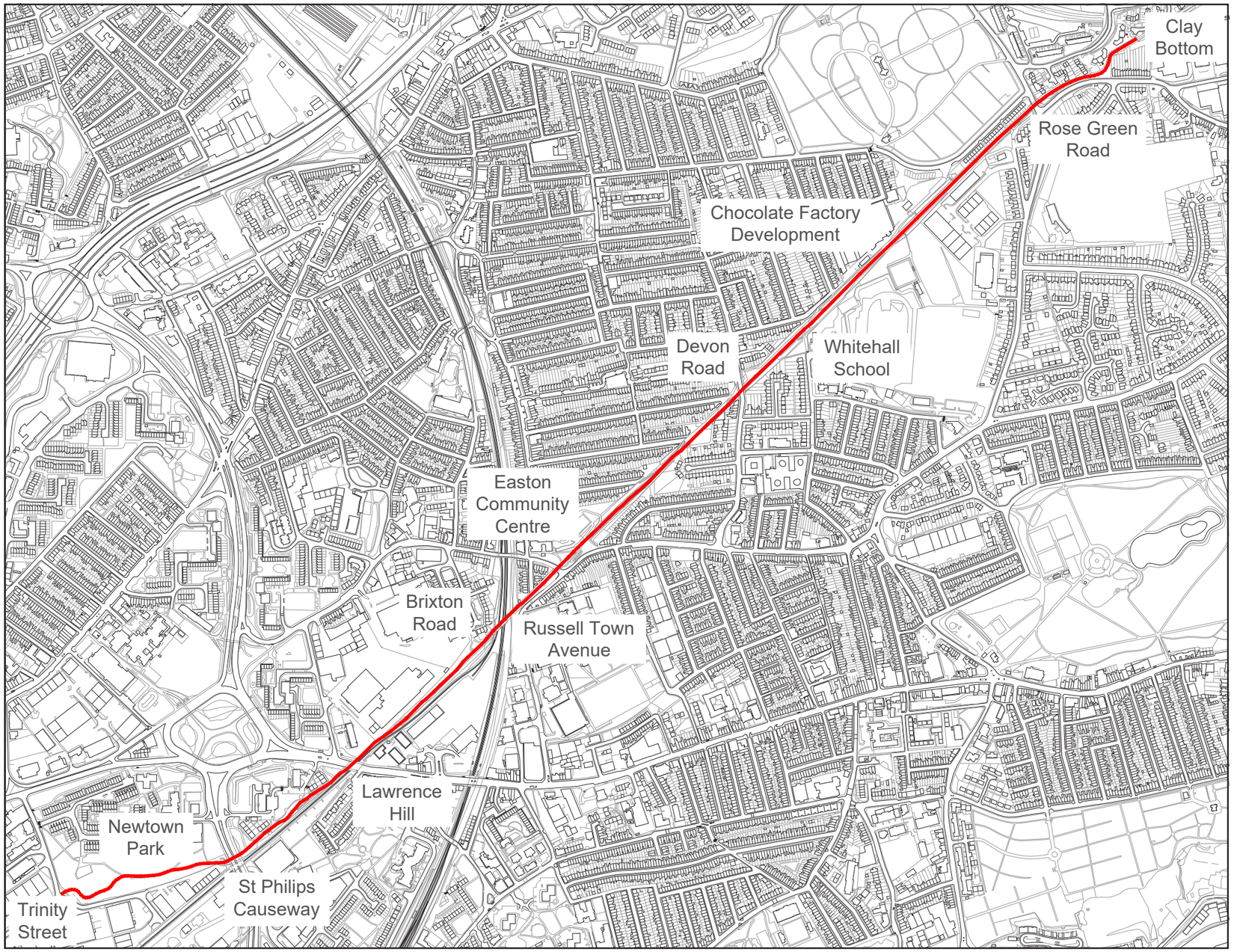
This feasibility report will look into how a 2.5km section of the Bristol and Bath Railway Path between Trinity Street and Clay Bottom in Bristol can be improved with the aim of increasing the range of user groups using the path, in line with the Community Vision for the path and Sustrans' vision of 'Paths for Everyone'.

The Community Vision for the path states: "We are committed to a Bristol and Bath Railway Path that is a safe space: a park, a place for all users, by foot or by wheel, enabling healthy lifestyles in a green and biodiverse corridor linking the two cities and communities across the West of England Combined Authority. We will work with all of the communities who use the Bristol and Bath Railway Path to redesign and reshape it so that its value to people, wildlife, its localities and the region as a whole is enhanced and protected for generations to come."

This section of the path is heavily used by cycle commuters into Bristol city centre, with morning and evening peak times particularly busy.

It is anticipated that this report, alongside multiple stages of community engagement will inform and help direct the design process for this project, to ensure viable and supported solutions are produced in line with the aims of the project.


Bristol & Bath Railway Path



2. Design Principles and Relevant Infrastructure Design Guidance

Sustrans believes that active transport should be the obvious and easiest choice for local journeys and that highway and street design should reflect and encourage this. We strive to deliver infrastructure of the highest quality, with benefits for its users, their communities and the environment. Our work is rooted in industry best practice but reaches far beyond this into new thinking and innovative ways of working.

Design Criteria

Highways England cycling design guidance, CD 195, states five key design criteria to consider when designing new infrastructure that encourages design that creates attractive, safe and convenient facilities. Although stated in cycle specific guidance, these criteria are equally applicable for pedestrian, and shared use, infrastructure.

Coherence	Cycle networks link trip origins and destinations, including public transport access points and are continuous and easy to navigate.
Directness	Cycle networks serve all the main destinations and seek to offer an advantage in terms of distance and journey time.
Comfort	Infrastructure meets design standards for alignment and surface quality, and caters for all types of user, including children and disabled people.
Attractiveness	Aesthetics, noise reduction and integration with surrounding areas are important.
Safety	Cycle networks not only improve cyclists' and other road users' safety, but also their feeling of how safe the environment is (their personal security).

Table 1 - CD 195, Highways England

The first two of these criteria mentioned are less relevant to this project because the route being looked at is an existing route, rather than a new route being developed. However comfort, attractiveness and safety are all key criteria for how the existing route can be improved.

Design Guidance

There is a library of useful design guidance available in the UK that helps to inform and direct our work. Below is a list of some of the guidance we refer to when designing high quality infrastructure for walking and cycling:

- CD 195 ' Designing for cycle traffic' (formerly IAN 195/16) – Highways England
- Designing for walking - CIHT
- Inclusive mobility – DfT
- Manual for streets – DfT

The 'cycle design vehicle'

CD 195 uses a conceptual 'cycle design vehicle' 2.8m long and 1.2m wide in order to aid design for all path users. This is based on a 1.8m bicycle with a 1m trailer.

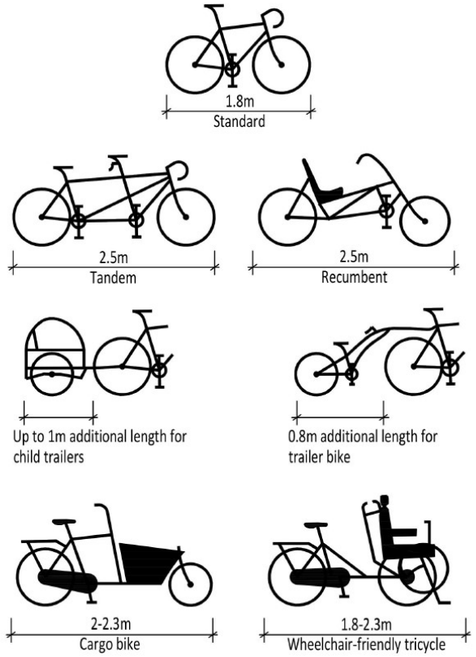
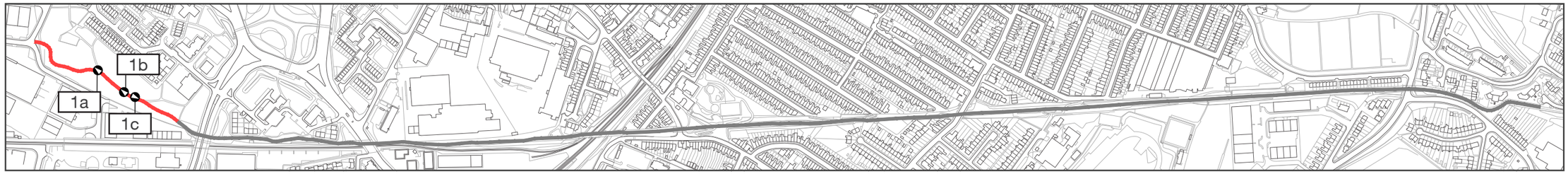


Figure 1 - CD 195, Highways England

Ecology

Sustrans delivers ecologically sound projects, seeking to deliver net biodiversity gains through our work. Ecological enhancements improve access to, and engagement with, nature for route users as well as create a positive impact on the quality and attractiveness of the route itself and are therefore a key part of our design approach. We also recognise the value of wildlife to the local community and seek to work with local stakeholders in identifying and delivering any enhancements.

3. Design Overview



3.1 Path Sections

Newtown Park - 280m

Constraints

The key constraints through the Newtown Park section of the path (between Trinity Street and St Philips Causeway Bridge) are those of undulating ground level and trees. Towards the St Philips Causeway Bridge the path follows undulating ground, with steep gradients in places. Additionally, through the middle section of Newtown Park the path is located between two steep sided mounds around 1.5m in height. In various locations through the park the path passes near to trees, in some places either side of the path. These constraints are likely to cause complications in any features designed within this section of the path.

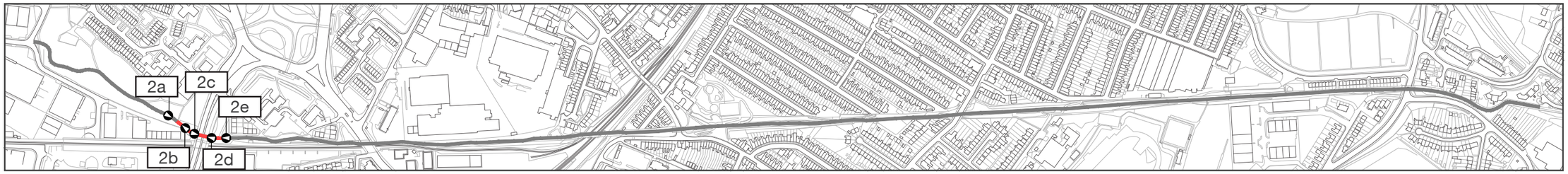
Opportunities

Through Newtown Park there are large areas of grassland, creating an opportunity for widening of the path. In addition, there is an existing desire line cutting a corner of the path near the Trinity Street entrance; there is an opportunity to incorporate this into the path.

Desire line through Newtown Park

Bank next to the path through Newtown Park

Undulating levels through Newtown Park



St Philips Causeway Bridge - 80m

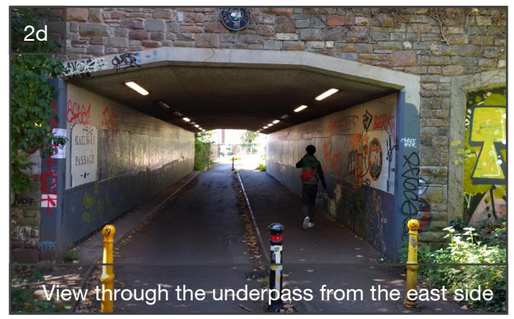
Constraints

The key constraint as the path passes under St Philips Causeway is the available width, limited by the width of the existing underpass. This section is 5m wide and has existing kerb segregation with a 2.5m wide cycleway and a 1.9m wide footway. A further constraint at this section is the existing bollards on both approaches to the underpass. These bollards are restrictive to movement as only a single user can pass between the bollards, making bidirectional flow difficult, especially during busier periods. The locations of these bollards means that this issue is seen on both the cycleway and footway sections of the underpass. Combined with the limited visibility through the underpass from the approaches, this funnelling effect creates unnecessary conflict on the approaches and through the underpass, particularly at busy times. Additionally, this section is bounded by steep banks and boundary fencelines on the approaches to the underpass. The access to the east of the underpass creates a further constraint in this area.

Opportunities

There is an opportunity in this section to improve the comfort and ease of movement for all users by removing, repositioning or reducing the number of the existing bollards on the approaches to the underpass. In addition, there is an opportunity to gain slight additional width on the eastern approach to the underpass to improve the sight lines through the underpass. There is also an opportunity within this section to better highlight the segregated section of the path through the underpass, and the intended uses of each side of this separation.

Approach to St Philips Causeway underpass

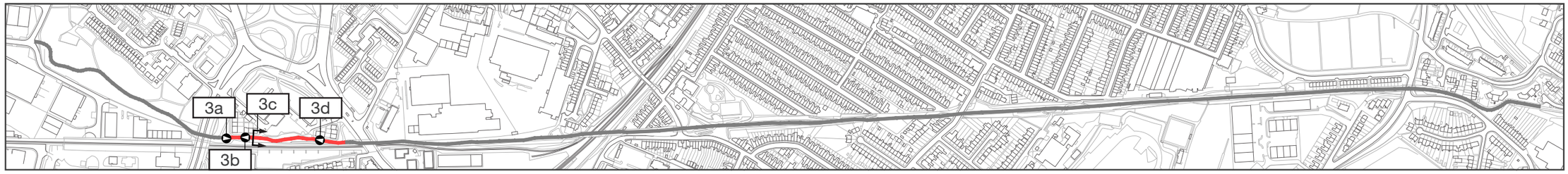


View through the underpass from the east side

Western approach from the underpass

Eastern approach to the underpass

View through the underpass from the west side



St Philips Causeway to Lawrence Hill - 240m

Constraints

Between the St Philips Causeway Bridge and the Lawrence Hill Bridge there are significant constraints which would limit any changes made to this section of the path. The path corridor along this section is significantly narrower than other sections of the path, with the width at its narrowest being only 3m as it runs between a retaining wall and the boundary fence. This extremely restricted width means that there is limited scope for widening or realignment of the path. The Preliminary Ecological Appraisal (PEA) has highlighted some areas of ecological importance, including species rich grassland and ivy broomrape, a nationally scarce plant. Tree removal will need to be informed by further arboriculture surveys and in some cases further investigation as to bat roost potential of the trees. So as to maintain the ecological importance of the path as a whole it is important that careful consideration is given to the retention of these features.

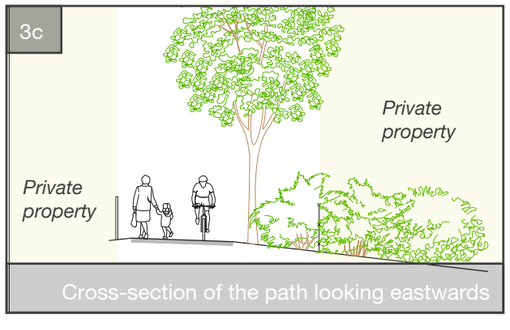
Constrained path width

Boundary fence adjacent to the path

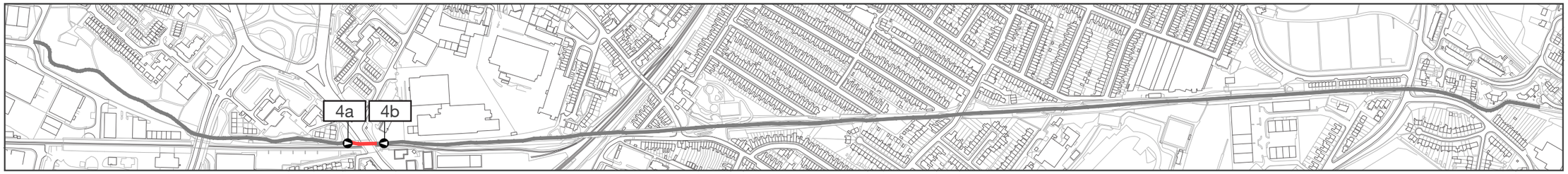
Boundary fence adjacent to the path

Opportunities

Due to the constraints highlighted above there are very few opportunities for physical changes to the path within this section. There is an opportunity to make the path safer and more comfortable for users by removing the line of cobblestones near the Lawrence Hill Bridge, which are uncomfortable to travel over and can become slippery in wet or icy conditions.



Cross-section of the path looking eastwards



Lawrence Hill Bridge

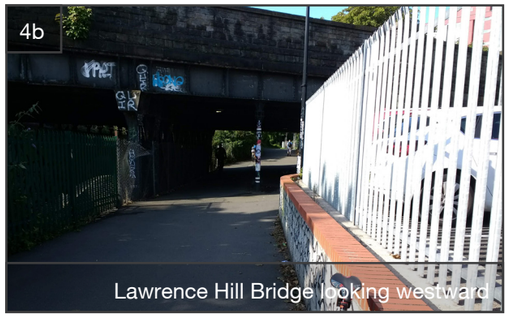
Constraints

The key constraint under Lawrence Hill Bridge is the location of the bridge support columns. Located near the centre of the path, the columns can cause conflict between users and are a constraint to any physical changes to the path in this location. Additionally, the blind access point from Lawrence Hill immediately northeast of the bridge can cause further conflict between users.

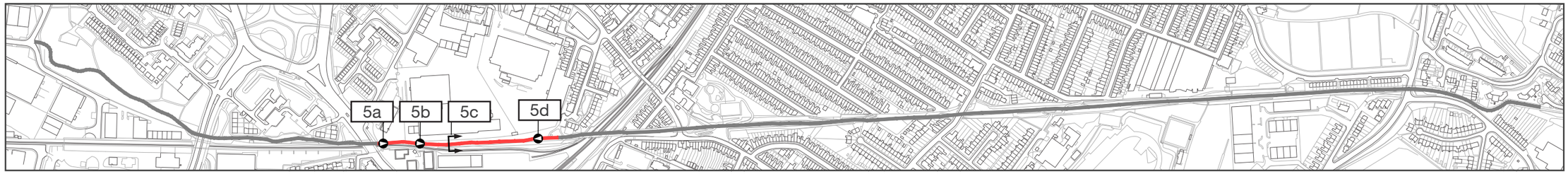
Lawrence Hill Bridge looking eastward

Opportunities

There is an opportunity to reduce conflict at the Lawrence Hill Bridge due to the natural separation that the central bridge support columns provide, and the additional path width compared to the majority of the path as a whole.



Lawrence Hill Bridge looking westward



Lawrence Hill to Brixton Road - 300m

Constraints

The first 75m of this section of the path is extremely constrained, with the path being bounded by fencelines on both sides of its 4m width. Whilst this path is wider here than the vast majority of its length, the effective width is reduced by 0.5m on each side due to the fences on both sides, meaning that the edges of the path cannot be utilised as handlebars and pedals cannot 'overhang' the edge of the path. The effective width is therefore 3m; consistent with the majority of the path along its length.

In addition, Japanese Knotweed has been identified in this area therefore measures will need to be implemented to ensure it is properly treated. Any physical path changes planned for this area would likely fall outside of the timescales of this project due to the requirement of the Japanese Knotweed to be properly treated before any works could commence in this area.

The key constraints for the latter part of this section are the trees and vegetation that flank the path. Whilst these are not immediately adjacent to the existing path, any physical changes to the path which include significant widening would cause considerable loss of vegetation and greenery, fundamentally changing the look and feel of the path. In addition the existing lighting columns along this section are within 0.5m of the path edge on the north side, meaning that any widening of the path on the north side would require the repositioning of the lighting columns, adding to the costs of the works.

Opportunities

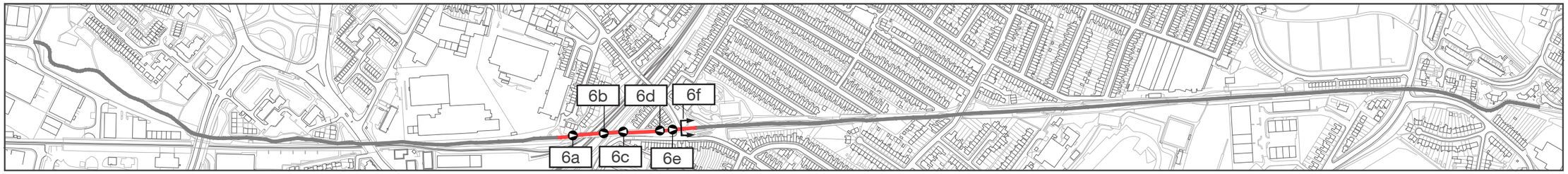
There are opportunities along this section to widen the path slightly by making use of the verge space either side of the path, especially if the vegetation were to be cut back. Additionally, there is an opportunity to improve the visibility of the access from Brixton Road.

Constrained path width

Path bounded by vegetation

Path bounded by vegetation and a fenceline

Cross-section of the path looking eastwards



Brixton Road to Easton Community Centre - 240m

Constraints

A key constraint on this section is the available widths as the path crosses two bridges, firstly over the railway, and secondly over Easton Road. The railway bridge is also constrained by a central girder running down the centre of the bridge. The bridge over Easton Road has steep slopes down from the centre of the path to the parapets of the bridge, whilst the parapets themselves are relatively low. Any physical changes to the path across this bridge would likely require the path to be level across the width of the bridge, and thus the parapets to be heightened to ensure the safety of the path is maintained. Any works across this bridge would likely require a risk assessment and agreement of the bridge owner.

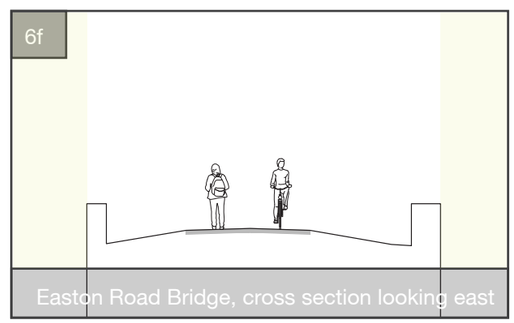
The access point at Russell Town Avenue has slopes with substandard gradients. The slope from the aforementioned Railway Bridge towards the access point would likely require significant works to engineer suitable gradients as the path level over the bridge cannot be lowered. This is a key constraint to making this access point, and the path as a whole accessible for all users.

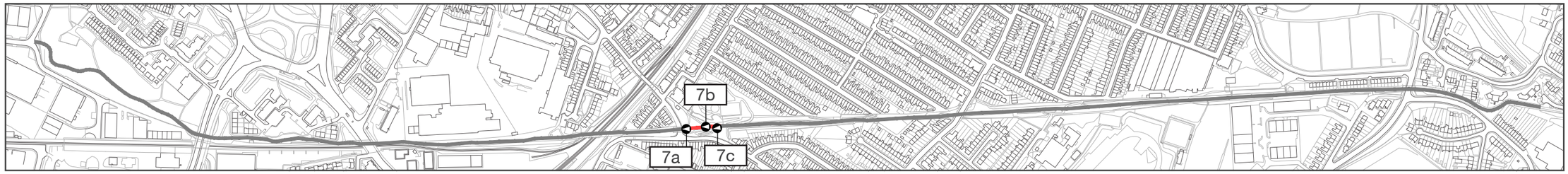
Between the Russell Town Avenue access point and the Easton Road Bridge the constraints are similar to those seen between Lawrence Hill and Brixton Road; namely trees and vegetation adjacent to the path, and existing lighting columns close to the north edge of the path. Significant widening of the path would have a considerable impact on the path's green corridor, due to the extent of the vegetation clearing which would be required.

Opportunities

At the Railway Bridge and Russell Town Avenue access, where the path is split due to the central girder, separation of users naturally occurs to an extent, with users continuing along the path using the northern side of the path, whilst those using the Russell Town Avenue access generally use the southern side of the path. There is an opportunity to formalise this separation to avoid conflict at the access point, especially during busy school times, due to the presence of the nearby City Academy.

Additionally there is an opportunity to provide additional path width between Russell Town Avenue and Easton Road Bridge to increase the comfort of the path for all users, similar to that described between Lawrence Hill and Brixton Road.





Easton Community Centre/Whitehall Road Accesses

Constraints

The key constraints in this section are the access points linking to the path on both sides. The access from Whitehall Road is particularly constrained as it doubles back on the steep bank. The access path is narrow with retaining walls on both sides. In addition, the path is steep, making it inaccessible for some users. The steep bank between the main path and Whitehall Road makes improving this access difficult without significant earthworks, retaining structures and long sections of ramped path.

Opportunities

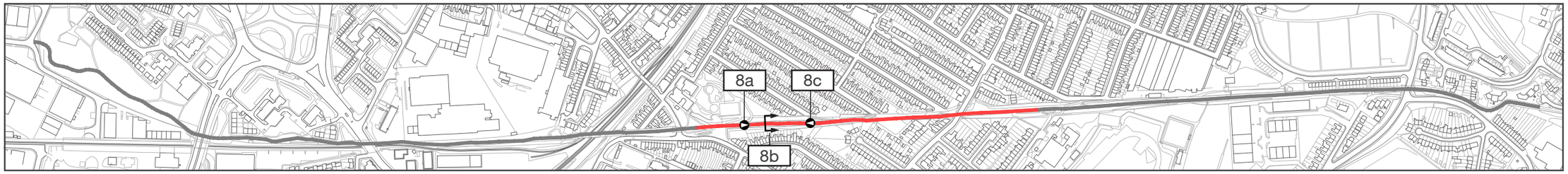
There is an opportunity to make use of the mounded area between the forks in the Easton Community Centre access path. Whilst using this space would require earthworks to level the area, vegetation clearance and removal of the existing wooden structure, this additional area could be used for localised widening of the path, helping to ease conflict caused by different movement requirements. This would also help to increase visibility and awareness of the access points at this location for users travelling along the path. There is an additional opportunity for this area to be utilised for place making features, such as planters, trees and seating.

There is an opportunity to improve the steep access path from Whitehall Road, however, this is likely to be expensive due to the need for shallower gradients, requiring significant earthworks and retaining structures. The narrow footway on Whitehall Road, the narrow entry to the access path and the immediate sharp turn makes any improvement to the access extremely difficult without significant changes to the highway environment on Whitehall Road; this would fall outside of the timescales and scope of this project. Whilst works could be completed to improve the accessibility of this access path, these significant works would not be beneficial without the aforementioned highways works. There is opportunity for smaller scale works to improve this access path without significant earthworks or retaining structures. These smaller works could include widening of the path at the switch-back, allowing more turning space.

View over Easton Road Bridge looking west

Junction of the main path and an access path

Whitehall Road access path



Easton Community Centre to Whitehall School - 610m

Constraints

The key constraints along this section are the limited available widths. Between the Easton Community Centre accesses and the Battersea Road access the path is within a cutting, with banks around 1.5m high on both sides. These banks limit any widening of the path width beyond its current state, without retaining structures being constructed. These retaining structures would add additional costs and have ecological impacts. The existing access point onto Battersea Road and Chelsea Park are particularly constrained due to the steep banks in which they ascend onto the path. There are further constraints as the main path passes the Colston Road access, with the main path passing between a slope to the access point and a large retaining wall. Whilst widening of the path by 0.5m could be achieved on the side of the wall, this would have no effect on the path itself as the effective width of the path would not be increased with this widening (because of the large wall).

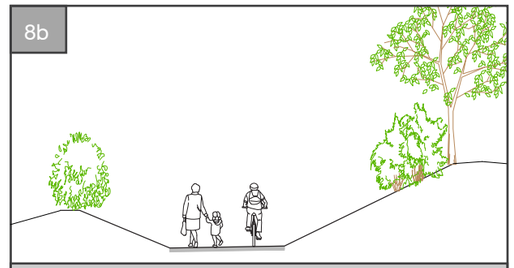
Constraints – Badgers

Badgers are known to be active along the stretch of the route from Easton Community Centre to the Rose Green Road Bridge, and will therefore have to be considered in the design proposals. Badgers and their setts are protected by the Protection of Badgers Act 1992. It is an offence to kill, injure or take a badger, intentionally or recklessly damage or destroy a badger sett, or obstruct access to it, or disturb a badger when it is occupying a sett. Furthermore, should the design proposals impact upon a badger sett a licence from Natural England will need to be in place before works can proceed. This type of licence is time-constrained and would require extensive survey and monitoring information to inform the licencing process.

Opportunities

Between the accesses for Chelsea Park and Colston Road the land opens out for a short section. There is an opportunity to use this space for localised widening of the path at this location. Whilst the access to Colston Road is relatively steep, there is an opportunity to make this entry to the path more accessible. Whilst there is limited feasibility for significant improvements to the accesses from Battersea Road and Chelsea Park, there is an opportunity to increase the visibility of these accesses.

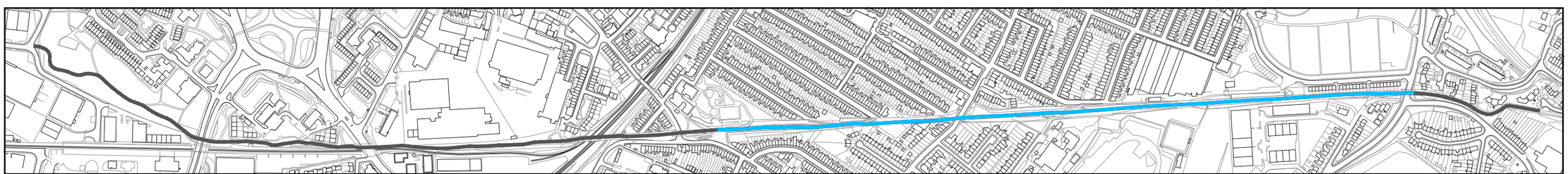
As the path goes underneath the Devon Road Bridge, additional space is available to the side of the path. Additionally, between Devon Road Bridge and the Whitehall School/Bruce Road accesses there is available space on either side of the path, with the trees and vegetation being set back further than in other sections of the path. This gives an opportunity for widening of the path without significant loss of greenery along this section. If this were to take place on the northern side of the path then existing lighting columns would need to be relocated.

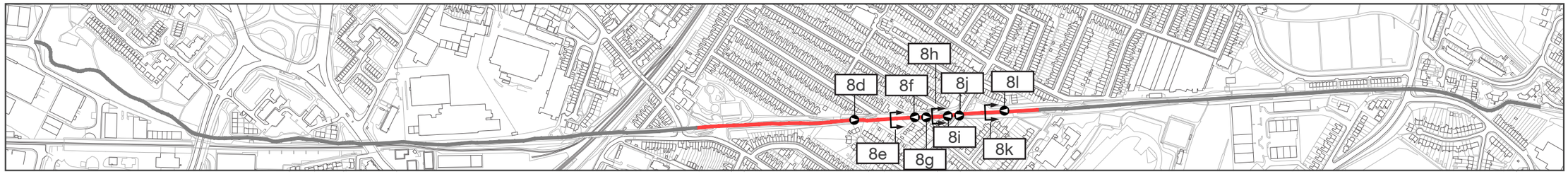


Cross section looking east through the cutting

Cutting between Whitehall Rd and Battersea Rd

Cutting between Whitehall Rd and Battersea Rd


Section of the path where Badgers are known to be active


8h
8d
8f
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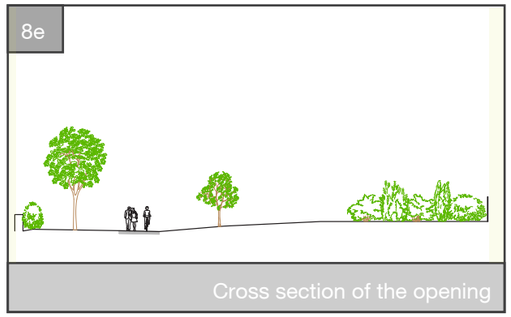
8d
Chelsea Park access


8g
Colston Road access looking eastwards


8j
Devon Road Bridge


8e
Cross section of the opening

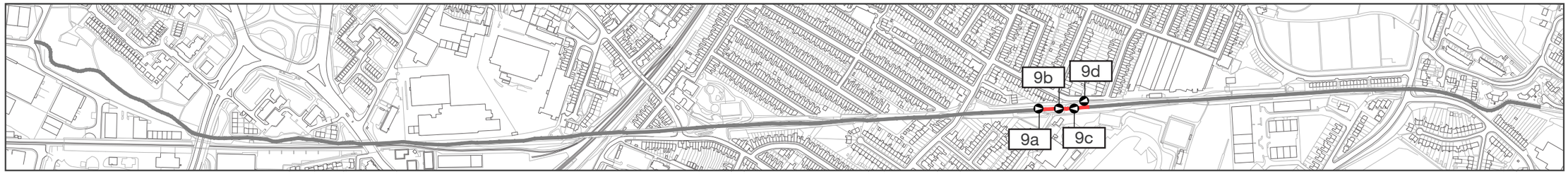

8h
Cross section of Colston Rd access looking east


8k
Cross section east of Devon Rd looking east


8f
Opening between Chelsea Park and Colston Rd


8i
Colston Road access looking westward


8l
Looking west near Whitehall School access



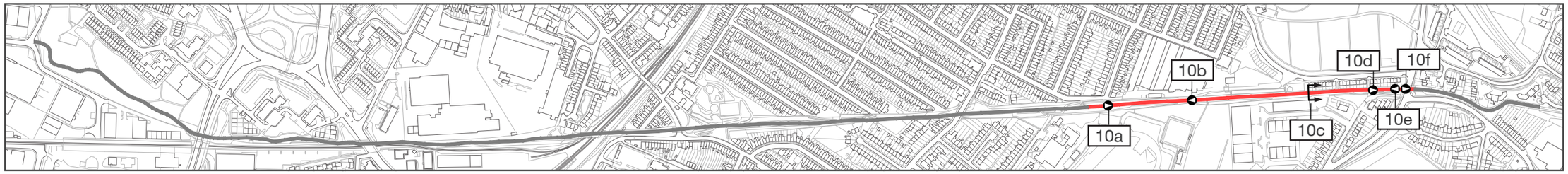
Whitehall School/Bruce Road Accesses

Constraints

The main constraints in this section of the path are the steep and tight access ramps from both Bruce Road and Johnsons Road (Whitehall School). These ramps are relatively narrow and are particularly busy around school start and finish times due to the proximity of Whitehall School. Considerable earthworks and retaining structures would be required to significantly alter these ramps, adding significant costs. The steep banks in the area offer limited bat roosting potential which will require further investigation. As mentioned in the previous section badgers are known to be active in this area, posing a further constraint.

Opportunities

Whilst significant changes to the access ramp may not be suitable within the scope of this project, there is an opportunity to improve the blind corner at the top of the Whitehall School ramp, which causes conflict, particularly around school times. There is also an opportunity to create a path linking the main path from the east with the ramp towards Whitehall School, so as to avoid some of the conflict at the main crossing point.



Whitehall School to Rose Green Road Bridge - 560m

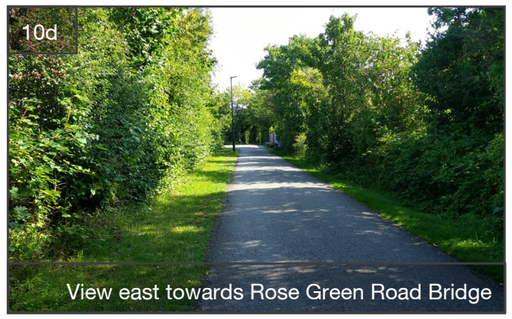
Constraints

As mentioned above badgers are know to be active in this area and this may limit the extent of works which can be completed in this area, without significant delays and additional costs. A further constraint is the temporary hoardings which are located 1m from the northern edge of the path along the Chocolate Factory development site. It should be noted that the timescales of the Chocolate Factory development exceeds the timescale of this project, meaning that any works on the path would be restricted by these temporary hoardings. This, alongside the aforementioned ecological constraints, significantly limits the extent to which any widening of the path could be completed along much of this section of the path.

Opportunities

Towards the Rose Green Road Bridge end of this section there is an opportunity to increase the visibility and awareness of the accesses from Greenbank Road and Gordon Road. Along the section of the path parallel to Greenbank Road there is an opportunity for slight widening of the existing path, however, this may have implications on the aforementioned poor visibility of the accesses on this section as users entering at the access would not have sight of the full path width until they were at the edge of the path.

Hoardings around the Chocolate Factory Site



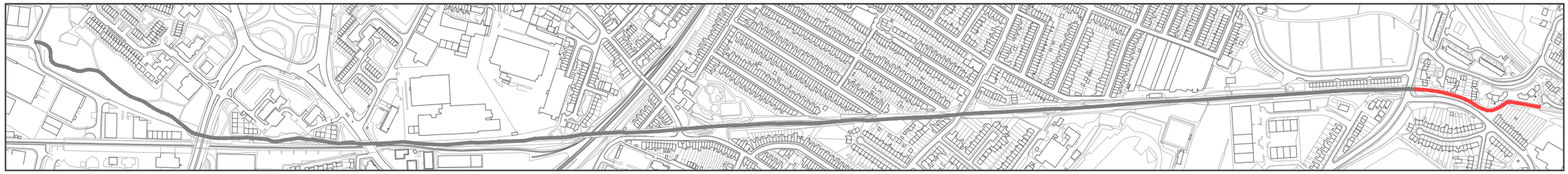
View east towards Rose Green Road Bridge

Hoardings around the Chocolate Factory Site

View west away from Rose Green Road Bridge

Cross section near Rose Green Road Bridge

Rose Green Road Bridge

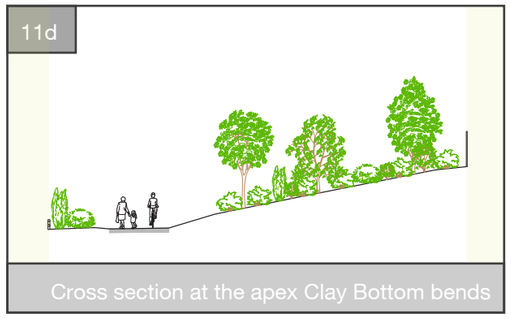


Rose Green Road Bridge to Clay Bottom - 200m

Constraints

The main constraint along this section is the blind nature of the corners in the path as it skirts around the Clay Bottom development. Additionally, the locations of trees in this area could be a constraint for widening of the path. The available space is limited in places along this section, particularly at the eastern corner of the Clay Bottom bends.

Approach to Clay Bottom bends



Cross section at the apex Clay Bottom bends

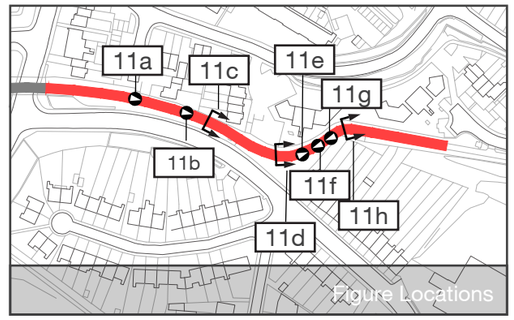


Figure Locations

Opportunities

There is an opportunity to improve the sight lines around the corners. In addition, there is available space on the outside of one of the bends, allowing for localised widening of the path at this point. Whilst this may require earthworks and retaining structures, this would be beneficial to improve sightlines and reduce conflict around the corners. There is an opportunity to improve the existing access points onto the path, from Clay Bottom and Rose Green Road, in particular to address the poor sightlines and tightness of the turns.

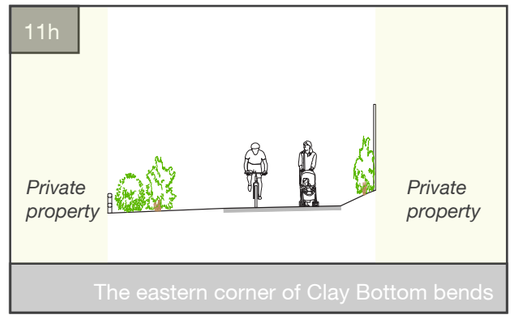
Rose Green Road access

View east around Clay Bottom bends

View west around Clay Bottom bends

Cross section near Rose Green Road access

View west around Clay Bottom bends



The eastern corner of Clay Bottom bends

3.2 Additional Future Links

Railway Alignment

It is worth noting that there is a potential route which is being explored externally to this project to link the path near St Philips Causeway along the original railway alignment towards Bristol Temple Meads Railway Station. This potential new link would likely serve as a more direct route towards the city centre with potentially fewer constraints than identified within this project. This potential route would aleviate pressure on the section through Newtown Park, providing a high quality additional path.

Chocolate Factory Development

Directly north of the path between the Whitehall School access and the Rose Green Road Bridge there is a new development being constructed on the site of the old chocolate factory. As part of this development temporary hoardings have been erected adjacent to the path for a section of 325m. Whilst linking to the development site falls outside the scope and timescales of this project it is understood that new accesses linking the development site with the path will be completed by the developer.

3.3 Path Accesses

There are a considerable number of accesses onto the main path along its length, most of which are of adequate quality to allow all users to access the path. However, various accesses have steep gradients which make the path inaccessible for some users. It is acknowledged that it will not be possible within the budget and timescales of this project to ensure that all accesses are of a suitable gradient. However, the process of engagement of different communities, including of disability groups, aims to ensure that any works at access points, where feasible, are suitably prioritised within the designs produced.

The key accesses in which the existing gradients are inadequate for full accessibility are those of Lawrence Hill, Whitehall Road, Battersea Road, Chelsea Park, Colston Road, Bruce Road, Johnsons Road and Rose Green Road.

At Lawrence Hill, there is no scope for improvements due to a lack of available land and fixed elevations at both ends of the access path, making improvement of the gradient impossible without unfeasible, large-scale highways changes on Lawrence Hill.

The accesses at Whitehall Road, Battersea Road and Chelsea Park have considerable constraints due to the steep banks on which they are located, meaning that for any changes in the paths, significant earthworks and retaining structures would be required.

Works at Bruce Road and Johnsons Road (Whitehall School) access ramps to reduce the gradients would require evaluation of existing retaining walls and banks. Additionally, lengthening the ramp from Johnsons Road would be constrained by being located in the stretch of the route where badgers are known to be active. This would make works here extremely difficult within the project timescales. Additionally, any lengthening of the Bruce Road access would mean that it would not be aligned with the Johnsons Road access, increasing conflict significantly, due to the high numbers of users, particularly those accessing Whitehall School, who cross the path between Bruce Road and Johnsons Road.

The existing ramp access at Colston Road is wide, however the steep nature of the ramp makes accessibility difficult. There is available space to extend this ramp, reducing the gradient to become more accommodating for all users. Whilst this would likely include some vegetation clearance and the removal, or relocation, of a mature tree, this is unlikely to have a significant negative impact on the ecology of the path.

At the Rose Green Road access near the Clay Bottom bends, whilst there is available space, the steep bank, rising 1m from the path to Rose Green Road, makes creation of a suitable ramp difficult without significant earthworks and retaining structures, making this option unfeasible for this project. A new access could be created further west of the existing access, where the elevations of the path and Rose Green Road are level. This would likely require liaison with the relevant highways authority, and would be unfeasible within the timescales of this project. Whilst a reduction in the gradient of the access is unfeasible within the project, the removal of some of the brick walls around the access could improve the sightlines and tightness of the access point.


Chelsea Park access

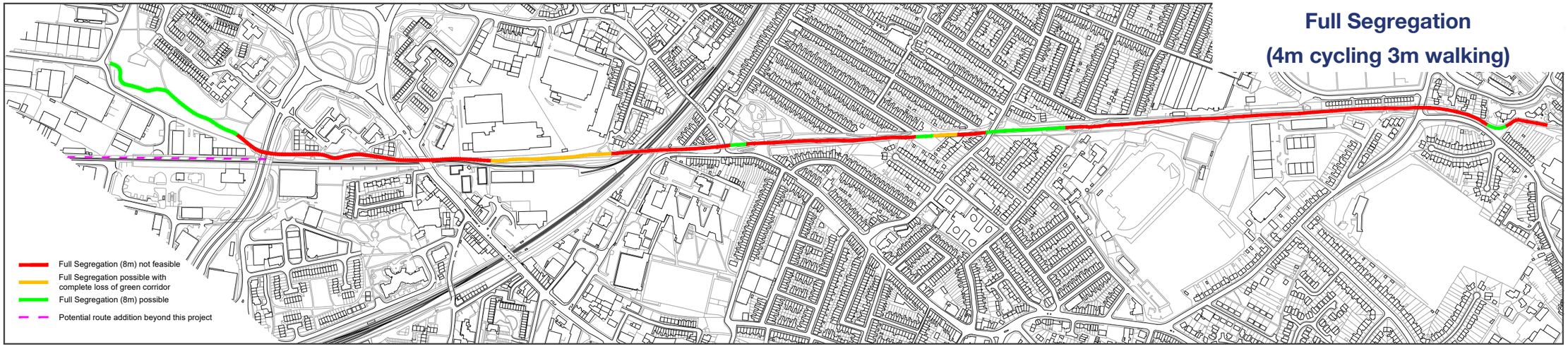

Colston Road access


Lawrence Hill access


Bruce Rd access from Johnsons Rd access


Whitehall Road access


Rose Green Road access



3.4 General Design Options

Segregation

Formal counts near the Whitehall School access has identified peak flows of over 750 cyclists per hour in the dominant direction of travel (westbound in the mornings and eastbound in the evenings). With these flows design guidance, set out in Highways England document CD 195, would direct towards a segregated approach for cyclists and pedestrians. For a peak time flow of more than 150 cyclists on a two-way cycle track a desirable minimum of 4m is stated. Measured peak flows on the path far exceed this threshold, therefore a minimum of a 4m path would be required for cyclists.

In addition to this, the existing path width would be retained for pedestrian use. A buffer of 1m is desirable between the cycle track and pedestrian path, allowing for lighting columns to be accommodated, as well as increasing comfort for users. This means that a minimum corridor width of 8m would be required. It is also worth noting that the effective width of a path is reduced by 0.5m if it is bounded by a vertical feature (wall, fence etc) over 600mm tall. Therefore, in the case of the path being bounded by a wall or fence on both sides, a minimum corridor width of 9m would be required. Where possible verges of 0.5m should be provided on both sides of the path, creating a desirable corridor of at least 9m.

Aside from ecological and topographical constraints, there are many places in which the path corridor is insufficiently wide to accommodate these required widths for sufficient segregated provision. When this is combined with ecological and topographical constraints, the lengths of the path in which segregated provision is feasible are small. The key sections in which segregation is technically feasible are Newtown Park and between Devon Road Bridge and the Whitehall School/Bruce Road accesses. It may not be advisable for the section through Newtown Park to be redesigned as a segregated route, due to the potential new future route linking the path near St Philips Causeway towards Bristol Temple Meads. This new route would likely make the case for significant additional width at this location redundant as a sufficient high quality alternative route would be provided.

Additional consideration should be given to the impacts that this solution would have on the path. The path is currently a continuous linear park, however, largescale segregated sections would be likely to considerably changed the look and feel of the path as a park space, in particular, as a continuous green corridor. This could have a significant negative effect on local ecology as well as an impact on the continuity of the green corridor, and its role within the wider ecological network within Bristol. Whilst segregation is feasible in some sections along the path, if completed along large sections it would likely have a considerable damaging impact on both the path itself, and the surrounding areas.

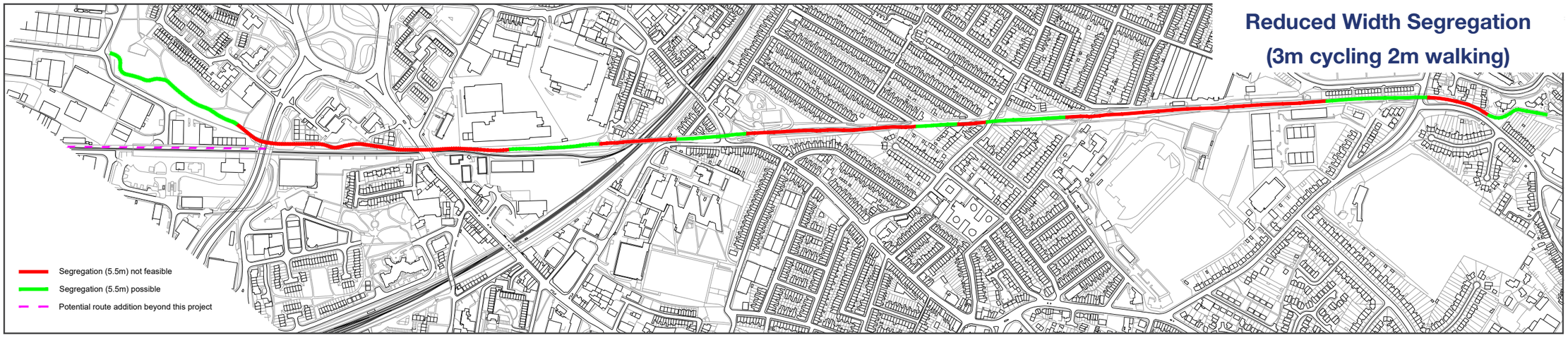
A compromise of the constraints of the site and segregated provision would be a 3m cycleway, a 2m footway with a 0.5m buffer between, creating a 5.5m corridor. Despite not meeting the widths suggested in guidance, this approach would allow for segregated provision along sections of the path where there is insufficient width for full width segregation. It is worth noting that this reduced width segregation would allow for no reductions for short sections at localised pinch points, whereas reductions in width for short sections at localised pinch points could be acceptable with full segregated provision.

The key sections in which this reduced width segregation could be achieved where full width segregation could not are the section as the path runs parallel to Greenbank Rd and around the bends at Clay Bottom, where this kind of segregation could improve safety and sightlines around the corners.

Whilst this reduced width segregation could be sufficient for the path's function as a transport corridor, it offers limited provision for other uses of the path due to its inflexibility. An example of this would be that social, side by side, cycling would be difficult on a 3m cycleway.

With both the full width and reduced width segregation the Pedestrian Comfort Levels, as set out in Transport for London's Pedestrian Comfort Guide would be classed as A+, meaning that "the pedestrian environment is very comfortable with plenty of space for people to walk at the speed and the route that they choose". It is worth noting that this guidance is focused on urban streets such as High Streets and residential areas, rather than linear parks and routes such as the Bristol and Bath Railway path.

The same guidance recommends minimum footway widths for different flows. For flows of <600 people per hour (as seen on the Bristol and Bath Railway Path), a minimum width of 2.6m is set out for high streets and



Reduced Width Segregation (3m cycling 2m walking)

tourist areas, to allow for people in to walk in groups and those with prams/buggies. Whilst the path is not a high street or a tourist area, it is a space where people will likely want to walk side by side, making this minimum ideal for the functions of the path. The guidance also sets out a minimum of 2m footway width for other areas, leaving enough space for two people to comfortably pass each other. Whilst this could be acceptable on the Bristol and Bath Railway Path, it would not be ideal in meeting the needs of some types of path use, such as it being a social space for groups to travel together. In addition narrow widths on both the footway and cycleway could lead to people using the wrong sections so as to pass/overtake other users.

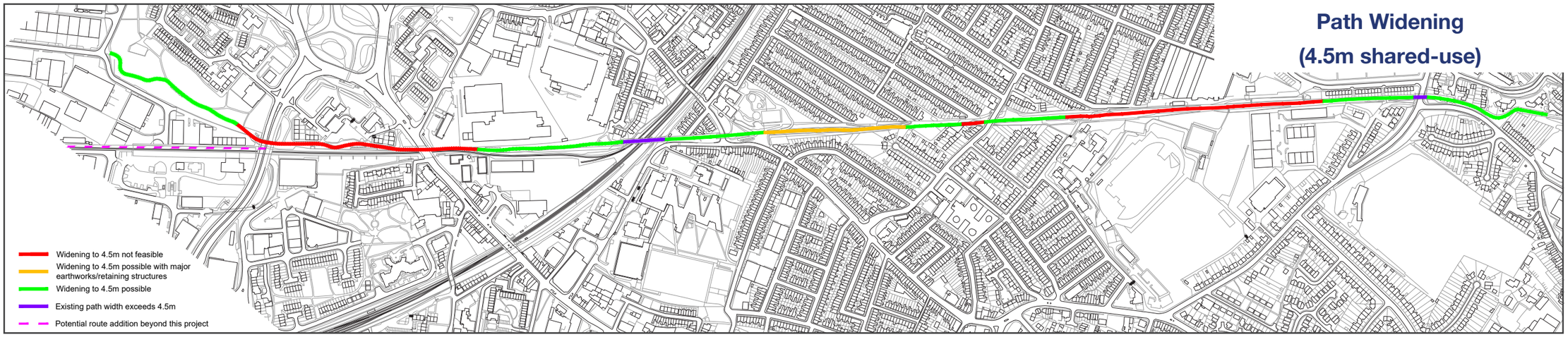
If the ecology, available space and topographic conditions were to allow, segregation along the length of the path would be the ideal solution for this project. However, this approach would have drawbacks relevant to the unique environment of this path, not accounted for within highways based cycle design guidance, such as CD 195. One of these is the location of accesses to the path on both sides which could create added conflict at access points to the path. Additionally, as the path has dual uses, as a transport corridor and simultaneously a linear park, different users utilise the path for different purposes, travelling along it at a range of different speeds. Segregation separates users by group rather than by speed, which can create conflict and uncomfortable conditions for some users within the same user groups. This is exacerbated by greater speeds which segregation can encourage.

It should be noted that segregated provision may not be worthwhile if there is a lack of continuity of such provision due to constraints of the site. It is unlikely to be of significant benefit in terms of improving the user experience to implement short sections of segregation when there are considerably longer sections between these which are shared use. The exception to this would be where there are particular features, such as tight bends, where separation could be beneficial.

It is worth noting that if any changes to the existing lighting conditions were to be proposed, consideration would need to be given to the impact this could have on bats. This would require bat surveys to be undertaken to inform mitigation against any such impact.

Localised Widening

There are a small number of locations where significant widening, similar to that required for segregation, could occur for short sections of the path. Whilst these lengths may not be sufficiently long to realistically allow for typical segregation, the available space could be utilised for localised widening. This could allow for placemaking features to be installed, in addition to the potential of conventional path widening. Localised widening for these purposes could be achieved at Clay Bottom bends, between the Chelsea Park and Colston Road accesses and at the Easton Community Centre access.



Path Widening

Whilst segregation is not possible along large sections of the path, there is feasibility to widen the existing path in some of these sections. This approach, while not ideal, would allow for greater comfort for all users, as well as facilitating other uses of the path which are currently difficult due to the existing width.

An assessment has been conducted into the feasibility of widening the path from its existing average of 3m to an average of 4.5m. A 4.5m wide path could easily accommodate three cyclists across the width. This would allow those using the path for social cycling to ride side by side whilst still allowing others to pass. Additionally, if small children are cycling, or walking, alongside a parent then there would still be sufficient space to allow other users to pass comfortably.

Widening of this extent would be feasible for much of the path lengths, with the key sections where this is not possible being between and the approaches to St Philips Causeway and Lawrence Hill, a short section near the Colston Road access, and the section alongside the Chocolate Factory development site. These locations are heavily constrained by site boundaries and ecological constraints, meaning that path widening would be unfeasible.

It is worth noting that if any changes to the existing lighting conditions were to be proposed, consideration would need to be given to the impact this could have on bats. This would require bat surveys to be undertaken to inform mitigation against any such impact.

4. Cost Estimates

Whilst detailed costings have not been completed at this stage, rough costings have been calculated for segregated provision where this is feasible, as well as for widening of the path to 4.5m where this is feasible. In both cases these costings are based on the cost of the surfacing and sub-base of the path, with costs of minor earthworks, repositioning of lighting columns, vegetation clearance and tree removal or relocation being covered within the costs. Costs of any cabling, major earthworks and retaining structures that may be required in some locations is not included within these costings.

Full Segregation

Costings for segregation provision is based on a corridor of 8m, consisting of a 4m cycle track, 1m buffer and 3m pedestrian path. An estimate of £500 per linear metre of path has been used for the calculation of these cost estimates. The lengths shown in the table indicate the length of path within each section in which segregation is feasible, rather than the total path length of the section. In some locations segregation is possible for short lengths. In these locations it is unlikely that segregation will be suitable due to the limited lengths, however localised widening could still be achieved. The cost estimates do not include the cost of segregation in these locations.

Reduced Width Segregation

Costings for reduced width segregation provision is based on a corridor of 5.5m, consisting of a 3m cycle track, 0.5m buffer and 2m pedestrian path. An estimate of £300 per linear metre of path has been used for the calculation of these cost estimates. The lengths shown in the table indicate the length of path within each section in which reduced width segregation is feasible, rather than the total path length of the section. In some locations segregation is possible for short lengths. In these locations it is unlikely that segregation will be suitable due to the limited lengths, however localised widening could still be achieved. Therefore the cost estimates do not include the cost of segregation in these locations.

Path Widening

Costings for path widening is based on an average path width of 4.5m for the sections where it is feasible. An estimate of £150 per linear metre has been used for the calculation of these cost estimates. The costings table shows the costs to widen the path to a 4.5m width in the different sections of the path, with the lengths shown being those deemed as feasible for such widening within each of the sections, not that of the total length of each section.

Full Segregation

Section	Length	Estimated Cost
Newtown Park	280m	£140,000
St Philips Causeway - Lawrence Hill	-	-
Lawrence Hill - Brixton Road	210m	£105,000
Brixton Road - Easton Community Centre	-	-
Easton Community Centre - Whitehall School	140m	£70,000
Whitehall School - Rose Green Road Bridge	-	-
Rose Green Rose Bridge - Clay Bottom	-	-
		£315,000

Table 2 - Estimated costs for segregation to an 8m corridor

Reduced Width Segregation

Section	Length	Estimated Cost
Newtown Park	280m	£84,000
St Philips Causeway - Lawrence Hill	-	-
Lawrence Hill - Brixton Road	160m	£48,000
Brixton Road - Easton Community Centre	120m	£36,000
Easton Community Centre - Whitehall School	140m	£42,000
Whitehall School - Rose Green Road Bridge	180m	£54,000
Rose Green Rose Bridge - Clay Bottom	100m	£30,000
		£294,000

Table 3 - Estimated costs for segregation to an 5.5m corridor

Widening

Section	Length	Estimated Cost
Newtown Park	280m	£42,000
St Philips Causeway - Lawrence Hill	-	-
Lawrence Hill - Brixton Road	220m	£33,000
Brixton Road - Easton Community Centre	140m	£21,000
Easton Community Centre - Whitehall School	530m	£80,000
Whitehall School - Rose Green Road Bridge	160m	£24,000
Rose Green Rose Bridge - Clay Bottom	200m	£30,000
		£230,000

Table 4 - Estimated costs for widening to 4.5m

5. Data and Surveys

To aid with the design process of the project, various surveys are required, some of which have already been completed and informed sections of this feasibility report.

5.1 Utilities

A utilities search has been completed to establish the underground and over-ground utilities which may create restrictions or difficulties for potential works. This has highlighted a small number of locations in which services pass underneath the path, however, due to its history as a railway line, there are very few utilities found underneath the path surface itself, especially in comparison to what you would expect on a highway. Whilst very few utilities have been highlighted in direct contact with the path alignment, consideration will still be required during the technical design process of the impact these will have during construction.

5.2 Topographical Survey

A topographical survey has also been completed for the relevant section of the path. This has informed much of this report, specifically in regard to available widths, elevations of the path and surroundings and vegetation/tree locations.

5.3 Ecology

A Preliminary Ecological Appraisal (PEA) has been completed, with results from this influencing the findings of this report in some of the above sections. Despite this, further ecological surveys will be required, and may produce further constraints not identified in the PEA. This could make some solutions deemed feasible in this report unviable due to ecological constraints not established within the PEA. Additional surveys will be required for specific species, including bat surveys, badger surveys and tree surveys. The results from these more detailed surveys will feed into the design process.

Surveys not possible | Limited survey period | Optimal survey period

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Habitats/ Vegetation	Phase I (sub-optimal) No other detailed plant surveys Mosses and lichens only			Detailed habitat assessment surveys National Vegetation Classification Surveys for higher plants and ferns Mosses and lichens in April, May and September only						Phase I (sub-optimal) No other detailed plant surveys Mosses and lichens only		
Badgers	Limited sett/bait surveys		Limited Activity		Limited bait marking and sett surveys				Sett surveys			Limited sett/bait surveys
Bats	Inspection of hibernation, tree and building roosts			Limited Activity	Summer roost emergence and activity surveys (Maternity roosts start to form in May, females give birth in June, Mating starts in September)					Limited Activity	Inspection of hibernation, tree and building roosts	
	Note: Potential roost and internal inspection surveys are possible all year round. Trees are best surveyed in winter.											
Birds	Winter species		Breeding birds/migrants species		Breeding birds		Low activity		Migrant species		Winter species	
Dormice	Gnawed hazelnut search (sub-optimal)		Nest tube / cage trap survey from April to November Nest searches (optimum time September to March)						Gnawed hazelnut search (optimum November to December)			
Great Crested Newts	Newts hibernating		Pond surveys for adults / Terrestrial surveys / Egg surveys April to mid-June / Larvae surveys from mid-May				Terrestrial habitat and larvae surveys		Terrestrial habitat survey		Newts hibernating	
Freshwater Pearl Mussel	Surveys not possible			Optimal survey period							Surveys not possible	
Fish	For coastal, river and stream dwelling species, the timing of the surveys will depend on the migration pattern of the species concerned. Where surveys require information on breeding, the timing of surveys will need to coincide with the breeding period, which may be summer or winter months, depending on the											

Sample survey calendar for ecological constraints

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Natterjack Toad	Hibernating			Surveys of breeding ponds for adults. Surveys for tadpoles from May onwards Surveys for adults on land.					Surveys for adults on land		Hibernating	
Otters	Limited by vegetation cover and weather conditions rather than seasons											
Pine Martins	Surveys may be conducted all year round weather permitting. Optimum time is spring and summer. Surveys for breeding dens from March to May.											
Red Squirrel	Surveys may be conducted all year round weather permitting. Optimum time is spring and summer. Surveys for breeding females from December to September.											
Reptiles	Reptiles hibernating		Peak survey months are April and May				Reduced basking time reduces effectiveness of refugia survey		Peak survey month	Limited activity	Reptiles hibernating	
Water Voles	Low activity	Initial habitat survey	Habitat and field signs / activity surveys May be limited by vegetation cover and weather								Initial habitat survey	Low activity
White-clawed Crayfish	Reduced activity			Searching Torching Trapping	Breeding torchlight survey only (no handling due to females releasing their young)		Substrate search by hand Torchlight and trapping surveys				Reduced activity	

Surveys not possible | Limited survey period | Optimal survey period

Note: This survey calendar should be used as a reference guide only with advice being sought from a qualified ecologist as site and project specific circumstances may alter seasonal windows

6. Conclusions

This report lays out the technical constraints and design options for the section of the Bristol and Bath Railway Path between Trinity Street and Clay Bottom. This report sits alongside a process of multiple stages of community engagement, feeding into the overall designs produced for the project. The key findings of this report are as follows:

- The Bristol and Bath Railway Path site, between Trinity Street and Clay Bottom is extremely constrained for much of its length, due to limited widths, ecological constraints, topographical constraints, existing structures and vegetation.
- Despite these constraints, there are still large sections of the path in which there are various feasible options for technical designs for this project.
- There are some options which, although technically feasible, would fall outside of the timescales and budget of this project.
- Segregated provision would be possible in a few, relatively short sections of the path, as well as a few areas where localised widening could take place. Segregation is feasible for a section between Lawrence Hill and Brixton Road, however this would mean the complete loss of the green corridor in this location, with major implications for the ecology of the area. Segregated provision may not be worthwhile as continuity of this provision cannot be achieved along large sections of the route.
- Larger sections of the path could be widened from an existing average path width of 3m to an average of 4.5m, to allow for greater comfort for all users.
- It is understood that links to the chocolate factory development site will be completed by the developer.
- A number of existing accesses are inaccessible for some users due to steep gradients. The requirement of major earthworks and retaining structures to sufficiently improve these accesses at some of these locations makes improvement of all of these accesses beyond the budget and timescales of this project.

It should be noted that the feasibility of the options within this report have been evaluated based on the information available at the time of writing. Future surveys may identify further constraints not established within this report, potentially impacting the feasibility of options which may be deemed feasible with the information available at the time of writing.

It is acknowledged that the budget of the project will not allow for all of the feasible technical design options evaluated in this report to be taken forward into the design phase. Whilst this report highlights the feasibility, or otherwise, of technical design options, the detail and combination of designs taken forward will be steered by the community-led design process taking place through multiple stages of community engagement.