

TECHNICAL NOTE

BH24FW016 - Eskdale Avenue

SUBJECT	PROJECT NO.	DATE
Eskdale Avenue - Feasibility Study	BH24FW016	July 2025
AUTHOR	DISTRIBUTION	REPRESENTING
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DOCUMENT REFERENCE		
TN001		

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	Initial Issue	JH	GF	ET	<initials>	July 2025

Client signoff

Client	Buckinghamshire County Council		
Project	BH24FW016 - Eskdale Avenue	Project No.	BH24FW016
Client signature / date			

Introduction

Existing Situation

Eskdale Avenue is a residential street in Chesham, Buckinghamshire. The road serves as a link between Broad Street and Botley Road, and is on a steep hill, with moderate horizontal curves, providing pedestrian and vehicular access to properties along the full length of the road.

On both sides of the road there are footways of approx. 1.8-2.1m width. Within the footways there are trees which appear to have grown to an extent in which they have started acting as obstructions for the footway, as well as causing root damage to the surfacing and kerbing. There are 15 no. trees within the highway extents, and they are spread across the length of the road on both sides. Figure 1 shows an overview of the Road, chainages and the tree locations (shown in green).



Figure 1 - Overall Plan

Previous Works

In April 2024, AtkinsRealis carried out an overall Arboricultural survey throughout Buckinghamshire. Pages 34-44 of the report (See Appendix A) describe and analyse the findings of the tree survey at Eskdale Avenue. A brief summary of the tree survey is below:

- The Seven mature or over-mature trees found at the western end of Eskdale Avenue (up to Ch. 200) are considered to be in good or fair health at the time of survey
- Trees 009 and 010 (at c Ch. 300) are considered to be low-quality specimens, with visible signs of decay and risk of falling into private property. The likelihood of these trees reaching maturity is low
- Further East (Ch. 400-500) there are 4 large mature beech trees which are growing close to road, these trees have grown to damage and/or displace kerbing, and causing significant mounding to the footway, there is minimal passable space on the footway as a result of the trees.

The remaining trees are situated away from the public footway and therefore do not cause any issues.

In June 2024, AtkinsRealis submitted a series of Feasibility Drawings, showing proposals for removal of trees and footway maintenance works. The proposals showed that 5 no trees required removal to establish a 'key footway route', utilising formalised crossing points to ensure that a route for non-motorised users was established for the entirety of

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Eskdale Avenue without encountering obstructions or difficulty due to trees. The Proposal Drawings can be seen in Appendix B. A Designer's Risk Assessment was also prepared for the proposals, this can be seen in Appendix C.

Following submission to Buckinghamshire Council, there was objection from the Members on going to a consultation to remove the trees, as there was opposition to the proposals. However, there was strong support from the LAT at the time.

The key aim for this feasibility study is to establish a design option which represents a balance between providing an acceptable maintenance solution which ensures and protects public health and safety and maintaining as much environmental and aesthetical value of trees within the public highway area as possible. The following sections of the report, provide a summary of these options and demonstrate how each option has been considered against several factors.

It is difficult to propose a preferred option, due to design priorities differing between stakeholders. Therefore, the proposed outcome of the report is to present the considered options, and to describe the validity of each option based on set considerations.

Proposed Feasibility Options

Four Options have been assessed and presented in this Options Report, for the proposed footway maintenance works on Eskdale Avenue. The options can be summarised below:

- A. All Trees to remain in Situ
- B. Removal of 5 Trees within Footway, and establishment of 'Key Footway Route' (As per 2024 proposals)
- C. Removal of all Trees within Footway
- D. Removal of all Trees and replace in-situ in formalised tree pits with widened footways and associated Highway works.

Each option shows a feasible approach for the maintenance or improvement for the footways on Eskdale Avenue, by considering the extent of tree removal and how this effects the design based on the following four considerations:

- Design Implications – how appropriate the scheme would be based on Buckinghamshire Council specifications, and how much additional detailed design the option would require
- Construction Implications – how much construction work would need to be done to implement the option, how difficult or constrained this would be, and how the cost compares against other options (Please note no cost estimates have been prepared as part of this feasibility study)
- Risk Reduction – Does the option help reduce or remove any existing design risk? What residual risks remain
- Tree Removal – How many trees are being removed and/or replaced, how this compares against other options

Due to the findings of the Arboricultural survey, it is recommended that trees T009 and T010 are removed for health reasons for all 4 options. It is also considered that for every tree which is removed from Eskdale Avenue, at least one tree is planted elsewhere, or within the site at a suitable location.

Replacement and adjustment of damaged street furniture such as kerbing, utility covers etc. is considered a necessity for all four options. Although the extent of these works may vary across the options.

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Please note that the scope of this report and study does not allow for any considerations towards the surface water drainage or the footways/highway, or the specification of the proposed footway surfacing. The general surfacing type (such as Flexi-Paving for tree pits, or standard Footway surface course) will be referred to.

Option A – All Trees remain in situ

In this option, the general proposal is to preserve all the healthy trees within the footway in situ. Tree pits are proposed to be installed around the trees, with resin-bound tree pit gravel (Flexi-Pave or similar approved) and aluminium edging – similar to the layout shown in Figure 2. The existing footways are to be maintained by patch repairs, either inlaid or overlaid, dependant on the vicinity of trees and private residential property thresholds, kerbing is to be reset or replaced. The effectiveness of the footway maintenance and resultant footway widths may be adversely affected by the presence of overgrown trees, or trees with prominent root uplift.



Figure 2 - Flexi-Pave Tree Pit installation

Design Implications

Following a conceptual feasibility design exercise, the following observations and comments are to be considered for this option:

- In the vicinity of the existing overgrown trees, the footway width remains restricted (1.0-1.5m max width)
- Footways which have been damaged by root ballasting require significant overlaying, however as shown in figure 2, some roots will remain above the footway surface.
- There is no possibility for a 'key route' from one end of Eskdale Avenue to the other, where wheelchair or pushchair users can travel on the footways without obstruction from Trees.
- Formalised crossing points may be required to allow for pedestrians to safely cross the road to reach an area of footway which is passable for wheelchairs and pushchairs etc.

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- Parking restrictions, additional road markings or signage may be required to provide increased visibility splays and lower road speeds to reduce risk of collision with non-motorised users on the carriageway.
- Pollarding may be required to be some trees, to slow unwanted growth.
- Some areas in the scheme extents will remain with no PCC Kerbing and may be replaced with aluminium edging to contain tree roots.

Construction Implications

Based on the above design approach, the following observations and comments are to be considered for the construction of this option:

- The majority of the associated works within this scheme are footway patch resurfacing or reconstruction
- This option requires the most amount of flexi-pave tree pits to be installed.
- This option requires the most amount of overlaying, especially in areas of root uplift and ballasting.
- This option requires arguably the least amount of construction works and therefore would have the least impact on local residents and road users during construction.

Risk Reduction

8 no. Design risks have been identified for Eskdale Road. Please refer to Appendix C for the Designer's Risk Assessment (undertaken in June 2024). Risks 4 and 5 relate to risks created by damaged/degraded footway surfacing and street furniture. Risks 6 and 7 refer to hazards created by Trees within the footway. Any risk elimination or reductions offered by this option have been considered below:

- Risk 4 (Damaged/Degraded Footway surfacing and/or foundations) – The risk would be reduced due to the patch repair works. This risk is not eliminated, as there are areas where the design may be compromised due to presence of trees and other obstacles.
- Risk 5 (Damaged/Degraded Street furniture such as kerbs and/or drainage gratings/covers.) – Similar to risk 4, the risk is reduced however there is a likelihood that some damaged kerbs may not be able to be adjusted or replaced due to presence of trees and other obstacles.
- Risk 6 (Tree roots causing damage to footway and/or carriageway surfacing) – The risk is reduced due to proposed overlaying works around tree roots where possible, although an 'Amber' significant risk remains. The overlaying works are more constricted to factors such as private property thresholds and kerbing, therefore risks from more prominent root damage won't be fully mitigated.
- Risk 7 (Trees within footways acting as obstruction) – As no trees are being removed as part of this option, there is minimal reduction in this risk, and therefore this remains an 'Amber' significant risk.

Tree Removal

Apart from the 2 trees which require removal due to poor health, no additional trees are proposed to be removed as part of the works proposed for Option A. Therefore, this option would be considered most ideal from a 'Tree Removal' basis.

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Option B – ‘Current’ Proposal (Removal of 5 Trees)

In option B, the general proposal is to establish a ‘Key Footway Route’ along the full length of Eskdale Avenue, where the footway is free of obstruction and associated damage from Trees. The route requires the installation of 2 crossing points, as well as the removal of 3 no. healthy trees, to allow for the route. A sketch layout of this option can be shown in Figure 3.

Similarly to Option A, where trees are to remain in-situ, tree pits are proposed to be installed around the trees, with resin-bound tree pit gravel (Flexi-Pave or similar approved) and aluminium edging – similar to the layout shown in Figure 2. The existing footways are to be maintained by patch repairs, either inlaid or overlaid, dependant on the vicinity of trees and private residential property thresholds, kerbing is to be reset or replaced. The effectiveness of the footway maintenance and resultant footway widths may still be adversely affected by the presence of overgrown trees, or trees with prominent root uplift. The previously submitted feasibility design drawings are shown in Appendix B

The design approach for this scheme is to establish a safe route for pedestrians and non-motorised users, and to minimise the removal of trees as much as possible, it is not the most effective or successful in any of the consideration categories. It does, however, present an effective compromise between safety design, and removal of trees.

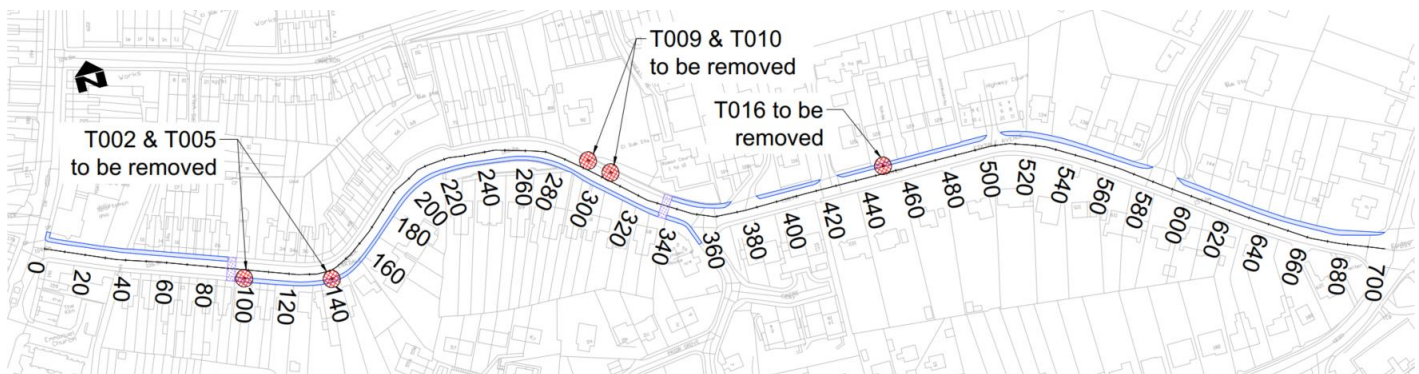


Figure 3 - Option B – Key Footway Route and Removal of 5 trees

Design Implications

Following a conceptual feasibility design exercise, the following observations and comments are to be considered for this option:

- As shown in Figure 3, a route can be established for the full length of Eskdale Avenue. The footway surfacing for this area is to be of suitable width (min 1.8m), and to be free of any defects or damage.
- To facilitate the Key route, and to minimise the number of trees requiring removal, 2 no. Formalised crossing points are required a part of the design. These are to be installed in a location with adequate visibility and constructed as per BC specification.
- In the vicinity of the overgrown trees remaining in situ, the footway width remains restricted (1.0-1.5m max width)
- Footways which have been damaged by root ballasting require significant overlaying, however as shown in figure 2, some roots will remain above the footway surface.
- Pollarding may be required to be some trees, to slow unwanted growth.

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- Some areas in the scheme extents will remain with no PCC Kerbing and may be replaced with aluminium edging to contain tree roots.

Construction Implications

Based on the above design approach, the following observations and comments are to be considered for the construction of this option:

- This option requires the removal of 5 no trees and their roots, resulting in areas of full footway, carriageway and kerb reconstruction in the vicinity of the removed trees.
- This option requires two dropped pedestrian crossing points to be installed.
- Several flexi-pave tree pits are to be installed around the trees remaining in-situ.
- This option requires several areas of pavement overlaying, especially in areas of root uplift and ballasting.

Risk Reduction

8 no. Design risks have been identified for Eskdale Road. Please refer to Appendix C for the Designer's Risk Assessment (undertaken in June 2024). Risks 4 and 5 relate to risks created by damaged/degraded footway surfacing and street furniture. Risks 6 and 7 refer to hazards created by Trees within the footway. Any risk elimination or reductions offered by this option have been considered below:

- Risk 4 (Damaged/Degraded Footway surfacing and/or foundations) – The risk would be reduced due to the patch repair works. This risk is not eliminated, as there are areas where the design may be compromised due to presence of trees and other obstacles, although to a lesser extent due to the removal of 5 no. trees.
- Risk 5 (Damaged/Degraded Street furniture such as kerbs and/or drainage gratings/covers.) – Similar to risk 4, the risk is reduced however there is a likelihood that some damaged kerbs may not be able to be adjusted or replaced due to presence of trees and other obstacles.
- Risk 6 (Tree roots causing damage to footway and/or carriageway surfacing) – The risk is reduced due to proposed overlaying works around tree roots where possible, although an 'Amber' significant risk remains. The overlaying works are more constricted to factors such as private property thresholds and kerbing, therefore risks from more prominent root damage won't be fully mitigated.
- Risk 7 (Trees within footways acting as obstruction) – this risk is reduced due to the proposed removal of 5 no trees, and the establishment of the Key route for the full length of the road. The risk is not eliminated as several overgrown trees will remain, causing an obstruction in areas not deemed a Key route. Although the risk has been reduced, the risk rating remains 'Amber – Significant' due to there still being obstructions present.

Tree Removal

As well as the 2 no. trees which require removal due to poor health, 3 no. additional trees are proposed to be removed as part of the works proposed for Option B. Therefore, this option would be considered the second-most ideal from a 'Tree Removal' basis.

Option C – Removal of All 15 Trees

In option C, the general proposal is to remove all 15 trees within the footway of Eskdale Road. Where trees are removed, the footway and carriageway (if required) are to be fully reconstructed, ensuring that the footway on both

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sides of the carriageway are of suitable width, and free of any damage or degradation as a result of the overgrown trees.

Design Implications

Following a conceptual feasibility design exercise, the following observations and comments are to be considered for this option:

- This is the most ideal option from a design perspective, as it offers the most complete design in terms of standards and safety.
- All 15 trees are to be removed, and the surrounding carriageway and footway are to be fully reconstructed to existing levels
- The footway width for the full extent of Eskdale Avenue will be around 1.8-2.1m
- Any degraded or damaged kerbing is to be reset or replaced.

Construction Implications

Based on the above design approach, the following observations and comments are to be considered for the construction of this option:

- This requires a fair amount of construction works, mainly due to the amount of root removal and hardstanding reconstruction required as part of the works.
- There is a lot of kerb adjustment/replacement required as part of these works
- The majority of the resurfacing works would be inlaid resurfacing of either surface course, or surface and binder courses.

Risk Reduction

8 no. Design risks have been identified for Eskdale Road. Please refer to Appendix C for the Designer's Risk Assessment (undertaken in June 2024). Risks 4 and 5 relate to risks created by damaged/degraded footway surfacing and street furniture. Risks 6 and 7 refer to hazards created by Trees within the footway. Any risk elimination or reductions offered by this option have been considered below:

- Risk 4 (Damaged/Degraded Footway surfacing and/or foundations) – This risk would be eliminated in this option, as any damaged or degraded footway surfacing and/or foundations will be repaired or reconstructed as necessary.
- Risk 5 (Damaged/Degraded Street furniture such as kerbs and/or drainage gratings/covers.) – Similar to risk 4, the risk is eliminated, as any damaged/degraded street furniture within the works extents will be replaced or adjusted as necessary.
- Risk 6 (Tree roots causing damage to footway and/or carriageway surfacing) – The risk is eliminated due to the removal of the trees within the works extents.
- Risk 7 (Trees within footways acting as obstruction) – this risk is also eliminated due to the removal of the trees within the works extents.

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Tree Removal

As well as the 2 no. trees which require removal due to poor health, the remaining 12 no. trees within the footway on Eskdale Avenue are proposed to be removed as part of this option. Therefore, this option would be considered the least favourable from a 'Tree Removal' basis.

Option D – Road Improvement Scheme

The general principle for Option D is to remove all the existing trees within the highway, before then planting new trees within the street within formalised tree pits, in suitable locations where footway width may be permit. To accommodate the tree pits, localised widening of footways may be required, this may be done by removing verges or by re-aligning road kerbs and locally narrowing the carriageway.

The amount of design this option would require, as well as permitting would elevate this scheme from a maintenance scheme to a Road Improvement scheme and may therefore require significantly more design input. Localised road narrowing and/or street features may contribute towards traffic calming measures, however due to the number of residential properties with vehicular accesses on the road, the design may be severely constrained and be subject to local opposition.

Design Implications

Following a conceptual feasibility design exercise, the following observations and comments are to be considered for this option:

- This is a very favourable option in terms of design, however as it requires the greatest amount of design works, it cannot be considered the most ideal.
- With the current site information, it is difficult to confirm the extents for the works, and therefore there are areas where road and kerb realignment may be unfeasible.
- A road white lining design may need to be produced to ensure the traffic calming is implemented safely.
- The resultant design would meet BC specifications for footways and streets and maintains the amount of trees and vegetation in the area.
- The footway width for the full extent of Eskdale Avenue will be minimum 1.8m, as per BC specifications
- Any degraded or damaged kerbing is to be reset or replaced.
- The road improvement scheme may be subject to a public consultation

Construction Implications

Based on the above design approach, the following observations and comments are to be considered for the construction of this option:

- It is anticipated that this option would require the greatest amount of construction works, due to the proposed potential realignment of kerbing, removal of trees and resultant reconstruction of the footways.
- There would be a lot of kerbing works, as well as ironworks within the footways and carriageways requiring adjustment or relocation.
- Due to the proposed replanting of trees in-situ, this may dictate or narrow the time period for when the works can take place.

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- Due to the amount of works taking place within the carriageway, it may be suitable to consider resurfacing the carriageway, rather than localised patch repair works.

Risk Reduction

8 no. Design risks have been identified for Eskdale Road. Please refer to Appendix C for the Designer's Risk Assessment (undertaken in June 2024). Risks 4 and 5 relate to risks created by damaged/degraded footway surfacing and street furniture. Risks 6 and 7 refer to hazards created by Trees within the footway. Any risk elimination or reductions offered by this option have been considered below:

- Risk 4 (Damaged/Degraded Footway surfacing and/or foundations) – This risk would be eliminated in this option, as any damaged or degraded footway surfacing and/or foundations will be repaired or reconstructed as necessary.
- Risk 5 (Damaged/Degraded Street furniture such as kerbs and/or drainage gratings/covers.) – Similar to risk 4, the risk is eliminated, as any damaged/degraded street furniture within the works extents will be replaced or adjusted as necessary.
- Risk 6 (Tree roots causing damage to footway and/or carriageway surfacing) – The risk is eliminated due to the removal and replanting of the trees within the works extents.
- Risk 7 (Trees within footways acting as obstruction) – this risk is also eliminated due to the removal and replanting of the trees within the works extents.

Tree Removal

Although all the existing trees within the footways on Eskdale are proposed to be removed, younger, healthier, and more suitable trees are proposed to be planted in place as part of this option. Therefore, from a Tree removal standpoint, this option will be on par with Option A.

Summary

This technical note has provided an explanation of the 4 options considered for the footway maintenance works at Eskdale Avenue, Chesham. Each option has been considered from a Design, Construction, Risk and Tree Removal basis. Each of these considerations may have different weighting, dependant on the stakeholder, therefore it is difficult to provide a clear recommendation for an optimum option. Therefore, each option has been summarised below:

Option A – Trees to Remain

- This option fails to eliminate any design risks due to trees, and reduces the risk minimally
- This Option requires the least amount of construction works
- This option does not present a good design option, as the footway is still obstructed by trees, and compromises for items such as kerbing, overlaying and footway widths need to be considered widely across the scheme
- As no trees are being removed (beyond the 2 trees for health reasons), this is the most ideal option

Option B – Key Footway Route with Removal of 5 Trees

- This option fails to eliminate any design risks due to trees; however the risks are reduced
- This Option requires more construction than Option A, but less than Options C & D

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- This option could be considered a compromise between retaining as many trees as possible and providing a safe footway which can be used by wheelchair and pushchairs.
- As well as the 2 unhealthy trees, an additional 3 trees are required to be removed to facilitate this design. Although 10 trees remain in-situ

Option C – Removal of All 15 Trees

- This Option effectively eliminates all Design risks regarding trees and damaged/degraded footways.
- This option requires a fair amount of construction works, due to the remedial construction works to reconstruct the footways, carriageways and kerbs following the removal of trees and root systems.
- This is by far the best option from a design perspective, as it requires minimal design works, and ensures that the resultant scheme suits all the BC specifications for footways.
- This is by far the worst from a tree removal perspective, as all 15 trees within the footways are to be removed.

Option D

- This Option effectively eliminates all Design risks regarding trees and damaged/degraded footways.
- This option requires a significant amount of construction works due to the potential realignment of kerbs, widening of footways and potential traffic calming measures.
- Although the resultant scheme will likely suit the BC Specifications for footways and highways, and should present an attractive streetscape, it will require a lot of design input, and approval due to it becoming a road improvement scheme.
- This option requires the removal of all the existing trees, although new trees are proposed to be planted in place of the old trees. The new trees will be housed in tree pits and will be selected to be more suited to their surroundings. Therefore, this represents an effective scheme when considering the trees.

Appendix A. Arboricultural Report (Relevant pages)

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Buckinghamshire Street Trees

SUBJECT	PROJECT NO.	DATE
Review of proposed footway works adjacent to trees	5221621	05 April 2024
AUTHOR	DISTRIBUTION	REPRESENTING

Document history

Revision	Purpose description	Originated	Checked	Reviewed	Authorised	Date
1.0	For information	AA	TD	JH		05 April 2024

Client signoff

Client	Buckinghamshire Highways		
Project	Buckinghamshire Street Trees	Project No.	5221621
Client signature / date			

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1. Introduction

1.1 Terms of reference

AtkinsRéalis has been commissioned by Buckinghamshire Highways to provide arboricultural consultancy services in relation to street trees at separate locations in Bourne End, Beaconsfield and Chesham, all in the county of Buckinghamshire.

Most of the trees considered in this report are roadside trees growing in 'hard' landscape surroundings. In many cases, tree root growth has caused direct damage to the hard materials adjacent to the tree, such as pavement surfacing and roadside kerbstones, which have created hazards for pedestrians and other users of the public highway. The primary objective of the survey has been to consider possible solutions that might enable repairs or improvements to be made in the areas around the trees while ensuring the retention of the trees. The improvements should be designed to limit or negate any adverse impact on the trees' physiological and structural health and, should where possible seek to improve growing conditions for the trees.

This report will consider the current condition of the trees, and the changing circumstances which have contributed to their current state of health. The report will consider the current proposals to repair and improve the hard landscaping elements that surround the trees, providing recommendations for the best possible measures to safeguard their health going forward, including through the construction process.

The findings of this Technical Note should be shared with the appropriate Tree Officer, with any recommendations for tree works, tree removals or replacement planting be verified by the Tree Officer.

1.2 Scope of works

This report presents arboricultural information captured on 18 and 25 January 2024 by AtkinsRéalis' Principal Arboricultural and Landscape Consultant Adam Atkins, BA (Hons), CMLI, TechCert (ArborA).

A survey of the trees was conducted in accordance with the British Standard BS 5837:2012 *Trees in Relation to Design, Demolition and Construction – Recommendations*. The findings from the three different site surveys are presented at Appendix A. Tree Constraints Plan (TCP) drawings have been prepared for the three sites, which display in graphic form the trees surveyed.

1.3 Survey methodology

The tree survey has been undertaken in accordance with the British Standard BS 5837:2012 *Trees in Relation to Design, Demolition and Construction – Recommendations*. The Standard provides parameters which enable the arboriculturist to assess the quality of all the trees and provide tree constraints information for designers. It also considers the general health of the trees and arboricultural features that may be affected by any proposed works.

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The quality categorisation system uses a cascade chart shown at Appendix B of this report. While the system is open to varied interpretation, it has value in this context in helping to clarify whether a particular tree is of sufficiently high quality, and appears to promise sufficient future longevity, to actually *warrant* the labour and expense that would be involved in its retention in the context of proposed construction work.

The trees were visually assessed in line with the Visual Tree Assessment (VTA) method as developed by Mattheck and Breloer (1994). This method is based on the axiom of uniform stress, whereby a tree will grow in response to environmental stimuli to produce a structure that bears forces evenly across its surface. As such an internal defect, such as decay, would initiate a noticeable change in the stem's shape to accommodate the physical change. The presence of tree defects is important when classifying the trees, and also to inform on their retention value in the context of the site.

The approach to the survey involved a ground-level walked assessment. The location of the trees was plotted using proprietary GIS data capture software on a Trimble hand-held mobile mapper and verified using available aerial imagery.

The trees were numbered sequentially from 001, prefixed with a 'T' (e.g. T001). Groups of trees were prefixed with a 'G' (e.g. G002).

1.4 Survey limitations

Trees were identified and inspected from ground level only and were not climbed. No invasive examination techniques (such as increment boring, or internal decay detection) were carried out and as such no assessment of the internal condition of the wood of these trees can be given.

The tree survey undertaken is not intended to be a tree risk management survey targeting safety-related issues. However, where specific hazards have been identified these have been recorded and management recommendations provided and are detailed within the tree survey schedules (see Appendix A of this report).

Topographic survey information was not available, and so the locations of the trees were measured against fixed points. As such, the accuracy of the tree locations is potentially open to discrepancies, and their locations may need verifying.

Trees are living organisms subject to changes outside human control. Trees and their environment alter with the seasons and it is as well to inspect trees whilst in full leaf and when out of leaf. Following harsh or unexpected weather conditions, or heavy storms it is also prudent to inspect trees. Changes to ground water conditions will affect the root growth of a tree. Such changes are not always the result of human influence and other factors may be involved.

4. Eskdale Avenue, Chesham

4.1 Site location

The B4505 Eskdale Avenue is located in the centre of Chesham. It runs broadly from west to east from the A416 Broad Street to a four-road junction at its east end. Its route is meandering, and for most of its length uphill from the west end. The road is residential along all its length, with a grammar school close to the junction at the east end.

An Ordnance Survey grid reference for a point at the west end of Eskdale Avenue is SP 96236 02303.

4.2 The trees of Eskdale Avenue

Twenty individual trees and one group of trees were recorded on Eskdale Avenue.

Most of the trees recorded are growing in the pavement area – there is no roadside grass verge on any part of Eskdale Avenue. In most cases the pavement surfacing extends almost to the trunk of the tree, with little or no soft ground that might be termed a ‘tree pit’.

Seven mature or over-mature pollarded trees are located at the west end of Eskdale Avenue. These are compact specimens of horse chestnut, sycamore, lime and catalpa, the tallest recorded at 11.5m height. All were displaying good or fair vitality at the time of the survey.

In the crook of the junction of Harding Road stands an imposing garden lime T012, the largest tree recorded. Although there is no apparent barrier to the tree’s root growth into the site, it is unlikely that the roots will have extended into the highway, and no displacement of the pavement surfacing was observed.

Continuing uphill and to the east, three large mature beech trees (T013, T015, T016) are growing close to the road side. T013 is perhaps the best of these, and the only tree recorded as a ‘Category A’ tree under British Standard criteria (of ‘high’ quality – see Appendix B).

Some of the trees recorded are growing on soft ground beyond the edge of the pavement. Most notable among these is the large linear group G008, which includes mature specimens of sycamore, horse chestnut and ash, their crowns overhanging the pavement and the road. For the full length of the group, the trees are located on raised ground behind a low concrete or brick retaining wall which appears to preclude the ingress of roots into the pavement area, and no displacement of the pavement surfacing was observed.

A handful of small- to medium-sized trees of other species was recorded – cherry plum, cherry and crab apple. Most of these trees were displaying good or fair vitality at the time of the survey. An exception is the cherry tree T010, which was displaying poor vitality. The removal of this tree, located at a point where the pavement is narrow, would facilitate pedestrian passage and may be considered appropriate due to the tree’s limited life prospects; however, the tree is small and the hazard that it represents correspondingly small.

Along much of the length of Eskdale Avenue, trenches have been excavated in the pavement area for telecommunications cables and/or other utilities. Any adjacent tree roots are likely to have been severed in the course

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of the excavation works, and so the presence of such trenching may generally be taken as an indicator that no roots exist in a section of pavement where the trench comes between it and any tree (unless the trench is very old). Information about utilities trenching, together with full data about all the trees on Eskdale Avenue, is shown at Appendix A.

4.3 Observations and recommendations for individual trees

The following recommendations are made for certain trees on Eskdale Avenue where it is judged that future management works would be either beneficial or necessary for the future wellbeing of the tree and/or as risk management measures. The suitability of proposed construction works adjacent to some of the trees is also considered. Photographs of the trees discussed here (except for T010) are shown at section 4.4.

Trees surveyed which do not appear in this section are not thought to require works at the present time.

Tree no.	Observations / Recommendations
T001 to T007	This group of compact trees are mature or over-mature, and have been managed in a way that permits their retention in the later stages of their life cycle with the minimum of risk. The trees are all likely to be hollow-stemmed to varying extents; some are displaying decay in the buttress roots area; all have established decay associated with the pollard wounds. T001 was the only tree to display the fruiting body of a decay fungus (<i>Ganoderma</i> sp.) at the time of the survey. The pavement surfacing is uneven to some extent around most of the trees, most notably around the sycamore T002, where there is pronounced displacement of the concrete pit edging kerbs and the pavement surfacing; and the catalpa T005, where there is pronounced mounding of the ground around the base. Passage for pedestrians is tightest around trees T002, T003 and T005, where pedestrians with wider buggies are required to detour into the road. It is understood that the retention of these trees (and of all the trees on Eskdale Avenue) is a matter of some political sensitivity, and the current form of management should continue for as long as the condition of the trees is thought to permit it, with repeat pollarding works as required. Regarding the quality of the pavement surface, the only treatment at the base of the trees that might be compatible with the retention of the trees is further tarmac patching on an 'as required' basis. A suggestion for extending the pavement area into the road is considered below for tree T013, but this has significant implications for vehicular traffic and would incur significant costs, and so may be judged inappropriate for trees with a comparatively limited estimated life expectancy in a section of the road where residents' car parking is particularly congested.
T009	This is a catalpa of modest size recorded as semi-mature. The stem has a pronounced lean to the north, with decayed basal roots extending along the kerb edge and displacing the kerbstones. The pavement surfacing is mounded at the base. Pedestrians with wider buggies are required to detour into the road to pass the tree. The primary concern here is the stability of the tree's rootplate. Imagery on Google Street View shows the base of the tree at different times dating back to 2008, but evidence of any movement of the rootplate is inconclusive. Were the tree to fall, it would fall towards the garden of a private residence. It is possible that the fall would be broken in part by a brick boundary wall and/or caught in adjacent vegetation. While the

TECHNICAL NOTE

Tree no.	Observations / Recommendations
	hazard might therefore be considered only moderate, there is a case to be made for the removal of the tree: the tree is unlikely to develop to full maturity due to the stem lean and the existing decay of the buttress roots, and its removal would also remove a significant barrier to pedestrian passage. If there is a will to retain the tree, then the lean might be addressed by crown pruning to lighten the load on the fall side of the tree; however, there is a limit to how much this could be achieved while maintaining an acceptable overall form to the tree. Consultation with the owners of the private residence may be appropriate.
T010	This cherry tree is a low-quality specimen at the centre of a narrow stretch of pavement; it exhibits burred, cankerous growth, a very modest crown, and established decay where the lower branches have been removed; The removal of the tree would facilitate pedestrian passage and may be considered appropriate due to the tree's limited life prospects; however, the tree is small and the hazard that it represents is correspondingly small.
T013	Tree T013 is a mature beech tree at the pavement edge. Displaying good vitality at the time of the survey, it was recorded as a 'Category A' tree according to British Standard survey criteria - trees "of high quality with an estimated remaining life expectancy of at least 40 years". There is pronounced mounding and displacement of the pavement surfacing around the tree, which has received periodic tarmac patching. The tree's growing buttress roots appear to have accounted for the kerbstones at its base, which are missing. The void has been filled by the roots, which are showing established decay in places. The narrowness of the pavement here means that pedestrians with wider buggies are required to detour into the road. Given that no works involving excavation at the base of the tree are compatible with the retention of the tree, alternative solutions must be sought. One way to make the passage around the tree easier for all pavement users could be to extend the pedestrian space into the road area, so that the pavement passes the tree on the road side, not on the property boundary side. This would mean creating a short section where the pavement 'juts out' into the road – a kind of inverted lay-by. This could be achieved without excavation, as the ground level could be built up above the existing road surface, after removal of the current road surface. The pavement on the property boundary side of the tree could also be taken up, to create a larger area of soft ground and improved future growing conditions for the tree (and also for any subsequent tree that might at some future date replace the current tree). Such a solution would of course have significant implications for vehicle users, but could perhaps be implemented as part of traffic-calming measures that might encourage motorists to drive at speeds appropriate for a residential road near to a school. <i>With a stem diameter of 700mm, the tree is in the early stages of maturity. As such, the estimated life expectancy of the tree could be thought to justify the cost of works to improve the pedestrian experience in the area adjacent to this tree.</i>
T015	Like T013, tree T015 is a mature beech tree at the pavement edge. Displaying good vitality at the time of the survey, it was recorded as a 'Category B' tree according to British Standard survey criteria - "of moderate quality with an estimated remaining life expectancy of at least 20 years". There is pronounced mounding and displacement of the pavement surfacing at the tree base, with buttress roots occupying the space vacated by kerbstones. Desiccated ripewood decay as observed on the buttress roots, and there is a distinctive protruding knobble 150mm above the pavement surface on a root to the west of the stem.

TECHNICAL NOTE

Tree no.	Observations / Recommendations
	Considerations for improving the pedestrian experience around this tree are very similar to those for T013: an innovative solution must be found if the tree is to be retained. However, a possible constraint for T015 is that it is located directly opposite T016 – another tree in a similar situation. Of the two trees, T015 is superior in terms of both size and physiological health. With a stem diameter of 670mm, the tree is in the early stages of maturity. <i>As such, the estimated life expectancy of the tree could be thought to justify the cost of works to improve the pedestrian experience in the area adjacent to this tree.</i>
T016	Tree T016 is another mature beech tree at the pavement edge. Displaying fair vitality at the time of the survey, it was recorded as a 'Category B' tree according to British Standard survey criteria - "of moderate quality with an estimated remaining life expectancy of at least 20 years". The tree has a slightly sparse crown, with pockets of established decay at crown-lifting wounds; further crown pruning has taken place associated with telecomms cables that pass close to the crown. There is very pronounced mounding and displacement of the pavement surfacing at the base of the tree. Buttress roots extend along the kerb, occluding over but not displacing the kerbstones. There is desiccated ripewood decay on the buttress roots. There is a history of extensive trench work around the tree (which may be seen on Google Street View imagery from 2008). Considerations for improving the pedestrian experience around this tree are very similar to those for T013: an innovative solution must be found if the tree is to be retained. However, a possible constraint for T016 is that it is located directly opposite T015 – another tree in a similar situation. Of the two trees, T015 is superior, as stated above.

TECHNICAL NOTE

4.4 Photographs of the trees



Figure 23: showing limited space for pedestrian passage, uneven surfacing and displaced edging units at the base of the sycamore T002.

TECHNICAL NOTE



Figure 24: showing the leaning stem of the catalpa T009, with buttress roots extending along the kerb, causing displacement of kerbstones. Pedestrians with wider buggies must detour into the road to pass the tree.

TECHNICAL NOTE



Figure 25: the beech tree T013, showing buttress roots occupying the space vacated by kerbstones. Space for pedestrians between the tree and the boundary fence is limited.

TECHNICAL NOTE



Figure 26: Tree T015, showing limited space for pedestrian passage between the tree and the property boundary behind. Buttress roots have filled the space where kerbstones may once have been.

TECHNICAL NOTE



Figure 27: the kerbstones remain in place beside tree T016, but the narrowness and pronounced mounding of the pavement means there is no easy passage for pedestrians.

TECHNICAL NOTE

4.5 Post-construction care

Where mature trees are to be retained, it will be important to take measures to improve the quality of the soil around the trees upon completion of the works. The guidelines suggested at section 2.5.1 apply.

Where trees are to be removed, it will be appropriate and desirable to plant replacement trees in accordance with the local authority's planning policies. The quantity and size of the new trees, and the planting location, should be determined by Buckinghamshire County Council.

4.6 Statutory protection

Trees may be protected through a Tree Preservation Order (TPO). The law on TPOs is in Part VIII of the Town and Country Planning Act 1990 as amended and in the Town and Country Planning (Tree Preservation) (England) Regulations 2012.

A TPO is made by a local planning authority in respect of a tree(s) as the tree is considered to bring amenity value to the surrounding area. A TPO makes it an offence to cut down, uproot, lop, top, wilfully damage or wilfully destroy a protected tree without authorisation.

Trees in a conservation area that are not protected by a TPO are protected under the provisions in section 211 of the Town and Country Planning Act 1990. There is a requirement to notify the local planning authority six weeks before carrying out certain work on such trees, unless an exception applies.

In an e-mail dated 09 February 2024, Buckinghamshire Council's Planning Technical Services Team indicated that *seven trees at the Eskdale Avenue site are subject of a TPO and that the site is not located within a conservation area.*

The seven trees recorded as being subject of a TPO are shown as being located in the magenta box at Figure 28 (overleaf). The TPO relating to these trees was made in 1973, and it is believed that only the tree in the bottom left corner of the box remains today. (The trees were located in the gardens of two private dwellings which were demolished to make way for the Clay Acre development.)

TECHNICAL NOTE



Figure 28: extract from PDF document supplied by Buckinghamshire Council, showing the Eskdale Avenue survey area outlined in blue. Individual trees that are subject of a TPO are denoted by the small green circles. The green circle on the north side of the road that is not in the magenta box appears to be a deciduous conifer located in a private garden.

Appendices

TECHNICAL NOTE

A.1 Appendix A

TECHNICAL NOTE

CHESHAM:

Tree no.	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				1st major branch height (m) / Direction	Canopy height	Life stage	Vitality	General observations Structural and/or physiological conditions	Preliminary management recommendations	Established remaining contribution	Category grading	Root Protection Area radius M
				N	E	S	W									
T001	Horse Chestnut	8	660	2.5	2.5	2.5	2.5	2	2	M-OM	Fair	Pollarded at 4m; burred and densely twiggy, with bunches of epicormic growth; likely established decay at pollard wounds; <i>Ganoderma</i> bracket at 1m height to east; minor displacement of tarmac pavement surfacing; base occluding around kerbstone (one kerbstone missing at base); utilities cover 600mm to south-east	No works required at time of survey	10+	C3	7.9
T002	Sycamore	11	360	4	4	4	4	2	3	M	Good	Repeatedly pollarded; pronounced displacement of concrete pit edging kerbs and pavement surfacing; utilities trench 500mm to south of base; knobbly lower stem; base has occluded around kerb - one kerbstone missing	No works required at time of survey	10+	C2	4.3
T003	Common Lime	9	540	5	5	5	5	3.5	3.5	M	Good	Pollarded; dense basal and frequent epicormic growth; pockets of decay at pollard and other wounds; moderate displacement of concrete pit edging units and pavement surfacing; utilities trench 300mm to north of pit edge; minor displacement of kerbstones	No works required at time of survey	10+	C2	6.5

TECHNICAL NOTE

Tree no.	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				1st major branch height (m) / Direction	Canopy height	Life stage	Vitality	General observations Structural and/or physiological condition	Preliminary management recommendations	Established remaining contribution	Category grading	Root Protection Area radius M
				N	E	S	W									
T004	Horse Chestnut	7	540	4	4	4	4	3	3	OM	Fair	Pollard, hollow stem opening to south-east; established decay at assorted wounds; minor displacement only of kerbstones and pavement surfacing; utilities trench 300mm to north of pit edge; telecomms cables passing through crown	No works required at time of survey	10+	C3	6.5
T005	Catalpa	11	500	3.5	3	4	5	2	2.5	M-OM	Good	Pollarded at 4m; decay of buttress roots and basal area; pronounced mound around base, with major displacement of pavement surfacing, with tarmac patching; utilities cover and trench closely adjacent; minor displacement of kerbstones	No works required at time of survey	10+	C3	6.0
T006	Horse Chestnut	7	340	3	3	3	3	2	3	OM	Good	Pollarded at 4m; established decay at wounds to north of stem at 300mm, 1100mm, and at pollard wounds; abundant basal and epicormic growth; no significant displacement of kerbstones or pavement surfacing; utilities trench closely adjacent	No works required at time of survey	10+	C3	4.1

TECHNICAL NOTE

Tree no.	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				1st major branch height (m) / Direction	Canopy height	Life stage	Vitality	General observations Structural and/or physiological condition	Preliminary management recommendations	Established remaining contribution	Category grading	Root Protection Area radius M
				N	E	S	W									
T007	Lime	7.5	410	3	3	3	3	2.5	3.5	M	Good	Pollarded tree; plentiful epicormic growth; established decay at pollard wounds; telecomms cables passing through crown; minor mounding of pavement surfacing and displacement of kerbstones, surfacing; utilities trench closely adjacent	No works required at time of survey	10+	C2	4.9
G008	A Group	to 18	to 800	9	9	9	9	4	4	EM-M	Good / Fair	Linear group, mature specimens of sycamore, horse chestnut, ash, crowns overhanging pavement and road; for all of length behind low concrete or brick retaining wall precluding ingress of roots into pavement area; managed laurel hedge at west end, shrubby smaller trees to east; no displacement of pavement surfacing observed; utilities trench passes along most of length	No works required at time of survey	20+	B2	9.6

TECHNICAL NOTE

Tree no.	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				1st major branch height (m) / Direction	Canopy height	Life stage	Vitality	General observations Structural and/or physiological condition	Preliminary management recommendation s	Established remaining contribution	Category grading	Root Protection Area radius M
				N	E	S	W									
T009	Catalpa	6.5	270	6	4	1.5	5.5	2.5	2	SM	Fair	Pronounced lean to north; decayed basal roots extending along kerb edge; pavement surfacing mounded at base; displacement of kerbstones,	Consideration should be given to removal of tree due to questionable stability of rootplate - although evidence of movement inconclusive	10+	C2	3.2
T010	Cherry	3	140	1.5	1.5	1	0	2	2	M	Poor	Low-quality specimen at centre of narrow stretch of pavement; burred, cankerous growth; very modest crown; established decay where lower branches removed	Removal to facilitate pedestrian passage may be considered due to limited life prospects; hazard posed is small due to small size	10+	C2	1.7

TECHNICAL NOTE

Tree no.	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				1st major branch height (m) / Direction	Canopy height	Life stage	Vitality	General observations Structural and/or physiological condition	Preliminary management recommendations	Established remaining contribution	Category grading	Root Protection Area radius M
				N	E	S	W									
G011-A	Field Maple	8	250 + 240 + 240	4.5	4.5	4.5	4.5	2	3	EM	Good	Trees growing in hedge at pavement side, on slope falling to north; bases slightly below pavement surface level; no displacement of pavement surfacing observed; this tree: three-stemmed, branches cut back from pavement	No works required at time of survey	20+	C2	5.2
G011-B	Ash	10	250 #	2	2	2	2	3	3	SM	Fair	Densely ivy-clad, upright form, modest crown; diameter estimated	No works required at time of survey	10+	C2	3.0
G011-C	Ash	10	200 + 100	2	2	2	2	3	3	SM	Fair	Parallel stems, possibly two trees, occluding; ivy-clad	No works required at time of survey	10+	C2	2.8
G011-D	Field Maple	12	240	4	4.5	4	3.5	2	3	SM-EM	Good	Hard by pavement side with no barrier to root growth into site; no displacement of pavement surfacing observed; utilities covers at 750mm to south, and trench apparently hard by base	No works required at time of survey	10+	C2	2.9

TECHNICAL NOTE

Tree no.	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				1st major branch height (m) / Direction	Canopy height	Life stage	Vitality	General observations Structural and/or physiological condition	Preliminary management recommendation s	Established remaining contribution	Category grading	Root Protection Area radius M
				N	E	S	W									
T012	Lime	16	1100 #	6	6	6	6	4	4	M	Good	Third-party tree behind closeboard fencing - no barrier to root growth into site; crown recently reduced; crown-lifted; 3no stems rising from stout bole, giving fennel bulb appearance; diameter estimated; no displacement of pavement surfacing observed; utilities trench in pavement	No works required at time of survey	20+	B2	13.2
T013	Beech	18	700	8	8	8	6	3-W	4	M	Good	Prominent specimen; light crown reduction; kerbstones at base absent, void occupied by buttress roots; roots also displacing kerbstones on both sides; pronounced mounding and displacement of pavement surfacing - periodic tarmac patching	No works required at time of survey	40+	A2	8.4
T014	Cherry plum	9	330	4	4	3	5	2	2.5	M	Fair	Exposed decayed heartwood at large wound low on road side; decay associated with pruning wounds above and around crown break; adjacent pavement surfacing displaced by incremental root growth; moderate displacement of kerbstones also	No works required at time of survey	10+	C2	4.0

TECHNICAL NOTE

Tree no.	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				1st major branch height (m) / Direction	Canopy height	Life stage	Vitality	General observations Structural and/or physiological condition	Preliminary management recommendations	Established remaining contribution	Category grading	Root Protection Area radius M
				N	E	S	W									
T015	Beech	16	670	6	6.5	8	7	4-NE	4	M	Good	Crown-lifted; pronounced mounding and displacement of pavement surfacing; buttress roots occupying space vacated by kerbstones; desiccated ripewood decay on buttress roots; protruding knobble 150mm above pavement surface on surface root to west	No works required at time of survey	20+	B2	8.0
T016	Beech	15	520	4.5	4	4.5	4	3	3	M	Fair	Minor crown pruning associated with telecomms cables; pockets of established decay at crown-lifting wounds; crown slightly sparse; very pronounced mounding and displacement of pavement surfacing at base; buttress roots extending along kerb, occluding over but not displacing kerbstones; desiccated ripewood decay on buttress roots; history of extensive trench work around tree (as shown on 2008 Street View)	No works required at time of survey	20+	B2	6.2
T017	Crab apple	6	210	2.5	2.5	2	5	2.5	3	EM	Fair	At pavement edge; modest, with twisting stem, part-suppressed by laurel hedge to south; no significant displacement of pavement surfacing or kerbstones	No works required at time of survey	10+	C2	2.5

TECHNICAL NOTE

Tree no.	Species	Height (m)	Stem diameter (mm)	Branch spread (m)				1st major branch height (m) / Direction	Canopy height	Life stage	Vitality	General observations Structural and/or physiological condition	Preliminary management recommendations	Established remaining contribution	Category grading	Root Protection Area radius M
				N	E	S	W									
T018	Crab apple	6	280	1.5	4	4.5	5	2.5	3	M	Good	Crown-lifted, with established decay at wounds; frequent epicormic growth; minimal displacement of pavement surfacing or kerbstones	No works required at time of survey	10+	C2	3.4

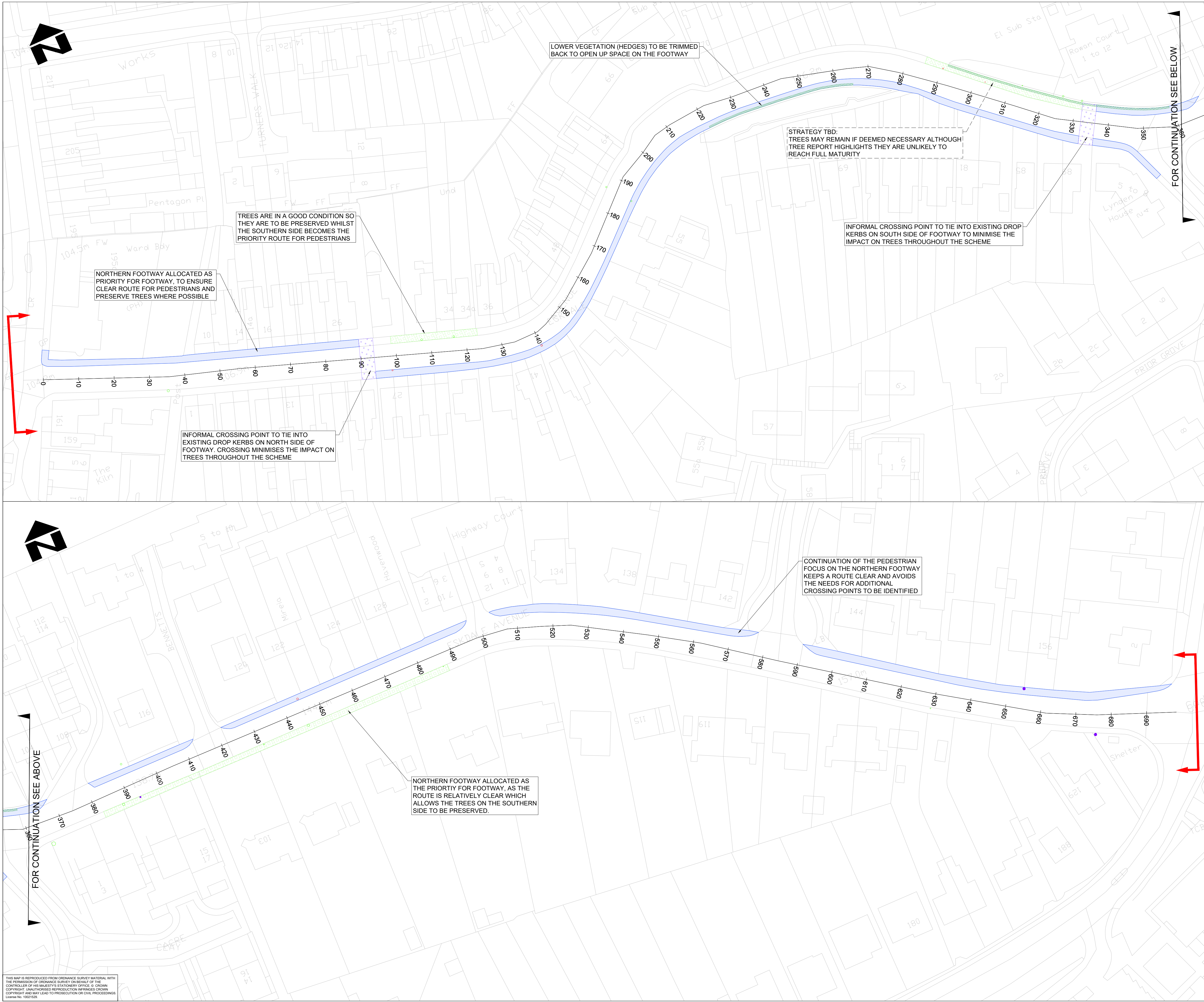
A.2 Appendix B

Table 1 Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)	Identification on plan
Trees unsuitable for retention (see Note)		
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	- Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) - Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline - Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.	See Table 2
Trees to be considered for retention		
1 Mainly arboricultural qualities		
2 Mainly landscape qualities		
3 Mainly cultural values, including conservation		
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees with material conservation or other cultural value
	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value
		See Table 2

Cascade chart for tree quality assessment, from British Standard 5837:2012 *Trees in Relation to Design, Demolition and Construction – Recommendations*

Appendix B. Submitted Feasibility Drawings (June 2024)



NOTES:

- DO NOT SCALE FROM THIS DRAWING.
- ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
- AREAS OF FOOTWAY ALONG THE ROUTE HAVE BEEN DESIGNATED AS 'PRIORITY ROUTES' FOR PEDESTRIANS TO ENSURE SAFE PASSAGE IS AVAILABLE ON AT LEAST ONE SIDE WHILST PRESERVING TREES ALONG THE ROUTE

KEY:

- SITE EXTENTS
- CHAINAGE
- PRIORITY FOOTWAY ROUTE FOR PEDESTRIANS
- AREAS WHERE THE PRESERVATION OF TREES IS THE PRIORITY
- VEGETATION CLEARANCE
- CROSSING POINT
- BUS STOP

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
Live traffic.
Presence of tar, presence of soil contamination, asbestos and breaking of concrete not known.
Underground services present within site works but unrecorded or unidentified utilities may still be present
Maintenance / Clearing
None
Use
Trees and roots potentially causing obstruction and/or damage to footway construction
Decommissioning / Demolition
None

P01	PB	JH		14/06/24
First Issue				
P02	PB	JH	JH	28/06/24
For Client Review				
Rev	Drawn / Des	Checked	Approved	Date
Description				
Drawing Status				Suitability
FOR REVIEW / COMMENT				S3

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Buckinghamshire Highways

Kevin Goad
Service Director
Highways & Technical Services

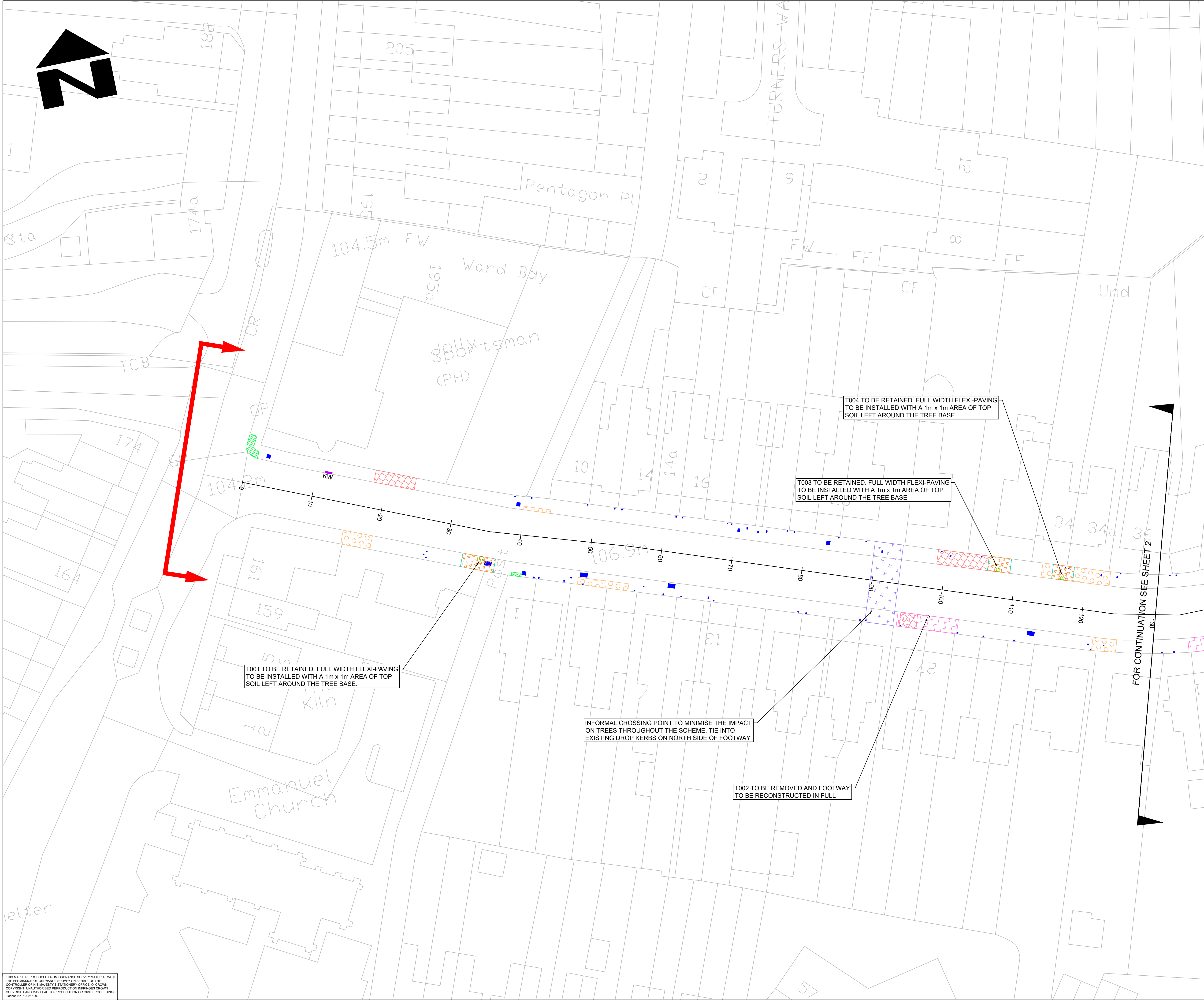
Project Title
5221621 Footway Structural Repairs Maintenance

Drawing Title
PKG 3.0 ESKDALE AVENUE FOOTWAY PRIORITY

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Original Size	Date	Date	Date	Date
A1	27/06/24	28/06/24	28/06/24	28/06/24
Drawing Number	Project	Originator	Volume	Job No.
	TO-12	ATK	HKF	5221621
	BH24	DR	CH	000003
Location	Type	Role	Number	P02

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CAD FILE: C:\projectwise\atkins_highways_uk\ids65182\TO-12-ATK-HKF-BH24-DR-CH-000003.dwg



NOTES:

- DO NOT SCALE FROM THIS DRAWING.
- ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED.
- THERE IS NO TOPOGRAPHICAL DATA FOR THIS SCHEME. ALL INFORMATION IS BASED ON OS DATA AS WELL AS THE WTB SURVEY CARRIED OUT NOVEMBER 2023.
- UTILITY COVERS ARE SHOWN FOR INFORMATION. LOCATIONS ARE APPROXIMATIONS BASED ON OBSERVATIONS FROM WTB SURVEY. PLEASE REFER TO PCI AND STATS RECORDS FOR FURTHER INFORMATION
- ALL WORKS ARE TO BE CARRIED OUT AND CONSTRUCTED AS PER BUCKINGHAMSHIRE COUNCIL SPECIFICATIONS UNLESS STATED OTHERWISE

KEY:

- SITE EXTENTS
- CHAINAGE
- 20mm DEEP PATCH
- 70mm DEEP PATCH
- 220mm DEEP PATCH
- 250mm DEEP PATCH
- FLEXI-PAVING. COLOUR TO BE CONFIRMED
- TOP SOIL TO FILL SPACE AROUND TREE BASE
- METAL EDGING TO CONTAIN FLEXI-PAVING
- FOOTWAY RECONSTRUCTION FOR REMOVED TREE
- VEGETATION CLEARANCE
- RS RELAY MISSING OR DAMAGED SETTS
- KW KERB WEIR TO BE REPLACED
- CROSSING POINT
- BUS STOP
- UTILITY COVER LOCATIONS

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction
Live traffic.
Presence of tar, presence of soil contamination, asbestos and breaking of concrete not known.
Underground services present within site works but unrecorded or unidentified utilities may still be present
Maintenance / Cleaning
None
Use
Trees and roots potentially causing obstruction and/or damage to footway construction
Decommissioning / Demolition
None

P01	PB	JH		14/06/24
First Issue				
P02	PB	JH	JH	28/06/24
For Client Review				
Rev	Drawn / Des	Checked	Approved	Date
Description				

Drawing Status	Suitability
FOR REVIEW / COMMENT	S3

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Client

**Buckinghamshire
Highways**

Kevin Goad
Service Director
Highways & Technical Services

Project Title

**5221621 Footway
Structural Repairs Maintenance**

Drawing Title

**PKG 3.0 ESKDALE AVENUE
GENERAL ARRANGEMENT
SHEET 1**

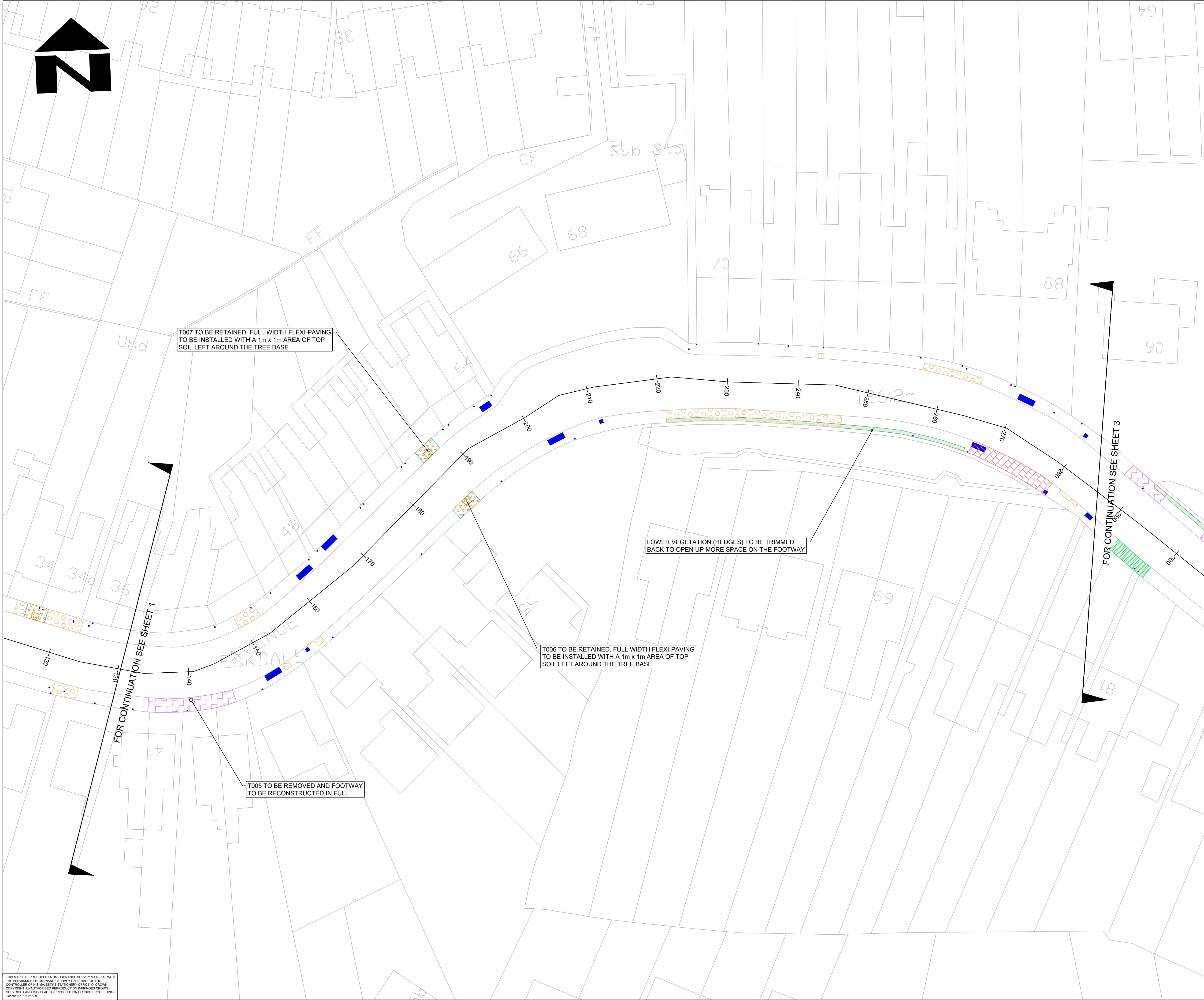
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Original Size	Date	Date	Date	Date
A1	28/06/24	28/06/24	28/06/24	28/06/24

Drawing Number	Project	Originator	Volume	Job No.
TO-12	BH24	ATK	HKF	5221621
				Revision
				P02

Location	Type	Role	Number

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KEY:

- SITE EXTENTS
- CHAINAGE
- 20mm DEEP PATCH
- 70mm DEEP PATCH
- 220mm DEEP PATCH
- 250mm DEEP PATCH
- FLEXI-PAVING. COLOUR TO BE CONFIRMED
- TOP SOIL TO FILL SPACE AROUND TREE BASE
- METAL EDGING TO CONTAIN FLEXI-PAVING
- FOOTWAY RECONSTRUCTION FOR REMOVED TREE
- VEGETATION CLEARANCE
- RS
RELAY MISSING OR DAMAGED SETTS
- KW
KERB WEIR TO BE REPLACED
- CROSSING POINT
- BUS STOP
- UTILITY COVER LOCATIONS

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

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Construction
Live traffic. Presence of tar, presence of soil contamination, asbestos and breaking of concrete not known. Underground services present within site works but unrecorded or unidentified utilities may still be present
Maintenance / Cleaning
None
Use
Trees and roots potentially causing obstruction and/or damage to footway construction
Decommissioning / Demolition
None

P01	PB	JH		14/06/24
First Issue				
P02	PB	JH	JH	28/06/24
For Client Review				
Rev	Drawn / Des	Checked	Approved	Date
Description				

Drawing Status	Suitability
FOR REVIEW / COMMENT	S3

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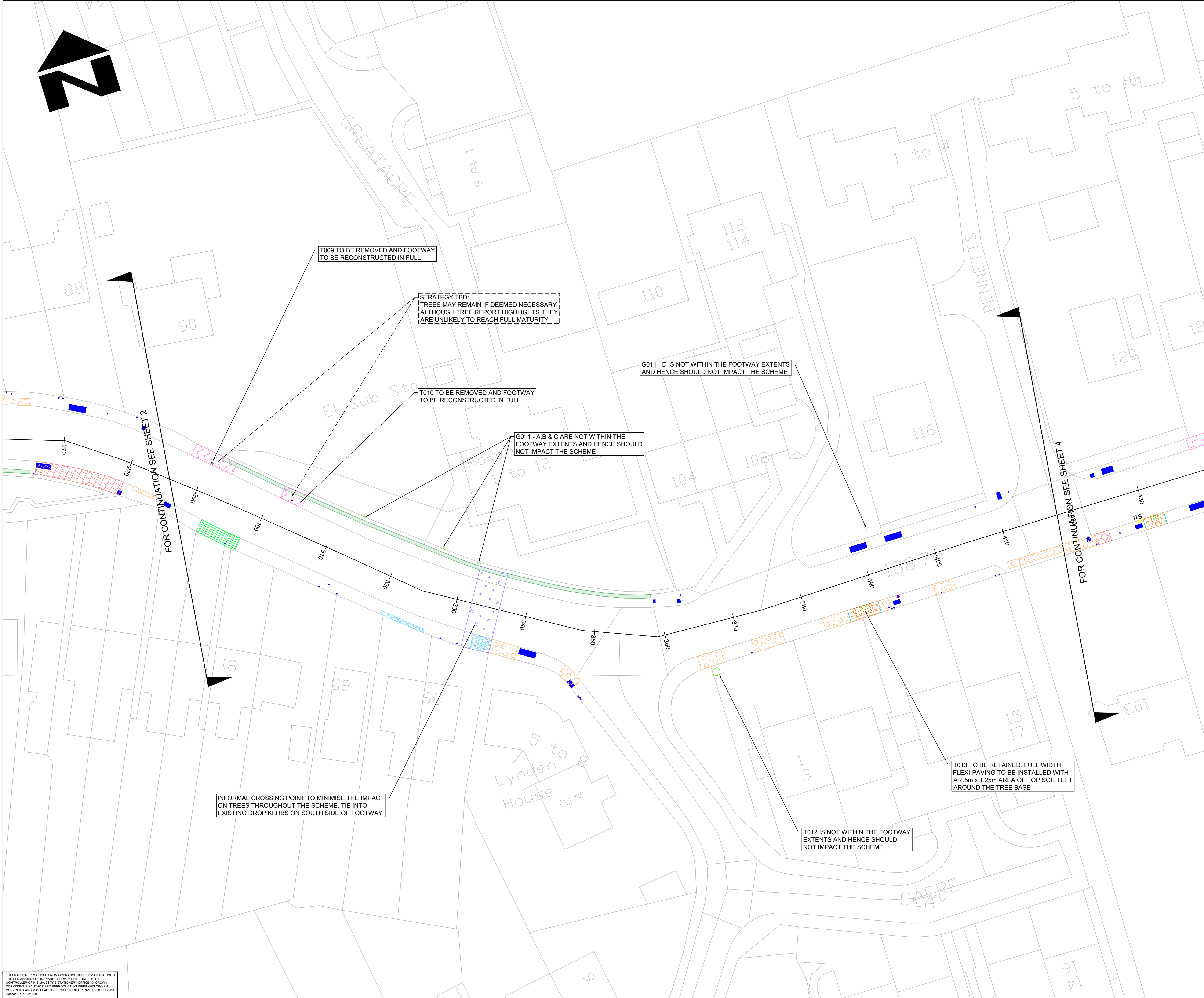
**Buckinghamshire
Highways**

Kevin Goad
Service Director
Highways & Technical Services

Project Title				
5221621 Footway Structural Repairs Maintenance				
Drawing Title				
PKG 3.0 ESKDALE AVENUE GENERAL ARRANGEMENT SHEET 2				
Scale	Designed / Drawn	Checked	Approved	Authorised
1:250	PB	JH	JH	ET
Original Size	Date	Date	Date	Date
A1	28/06/24	28/06/24	28/06/24	28/06/24
Drawing Number	Project	Originator	Volume	Job No.
TO-12	-	ATK	-	5221621
BH24	-	DR	-	000005
Location	Type	Role	Number	Revision
				P02

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Maintenance / Cleaning
None
Use
Trees and roots potentially causing obstruction and/or damage to footway construction
Decommissioning / Demolition
None

P01	PB	JH		14/06/24
First Issue				
P02	PB	JH	JH	28/06/24
For Client Review				
Rev	Drawn / Des	Checked	Approved	Date
Description				

Drawing Status	Suitability
FOR REVIEW / COMMENT	S3

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Client

**Buckinghamshire
Highways**

Kevin Goad
Service Director
Highways & Technical Services

Project Title

**5221621 Footway
Structural Repairs Maintenance**

Drawing Title

**PKG 3.0 ESKDALE AVENUE
GENERAL ARRANGEMENT
SHEET 3**

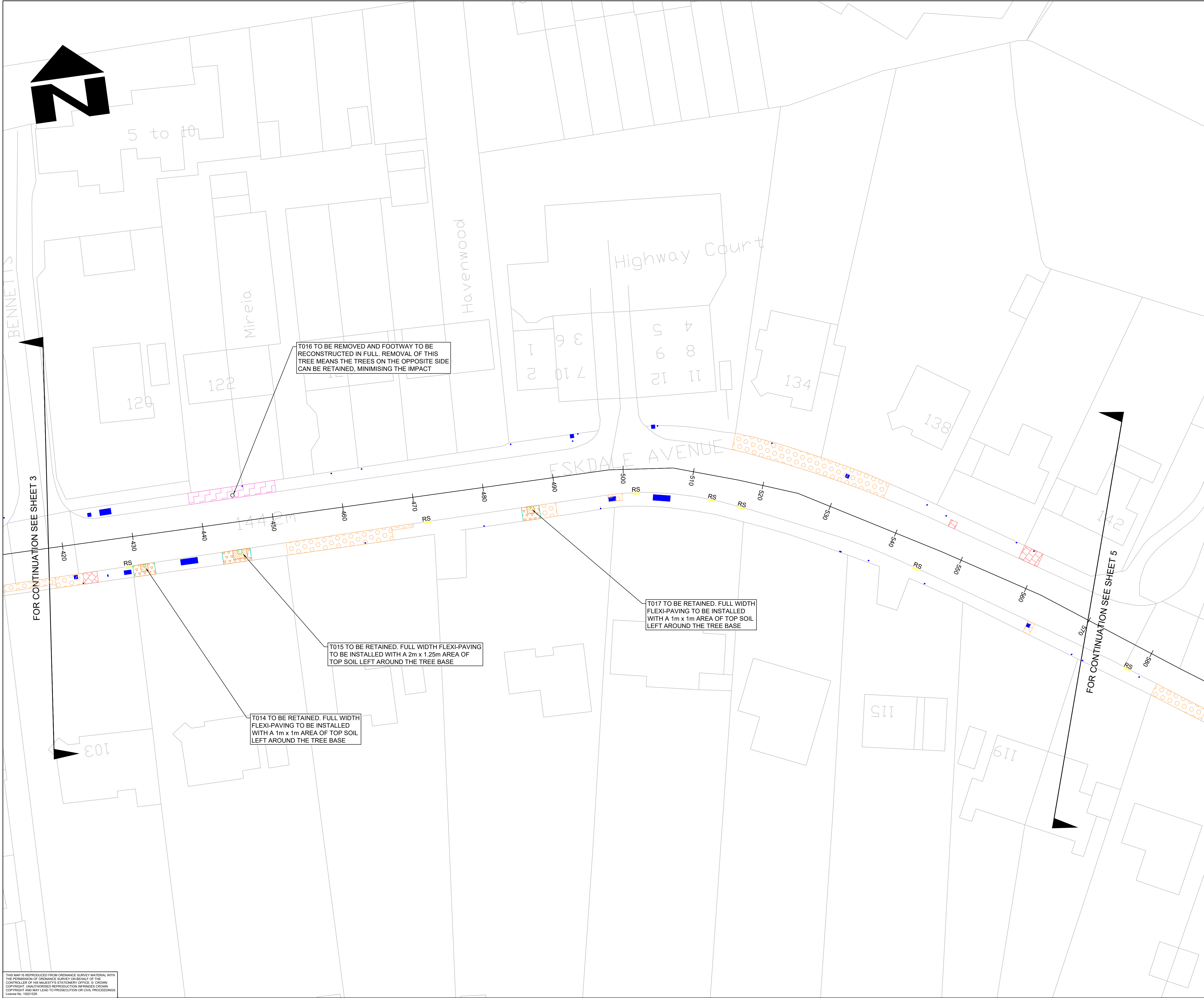
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A1	28/06/24	28/06/24	28/06/24	28/06/24

Drawing Number	Project	Originator	Volume	Job No.
TO-12	BH24	ATK	HKF	5221621
		DR	CH	000006
	Location	Type	Role	Number

Revision	P02
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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

In addition to the hazards/risks normally associated with the types of work detailed on this drawing, note the following significant residual risks (Reference shall also be made to the design hazard log).

Construction

Live traffic.
Presence of tar, presence of soil contamination, asbestos and breaking of concrete not known.
Underground services present within site works but unrecorded or unidentified utilities may still be present

Maintenance / Cleaning

None

Use

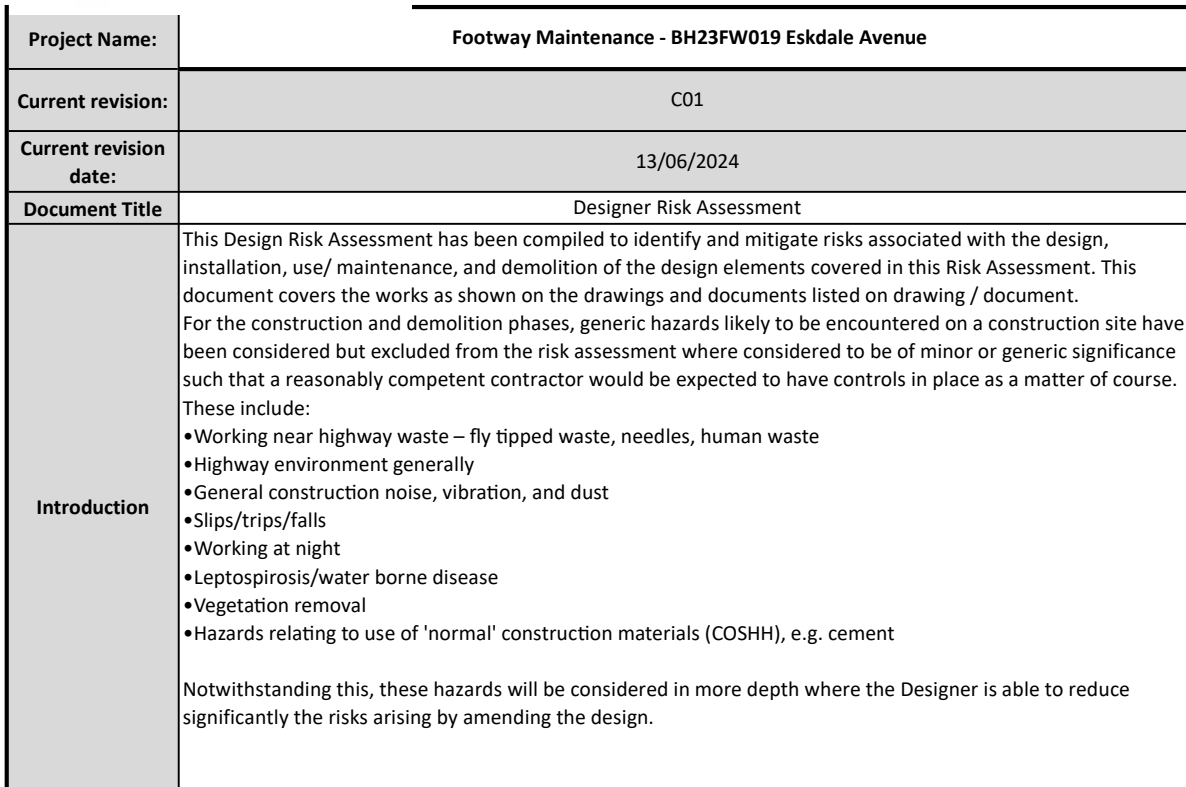
Trees and roots potentially causing obstruction and/or damage to footway construction

Decommissioning / Demolition

None

P01	PB	JH		14/06/24
First Issue				
P02	PB	JH	JH	28/06/24
For Client Review				
Rev	Drawn / Des	Checked	Approved	Date
Description				
Drawing Status				Suitability
FOR REVIEW / COMMENT				S3
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Client				
Project Title				
5221621 Footway Structural Repairs Maintenance				
Drawing Title				
PKG 3.0 ESKDALE AVENUE GENERAL ARRANGEMENT SHEET 4				
Scale	Designed / Drawn	Checked	Approved	Authorised
1:250	PB	JH	JH	ET
Original Size	Date	Date	Date	Date
A1	28/06/24	28/06/24	28/06/24	28/06/24
Drawing Number	Project	Originator	Volume	Job No.
TO-12	ATK	HKF	5221621	
BH24	DR	CH	000007	P02
Location	Type	Role	Number	Revision

Appendix C. Designer's Risk Assessment (June 2024)

[illegible]



			Design Risk Identification				Eliminate (Hazard Elimination) or Reduce (Risk Reduction) and Control - CDM 2015 Regulation 9 - Duties of designers				Inform - Communication of Residual Risk - but only if Significant			Notes	
A			B	C	D	D	F	G	H	I	J	K	L	M	N
			Activity/ Location			Hazard/ Persons	Design Measures to Eliminate	Design Measures to Reduce	Designers' Assumptions	Control Measures	Residual Risk	Significance	Communicate	Complete?	Notes
Ref.	Added by	Date	Original Design Risk	Location of Design Risk	Hazard - Potential for Harm	Person(s) at risk	Designer action to Eliminate/ Reduce/ Control to be tackled as a hierarchy - first record here- Design Measures to Eliminate Hazards (design out), or state "It has not been possible to eliminate the identified Hazard"	Designer action if unable to eliminate identified Hazard - next record here - Design Measures to Reduce Risk. Record what you the designer has done or will do. Do not record what you expect the Construction Contractor to do.	Record Significant Designers' Assumptions. (e.g. Work Methods or Sequences)- these will be carried forward to the Pre-construction Information as information, but unless you mandate them as a Control Measure, you may not rely on them being followed.	Have you decided to rely on anything in Column H to reduce risk - by making it a contract requirement? Record here any such Controls.	Brief summary of what remains, or state "None" if eliminated.	Significance of Residual Risk (Select from RAG List or classify as equivalent)	Means of Communicating Significant Residual Risk (RED/ AMBER Construction will go in PCI)	Is this Item Complete or a Work in Progress? Can only be complete at Detailed Design Phase.	Commentary if required/ Project Director sign off of any Red and/ or Amber Items
1	PB	13/06/2024	Unidentified underground utilities present within site extents	Scheme wide	RISK - Damage to utility infrastructure and injury to labourers/ public HAZARD - striking utility infrastructure	Workforce, Public	It has not been possible to eliminate the identified hazard	GPR survey information not available at current design stage. Responses from Statutory undertakers containing confirmation of presence, as well as location plans have been provided in PCI. Approximate Cover locations (relative to chainage) were recorded during WTB, and these have been shown on drawings. Works have been designed to reduce excavation works above or in close proximity to known ducts where possible.	Prior to removal of the old pavement works, CAT scans will be undertaken by the contractor to ensure no unexpected utility infrastructure is encountered.	Contractor will undertake appropriate measures to detect underground utilities prior to any excavation. Gas Engineer to be on site when the excavations are occurring above any M.P. mains. Avoid working in vicinity of cables as much as practicably possible. Ensure location is proved with a CAT and Genny scan, and hand digging. Method statements required for working near gas mains	Underground services present within site works. Unrecorded or unidentified utilities may still be present.	Amber - Significant	Drawings and PCI	Item Work in Progress	
2	PB	13/06/2024	Potential presence of Asbestos within works/site extents	Scheme wide	RISK - Excavation / site clearance causes dicturbance to asbestos elements that may be present HAZARD - damaged asbestos elements causing asbestos fibres to be released (harmful if breathed in)	Workforce, Public	It has not been possible to eliminate the identified hazard	Asbestos survey information was not available from the client at current design stage. Existing Statutory undertakers plant locations from utility returns has been prepared with available information during design stage to reduce risk of strike.	The designer assumes that asbestos is not present. An asbestos survey should be undertaken in any high-risk or likelihood areas.	A competent contractor to have suitably trained staff in asbestos awareness including the recognition of potentially hazardous material.	Potential unrecorded asbestos present within site extents.	Not Significant	PCI	Item Work in Progress	
3	PB	13/06/2024	Overhead cables present within site and work extents	Specific Location	RISK - Damage to overhead cable(s) HAZARD - overhead cable breaking and hitting labourer/ public causing injury	Workforce	It has not been possible to eliminate the identified hazard	Responses from Statutory undertakers containing confirmation of presence, as well as location plans have been provided in PCI. Approximate locations (relative to chainage) were recorded during WTB. Works have been designed to reduce or remove any works at height in close proximity to lines where possible.	Contractor will take all necessary precautions (e.g. use of goalpost marking and usage of blue and yellow cones) before taking up any work on the overhead location and include the information in the Health & Safety plan for approval. Also, method statements required for working near overhead cable(s).	Contractor will undertake appropriate measures to avoid overhead cable strike	Overhead cables within site and works areas.	Not Significant	Drawings and PCI	Item Work in Progress	
4	PB	13/06/2024	Damaged/Degraded Footway surfacing and/or foundations	Specific Recorded Locations	RISK - Uneven surface and levels creating trip hazard and/or causing difficult passage for pedestrians, wheelchairs and pushchairs. HAZARD - Injury due to trips and falls, damage to non-motorised vehicles.	Workforce, Public	It has not been possible to eliminate the identified hazard	Footways are to be patch repaired where specified to varying extents, based on recorded damage/degradation level. Footways have been prioritised as primary/secondary pedestrian routes to advise levels of maintenance required.	Designer assumes that the patch repair and resurfacing works will be undertaken by competent contractor who will ensure that the patch repairs are properly implemented (i.e. tying into existing paving without causing new hazards), and recorded with minimal disruption.	Contractor to ensure that finished works tie into existing levels within acceptable tolerance. Tolerance to be agreed with client.	Damaged/Degraded Footway surfacing and/or foundations	Not Significant	Drawings and PCI	Item Work in Progress	
5	PB	13/06/2024	Damaged/Degraded street furniture such as kerbs and/or drainage gratings/covers.	Specific Recorded Locations	RISK - Uneven surface and levels creating trip hazard and/or causing difficult passage for pedestrians, wheelchairs and pushchairs. HAZARD - Injury due to trips and falls, damage to non-motorised vehicles.	Workforce, Public	It has not been possible to eliminate the identified hazard	Footways have been prioritised as primary/secondary pedestrian routes to advise levels of maintenance required. Damaged street furniture within these areas are to be reset, replaced or repaired where necessary.	Designer assumes that the works will be undertaken by competent contractor who will ensure that the maintenance activities are undertaken and recorded with minimal disruption with fit for purpose construction method statements.	Contractor to ensure that finished works tie into existing levels within acceptable tolerance. Tolerance to be agreed with client.	Damaged/Degraded street furniture may still exist where the maintenance was not a priority	Not Significant	Drawings and PCI	Item Work in Progress	
6	PB	13/06/2024	Tree roots causing damage to footway and/or carriageway surfacing	Specific Recorded Locations	RISK - Uneven surface and levels creating road hazards. HAZARD - Injury due to trips and falls, damage to non-motorised vehicles.	Workforce, Public	It has not been possible to eliminate the identified hazard	For trees in good condition - Flexible paving is to be installed in the effected areas, and suitable areas of top soil are to be left around the tree base. For poor condition/health trees - the tree and roots are to be removed and the footway to be reconstructed to previous levels.	Designer assumes that the works will be undertaken by competent contractor who will ensure that the resurfacing, tree felling and/or reconstruction activities are undertaken and recorded with minimal disruption with fit for purpose construction method statements.	Contractor to ensure that finished works tie into existing levels within acceptable tolerance. Tolerance to be agreed with client.	Trees and roots may cause damage to footway surfacing if not properly maintained.	Not Significant	Drawings and PCI	Item Work in Progress	
7	PB	13/06/2024	Trees within footways acting as obstruction.	Specific Recorded Locations	RISK - insufficient or unsafe passing width for pedestrians and other footway users HAZARD - Injury due to trips and falls, collision, or pedestrians needing to enter the carriageway to pass leading to road safety risks.	Public	It has not been possible to eliminate the identified hazard	Where the tree is in poor condition, the tree and roots are to be removed and the footway to be reconstructed to previous levels. Where the tree is in good condition, an informal crossing point is to be provided to allow pedestrians to safely cross to a footway with sufficient width.	Designer assumes that the works will be undertaken by competent contractor who will ensure that the resurfacing, tree felling and/or reconstruction activities are undertaken and recorded with minimal disruption with fit for purpose construction method statements.	Contractor to ensure that finished works tie into existing levels within acceptable tolerance. Tolerance to be agreed with client.	Lowered the need to pass directly around the obstruction but people may ignore the crossing points	Amber - Significant	Drawings and PCI	Item Work in Progress	
8	PB	13/06/2024	Visibility reduced by overhanging tree branches and vegetation	Specific Recorded Locations	RISK - Reduced forward visibility for road users. HAZARD - potential for collisions with other vehicles and/or pedestrians	Workforce, Public	Overgrown vegetation effecting visibility to be trimmed back.		Designer assumes that the works will be undertaken by competent contractor who will ensure that activities are undertaken and recorded with minimal disruption with fit for purpose construction method statements.	Contractor to ensure that finished works tie into existing levels within acceptable tolerance. Tolerance to be agreed with client.	Maintenance required in order to keep the visibility clear	Not Significant	Drawings and PCI	Item Work in Progress	

To insert a row - select any row with a right click, then click "Insert". Same to delete a row.

Notes:	This Designers' Risk Register does not employ scoring. In its place is a requirement to determine whether any residual risk is "Significant" - refer HSE L153 Glossary of acronyms and
	This Risk Register should be used in conjunction with the RAG List developed by The UK Consultants Forum - Arup, Atkins, CH2MHILL, Hyder and Mott MacDonald.
	The provision of Items in the Red and Amber lists does not remove from the Designer, an obligation to identify and assess hazards and risks specific to the project.
	Refer also to Guidance Worksheet



Red
Amber &
Green

RAG lists are practical aides to designers on what to eliminate or avoid and what to actively include in their designs

As part of their efforts to eliminate or reduce the risks faced by construction, facilities and maintenance workers designers should avoid elements, materials or processes considered to be high risk, unless no safer solution exists, whilst actively incorporating low risk, or beneficial, aspects into their designs

• Red list items

Elements which are effectively prohibited and should not be incorporated into designs except where there is no alternative or safer option.

If any red list item has to be employed the reasons for this must be formally recorded in the design documentation and the agreement of the Project Director, or similar, should be obtained.

The presence of the red list item must be specifically highlighted on the drawings and in other documents such as reports or specifications. Designers should provide guidance on how the red list item could be safely incorporated within the works.

• Amber list items

Elements which should be avoided except where they can be justified on a risk management basis. Whilst we would prefer not to utilise these elements we accept that sometimes they may constitute the least bad option.

Where any amber list item is selected the reasons for this must be recorded in the design documentation and the agreement of the Design Team Leader, or similar, should be obtained.

The presence of any amber list items must be specifically highlighted on the drawings. Designers should also provide information on how they envisaged the amber list items being safely incorporated within the works.

• Green list items

Elements which are preferred because they are low risk. Designers should actively look for opportunities to include these elements in their designs.

Where green list items are included in the design they should be added to the designers records of their efforts to design out risk.

Generally there is no requirement to advise others when you've included green list items in your design. You may however need to highlight any residual risks your green list items may have reduced, but not eliminated, if a competent contractor familiar with the work you're designing would not readily anticipate such risks.

It's important to keep in mind that the lists focus on issues that are likely to occur on many sites, and that they are in no way exhaustive. Most projects will have other potentially hazardous options that should be avoided, and there will be other opportunities to include beneficial elements within the design.

The lists have been prepared to help you, but you should have the health, safety and wellbeing of construction, operation and maintenance staff in mind when making *all* your design decisions.



Red

R1	Fragile rooflights and roofing assemblies.
R2	Hand scabbling of concrete.
R3	Breaking down of the tops of concrete piles by hand-held breakers.
R4	Processes giving rise to large quantities of dust such as dry cutting or blasting
R5	Designs that require on site spraying or other application of harmful chemicals.
R6	Site layouts that do not allow adequate room for delivery or storage of materials.
R7	Solutions which incorporate the use of existing or new confined spaces.
R8	Specification of hazardous chemicals which are unsuitable for use in confined areas.

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Amber

Amber list items - elements which should be avoided except where they can be justified on a risk management basis

A1	Relying on fall protection, restraint or arrest systems for access.
A2	The specification of curtain wall or panel systems without provision for temporary access.
A3	Inspection chambers and manholes in trafficked areas.
A4	Designs that would require traffic management vehicles to stop in live traffic lanes.
A5	Designs of traffic management arrangements which would require the manual carrying of equipment such as traffic cones or signs across live traffic on high speed roads of 2 or more lanes.
A6	Warning of buried pipe-work and cables using only marker tapes.
A7	Relying on step-overs where pipe or service routes cross walkways.
A8	Specification of shallow steps in external paved areas.
A9	Designs which require manual work which may lead to Musculoskeletal Disorders for example, drilling into concrete.
A10	Breaking down of the tops of concrete piles by the use of machine mounted breakers.
A11	Relying on noise enclosures, acoustic hoods or dampers for machinery or equipment
A12	Chasing out of concrete, brick or blockwork walls or floors for the installation of services.
A13	Specification of heavy building blocks i.e. those weighing > 20kgs.
A14	Specification of heavy lintels.
A15	Speciation of large and heavy glass panels.
A16	Designs which require entry into a confined space.
A17	Designs which require blasting using explosives.
A18	Designs which require on-site welding.
A19	Thermic rail welding.

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Green

Green list items - elements which are preferred because they are low risk

G1	Locate plant and equipment at ground level.
G2	Provide low-maintenance equipment to reduce the requirement to work at height.
G3	Ensure items requiring frequent maintenance can be brought to lower levels or provide suitable permanent access at height.
G4	Secondary security grills with assisted opening covers and pop-up barrier system installed on openings into chambers, manholes etc.
G5	Protect open structures and tanks with mesh flooring and guardrails.
G6	Design to allow the assembly of high level elements at ground level which can then be lifted into place.
G7	Practical and safe methods of window cleaning e.g. from the inside, from ground level or from dedicated access facilities.
G8	The provision of edge protection where there is a foreseeable risk of falls.
G9	Design to allow the early installation of permanent access and prefabricated staircases with hand rails.
G10	Specify water rescue equipment adjacent to open water e.g. buoyancy aids.
G11	Position plant and equipment away from water.
G12	Specify visibility panels to view processes from a point of safety.
G13	Confirm access is practicable for deliveries and plant under overhead cables and obstructions.
G14	Provide separate access routes and parking facilities for staff and visitors away from operational areas.
G15	Design one-way systems with adequate turning circles to eliminate the need to reverse.
G16	Ensure required lifting operations are practicable and provide any necessary crane foundations.
G17	Segregate pedestrians from vehicles using physical barriers in depots, distribution areas etc.
G18	Consult with the police, local authorities and other interested parties for all traffic management proposals.
G19	Provide safe stopping places for vehicles that will be needed during routine maintenance operations.
G20	Consider road closures in preference to any other form of traffic management.
G21	Consider using remote controlled signs or other equipment to help mitigate risks when designing traffic management layouts.
G22	Use of ground penetrating radar, CAT and genny equipment and utility detection services to identify buried services.
G23	Hand dug trial holes to identify services.
G24	Provision of additional capacity in cable trays, duct systems, pipe routes for future use.
G25	Consider not burying services in operational areas.

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Green

Green list items - elements which are preferred because they are low risk

G26	Use of 'no-dig' technology e.g. directional drilling, etc.
G27	Re-use of existing pipe work using sheathing and lining.
G28	Re-route existing services prior to main construction.

G29	Use of Electronic Marker Systems, marker posts, marked cable ties for utility services.
G30	Provide adequate space for maintenance activities without impinging on walkways etc.
G31	Provide sufficient space around plant for construction, maintenance and inspection activities.
G32	Provide fixed lifting points on new plant and equipment
G33	Provide adequate headroom for maintenance in plant rooms and facilities for replacing heavy components.
G34	Site equipment where there is safe access and space for maintenance.
G35	Design buried structures to be flush with, or a significant distance above, ground level.
G36	Appointment of a Temporary Work Coordinator.
G37	Utilise temporary works elements in the permanent design.
G38	Suitable water-based products to be used instead of hazardous substances
G39	Ensure early identification and assessment of any asbestos-containing materials.
G40	Ensure ground investigation survey information, including contamination, is available in the early stages of design.
G41	Specify the use of concrete retardant in preference to mechanical means for forming joints etc.
G42	Design to allow non-percussive proprietary methods of pile head removal.
G43	Use pre-cast concrete units to avoid on-site pours.
G44	Use extended valve spindles to enable operation from a safe position.
G45	Design plant and equipment that will minimise noise.
G46	Ensure electrical and mechanical equipment can be isolated and locked-off for safety during maintenance.
G47	Specify concrete products with pre-cast fixings to avoid drilling.
G48	Maximise the use of natural ventilation to reduce the risk of gas accumulation.
G49	Specify off-site treatment or coating of materials or products e.g. timber preservatives
G50	Provide davit lifting arms or hook location systems where heavy items may be needed during maintenance.

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Green

Green list items - elements which are preferred because they are low risk

G51	Design solutions that eliminate lifting operations e.g. tankered deliveries instead of palletised materials.
G52	Provide permanent lifting points on removable covers and equipment.
G53	Specify half board sizes for plasterboard sheets to make handling easier.
G54	Ensure heavy construction components can be handled using mechanical lifting devices - consider access, floor loadings etc.
G55	Provide natural ventilation.
G56	Locate operational features at ground level e.g. valve chambers and control systems.
G57	Minimise the need for personnel to enter confined space e.g. site control equipment at ground level.
G58	Design to allow the remote mechanical retrieval of deep-set equipment, such as submersible pumps.
G59	Specify access equipment into confined spaces based on assessment of access frequency, conditions, security etc.
G60	Provide security grills, gratings, or doors to prevent unauthorised access.

G61	Design to maximise the amount of off site fabrication that can be done.
G62	Specify flash butt welding for rails
G63	Maximise the use of non-intrusive survey techniques such as ground penetrating radar and GPS positioning and plotting.