

M25 Junction 10 - A3 Ockham Alignment Options Assessment

27/01/20

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1. Introduction

- 1.1.1 This Technical Note has been produced to record the modifications proposed to the A3 northbound mainline carriageway adjacent to the Royal Horticultural Society (RHS) Garden Wisley. The current DCO design impacts seven important trees along the RHS Garden Wisley boundary, and this document illustrates how the alignment can be amended to avoid them.

2. Background

- 2.1.1 The Highway boundary to the A3 Northbound merge at Ockham Park Junction abuts the RHS Garden Wisley. Within the existing nearside verge, established vegetation comprising mixed types of planting is evident. To the rear of this vegetation is the highway boundary, depicted by a timber palisade fence (Figure 1).

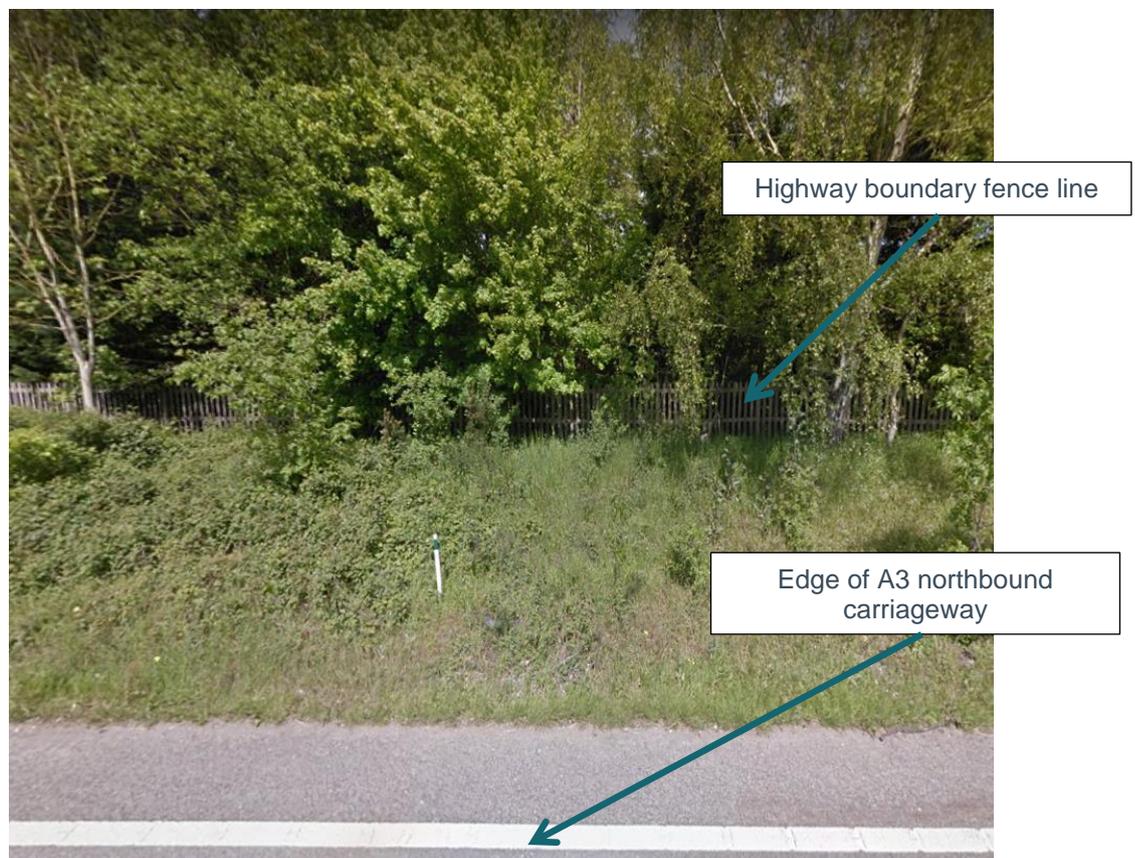


Figure 1 – A3 Northbound Carriageway Verge

- 2.1.2 A tree survey was undertaken to record the position and size of important trees inside RHS Garden Wisley. The impacted trees are denoted as follows:

1. T197 – Hybrid Black Poplar
2. T192 – Populus X Generosa 'Beaupre'
3. T185 – Turkey Oak
4. T184 – Giant Redwood
5. T183 – Giant Redwood
6. T181 – Red Oak

7. T176 – Norway Maple

- 2.1.3 The structural root zone for each tree is a constraint to be avoided by the proposed highway design and associated construction activities. It should be noted that the root zone extends into Highways England Land, and no land is being sought though RHS Garden Wisley.

3. Original Design Rationale

- 3.1.1 The original design proposal took in to consideration a variety of physical constraints as well as looking at the buildability aspects. Below is a summary of the pertinent factors that influenced the original design layout:

1. The original layout avoided significant works in the central reservation by using the existing verge to accommodate the widening for the merge and subsequent lane gain. A pinch point at the merge nosing created a localised length of pavement widening within the central reservation. Widening to a 'single side' of the carriageway avoids an additional phase of Traffic Management reducing the construction programme and delay to road users.
2. The existing sliproad features sub-standard lane widths and congestion at peak times. To provide a fully compliant design an upgraded junction with widened lanes was proposed. Widening on the nearside of the slip road (adjacent to the highway boundary) used freely available space improving congestion and safety without impacting the highway boundary.
3. Widening to the offside of the slip road results in the need for a retaining solution due to the presence of earthworks, with significant cost implications. It is possible that the vertical profile of the sliproad would be affected at the tie in with the mainline carriageway.
4. At the time of the preliminary design, the location of trees within the RHS Garden Wisley boundary were known. However, this did not include root survey information, and a subsequent survey has now been undertaken identifying the issue.
5. A level difference exists between the north and southbound carriageways in the vicinity of Wisley Lane. Widening in to the central reservation would have entailed a geotechnical solution (retaining solution or earthworks slope).
6. The proposed design offered a smooth alignment within the extent of the highway's boundary. Widening in to the central reservation would have introduced a less favourable horizontal alignment.

4. Options

- 4.1.1 Three options were explored to establish the most suitable solution to resolving the conflicts with the tree root zone. These options are summarised below and described in further detail in this section:

1. realignment of the slip road and northbound carriageway.
2. reduction of lane widths.
3. modification of the merge layout type.

4.2 Realignment of the slip road and northbound carriageway

- 4.2.1 This proposal seeks to adjust the northbound carriageway alignment, pulling the carriageway closer to its existing alignment. This change would move the carriageway towards the wide central reservation using that space to construct the new carriageway alignment.
- 4.2.2 Modelling of the proposed changes confirms that it is possible to move the carriageway away from the highway boundary. The following results would be achieved:
1. reduction in the extent of widening within the existing nearside verge.
 2. increase the widening in to the central reservation.
 3. minimise works within the verge e.g. water main diversion, crib wall.
 4. avoid the structural root zone of the affected trees (refer to paragraph 4.2.3).
- 4.2.3 Referring to drawing HE551522-ATK-GEN-A3_L1_ML-DR-ZM-000001 it is evident that the proposed alignment of the carriageway sits partially within the extents of the root protection area for trees T184 and T183. However, the root protection area extends beyond the structural root zone. By pulling the alignment back to the original edge of carriageway line, works within the verge can be consolidated to minimise construction activities within the root protection area whilst fully avoiding the structural root zone.
- 4.2.4 The central reservation comprises established vegetation which would be reduced as a consequence of carriageway construction. This vegetation is not considered significant by our environment team, and its loss would not be detrimental.
- 4.2.5 Upon further development of the realignment during the detailed design, there is a risk that departures may arise as a result of the modified design. These will be mitigated accordingly in consultation with Highways England Safety, Engineering and Standards (SES).
- 4.2.6 As this option physically avoids the structural root zones of the trees and minimises construction works in the verge, it will be adopted for further development within the detailed design phase.

4.3 Reduction of lane widths

- 4.3.1 The proposed scheme adopts a standard cross-section in accordance with CD 127 of the Design Manual for Roads and Bridge (DMRB).
- 4.3.2 Comparison of lane widths is given in Table 1.

Table 1 – Lane widths

	Compliant Lane Width (m)	Reduced Lane Width (m)
Lane 1	3.65	3.60
Lane 2	3.70	3.50
Lane 3	3.70	3.35
Lane 4	3.65	3.35
Total	14.70	13.80

- 4.3.3 Adoption of reduced lane widths would require a departure from standards which would be subject to approval by Highways England SES.
- 4.3.4 The net gain in reducing the lane widths would give an additional 0.90m of space within the verge. This would not provide adequate space to avoid a clash with the structural root zone of all the affected trees.
- 4.3.5 It is worth noting that during the preliminary design, the team approached Highways England SES to consider whether a reduction in lane widths could be adopted elsewhere along the A3. Feedback received suggested that a reduction in lane width along the mainline would not be supported.
- 4.3.6 This option considered in isolation would not therefor be feasible.

4.4 Modification of the Merge Layout Type

- 4.4.1 The current proposal for the merge layout type as defined in CD 122¹ of the DMRB is a Type E layout (Option 2), as illustrated in Figure 2 below.

Figure 3.14f Layout E Option 1 - lane gain with ghost island offside merge

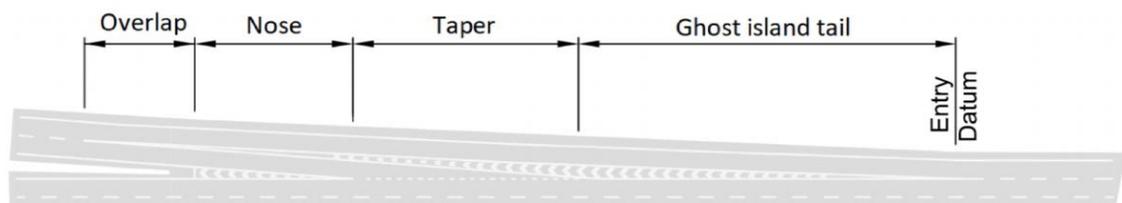


Figure 3.14g Layout E Option 2 - lane gain with ghost island nearside merge

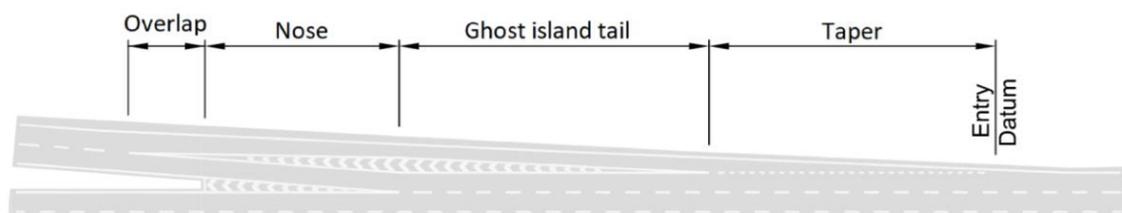


Figure 2 – CD122 Type E Options 1 and 2 merge layout

- 4.4.2 Determination of this layout type is derived using Figure 3.12a of CD 122.
- 4.4.3 In the case of the Option E layout, two variations of the layout can be adopted by the designer (Figure 2). The choice of layout is affected by physical space constraints and the prevalence of slow-moving vehicles e.g. HGV's. The Option 1 layout occupies a longer footprint compared to the Option 2 layout and is generally considered the more favourable option.
- 4.4.4 The key driver for selecting the Option 2 layout was dependant on the traffic modelling. The modelling of layout Type E Option 1 predicted a severe detrimental impact on the operation of the slip road, with the taper merge predicted to operate over capacity, and have limited use, due to the high nearside lane usage of the through movement on the A3. This in turn was predicted to force traffic onto the lane gain which subsequently operated above

¹ Note, CD 122 - Geometric design of grade separated junctions supersedes TD22/06 - LAYOUT OF GRADE SEPARATED JUNCTIONS, which the original design is based upon. References to the layout lettering convention have since changed. The Type E layout referred to in this report, was formerly a Type F layout. These two layouts whilst similar, should not be confused between each other.

its link capacity. The Type E Option 2 layout negated this impact by allowing the taper merge traffic to give way to the lane gaining traffic, allowing A3 through traffic to weave with the merging flow beyond the merge point.

4.4.5 HGV percentage is predicted to be very low (2.25%) and therefore the direct taper merge onto lane 2 is not considered as much of an issue.

4.4.6 Consideration was given to the applicability of alternative merge layouts. Improving the layout to a Type F or above would become an overprovision (requiring a departure from standards) and would increase the highway footprint and further impact upon the constraints in the locality. Down-grading the layout to a Type D or below would also be a departure from standards and would significantly risk traffic congestion during peak hours due to the lower capacity. This is likely to increase the risk of collisions with merging vehicles.

4.4.7 With the above in mind, the Type E Option 2 layout was retained as the appropriate merge type for the proposed scheme.

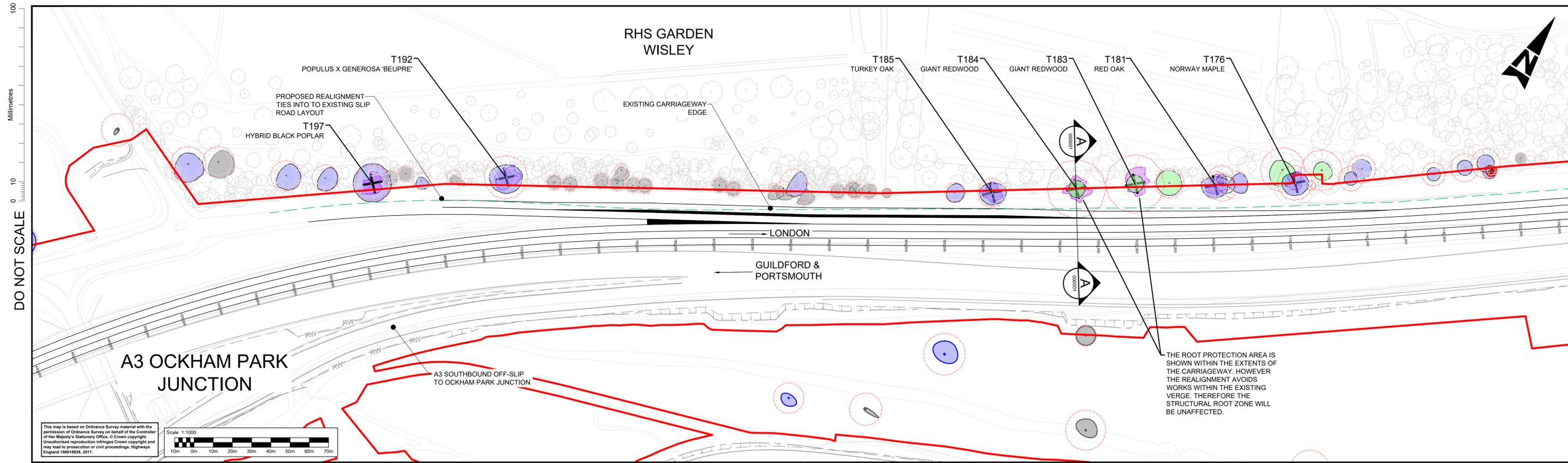
5. Conclusion

5.1.1 Following a review of original design proposal. Further enhancements have been identified to realign the A3 northbound carriageway. The realignment avoids impacts upon the structural root zones of the impacted trees by shifting the carriageway across in to the central reservation. This moves the nearside edge of carriageway back towards its original position and minimises construction within the verge. The realignment does however introduce an additional phase of Traffic Management to enable works within the central reservation to be undertaken.

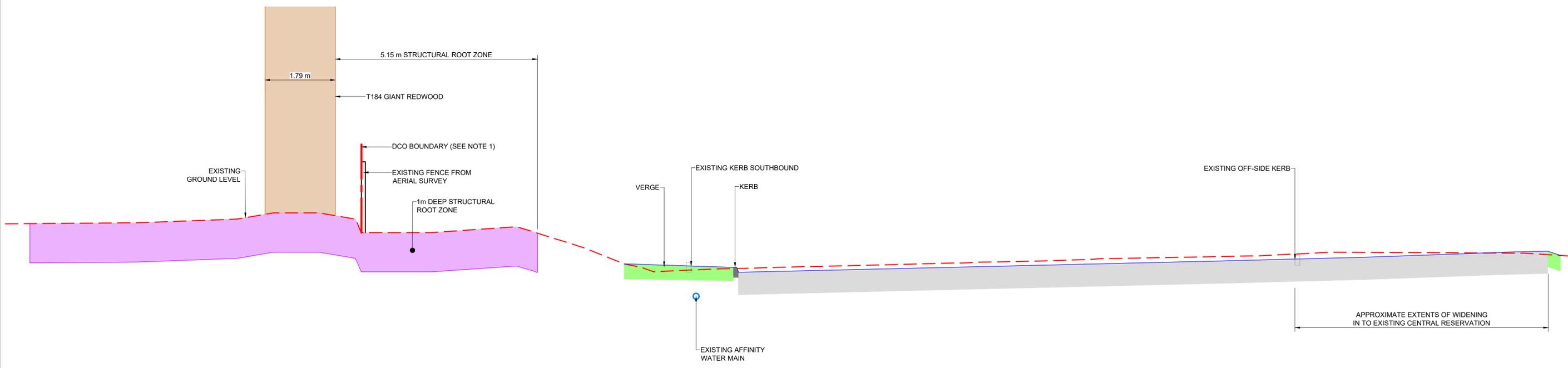
Appendices

Appendix A. Tree Location Plans

A.1 HE551522-ATK-GEN-A3_L1_ML-DR-ZM-000001



SECTION A - NOT TO SCALE



NOTES:
 1. DEVELOPMENT CONSENT ORDER (DCO) BOUNDARY IS BASED ON AERIAL SURVEY FOR THE HIGHWAY BOUNDARY.

LEGEND:
 --- EXISTING CARRIAGEWAY EDGE
 --- PROPOSED CARRIAGEWAY

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							
None							
Maintenance / Cleaning							
None							
Use							
None							
Decommissioning / Demolition							
None							
Status	Revision	Drawn	Checked	Reviewed	Authorised	Issue Date	
A1	C01	TR	TR	SG	SG	27/01/20	

Drawing Suitability	APPROVED - PUBLISHED	Status	A1	Project Title	M25 junction 10/A3 Wisley interchange
		Epsom Gateway Ashley Avenue Epsom Surrey KT18 5AL Tel: +44 (0)1372 726140 Fax: +44 (0)1372 740055 www.atkinsglobal.com			
		Drawing Number Project HE551522 - ATK - GEN - A3_L1_ML - DR - ZM - 00001 Location Original Size: A1 Scale: AS SHOWN Project Ref. No.: 5158141 Sheet: 1 of 1 Rev: C01			

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