

Technical note

Project	Bristol Rapid Transit	Date	3 March 2009
Note	Response to Cyril Sweett Cost Overview Report	Ref	CTR-ACF
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1 *Introduction*

1.1 This Technical Note is in response to the draft review undertaken by Cyril Sweett on the Ashton Vale to Bristol City Centre Bristol Rapid Transit alignment with regards to the design and cost estimate.

2 *Comments*

2.1 References are from Cyril Sweett's draft Cost Overview Report.

	Cyril Sweett	Halcrow Response
Section A		
1 (Ref: 4.3)	The site clearance quantity didn't include for the junction with the park and ride or the path to the platforms. This has been adjusted to include all areas of work.	Agreed
2 (Ref: 4.3)	The quantity of manholes allowed seems low. A further allowance has been added. (Changed from 6nr to 11nr)	Cost estimate allows for manholes at maximum 90m centres, on the linear length of route without the need for a detailed design. Therefore at this stage revert to 6 nr
3 (Ref: 4.3)	The excavation quantity didn't include for the transit track. This has been added in.	Agreed
4 (Ref: 4.3)	The sub base quantity to the non guideway construction didn't include for the junction with the park and ride. This has been added in.	Agreed
5 (Ref: 4.3)	The road base course quantity to the non guideway construction was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted and the area of the junction with the park and ride added in. The rate seems high and has been adjusted.	Agreed
6 (Ref: 4.3)	The wearing course quantity to the non guideway construction was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted and the area of the junction with the park and ride added in	Agreed

7 (Ref: 4.3)	The kerb quantity to the non guideway construction didn't include the junction with the park and ride. This has been added in	Agreed
8 (Ref: 4.3)	The rate for the new kerb to the highway reconstruction was different from the kerb rate elsewhere. This has been adjusted to match	The figure of £20 per m was for both in and outbound kerbs edges for non-guideway. Amend spreadsheet to suit
9 (Ref: 4.3)	The cycleway base course rate seems too high. This has been adjusted	Agreed
10 (Ref: 4.3)	The cycleway base course didn't include the junction with the park and ride. This has been added in	Agreed
11 (Ref: 4.3)	The cycleway wearing course quantity was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted and the area of the junction with the park and ride added in.	Agreed
12 (Ref: 4.3)	The cycleway kerb quantity didn't include the junction with the park and ride. This has been added in.	Agreed
13 (Ref: 4.3)	The cable quantity appears low. This has been adjusted.	Agreed
Section B		
14 (Ref: 4.6)	The haul road quantity was incorrect (m2 x 4 x 0.5) this should have been (m x 4 x 0.5). This has been adjusted	Agreed
15 (Ref: 4.6)	The site clearance quantity contained an error. This has been corrected	Agreed
16 (Ref: 4.6)	The quantity of manholes allowed seems low. A further allowance has been added. (Changed from 6nr to 11nr)	Cost estimate allows for manholes at maximum 90m centres, on the linear length of route without the need for a detailed design. Therefore at this stage revert to 6 nr
17 (Ref: 4.6)	The road base course rate seems high and has been adjusted	Agreed if C Sweett has a detailed cost estimate
18 (Ref: 4.6)	The cycleway base course quantity was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted.	Agreed
18 (Ref: 4.6)	The cycleway base course rate seems too high. This has been adjusted	Agreed
19 (Ref: 4.6)	The cycleway wearing course quantity was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted	Agreed
Section C		
20 (Ref: 4.9)	The excavation quantity calculation wasn't consistent through the spreadsheet (see query sheet nr 2 item 13). This has been adjusted to be the same throughout	Agreed
21 (Ref: 4.9)	The road base course quantity to the non	Agreed

	guideway construction was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted. The rate seems high and has been adjusted	
22 (Ref: 4.9)	The wearing course quantity to the non guideway construction was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted. The cycleway base course rate seems too high. This has been adjusted	Agreed
23 (Ref: 4.9)	The cycleway base course quantity was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted	Agreed
24 (Ref: 4.9)	The cycleway wearing course quantity was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted	Agreed
25 (Ref: 4.9)	The duct and cable quantity didn't include for the short length of lighted cycleway. This has been added in	Agreed
26 (Ref: 4.10)	The drainage allowance assumes underground drainage but this sub section includes the elevated section over the railway lines. It is assumed that the allowed costs are sufficient to cover the cost of the above ground drainage to the elevated section	Detailed design of over bridge will include drainage
27 (Ref: 4.11)	The allowance of £ 510,000 for rail closures for constructing the elevated section is an estimated figure	Correct. Further discussions required with Network Rail
28 (Ref: 4.11)	There is no allowance in the costs for Rail Track supervision, which will be required as the works are constructed within close proximity of the rail lines	Further discussions required with Network Rail
29 (Ref: 4.11)	Discussions with Rail Track will be required to confirm costs are adequate and to confirm costs associated with supervision requirements	Further discussions required with Network Rail
Section D		
30 (Ref: 4.14)	The haul road quantity was incorrect (m2 x 4 x 0.5) this should have been (m x 4 x 0.5). This has been adjusted	Agreed
31 (Ref: 4.14)	The site clearance quantity contained an arithmetical error. This has been corrected.	Agreed
32 (Ref: 4.14)	The quantity of manholes allowed seems low. A further allowance has been added. (Changed from 0nr to 4nr)	Agreed
33 (Ref: 4.14)	The excavation quantity calculation wasn't consistent through the spreadsheet (see query sheet nr 2 item 13). This has been adjusted to be the same throughout. Also some areas were missing these have now been added in	Agreed

34 (Ref: 4.14)	The road base course quantity to the non guideway construction was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted. The rate seems high and has been adjusted	Agreed
35 (Ref: 4.14)	The wearing course quantity to the non guideway construction was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted	Agreed
36 (Ref: 4.14)	The rate for the new kerb to the highway reconstruction was different from the kerb rate elsewhere. This has been adjusted to match	The figure of £20 per m was for both in and outbound kerbs edges for non-guideway. Amend spreadsheet to suit
37 (Ref: 4.14)	The cycleway base course rate seems too high. This has been adjusted	Agreed
38 (Ref: 4.14)	The cycleway base course quantity was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted	Agreed
39 (Ref: 4.14)	The cycleway wearing course quantity was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted	Agreed
40 (Ref: 4.14)	The edging kerb quantity didn't include all the cycleway. This has been added in	Agreed
41 (Ref: 4.14)	The sub total formula for level crossings didn't pick up all the values. This has been corrected	Agreed
42 (Ref: 4.15)	The allowance of £ 200,000 for revision to existing level crossing is an estimated figure	Agreed. Further discussions with Rail Track are required
43 (Ref: 4.15)	There is no allowance in the costs for Rail Track supervision, which will be required as the works are constructed within close proximity of the rail lines	Agreed. Further discussions with Rail Track are required
Section E		
44 (Ref: 4.18)	The quantity of manholes allowed seems low. A further allowance has been added. (Changed from 8nr to 16nr).	Cost estimate allows for manholes at maximum 90m centres, on the linear length of route without the need for a detailed design. Therefore at this stage revert to 8 nr
45 (Ref: 4.18)	The excavation quantity calculation wasn't consistent through the spreadsheet (see query sheet nr 2 item 13). This has been adjusted to be the same throughout	Agreed
46 (Ref: 4.18)	The rate for contaminated excavation seems high. This has been adjusted	Rate came from existing Halcrow project. Keep as £210 m3
47 (Ref: 4.18)	The road base course rate seems high and has been adjusted	Agreed if C Sweett has a detailed cost estimate
48 (Ref: 4.18)	The rate for the new kerb to the highway reconstruction was different from the	The £20 per m was for both sides. Revert back to

	kerb rate elsewhere. This has been adjusted to match	£10 per m
49 (Ref: 4.18)	The cycleway base course rate seems too high. This has been adjusted.	Agreed
50 (Ref: 4.18)	The cycleway base course quantity was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted	Agreed
51 (Ref: 4.18)	The cycleway wearing course quantity was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted	Agreed
52 (Ref: 4.18)	The edging kerb quantity didn't include all cycleways. This has been adjusted	Agreed
53 (Ref: 4.19)	The excavation of contaminated material has been based on the assumption that where rails have been present that the ground is contaminated with hazardous material. Is this assumption justified or could this allowance be down graded to contaminated non hazardous?	We believe the assumption is justified due to the age in which the rail line was constructed (c 1872) and their preferred method of using creosoted sleepers
Section F		
54 (Ref: 4.23)	No haul road has been allowed. This has been added in	Agreed
55 (Ref: 4.23)	The site clearance quantity contains errors. This has been corrected	Agreed
56 (Ref: 4.23)	The quantity of drain pipes, gullies and manholes allowed seems low. A further allowance has been added	Agreed
57 (Ref: 4.23)	The excavation quantity calculation wasn't consistent through the spreadsheet (see query sheet nr 2 item 13). This has been adjusted to be the same throughout	Agreed
58 (Ref: 4.23)	The excavation quantity included areas of existing cycleway. This has been corrected	Agreed
59 (Ref: 4.23)	The excavation of contaminated material didn't include for all the areas of cycleway and non guided track north of the river. This has been adjusted	Agreed
60 (Ref: 4.23)	The rate for contaminated excavation seems high. This has been adjusted	Rate came from existing Halcrow project. Keep as £210 m3
61 (Ref: 4.23)	The road base course rate seems high and has been adjusted	Agreed if C Sweett has a detailed cost estimate
62 (Ref: 4.23)	The highway reconstruction wearing course didn't include the resurfaced area. This has been added in	Agreed
63 (Ref: 4.23)	The rate for the new kerb to the highway reconstruction was different from the kerb rate elsewhere. This has been adjusted to match	The figure of £20 per m was for both in and outbound kerbs edges for non-guideway. Amend spreadsheet to suit
64 (Ref: 4.23)	The planing off and tack coat quantity has been adjusted as discussed with Andy Seek	Agreed
65 (Ref: 4.23)	The cycleway base course rate seems too	Agreed

	high. This has been adjusted	
66 (Ref: 4.23)	The cycleway base course was measured as a m3 quantity but rated at a m2 rate and stated as a m2 unit. The quantity has therefore been adjusted	Agreed
67 (Ref: 4.23)	The cycleway wearing course quantity but rated at a m2 rate has therefore been adjusted	Agreed
68 (Ref: 4.23)	The cycleway kerb quantity included lengths of existing path. This has been corrected	Agreed
69 (Ref: 4.23)	The white lining formula didn't pick up the quantity. This has been corrected	Agreed
70 (Ref: 4.24)	The non guideway construction (concrete slab and tarmacadam) has been taken over the existing bridge. Is this required as it would increase the loading on the bridge	Only 40mm wearing course is required over Ashton Avenue bridge subject to bridge detailed assessment
71 (Ref: 4.25)	The excavation of contaminated material has been based on the assumption that where rails have been present that the ground is contaminated with hazardous material. Is this assumption justified or could this allowance be down graded to contaminated non hazardous	We believe the assumption is justified due to the age in which the rail line was constructed (c 1872) and their preferred method of using creosoted sleepers
72 (Ref: 4.26)	The allowance for excavation of contaminated material is an area where further investigation works could result in clearer understanding of the extent of contaminated material and the likely costs	We believe the assumption is justified due to the age in which the rail line was constructed (c 1872) and their preferred method of using creosoted sleepers
73 (Ref: 4.26)	The allowance of £600,000 for the new footbridge seems inadequate for a 90m by 5m wide footbridge. This item needs to be revisited	Agreed. Rate has been reviewed and increased to £800,000
74 (Ref: 4.26)	The allowance of £1,000,000 for Ashton Avenue Bridge is considered adequate at this stage, for refurbishing and strengthening works to accommodate the Rapid transit scheme	Rate came from Bristol City Council as they have a quote for refurbishment and strengthening
Section G		
75 (Ref: 4.29)	The quantity of highway crash barrier seems low. A further allowance has been added	Agreed
76 (Ref: 4.29)	New gullies have been allowed but no drain pipes or chambers. An allowance for pipes and chambers has been added in	Pipes and chambers to be removed as Tram Slab will be self draining. Gullies added for Cumberland Road due to new kerb alignment
77 (Ref: 4.29)	The excavation quantity calculation wasn't consistent through the spreadsheet (see query sheet nr 2 item 13). This has been adjusted to be the same throughout.	Agreed
78 (Ref: 4.29)	The quantities of highway reconstruction have been adjusted following discussions	Agreed

	with Andy Seek to include full length of road	
79 (Ref: 4.29)	The coloured surfacing quantity didn't include for the area on drawing 268. This has been added in	Agreed
80 (Ref: 4.29)	The feeder pillar lining formula didn't pick up the quantity. This has been corrected	Agreed
81 (Ref: 4.30)	The non guideway construction (concrete slab and tarmacadam) has been taken over the existing bridge. Is this correct?	Agreed spreadsheet amended
82 (Ref: 4.31)	The extent of resurfacing works needs verifying. The allowances been increased following discussion with Andy Seek	Agreed
Section H		
83 (Ref: 4.34)	The drainage sub total formula didn't pick up the chambers quantity. This has been corrected	Agreed
84 (Ref: 4.34)	The road base course rate seems high and has been adjusted	Agreed if C Sweett has a detailed cost estimate
85 (Ref: 4.34)	The rate for the new kerb to the highway reconstruction was different from the kerb rate elsewhere. This has been adjusted to match	The figure of £20 per m was for both in and outbound kerbs edges for non-guideway. Amend spreadsheet to suit
Section I		
86 (Ref: 4.37)	The tram construction doesn't go the full length of sub section I, so the quantities have been adjusted following discussion with Andy Seek, to reflect excavation and construction of the unguided track and Cycleway	Agreed
87 (Ref: 4.37)	The rate for contaminated excavation seems high. This has been adjusted	Rate came from existing Halcrow project. Keep as £210 m3
88 (Ref: 4.37)	The cycleway base course rate seems too high. This has been adjusted	Agreed
89 (Ref: 4.38)	The excavation of contaminated material has been based on the assumption that where rails have been present that the ground is contaminated with hazardous material. Is this assumption justified or could this allowance be down graded to contaminated non hazardous	We believe the assumption is justified due to the age in which the rail line was constructed (c 1872) and their preferred method of using creosoted sleepers
90 (Ref: 4.39)	The allowance for excavation of contaminated material is an area where further investigation works could result in clearer understanding of the extent of contaminated material and the likely costs	We believe the assumption is justified due to the age in which the rail line was constructed (c 1872) and their preferred method of using creosoted sleepers
Section J		
91 (Ref: 4.42)	The site clearance formula didn't pick up the quantity. This has been corrected	Agreed
92 (Ref: 4.42)	The excavation quantity calculation wasn't consistent through the spreadsheet	Agreed

	(see query sheet nr 2 item 13). This has been adjusted to be the same throughout	
93 (Ref: 4.42)	No excavation or construction has been allowed for the non guideway transit track. This has been added in	Agreed
94 (Ref: 4.42)	The rate for contaminated excavation seems high. This has been adjusted	Rate came from existing Halcrow project. Keep as £210 m3
95 (Ref: 4.42)	The rate for the new kerb to the highway reconstruction was different from the kerb rate elsewhere. This has been adjusted to match	The figure of £20 per m was for both in and outbound kerbs edges for non-guideway. Amend spreadsheet to suit
96 (Ref: 4.42)	The cycleway base course rate seems too high. This has been adjusted	Agreed
97 (Ref: 4.43)	The excavation of contaminated material has been based on the assumption that where rails have been present that the ground is contaminated with hazardous material. Is this assumption justified or could this allowance be down graded to contaminated non hazardous	We believe the assumption is justified due to the age in which the rail line was constructed (c 1872) and their preferred method of using creosoted sleepers
98 (Ref: 4.44)	The allowance for excavation of contaminated material is an area where further investigation works could result in clearer understanding of the extent of contaminated material and the likely costs	We believe the assumption is justified due to the age in which the rail line was constructed (c 1872) and their preferred method of using creosoted sleepers
99 (Ref: 4.44)	The allowance of £1,000,000 for the swing bridge replacement could prove to be in-adequate and is more likely to be an allowance to cover for refurbishment only	£1m has set aside for the refurbishment of the bridge only.

3 *Extracts from Cyril Sweett's Over View Report*

3.1 The section below are extracts from the Over View Report which has been prepared by Cyril Sweett, with clarifications as described.

3.2 All references below are according to the Over View Report.

Executive Summary:

1.3 The vast majority of the issues contained in our Query Sheet Nr 1 have been addressed by Bristol Engineering Consultancy either by the incorporation of additional allowances into the Cost Estimate or by justifying why additional allowances have not been incorporated.

No Halcrow Involvement

1.6 We have the following outstanding concerns in respect of the ITS costs:

a) We are not convinced that Ducting and chambers associated with the traffic signalisation have currently been included. Halcrow Group to clarify where this allowance has been incorporated.

Halcrow Group: Cyril Sweett to refer to 5.1a below.

b) Whilst Halcrow Group have indicated that all ITS rates are inclusive of preliminary items (which are anticipated by Halcrow to be negligible) we recommend that unless these works are to be procured directly under separate contracts, a percentage allowance for (albeit minimal) main contractor preliminaries and main Contractors overheads and profit need to be applied to the ITS costs.

Halcrow Group: Cyril Sweett to refer to 5.1c below.

c) There does not appear to be any allowance made in respect of Consultancy Fees associated with the ITS estimated costs.

Halcrow Group: Refer to 5.1f below.

d) There does not appear to be any allowance made in respect of Supervision Fees associated with the ITS estimated costs.

Halcrow Group: Cyril Sweett to refer to 5.1g below.

Ticket Machines

1.7 It appears that the ticket machines have still been double counted in the latest cost spreadsheet. £700K has been included in the ITS costs 'tab' and a further £500K has been included in the Cost Summary.

Halcrow Group: Cyril Sweett to refer to 7.3

Ashton Vale to Bristol City Centre Comments

4.3 We are concerned regarding the overall level of accuracy of the current estimates.

The main areas of concern are:

a) The numerous quantity related adjustments that we have identified as being required to the Ashton Vale to Bristol City Centre scheme – refer to Item 4.5 to 4.48 of this report for details.

Cyril Sweett: This comment has yet to be fully confirmed by Halcrow Group.

Halcrow Group: Refer to the tables above

4.4 No review or comments seem to have been generated from Halcrow on the proposed amendments as detailed in the following sub sections A to J inc of the Aston Vale spreadsheet. Only those items of risk that were identified have been justified or adjusted.

This spreadsheet is a Halcrow produced document and should not be labelled as C Sweett. We produced an amended sheet in order to clearly show the possible errors and suggested what amendments might need to be made, Halcrow need to review and confirm if the amendments are correct as owners of this estimate.

Cyril Sweett: This comment has yet to be fully confirmed by Halcrow Group.

Halcrow Group: The spreadsheet has been amended by the various suppliers of the information and is now believed to incorporate all items.

4.49 Whilst an allowance for traffic management has been included, this only equates to about 6%. In our opinion an allowance for preliminaries, which would include for site welfare, H&S, Traffic management etc should be in the order of 20% (Including OH&P). The City Centre Loop estimate contains an allowance equating to 20%.

Halcrow Group: Much of the works will be built as closed sites and £220,000 in TM costs has been allowed for this. The health and safety is included in the rates under the design and build contract proposed

Cyril Sweett: We are concerned that that this section of works doesn't include enough for preliminaries and Contractors OH&P. We would expect a minimum of 20%.

Halcrow Group: The City Centre design will be constructed on live carriageway where we would expect to have a high cost of TM and preliminaries for both site operative safety as well as the general public. As the Ashton Vale is closed site with little need of TM, the rates include the cost for Contractors Welfare and H&S and an allowance of 20% of the final cost for these items is over rated. We have however allowed a further sum of £160,000.00 for this item which is felt to be more than adequate for the proposed construction method.

5.1 No allowance appears to have been made for the following items:

5.1 a) Ducting and chambers associated with the traffic signalisation.

Halcrow Group: These are included in the main rate items under rogue items

Cyril Sweett: We cannot find an item for rogue items associated with the ITS costs and hence are not convinced that these items have currently been included. Halcrow Group to clarify where this allowance has been incorporated.

Halcrow Group: the overall costs for ITS ducting included an allowance for the traffic signals ducts and chambers. As the layout of this element is not designed until the detailed construction drawings are produced as it requires cable calculations to be determined then the quantity of ducting etc was over measured as this is actually a minor sum. We have now done this calculation and created a specific area for this measurement and adjusted the overall ITS ducting allowance accordingly.

5.1 c) Series 100: Traffic Safety & Management - Health and safety, site welfare facilities, Chapter 8 - temporary traffic management etc. Note: 20% applied to the measured works costs for these items in the City Centre Loop costings.

Halcrow Group: All rates are inclusive of preliminary items, TM will be shared with the main contractors costs and will be negligible given the closed nature of much of the site

Cyril Sweett: Noted but would recommend that unless these works are to be procured directly under separate contracts, a percentage allowance for (albeit minimal) main Contractors preliminaries, overheads and profit should be applied to the ITS costs.

Halcrow Group: the specifics of this depend on the item as follows: The traffic signals rates include for traffic management within them.

All construction for ITS will done by the main contractor the rates current quoted allow for all of the installation costs including supply of equipment, traffic management and fixing for a single item. Costs for the quantities specified in the contract would be below this level especially given the value of the contract. There are no real design costs for these equipment as standard specifications exist. The only design would be confirming the location of the cabinets etc equipment which is covered by the main works items. Taking this into account then the contractors profit element is included.

5.1 f) Consultancy Fees associated with the ITS estimated costs. Note: 20% applied to the measured works and Series 100 costs in the City Centre Loop costings.

Cyril Sweett: This comment has yet to be addressed by Halcrow Group.

Standard specifications exist for these elements which would be included in the design and build specification for ITS items. Further design of the traffic signal element would be included in the general fee costs for the remainder of the project. It is small in nature as the sites are not complex.

5.1 g) Supervision Fees associated with the ITS estimated costs. Note: 5% applied to the measured works and Series 100 costs in the City Centre Loop costings.

Cyril Sweett: This comment has yet to be addressed by Halcrow Group.

The Supervision of the ITS elements are contained in the cost estimate for the back office system, in reality then the other elements whist expensive would be covered by the standard RE staff as there are only 30 pole bases to be erected. It is worth noting that the value of these machines is down to the complex but standard software required to count change and process charge /smart cards. There has been a downwards trend in the costs of this type of system recently due to increased competition in the market and greater interchangeability with machines such as parking machines. As such the costs with this are included within the overall sums.

6.1 We note that there are numerous discrepancies between the rates used in the

pricing of the City Centre Anti Clockwise Loop and the Ashton Vale to City Centre cost exercises. In order to ensure a more consistent level of pricing between the two schemes, we suggest that the following rates are used for both cost exercises.

- **Series 500: Drainage**
- **Series 600: Earthworks**
- **Series 700: Pavements**
- **Series 1200: Traffic Signs, Road Markings, Highway Lining and Signing**
- **Series 1300: Street Lighting and Electrical Works**

Cyril Sweett: The above rate changes were intended to ensure a more consistent level of pricing between the two schemes. The rate changes have yet to be incorporated by either Bristol Engineering Consultancy or Halcrow Group. There is unlikely to be a significant financial effect on either scheme.

Halcrow Group: Agreed. Segregated spreadsheet to be updated accordingly except where noted in the 'Response to Cyril Sweett Cost Overview Report' Technical Note.

Action: Halcrow to amend spreadsheet to suit.

7.3 A lump sum allowance of £80,000 has been included for 'Ticket Machines' but we have no indication as to how it has been calculated. There may be an element of double counting however in that the ITS 'tab' also includes an allowance of £350K for Ticketing machines (complex).

Details provided in cost update. The 80,000 sum has been removed from the cost summary

Cyril Sweett: the double counting still appears in the latest cost spreadsheet in that £700K has been included in the ITS costs and a further £500K has been added into the Cost Summary.

Halcrow Group: Agreed. Tab 'Inputs - ITS' cell D5, there is an amount for £700k for ticket machines which gets carried over to the Cost Summary tab in the final cost of ITS.

Tab 'Inputs - Tkt Machines', there is an amount of £525k for ticket machine of a lower number, which is carried over in the Cost Summary sheet cell F28

The spread sheet has been amended to reflect lower costs for Centre ticket machines that this element reflects.