

WARRINGTON BOROUGH COUNCIL

Western Link

Independent Cost Review

07 December 2017

Appendix X



FAITHFUL
GOULD

Member of the SNC-Lavalin Group



Document Status					
Revision	Date	Status or comment	Prepared by	Checked by	Authorised by
0	07/12/17	Draft for Comment	S Holme	D Duncan	S Baker
1	08/12/17	Issue	S Holme	S Baker	S Baker

Disclaimer

This document and its contents have been prepared and are intended solely for the Client's information and use in relation to Cost Review.

Faithful+Gould assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

Copyright

The copyright of this document is vested in Faithful+Gould. This document may not be reproduced in whole or in part without their express written permission.



Contents

1.0	Executive Summary.....	3
2.0	Introduction	5
3.0	Methodology	6
	Inflation	6
	Statutory Undertakers.....	6
	Land	7
	Fees	7
	Risk.....	7
	Network Rail	8
	Maintenance	8
4.0	Rates.....	9
	Arithmetically Checking	9
	Consistency and Mark-up.....	9
	Lump Sums Allowances	9
	Preliminaries	10
	Extra Over for Route Costs.....	10
	Structures	11
	R01 Cost Plan.....	12
	RO2 Route.....	14
	RO3 Route.....	15
	RO4 Route.....	16
	RO5 Route.....	17
5.0	Summary.....	19
6.0	Appendices	20
	Schedule of Information.....	23



1.0 Executive Summary

- 1.1 Faithful+Gould (F+G) have been commissioned by Warrington Borough Council (WBC) to undertake an independent commercial review of costs for the proposed Western Link redevelopment in Warrington. The purpose of the Western Link will be to reduce congestion levels within the town centre, caused by the location and pinch point from the River Mersey, Manchester Ship Canal and the West Coast Mainline, which constricts traffic flows. The link way will also provide access to undeveloped land to support future development of Warrington.
- 1.2 The scheme comprises of the single carriageway road from A56 Chester Road to A57 Sankey Way, with the construction of new bridges, repairs and enhancements to existing structures and new traffic signals and roundabout.
- 1.3 The scheme will be delivered under the Scape Infrastructure framework. Balfour Beatty (BB) have been appointed to carry out the works and have compiled a feasibility budget cost plan using m, m2 and m3 unit rates and lump sums allowances. From the information supplied, we would describe this cost plan as “Class 2 Budget Control” and have conducted our review on this basis.
- 1.4 During our review, we identified areas which may require further clarification and have made several recommendations, however from the information supplied we have not found any major irregularities within the estimated costs that would give us cause for concern. We have detailed the areas of divergence within the main text of this report, however prominent points of review have been included below:
- 1.5 Due to programme duration of this work, inflation has been accounted for and included within the scheme costs. BB have calculated the rate of inflation by using the BCIS Civil Engineering indices. The yearly percentage has been added at 5.4% which is an average of the inflation cost from years 2018 to 2022. We have assessed the inflation against BCIS TPI Indices and Civil Engineering Indices for comparison which produced differing figures to the percentages calculated by BB. Although the figures are different, the difference is likely to be due to the indices being calculated daily which make the indices continually changing. Although there is a variance in the percentage inflations, we do not consider at this stage that the 5.4% uplift is excessive and recommend inflation is re-calculated as changes occur to the design.
- 1.6 Utilities cost have been estimated and assessed by BB. At this stage of the process it is common practice to use lump sum allowances and it is likely that as the design progresses and information is sought from the Statutory Authorities that these allowances will be developed in greater detail. However, at this stage of estimating we consider the allowances to be reasonable.
- 1.7 There are a number of lump sum allowances which have been included in the cost plan, at this stage of design it is not unusual for allowances to be estimated for items which cannot be defined and there are too many unknowns. We have assessed these costs on an individual basis and sought additional information when required. It is our view that the costs included are acceptable, however we would expect and recommend that these allowances are quantified as design develops.
- 1.8 The route proposal, involves the alterations and enhancements which are required to be made to some of the Network Rail structures. We know from the documentation that these structures have been discussed with Network Rail and costs have been established and allocated to each of the bridges affected. Administration and supervisory costs have also been included for internal rail staff liaison and within the “on site” staff costs. A further rail cost has been estimated for the signalling and OLE works at Walton Bridge. We consider the Network Rail costs to be adequate and recommend that these costs are revisited as design of the bridges and possession times are advanced.



- 1.9 We have compared the rates included in the route section and found the majority of rates to be within the expected cost range when compared to data. There were a few rates which fall outside of the price range, such as the cost of the attenuation tanks which we believe is low when compared to data, however the low cost may be due to how BB have priced the attenuation tank with aspects of the construction such as excavation of the tank being included elsewhere in the cost plan and not within the tank rate. We have made comment on the rates in section 4 of this report.
- 1.10 We have checked rates for uniformity across each of the five route sections and found the vast majority of rates to be consistent. There are some items however where the rate has increased depending on the route section. The increases, are due to the mark-up percentage applied to some of the items increasing from a standard 100% to 125%/200% mark-up. There may be reasons for these increases in mark-up percentages and recommend these items are discussed with BB. As stated in the paragraph above we have commented on these individual rate increases within Section 4.
- 1.11 With regards to comparing the structures costs, BB have estimated the costs of their structures using rates for various sized abutments and various deck structures. These rates have been collated and formed the cost of the structure. In comparison to data, rates for bridges and other structures are generally given as approximate quantities based on m or m2 rates. Therefore, we have compared the structures total costs against approximate m2 rates using the areas as stated by BB and have tabled the results in Part 4 of this report.
- 1.12 Within route R05, an additional figure of £500,000 has been included in Series 2700 Accommodation Works and Stats. This figure has been included in the rate section, however it does not have an item description or has it been included within the section total. We have assumed that the figure is a typing error, however we would recommend this figure is discussed with BB to confirm it is an error.
- 1.13 In summary, we believe the construction costs for this scheme are robust and given the estimating tolerance are reasonable. There were areas in the report, where we consider the some costs to be at the lower end of our cost data and have included a table in Section 5 showing our estimated cost recommendations. However, this does not mean that we consider the figures in the cost plan to be low, as our estimate costs are within the tolerances set for this stage of estimating.



2.0 Introduction

- 2.1 Faithful+Gould (F+G) have been appointed by Warrington Borough Council (WBC) to compile an independent cost review on a feasibility budget for Western Link, this scheme incorporates the A56 Chester Road and A57 Sankey Road and consists of structures and signals as listed below:
- Traffic Signal Controlled Junction on Chester Road
 - High level Structure Crossing the Manchester Ship Canal
 - Replacement of the existing masonry arch/precast structure on Chester/Helsby Railway over Eastford Road
 - Roundabout Junction on Arpley Meadows to facilitate future development.
 - A new structure crossing the River Mersey and the existing Forrest Way Structure (maintained for local access).
 - New Structures to UU Access Road, Barnard Street, Fiddlers Ferry Freight Railway, Liverpool Road and St Helens Canal.
 - A new traffic signal junction on the A57 at the existing Cromwell Avenue Junction including a single carriageway flyover for East/West traffic.
- 2.2 We have based our review on information contained in the Western Link Appendix K Scheme Cost Report issued for Stage 2b, which includes the preferred “red” route scheme and consisted of an activity schedule, drawings, programme and services diversions. A full breakdown of the information utilised during our review can be found in Appendix A.
- 2.3 The scheme will be delivered through Scape under an infrastructure framework with Balfour Beatty (BB) appointed to deliver the works. The estimate cost plan has been created by BB, and is described as a feasibility budget and consisting of m, m2 and m3 unit rates and lump sum allowances. The Summary cost plan, also incorporates construction “additional costs” including inflation, fees, maintenance and Utilities as well as construction costs.
- 2.4 We have separated our review into two areas. The first area of review will focus on the commercial methodology used to compile the estimates which is covered in section 3 of this report and the second area of review focuses on the construction cost plan estimates which we have reviewed on a highways series basis, the findings of which are included in Section 4 of the report.



3.0 Methodology

- 3.1 During the course of our review, we have examined specific project costs which are additions to the construction value and make up the total scheme costs. These costs include items such as inflation, Utilities, fees and QRA.

Inflation

- 3.2 It is common practice to include a percentage uplift to cover the increase in price of plant, labour and material costs which can be applied to a project over the duration of the works. Inflation is usually calculated from the base date of the estimate (date the estimate was generated) to the mid-point of the expected construction duration.
- 3.3 For the Western Link scheme, the inflation has been calculated using the Building Cost Information Service (BCIS) General Civil Engineering indices. BB have calculated the average rate of inflation at 5.4%, based on the following percentages as taken from the indices published 3Q 2017:

Inflation Table			
Year	BB (BCIS Civil) Indices 3Q 2017	F+G (BCIS TPI) Indices 4Q 2017	F+G (BCIS Civil) Indices 4Q 2017
2018	3.0%	4.4%	2.9%
2019	3.4%	0.64%	2.8%
2020	5.2%	4.1%	3.0%
2021	6.1%	4.6%	3.6%
2022	5.3%	5.9%	4.3%

- 3.4 We are unsure of how BB calculated the average percent over the years 2018 to 2022 at 5.4% but this figure has been included in the years 2018 to 2023 and applied to the maintenance figures. From our calculation of the Indices as taken from BCIS in 4Q 2017, the figures above show a difference, this difference is due to the day on which the inflation is calculated as the indices are constantly updated. These updates move the index figures thus changing the indices percentage.
- 3.5 There are numerous published indices available covering both Building and Civil Engineering construction. It is important that the appropriate indices are selected that is suitable for this project type including road construction and civil engineering. For a lengthy construction period, we also need to look at an index which can present future forecasting not just the present day. For this scheme, we consider BCIS General Civil Engineering indices as acceptable to use.

Statutory Undertakers

- 3.6 As part of our review we have assessed the Utilities costs of Western Link. These costs have been estimated by BB and no C3 costs have been determined, due to the current design level. The allowances seem adequate, given the nature of the project and design stage, however we would recommend liaison with the Utilities providers as the project progresses to the next stage.



Land

- 3.7 We understand from the Appendix K Scheme Cost Report that the land costs have been prepared by Axis and is based on obtaining both permanent and temporary land for the scheme. We understand that the costs include for land taken, injurious affection /severance, disturbance, professional fees and statutory loss.
- 3.8 Land acquisition costs are hard to determine and require specialist knowledge from experts to assess the value of the land, relocation costs (if applicable) and compensation due to missed opportunities to the seller. With all land acquisitions, the value figure is changeable due to the fact that the purchase price calculated may be different from what the seller believes the land to be worth. This could lead to the start of a prolonged negotiation to derive a cost which satisfies both parties.
- 3.9 Due to the specialist knowledge required, we have only reviewed the cost on a transferrable basis to the summary, we reviewed document Stage 2 Cost Allocation v5 "Red Route," the land costs had been correctly transferred to the cost plan.

Fees

- 3.10 The total cost allocated to the fees is approximately £9,838,000, this cost has been calculated based on the weekly "on site" staff cost times against a programme duration of 154 weeks. If we compared the costs as a percentage against cost data, it equates to 4% of the construction total in comparison to cost data we would expect the "on site" staff cost to be within the range of 5% to 8% mark and consider the cost to be low in comparison.
- 3.11 On review of the weekly "on site" staff cost, BB have separated the fee amount into work teams including a core team made up of a Buyer, Planner, D&B Co-ordinator and Senior Project Manager. BB have then allocated a Road team and three Structures teams, with each team made up of Project Manager, Quantity Surveyor, Engineers, Site Agents, Sub Agents and General Foreman. We consider the staff allocation to be reasonable and have checked the staff allocations against the submitted programme. There are a number of structures which are due to run concurrently which would require the utilisation of three structures team, however we would expect the requirement for the three structures teams to reduce as the works to some of the structures starts to complete quicker than other programmed structure works. However, at this stage of estimating the allocation of three teams, is acceptable.
- 3.12 When reviewing the individual staff rates, we deem them to be acceptable and within the expected range. The Project Manager cost is at the higher end of the data, however due to the nature of the works and rail involvement we do not consider the cost to be excessive.
- 3.13 A design costs fee has also been included on the summary costs page in the sum of £9,263,000, which when converted as a percentage allocation against the construction cost, it equates to 3.6% of the overall percentage total, for the scope of work and structural design we consider this percentage allocation to be reasonable.

Risk

- 3.14 A QRA has been developed for the scheme and reviewed at various stage throughout the design, commencing from Stage 1. We know from the Risk document and from WBC, that BB have been involved and present at the risk workshops/meetings.
- 3.15 As a norm, risks are generally made up of both Client and Contractor risks and are generally allocated to an owner, who will take responsibility for the risk. With this QRA document the risks allocated to the scheme have not been allocated an owner of the risk, this is likely to do with the stage of design and it is probably too early to associate the owner with the risk. The risks listed



in the document have be categorised and colour coded in red, orange, yellow and green depending on the severity of the risk, this is likely to be done during discussions, with all parties contributing. Monies have been allocated to each of the risks, this has been calculated based on a least likely/most likely basis calculated against a probability percentage of the risk occurring to provide a total risk cost for that risk.

- 3.16 From the calculations, we do not see any costs attributed to the scheme which would give us cause for concern. On a scheme allocation, the risk cost amount to 11% of the overall total cost and when checked against similar scheme we would expect the risk allocation to be approximately between the range of 10% to 15% of the total cost. Risks are project specific and it is difficult to comment on the individual risks probabilities, as we are not party to the scheme's design and lack detailed project knowledge, we have reviewed the risks and monetary allocations and we do not see any unnecessary items and consider the content to be justifiable
- 3.17 As with all risks we would recommend the continuation of risk workshops throughout the design and construction process to capture all risks which will affect the scheme, this will provide WBC with confidence that all costs are captured.

Network Rail

- 3.18 The route plan will disturb some Network Rail structures and therefore costs requirements for these works needs to be assessed. We know from documentation that liaison has taken place with Network Rail to discuss the bridges, work and possessions which are required due to the works to the tracks and signals. From review, these works have been allocated monies, with a cost of £882,642 allocated to cover possessions, administration and supervisory costs. These costs have been developed with Network Rail and we consider the costs to be reasonable based on the information we have reviewed. We also note from the cost plan that site administration and supervision has been included within the weekly "on site" staff costs. Within the structures section, a cost of £900,000 has been included for the track and signal works to Walton Viaduct. We consider based on the above that the costs included are reasonable and adequate for the works, but recommend further liaison with Network Rail as the scheme progresses.

Maintenance

- 3.19 Maintenance costs have been calculated on a 65 years maintenance period this included items such as planing and resurfacing of carriageway, road sweeping, structure inspections, street lighting and fencing. The fact that this exercise has been done will firm the costs and provide WBC with confidence in their cost expenditure for future years. The rates have been built up from cost information and estimation of the duration of the maintenance activities, inflation has been added and a discount factor has been applied for NPV. Maintenance is always an estimating process as it is impossible to determined when the road may need to be resurfaced or outfalls cleaned, however the fact that some monies have been allocated to this process will provide some cost contingency to future maintenance.



4.0 Rates

- 4.1 As part of our scope of service we have been requested to review the BB Cost Plan, for competitiveness and robustness. As previously stated we have reviewed the Western Link Appendix K Scheme Cost Report issued for Stage 2b – Activity Schedule.
- 4.2 Based on guideline criteria we would categorise the estimate as “Class 2” (Budget/Control). The principles of this includes, a 70% project definition and the format of the estimate which includes defined construction quantities. Under the guideline for a Class 2 this allows an estimating accuracy range of between -15% to +15%.
- 4.3 The cost plan has been formatted to give scope of work items which have been priced against unit, quantity and rate, with the inclusion of lump sum items when needed, due to the level of design information. During the course of our review we have not measured the unit quantities and have assumed all quantities to be correct.
- 4.4 We note from the report, that BB have derived their rates costs from Sub-contractor orders and quotations, historical information and rates built from first principles (plant, labour, material) and that the spreadsheet cost data was last updated in 1Q 2017. For this review, we have assessed the rates on the same base date for comparison.

Arithmetically Checking

- 4.5 We have arithmetically checked the cost estimate and found no inaccuracies, during this process we have also checked the transferral of construction totals to the main summary pages and found no errors.
- 4.6 In route section R05 and in highway series 2700 Accommodation Works and Stats a figure has been included in the sum of £500,000, this figure does not have an item description and from calculations we do not believe this sum has been included in the total. We have assumed that the figure is an error, however recommend that WBC confirm the figure with BB.

Consistency and Mark-up

- 4.7 During the review, we have checked the rates for consistency and found most rates to be unchanging. There are a few incidences where item rates have increased in cost, from route section to route section. An example of this being, the 3-way traffic signals which is costed at £35,250 on all routes except in R01 route when the cost has increased to £70,500. This increase is due to the “mark-up” percentage allocated to all items at a standard 100%, however for some items of work this “mark-up” percentage has increase to 125% and 200%. We believe this increase maybe allocated to cover location factors or construction methodology which may increase cost in that particular section of route and we recommend that the mark-up increases are discussed with BB. We have commented on these items in the individual route sections.

Lump Sums Allowances

- 4.8 Due to the estimating stage and level of design information, there are a number of Provisional Sums/Lump Sums which have been included within the estimate. At this stage of design, it is not uncommon to have areas of work which cannot be priced due to insufficient detail in design or unknown specification. There are some scope items which may only become apparent when on site, such as possible abnormalities in the ground which would have a bearing on construction methodology and therefore would remain as Provisional Sums throughout the estimating period.



These sums are generally re-measured and corrected during the construction phase and when information is detailed enough to provide accurate cost data.

- 4.9 There are a number of highways Lump Sums included in the schemes, which amounts to 6% of the highways total cost and we have reviewed the sums on an individual item basis. It is our considered view that the sums included are reasonable, based on the information and design stage. We are aware that we have limited knowledge of the scheme in terms of site constraints and design meetings and have taken this into account during our review. As with all Provisional Sums it is important to review these items as the design develops and to amend the sums as necessary and we recommend continual review.

Preliminaries

- 4.10 Preliminaries are usually derived from a list of items required by the Contractor to enable delivery of the works and include items such as accommodation, welfare and staff costs. They are difficult to assess and each Contractor or Quantity Surveyor will each price them differently, as they are project specific. Thought needs to be given to the location, scope and methodology of construction work to be undertaken and site constraints.
- 4.11 For Western Link, due to the Scape agreement these costs are added to the construction cost as on-cost percentages agreed as 9% working area overhead and 2.5% direct fee applied to the Construction costs. A further 0.5% uplift has also been added for the use of the Scape framework, this is an administration cost.
- 4.12 Although the fees above have been applied to the highway and structures costs, BB have also included within the individual route section site specific preliminaries items such as penetrating radar surveys and traffic management. BB have also included within this section for temporary works, including costs for access points and temporary roads.

Extra Over for Route Costs

- 4.13 Within the Section Route Summary, costs have been included for Extra Over for Route Costs items this included costs for Special Preliminaries for Attendant Gang, traffic signs and road marking. As the description states, these are an extra over cost and at this stage we consider the cost to be a "contingency figure."
- 4.14 A cost has been included in the sum of £770,000 for attendant gang, we have assumed the item relates to site labour attendance during construction. Usually we would expect this cost to be included within the construction rates, however due to the nature of the works there is likely to be a requirement for night working or weekend working which would incur a charge for out of office working. We consider this cost to be reasonable, due to the location and restrictive working pattern associated with this construction.
- 4.15 Further cost has been included for traffic signs in the sum of £229,387 and Road Marking in the sum of £4,500, it is unlikely at this stage of design that the extent of traffic signage and road marking are known, as these items are dependent on a fixed route design. We believe that the cost attributed to these items are acceptable at this design stage.



Structures

- 4.16 From our review, the structures have been estimated based on cost data from previous schemes and the cost has been built up based on various sized abutment costs and decking. Due to the comparison of cost data, we have compared the costs against approximate bridge costs which we have included in the table below, using the bridge areas as a basis of calculation.

Bridge Structure Costs						
Bridges	Area	BB m2 Cost	BB Total	F+G m2 Cost	F+G Total	Total Difference
MSC Viaduct	7251	£2,192.66	£15,898,969	£2,5000	£21,753,000	−£5,854,031
Walton Viaduct	132	£21,098.73	£2,785,032	£20,0000	£2,640,000	+£145,032
WCML Viaduct			£118,443			
Forrest Way Bridge	2715	£2,384.76	£6,476,424	£2.500	£6,787,500	−£311,076
East Garston Rail Viaduct	416	£1,775.33	£738,822	£3,000	£1,456,000	−£717,178
West Garston Rail Viaduct	658	£2,378.84	£1,565,038	£3,000	£1,974,000	−£408,962
St Helens Canal Bridge	216	£2,368.53	£558,074	£3,000	£648,000	−£89,926
Cromwell Avenue Grade Separated	560	£3,133.83	£1,754,947	£3,000	£1,680,000	+£74,947

- 4.17 The costs of the bridge structures have been derived from variously sized bridge abutments and various sized deck costs, added to form the bridge construction cost. Based on this method of pricing it is difficult to compare the costs as cost data is not based on abutment sizing. Due to this we have compared the cost of the bridges against approximate and generic bridge rates, as shown in the above table. With the use of the generic rate, although this will include for all aspects of construction of the bridge, it will not be bridge specific and will not take into account the individual specifications of the bridge and this is possibly the reason for the different in the cost comparison. This difference does not necessary make BB bridge cost above or below the norm and we consider the bridge costs submitted by BB to be robust based on information and design stage. As design develops the structures will be reviewed and pricing altered in line with future design, however for this current stage we believe the cost attributed to the structures to be adequate.



- 4.18 Five of the structures require earthwork support, BB have estimated this on a unit rate basis and data shows how some of the rates have been established. From our review of the individual rate information we consider the rates to be at the lower side of the expected range. However, the build-up of the rate is comprehensive.

R01 Cost Plan

- 4.19 The construction cost of the route has been estimated at £16,622,855 with 8 % of the total being made up of lump sum items. This route section have been arithmetically checked and the majority of rates are consistent with other routes sections.
- 4.20 We have appraised the monies allocated to the lump sum costs and we estimate the sums to be reasonable for this stage of design, based on the information. A cost has been included for Traffic Management in the sum of £150,000 based on the scope of work for this route and the location we consider this cost to be reasonable. There are a number of buildings which are due to be demolished including, an Industrial unit on Solvay, 3 semi-detached houses on Baronet Road, Garages and Chester Rail Bridge on Eastford Road. The allowances appear to be reasonable, however we recommend that WBC confirm if the cost includes for the capping off, of services, grubbing up of foundations and making good levels following demolition. We also recommend an asbestos survey is carried out prior to demolition as the discovery of asbestos will delay the process and further costs will be included. Due to ground conditions and location of the works BB have included for water siltation Management and vacuum excavation, the allowances appear reasonable.
- 4.21 The rates included in Series 200 Site Clearance seems to be reasonable and within expected norms.
- 4.22 In Series 300 Fencing, we believe the rates included to be acceptable and within the expected cost range.
- 4.23 With regards to the Series 400 Vehicle Restraint System (VRS), the rates are within the expected norms.
- 4.24 On first review, we would deem the rates attached to the carrier drains to be at the high end of our cost data, however given the nature of the works, we believe that the costs are high due to the site constraints and construction methodology. The rates associated with drainage connections appear to be reasonable, however the rate allocated to the petrol interceptor appears to fall at the higher end of our cost data. On review of the attenuation tanks the rate of £230/m³ appears to be low in comparison to data, however the reason for the low cost may be that some of the construction features such as excavation are included elsewhere in the cost plan and not in the attenuation rate. The manhole/catchpit costs were at the high range of the cost data, however, due to the ground conditions surrounding the route, additional support may be required to the installation. Due to the location and scope of works for this section of route a cost has been included for a pumping station, this cost has been based on a previous scheme and from review we consider this cost to be reasonable.
- 4.25 BB have included within the estimate for disposal of contaminated material, at a cost of £251.80 /m³ this rate has been priced based on local guidance of disposal sites. We deem this rate to be acceptable for this design stage, this may change as further surveys are sought and makeup of the ground is known, therefore we would recommend further review at the next stage.
- 4.26 When reviewing section 700, we consider the rates of the surfacing to be expensive, however we note that this work has been priced as night work, which may be the reason for the higher cost.
- 4.27 In section 1100, the construction of the kerbs appears to be at the high end of the cost data, we are unsure of specification which may be a factor, with a particular kerb stone to be used to match



- council landscaping branding. The tarmac footway is at the low end of the expected cost range in comparison to data, a reason for this may be with regards to the quantity of material which will have an effect on unit cost.
- 4.28 With regards to Series 1200 Traffic Sign and Signals, we believe when comparing the rates against cost data that the estimated costs are within the expected norm. The item relating to the three-way junction has been priced at £70,500 for this route section, however in other route sections the cost for the same item is half the cost and priced at £35,250. We have assumed the cost difference related to the size of junction, we recommend this is checked with BB.
- 4.29 Road Marking in section 1200, has been priced as a day rate, we are unsure what the operative and plant requirements are for this rate or how much output can be gauged from this day rate. Therefore, we have considered the cost as a allowance and consider at this stage of estimating the cost is reasonable.
- 4.30 We consider the cost allocated to Series 1300 Street Lighting and Series 1400 Electrical works to Road Lighting and Traffic Signs, are within the expected pricing norms and consider the costs to be robust.
- 4.31 The costs in Series 2700 Accommodation Works and Stats relate to the relocation of a play area, football pitch and noise attenuation measures to houses. Based on the level of information and estimating stage we consider these costs to be reasonable. A cost has been included for works to access steps to the river in the sum of £250,000, this cost appears to be on the high end of the costs data, however we believe from documents that the stairs are to be relocated from one bridge span to another and have assumed the allowance includes for making good bridge and foundations/slab and additional support for the bridge and therefore deem the allowance to be robust.
- 4.32 We consider the cost of the landscaping works to be robust and the rates applied to be within the expected ranging.
- 4.33 There are three structures associated with this route including:
- Manchester Ship Canal Viaduct
- 4.34 The Manchester ship canal has an overall bridge length of 440m with a vertical clearance of 24m above average water height level. Due to the height of this structure it requires a long lead in approach with a rise gradient of 6%, the bridge also requires tall piers supported on deep foundations. The bridge has been designed with 7 spans of between 50-70m and is to be constructed of steel composite with a reinforced concrete deck and have an area of 7251m². The costs have been derived from the 8 large abutments, 2 tidal abutments and concrete /steel deck and has a cost of £15,898,969. F+G estimated cost of the structure has been calculated as £21,753,000. There is a £6 million difference between F+G estimated cost and BB cost, as said previously the difference will be in the method of pricing.
- Walton Viaduct
- 4.35 Walton Viaduct is an existing structure built in 1830 and constructed with twelve masonry and stone arches and carries two track lines which are electrified. The works consist of the replacement of three spans, namely Span 5, Span 6 and Span 7 and the work consist of a condition survey of the track to confirm OLE, LV and signals, comms and control cables to confirm position, Span 4 opened up for inspection and then refilled with engineering back fill. During the works, temporary support will be given to the track, cables and services and de-wiring of the OLE system. During the works, work will be done to enhance waterproofing and drainage of the structure. Span 5 to 7 of the bridge will be constructed and the track will be re-fixed and cables, services etc will be reconnected. The overall cost of this work is £2,758,032, this included a cost of £900,000 for Network Rail switch and crossing signal works. F+G estimate is approximately



£2,650,000, our estimate is slightly below BB costs, we consider the difference is due to estimating methods, but do not consider BB cost to be excessive.

WCML Viaduct

- 4.36 The viaduct is existing and requires remedial works including the repointing of arches, removal of vegetation and resin pointing to cracks. The cost of this work has been estimated at £118,443, this cost also includes for Network Rail safety management and monitoring. We consider the cost of these works to be reasonable based on information and we would recommend that these costs are revisited as design develops.

Additional Structures Cost Estimate

- 4.37 An additional estimating cost of £3,066,122.07 has been included in this route section, the works account for the establishment of piling rig, bored piles monitoring and insitu concrete and waterproofing. We have reviewed these items which have been individual rated and found the rates to be acceptable. BB rates have been derived from previous experience as allowances; and at this stage of estimating we consider the rates to be reasonable.

RO2 Route

- 4.38 The construction cost of the route has been estimated at £6,428,385.86 with 3% of the total being made up of provisional sum items. This section of route have been arithmetically checked and found to be correct, and rates are consistent with other route rates.
- 4.39 A cost has been allocated in Specific prelims for the construction of a slab over EP and HP gas mains in the sum of £150,000, this has been estimated on a nominal concrete protection slab, the cost of working around the high-risk pipelines, with restricted methods of working and time allocation, it is also expected that supervision will be required by the pipeline, based on this information we consider the cost to be robust.
- 4.40 On review of the Site Clearance costs, we consider the costs for this Series to be reasonable. Within this section under Site Specific Items, an item has been included for the demolition of tanks in the sum of £35,000, as an allowance we consider this cost to be reasonable. A further cost for the removal of contaminated material surrounding the tanks has been included at a rate of £350.00, we believe given the nature of the contamination, that this rate is reasonable.
- 4.41 We consider the rates contained in Series 300 Fencing are reasonable.
- 4.42 As stated in R01, rates regarding the carrier drains, does appear on the higher range of our cost data, however we consider the high rate to be reasonable based on the nature of the works. Costs with regards to manholes and catch pits again are on the higher range of the cost data, but given the working environment we consider the rate to be reasonable.
- 4.43 Section 600 Earthworks accounted for up to 40% of the construction total for this section of route, the rates when checked individually where within the expected cost data when compared and had been derived from sub-contractor quotations with added prelims. We consider the cost for this section to be reasonable.
- 4.44 We consider the rates included in Series 700 to be reasonable and within the expected norms.
- 4.45 From review of the rates included in Series 1100 we consider the cost of the kerbs to be high in comparison to our data, we do not know the specification type which may be a reason why the kerbs rates are high. The footway rate to be at the low end of the cost data, as stated previously a reason for this maybe to do with quantity of material which will have an effect on the unit cost.



- 4.46 We consider the rates included in Series 1200 Traffic signs to be reasonable. A day rate has been included for road marking, we have review this item as a lump sum and consider for this section of route to be adequate.
- 4.47 With regards to Series 1300 Road Lighting and Series 1400 Electric Works for Road Lighting and Traffic Signs, we consider the rates allocated to the items to be adequate and within the expected norms.
- 4.48 Series 2700 Accommodation Work and Stats included a items called the “Trans Pennine Trail” footpath at a rate of £35.00, we are unsure of the specification of the footpath or whether the works are to enhance the existing footpath or to renew the footpath. We have therefore not commented on these works.
- 4.49 We consider rates included in Series 3000 Landscaping and Ecology to be reasonable and within expected norms.
- 4.50 There are no Structures associated with this section of route.

RO3 Route

- 4.51 The construction cost of the route has been estimated at £1,252,299.34 with 9% of the total being made up of provisional sum items. This route section rates have been arithmetically checked and found to be correct, and rates are consistent with other routes.
- 4.52 From review of the items included in Series 1 Site Specific Preliminaries, we believe the rate costs to be reasonable.
- 4.53 From our review of Series 200 Site Clearance and Series 300 Fencing, for both series we consider the rate costs to be adequate.
- 4.54 With regards to Series 400 VRS, we deem the rates to be adequate and within expected norms.
- 4.55 On review of Series 500 Drainage, the carrier drain rates are high, however due to the nature of the carriageway works, we believe the cost to be reasonable. The costs of the manhole and catchpits are on the higher end of the cost data, however given the nature of the works and the subcontractors quoted rate, we deem them to be acceptable. From cost date we consider the rate allocated to the Headwall pipe is reasonable.
- 4.56 With regards to Series 600 Earthworks, we believe the rate of the Capping Layer at £47.30 is acceptable.
- 4.57 We consider rates included in Series 700 are acceptable and fall within expected norms.
- 4.58 When we review Series 1100, as with previous route sections, we consider the cost of the kerbs to be high, however we are unsure of kerb specification, however believe the cost to be reasonable at estimating stage. We also consider the cost of the footpath to be low in comparison with data, the reason for this maybe to do with quantity of material.
- 4.59 With regards to Series 1200 Traffic Sign and Traffic Signals, we consider the rate cost to be reasonable. One of the item for a signal three-way junction is rated at £35,250. For the same item on route section R01 the Item has a rate of £70,500, which is double the cost of this item. We have assumed the cost difference related to the size of junction, we would recommend further review as design progresses. Road marking have been rated as a day rate we have compared the cost as a lump sum item and consider the cost to be adequate.
- 4.60 We consider the rates included in Series 1300 Street Lighting and Series 1400 Electric Works for Road Lighting and Traffic Signs to be reasonable and within expected norms.



- 4.61 We consider the costs included in Series 3000 Landscaping and Ecology to be reasonable.

Forrest Way Bridge

- 4.62 Currently there is an existing bridge, however we believe there is an option to replace this bridge, the bridge will carry two lane traffic and will be approximately 7.3m in width with a 1.85m footpath either side and 172.5m in length. The bridge will be steel composite structure with two main trapezoidal steel box sections with reinforced deck. Pier and abutments will be constructed in the existing some structure. The works have been priced as two large abutments, two tidal abutments and concrete/steel deck in the sum of £6,476,42. F+G estimated cost of the structure has been calculated at £6,787,500, with a difference of £311,076 between BB costs and F+G costs.

RO4 Route

- 4.63 The construction cost of the route has been estimated at £9,689,519.36 with 4% of the total being made up of provisional sum items. This route section have been arithmetically checked and found to be correct, and rates are consistent with other route sections.
- 4.64 From review of the items included in Series 1 Site Specific Preliminaries, we believe the rate costs to be reasonable. The ground penetrating radar allowance has increased from £10,000 to £40,000 have assumed that the increase is based on the number of locations required for this route and recommend this cost is reviewed with BB.
- 4.65 On review of the Site Clearance costs, we consider the rates for this Series to be reasonable. However, under the Site-Specific Items, the items have been included as Barnard Street in the sum of £30,000, Liverpool Road in the sum of £80,000, Paul Hart Cars in the sum of £15,000 and Sankey Valley Park in the sum of £15,000, these costs relate to the demolition of Industrial unit and yard on Barnard Street, demolition of a pub on Liverpool Road, demolition of a garage on Liverpool Road (Paul Hart Cars) and removal of BMX track in Sankey Valley Park. We consider the lump sum allowance to be adequate.
- 4.66 We consider the rates included in Series 300 Fencing and Series 400 VRS to be adequate and within the expected norms.
- 4.67 As stated in pervious sections above on review of Series 500 Drainage, we consider the carrier drain rates too be high in comparison to data, given the nature of the carriageway works, and the site constraint of this work we believe the rates included are reasonable. The rates allocated to the manhole/catchpits item are also high, however as with the carrier drains given the nature of the works and the subcontractors quoted rate, we deem them to be acceptable.
- 4.68 With regards to Series 600 Earthworks, the cost for this series, accounts for approximately 63% of the construction costs. On review of the individual item rates, the rates allocated are reasonable. The rates associated with the Pencil grouting are within the expected norms and have been priced from subcontractor rates plus prelims and are consider reasonable.
- 4.69 We consider the cost included in Series 700 Paving to be acceptable, as with previous routes, some of the works have been rated to be carried out at night, we consider these rates to be reasonable.
- 4.70 As stated previously we believe that the rates associated with kerbs in Series 1100 Kerbs, Footways and Paved Areas are high in comparison to cost data, however at estimating we consider the rates to be reasonable. We consider the rate allocated to the footway to be low in comparison to data, however as stated above this may be due to quantity savings.
- 4.71 We consider the rates included in Series 1200 Traffic Signs and Traffic Signals to be reasonable. The road markings cost has been included as a day rate, for review we have deemed this cost to be a lump sum and consider this sum to be adequate.



- 4.72 We consider the rates included in Series Street Lighting and Series 1400 Electrical Works for Road and Lighting to be reasonable.
- 4.73 With regards to Series 2700 Accommodation Works and Stats, two items have been included in this Series, Sankey Valley cycle track in the sum of £100,000 and Reptile Translocation Area in the sum of £100,000, at this stage it is unlikely that these items are defined and lump sums have been allocated, we consider the cost to be acceptable for this stage.
- 4.74 On review of Series 3000 Landscaping and Ecology, the rates included appear to be reasonable. For the item "combined Species Tunnel the rate included has increased to a cost £19,443. In other sections of route, the cost for this item is £15,555. We are unsure of the reason for the make-up increase in rate and recommend WBC confirm the rate with BB.
- 4.75 There are six main structures on this stretch of the route they are as follows:

Garston Rail Viaduct

- 4.76 There are five structures that form Garston Rail Viaduct, the east side bridges are Bernard Street and UU Access, the west side is made up of bridges Sankey Brook, Ditton Goods Line and Old Liverpool Road. All bridges are designed to be constructed as pre-stressed concrete beams with piled foundations, with small abutments and watercourse abutments to Sankey Brook. All bridges have been estimated lower than the generic F+G bridge cost, as said previously we believe this may be due to individual specifications of the bridge and groundwork conditions which would be known to the Contractor and can therefore be priced with more accuracy specific to the bridge structures.

St Helens Canal Bridge

- 4.77 St Helens Bridge is designed to be constructed with Pre-Stressed Concrete beams with pile foundations, the bridge is made up of watercourse abutments and has a deck area of 235m². BB have estimated this bridges construction at £558,074 which is lower than F+G estimate cost of £648,000 by approximately 16%. The reason for the reduction we believe is due to Contractor knowledge and the generic cost rating and are not unduly concerned with the difference, however we believe that as the design develops these structures cost will be firmed up as design detail is reviewed.

RO5 Route

- 4.78 The construction cost of the route has been estimated at £9,383,081 with 9% of the total being made up of provisional sum items. This route cost has been arithmetically checked and found to be correct.
- 4.79 From review of the Site-Specific Preliminaries the Ground Penetration Radar has doubled from £10,000 to £20,000. A reason for this may be due to extent area of survey, we recommend that WBC confirm this allowance. A cost has been included for Traffic Management in the sum of £150,000 based on location we consider this cost to be reasonable. There are a number of temporary works associated with this section of route and Water Siltation Management is required in this location, we believe based on the information that these allowances are reasonable at this estimating stage.
- 4.80 We consider the costs included in Series 200 Site Clearance are reasonable. Under this section a cost has also been included for the demolition of a footbridge in the sum of £250,000 we consider based on estimating that this cost is reasonable, however we recommend further review as the design progresses.



- 4.81 On review of Series 300 Fencing there are two items relating to the same description, but have been priced differently, with the mark up percentage increasing from 100% to 200%, the mark up percentage maybe to do with site constraints, we recommend that WBC review this item with BB.
- 4.82 We consider the rates included in Series 400 VRS to be reasonable.
- 4.83 As with pervious route sections, we consider the carrier drain rates in Series 500 Drainage are to be high in comparison to data, given the nature of the carriageway works, and the site constraint of this work we believe the rates included are reasonable. The rates allocated to the manhole/catchpits item are also high, however as with the carrier drains given the nature of the works and the subcontractors quoted rate, we deem them to be acceptable.
- 4.84 With regards to Series 600 Earthworks, we consider the earthworks rates to be acceptable for this stage of estimating.
- 4.85 We consider the cost included in Series 700 Paving to be acceptable, as with previous routes, some of the works have been rated to be carried out at night, we consider these rates to be reasonable.
- 4.86 As stated in other section of route we consider the costs allocated to the kerbs, in series 1100 to be high within the cost data range. We consider the rate of the footway to be low in comparison to cost data.
- 4.87 With regards to series 1200 Traffic Sign and Traffic Signals we deem the rates to be included to be reasonable. A cost has been included for a four-way traffic signal in the sum of £94,200, we consider at this stage of estimating that the cost allocated is reasonable. As with previous route we consider the costs associated to the Road Marking to be reasonable as a lump sum cost.
- 4.88 We consider the rates included in Series Street Lighting and Series 1400 Electrical Works for Road and Lighting to be reasonable.
- 4.89 With regards to Series 2700 Accommodation Works and Stats, two items have been included in this Series. Access and Amended car park to Sankey Valley Park in the sum of £75,000 and Noise attenuation to houses in the sum of £225,000. We do not have any details of the scope of works and have therefore not reviewed these items. An additional figure of £500,000 has been included in the rate column, however this figure does not have an item description or has been included in total and summary total and may be just a typing error. We would recommend this is confirmed with BB that it is an error.
- 4.90 We consider the costs included in Series 3000 Landscaping and Ecology to be reasonable, based on estimating stage.

Cromwell Avenue Grade Separated

- 4.91 This bridge is currently designed as a steel composite bridge with two large abutments and a deck area of 560m². The bridge has been estimated at £1,754,947 and is above our estimated cost of £1,680,000, by approximately 4%, we believe this difference relates to the method of estimating and at this stage for estimating we consider BB estimate to still be robust.



5.0 Summary

- 5.1 Following our review of the information issued to F+G and based on our understanding of the project methodology we make the following observations.
- 5.2 The rates included in the Cost Plan have been arithmetically checked, reviewed for consistency and compared to cost data. From conducting our review, we consider the vast majority of rates to be within the expected pricing norms and have reviewed the rates in line with the categorised estimating criteria of a "Class 2" Budget/Control cost plan allowing for an accuracy range of between -15% and +15%. We consider the rates at this stage of estimating to be reasonable, although, we have in places made recommendation for the rate cost to be reviewed with BB. We also recommend an update and review of the rate items as the design develops and construction methodology change.
- 5.3 Due to the stage of design there are a number of Provisional Sums included in the schemes. Upon review, we consider the sums to be reasonable based on the information issued, but recommend that these allowances are reviewed as design progresses.
- 5.4 We understand from discussions with WBC that risk workshops have taken place and risks identified. At this stage of estimating, it is common practice to include an overall percentage additional to the construction total to allow for generic risk and contingency. We would expect this allowance to be in the region of 15% to 20%. The risk allowance for Western Link is approximately 11% of the cost plan total, although this is lower than the estimating norm, we believe that the discussions and investigations which enabled the preferred route may have reduced the number of risks associated with WBC and BB defining the individual scheme risks and as a consequence reducing the overall contingency. To be encompass further risks as the design develops we recommend continued risk workshop meetings.
- 5.5 From the information reviewed, we understand that there has been many meetings and reports produced, which have determined the location and design of the Western Link scheme and that different options have been created, before a preferred scheme was confirmed and agreed with all parties. The costs show that site constraints have been assessed and temporary works acknowledge in the delivery of the scheme and that a lot of thought has gone into the production of this preferred route. With the benefit of early contractor involvement this has enabled costs such as temporary works to be assessed and discussed, and costs which may not have been included at this stage such as, the inclusion of a water siltation system and pumping systems have been allowed for. The specialist and expertise the Contractor can offer at this early stage provides assurance to WBC that construction methodology, which usually happens later in the design process is happening now when budgets are set.
- 5.6 During our report, we have made several recommendations where we considered the rates to be at the lower end of our cost data, or the percentage allocated to risk and fees to be low. We have therefore tabled our estimated costs of these areas which we have summarised in the table below, we have also included a detailed breakdown of these estimated costs in Appendix A.
- 5.7 In calculating the costs, we have included the Working Area Overhead, Fee and Scape percentages where applicable.



Estimated Increases			
	BB Costs	F+G Cost	Difference
Fee increase from 4% to 6.5%	9,838,000	16,563,000	£6,725,000
Risk Increase from 11% to 12.5%	£27,621,000	£31,852,000	£4,231,000
Structures Cost	£33,381,000	£41,242,000	£7,861,000
Additional Demolition Cost	£0	£168,000	£168,000
Attenuation Tank	£1,018,000	£1,371,000	£353,000
Footways	1,214,000	£2,102,000	£888,000

5.8 In summary, based on information issued to us and with a degree of estimating tolerance expected at this design stage, we consider the costs to be robust and from methodology of the estimates and cost plan we have found no major irregularities which would cause us concern

6.0 Appendices

Contains *private* information



Appendix A – Table of Estimated Increases
– Schedule of Information

Appendix A

Schedule of Information





Table Showing Estimated Increases

Schedule of Recommendations									
Structures		BB Totals		F+G	WAO	Fee	Scape	Total	Differ
MSC Viaduct	7251	£ 17,851,948.45	£ 3,000.00	£ 21,753,000.00	£ 1,957,770.00	£ 592,769.25	£ 121,517.70	£ 24,425,056.95	£ 6,573,108.49
Walton Viaduct	132	£ 3,127,135.29	£ 20,000.00	£ 2,640,000.00	£ 237,600.00	£ 71,940.00	£ 14,747.70	£ 2,964,287.70	-£ 162,847.59
WML Viaduct	2715	£ 7,269,941.86	£ 2,500.00	£ 6,787,500.00	£ 610,875.00	£ 184,959.38	£ 37,916.67	£ 7,621,251.05	£ 351,309.19
East Garston Rail Viaduct	416	£ 829,256.43	£ 3,000.00	£ 1,248,000.00	£ 112,320.00	£ 34,008.00	£ 6,971.64	£ 1,401,299.64	£ 572,043.21
West Garston Viaduct	658	£ 1,757,549.44	£ 3,000.00	£ 1,974,000.00	£ 177,660.00	£ 53,791.50	£ 11,027.26	£ 2,216,478.76	£ 458,929.32
St Helens Canal	216	£ 574,445.81	£ 3,000.00	£ 648,000.00	£ 58,320.00	£ 17,658.00	£ 3,619.89	£ 727,597.89	£ 153,152.08
Cromwell Avenue Grade	560	£ 1,970,515.64	£ 3,000.00	£ 1,680,000.00	£ 151,200.00	£ 45,780.00	£ 9,384.90	£ 1,886,364.90	-£ 84,150.74
		£ 33,380,792.93		£ 36,730,500.00	£ 3,305,745.00	£ 1,000,906.13	£ 205,185.76	£ 41,242,336.88	£ 7,861,543.96
Fee Increase	4%	£ 9,838,000.00	6.5%	£ 16,563,000.00					£ 6,725,000.00
Risk	11%	£ 27,621,000.00	12.50%	£ 31,852,000.00					£ 4,231,000.00
Additional Contingency or demolition				£ 150,000.00	£ 13,500.00	£ 4,087.50	£ 837.94	£ 168,425.44	£ 168,425.44
Attenuation Tank									
R01	1600	£ 413,204	£ 310.00	£ 496,000	£ 44,640	£ 13,516	£ 2,771	£ 556,927	£ 143,723
R02	960	£ 247,922	£ 310.00	£ 297,600	£ 26,784	£ 8,110	£ 1,662	£ 334,156	£ 86,234
R03	620	£ 160,116	£ 310.00	£ 192,200	£ 17,298	£ 5,237	£ 1,074	£ 215,809	£ 55,693
R04	590	£ 152,369	£ 310.00	£ 182,900	£ 16,461	£ 4,984	£ 1,022	£ 205,367	£ 52,998
R05	170	£ 43,903	£ 310.00	£ 52,700	£ 4,743	£ 1,436	£ 294	£ 59,173	£ 15,271
		£ 1,017,514		£ 1,221,400	£ 109,926	£ 33,283	£ 6,823	£ 1,371,432	£ 353,918
Footway									
R01	5317	£ 196,477	£ 57.00	£ 303,069	£ 27,276.21	£ 8,259	£ 1,693	£ 340,297	£ 143,820.20
R02	11340	£ 419,042	£ 57.00	£ 646,380	£ 58,174.20	£ 17,614	£ 3,611	£ 725,779	£ 306,737.08
R03	2394	£ 88,464	£ 57.00	£ 136,458	£ 12,281.22	£ 3,718	£ 762	£ 153,220	£ 64,755.61
R04	7732	£ 285,717	£ 57.00	£ 440,724	£ 39,665.16	£ 12,010	£ 2,462	£ 494,861	£ 209,143.84
R05	6066	£ 224,154	£ 57.00	£ 345,762	£ 31,118.58	£ 9,422	£ 1,932	£ 388,234	£ 164,079.99
		£ 1,213,854		£ 1,872,393	£ 168,515	£ 51,023	£ 10,460	£ 2,102,391	£ 888,536.72
									£ 20,228,424.09



Schedule of Information

Please find below a list of information used when conducting our review of Western Link.

- Appendix K Scheme Cost Report Rev 1 Issued for Stage 2b Cost Report dated 18/10/17 Part 1 of 2 – WL-BBC-07-XX-RP-U-1000
- Appendix K Scheme Cost Report Rev 1 Issued for Stage 2b Cost Report dated 18/10/17 Part 2 of 3 – WL-BBC-07-XX-RP-U-1000
- Appendix K Scheme Cost Report Rev 1 Issued for Stage 2b Cost Report dated 18/10/17 Part 3 of 4 – WL-BBC-07-XX-RP-U-1000
- Appendix K Scheme Cost Report Rev 1 Issued for Stage 2b Cost Report dated 18/10/17 Part 4 of 4 – WL-BBC-07-XX-RP-U-1000
- Bridge Structure Summary
- Stage 2 Cost Allocation v5
- Appendix D Scheme Drawings Part 1 to 10 WL-MMD-07-XX-RP-U-1000
- Appendix D Scheme Drawings Part 2 to 10 WL-MMD-07-XX-RP-U-1000
- Appendix D Scheme Drawings Part 3 to 10 WL-MMD-07-XX-RP-U-1000
- Appendix D Scheme Drawings Part 4 to 10 WL-MMD-07-XX-RP-U-1000
- Appendix D Scheme Drawings Part 5 to 10 WL-MMD-07-XX-RP-U-1000
- Appendix D Scheme Drawings Part 6 to 10 WL-MMD-07-XX-RP-U-1000
- Appendix D Scheme Drawings Part 7 to 10 WL-MMD-07-XX-RP-U-1000
- Appendix D Scheme Drawings Part 8 to 10 WL-MMD-07-XX-RP-U-1000
- Appendix D Scheme Drawings Part 9 to 10 WL-MMD-07-XX-RP-U-1000
- Appendix D Scheme Drawings Part 10 to 10 WL-MMD-07-XX-RP-U-1000
- Risk WC-BBC-XX-CT-U-0004



Sara Holme

Senior Quantity Surveyor

Faithful+Gould
UK AND EUROPE

T +44 (0)1925 238300
F +44 (0)1925 238500
E sara.holme@fgould.com

Contains *private* information

FGOULD.COM