



It was important that the diversions affecting this bridge were completed as soon as possible to allow work on the bridge to commence at the earliest possible date. In the delay analysis programmes contained in Appendices C & D of the Estimate, the Infraco shows the utility diversions for the bridge as being complete on 10 June 2009. However, work on the bridge itself is not shown as starting until 17 December 2009, which coincides with the MUDFA Revision 8 date for completion of the last utility diversion in Intermediate Section 1A. This last utility diversion is BT cabling which has no impact on the commencement of the bridgeworks. Consequently, the Infraco's delay analysis over-states the actual physical delay to the commencement of critical works in Intermediate Section 1A by approximately 31 weeks. (Ref. paragraphs 5.2.5d) and 5.2.5e) above.)

- *“Road and Track works Rennies Isle to Casino Square”* – the Infraco's programme for its assessment of the work required extends to 82 working days. I observe that this is a 470m long, relatively straight forward section of the Infraco Works. The durations allowed for each of the activities appear to me to be generous and could be reduced by increasing resource and or working longer hours. The cost effectiveness of taking such action to mitigate delay, and the degree to which it should be applied, would depend on the amount of any increase in direct cost, if any, compared with the additional cost associated with the delay that could be mitigated or indeed eliminated.
- *“Victoria Dock Access Bridge and associated road and track works”* – Utilities diversions to allow work to commence on Victoria Dock Access Bridge were treated by both parties in a similar manner as those for Tower Place Bridge (as noted above). In the delay analysis programmes contained in Appendices C & D of the Estimate, the Infraco shows the utility diversions for the bridge as being complete on 10 June 2009. However, work on the bridge itself is not shown as starting until 18 April 2011, some 22 months later. The programme network logic is driving this later commencement date from commencement of roadworks in the surrounding area. It appears to me that where the roadworks may have or are likely to be



delayed by such a long period of time the Infraco is obliged to mitigate the delay by re-sequencing the works. I note that the works to Victoria Dock Access (Entrance) Bridge consist, primarily, of re-profiling and deck waterproofing. the Infraco has allowed 30 working days for these tasks. I consider that by taking access at an earlier date when the works could be done, this 30 day duration could readily be taken-off the critical path.

- *“OHLE works to Intermediate Section 1A”* - I note that in the “E&M Installation” section of the Infraco’s mitigated delay analysis programme (Appendix D) the commencement of the OHLE is delayed by two and a half months by a preferential resource constraint logic link. As I have noted earlier in this report, I consider such a resource constraint to be unjustifiable given that there is likely to be relatively little additional cost, if any, associated with removing it and that the savings in time related additional costs would be very much greater.
- *“OHLE works to Intermediate Section 5B”* - I note that the only reason why this work is at the end of the critical path is because there is a preferential logic link (resource constraint) to its commencement from completion of the similar activities in intermediate section 1A. As I have shown at paragraph 5.2.7c) above, by increasing the available resource by just one gang, 7 months of delay to this work can be removed. (It would also appear possible to save a further 7 months on the completion of this work if one additional track laying gang was also introduced.)

ii) Section A / B critical path

- *“MUDFA Completion of water main at Depot”* – The MUDFA Revision 8 programme does not show a projected completion date for the water main. It is my understanding that this is because the water main diversion had already been completed prior to the issue of the MUDFA Revision 8 programme. I am advised that the water main diversion was complete by



17 February 2009, which is two weeks earlier than the date used by the Infraco in its delay analysis<sup>5</sup>.

- “*Depot earthworks*” – the Infraco’s delay analysis programmes link completion of the water main diversion in a finish to start relationship with commencement of the Depot earthworks. I have examined the drawings for the Depot and observed that the majority of the Depot earthworks consist of the removal from site of existing soils thereby generally lowering the entire area to the formation level required for the construction of the Depot Building and the extensive areas of track required for tram stabling and shunting. The Pricing Assumptions state that the volume to be removed is 80,000m<sup>3</sup>. I am advised that during Autumn 2008 it became apparent to both parties that this volume was significantly underestimated and that approximately 170,000m<sup>3</sup> would have to be removed from the Depot site. I have examined the detail of the water main diversion and estimated that until it is completed approximately 25,000 to 30,000m<sup>3</sup> of this bulk excavation cannot be undertaken. (This is to prevent the risk of disturbing the existing water mains that are to be abandoned and removed after the water main diversion is operational.) Of this volume approximately 10,000 m<sup>3</sup> affects the critical path activities for the Depot. I am aware that during the period August 2008 to January 2009 **tie** wrote to the Infraco on several occasions confirming the availability of access to commence the available bulk earthworks. The Infraco would appear to have decided not to progress with this available work despite the fact that it was then and is now claiming it to be on the critical path to Sectional Completion Date A. I consider this to be a missed opportunity to mitigate the later than planned completion of the water main diversion. This failure to progress available work with due expedition appears to me to have unnecessarily increased the projected requirement for additional time to achieve Sectional Completion Date A. I am informed<sup>6</sup> that the Infraco did not actually commence the Depot earthworks until 7 April 2009, some 7 weeks after the completion of the water main diversion. From this it

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<sup>5</sup> Source : Andrew Scott (**tie** Project Manager)

<sup>6</sup> Source: Andrew Scott (**tie** Project Manager)



appears to me that completion of the water diversion was not driving commencement of the Depot earthworks. This makes me question what is actually driving the critical path. The water main diversion was not on the critical path of the Rev.1 programme and it appears it is not on the actual critical path for the construction of the Depot. I cite this as another example of the unreliable results that arise from using the “as-planned impacted” method of delay analysis, particularly in the circumstance prevailing on this contract. The failure to consider in the delay analysis what has actually happened produces results that do not align with the facts.

- *“Foundations”* – I consider the duration allowed for the foundations to be generous and capable of being reduced by re-sequencing and increasing resources. I am advised that the actual time taken for construction of the foundations on the critical path to have been significantly shorter than that shown on the Infraco’s programme. From this it appears to me that there is scope within the programme to mitigate delay within the time allowances contained within the Infraco’s programmes. I also note that in the Infraco’s programmes the start of the foundations is linked “start to start” with the Depot earthworks but with a 25 day lag. This indicates to me the planned intent to commence the foundations 25 days after commencement of the Depot earthworks. This logic makes practical and economic sense in that priority would be given to the earthworks required for the most critical works (i.e. the foundations for the Depot Building) thereby allowing them to commence at the earliest possible date. I am advised that this did not happen and that the foundations did not actually commence until 3 June 2009, **some 10 weeks after** the earthworks in the entire depot area had been completed. From this it appears to me that completion of the Depot earthworks was not driving commencement of the foundations. Matters other than the sequence of water main diversion followed by earthworks would appear to be driving the actual critical path for the Depot. Consequently, the projected critical path to Sectional Completion Date A, as presented by the Infraco, does not appear to accord with the facts. I cite



this as yet another example of the unreliable results that arise from using this entirely theoretical “as-planned impacted” method of delay analysis.

- *“Building Envelope”* – I consider the duration allowed for the Building Envelope to be generous and capable of being reduced by re-sequencing and increasing resources. The unit rates for productivity appear to be very conservative and given the size of the building it is clear to me that several work fronts can be accommodated without adverse impact on efficiency. Indeed, working on several work fronts at one time would appear to me to make economic and practical sense.
- *“Building Services”* – I consider the duration allowed for the Building Services to be overly generous and capable of being significantly reduced by re-sequencing and increasing resources. The overall duration of 160 working days (32 working weeks) I would associate with a highly complex and heavily services building. The Depot is not such a building.
- *“Fit-out and finishes”* – The fit-out and finishes activity is also 160 working days long and runs concurrently with the Building Services. My observations on this activity are the same as those noted above for the Building Services.
- *“Install workshop equipment”* – As referred to at paragraph 5.2.7m) above there is scope to mitigate delay by revising the finish to start relationship between this activity and the Building Services, Fit-out and Finishes. Such re-sequencing of the programme appears to me make practical and economic sense. I note again that the Infraco has acknowledged the practicality of such re-sequencing. It has, however, failed to include same in its current submission.
- *“Inspection and testing”* – I note the duration for this activity to be 20 working days, linked finish to start from completion of the Installation of the workshop equipment. It is my opinion that there is scope to reduce the projected delay by revising this relationship, thereby re-sequencing this work so that it can commence, in some areas and on some equipment, prior to completion of preceding sets of activities.



- d) I note that in the Appendix A narrative of the Estimate the Infraco goes on to state that there are also “*several additional near-critical paths*” as a result of the delay in completion of the Utility Works and that the resource levelling (to comply with the constraints imposed by the Infraco) has effectively made critical any construction sequence concluding with track-laying or OHLE activities. I consider that to be an inevitable consequence of the manner in which the Infraco has prepared its delay analysis programme. By using preferential logic links to constrain resource demand to the limits it has set, the Infraco’s has engineered a delay analysis programme that does not accurately model the time required to deliver the Infraco Works in a cost effective manner and in accordance with the Infraco’s obligations under the contract. It appears to me to be a construction aimed at maximising the projection of delay beyond that actually required.
- e) I do not agree with the Infraco’s assertion that “*criticality (is) now inherent within every construction phase*”. By inspection, the Infraco’s Appendix D delay analysis programme shows float available on the great majority of the activities it contains. I do, however, acknowledge that by mitigating delay, the risk profile of the project will change from that upon which the contract is based. I consider that to be an inevitable consequence of change and a matter that requires to be addressed as part of the various change mechanisms contained within the contract and within the Infraco’s Estimate.

## 5.3 Conclusion

- 5.3.1 I note the Infraco’s conclusions but, for the reasons noted above, consider them to be calculated on the basis of erroneous and unreliable information used in, and produced from, an inappropriate method of delay analysis. I also note that the manner in which the analysis has been conducted ignores a significant number of the Infraco’s obligations to mitigate delay, minimise cost and progress the Infraco Works with due expedition. It is my opinion that the projected requirements for revision of the four Sectional Completion Dates are greatly exaggerated.



## Section 6 Assessment of requirement for Extension of Time

### 6.1 Introduction

6.1.1 I have been asked to provide my own opinion as to what I might consider to be a reasonable assessment of the requirement for extension of time that may arise from the issuing of the MUDFA Revision 8 programme. I find that I must do that in the absence of what I consider to be most pertinent information from the Infraco in relation to resourcing, procurement, methodology, productivity and their associated costs. It appears to me that the provision of such information should have been part of the Estimate submission and the subject of discussion at subsequent meeting(s) to agree it. Notwithstanding, I have undertaken a detailed examination of the delay analyses submitted by the Infraco and used my own experience and judgement to consider the practicalities and relative cost (if any) in mitigating delay to implement this **tie** Change in the most cost effective manner. I accept that this necessarily requires the making of certain subjective assessments of various factors affecting logic and durations and that this can lead to imprecise outcomes. It does, however, indicate that the actual requirement for extensions to the Sectional Completion Dates is likely to be considerably less than those sought by the Infraco.

### 6.2 Process

6.2.1 The process I undertook involved:

- a) checking and, where appropriate, adjusting the factual information contained within the submitted programmes. (Some of the actual progress dates used by the Infraco were different from **tie**'s contemporaneous records.)
- b) examining the network logic contained within the impacted programmes to check that it was logical and justifiable, and to determine if it was physical logic (i.e. true interdependency) or preferential logic (e.g. logic added by the Infraco for its own preferences in relation sequencing and constraining demands on certain resources).
- c) tracing, through the programme network, the critical and near critical paths that were driving the Sectional Completion Dates to identify why the Infraco's analyses were projecting the magnitude of delay being claimed.

6.2.2 In each and every case it became apparent that the critical path was being driven by a number of preferential logic links and/or resource constraints that the Infraco had built



into its programmes. There appears to be little justification for strict adherence to most of these. Much of the preferential logic I found to be superseded and required removal or revision. Preferential logic links included in the original programme to effect resource constraints on track laying and overhead line work were driving a large proportion of the projected delays despite the fact that they were no longer serving their original intended purpose. I acknowledge that the Infraco has made some minor adjustments to the logic network (claiming such action to fulfil its obligation to mitigate delay) but these are relatively limited in nature and only partly reduce the projection of delay.

6.2.3 Having completed these examinations, I then used the delay analysis presented by the Infraco as the starting points to establish my own assessment of the requirements for extensions of time. This took the form of reverse (back) analysis of the Infraco's impacted programme. Following adjustments for errors in baseline factual data, the critical paths of all activity strings that were projecting delay beyond the current Sectional Completion Dates were examined. They were each traced back from the link to the Sectional Completion Date milestones. Where criticality was found to be driven by what I considered to be: unnecessary/superseded preferential logic; errors in the network, unjustified/unnecessary/superseded constraints; and the like, I made what I consider to be an appropriate assessment of the delay that could be mitigated. By this process I was able to identify means by which the requirement to adjust the Sectional Completion Dates for delayed work in particular areas could be reduced or eliminated. This was an iterative process as each adjustment had the potential to, and often did, change the route of the critical path.

6.2.4 I then examined in more detail the sections of the programme that continued to project beyond the current Sectional Completion Dates. For each of these I scrutinised the individual activity durations and the manner in which they were linked together in the programme network. For each activity I considered whether, in my opinion, cost effective delay mitigation measures could be applied. For the most part, the delay mitigation measures I considered applicable were: increasing resources to overcome the Infraco self-imposed constraints; increasing the number of working hours; and/or opportunities to reduce some activity durations where the allowance made by the Infraco appeared to be overly generous. In relation to this latter point, this was particularly where I considered the logic relationship between activities to project unnecessary delay (i.e. there appeared to be





float hidden in the Programme through overly generous duration allowances and unnecessary finish-to-start interdependency links).

## **6.3 Findings**

- 6.3.1 A summary of my assessments from this exercise is included at Appendix 6/1 of this report. It concludes that it would appear to be possible to mitigate all of the MUDFA Revision 8 projected delays to the extent that there is would be no requirement to extend any of the four Sectional Completion Dates.



## Section 7 Opinion and Conclusions

7.1.1 It is my opinion that the Infraco's Estimate submission produced in support of its claim for extension of time has not been made in accordance with the terms of the contract. The contract, and in particular clause 80, sets out the mechanism for dealing with **tie** Change and how its impact on obligations relating to time should be considered and dealt with. The Infraco has not complied with that prescribed mechanism and, I am advised, seeks to impose an alternative process. I can find no justification for such a departure from the contract.

7.1.2 I consider that the Infraco's Estimate is incompetent for the following reasons:

- a) It does not include sufficient and appropriate supporting information as is required by the contract;
- b) It does not properly and clearly link cause with effect;
- c) The method of delay analysis used by the Infraco is inappropriate in relation to the terms of the contract;
- d) The actual impact of the revised MUDFA programme has not been accurately impacted into the Programme resulting in over-stated results;
- e) The programme network used in the delay analysis contains errors, omissions, superseded logic and unnecessary constraints, all of which combine to produce unreliable and over-stated results;
- f) It does not appear to consider or apply readily available and applicable cost effective mitigation measures;
- g) It does not properly consider the impact of delays in relation to the events and activities that are the Infraco's responsibility under the terms of the contract;
- h) It is entirely theoretical in its approach and does not accord with the actual facts.

7.1.3 As noted above, the manner in which the Infraco has analysed delay does not accord with the requirements of the contract. It contains factual errors and produces unreliable results. I consider that the Infraco's Estimate greatly over-states the requirement for extension of time and does not implement this **tie** Change in a cost effective manner.



- 7.1.4 Notwithstanding the criticisms made at 7.1.1 to 7.1.3 above, it is clear that there have been delays to completion of the MUDFA Works and liability for the consequences of those delays lies with **tie**. I consider that the Infraco has an entitlement to seek revision to the Sectional Completion Dates but only to the extent that such revision is required as a consequence of implementing this change in the most cost effective manner. I say that based on my interpretation of the change mechanism set out in Clause 80 of the contract as explained in more detail in Section 4 of this report.
- 7.1.5 To determine the most cost effective manner in which to implement this **tie** Change requires some form of cost–benefit analysis. I consider that to carry this out with any degree of precision requires both parties to work together sharing information and considering options. Clearly, cost information, as it relates to the various ways in which the **tie** Change could be implemented is an essential element of such an analysis. The fact that the Infraco has not responded positively to **tie**'s requests for such information and to engage with it in discussions to consider how best to implement this **tie** Change appears to me to be frustrating the proper operation of the change mechanism set-out in Clause 80.
- 7.1.6 In the absence of cost information from, and engagement with, the Infraco, it appears to me that **tie** is being impeded in any attempt it may make to assess the Infraco's fair entitlement to extension of time as it may relate to this **tie** Change. I have been similarly impeded in my task to form an independent assessment of the Estimate and have had to rely heavily on my own experience and knowledge to form an opinion on what can be readily achieved by way of cost effective mitigation. Consequently, my assessment lacks precision and in many places is based on value ranges rather than specific numbers. That said, I still consider it to be sufficiently accurate to enable me to arrive at my opinion.
- 7.1.7 My assessment concludes that there would appear to be cost effective ways to implement this **tie** Change with no requirement to extend the four Sectional Completion Dates. To do so is likely to increase some of the direct costs associated with delivering the Infraco Works but these would, in my opinion, be far outweighed by the additional time related costs that would arise if this **tie** Change was implemented in the manner set-out by the Infraco in the Estimate.



## Section 8 Statement of Truth

I Iain McAlister declare that;

- 8.1.1 I understand that my duty in providing written reports and giving evidence is to assist the Adjudicator and this duty overrides any obligation to the party by whom I am engaged. I confirm that I have complied with and will continue to comply with my duty.
- 8.1.2 I confirm that, insofar as the statements made within my report are within my own knowledge I have made clear which they are and I believe them to be true and that the opinions I have expressed are correct, are within my field of expertise, and represent my true and complete professional opinion.
- 8.1.3 I have endeavoured to include in my report those matters of which I have knowledge or of which I have been made aware that might adversely affect the validity of my opinion. I have clearly stated any qualifications to my opinion.
- 8.1.4 I have not, without forming an independent view, included or excluded anything which has been suggested to me by others including my instructing client's (**tie**'s) representatives.
- 8.1.5 I will notify those instructing me immediately and confirm in writing if for any reason my existing report requires any correction or modification.
- 8.1.6 I confirm my understanding that this report is to be submitted by into an adjudication between the Bilfinger – Siemens – CAF Consortium and **tie** Limited, and that this matter, if it goes further, may ultimately be taken into litigation.
- 8.1.7 I confirm that I have not entered into any arrangement where the amount or payment of my fees is in any way dependent on the outcome of this adjudication.
- 8.1.8 This report is submitted in compliance with, and acknowledgement of, my responsibilities and associated obligations.

Signed

Date: 5 May 2010

Iain McAlister, ACUTUS



## Section 9 Appendices

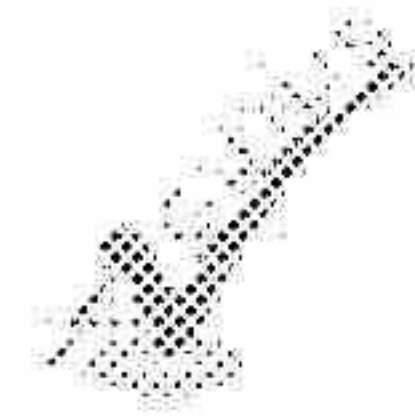
Appendix 2/1 – Initial brief from **tie** to Acutus.

Appendix 2/2 – Curriculum Vitae for Iain McAlister

Appendix 5/1 – Time-Chainage programme showing actual impact of MUDFA Rev.8 dates in Section 1A.

Appendix 5/2 – Schedule of periods of inactivity between roadworks/groundworks and the start of track laying.

Appendix 6/1 – Summary of Assessment of Delay Mitigation Opportunities and requirements for extension of time.



Appendix 2/1 – Initial brief from **tie** to Acutus

**Subject :** Brief for Forensic Planning Exercise in relation to the Edinburgh Tram Project  
**Date :** 8<sup>th</sup> April 2009  
**Client :** Dennis Murray, Commercial Director, Edinburgh Trams

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## **Background**

The Edinburgh Trams Infraco contract was awarded to the consortium Bilfinger Berger Siemens (now BSC) on 8<sup>th</sup> May 2008 and this included as Schedule Part 15 to the contract, a contract programme. An immediate change to this programme was expected due to the movement in the design programme from finalisation of the programme and the signing of the contract (this is notified departure 001 and relates to the V26 and V31 design programme movements). The time for this has been agreed between **tie** and BSC.

However, a number of delays have been experienced subsequently – both due to **tie** and to BSC and this is indicating a delay to the overall programme duration. **tie** has recorded the reasons for these delays but now needs to prepare for the discussions on liability for those delays with a view to agreeing responsibility for those delays, potential extensions of time, or relief and liability for costs.

## **Scope of Brief**

To support and challenge the internal work completed to date, **tie** requires an independent forensic planning exercise to :

- Review the contract to understand the mechanics of the programme within this bespoke contract ;
- Review planned v's actual progress and verify both the **tie** and BSC view of the programme progress and projections;
- Review the history of programme analysis to date and relevant contractual correspondence;
- Analyse and quantify any delay, disruption and prolongation in the context of specific contractual requirements, including a cause and effect analysis, concurrency of delays and identify responsibility for addressing same;
- Challenge programme and commercial approach to date and identify strengths and weaknesses in process and evidence/actions to date;
- Provide view on opportunities for improving confidence in **tie**'s ability to negotiate a successful conclusion to programme delay and mitigate costs; and
- Identify/recommend opportunities for recovery or acceleration if evidenced.

## **Timescales**

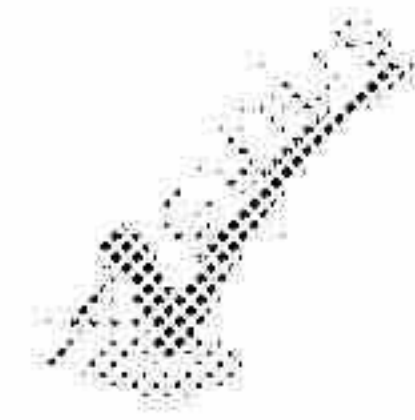
**tie** expects that this exercise will last for a period of 4 – 5 weeks and needs to report back on key milestones. The timescale will be reviewed and agreed based on initial review of the scope, programme and contract.

## **Deliverables**

**tie** would expect to receive as deliverables the following:

- 1) Initial response to the scope including confirmation/proposals of timescales, deliverables and costs. This should include an assessment of access required to tie personnel.
- 2) Weekly interim reports to identify strengths and weaknesses identified so that immediate corrective action can be taken
- 3) Final report to include:
  - Executive summary
  - Explanation of the process used and analysis conducted
  - Detailed outputs from the analysis
  - Conclusions on strengths/weaknesses of the **tie** position including validation of the arguments used to date
  - Recommendations for any changes in processor actions which can be implemented to immediately strengthen the tie position but also identify longer term areas for improvement.





Appendix 2/2 – Curriculum Vitae for Iain McAlister

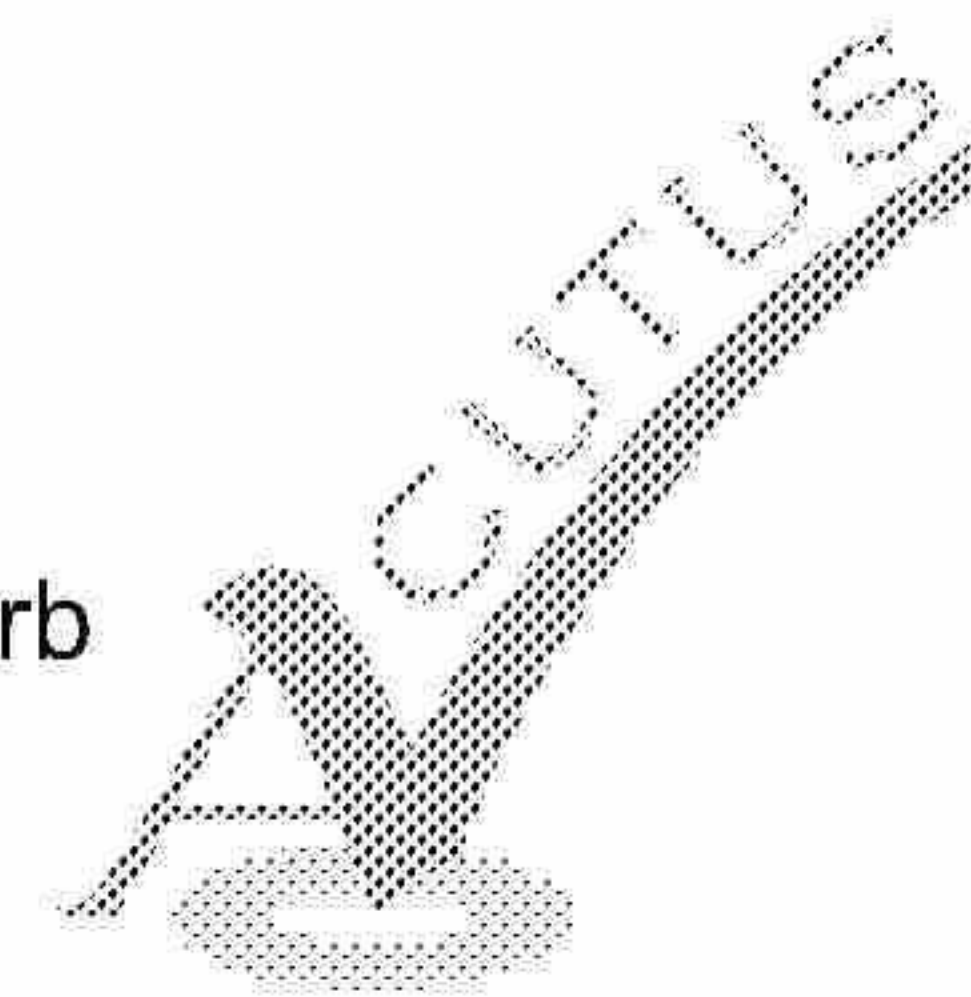


## IAIN MCALISTER

BSc (Hons.), LL.M (Const. Law), CEng, FICE, FIHT, MCI Arb

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### SPECIALISATIONS

Resolution of disputes through negotiation, mediation and third party determination. Project management, planning and programming. Construction methodology, design and value engineering. Risk management. Analysis of delay and disruption. Claims preparation and investigation. Management of PPP projects in both construction and operational phases. Application of information technology in construction. Professional education and training.

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### HIGHLIGHTS

Chief Engineer for major multi-discipline contracting organisation. Chief Engineer on major PPP motorway project managing design, construction, routine operation and maintenance.

Development and implementation of award winning information management system.

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### EDUCATION AND PROFESSIONAL STATUS

Chartered Engineer, Honours Degree in Civil Engineering, Masters Degree in Construction Law, Fellow of Institution of Civil Engineers, Fellow of Institution of Highways and Transportation. Member of the Chartered Institute of Arbitrators. Member of Society for Construction Law. Approved Expert Witness. Member of ICE Scotland Management Committee. Past Vice Chairman of Glasgow & West of Scotland ICE. Member of Industry Advisory Panel at Glasgow University. Regular speaker at professional development and education events.

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### BRIEF SUMMARY

Drawing on 26 years in contracting, Iain has a wide range of technical, contractual and managerial knowledge. Having successfully delivered many major projects in building, civil engineering, manufacturing, quarrying and waste management, he brings a wealth of practical experience and know-how to every task he undertakes. He has operated many forms of contract including both the D&B and operational phases of PFI / PPP. His skills in strategy development and business planning have been honed through participation in bid management and organisational change. A logical thinker who's intuition and vision cut through the minutiae to get to the real issues. Through a carefully considered, pragmatic approach he delivers reasoned and well informed output. An experienced team player and effective communicator, he works well with all disciplines.

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### MANAGEMENT AND ADVISORY ROLES

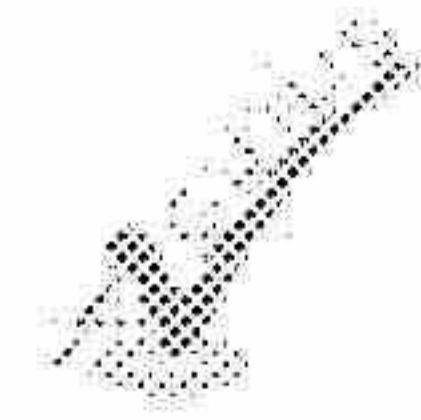
- Castlehill Hospital PPP, Cottingham
- M6 DBFO Motorway
- Glasgow Royal Concert Hall
- Scotland Gas Project, Mossmorran & Braefoot Bay
- A71 / A72 Garrion Bridge, South Lanarkshire
- Inverurie Paper Mill & Power Station
- Argyll & Bute Education PPP
- M74 Motorway (Cleuchbrae to Dinwoodie Green)
- East Fife Waste Water Treatment Project
- A6091(T) Melrose Bypass
- Methil Dock Improvements
- Gattonside Suspension Bridge
- Vatersay Causeway
- Paisley Inner Ring Road
- Supermarket developments
- Design, manufacture & erection of precast concrete
- Midlands Bank Domes, Poultry, London
- Housing Repairs & Maintenance Framework, London
- Stadium developments
- Commercial and residential developments
- Water treatment projects
- Rail bridge replacements (various)
- Pipeline and drainage projects (numerous)
- Power transmission and distribution projects
- MoD / Defence Estates developments
- Landfill site development and licensing
- Minerals extraction, planning and permitting
- IT planning and implementation groups (various)
- Waste management strategy groups (various)
- Health & Safety in construction (various)
- Total quality management system
- Environmental management systems

## EXPERT ADVISORY ROLES

- Delay Analysis & Assessment of Disruption on:
  - Major transport infrastructure projects including D&B and PFI
  - New build and refurbished schools and colleges
  - Major City Centre office and Residential Developments
  - Energy facilities including gas, wind power and EfW
- Critical analysis of design development liabilities for standard and bespoke contracts
- Independent examination of claims and counterclaims on building and civil engineering projects
- Resolution of disputes on partnering contracts between public and private sectors
- Independent advisor and expert in mediations, adjudications and litigated disputes

## CAREER SUMMARY

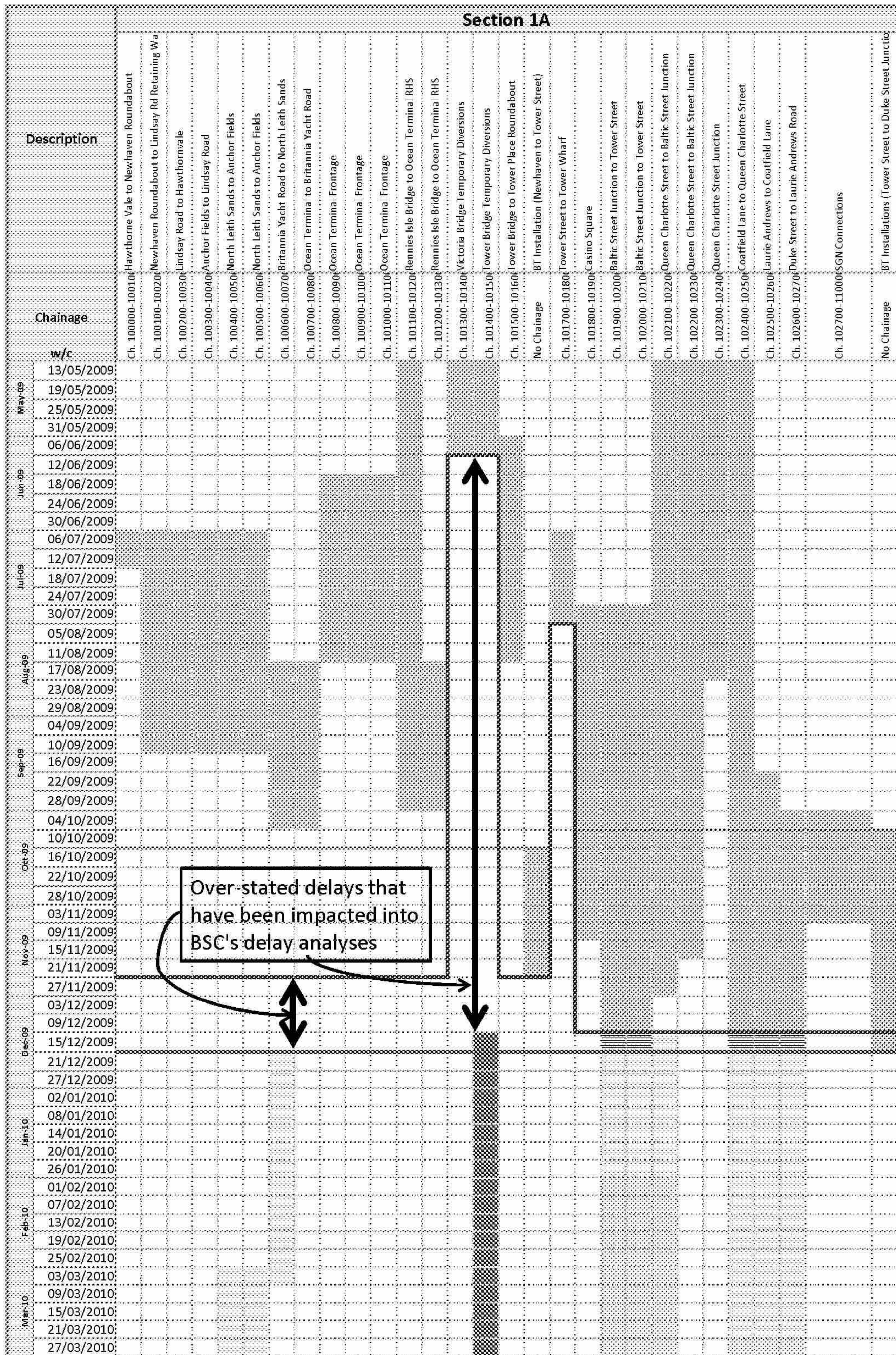
- 2006            **Associate Director with Acutus.**
- 1999 - 2005    **Chief Engineer with Barr Limited.** Following re-organisation of the Barr Group (turnover circa £200M), appointed Chief Engineer across the three operating divisions of Construction, Industrial and Manufacturing. Responsible for: contract planning & risk assessment; engineering; design management and Planning Supervisor functions; strategy development; bid and project management (including contractual and commercial reviews); quality and environment management; planning consents, licensing and permitting; professional development, education and training.
- 1997 - 1999    **Chief Engineer with M6 Joint Venture.** Worked as a senior member of the M6DBFO Joint Venture Management Team (Amey, Sir Robert McAlpine, Taylor Woodrow, Barr), responsible for all functions provided by the Central Services Department including design development, project management, planning and programming, progress monitoring, data management, staff and operative training, health, safety and welfare, environmental management and temporary works design. (Contract value £330M over 25 years, £110M of new build motorway).
- 1994 - 1997    **Director with Barr Construction Services.**  
Director of Manufacturing, Plant and Transport division within the Barr Group, responsible for general management, estimating, design, contractual and commercial matters, production co-ordination and forward planning. Head of Department responsible for proposals management, planning, programming, progress monitoring, temporary works and alternative designs for the majority of building and civil engineering works undertaken by Barr Limited.
- 1993 - 1994    **Chief Engineer with Barr Construction.**  
Worked as part of a major design and build project team (M74 Cleuchbrae to Dinwoodie Green), responsible for all planning, programming, progress monitoring and temporary works design. Co-ordinator of the design and build elements of the project including the River Annan Bridge.
- 1991 - 1993    **Contracts Manager (Director Designate) with R J McLeod (Contractors) Ltd.**  
Worked in an overseeing role providing management, advice, guidance and back-up to on-site construction teams. Responsible for overall project co-ordination, planning, construction and contractual / commercial control.
- 1988 - 1991    **Commercial Manager with R J McLeod (Contractors) Ltd.**  
Established, developed and operated a centralised commercial department responsible for all of the company's Central Scotland contracts valuations and claims.
- 1987 - 1988    **Design Engineer with Kenchington, Little, and Partners, Glasgow.**
- 1984 - 1987    **Agent / Senior Project Manager with R J McLeod (Contractors) Ltd**
- 1981 - 1984    **Planning Engineer with R J McLeod (Contractors) Ltd**
- 1980 - 1981    **Site Engineer with R J. McLeod (Contractors) Ltd.**



Appendix 5/1 – Time-Chainage programme showing actual impact of MUDFA Rev.8  
dates in Section 1A.

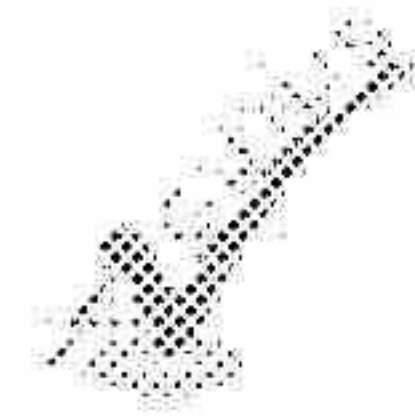


Appendix 5/1 - Time-Chainage programme showing actual impact of MUDFA Rev.8 dates in Section 1A



- Key**
- MUDFA activities as shown on the MUDFA Rev.8 programme
  - BSC Programme - Construction Works
  - Tower Place Bridge construction
  - Gap in BSC activity
  - MUDFA Rev.8 Date impacted into BSC's delay analysis programmes
  - Actual completion of MUDFA as per MUDFA Rev.8 programme

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Appendix 5/2 – Schedule of periods of inactivity between roadworks/groundworks  
and the start of track laying.

BSC "Unmitigated" Delay Analysis - Appendix C of the Estimate submission)

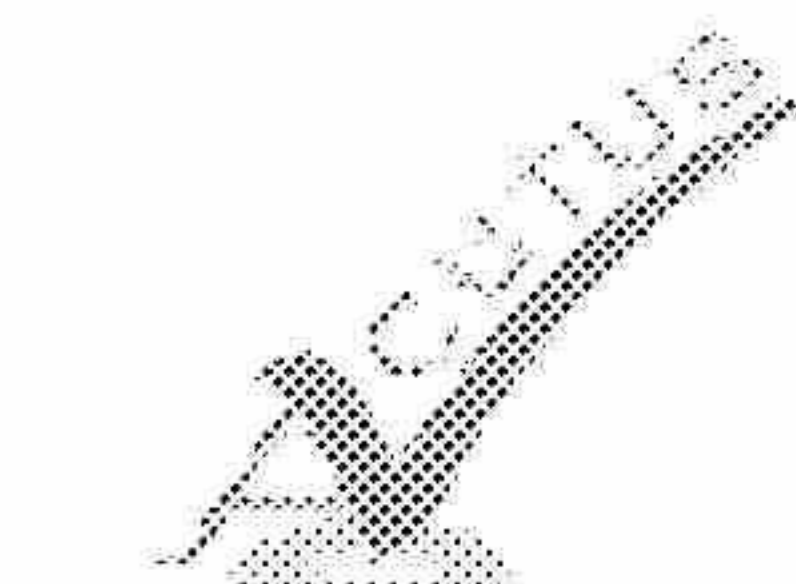
Periods of inactivity between roadworks/groundworks and the start of tracklaying.

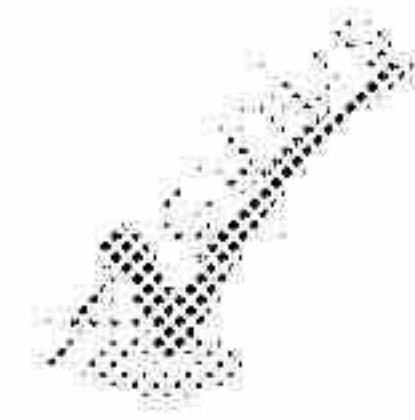
Intermediate Section	Location	Chainage	Activity Code Roadwork	Finish Roadwork	Set Track	Period of Inactivity between Roadwork completion and Trackwork Laying (days)
<b>Section 1A</b>						
	Chainage	0-265	1A-24A-TRCK-	23/03/2011	03/05/2011	41
	Chainage	265-425	1A-24B-TRCK-	25/08/2010	08/12/2010	105
	Chainage	475-600	1A-24D-TRCK-	23/03/2010	10/05/2010	48
	Chainage	700-850	1A-24F-TRCK-	22/11/2010	11/05/2011	170
	Rennies Isle to Casino Square	1410-1880	1A-23C-TRCK-	22/03/2011	22/06/2011	92
	Casino Square to Baltic Street	1850-1880	1A-22A-TRCK-	01/12/2010	23/12/2010	22
	Casino Square to Baltic Street	1880-2110	1A-22B-TRCK-	04/02/2010	13/10/2010	251
	Baltic to Queen Charlotte	2110-2340	1A-21A-TRCK-	06/06/2011	05/09/2011	91
	Queen Charlotte to Foot/Walk	2340-2730	1A-21B-TRCK-	01/04/2010	16/03/2011	349
<b>Section 1B</b>						
	Foot of the Walk	0-100	1B-20A-TRCK-	25/02/2010	26/04/2010	60
<b>Section 1C</b>						
	York Place	700-850	1C-17H-TRCK-	24/03/2011	21/04/2011	28
	York Place	850-1000	1C-17J-TRCK-	05/07/2011	05/09/2011	62
	St Andrews Square to Waverley Bridge	1000-1360	1C-16-TRCK-	15/10/2010	04/02/2011	112
<b>Section 1D</b>						
	Lothian Road Junction - Phase 2 - 1st Half	280-440	1D-15B-TRCK-	03/11/2009	17/03/2010	134
	Lothian Road Junction - Phase - 3a - 2nd Half	280-440	1D-15F-TRCK-	21/06/2010	03/11/2010	135
	Haymarket - Phase 3 - 1st Half	1125-1250	1D-14C-TRCK-	11/11/2009	26/03/2010	135
	Haymarket - Phase 5 - 2nd Half	1125-1250	1D-14H-TRCK-	27/07/2010	12/11/2010	108
	Torphichen - Phase 1 - 1st Half	940-1125	1D-14M-TRCK-	24/05/2010	14/07/2010	51
	Torphichen - Phase 2 - 1st Half	940-1125	1D-14O-TRCK-	23/02/2011	24/03/2011	29
	West Maitland Phases 2&3 - 1st half	850-940	1D-14U-TRCK-	26/11/2010	10/03/2011	104
	West Maitland Phases 2&3 - 2nd half	850-940	1D-14V-TRCK-	30/03/2011	01/06/2011	63
	Shandwick Place - Phase 1	440-850	1D-14W-TRCK-	28/07/2010	05/10/2010	69
<b>Section 2A</b>						
	Trackwork	(1135m)	2A-13B-TRCK-	19/01/2009	04/06/2010	501
<b>Section 5A</b>						
	Trackwork	(470m)	5A-12-TRCK-	19/11/2009	24/03/2011	490
	Trackwork	(1006m)	5A-11-TRCK-	12/07/2010	23/09/2011	438
<b>Section 5B</b>						
	Trackwork - Ballasted Track (1160m)	(1690m)	5B-10A-TRCK-	31/08/2009	15/12/2009	106
	Trackwork - Concrete Slab (590m)	(590m)	5B-10C-TRCK-	21/07/2009	05/02/2010	199
	Trackwork	(1260m)	5B-09-TRCK-	08/01/2009	03/11/2009	299
	Trackwork	(854m)	5B-07-TRCK-	23/10/2008	07/07/2010	622
<b>Section 5C</b>						
	Trackwork - Gyle Centre to Depot Stop	(562m)	5C-02-TRCK-	06/04/2010	07/07/2011	457
	Trackwork - Depot Stop to Gogarburn	(562m)	5C-02-TRCK-	04/03/2010	13/09/2010	193
<b>Section 6</b>						
	Total	(3492m)				
	Trackwork - Ballasted		6A-01-TRCK-	08/02/2009	12/02/2009	4
	Trackwork - Ballast & Embedded		6A-01-TRCK-	26/03/2009	24/07/2009	120
	Trackwork - Column Track		6A-01-TRCK-	25/05/2009	19/08/2009	86
<b>Section 7</b>						
	Trackwork	(1750m)	7A-04-TRCK-	01/06/2010	27/10/2010	148
	Trackwork	(833m)	7A-05-TRCK-	31/08/2010	10/02/2011	163
<b>Average period of inactivity (days)</b>						<b>135</b>
<b>Total Duration of Inactivity (days)</b>						<b>6085</b>

BSC "Mitigated" Delay Analysis - Appendix D of the Estimate submission)

Periods of inactivity between roadworks/groundworks and the start of tracklaying.

Intermediate Section	Location	Chainage	Activity Code Roadwork	Finish Roadwork	Set Track	Period of Inactivity between Roadwork completion and Trackwork Laying (days)	Difference in durations between no mitigation and mitigation programmes
<b>Section 1A</b>							
	Chainage	700-850	1A-24F-TRCK-	22/11/2010	13/04/2011	142	41
	Casino Square to Baltic Street	1850-1880	1A-22A-TRCK-	02/11/2010	16/12/2010	44	105
	Casino Square to Baltic Street	1880-2110	1A-22B-TRCK-	04/02/2010	14/09/2010	222	48
	Baltic to Queen Charlotte	2110-2340	1A-21A-TRCK-	05/11/2010	21/03/2011	136	28
	Queen Charlotte to Foot/Walk	2340-2730	1A-21B-TRCK-	01/04/2010	21/07/2010	111	92
	Ocean Terminal	850-1080	1A-23A-TRCK-	02/12/2010	07/04/2011	126	-22
<b>Section 1B</b>							
	Foot of the Walk	0-100	1B-20A-TRCK-	25/02/2010	26/04/2010	60	60
<b>Section 1C</b>							
	York Place	700-850	1C-17H-TRCK-	10/09/2010	11/01/2011	123	-95
	York Place	850-1000	1C-17J-TRCK-	28/01/2011	24/02/2011	27	35
	St Andrews Square to Waverley Bridge	1000-1360	1C-16-TRCK-	10/05/2010	14/06/2010	35	77
<b>Section 1D</b>							
	Lothian Road Junction - Phase - 3a - 2nd Half	280-440	1D-15F-TRCK-	06/04/2010	14/05/2010	38	134
	Haymarket - Phase 5 - 2nd Half	1125-1250	1D-14H-TRCK-	27/05/2010	05/07/2010	39	97
	Torphichen - Phase 1 - 1st Half	940-1125	1D-14M-TRCK-	23/03/2010	27/04/2010	35	135
	Torphichen - Phase 2 - 1st Half	940-1125	1D-14O-TRCK-	19/11/2010	01/02/2011	74	69
	West Maitland Phases 2&3 - 1st half	850-940	1D-14U-TRCK-	18/06/2010	08/10/2010	112	16
	Shandwick Place - Phase 1	440-850	1D-14W-TRCK-	23/03/2010	26/04/2010	34	-45
	Lothian Road Junction - Phase - 3a - 1st Half	280-440	1D-15F-TRCK-	13/01/2010	17/03/2010	63	-8
	Lothian Road Junction - Phase - 4 - 1st Half	280-440	1D-15F-TRCK-	08/06/2010	14/10/2010	128	63
	Lothian Road Junction - Phase - 4 - 2nd Half	280-440	1D-15F-TRCK-	04/11/2010	07/02/2011	95	-63
	Princes Street	0-280 / 1360-1980	1D-15/16-TRCK-	30/04/2009	03/06/2009	34	-128
	Haymarket - Phase 3 - 2nd Half	1125-1250	1D-14C-TRCK-	04/01/2010	17/02/2010	44	-34
	Haymarket - Phase 6 - 1st Half	1125-1250	1D-14I-TRCK-	27/07/2010	05/10/2010	70	-44
	Torphichen - Phase 1 - 2nd Half	940-1125	1D-14M-TRCK-	25/05/2010	06/10/2010	134	-70
<b>Section 2A</b>							
	Trackwork	(1135m)	2A-13B-TRCK-	19/01/2009	04/06/2010	501	501
<b>Section 5A</b>							
	Trackwork	(470m)	5A-12-TRCK-	19/11/2009	16/06/2010	209	281
	Trackwork	(1006m)	5A-11-TRCK-	12/07/2010	17/11/2010	128	310
<b>Section 5B</b>							
	Trackwork	(1260m)	5B-09-TRCK-	14/07/2009	28/07/2010	379	106
	Trackwork	(854m)	5B-07-TRCK-	28/07/2009	03/08/2010	371	199
<b>Section 5C</b>							
	Trackwork - Depot Stop to Gogarburn	(562m)	5C-02-TRCK-	06/04/2010	13/12/2010	251	-80
	Trackwork	(760m)	5C-06-TRCK-	03/12/2009	10/09/2010	281	251
<b>Section 6</b>							
	Total	(3492m)					
	Trackwork - Ballasted		6A-01-TRCK-	08/02/2009	12/02/2009	4	4
	Trackwork - Ballast & Embedded		6A-01-TRCK-	26/03/2009	24/07/2009	120	
	Trackwork - Column Track		6A-01-TRCK-	25/05/2009	19/08/2009	86	
<b>Section 7</b>							
	Trackwork	(1750m)	7A-04-TRCK-	01/06/2010	27/10/2010	148	148
	Trackwork	(833m)	7A-05-TRCK-	31/08/2010	10/02/2011	163	163
<b>Average period of inactivity (days)</b>						<b>73</b>	<b>63</b>
<b>Total Duration of Inactivity (days)</b>						<b>3485</b>	<b>2394</b>





Appendix 6/1 – Summary of Assessment of Delay Mitigation Opportunities and requirements for extension of time.





### Appendix 6/1 - Summary of Assessment of Delay Mitigation Opportunities and requirement for extension of time

Ref. No.	Activity Set/Group	Over-run date on BSC mitigated programme	Over-run on current Section Completion Date (Calendar days)	Driving Activities / Further mitigation	Residual estimated requirement to EoT (calendar Days)	Comment
1	Final track works Lindsay Road Ch 700-850	12/05/2011	63	Re-programme this entire section to reduce overall duration from 26 months to approx. 12 months. (Work scope = 850m of road and track with 250m of retaining wall.)	0	More recent programme produced by BSC show a significantly shorter overall duration for the actual design that has to be built.
2	Newhaven Tram Stop	23/05/2011	74	Projected delay to be mitigated as part of the Lindsay Road works, referred to at 1. above.	0	There is no apparent reason why this tram stop cannot be constructed during 2009 - 2010.
3	Leith Sands Sub-station	13/06/2011	95	There appears to be no physical reason why this work cannot commence at a much earlier date.	0	The logic driving this activity does not appear to be justified in terms of the nature of the work and its interdependency on other activities.
4	Victoria Dock Entrance Bridge (S16) - Re-profile and waterproof deck (dummy)	31/05/2011	82	This activity is driven by trackwork at Ocean Terminal to Rennies Isle. These works are being driven by Tower Place Bridge which is being driven by the MUDFA milestone. The access date to commence Tower Place Bridge appears to be over-stated by over 30 weeks in BSC's delay analysis.	0	Refer to Section 5 of this report for further details.
5	Tower Place Bridge	25/03/2011	15	In BSC's analysis, this activity is being driven by the MUDFA milestone for "Area 1". The access date to commence this work appears to be over-stated by over 30 weeks as it should be driven by the specific utilities diversions associated with this structure and not the "Area 1" milestone.	0	
6	Roadworks Ocean Terminal to Rennies Isle Ch 1080-1410	01/07/2011	113	This is part of a chain of activities driven by the delay impacted on Tower Place Bridge. As this delay appears to be over-stated by over 30 week, the delay to this activity is likewise over-stated.	0	

Ref No.	Activity Set/Group	Over-run date on BSC mitigated programme	Over-run on current Section Completion Date C (Calendar days)	Driving Activities / Further mitigation	Residual estimated requirement for EoI (Calendar Days)	Comment
7	Trackworks Ocean Terminal Ch 850-1080	03/06/2011	85	This is part of a chain of activities driven by the delay erroneously impacted on Tower Place Bridge. Consequently, the projection of the delay to this activity appears to be over-over 30 weeks.	0	
8	Trackworks Rennies Isle to Casino Square Ch 1410-1880	13/04/2011	34	This is part of a chain of activities driven by the delay erroneously impacted on Tower Place Bridge. Consequently, the projection of the delay to this activity appears to be over-stated by over 30 weeks.	0	
9	Trackwork Ocean Terminal to Rennies Isle Ch 1080-1410	04/07/2011	116	This is part of a chain of activities driven by the delay erroneously impacted on Tower Place Bridge. Consequently, the projection of the delay to this activity appears to be over-stated by over 30 weeks.	0	
10	Ocean Terminal Tram Stop - Commissioning of SIG - interlocking cubicle.	11/08/2011	154	Driven by E&M Newhaven to Ocean terminal the delay to which, as noted below, is over-stated by over 200 days as a result of Infracore imposed resource constraints.	0	
11	Port of Leith Tram Stop	10/06/2011	92	This is part of a chain of activities driven by the delay erroneously impacted on Tower Place Bridge. Consequently, the projection of the delay to this activity appears to be over-stated by over 30 weeks.	0	It appears to me that there is no apparent reason why this tram stop cannot be constructed well in advance of Section Completion Date C.
12	Trackworks Baltic to Queen Charlotte Ch 2110-2340	26/04/2011	47	This activity set is presented with 4 months delay between initial civil works and "Set Track". This appears to be a delay driven by two resource constraints from logic linking Finish to Start with other "Set Track" activities. Lifting the resource constraints by addition an additional gang would appear to me to eliminate the projected delay beyond the current Section Completion Date C.	0	
13	Bernard Street Tram Stop	28/04/2011	49	This driven by the traffic management set-up on track works at Baltic to Queen Charlotte Ch 2110-2340 which in turn is driven by track work on Queen Charlotte to Foot/Walk Ch 2340-2730. This later set of activities includes an 81 day "Set Track" delay that appears to arise from preferential logic and/or resource smoothing. By increasing the track resources by one gang this delay can be avoided.	0	It appears to me that there is no apparent reason why this tram stop cannot be constructed well in advance of Section Completion Date C.

Ref No.	Activity Set/Group	Over-run date on BSC mitigated programme	Over-run on current Section Completion Date C (Calendar days)	Driving Activities / Further mitigation	Residual estimated requirement for EoI (Calendar Days)	Comment
14	E&M Installations - Newhaven to Ocean Terminal	04/10/2011	208	This activity set is initially driven by resource links to from Section 5B. It is then further delayed by what appears to be resource levelling arising from high demand in the over-run period. This constraints could be relieved by the introduction of an additional OHE gang. This could mitigate the delay to the extent that there would be no over-run on the current Section Completion Date C.	0	
15	E&M Installations - Ocean Terminal to Foot of Walk	06/09/2011	180	This activity set is initially driven by completion of track works in several parts of Section 1A. These activities have been delayed by an erroneous linkage to the Section 1A MUDFA milestone and the consequential projected delays to the Tower Place and Victoria Dock Entrance bridges referred to above. Correction of this error has the potential to save approx. 6 months (182 days) of delay. Increasing the available resources would add further to the mitigation that could be achieved, if required.	0	
16	Foot of the Walk (inc.) to McDonald Road (exc.) - E&M Installation	08/08/2011	151	This activity set is driven by the series of activities sets for the works along Section 1B. The BSC's submission is based on the MUDFA milestone for this area being 24 September 2009. I have examined the detail of the MUDFA Rev.8 programme and note that access is available to commence work in many parts of this intermediate section 8 to 10 weeks (56 to 70 days) earlier that shown in BSC's delay analyses submissions. I consider that there is also scope to mitigate delay by reducing durations and/or breaking the unnecessary Finish to Start chains of logic through the many phases on this intermediate section. Examination of the durations allowed for each of the numerous activities indicates to me scope for time savings. Production rates on excavation, kerbing, ducts and drainage appear overly generous. Track laying durations may also provide opportunity to recover time. There would also appear to be opportunity to increase the number of hours worked each week. I estimate that by saving a few days on each of the longer activities, approximately 100 to 150 calendars days of delay can be mitigated in what I consider would be a cost effective manner.	0	I have been unable to conducted a more accurate assessment and cost benefit analysis because of the lack of actual resource and cost information and what I am advised to be BSC rejection of tie's requests to jointly investigate such mitigation measures.
17	Roadworks and track works on Section 1B	Varies	Varies	See notes on item 16 above. These works are all part of the activity chains that lead to the E&M installation on Section 1B.		

Ref No.	Activity Set/Group	Over-run date on BSC mitigated programme	Over-run on current Section Completion Date C (Calendar days)	Driving Activities / Further mitigation	Residual estimated requirement for EoI (Calendar Days)	Comment
18	McDonald Road (inc.) to Princes Street West (exc.)	07/07/2011	119	This set of activity groups is driven by the MUDFA Area 1 milestone. In reality, this work is dependent on the Area 1C diversions. These are planned to be complete approximately 107 days earlier. The activities are also linked to the summer and Xmas embargo calendars. I am advised that this is incorrect and that the principle of relaxing these types of embargos as a mitigation measure has previously been established. This has the potential to save a further 56 days of delay.	0	Further time could be saved on these activities, if required, by applying some of the mitigation measures noted at 16. above.
19	Picardy Place	13/09/2011	187	In BSC's delay analysis, these works are driven by completion of works at Shandwick Place. It is understood that this linkage is superseded logic associated with traffic management. Removing this logic reduces the delay by approximately 80 days. The final two phases on Picardy Place are outwith the requirements for Section Completion Date C and therefore a further 102 days can be deducted from the overall delay. Phases 3 & 6 of Picardy Place have been linked to the Festivals embargo calendar which could be relaxed. This leads to a further delay reduction of 56 days.	0	
20	Cathedral Sub-station - Testing & Commissioning.	14/07/2011	126	The start of this activity group is driven by the civil engineering and building works at Picardy Place Tram Stop. As noted at item 19. above, this work is being projected with unnecessary delay of over 200 days. The final commissioning is also linked to Section 1C works.	0	
21	Princes Street (inc.) to Haymarket (exc.) - E&M Installation	20/05/2011	71	These activities are being driven by the various traffic management phases through the Haymarket / Torphichen Area. This is driven by the MUDFA Area 1D milestone, currently set at 29/9/09. These works are projected through three "festival" embargo calendars which add 77 days of delay. Relaxation of these should provide sufficient time to mitigate the projected delay. The chain of activity groups through this area also appear to be being prolonged due to resource constraints (Track resources). Addressing the BSC imposed resource constraints will save significantly more time.	0	

Ref No.	Activity Set/Group	Over-run date on BSC mitigated programme	Over-run on current Section Completion Date C (Calendar days)	Driving Activities / Further mitigation	Residual estimated requirement for EoT (Calendar Days)	Comment
22	Lothian Road Junction Ch 440-280 - Phase 4a	11/04/2011	32	Track resource constraints appear to be prolonging the duration of these activity groups. If this constraint is released and cognicance taken of the revised programme of works for this area, the projected delay beyond the current Sectional Completion C date should be significantly mitigated.	0	
23	Balgreen Road (exc.) to Edinburgh Park Central (inc.)	15/11/2011	250	The delay to this activity set , prior to Infracore resource smoothing and delay mitigation was only 61 days. It appears that the increase of 189 days is resource driven. Additionally, the commencement date for the first activity in the set is resource driven by the completion of track works on a different section of the route. Lifting these constraints reduces the projected completion to within the current Sectional Completion Date.	0	
24	Edinburgh Park Central (exc.) to Gogarburn (inc.) - E&M Installations	13/04/2011	34	Delayed by track laying which is resource driven. Lifting the resource constraint would appear to save several months of time.	0	
25	Gyle Centre Tram Stop	27/05/2011	78	This activity set is driven by the track works referred to at item 24. above. If the resource constraint is lifted the projected over-run can be mitigated.	0	

Ref. No.	Activity Set/Group	Over-run date on BSC mitigated programme	Over-run on current Section Completion Date A (Calendar days)	Driving Activities / Further mitigation	Resultant estimated requirement for EoT (Calendar Days)	Comment
26	Depot building & Equipment	13/12/2010	195	The MUDFA 8 date impacted into BSC's delay analyses is approximately 16 days later than what I am advised is the actual date for completion of the water main diversion. The logic network in BSC's analyses is based on the premise that none of the bulk earthworks can commence before the water main is diverted. As I note in Section 5 of this report, there would appear to me to be no justifiable reason why the bulk of the earthwork should not have been removed earlier. I understand that tie directed BSC to do so but that direction was not followed. I estimate that should have saved at least 28 days of the projected delay. I also consider that by re-sequencing the building construction works and increasing resources another 40 to 80 days could be saved on the programmed allowance for the building envelope. The building services and fit-out activities also appear to have overly generous allowances which have scope for reducing by re-sequencing and revised resourcing. I also question the strict finish to start logic link between testing and commissioning the building and the commencement of the equipment installation. As noted in Section 5 of this report, I consider there is scope to mitigate delay by introducing a significant negative lag to this relationship in the order of 60 to 90 days. I note that in discussions with BSC's representatives the practicalities and potential time savings from such action have been acknowledged.	Potentially zero	I also note that the projected consequences of late completion of the water main diversion do not accord with what has happened on site. As noted in Section 5 of this report, the water main diversion would not appear to be on the actual critical path for the Depot. This brings into question whether the water main is in fact playing any part in the actual cause of delay.
27	Depot track works	05/07/2010	34	The MUDFA 8 date impacted into BSC's delay analyses is approximately 16 days later than what I am advised is the actual date. The Depot trackwork are programmed to take almost 1 year using only 1 tracklaying squad. Adding an additional squad (potentially saving up to 6 months of time) will reduce the projected over-run to within the current Section Completion Date A. I also note that some of the issues noted at item 26 above would further significantly reduce the projected delay.	0	

28	Depot E&M works	06/12/2010	188	Mitigation of the projected delay to the track works, as noted at 27. above, will allow earlier commencement of this activity set. The introduction of additional resource would greatly reduce the overall duration. I also note that the E&M works are linked finish to start with completion of the entire 3,500 linear metres of track within the Depot site. I consider this logic relationship to project an unnecessarily long delay and that there is realistic scope to introduce a negative lag of at least three month. The combined effect of these two mitigation measures would bring the projected delay within that projected for item 26. above.	0	
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