

Edinburgh Tram Project

MUDFA Rev.08

Initial assessment of EoT requirement

Initial Assessment of Infraco Claim for Extension of Time in
relation to the issue of the MUDFA Rev.08 Programme.

DRAFT

Authors:

Iain McAlister & Tom Hickman

31 August 2009 Ver.01

Interim Assessment of MUDFA delays EoT submission

Background

Infraco has submitted a claim for extension of time (EoT) arising from the late completion, and projected late completion, of the MUDFA programme of works. It is presented pursuant to Clause 80 of the Infraco Contract as the Estimate associated with a notified **tie** Change.

The document takes the form of a letter dated 6th August 2009 entitled “*Estimate in Respect of Notice of tie Change Number 429 - MUDFA programme Revision 08 – Delay and Disruption Resulting From Incomplete Utility Works*”. It contains several hard and soft copy appendices. Appendices C & D are impacted programmes. The soft copies of these programmes are presented in “pdf” format. This does not permit examination and analysis of the network logic, resource allocations and other programming data as it does not appear on the printed output. Consequently, the submission provides limited information for **tie** to conduct its assessment.

Following several requests from **tie**, Infraco, subsequently, provided full soft copy (in Primavera “xer” format) of the programmes contained in Appendices C & D. These were received by **tie** on 18th August 2009 (email Stephen Sharp to Tom Hickman).

Entitlement

Infraco has based its submission on the premise that if the MUDFA Contractor and/or Utility does not complete the diversion works in accordance with the requirements of the Programme a departure from the Base Case Assumptions has arisen. Examination of Schedule Part 4 would appear to indicate that this is the case. Consequently, a Notified Departure has occurred. By definition, this is a Mandatory **tie** Change and falls to be assessed in accordance with Clause 80 (**tie** Change).

It should also be noted that Clause 3.5 of Schedule Part 4 states that;

“.....For the avoidance of doubt tie shall pay to the Infraco, to the extent not taken into account in the Estimate provided pursuant to Clause 80.24.1, any additional loss and expense incurred by the Infraco as a consequence of the delay between the notification of the Notified Departure and the actual date (not the deemed date) that tie issues a tie Change Order, such payment to be made by tie following evaluation, agreement or determination of such additional loss and expense pursuant to Clause 65 (Compensation Events) as if the delay was itself a Compensation Event.”

In recognition of the time that will lapse in agreeing the Estimate of the Notified Departure / Mandatory **tie** Change through the contractual mechanism prescribed in Clause 80, it would seem prudent to make sure there is always clarity as to how such delay is or is not taken into account in the Estimate.

Contractual Processes

[Suggest DLA comment on the content and relative timings of the notices and submissions relating to the MUDFA works. It should be noted that Infraco has submitted a large number of notifications associated with the MUDFA works since May 2008.]

By way of its letter reference 25.1.201/MRH/3016 dated 8 July 2009, Infraco has notified **tie** of a Notified Departure arising from the issue of the MUDFA Rev.08 programme. The contractual process for assessing Notified Departures is prescribed in Clause 80 of the Contract. It is summarised as follows.

1. By the action of Infraco notifying a Notified Departure, **tie** is deemed to have issued a **tie** Notice of Change. (Schedule Part 4, Clause 3.5)
2. If Infraco considers that the Estimate required is too complex to be completed and returned to **tie** within 18 Business Days, Infraco shall, within 5 Business Days, deliver a request for a reasonable extended period of time for return of the Estimate. (Clause 80.3)
3. Within 18 Business Days Infraco shall deliver to **tie** the Estimate. It shall include, among other things (Clause 80.5),:
 - a. Requirements for relief from obligations
 - b. Any impact on the programme and any requirement for EoT
 - c. Proposals to mitigate the impact of the **tie** Change
 - d. Any increase or decrease in any sums due to be paid under the Agreement
4. The Estimate shall include, among other things, evidence demonstrating that (Clause 80.7):
 - a. Infraco has used all reasonable endeavours to minimise any increase in costs and maximise any reduction of costs
 - b. Infraco has investigated how to mitigate the impact of the **tie** Change
 - c. The **tie** Change will be implemented in the most cost effective manner
5. As soon as reasonably practicable after **tie** receives the Estimate the parties shall discuss and agree the issues set out in the Estimate (Clause 80.9).
6. As soon as reasonably practicable after the contents of the Estimate have been agreed, **tie** may issue a **tie** Change Order or, if **tie** does not issue a **tie** Change Order within 28 Business Days, **tie** will be deemed to have issued a **tie** Change Order (Clause 80.14).
7. If the parties cannot agree the contents of the Estimate then either party may refer the Estimate to the DRP (Clause 80.10).

Compliance with Contractual Processes

Infraco's submissions in respect of this Notified Departure deviate from the prescribed contractual process, as set out below.

1. The notice of Notified Departure, served on 8th July 2009, is submitted 47 Business Days after **tie** issued to Infraco the revised MUDFA programme. This brings into question when the notification of Notified Departure was actually deemed to have been served (30 April 2009 or 8 July 2009).
2. Notwithstanding item 1. above, Infraco has neither submitted the Estimate within 18 Business days nor notified within 5 Business Days that the Estimate required is too complex to be completed and returned within 18 Business Days. (The Estimate was submitted 98 days from 30 April 2009 and 31 days from 8 July 2009.)
3. The Estimate submitted on 6 August 2009 and supplemented by electronic programming information sent by email on 18 August 2009 does not include all of the information, opinion and evidence required by Clause 80. In particular it does not include:
 - a. Any increase or decrease in any sums due to be paid to Infraco

- b. Evidence demonstrating Infraco has used all reasonable endeavours to minimise any increase in costs and to maximise any reduction of costs
- c. Evidence demonstrating that the **tie** Change will be implemented in the most cost effective manner

In addition, while the submission appears to have addressed mitigation of the impact of the Change, the measures that appear to have been considered and applied are considered to be very limited and have relatively little beneficial effect. There would appear to be many more opportunities to mitigate delay and thereby considerably reduce the time and cost impact of this **tie** Change.

Infraco Assessment of Requirement for Extension of Time

Infraco's method of assessment of the requirement for extension of time is set-out in Appendix A of the Estimate submission. It takes the form of an "as-planned impacted" delay analysis.

The original and current versions of the (Contract) Programme contain 10 milestones associated with MUDFA & Utilities works. Each milestone refers to a specific geographic area of the route. Together, the geographic areas span the entire length of the route. These milestones were created by Infraco as part of its preparation of the Contract Programme. The dates associated with them are listed in the Infraco Programming Assumptions (12 May 2008) contained in Schedule 15 of the Contract¹.

Infraco appears to have updated the milestone dates in the current Programme with the actual/forecast dates from the MUDFA Revision 08 programme. (For each section's milestone, the latest activity completion date has been used as the revised date for the milestone.) These dates have then been impacted, apparently without further consideration as to their true impact, into the current Programme. This produces the programme included at Appendix C of Infraco's Estimate submission.

Infraco has then taken this "Appendix C" programme and adjusted it to correct some readily apparent logic errors and to re-prioritise the allocation of its track and overhead line resources within the constraints it has imposed. Explanation of these actions is provided in Appendix A of the Estimate submission. Infraco appears to consider that, by this action, it has fulfilled its mitigation obligations. The resulting programme is presented as the evidence and calculation of its requirement for EoT.

tie assessment of Requirement for Extension of Time

In the absence of further information from Infraco, **tie** has conducted an initial assessment of what it considers to be Infraco's actual requirement for EoT. This assessment includes the application of what appear to be practical and cost effective delay mitigation measures. Where errors have been identified in the network logic their impact on Infraco's projections has also been taken into account.

The following process has been applied to inform **tie**'s assessment:

¹ The activity names used in the programme do not precisely match those used in the Programming Assumptions. On first inspection, they do not appear to correlate. However, on closer examination, 9 out of 10 can be matched. The 10th, referred to in the Programming Assumptions as Section 2A, does not appear as a milestone in the Programme.

Taking each milestone and associated section in turn;

1. Examine the information presented by the Infraco and check for factual accuracy.
2. Consider whether the delay to the milestone can be accommodated within the total float attaching to that milestone in the current Programme? If yes, there is no requirement for an EoT. The impact of the delay to the milestone requires no further consideration as part of the assessment.
3. If the delay to the milestone exceeds the attributed float, identify which succeeding activities are shown as delayed.
4. Of the identified succeeding activities, consider which are actually driven by the delayed MUDFA works.
5. For each activity or group of activities that are projected to be completed after the appropriate current Sectional Completion Date, examine the programme logic and resource constraints that give rise to this delay. Consider means by which the delay can be mitigated. Where identified mitigation measure appear to reduce the requirement for EoT, identify what is required to reduce the delay to the point where it no longer contributes to the requirement for EoT. For delays to activities or activity groups which cannot be mitigated to this extent, consider to what extent the requirement for EoT can be reduced without incurring disproportionate additional cost and/or disruption.
6. On completion of this exercise and the noting of the mitigation measures considered to be practicable and cost effective, assess the EoT required as a result of implementing this **tie** Change.

The details of this assessment and the mitigation measures applied in the assessment are included at Appendices A & B to this paper.

Identified Mitigation Measures / Opportunities

Through the aforementioned process of examination and analysis the following mitigation measures and opportunities were identified:

1. Re-ordering and re-sequencing of activities to reduce overall durations (e.g. Lindsay Road, Depot Building, Section 5 structures.)
2. Revision of traffic management arrangements and phasing, some of which are already being implemented. (e.g. Princes Street, St Andrew Square, Picardy Place, Leith Walk, Lindsay Road, Haymarket.)
3. The lifting of Infraco imposed constraints on certain resources, in particular those associated with track laying and overhead lines.
4. The advancement of construction works in areas already made available to Infraco, thereby reducing the general work intensity in the later stages of the projected Programme (e.g. Section 1 Tower Place Bridge, Section 2 track works, Section 5 – various structures and track works, Depot building and track works, Section 7 structures and track works.)
5. The revision/removal of embargoes on different parts of the site, some of which have already been relaxed. (e.g. Princes Street, Haymarket. Further relaxations can be investigated if Infraco considers they would be advantageous)

6. Review of particular designs to produce more cost effective solutions that can be constructed more quickly. (e.g. Lindsay Road, Section 7 civil works, ground improvement layers in various locations, Section 5 – various structures.)
7. The acceleration of particular activities that are identified as being on the critical path to the Sectional Completion dates where the costs associated with such action would be relatively small compared against the delay mitigated and its associated additional cost.

Conclusion

The Estimate submitted by the Infraco in relation to this Notified Departure does not fulfil the requirement of the Contract and in particular the specific provisions of Clause 80. It does not appear to be based on the most cost effective implementation of this Mandatory **tie** Change. The identified mitigation measures appear to fall far short of those that could be readily employed. This produces an unnecessarily long projected delay to the Sectional Completion Dates and will give rise to considerable additional cost. The absence from the Estimate of any cost information hinders **tie**'s ability to make well informed and accurate judgement on this matter.

Infraco's approach to this Mandatory **tie** Change is considered to be in direct contravention of its general and specific contractual obligations with respect to using all reasonable endeavours to mitigate additional cost and delay.

tie's initial assessment of the EoT that may be required as a result of implementing this Mandatory **tie** Change, in the most cost effective manner, is set out in the table below.

Section	Current (Rev.01)	MUDFA 8 Claim	tie unmitigated assessment	tie mitigated assessment	Comment
A	1 June 2010	13 Dec. 2010	153 days delay 1 Nov. 2010	63 days delay 3 Aug 2010	Mitigation of 60 days saving on building works plus 30 days overlap of equipment installation
B	1 July 2010	10 Jan. 2011	153 days delay	63 days delay 2 Sept. 2010	Section B date is 28 days after the Section A date, assuming sufficient track is laid away from the Depot.
C	10 Mar. 2011	22 Nov. 2011	151 days delay 3 Aug. 2011	19 days delay 29 Mar. 2011	Infraco claim appears to over-estimate MUDFA completion date by 23 days. Leith Walk is the primary driver of delay. Opportunities identified to reduce overall duration by approximately 109 days.
D	6 Sept. 2011	20 May 2012	151 days delay	19 days delay 29 Sept. 2011	Section D date is 6 months after the Section C date.

Important Notes

Sectional Completion A Date

The mitigation identified for Sectional Completion A is considered to be a conservative estimate of what can practicably be achieved in terms of reducing the durations allowed for the building and track works in the Depot. However, it is also important to note that other matters (outwith the MUDFA Works) have delayed many of the Depot activities beyond the start dates indicated on the impacted programme. Liability for many of these has yet to be determined. There also appear to be issues of concurrency and dominant cause associated with the overall assessment of the requirement for EoT to the Sectional Completion A Date. These include delays associated with procurement and design for which it appears Infraco carries liability. These can only be fully assessed when further information becomes available. This may increase or decrease the assessment above.

Sectional Completion C Date

This assessment of the requirement for an EoT to the Sectional Completion C Date has concluded that the critical area under the current Programme logic is the delay to commencement of the Infraco Works in Leith Walk (i.e. Sections 1B/1C1). It is considered that effective mitigation measures can be applied to all other areas where Infraco's submission projects works beyond the current Sectional Completion C Date. The works in Leith Walk require to be phased around the traffic management requirements and constraints. It is considered there is scope to introduce mitigation/acceleration measures to improve the efficiency of the execution of these works and thereby reduce activity durations. It has been assumed that Infraco can be persuaded to adopt such

an approach so that this can be achieved. Such mitigation will require close cooperation between the Infracore and **tie** management teams to ensure every possible time saving can be realised and no further delay is incurred.

End. 31/8/09 IMcA/TH

DRAFT

Appendix A

Initial Assessment of Impact on Sectional Completion A Date

DRAFT

APPENDIX A - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion A Date

Depot Building Programme Summary				MUDFA unmitigated			Rev.02 (For comparison purposes only. Not used in this assessment)		
Description	Rev.01			Start	Finish	Duration	Start	Finish	Duration
	Start	Finish	Duration						
Earthworks	27/06/2008	10/11/2008	136	03/03/2009	16/07/2009	135			
Foundations	01/08/2008	20/10/2008	80	07/04/2009	25/06/2009	79	18/09/2009	16/10/2009	28
Building including fit-out	01/09/2008	14/10/2009	408	07/05/2009	12/05/2010	370	16/10/2009	23/06/2011	615
Tram equipment	14/10/2009	30/04/2010	198	13/05/2010	12/11/2010	183	22/10/2010	11/05/2011	201
Inspection & Handover	30/04/2010	01/06/2010	32	15/11/2010	13/12/2010	28			
Overall durations	704 days			(excl. E/w)	650 days				
				(excl. E/w) & Insp'n & H'over	615 days				
					584 days		(excl. E/w) & Insp'n & H'over	600 days	

Rev.02 spans 2 Xmas holidays.
This accounts for the difference in overall duration

tie considers that the water main diversion was practically complete by 17 February 2009. Infraco claim 2 March 2009

If water main was not practically complete until **17/02/2009** completion without mitigation should be 01/11/2010 EoT required without mitigation 153 days
(i.e. 17/02/2009 + 615 + 7 days for the critical earthworks dependent on diversion of the water main.

Mitigation opportunities

- Reduce the duration of the building works by efficient working. Many of the existing durations appear unnecessarily long.
- Re-ordering/sequencing of building superstructure works to reduce overall durations for steel erection, cladding and blockwork.
- Remove the finish to start relationship between completion of the building and installation of the equipment.

Potential time savings. (subject to further detailed examination and discussion with Infraco?)

Overall construction period for the building - 30 to 90 days. (Say, for the meantime, 60 days for the purpose of this initial assessment of MUDFA Rev. 8 claim)
Earlier start on equipment installation - 30 days. (This could be more. Requirement for detailed discussions with Infraco to establish exactly what can be achieved)

Appendix B

Initial Assessment of Impact on Sectional Completion C Date

DRAFT

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on current Section C		Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
		Infraco mitigated programme	Date (Calendar days)			
1	Final track works Lindsay Road Ch 700-850	12/05/2011	63	Re-programme this whole 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	
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	
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	
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. The works are being driven by Tower Place Bridge which is being driven by the MUDFA milestone. This link appears to be an error in the programme network logic. The resulting projected delay = approx. 6months over-stated.	0	There appear to be underlying delays to the SDS design associated with design intergration issues. (Ref. SDS programme - TH)
5	Tower Place Bridge	25/03/2011	15	This activity is driven by the MUDFA milestone for Area 1. This work should not be being driven by this MUDFA milestone as the utilities diversion work around this and other structures in the area has already been completed. Resulted unnecessary projected delay = approx. 6 months.	0	There appear to be underlying delays to the design associated with design intergration issues. (Ref. SDS programme - TH)
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 around 6 months, this activity is likewise.	0	
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-stated by around 6 months.	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 around 6 months.	0	

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on Infraco mitigated programme	Over-run date on current Section C Date (Calendar days)	Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
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 around 6 months.	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 Infraco 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 around 6 months.	0	
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 2 resource constraints from logic linking FS with other "Set Track" activities.	0	
13	Bernard Street Tram Stop	28/04/2011	49	Driven by TM 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.	0	
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 Sectional Completion Date.	0	

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on current Section C		Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
		Infraco mitigated programme	Date (Calendar days)			
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.	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 Infraco submission is based on the MUDFA milestone for this area being 24 September 2009. The current tie estimate for this key date is 1 September 2009. This realises a 23 day reduction in the projected delay. The remainder of the delay can only be mitigated by reducing durations and/or breaking the F-S chain of logic through the phases on this section. The recent rejection of alternative TM proposals that would have facilitated mitigation through re-sequencing appears to have limited this option. Examination of the durations allowed for each of the numerous activities indicates scope for time savings. Production rates on excavation, kerbing, ducts and drainage appear generous. Track laying durations may also provide opportunity to recover time. This is particularly so if there is scope to increase working hours. It is estimated that by saving a few days on each of the longer activities, 109 calendars days of delay can be mitigated.	19	Further work is required by the project managers who understand the technical and contractual details of his part of the Project. There may also be scope for further mitigation.
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.		

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on current Section C		Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
		Infraco mitigated programme	Date (Calendar days)			
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 to 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. This is wrong. Correction results in a further time saving of 56 days.	0	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	These works are driven by completion of 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 Sectional Completion C 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. This leads to a further deduction 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	Being driven by the various TM phases through Haymarket / Torphichen Area. This is driven by MUDFA Area 1D milestone, currently set at 29/9/09. These works are also 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 scheduling. (Track resources). Addressing resources should alleviate this constraint and save more time.	0	This milestone is currently predicted by tie to, possibly, extend to 4/1/10. This would impact further delay into the programme. The consequences of this are considered, at the time this paper was prepared, to be within the projected delay to Section 1B.

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on current Section C		Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
		Infraco mitigated programme	Date (Calendar days)			
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 mitigated.	0	
23	Balgreen Road (exc.) to Edinburgh Park Central (inc.)	15/11/2011	250	The delay to this activity set , prior to Infraco 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 can 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	
26	Depot building & Equipment	13/12/2010	N/a	Ref. Appendix A for initial assessment of the impact on the Sectional Completion A date.	63 days (on the Sectional Completion A date)	See "Appendix A" for further details. It is believed there is opportunity to further mitigate the 63 day resultant EoT noted in the adjacent cell.
27	Depot track works	05/07/2010	34	The MUDFA 8 date claimed by BSC is 28 days later than tie's equivalent date. This saves 28 days. The Depot trackwork are programmed to take almost 1 year using 1 tracklaying squad. Adding an additional squad will reduce the projected over-run to within the current Sectional Completion A date.	0	

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on Infraco mitigated programme	Over-run date on current Section C Date (Calendar days)	Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
28	Depot E&M works	13/12/2010	195	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. The combined effect of these two mitigation measures would bring the projected delay within that projected at 26. above.	0	

Edinburgh Tram Project

MUDFA Rev.08

Initial assessment of EoT requirement

Initial Assessment of Infraco Claim for Extension of Time in relation to the issue of the MUDFA Rev.08 Programme.

Alternative A – Assumptions as per EoT Paper (7 September 2009)

DRAFT

Authors:

Iain McAlister & Tom Hickman

8 September 2009 Ver.00

Interim Assessment of MUDFA delays EoT submission

This paper is one of two alternative versions of **tie**'s MUDFA 8 Rev.08 Initial Assessment of EoT. It has been prepared as a tracked changes version of the original so that the differences from the original can be readily identified.

Formatted: Font: Bold

The difference between this alternative and the original relates solely to the Gogar Depot works and the assessment of the Sectional Completion A Date. This alternative uses the same reduced durations for the depot building work as used in **tie**'s EoT 2 assessment. The time saving is based on what **tie** considers could be achieved if resequencing and resourcing was targeted for earliest practical completion of the building with equipment installation co-ordinated with the building finishes and commissioning.

Formatted: Font: Bold

The resulting assessment concludes that there **may** be no requirement to extend the current date for Sectional Completion A if Infraco mitigates delay and applies cost effective measures to recover lost time.

Formatted: Font: Bold, Italic, Underline

Background

Infraco has submitted a claim for extension of time (EoT) arising from the late completion, and projected late completion, of the MUDFA programme of works. It is presented pursuant to Clause 80 of the Infraco Contract as the Estimate associated with a notified **tie** Change.

The document takes the form of a letter dated 6th August 2009 entitled "*Estimate in Respect of Notice of tie Change Number 429 - MUDFA programme Revision 08 – Delay and Disruption Resulting From Incomplete Utility Works*". It contains several hard and soft copy appendices. Appendices C & D are impacted programmes. The soft copies of these programmes are presented in "pdf" format. This does not permit examination and analysis of the network logic, resource allocations and other programming data as it does not appear on the printed output. Consequently, the submission provides limited information for **tie** to conduct its assessment.

Following several requests from **tie**, Infraco, subsequently, provided full soft copy (in Primavera "xer" format) of the programmes contained in Appendices C & D. These were received by **tie** on 18th August 2009 (email Stephen Sharp to Tom Hickman).

Entitlement

Infraco has based its submission on the premise that if the MUDFA Contractor and/or Utility does not complete the diversion works in accordance with the requirements of the Programme a departure from the Base Case Assumptions has arisen. Examination of Schedule Part 4 would appear to indicate that this is the case. Consequently, a Notified Departure has occurred. By definition, this is a Mandatory **tie** Change and falls to be assessed in accordance with Clause 80 (**tie** Change).

It should also be noted that Clause 3.5 of Schedule Part 4 states that;

*".....For the avoidance of doubt **tie** shall pay to the Infraco, to the extent not taken into account in the Estimate provided pursuant to Clause 80.24.1, any additional loss and expense incurred by the Infraco as a consequence of the delay between the notification of the Notified Departure and the actual date (not the deemed date) that **tie** issues a **tie** Change Order, such payment to be made by*

tie following evaluation, agreement or determination of such additional loss and expense pursuant to Clause 65 (Compensation Events) as if the delay was itself a Compensation Event.”

In recognition of the time that will lapse in agreeing the Estimate of the Notified Departure / Mandatory **tie** Change through the contractual mechanism prescribed in Clause 80, it would seem prudent to make sure there is always clarity as to how such delay is or is not taken into account in the Estimate.

Contractual Processes

[Suggest DLA comment on the content and relative timings of the notices and submissions relating to the MUDFA works. It should be noted that Infraco has submitted a large number of notifications associated with the MUDFA works since May 2008.]

By way of its letter reference 25.1.201/MRH/3016 dated 8 July 2009, Infraco has notified **tie** of a Notified Departure arising from the issue of the MUDFA Rev.08 programme. The contractual process for assessing Notified Departures is prescribed in Clause 80 of the Contract. It is summarised as follows.

1. By the action of Infraco notifying a Notified Departure, **tie** is deemed to have issued a **tie** Notice of Change. (Schedule Part 4, Clause 3.5)
2. If Infraco considers that the Estimate required is too complex to be completed and returned to **tie** within 18 Business Days, Infraco shall, within 5 Business Days, deliver a request for a reasonable extended period of time for return of the Estimate. (Clause 80.3)
3. Within 18 Business Days Infraco shall deliver to **tie** the Estimate. It shall include, among other things (Clause 80.5),:
 - a. Requirements for relief from obligations
 - b. Any impact on the programme and any requirement for EoT
 - c. Proposals to mitigate the impact of the **tie** Change
 - d. Any increase or decrease in any sums due to be paid under the Agreement
4. The Estimate shall include, among other things, evidence demonstrating that (Clause 80.7):
 - a. Infraco has used all reasonable endeavours to minimise any increase in costs and maximise any reduction of costs
 - b. Infraco has investigated how to mitigate the impact of the **tie** Change
 - c. The **tie** Change will be implemented in the most cost effective manner
5. As soon as reasonably practicable after **tie** receives the Estimate the parties shall discuss and agree the issues set out in the Estimate (Clause 80.9).
6. As soon as reasonably practicable after the contents of the Estimate have been agreed, **tie** may issue a **tie** Change Order or, if **tie** does not issue a **tie** Change Order within 28 Business Days, **tie** will be deemed to have issued a **tie** Change Order (Clause 80.14).
7. If the parties cannot agree the contents of the Estimate then either party may refer the Estimate to the DRP (Clause 80.10).

Compliance with Contractual Processes

Infraco's submissions in respect of this Notified Departure deviate from the prescribed contractual process, as set out below.

1. The notice of Notified Departure, served on 8th July 2009, is submitted 47 Business Days after **tie** issued to Infraco the revised MUDFA programme. This brings into question when the notification of Notified Departure was actually deemed to have been served (30 April 2009 or 8 July 2009).
2. Notwithstanding item 1. above, Infraco has neither submitted the Estimate within 18 Business days nor notified within 5 Business Days that the Estimate required is too complex to be completed and returned within 18 Business Days. (The Estimate was submitted 98 days from 30 April 2009 and 31 days from 8 July 2009.)
3. The Estimate submitted on 6 August 2009 and supplemented by electronic programming information sent by email on 18 August 2009 does not include all of the information, opinion and evidence required by Clause 80. In particular it does not include:
 - a. Any increase or decrease in any sums due to be paid to Infraco
 - b. Evidence demonstrating Infraco has used all reasonable endeavours to minimise any increase in costs and to maximise any reduction of costs
 - c. Evidence demonstrating that the **tie** Change will be implemented in the most cost effective manner

In addition, while the submission appears to have addressed mitigation of the impact of the Change, the measures that appear to have been considered and applied are considered to be very limited and have relatively little beneficial effect. There would appear to be many more opportunities to mitigate delay and thereby considerably reduce the time and cost impact of this **tie** Change.

Infraco Assessment of Requirement for Extension of Time

Infraco's method of assessment of the requirement for extension of time is set-out in Appendix A of the Estimate submission. It takes the form of an "as-planned impacted" delay analysis.

The original and current versions of the (Contract) Programme contain 10 milestones associated with MUDFA & Utilities works. Each milestone refers to a specific geographic area of the route. Together, the geographic areas span the entire length of the route. These milestones were created by Infraco as part of its preparation of the Contract Programme. The dates associated with them are listed in the Infraco Programming Assumptions (12 May 2008) contained in Schedule 15 of the Contract¹.

Infraco appears to have updated the milestone dates in the current Programme with the actual/forecast dates from the MUDFA Revision 08 programme. (For each section's milestone, the latest activity completion date has been used as the revised date for the milestone.) These dates have then been impacted, apparently without further consideration as to their true impact, into the current Programme. This produces the programme included at Appendix C of Infraco's Estimate submission.

Infraco has then taken this "Appendix C" programme and adjusted it to correct some readily apparent logic errors and to re-prioritise the allocation of its track and overhead line resources

¹ The activity names used in the programme do not precisely match those used in the Programming Assumptions. On first inspection, they do not appear to correlate. However, on closer examination, 9 out of 10 can be matched. The 10th, referred to in the Programming Assumptions as Section 2A, does not appear as a milestone in the Programme.

within the constraints it has imposed. Explanation of these actions is provided in Appendix A of the Estimate submission. Infraco appears to consider that, by this action, it has fulfilled its mitigation obligations. The resulting programme is presented as the evidence and calculation of its requirement for EoT.

tie assessment of Requirement for Extension of Time

In the absence of further information from Infraco, **tie** has conducted an initial assessment of what it considers to be Infraco's actual requirement for EoT. This assessment includes the application of what appear to be practical and cost effective delay mitigation measures. Where errors have been identified in the network logic their impact on Infraco's projections has also been taken into account.

The following process has been applied to inform **tie**'s assessment:

Taking each milestone and associated section in turn;

1. Examine the information presented by the Infraco and check for factual accuracy.
2. Consider whether the delay to the milestone can be accommodated within the total float attaching to that milestone in the current Programme? If yes, there is no requirement for an EoT. The impact of the delay to the milestone requires no further consideration as part of the assessment.
3. If the delay to the milestone exceeds the attributed float, identify which succeeding activities are shown as delayed.
4. Of the identified succeeding activities, consider which are actually driven by the delayed MUDFA works.
5. For each activity or group of activities that are projected to be completed after the appropriate current Sectional Completion Date, examine the programme logic and resource constraints that give rise to this delay. Consider means by which the delay can be mitigated. Where identified mitigation measure appear to reduce the requirement for EoT, identify what is required to reduce the delay to the point where it no longer contributes to the requirement for EoT. For delays to activities or activity groups which cannot be mitigated to this extent, consider to what extent the requirement for EoT can be reduced without incurring disproportionate additional cost and/or disruption.
6. On completion of this exercise and the noting of the mitigation measures considered to be practicable and cost effective, assess the EoT required as a result of implementing this **tie** Change.

The details of this assessment and the mitigation measures applied in the assessment are included at Appendices A & B to this paper.

Identified Mitigation Measures / Opportunities

Through the aforementioned process of examination and analysis the following mitigation measures and opportunities were identified:

1. Re-ordering and re-sequencing of activities to reduce overall durations (e.g. Lindsay Road, Depot Building, Section 5 structures.)

2. Revision of traffic management arrangements and phasing, some of which are already being implemented. (e.g. Princes Street, St Andrew Square, Picardy Place, Leith Walk, Lindsay Road, Haymarket.)
3. The lifting of Infraco imposed constraints on certain resources, in particular those associated with track laying and overhead lines.
4. The advancement of construction works in areas already made available to Infraco, thereby reducing the general work intensity in the later stages of the projected Programme (e.g. Section 1 Tower Place Bridge, Section 2 track works, Section 5 – various structures and track works, Depot building and track works, Section 7 structures and track works.)
5. The revision/removal of embargoes on different parts of the site, some of which have already been relaxed. (e.g. Princes Street, Haymarket. Further relaxations can be investigated if Infraco considers they would be advantageous)
6. Review of particular designs to produce more cost effective solutions that can be constructed more quickly. (e.g. Lindsay Road, Section 7 civil works, ground improvement layers in various locations, Section 5 – various structures.)
7. The acceleration of particular activities that are identified as being on the critical path to the Sectional Completion dates where the costs associated with such action would be relatively small compared against the delay mitigated and its associated additional cost.

Conclusion

The Estimate submitted by the Infraco in relation to this Notified Departure does not fulfil the requirement of the Contract and in particular the specific provisions of Clause 80. It does not appear to be based on the most cost effective implementation of this Mandatory **tie** Change. The identified mitigation measures appear to fall far short of those that could be readily employed. This produces an unnecessarily long projected delay to the Sectional Completion Dates and will give rise to considerable additional cost. The absence from the Estimate of any cost information hinders **tie**'s ability to make well informed and accurate judgement on this matter.

Infraco's approach to this Mandatory **tie** Change is considered to be in direct contravention of its general and specific contractual obligations with respect to using all reasonable endeavours to mitigate additional cost and delay.

tie's initial assessment of the EoT that may be required as a result of implementing this Mandatory **tie** Change, in the most cost effective manner, is set out in the table below.

Section	Current (Rev.01)	MUDFA 8 Claim	tie unmitigated assessment	tie mitigated assessment	Comment
A	1 June 2010	13 Dec. 2010	153 days delay 1 Nov. 2010	63-0 days delay 2-Aug1 Jun 2010	Mitigation of 60 days <u>21 weeks</u> saving on building works plus 30 days <u>overlap of 14 weeks</u> on equipment installation
B	1 July 2010	10 Jan. 2011	153 days delay	63-0 days delay 2-Sept1 Jul. 2010	Section B date is 28 days after the Section A date, assuming sufficient track is laid away from the Depot.
C	10 Mar. 2011	22 Nov. 2011	151 days delay 3 Aug. 2011	19 days delay 29 Mar. 2011	Infraco claim appears to over-estimate MUDFA completion date by 23 days. Leith Walk is the primary driver of delay. Opportunities identified to reduce overall duration by approximately 109 days.
D	6 Sept. 2011	20 May 2012	151 days delay	19 days delay 29 Sept. 2011	Section D date is 6 months after the Section C date.

Important Notes

Sectional Completion A Date

The mitigation identified for Sectional Completion A is considered to be ~~a conservative estimate of~~ what can practicably be achieved in terms of reducing the durations allowed for the building and track works in the Depot. However, it is also important to note that other matters (outwith the MUDFA Works) have delayed many of the Depot activities beyond the start dates indicated on the impacted programme. Liability for many of these has yet to be determined. There also appear to be issues of concurrency and dominant cause associated with the overall assessment of the requirement for EoT to the Sectional Completion A Date. These include delays associated with procurement and design for which it appears Infraco carries liability. These can only be fully assessed when further information becomes available. This may increase or decrease the assessment above.

Sectional Completion C Date

This assessment of the requirement for an EoT to the Sectional Completion C Date has concluded that the critical area under the current Programme logic is the delay to commencement of the Infraco Works in Leith Walk (i.e. Sections 1B/1C1). It is considered that effective mitigation measures can be applied to all other areas where Infraco's submission projects works beyond the current Sectional Completion C Date. The works in Leith Walk require to be phased around the traffic management requirements and constraints. It is considered there is scope to introduce mitigation/acceleration measures to improve the efficiency of the execution of these works and

thereby reduce activity durations. It has been assumed that Infracore can be persuaded to adopt such an approach so that this can be achieved. Such mitigation will require close cooperation between the Infracore and **tie** management teams to ensure every possible time saving can be realised and no further delay is incurred.

End. 8/9/09 IMcA/TH

DRAFT

Appendix A

Initial Assessment of Impact on Sectional Completion A Date

DRAFT

APPENDIX A - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion A Date

Depot Building Programme Summary Description	Rev.01			MUDFA unmitigated			Rev.02 (For comparison purposes only. Not used in this assessment)			EoT 2 Assessment (Appendix 4)		
	Start	Finish	Duration	Start	Finish	Duration	Start	Finish	Duration	Start	Finish	Duration
Earthworks	27/06/2008	10/11/2008	136	03/03/2009	16/07/2009	135				04 January 2009	11 June 2009	158
Foundations	01/08/2008	20/10/2008	80	07/04/2009	25/06/2009	79	18/09/2009	16/10/2009	28	15/03/2009	31/07/2009	138
Building including fit-out	01/09/2008	14/10/2009	408	07/05/2009	12/05/2010	370	16/10/2009	23/06/2011	615	26/04/2009	12/11/2009	200
Tram equipment	14/10/2009	30/04/2010	198	13/05/2010	12/11/2010	183	22/10/2010	11/05/2011	201	18/10/2009	11/02/2010	116
Inspection & Handover	30/04/2010	01/06/2010	32	15/11/2010	13/12/2010	28				14 February 2010	11 March 2010	25
Overall durations	704 days			650 days						431 days		
				<i>(excl. E/w) & Insp'n & H'over</i> 615 days			<i>(excl. E/w) & Insp'n & H'over</i> 600 days					

tie considers that the water main diversion was practically complete by 17 February 2009. Infraco claim 2 March 2009.

If water main was not practically complete until **17/02/2009** completion without mitigation should be (i.e. 17/02/2009 + 615 + 7 days for the critical earthworks dependent on diversion of the water main.)

01/11/2009
01/05/2010

EoT required without mitigation

153 days
-31 days

i.e. if EoT 2 reduced durations for building used.

Mitigation opportunities

Reduce the duration of the building works by efficient working. Many of the existing durations appear unnecessarily long.
Re-ordering/sequencing of building superstructure works to reduce overall durations for steel erection, cladding and blockwork.
Remove the finish to start relationship between completion of the building and installation of the equipment.

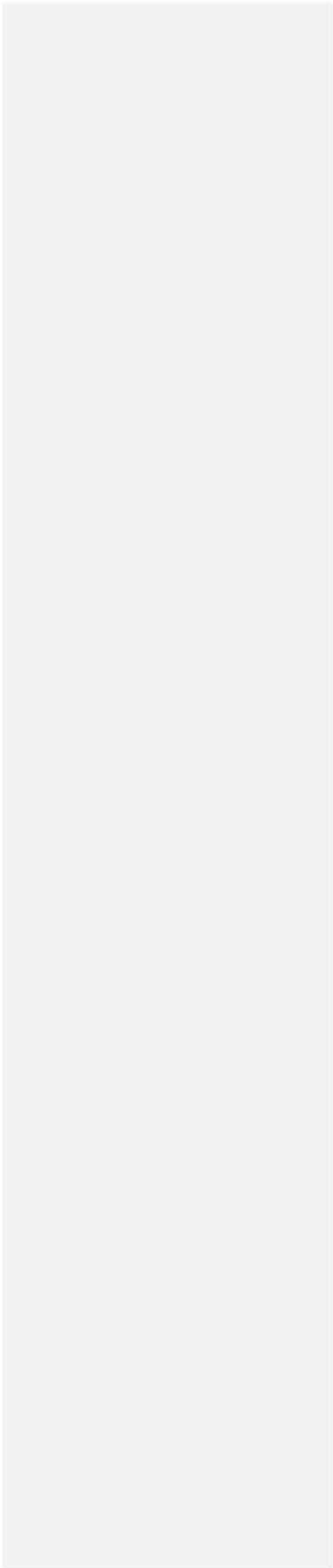
Potential time savings. (subject to further detailed examination and discussion with Infraco?)

Overall construction period for the building - 30 to 90 days. (Say, for the meantime, 60 days for the purpose of this initial assessment of MUDFA Rev. 8 claim)
Earlier start on equipment installation - 30 days. (This could be more. Requirement for detailed discussions with Infraco to establish exactly what can be achieved.)

Appendix B

Initial Assessment of Impact on Sectional Completion C Date

DRAFT



APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on current Section C		Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
		Infraco mitigated programme	Date (Calendar days)			
1	Final track works Lindsay Road Ch 700-850	12/05/2011	63	Re-programme this whole 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	
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	
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	
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. The works are being driven by Tower Place Bridge which is being driven by the MUDFA milestone. This link appears to be an error in the programme network logic. The resulting projected delay = approx. 6months over-stated.	0	There appear to be underlying delays to the SDS design associated with design intergration issues. (Ref. SDS programme - TH)
5	Tower Place Bridge	25/03/2011	15	This activity is driven by the MUDFA milestone for Area 1. This work should not be being driven by this MUDFA milestone as the utilities diversion work around this and other structures in the area has already been completed. Resulted unnecessary projected delay = approx. 6 months.	0	There appear to be underlying delays to the design associated with design intergration issues. (Ref. SDS programme - TH)
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 around 6 months, this activity is likewise.	0	
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-stated by around 6 months.	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 around 6 months.	0	

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on Infraco mitigated programme	Over-run date on current Section C Date (Calendar days)	Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
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 around 6 months.	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 Infraco 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 around 6 months.	0	
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 2 resource constraints from logic linking FS with other "Set Track" activities.	0	
13	Bernard Street Tram Stop	28/04/2011	49	Driven by TM 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.	0	
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 Sectional Completion Date.	0	

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on current Section C		Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
		Infraco mitigated programme	Date (Calendar days)			
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.	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 Infraco submission is based on the MUDFA milestone for this area being 24 September 2009. The current tie estimate for this key date is 1 September 2009. This realises a 23 day reduction in the projected delay. The remainder of the delay can only be mitigated by reducing durations and/or breaking the F-S chain of logic through the phases on this section. The recent rejection of alternative TM proposals that would have facilitated mitigation through re-sequencing appears to have limited this option. Examination of the durations allowed for each of the numerous activities indicates scope for time savings. Production rates on excavation, kerbing, ducts and drainage appear generous. Track laying durations may also provide opportunity to recover time. This is particularly so if there is scope to increase working hours. It is estimated that by saving a few days on each of the longer activities, 109 calendars days of delay can be mitigated.	19	Further work is required by the project managers who understand the technical and contractual details of his part of the Project. There may also be scope for further mitigation.
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.		

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on current Section C		Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
		Infraco mitigated programme	Date (Calendar days)			
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 to 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. This is wrong. Correction results in a further time saving of 56 days.	0	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	These works are driven by completion of 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 Sectional Completion C 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. This leads to a further deduction 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	Being driven by the various TM phases through Haymarket / Torphichen Area. This is driven by MUDFA Area 1D milestone, currently set at 29/9/09. These works are also 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 scheduling. (Track resources). Addressing resources should alleviate this constraint and save more time.	0	This milestone is currently predicted by tie to, possibly, extend to 4/1/10. This would impact further delay into the programme. The consequences of this are considered, at the time this paper was prepared, to be within the projected delay to Section 1B.

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on current Section C		Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
		Infraco mitigated programme	Date (Calendar days)			
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 mitigated.	0	
23	Balgreen Road (exc.) to Edinburgh Park Central (inc.)	15/11/2011	250	The delay to this activity set , prior to Infraco 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 can 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	
26	Depot building & Equipment	13/12/2010	N/a	Ref. Appendix A for initial assessment of the impact on the Sectional Completion A date.	63 days (on the Sectional Completion A date)	See "Appendix A" for further details. It is believed there is opportunity to further mitigate the 63 day resultant EoT noted in the adjacent cell.
27	Depot track works	05/07/2010	34	The MUDFA 8 date claimed by BSC is 28 days later than tie's equivalent date. This saves 28 days. The Depot trackwork are programmed to take almost 1 year using 1 tracklaying squad. Adding an additional squad will reduce the projected over-run to within the current Sectional Completion A date.	0	

APPENDIX B - Initial Assessment of MUDFA Rev. 8 EoT Claim - Impact on Sectional Completion C Date

Ref. No.	Activity Set/Group	Over-run on Infraco mitigated programme	Over-run date on current Section C Date (Calendar days)	Driving Activities / Further mitigation	Resultant EoT interim assessment (Calendar Days)	Comment
28	Depot E&M works	13/12/2010	195	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. The combined effect of these two mitigation measures would bring the projected delay within that projected at 26. above.	0	