
Report on investigations into delays incurred to certain elements of the Infraco Works

in relation to the

The Edinburgh Tram Project

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Draft for
discussion



Executive Summary

1. This report has been prepared to investigate and, where possible, identify areas of culpability for delays incurred to commencement, progress and completion of certain key elements, and hence Sectional Completion Dates A, B C & D, of the Infraco Works.
2. The investigations carried out to date indicate that **both parties to the Infraco Contract bear some responsibility for the delays incurred**. There is also the potential the SDS has contributed to those delays. Our current opinion on the parties respective culpability for delay has been summarised within 'Appendix (i)' attached to this report.
3. These investigations have identified a number of key areas of further investigation and/or audit which are required in order to more accurately establish the precise measure of each party's culpability. As a consequence, a number of **recommendations** have been made within the main body of this report in relation to matters such as (i) the reasons for delays to IFC package issue dates (both original and revised packages); (ii) the dates when the Infraco Design was issued to SDS; (iii) the INTC process; and (iv) Infraco sub-contractor procurement. Items (i) and (ii) above are key areas of uncertainty where delays have occurred but the reasons for same are uncertain.
4. We have also made further recommendations in respect of tie maintaining detailed INTC Master List Schedule, a more comprehensive IFC tracker process and the contemporaneous compilation of a detailed as-built programme.
5. For each of the Sectional Completion Dates we note the following in respect of our current estimate of liability for delay:-

1	2	3	4	5	6
Sectional Completion Date	Overall Projected Delay		Estimated tie culpability	Estimated Infraco culpability	Report Section
Section A	57 weeks	Lower Limit	25 weeks	14 weeks	Section 3
		Upper Limit	43 weeks	32 weeks	
Section B	57 weeks	Lower Limit	25 weeks	14 weeks	
		Upper Limit	43 weeks	32 weeks	
Section C	61 weeks	Lower Limit	61 weeks	0 weeks	Section 4
		Upper Limit	61 weeks	0 weeks	
Section D	61 weeks	Lower Limit	0	0 weeks	
		Upper Limit	61 weeks	0	

Note: The delay periods are measured against a mitigated view of Infraco's Revision 3 Setp 4 Issue 3 programme. Agreement has yet to be reached with Infraco as to the achievability of those dates.

Comment [RB1]: We are trying to get a better handle on this lower limit of tie's liability. Iain has been working on the revised durations still contained within the mitigated Issue 3 programme exercise which still show significant increases over the Rev. 1 programme. The intention is to try to close this out during the course of the coming week. Iain has also noted that 1A and 1C are not too far off the critical path and are also subject to the same increased durations as 1B. Iain will make contact with the PM's this coming week to progress.



6. In respect of **Section A** (Depot), **tie's** liability for delay is estimated to be between **25 to 43 weeks** (out of a total delay analysed of **57 weeks**). That is likely to give rise to a liability for area specific prolongation costs. Please refer to **Section 3** of this report for further details.
7. **tie** culpability for delays to the **Section C** date is estimated to be between **XX to YY weeks** (out of a total projected delay of **61 weeks** claimed by the Infraco). This is likely to give rise to a **tie** liability for **project level prolongation costs**. **Section 4** of this report refers. The measure of prolongation costs to which Infraco may be entitled however, is not necessarily inextricably linked to the period of extension of time to which it is entitled. Matters such as concurrency and causation of the particular loss claimed will feature in any analysis of entitlement to additional payment. Failures on the part of SDS where proven by further audit and analysis may also entitle **tie** to deduct sums from payments due to Infraco. Detailed analysis of the costs ultimately claimed by Infraco will be required to ensure that any sums claimed is properly due taking all of the above into consideration.
8. The measure of the delay which will actually be incurred however is dependent upon Infraco's implementation of mitigation and/or other acceleration measures which could be adopted to limit the delays actually incurred. Agreement on such measures has yet to occur.
9. In this regard, at intermediate and sub-section level in particular, there is considerable evidence of **Infraco culpability for delay** in the various elements within Sections 2¹, 5 & 7. This is highlighted within '**Appendix (i)**' attached. It is stressed that whilst this may not translate into a disallowable period of extension of time for the Section C date, it does/should preclude both Infraco and its sub-contractors' from an entitlement to recovery of the prolongation costs incurred during those periods of culpable delay. Much will depend on the nature and type of costs claimed or yet to be claimed.
10. It is important to note that the assessment of estimated culpability detailed above includes matters known about up to end of March 2010. As matters and construction progress, culpability is likely to change as the causes of delay change or responsibility moves from one party to another. It is therefore essential that **tie** continues to closely monitor, record and analyse progress of the various elements of the Infraco Works.

Comment [RB2]: See earlier comment

¹ Section 2 does not form part of this current exercise and report; Section 2 is not considered as important in terms of overall project delays.



Section 1 Introduction

1.1 Formal details

1.1.1 This report has been prepared by **Robert Burt** (Director) and **John Hughes** (Consultant), both of Acutus. Assistance was also provided by **Iain McAlister**, Associate Director at Acutus.

1.2 Instructions and issues to be addressed

1.2.1 On 3 March 2010 Acutus provided an initial view on potential tie liability for delay to the Infraco Works (Acutus email of 3 March 2010 refers). A subsequent meeting was held on 10 March 2010 between tie and Acutus to discuss those initial conclusions. At that meeting it was agreed that a further process of investigation would be undertaken by Acutus. Those investigations were to focus on certain 'prioritised' elements of the Infraco Works which were jointly identified as being likely to be critical to overall progress and completion. 27 'elements' were selected out of a total of 80 sections/areas which together form the Infraco Works. It was further agreed that a deadline of 12 May 2010 would be set for Acutus to report back to tie. A draft report was issued for discussion on that date.

1.2.2 Each element was given a priority level code² depending on the then perceived level of importance in respect of progress and delay to the relevant Sections and Sectional Completion Dates. Those prioritised elements are set out in the table below.

Priority level	Intermediate Section	Description of area / structure
1	1A4	Lindsay Road RW -W1
1	1A4	Road and Track
1	1A3	Victoria Dock Bridge - S16
1	1A3	Tower Place Bridge - S17
1	1A1	Road and Track
1	1B	Road and Track
1	1C2	Road and Track
1	1C3	Road and Track
2	5A	Russell RD RW - W3
1	5A	Russell RD RW - W4
1	5A	Murrayfield TS RW - W18
2	5A	Murrayfield TS

² Priority level '1' being considered to have more relevance in terms of effect on progress and delay than level '2'



Priority level	Intermediate Section	Description of area / structure
1	5A	Roseburn Viaduct - S21A
2	5A	Murrayfield Stadium Underpass - S21C
2	5A	Water of Leith Bridge - S21E
1	5A	Baird Drive Retaining Wall - W8
1	5A	Balgreen Road Bridge - S22A Incl. Balgreen Road Retaining Wall W9
1	5A	Balgreen Road Bridge - S22B
2	5B	Carrick Knowe Bridge - S23
2	5B	Road and Track
2	5C	Road and Track
1	5C	A8 Underpass - W28
1	5C	Depot Access Road Bridge - S32
1	6	Depot Building
1	6	Roads & Track + Depot
1	7a	Track - Section 7
1	7b	Gogarburn RW - W14/W15

1.2.3 The main objectives of this exercise were to identify, as far as possible within the time and from the records available:-

- a) the key matters which had caused or were causing delay to the elements under investigation, including delay to commencement, progress and projected completion;
- b) to identify areas of concurrent delay and express a view on the significance of same;
- c) to express our current opinion on the extent of tie liability in respect of delay to each element and from those elements the likely liability in respect of the Sectional Completion Dates; and
- d) to identify any areas of further investigation (including possible audits of Infraco's files) which may be required.

1.2.4 It is anticipated that the output from this and other future exercises, undertaken by tie or others, will assist and inform decisions in respect of extensions of time and additional payment at Sectional Completion level. This process will also provide a platform from which tie can assess, and if necessary defend, claims for additional payment from Infraco and/or its sub-contractors at Section and intermediate section level. It will also inform project risk profile considerations.



1.2.5 This report and the appendices attaching hereto, summarises our findings and opinion in respect of the above.

1.3 Information, data and documentation provided

1.3.1 Information and data required for the investigations, was identified and generally requested via a series of email questionnaires issued in respect of each element³. That information was subsequently provided by tie either by email or during discussions with tie personnel.

1.3.2 That said, during the investigations it became apparent that in some instances certain important data was not always / readily available. As a consequence, we have made specific recommendations within the subsequent sections (where relevant) regarding, for example, the need for further audits to be carried out by tie (including the type of information and documentation required to be recovered from Infraco during that process). For ease of reference any such 'recommendations' have been indicated thus "**Recommendation:** ...".

1.3.3 As noted above, a timescale for this exercise was set whereby it was agreed that Acutus would report back to tie on 12 May 2010. That timescale afforded an average of approximately one and a half days per element for the current exercise. As a consequence, for the most part the information, data and advice upon which the current exercise and opinion is based, has been provided by tie personnel. That process is to be distinguished from separate interrogation and verification of the contemporaneous project evidence files by ourselves. While we have no reason to doubt the information and data provided, time has not permitted independent corroboration of the majority of that information.

1.4 Meetings held

1.4.1 A number of meetings were held with various tie project management staff over the course of the investigations. In this regard, meetings and/or telephone discussions were held with the following individuals:-

- a) Malcolm Butchert and Alisdair Dickinson (in respect of intermediate section 1A);
- b) Phil Dobbin (in respect of intermediate section 1B);

³ Questions in respect of structure related questions were issued under cover of emails dated 22 March 2010, 23 March 2010, 12 April 2010, 19 April 2010, 22 April 2010, 26 April 2010 and 29 April 2010 refer. Separate emails were issued in respect of contractual questions, design processes and INTC data.



- c) David Burns (in respect of intermediate section 1C);
- d) Tom Cotter (in respect of intermediate sections 5A & 5B);
- e) Andrew Scott (in respect of intermediate sections 5C, 6 & 7); and
- f) Colin Neil.

(Note: Section 2 was not included in this exercise due to the fact that it was not considered to be a priority in terms of progress and/or delay to the overall Infraco Works)

1.4.2 Further meetings and dialogue were held with Damian Sharp (in respect of design processes and data), Fiona Dunn (re commercial issues such as INTC's and sub-contractor procurement) and Tom Hickman (regarding planning and as-built data).

1.4.3 It is relevant to note that all **tfie** personnel were extremely helpful and willing to assist in this process, providing whatever assistance they could (often outwith normal working hours).

Draft for discussion



Section 2 Preamble to analysis and conclusions

2.1 Generally

2.1.1 The investigations and analysis focussed on the following key headings which were highlighted as being consistently significant in terms of progress and delays. Those headings are:-

- A. The “Issue For Construction drawings” (**‘IFC’ process**) – see report section 2.2 below and Section ‘A’ of each individual appendix;
- B. The “Infraco Notice of tie Change” (**‘INTC’ process**) – see report section 2.3 below and Section ‘B’ of each individual appendix;
- C. The progress and completion of the **MUDFA Works or other utility works** – see report section 2.4 below and Section ‘C’ of each individual appendix;
- D. **‘Other’** matters such as sub-contractor procurement by Infraco, Work Package Plan (WPP) submissions by Infraco, the Infraco IDR/IDC process and other structure or area related issues arising during the investigations. See report section 2.5 below and Section ‘D’ of each individual appendix;
- E. Comparison of the **construction periods** included within Infraco’s Revision 1 and Revision 3 programmes – see report section 2.6 below and Section ‘E’ of each individual appendix; and
- F. **Availability of specific areas** (whether in whole or in part) – see Section ‘F’ of each individual appendix.

2.1.2 For consistency, progress and delays attaching to each element has been considered under each of the above headings.

2.1.3 Prior to outlining the specific findings in respect of each prioritised element it is prudent to make the following general comments in respect of each of the key headings.

2.2 IFC process

2.2.1 A key issue identified in a number of instances was the availability of design such that the works could commence or progress could be maintained. Matters such as late release of the IFC by the date identified in the Programme or a material breach by SDS in



performance of its obligations are Compensation Events under the Infraco Contract⁴. Those matters *may* give Infraco an entitlement to additional time and payment but only where they have been established as the direct cause of delay to the Works (albeit that Infraco entitlement to any additional payment is also subject to certain potential deductions as set out in Clauses 65.12.2 and 65.13). It is therefore important to identify and establish, as far as possible, whether any such Compensation Events were “... *the direct cause of a delay in achievement of the issue of a Certificate of Sectional Completion* ...” (emphasis added).

2.2.2 In addition, questions surrounding Infraco’s management⁵ (or otherwise) of SDS and the IFC process generally were also raised by tie during the current exercise. That, together with the provisions of Clause 19.19⁶, tie’s liability for delays in respect of tie Changes and third party approval delays, render it essential that the ‘cause’ of any delay to the IFC’s be established (as distinct from merely identifying that a delay in IFC issue has occurred).

2.2.3 As a consequence, during the current exercise we requested and were provided with, a copy of tie’s “*SDS Approvals tracker*”⁷. That document provided information relating to the dates on which the ‘first’ IFC packages were planned to be issued and when/if they were actually issued. From that data we were able to establish whether any delay had in fact occurred to the (first) IFC.

2.2.4 It is apparent however that certain further information is required in order to establish, with a greater degree of certainty, the culpability for any such delay in IFC issue. That further information is not presently available, as further explained below:-

a) **‘Cause’ of delays to Initial IFC:** the “*SDS Approvals tracker*” monitors only the issue of, and delays in respect of, the first IFC for each ‘package’. It does not however specifically identify the ‘cause’ of that delay. Potential causes of delay may include one or more of the following:-

- i. late issue by SDS (in its simplest form a CE under 65(t) – which may in turn permit the application of clause 65.12.2);

⁴ Clause 65 and Compensation Events (t) and (u) respectively

⁵ Clauses 11.3 & 11.4 of the Infraco Contract refer

⁶ Clause 19.19 limits tie’s liability for Compensation Events in certain circumstances related to failures on the part of Infraco

⁷ Copy provided to us was the MS Excel file ref. ‘SDS Approvals tracker – download at 6 April 2010.xlsm’



- ii. a material breach by SDS (again in its simplest form a CE under 65(u) – which may in turn permit the application of clause 65.13);
- iii. a failure of BSC to provide the Infraco Design to SDS in accordance with the Consents Programme and Schedule Part 14 (clause 19.19 refers);
- iv. a tie Change;
- v. A failure of BSC in respect of its management of SDS or another breach by BSC (e.g. failure to properly manage the CEC/NR interface); and/or
- vi. A requirement of CEC/NR for which tie will bear responsibility;

No doubt there are a number of other potential causes of delay not identified above. However, until further details are available it is not possible (in the majority of instances) to establish with any certainty the cause of and culpability for delay in the issue of the IFC's.

Recommendation: tie should (on a focussed basis) carry out an audit of identified IFC packages against which critical delays may have occurred.

Recommendation: a significant delay has been identified in respect of the design for **Roseburn Viaduct** within Intermediate Section 5A. Delay in the region of **92 weeks** has so far been incurred to the IFC (incorporating the VE design) for this structure. This structure is crucial to the works in 5A which itself is key to completion of the 'off-street' works within Sectional Completion C. As a consequence, it is recommended that a detailed audit of this process of, and delays to, the design of this structure is undertaken.

- b) **Revised IFC drawings:** the current "*SDS Approvals tracker*" monitors only the first IFC issued in respect of each 'package'. It does not track either the timing of, or reasons for, the re-issue of subsequent revised IFC's for those packages.

Recommendation: tie should consider implementing a wider, more comprehensive IFC tracker capable of monitoring the subsequent revised issues of each IFC. That tracker should also endeavour to identify the reasons and culpability for the revisions made. This will more readily inform any subsequent analysis of delays.



- c) **Infraco Design:** there is no data presently available (to ourselves or tie) that can inform us as to when Infraco provided its design to SDS. We understand that although tie has requested this information from Infraco, it has refused to provide this information. This however affects, among other things, the consideration of Clause 65(t) and tie's ability to apply clause 19.19 where or if appropriate.

In this regard, we are advised that an audit is planned on selected areas of design which should retrieve this type of information (at least for the areas considered by the audit). We understand the proposed audit will also address (or attempt to address) retrieval of information on how, or how effectively, Infraco managed SDS. That information however is not yet available.

Recommendation: tie should press Infraco for the provision of data surrounding the provision of the Infraco Design to SDS.

- 2.2.5 As a consequence of the above, we have endeavoured where possible to identify the most likely causes underlying the delays. There is however some uncertainty surrounding the establishment of culpability for these delays. That uncertainty however could be addressed by the data obtained by implementation of the recommendations above.

2.3 INTC Process

- 2.3.1 A number of issues arise in respect of the INTC process. We have summarised those issues below together with notes on any interim assumptions made in respect of same.

- a) **INTC Master List:** **Recommendation** – tie may wish to consider maintaining a central master INTC schedule which monitors the various components⁸ of the INTC process. That master list is likely to save time in the future locating the relevant details surrounding individual INTC's.
- b) **INTC's included in the current analysis:** we have relied on the tie project managers to highlight the key INTC's which have affected commencement, progress and delays to individual structures. A separate exercise is also underway by the tie commercial

⁸ Those components include (but are not necessarily limited to) data concerning the relevant location / structure, date Estimate required; relevant (reasonable) extended date for provision of the Estimate; whether revised Estimate required; date Estimate(s) issued; date of tie Change Order; whether subject to 80.13 instruction (and date); whether referred to DRP; date of reference to DRP; whether 80.15 instruction issued by tie; outcome of DRP and other Comments. An example of the type of master list was provided (and used) as part of this current exercise. That data could also be compiled using a database application if that format is preferred by tie.



team, where the current INTC master list is being populated with the relevant data. When complete, the master list will facilitate identification of all INTC's applicable to specific individual areas or structures, thus permitting a more comprehensive analysis to be undertaken. That exercise however is not yet complete – hence our reliance on the INTC's identified by the project management personnel.

Recommendation: that the tie commercial team continues to compile and maintain a detailed master list of all INTC's (and related data) in either Excel or database format.

- c) **Period for provision of Estimate:** Clause 80 provides that Estimates shall be provided by Infraco within an 18 Business Day period, unless an extended period is agreed by the Parties. We understand that few extensions were agreed by the Parties. There is also no data available to inform us as to tie's position on any reasonable extended period. Time has not permitted us to review the contents of each INTC in order to arrive at a view on a reasonable⁹ period for the provision of that Estimate. We have therefore, by necessity, proceeded on the basis that the 18 Business Day period applies to each INTC. It should therefore be borne in mind that this position could be subsequently challenged by Infraco and that a period longer than 18 Business Days may be held by a third party as being applicable / more reasonable.

Period for tie to review and respond to Estimates: in the current analysis we have not allowed any specific 'default' period for tie to review and respond to Estimates provided by Infraco. While it is accepted that this period will vary depending on the contents and nature of the Estimate, time has not permitted a review the contents of the various Estimates to establish for ourselves what we would consider to be a reasonable period. In any event it is also noted that, Compensation Event (x) renders tie liable for the "*delay arising between the date tie is notified of a Notified Departure and the actual date on which tie issue a tie Change Order in respect of such Notified Departure*" (where that CE is the direct cause of delay).

As such, the time taken by tie beyond receipt of the Estimate has been attributed to tie as a period for which it is likely to be culpable. That position is generally in line with the advice received from DLA on 24 March 2010 (email timed at 15:44), where it was

⁹ Please refer to item 4 of the DLA advice note dated 16 January 2010.



noted that "... to avoid further delay/cost consequences, it would be open to tie to refer the Estimate for determination in accordance with DRP".

- d) **Period taken by Infraco to issue INTC:** the recent exercises have identified a number of instances where significant periods of time have elapsed between an IFC issue date and the date on which Infraco has notified tie of an INTC. As an example, INTC 399 was notified on 26 February 2010. We are advised however that the Geotechnical IFC for this area was available to Infraco on or around 18 December 2008. That equates to a period of 62 weeks prior to notification. On the face of it that period is unreasonable and raises questions as to Infraco's management of this process and the Works generally. Other similar examples are prevalent throughout several elements. Note: the Infraco Contract does not make specific provision for notification of INTC's within a specific period.

Recommendation: that discussions are held with, or advice sought from, DLA to establish whether excessive time taken to notify INTC's is a failure / breach by Infraco of its general obligations under the Contract.

- e) **Effect of 80.13 instruction:** we have been provided with a copy of tie's letter dated 19 March 2010 issuing an 80.13 instruction in respect of a number of INTC's. We also understand that Infraco has disputed the validity of an instruction under that clause. For present purposes we have proceeded on the premise that the tie 80.13 instruction is valid. In the event that it is found not to be valid, the conclusions concerning culpability for delay associated with those INTC's may change. In this regard we have also proceeded on the premise that the issue of an 80.13 instruction by tie will not 'open the door' for Infraco to somehow argue that such an instruction could/should have been issued earlier. This is particularly relevant to circumstances where Infraco was in significant delay in the provision of Estimates for INTC's prior to the issue of an 80.13 instruction. Whilst it is considered unlikely that Infraco would be successful in prosecuting such an argument it may be prudent to discuss this with DLA.

2.4 MUDFA and/or other utility works

- 2.4.1 Information regarding completion or projected completion of MUDFA or other utility works was obtained from two principle sources, being (i) information obtained from tie project



management personnel and (ii) the marked up photographs of the various sections produced by tie at periodic intervals.

Recommendation: that tie maintain a central database of MUDFA / utility commencement / completion dates (that information has proven difficult to extract).

2.5 Other

2.5.1 **Sub-contractor procurement:** data in respect of Infraco's procurement of its sub-contractor's was obtained from two principle sources, being (i) a copy of tie's audit report dated February 2010; and (ii) section 4.1.2.1 and Appendix 10.6 of the Infraco Period Report 3-1 to 24 April 2010. Review of that documentation shows that Infraco has not operated the procurement process in accordance with the Infraco Contract. This could have significant commercial implications as events unfold. In terms of the effect of the procurement process on progress and delays however, the investigations focussed on gaining an understanding of whether the procurement of sub-contractors affected progress of the Infraco Works themselves. In this regard, we note that it is quite possible that the issue of letters of intent (LOI's), as opposed to formal sub-contracts, could lead to delays to either a start on site or progress on site. That is particularly so because the LOI's issued by Infraco all appear to have restricted 'authorised value limits'. It is therefore important to understand whether, and in what way, this process actually affected the sub-contracts in question. That information however is not available from the audit; nor is it available from the Infraco Period Reports. The audit itself identifies this as a further action (at page 4 "Further Audit Requirements", where, in the last two sentences 'scope' and 'timeline' is discussed).

Recommendation: that a further audit is carried out by tie (as planned) which goes towards establishing the timing and details of the various extensions to the sub-contractor's letters of intent. That audit should also aim to gain sight of (or retrieve copies of) relevant correspondence between Infraco and the sub-contractors. That information should in turn assist in identifying whether this process caused delays to commencement / progress. Please note however that our initial conclusions in respect of the prioritised elements indicate that sub-contractor procurement process was not a significant obstacle to commencement or progress. This is explained in detail within the relevant appendices.



2.5.2 Infraco IDR/IDC process: Following discussions with Damian Sharp at tie, we understand that the original intent behind the provisions of Schedule Part 14 was that SDS would have its Inter-disciplinary Design Check (IDC) in place before issue of the IFC; and that Infraco's IDR/IDC would occur after that point. That is, Infraco would 'complete' its element of the design following receipt of the first IFC from SDS. As such, the 'IDC' shown in the flow chart at paragraph 2.2.13 in Schedule Part 14, was apparently intended to relate to the SDS IDC (not Infraco's IDC). That said, it was explained that the flow chart *could* also apply to the subsequent Infraco design process but in a separate timescale (it is this separate timescale that needs to be better understood). It was also explained that it was not anticipated that SDS would update its IFC for subsequent Infraco design input or change requests. However, it is apparent that this is now occurring such that revised IFC's are being issued by SDS following integration of Infraco Design; with Infraco submitting Compensation Event notices under CE(t). We have been unable to establish where the Infraco IDR/IDC process sits in terms of the contractual timeline.

In addition, we have not yet located where or if it is explicitly stated, or impliedly included, in the Infraco Contract that the Infraco Design has to be in place before construction starts (this may however fall out of Schedule Part 14, Part A clause 7). This should be discussed further to ensure that tie's position on this issue is protected. Other related contractual issues arising during our discussions with Damian Sharp include:-

- a) Does Compensation Event '(t)' relate only to the first IFC in respect of the 112 listed in the Design Delivery Programme (currently the projection is that 262 IFC's will be issued)?
- b) How should IFC's emanating from the development workshops feature in this process?
- c) How should the inclusion of BSC's design in a subsequently revised IFC from SDS be addressed?

Recommendation: further investigation (via tie audit) into the provision of the Infraco Design and the subsequent timing of the integration of that Infraco Design into the SDS design.

Recommendation: clarification of the contractual issues raised above.



2.6 Comparison of the construction periods included within Infraco's Revision 1 and Revision 3 programmes

- 2.6.1 Within the individual analysis of each of the prioritised elements, we have undertaken a review of (i) the delay to start of the relevant structure / element; and (ii) any forecast delay to the finish of same.
- 2.6.2 We have also undertaken a review and comparison of the different construction periods included within the following programmes:-
- a) Infraco Revision 1 Programme;
 - b) Infraco Revision 3 Step 4 Issue 3 programme; and
 - c) Iain McAlister's opinion on a reasonable mitigated version of Infraco's programme Revision 3 Step 4 Issue 1^[10].
- 2.6.3 The latter review (of forecast delays to finish dates) necessarily includes consideration of any increased activity durations included within the Infraco Programme Revision 3 Step 4 Issue 3. Those durations have therefore been compared with the Infraco Revision 1 durations. We note however that no information has been provided by Infraco which substantiates the increased duration included in the latest programme.

Compilation of as-built programme

- 2.6.4 Availability of accurate as-built data is and will be essential to the successful defence, or prosecution, of any claims and/or counterclaims. While some as-built information was made available by tie's project management personnel, the absence of detailed as-built data has hindered the current exercise. As such, it is important to reinforce the value of detailed as-built records and the contemporaneous compilation of a detailed record of as-built progress (ideally in programme format).

Recommendation: that tie allocates a resource (possibly a dedicated resource) to the compilation of an accurate and detailed as-built programme together with evidence files (which support / validate the entries within the as-built programme).

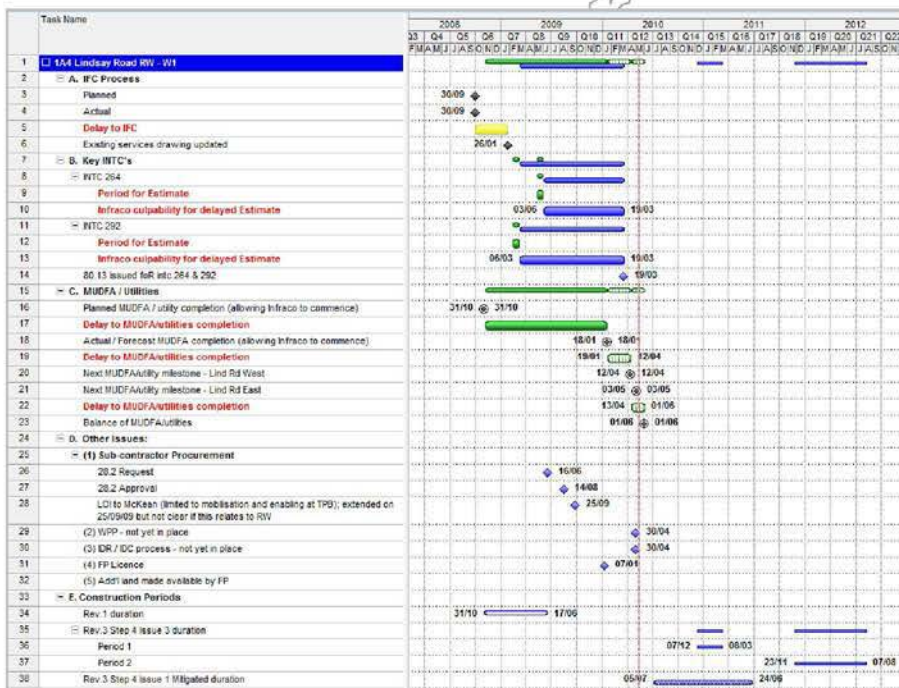
¹⁰ Note: we have used the IM view of Infraco's programme Revision 3 Step 4 Issue 1 (as distinct from Revision 3 Step 4 Issue 3) due to the fact that the Issue 3 exercise has not yet been completed. As such there may ultimately be differences between those two exercises which may require to be reconciled in the future. However for present purposes use of Revision 3 Step 4 Issue 1 provides the information necessary to consider indicative comparisons.



2.7 Process of review and analysis

2.7.1 The following provides a brief overview of the analysis undertaken in respect of each of the prioritised elements.

2.7.2 Summary programme: a simple summary programme has been prepared for each prioritised element identifying key facts in relation to 'A. the IFC Process'; 'B. the INTC process'; 'C. MUDFA / Utilities'; 'D. Other issues'; and 'E. Construction periods'. Illustrating all of the above in a programme allowed us to view the inter-relationship of each of those issues graphically within the correct timeframe. See example below.



2.7.3 'A. IFC Process': planned and actual IFC issue dates were plotted in respect of the key IFC's for the relevant structure or element. Where a delay was incurred to the IFC, information was sought in respect of the cause of that delay. At this stage mainly anecdotal evidence is available as to the possible causes of said delay (please refer to section 2.2 above). Delays were indicated by a **yellow bar** (indicating culpability for IFC delay has to be firmed up).

2.7.4 'B. INTC Process': information was obtained from tie project management personnel on the key INTC's which were thought to have affected commencement and/or progress. Information was then sought in respect of the key stages in the INTC process including



notification date, date Estimate required, date Estimate submitted (if at all) and dates of any applicable 80.13 or 80.15 instruction. Culpability for delays through that process was categorised on the basis as set out at section 2.3 above. **Blue bars** indicate Infraco culpability; **Green bars** indicate tie culpability.

- 2.7.5 'C. MUDFA/Utilities': dates of planned and actual MUDFA and/or other utility completions were plotted. Culpability for same was indicated. Again, **blue bars** indicate Infraco culpability; **green bars** indicate tie culpability.
- 2.7.6 'D. Other issues': where possible the sub-contractor procurement process was tracked through the various stages including (i) clause 28.2 & 28.4 requests and approvals; and (ii) issue dates of letters of intent. Milestone dates were inserted for each.
- 2.7.7 'E. Construction Periods': where possible each chart contains details of the following constructions periods: (i) Revision 1 programme; (ii) Revision 3 Step 4 Issue 3; and (iii) IM mitigated version of Revision 3 Step 4 Issue 1¹¹. This again allowed us to present a graphical representation of the respective durations within the correct timeframes. An assessment of the delays to start and delays to finish was then undertaken – that process being informed by information provided by, and discussions with, tie personnel.
- 2.7.8 'F. tie position on area availability': consideration has also been given to the question of area availability. That is, when in tie's opinion Infraco could / should have commenced works in certain areas. This matter was discussed with the respective tie project management personnel in order to arrive at an opinion on same.
- 2.7.9 Thereafter, within section 'G. Conclusion', we have summarised our opinion, based on the information available, as to the (i) the significant events/issues affecting commencement and/or progress; (ii) concurrent issues/events which may have occurred; and (iii) consideration of any events which would likely be considered to be the dominant cause of the delay to that element or area.

¹¹ See footnote 10 on page 12 above



Section 3 'Section A & B' – Conclusions arising from current analysis

3.1 Generally

3.1.1 Section 'A' is defined within Schedule Part 1 as "means completion of the Depot (including energisation) and the first Tram delivered to the Site and assembled and the completion of all tests required by the Employer's Requirements in relation to that Section".

3.1.2 Two prioritised elements relate to Section A, being (i) the 'Depot Building'; and (ii) 'Roads & Track – Depot'. We note the following in respect of each.

3.2 Section 6

3.2.1 **Section 6 Depot Building:** please refer to **Appendix 16** attached. The table below summarises the respective start / finish dates and activity durations within (incl. delays between) the Revision 1, Revision 3 and IM mitigated Rev.3 programmes.

6 Depot Building (taking Earthworks as start dates)					
	Rev.1	Rev.3 Issue 3	Delay	IM Mitigated Rev.3	Delay
Start	27/06/2008	07/04/2009	40.57 wks	07/04/2009	40.57 wks
Finish	01/06/2010	16/06/2011	54.29 wks	31/12/2010	30.43 wks
Cal. Duration	100.71 wks	114.43 wks	13.71 wks	90.57 wks	-10.14 wks

Our conclusions in respect of delay incurred to this structure can be summarised as follows:-

- (i) **'Significant' issues/events:** the significant issues affecting commencement of the earthworks were (i) water main diversion; and (ii) INTC 187. The delay due to water main, causing delay to access – 01/08/08 (planned start) to 18/02/09 (when material start should have commenced). **35 week delay (tie culpability)**. INTC 187 (delay in provision of Estimate) appears to have caused a further **6 week delay to the earthworks (Infraco culpability)**. Thereafter there are questions surrounding Infraco performance in earthworks operations, commencement of foundations and steelwork – causing a **16 week delay** to foundations and steelwork. For the most part, excluding the water main, these appear to be Infraco culpability. That said, issues such as increased workscope in terms of earthworks volumes and foundation increased scope must be taken into account. For present purposes we have allocated a **Split liability for this 16 weeks period** (that is to say the liability



for this 16 week period has been split between the parties – see Appendix 16 attached and table below).

Note: the above is slightly different from previous information supplied to us. That is, previously we understood that tie’s position was that partial access was available on or around late 2008 (i.e. prior to the completion of the water main). The above however is the explanation we have recently received. If however the earlier tie position is correct the balance of culpability shifts more towards Infraco as a result of a failure to commence earlier. The measure of the shift in culpability is likely to be in the region of **6-10 weeks**.

- (ii) Concurrent issues: there is a question of the completion of the water main diversion (to 05/05/09) being concurrent. This however was not seen as critical to the building. No doubt Infraco will however focus on this and the time periods taken by tie for issue of TCO’s.
- (iii) Considerations of dominance: water main work will be difficult to argue as being anything other than dominant until 18/02/09 (but see note above). Thereafter, the delays to commencement of earthworks, foundations and steelwork are critical.
- (iv) As such, our current opinion on allocation of culpability can be summarised as follows:-

Description	Opinion on tie culpability	Opinion on Infraco culpability
Delay to Start	<i>Range of 25 to 35 weeks</i>	<i>Range of 6 to 16 weeks</i>
Delay up to Steelwork erection: further 16 week delay. This may have been caused by late procurement of steelwork (hence lower range of 0 weeks); but some allowance may also be due for increased earthworks and foundation work (need more detailed as-built data to conclude). There is also a further risk regarding Depot doors.	<i>Range of 0 weeks to 8 weeks</i>	<i>Range of 8 weeks to 16 weeks</i>
Lower limit:	25 weeks	14 weeks
Upper limit:	43 weeks	32 weeks

3.2.2 **Section 6 Roads & Track – Depot’:** please refer to **Appendix 17** attached.

Our conclusions in respect of delay incurred to this element can be summarised as follows:-



- (i) 'Significant' issues/events: There appear to be five main issues affecting this element. Those are (i) the water main delay; (ii) INTC 187; (iii) the delay to issue of the Roads IFC; (iv) delay to drainage design; and (v) delays to the OLE foundation design. The delay due to water main, delayed access to the site – from 01/08/08 (planned start) to 18/02/09 (when material start should have commenced). **35 week delay; tie culpability.** INTC 187 (delay in provision of Estimate) appears to have caused a further **6 week delay to the earthworks; Infraco culpability.** Thereafter there are questions surrounding the production of the Roads IFC and drainage design. This was not issued by SDS until 14/08/09 (52 weeks later than planned – albeit that the 41 week delay to commencement takes up the majority of that delay). This needs to be audited and analysed.
- (ii) Concurrent issues: there is a question of the final completion of the water main diversion to 05/05/09, being concurrent with other issues above. No doubt Infraco will focus on this and the time periods taken by tie for issue of TCO's. Infraco culpability in respect of the OLE foundations design may yet prove to cause further delay to progress (those delays however have yet to unfold). This should be monitored closely via as-built programme collation and other tie audits.
- (iii) Considerations of dominance: water main work will be difficult to argue as being anything other than dominant until 18/02/09 (as it restricted access to the whole site until mid February 2009). Thereafter, the delay to issue of the Roads IFC is likely to feature significantly in any delay analysis. Culpability for this delay may well rest with SDS (excusable under CE(t) or (u); but may also relate to Infraco failure to manage SDS). Risks remain that CEC was complicit in delay. Overall delay to this element and Section 'A' in particular however linked closely to completion of Depot Building (which at present is the longer more dominant string of activities).

3.3 Conclusions in respect of Sections A & B

3.3.1 Please refer to 'Appendix (i)' for a summary of the detail above and below.

3.3.2 In light of the above, we summarise our current opinion in respect of Sectional Completion Date 'A' as follows:-

- (i) Sectional Completion Date 'A' 'time' implications: Potential **tie** liability:-



a. Lower Limit: **25 weeks**.

b. Upper Limit: **43 weeks**.

Note: in terms of Sectional Completion Date 'B' please refer to IM email of 04/03/10. That confirms the following *"The programme logic models the requirement to have the track sections 5C and 7A complete to achieve the Section B date. On that basis the late completion of the A8 Underpass and the groundworks at the Gogarburn Landfill Site project the Section B date to 15 February 2012. However, we have previously been advised, in discussions with tie's E&M and operations staff, that the actual requirements of the test track is approximately 1km of live track running from the Depot. Having discussed this with tie's PMs it would appear that a suitable length of track can be constructed by January 2011. The track section 5C running through the A8 underpass and to the south is not required for the test track. Providing the contractor makes a concerted effort to carry out the landfill site works in the Spring, Summer and Autumn of 2010, while at the same time progresses track construction in the adjacent sections of the route, there should be no impediment to having the test track ready within 28 days of the completion of the Depot."* This however is dependent on Infraco resolving the landfill site within the timescale required to suit the above.

(ii) Sectional 'financial' implications: in terms of site prelims it is noted that the majority of the 'time' implications above relates to delayed access to the area. As such, sub-contractor 'Sectional' time related costs should not have been incurred by Infraco to any great extent, if at all. Infraco 'sectional' costs¹² are likely to be related to Section A dedicated management resources. On that basis, we note the following:

a. Lower Limit: Infraco costs **25 weeks**; sub-contractor costs **6-10 weeks**.

b. Upper Limit: Infraco costs **43 weeks**; sub-contractor costs **14-18 weeks**.

3.3.3 In terms of the current projected delays to completion of this Section, we note that within the Revision 3 programme Infraco has increased the projected duration of the Depot Building works by approximately 14 weeks. No substantiation has been provided by

¹² Overall 'Project' related prolongation costs are reconciled



Infraco is respect of same. In our opinion no further time should be awarded to Infraco for increased durations until such time as the relevant substantiation is provided. This is particularly relevant in light of the current views on potential mitigation and/or acceleration measures¹³. That said, tie should consider when it needs to have the Depot and Test Track complete. If, for example, Section 'C' is significantly delayed, there may be little benefit in expediting the Depot completion at additional acceleration cost.

Draft for
discussion

¹³ Iain McAlister's previous opinion on the Infraco Revision 3 Step 4 Issue 1 programme was that time (in the region of 10 weeks for the Depot Building and 23 weeks for the associated Roads & Track) could be saved. Please note, that where any of those measures are deemed to be 'acceleration' there may be costs implications for tie attaching to same.



Section 4 'Sections C & D' – Conclusions arising from current analysis

4.1 Generally

4.1.1 Section 'C' is defined within Schedule Part 1 as "... *the carrying out and completion of Phase 1a to Newhaven (including energisation) and the spur or delta at Roseburn Junction and the completion of all tests required by the Employer's Requirements in relation to that Section, including those System Acceptance Tests that must be successfully completed prior to shadow running as provided for in the Employer's Requirements*". This in effect comprises Sections 1, 2, 5 & 7.

4.1.2 Section 'D' is defined within Schedule Part 1 as "... *the completion of shadow running and commencement of revenue service approval obtained and the completion of all tests required by the Employer's Requirements in relation to that Section, including those System Acceptance Tests that must be successfully completed to enable Service Commencement*". This was originally planned to complete 26 weeks after the completion of Section C.

4.2 Section 1

4.2.1 **Appendices 1 to 8** attached contain the current analysis and conclusions in respect of the following Section 1 prioritised elements:-

Appendix	Section	Description of area / structure
Priority Level 1 Elements		
1	1A4	Lindsay Road RW -W1
2	1A4	Road and Track
3	1A3	Victoria Dock Bridge - S16
4	1A3	Tower Place Bridge - S17
5	1A1	Road and Track
6	1B	Road and Track
7	1C2	Road and Track
8	1C3	Road and Track

4.2.2 From the attached, it is evident that the dominant delays to commencement (and completion) on intermediate sections 1A, 1B & 1C remain with the utility completions in each of those areas. The extent of those delays renders this Section the dominant sequence of activities which continue to drive Sectional Completion Date 'C'. That position



remains true whether observing the Infraco Revision 3 programme or Iain McAlister's Revision 3 Issue 1 or Issue 3 mitigation exercises.

4.2.3 In terms of delay and consequent (mitigated) completion, the latest intermediates sections are 1B and 1C2 Road & track. On 4 March 2010 the then projected mitigated dates in respect of the Issue 1 programme were June and August 2012 respectively. That said, the recent Issue 3 mitigation exercise conducted by Iain McAlister in conjunction with tie and others, indicates that completion of Section C could be achieved by **11 May 2012**.

4.2.4 Please refer to report section 4.7 for our conclusions in respect of the effect of the above on Sectional Completion Date 'C'.

4.3 Section 5

4.3.1 **Appendices 9 to 15** attached contain the current analysis and conclusions in respect of the Section 5 priority '1' elements; Priority '2' elements are contained within **Appendices 20 to 26**, as follows:-

Appendix	Section	Description of area / structure
Priority Level 1 Elements		
9	5A	Russell RD RW - W4
10	5A	Murrayfield TS RW - W18
11	5A	Roseburn Viaduct - S21A
12	5A	Baird Drive Retaining Wall - W8
13	5A	Balgreen Road Bridge - S22A Incl. Balgreen Road Retaining Wall W9; including Balgreen Road Bridge - S22B
14	5C	A8 Underpass - W28
15	5C	Depot Access Road Bridge - S32
Priority Level 2 Elements		
20	5A	Russell RD RW - W3
21	5A	Murrayfield TS
22	5A	Murrayfield Stadium Underpass - S21C
23	5A	Water of Leith Bridge - S21E
24	5B	Carrick Knowe Bridge - S23
25	5B	Road and Track
26	5C	Road and Track

4.3.2 The analysis of the above confirms that at Project level the delays incurred in this Section of the works (although significant) are subsumed by the more extensive delays incurred within Section 1. This presumes that if Section 1 works are mitigated then so are the critical



parts of Section 5. It also assumes no resource requirement linkage between the two Sections.

4.3.3 That said, the analysis of those Section 5 elements, clearly identify considerable periods of concurrent delay at an intermediate section level. Infraco culpability throughout this Section is significant. tie culpability is also present.

4.3.4 This analysis has also raised significant questions in respect of the timing and/or management of the design process.

4.3.5 As noted at paragraph 1.2.4, maintaining this form of record and analysis will enable tie to properly assess, and where necessary defend, claims for additional payment from Infraco and/or its sub-contractors at Section and intermediate section level. It may also assist tie in informing strategy in relation to its relationship and dealings with SDS.

4.4 Section 7

4.4.1 **Appendices 18 and 19** attached, contain the current analysis and conclusions in respect of the following Section 7 priority '1' elements:-

Appendix	Section	Description of area / structure
Priority Level 1 Elements		
18	7a	Track - Section 7
19	7b	Gogarburn RW - W14/W15

4.4.2 Similar comments apply here in relation to Section 7 as are made at paragraphs 4.3.2 to 4.3.5 above (re Section 5).

4.5 Consideration of position adopted in the 'MUDFA Rev.8' adjudication

4.5.1 During the 'MUDFA Rev.8' adjudication process, a report was produced by Acutus¹⁴ which concluded that "... it would appear to be possible to mitigate all of the MUDFA Revision 8 projected delays to the extent that there would be no requirement to extend any of the four Sectional Completion Dates"¹⁵.

4.5.2 It is acknowledged that, on the face of it, the comments made above in the MUDFA Rev.8 adjudication report may not appear to be consistent with our opinion on the delays to

¹⁴ Report Ref. J086-209 dated 5 May 2010 entitled "Expert Report regarding Estimate in Respect of INTC No. 429 MUDFA programme Revision 8 Delay and Disruption Resulting from Incomplete Utility Works"

¹⁵ Paragraph 6.3.1



Section 1 and the culpability for same (even after mitigation). It is therefore necessary to explain how the two positions need to be reconciled.

4.5.3 The 'MUDFA Rev.8' adjudication focussed on projected delays to the completion of MUDFA works as at 28 March 2009. When compared to the Infraco Revision 1 Programme 'assumptions', the following delays to the MUDFA works were forecast to occur:-

1	2	3	4
Int. Section	Revision 1 Prog.Dates	MUDFA Rev.8 Dates	Delay (wks)
1A	31/10/2008	17/12/2009	58.86
1B	01/08/2008	24/09/2009	59.86
1C	31/10/2008	18/12/2009	59.00
1D	19/12/2008	25/09/2009	40.00

4.5.4 It was against the background of those delays (circa 59 weeks) that Iain McAlister's 'MUDFA Rev.8' report was drafted. Since that date however, the completion of the MUDFA works, within Section 1 in particular, have been further delayed, to the extent that the following delays (shown in columns 7 & 8 below) were forecast as at **April 2010** (we understand however that those dates have slipped further since April 2010):-

1	2	3	4	5	6	7	8	9
Int. Section	Revision 1 Prog.Dates	MUDFA Rev.8 Dates	Delay (wks)	Rev3Step4Issue3 Range from	to	Delay in weeks [Rev.1 to Rev3S4I3]	Increase in delay (wks)	
1A	31/10/2008	17/12/2009	58.86	02/03/2010	13/12/2010	69.57	110.43	51.57
1B	01/08/2008	24/09/2009	59.86	01/07/2010		99.86		40.00
1C	31/10/2008	18/12/2009	59.00	07/05/2010	04/11/2010	79.00	104.86	45.86
1D	19/12/2008	25/09/2009	40.00	30/01/2010	08/02/2010	58.14	59.43	19.43

4.5.5 That is as at April 2010, the overall projected delays to MUDFA works in Section 1 had increased to circa **110 weeks**. That is, an increase of up to **52 weeks** beyond those forecast in the 'MUDFA Rev.8' programme are expected (see columns 8 & 9 in the table directly above). It was this Section that drove Sectional Completion Date C within the mitigated Issue 1 programme (see comments in report section 4.1 above).

Revision 3 Step 4 Issue 1 mitigation exercise

4.5.6 Iain McAlister's mitigation exercise on the Revision 3 (Step 4 Issue 1) programme¹⁶ indicated that mitigation / acceleration *could* bring the projected completion date forward

¹⁶ Including the joint 'mitigation' review with Blair Anderson. That review has taken intermediate section 1A off the critical list; but maintains the criticality of intermediate sections 1B & 1C. That exercise still indicates as a forecast completion of summer 2012.



to circa July / August 2012¹⁷. That equated to an overall delay in the region of 73 to 77 weeks for Sectional Completion Date C. As noted, that delay was driven by the dominant delays in Section 1 (intermediate sections 1A, 1B & 1C in particular). The difference between the increased MUDFA delays (of up to 52 weeks) and the mitigated delay to Sectional Completion Date C (of 73 to 77 weeks) appeared to have been brought about by the introduction of different Traffic Management phasing within Section 1 (together with a degree of increased workscope as a result of INTC's). This added to the critical MUDFA / utility delays in Section 1 by upwards of 21 to 25 weeks.

Revision 3 Step 4 Issue 3 mitigation exercise

4.5.7 Notwithstanding the above, as noted at paragraph 4.2.3 above, a further mitigation review exercise has recently been carried out, this time on the Issue 3 programme, by Iain McAlister in conjunction with tie and others. That exercise shows that a **mid May 2012** completion currently appears achievable¹⁸. This equates to an approximate overall delay to 'Section C' of **61 weeks**. This is driven by on-street intermediate **section 1B**. On that basis, the risk for this overall period appears to remain with tie¹⁹ (albeit that the current exercises being undertaken by tie in respect of TM phasing may well inform a further reduction in the current projection of forecast delays and evidence BSC's liability for part of this delay).

4.6 Consideration of tie position re lack of early progress on 'off-street' works by Infraco

4.6.1 At a meeting held on 5 May 2010 tie reiterated its concern that the focus on dominant delays to MUDFA / utility works in the 'on-street' Section 1, would mask the effect that Infraco's lack of early progress on the 'off-street' Sections has on the programme for the 'on-street' sections when they become available. In particular, tie noted that had Infraco progressed the 'off-street' sections earlier, resources which now remain engaged on those delayed 'off-street' works, could/would have been applied to the 'on-street works' as those workfaces became available. Had that occurred, tie would have expected the 'on-street' sections to be completed earlier than currently planned.

¹⁷ Email from Acutus (IM) of 4 March 2010 timed at 19:17hrs refers. That mitigation exercise did not allow for full depth construction i.e. it had been removed from the activity durations as directed by tie.

¹⁸ That clearly will require Infraco's cooperation / engagement in adopting the relevant mitigation

¹⁹ Unless it can be proven that BSC's phasing and durations shown in the Rev.0 and Rev.1 programmes were always unachievable and that this is therefore an Infraco error. That however may be a difficult argument to prove.



4.6.2 This has been discussed with Iain McAlister in order to understand what effect the above has/had on the collective discussions on potential mitigation which has been developed by Iain, Blair Anderson and tie over recent weeks. In particular, we discussed the assumptions and constraints considered and applied when carrying out the mitigation exercise(s) on the Infraco Rev.3 programme(s).

4.6.3 Initial indications are that any resource constraints previously applied by Infraco on the 'on-street' sections were removed during the mitigation exercise, to the extent that resources are no longer driving the mitigated programme(s). As such, the degree to which this particular tie concern affects the overall Sectional Completion Date C is thought to be minimal.

4.6.4 That said, this matter can be further considered during the completion of the current mitigation review of the Infraco Revision 3 Step 4 Issue 3 programme.

4.7 Conclusions in respect of Section C & D

Questions of 'criticality', 'dominance' and 'significance'

4.7.1 One of the key issues which we have had to consider when arriving at our opinion on respective culpability for delay to Sectional Completion Date 'C' is what effect the delays to the constituent elements have had on this sectional date. In particular, we considered how a third party tribunal would analyse same. In so doing, matters such as criticality, dominance, significance and the like are of paramount relevance.

4.7.2 In the present circumstances, we consider that the magnitude of the early and ongoing delays to the MUDFA and utility works renders arguments about concurrent (critical) delay more difficult to prosecute. This is particularly relevant to the respective delays evident in and between Section 1 and Sections 5 & 7. Whilst there is clearly Infraco culpable delay within Sections 5 & 7, the project critical path remains firmly fixed within Section 1 (intermediate section 1B in particular is currently seen to be driving the Sectional Completion Date to 11 May 2012). Please refer to 'Appendix (i)' for details on our current opinion on respective culpability for delay in respect of each element.

4.7.3 Previous discussions have focussed on recent case law²⁰ which lends support in certain circumstances to a process of apportionment when considering culpability for delay and

²⁰ City Inn Ltd v Shepherd Construction Ltd [2007] ScotCS CSOH_190 (30 November 2007)



extension of time. The difficulty, which in our opinion will be faced in tie presenting a case on the basis of 'apportionment' however, is that the particular judgement in question focuses firstly on a test of dominance²¹. When considering the application of apportionment (if appropriate), the court went on to note that "length of delay" and the causative "significance of the events for the Works as a whole"²² were factors which must be considered. Each of these three factors²³ pose significant hurdles for tie to overcome.

4.7.4 As a consequence, at Sectional Completion Date level it remains our opinion that Infraco will be excused for delays incurred up to circa 61 weeks (for Sectional Completion Date C) – please refer to paragraph 4.5.7 above. The measure of the delay which will actually be incurred however is dependent upon Infraco's implementation of mitigation and/or other acceleration measures which could be adopted to limit the delays actually incurred. Agreement on such measures has yet to occur.

4.7.5 We also note that this overall 61 week delay does not arise solely as a result of the delayed MUDFA/utility diversion works. Present indications from the Issue 3 mitigation exercise are that increased activity durations, BDDI to IFC changes and different TM phasing arrangements may well have contribute. The precise split between those potential causes remains uncertain (and should be the subject of further investigation).

4.7.6 At present it is thought that the majority of the period of delay is attributable to the late MUDFA/utility diversions. Different TM phasing is not considered to be a matter for which tie should be responsible (although this too requires to be established). Liability for (valid) BDDI to IFC issues will however rest with tie. In light of the uncertainty surrounding the above we are only able to estimate at present the likely

Description	Opinion on tie culpability	Opinion on Infraco culpability
Lower limit:	XX weeks	0 weeks
Upper limit:	61 weeks	XX weeks

Comment [RB3]: We are trying to get a better handle on this lower limit. Iain has been working on the revised durations still contained within the mitigated Issue 3 programme exercise which still show significant increases over the Rev. 1 programme. The intention is to try to close this out during the course of the coming week. Iain has also noted that 1A and 1C are not too far off the critical path and are also subject to the same increased durations as 1B. Iain will make contact with the PM's this coming week to progress.

4.7.7 Those delays could also give rise to project level prolongation costs. The measure of prolongation costs to which BSC may be entitled however, is not necessarily inextricably

²¹ Paragraphs 21 and 157 of the 'City Inns' judgement refer

²² Paragraph 158 of the 'City Inns' judgement refer

²³ i.e. dominance, length of delay and causative significance



linked to the period of extension of time to which it is entitled. Matters such as concurrency and causation of the particular loss claimed will feature in any analysis of entitlement to additional payment.

4.7.8 In this regard, at Section and intermediate section level in particular, there is considerable evidence of BSC culpability for delay in the various elements within Sections 2, 5 & 7 (and in certain elements of section 1). This is highlighted (for elements within Sections 1, 5 & 7) within '**Appendix (i)**' attached. Whilst this may not translate into a disallowable period of extension of time, it does/should preclude both Infraco and its sub-contractors' from an entitlement to recovery of the prolongation costs incurred during those periods of culpable delay. Much will depend on the nature and type of costs claimed or yet to be claimed.

4.7.9 In relation to Sectional Completion Date 'D' we have assumed for present purposes that this will be 6 months after the Sectional Completion Date 'C' (acknowledging that tie may wish to take a view on whether this 6 month period can be reduced²⁴).

Robert Burt

John Hughes

Dated: XX June 2010

²⁴ Particularly if the off-street section can be completed significantly earlier to allow driver training and system testing to begin earlier.



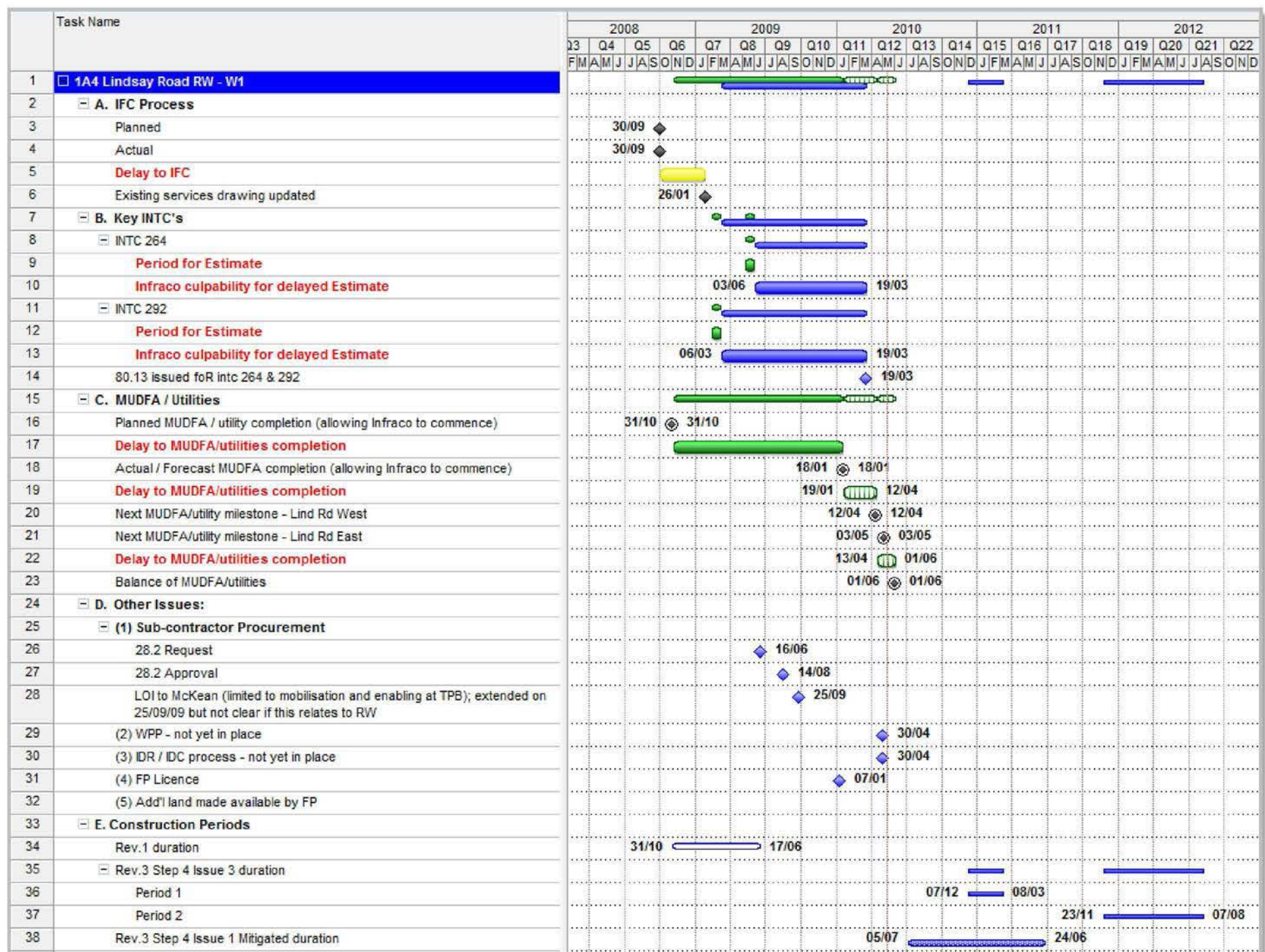
LIST OF APPENDICES

Appendix	Section	Description of area / structure
(i)		Summary table of current view on respective party culpability for delay
Priority Level 1 Elements		
1	1A4	Lindsay Road RW -W1
2	1A4	Road and Track
3	1A3	Victoria Dock Bridge - S16
4	1A3	Tower Place Bridge - S17
5	1A1	Road and Track
6	1B	Road and Track
7	1C2	Road and Track
8	1C3	Road and Track
9	5A	Russell RD RW - W4
10	5A	Murrayfield TS RW - W18
11	5A	Roseburn Viaduct - S21A
12	5A	Baird Drive Retaining Wall - W8
13	5A	Balgreen Road Bridge - S22A Incl. Balgreen Road Retaining Wall W9; including Balgreen Road Bridge - S22B
14	5C	A8 Underpass - W28
15	5C	Depot Access Road Bridge - S32
16	6	Depot Building
17	6	Roads & Track – Depot
18	7a	Track - Section 7
19	7b	Gogarburn RW - W14/W15
Priority Level 2 Elements		
20	5A	Russell RD RW - W3
21	5A	Murrayfield TS
22	5A	Murrayfield Stadium Underpass - S21C
23	5A	Water of Leith Bridge - S21E
24	5B	Carrick Knowe Bridge - S23
25	5B	Road and Track
26	5C	Road and Track

Current view on respective party culpability		Possibly SDS					ANALYSIS OF LATE FINISH			
App. Section	Description of area / structure	Late Start	Upper/Lower Liability	tie culpability	Infraco culpability	Poss. SDS culpability	IM Mitigated Period		Infraco Rev.3 Period	
							tie	Infraco	tie	Infraco
SECTIONAL COMPLETION DATE A			Lower Limit	25 weeks	14 weeks					
			Upper Limit	43 weeks	32 weeks					
Section 6		<i>As depot building and Sectional Completion Date A</i>								
16	6	Depot Building	41 weeks	Lower Limit	25 weeks	6 weeks	0 weeks	0 weeks	8 weeks	Assumes IM mitigated
				Upper Limit	35 weeks	16 weeks		8 weeks	16 weeks	Assumes IM mitigated
17	6	Roads & Track - Depot	89 weeks	Lower Limit	See chart for details (drive)	52 weeks		See above		
				Upper Limit	See chart for details (drive)	81 weeks		See above		
SECTIONAL COMPLETION DATE B		See comments in Report at Paragraph 3.3.2								
SECTIONAL COMPLETION DATE C			Lower Limit		0 weeks					
			Upper Limit	61 weeks						
SECTION 1										
1	1A4	Lindsay Road RW -W1	72 weeks	Lower Limit	63.4 weeks	8 weeks	17 weeks	0 weeks	0 weeks	0 weeks
				Upper Limit	72 weeks	8 weeks	62 weeks	18 weeks	18 weeks	18 weeks
2	1A4	Road and Track	88 weeks	Lower Limit	75 weeks	5.9 weeks	28 weeks	-2 weeks	-2 weeks	-2 weeks
				Upper Limit	82.1 weeks	54 weeks	61 weeks	0 weeks	0 weeks	0 weeks
3	1A3	Victoria Dock Bridge - S16	79 weeks	Lower Limit	11 weeks	22 weeks	0 weeks	2 weeks	0 weeks	0 weeks
				Upper Limit	61 weeks	72 weeks	50 weeks	17 weeks	15 weeks	15 weeks
4	1A3	Tower Place Bridge - S17	61 weeks	Lower Limit	10.9 weeks	1 weeks	0 weeks	-29 weeks	-29 weeks	-29 weeks
				Upper Limit	61 weeks	50 weeks	50 weeks	0 weeks	0 weeks	-13 weeks
5	1A1	Road and Track	54 weeks	Lower Limit	54 weeks	0 weeks	19 weeks	0 weeks	0 weeks	0 weeks
				Upper Limit	54 weeks	0 weeks	19 weeks	22 weeks	22 weeks	22 weeks
6	1B	Road and Track	100 weeks	Lower Limit	100 weeks	0 weeks	10 weeks	-6 weeks	-6 weeks	-6 weeks
				Upper Limit	100 weeks	0 weeks	63 weeks	0 weeks	0 weeks	0 weeks
7	1C2	Road and Track	30 weeks	Lower Limit	30 weeks	0 weeks	0 weeks	0 weeks	0 weeks	0 weeks
				Upper Limit	30 weeks	0 weeks	0 weeks	16 weeks	16 weeks	16 weeks
8	1C3	Road and Track	42 weeks	Lower Limit	41 weeks	0 weeks	0 weeks	0 weeks	0 weeks	0 weeks
				Upper Limit	41 weeks	0 weeks	15 weeks	46 weeks	46 weeks	46 weeks
SECTION 5										
20	5A	Russell RD RW - W3	107 weeks	Lower Limit	21 weeks	26 weeks	0 weeks	-16 weeks	-16 weeks	-16 weeks
				Upper Limit	21 weeks	86 weeks	46 weeks	0 weeks	0 weeks	-10.9 weeks
9	5A	Russell RD RW - W4	44 weeks	Lower Limit	17 weeks	22 weeks	0 weeks	-6 weeks	2.5 weeks	-6 weeks
				Upper Limit	22 weeks	27 weeks	66 weeks	0 weeks	0 weeks	0 weeks
10	5A	Murrayfield TS RW - W18 <i>[Directly affected by RV VE - audit req'd]</i>	87 weeks	Lower Limit	0 weeks	0 weeks	0 weeks	0 weeks	0 weeks	0 weeks
				Upper Limit	87 weeks	87 weeks	87 weeks	5 weeks	5 weeks	5 weeks
21	5A	Murrayfield TS <i>[Directly affected by RV VE - audit req'd]</i>	83 weeks	Lower Limit	0 weeks	0 weeks	0 weeks	-17 weeks	-17 weeks	-17 weeks
				Upper Limit	83 weeks	83 weeks	63 weeks	0 weeks	0 weeks	0 weeks
11	5A	Roseburn Viaduct - S21A <i>[Commencement delayed by VE exercise - audit]</i>	59 weeks	Lower Limit	0 weeks	0 weeks	0 weeks	-16 weeks	-16 weeks	-16 weeks
				Upper Limit	59 weeks	59 weeks	59 weeks	0 weeks	0 weeks	-10 weeks
22	5A	Murrayfield Stadium Underpass - S21C	106 weeks	Lower Limit	47 weeks	32 weeks	0 weeks	0 weeks	0 weeks	0 weeks
				Upper Limit	74 weeks	59 weeks	0 weeks	4 weeks	4 weeks	4 weeks
23	5A	Water of Leith Bridge - S21E	46 weeks	Lower Limit	12 weeks	46 weeks	0 weeks	0 weeks	0 weeks	0 weeks
				Upper Limit	15 weeks	46 weeks	0 weeks	0 weeks	0 weeks	0 weeks
12	5A	Baird Drive Retaining Wall - W8	105 weeks	Lower Limit	26.6 weeks	77 weeks	0 weeks	13 weeks	0 weeks	0 weeks
				Upper Limit	28.6 weeks	77 weeks	0 weeks	34 weeks	21 weeks	21 weeks
13	5A	Balgreen Road Bridge - S22A Incl. Balgreen Road Ret. Walls W9 [incl. Balgreen Road Bridge - S22B]	94 weeks	Lower Limit	0 weeks	94 weeks	45 weeks	0 weeks	0 weeks	0 weeks
				Upper Limit	0 weeks	94 weeks	45 weeks	1 weeks	1 weeks	1 weeks
24	5B	Carrick Knowe Bridge - S23	10 weeks	Lower Limit	4 weeks	0 weeks	0 weeks	17 weeks	11 weeks	17 weeks
				Upper Limit	4 weeks	10 weeks	0 weeks	51 weeks	51 weeks	51 weeks
25	5B	Road and Track	39 weeks	Lower Limit	6 weeks	5 weeks	8.71 weeks	39 weeks	0 weeks	39 weeks
				Upper Limit	34 weeks	39 weeks	33.3 weeks	67 weeks	67 weeks	67 weeks
26	5C	Road and Track	88 weeks	Lower Limit	9 weeks	16 weeks	21 weeks	-26 weeks	-26 weeks	-26 weeks
				Upper Limit	72 weeks	79 weeks	21 weeks	0 weeks	0 weeks	-12 weeks
14	5C	A8 Underpass - W28	7 weeks	Lower Limit	7 weeks	0 weeks	0 weeks	24 weeks	30 weeks	24 weeks
				Upper Limit	7 weeks	0 weeks	0 weeks	91 weeks	91 weeks	91 weeks
15	5C	Depot Access Road Bridge - S32	32 weeks	Lower Limit	17 weeks	14 weeks	0 weeks	0 weeks	0 weeks	0 weeks
				Upper Limit	17 weeks	14 weeks	0 weeks	7 weeks	7 weeks	7 weeks
SECTION 7										
18	7a	Track - Section 7	57 weeks	Lower Limit	22 weeks	18 weeks	15 weeks	-14 weeks	-14 weeks	-14 weeks
				Upper Limit	45 weeks	35 weeks	15 weeks	0 weeks	0 weeks	0 weeks
19	7b	Gogarburn RW - W14/W15	Insufficient data	Lower Limit			21 weeks			
				Upper Limit			85 weeks			
SECTIONAL COMPLETION DATE D		See comments in Report at Paragraph 4.7.9 (assumed 6 months after Sectional Completion Date C)								

Caution: Needs to be read in conjunction with individual Appendices. Allocation of costs claimed should not be based on simplistic analysis of the above

1A4 Lindsay Road RW – W1



- A. IFC Process:** Initial IFC issued on time (planned 30/09/08; actual 30/09/08). Subsequent IFC's issued as follows:-
- (i) 'Existing services drawing' updated 26/01/09. This does not appear in the Approvals Tracker provided; not clear if this is a formal IFC. There is no information presently available to inform culpability for delay (see Preamble). Potential reasons include:-
 - a. Late issue by SDS (CE(t));
 - b. A material breach by SDS (CE (u));
 - c. A tie Change;
 - d. A failure of Infracore in respect of its management of SDS or another breach by Infracore;
 - e. A requirement of FP for which tie will bear responsibility;**Potential delay by SDS/tie; Infracore** [This may have influenced delay to commencement; much depends on the contemporaneous knowledge about MUDFA/utility works in this area]
- B. Key INTC's:** From the information provided it appears that Infracore issued 4 no. INTC's against this structure. INTC's 129, 292, 085 & 264 refer **[Complete data on INTC's awaited]**. Of the aforementioned it appears likely that **INTC 292** (Additional Ramp / Steps at Lindsay Road RTW) & **INTC 264** (Section 1A4 – groundworks) materially affected Infracore's ability to commence works in accordance with the Rev 01 programme. Both were the subject of an **80.13 instruction on 19/03/10**. Details as follows:-
- (i) INTC 264: issued 07/05/09; Estimate due 02/06/09; No Estimate provided by Infracore. **Delay by Infracore.**
 - (ii) INTC 292: issued 09/02/09; Estimate due 5/3/09; No Estimate provided by Infracore. **Delay by Infracore.**
- C. MUDFA / Utilities:** Planned completion 31/10/08; MUDFA / utilities works in association with Lindsay Road RTW's were partially completed to allow commencement at chainage 0-230 as at 18/01/10. MUDFA / utilities work beyond that date are forecast to complete as follows:-
- a. Lindsay Road West (12/04/10) – access to chainage 0-500 on westbound lane works;
 - b. Lindsay Road East (03/05/10);
 - c. Balance of MUDFA / Utilities works (01/06/10 – MB believes this may be 01/07/10).
- We understand that an actual start on RW1A and RW1c was achieved on or around 17/03/10. This start was not dependent on any of the foregoing utility diversions. We are advised that a start of those structures could have been made on or around 07/01/10 (upon execution of the FP agreement). It appears therefore that the delay from circa 01/02/10 (allowing a reasonable period for mobilisation) to the actual start of 17/03/10 would be to Infracore's account. **Delay by Infracore.**
- Delay by tie; tie culpability** Note: tie restricting Infracore access to this area pending resolution of the Infracore IDC certification process (see below).

D. Other Issues:

- (i) **Sub-Contractor Procurement:** No formal sub-contract has been put in place for this section. It is also not clear whether any informal (LOI) is in place for road works in this section. LOI to McKean of 04/08/08 does not appear to cover 1A4 Lindsay Road RW; extended LOI issued 25/9/09 but scope not clear [subject to future tie audit]. **Delay by Infraco. Infraco culpability.**
- (ii) **WPP Process:** Not yet submitted (as advised by MB). This could be an obstacle to commencement. **Delay by Infraco. Infraco culpability.**
- (iii) **IDR/IDC process:** IDC not yet in place. Infraco programme of 18/12/09 does not contain details for this structure. Infraco delay. We understand that **tie** was restricting Infraco access to this area pending resolution of the Infraco IDC certification process. **Contractual position not yet resolved – see Preamble.**
- (iv) **FPA Licence:** Not in place until 07/01/10. This would have been an obstacle to commencement. Advised that delay arose from failure of SDS (or a failure of Infraco to manage SDS?) to provide 'Category 2' design calculations for ramp at TPB. SDS subsequently revised design to remove ramps as it could not satisfy FP as to suitability of design. This would have been an obstacle to commencement. It is understood that execution of this agreement on 07/01/10 allowed Infraco access to commence RW 1A & RW 1C. **Delay by SDS (possible material breach – excusable under 65(u)); but possibly Infraco in failing to manage SDS (no evidence). SDS or Infraco culpability.**

E. Construction Periods:

1A4 Lindsay Road RW - W1					
	Rev.1	Rev.3 Issue 3	Delay	IM Mitigated Rev.3	Delay
Start	31/10/2008	07/12/2010	109.57 wks	05/07/2010	87.43 wks
Finish	17/06/2009	07/08/2012	163.86 wks	24/06/2011	105.29 wks
Cal. Duration	32.86 wks	87.14 wks	54.29 wks	50.71 wks	17.86 wks

Note: MB suggested mitigation exercise shows overall commencement and completion in Intermediate Section 1A4 as 01/03/10 to 05/07/11 respectively. That equates to a period of **70 weeks**. No specific identification of RW.

- (i) **Delay to Start:** The table above refers to various programme dates. Forecast start dates differ between Issue 3, IM Issue 3, MB mitigated programme and MUDFA / Utility dates listed above. **Delay to start** is therefore forecast to be a **range between 87 weeks (05/07/10) and 109 weeks (07/12/10)**. Note however that the RW may have commenced on **17/03/10** (a delay to start of **72 weeks**). Primary causes of delay to start as follows:-
 - A. **IFC process:** The initial IFC **was on time**; planned date was **30/09/08**; the actual was **30/09/08**. Subsequent IFC dated 26/01/09 was **17 weeks late**. It is unclear as to whether this would have been material. There is no information presently available to inform culpability for delay to this subsequent IFC. Unless there is proof of Infraco breach, **it may be a CE under either 65(t) or (u)** (but uncertain).
 - B. **INTC's:** Delays by Infraco in the submission of Estimates. Delay up to 19/03/10 when tie issued clause 80.13 instruction (note tie responsible for standard 18 day Estimate period – see CE(x)).
 - C. **MUDFA / Utilities:** Planned completion **31/10/08**. Partial completion at Lindsay Road RTW's as at **18/01/10**; further release of areas as at **12/04/10, 03/05/10 and 01/06/10. Delay by tie; tie culpability.**
 - D. **Other:**
 - **Sub-Contractor procurement:** No formal sub-contract has been put in place for this section. It is also not clear whether any informal (LOI) is in place for road works in this section. **Delay by Infraco. Infraco culpability.** Effect of this is not clear – it could be a hindrance to progress – but details not available to establish scope of work under McKean LOI;
 - **WPP process:** Not yet submitted (as advised by MB). This could be an obstacle to commencement. **Delay by Infraco. Infraco culpability.** Unlikely to have significant impact;
 - **IDR/IDC process:** IDC not yet in place. **tie** restricting Infraco access to this area pending resolution of the Infraco IDC certification process.
 - **FPA Licence:** Not in place until 07/01/10. Delay arose from failure of SDS (Infraco?) to provide 'Category 2' design calculations. This would have been an obstacle to commencement. **Delay by SDS (possible material breach – excusable under 65(u)); but possibly Infraco in failing to manage SDS (no evidence). SDS or Infraco culpability.**
- (ii) **Delay to Finish:** Issue 3 programme shows an **increase of circa 54 weeks** over the timescale in Rev.1 programme (majority of increase understood to be as a result of full-depth construction issue). IM mitigated view of Issue 3 also shows an increased duration of **18 weeks** to the Rev.1 programme (albeit **36 weeks** shorter than Infraco's proposed Issue 3 programme). That increase appears to relate to additional TM phasing. MB mitigation proposal also has shorter overall duration for 1A than Issue 3 (but RW not separately identified).

F. tie position on area availability:

- (i) We are advised that access for commencement of RW 1A & 1C was available as at 07/01/10 (following execution of FP agreement). That allowed Infraco access (unhindered by utilities) for those elements. Allowing for mobilisation it is reasonable to consider that Infraco could have commenced on or around 01/02/10. Also refer to section (C) above re MUDFA dates (available from January 2010 although in terms of RW construction this does not appear to have been the obstacle to commencement).

G. Conclusion:

- (i) **'Significant' issues/events:** In our opinion there were four main contributory factors, being (a) the IFC process; (b) the INTC process in respect of INTC 264 & 292; (c) late completion of MUDFA/utilities; and (d) the late execution of the FP licence. Taking those events in chronological order:-

The initial IFC was issued on time on **30/09/08**; but a revision appears to have been issued on **26/01/09 (17 weeks later than planned)**. **MUDFA/utilities diversions** were supposed to be completed on **31/10/08** (to facilitate a start on 1A4 Lindsay Road RW 31/10/08). Those diversions however were not actually completed suffice to allow commencement until circa **18/01/10, with subsequent phased completions forecast to complete up to 01/06/10** (current forecast 01/07/10). This is **tie's** culpability. Running concurrently with this was the **late provision by Infraco of the Estimates** for INTC 264 & 292. Those Estimates have yet to be provided. This is a matter for which Infraco is responsible. **Delay measured to 19/03/10** (when clause 80.13 instruction issued; but may not have been an obstacle to actual commencement). Each of those events could have delayed commencement in this area. In addition, the execution of the **FP licence** is