



NRE 1.1

Summary of Proof of Evidence – Scheme Overview and Construction Management / Methodology (Mr Andy Barnes)

(Inquiries Procedure (England & Wales) Rules 2004)

January 2022

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1 Summary of Proof of Evidence

1.1 Qualifications and experience

1. I am a chartered civil engineer with over 35 years' experience as a design engineer and as an engineering manager responsible for planning and delivery of construction works. Over the last 24 years of my career, I have been supporting railway customers as a designer and as a contractor to deliver railway upgrades and enhancements including station projects.
2. I am also Engineering Director within One Team Wessex, a collaborative delivery framework with Network Rail and Osborne Infrastructure.
3. I act as the current chairperson for Network Rail's Health and Safe by Design thought leadership group. This is an industry wide programme to develop and share best practice to that ensure healthy and safe outcomes emanate from project design.

1.2 Involvement with the Project

4. I am employed by Arcadis Consulting (UK) Limited who were retained by Network Rail to provide a range of services in support of project development for Cambridge South Infrastructure Enhancements. This included multi discipline railway engineering, environmental impact assessment and construction advice.
5. My role in the Cambridge South Infrastructure Enhancements project was to act as the Contractors Engineering Manager. This is a recognised railway term and the role provides Network Rail with assurance that engineering proposals are coordinated across railway disciplines and comply with railway standards as well as project requirements, but most importantly are safe. I also acted as the Contractor's Responsible Engineer for Construction advice.
6. I have subsequently been instructed to provide this evidence.

1.3 Scope and structure of this proof of evidence

7. My Proof of Evidence is Document Ref. NRE 1.2.
8. In my Proof of Evidence, I set out the development of proposals for a new station at Cambridge South and for the railway systems enhancements. This focussed on issues that have an impact on land take and the environment.
9. My Proof of Evidence makes reference to the project requirements.
10. A key objective of the project was that the operation of a new station should not disrupt the existing railway timetable for railway customers. That demands that there are 4Nr.12 car platforms to accommodate the combination of stopping and non-stopping trains passing the station.
11. Studies concluded that alongside the two additional loop lines required to service the 4Nr. platforms, speed improvements are also required through Shepreth Branch Junction, an additional cross over is required outside Cambridge Station and additional signalling sections are required to provide additional capacity to offset the impact of stopping services.
12. For those reasons, my Proof of Evidence recognises that the project has remodelling of the existing two track railway at its heart and there are large parts of the document that focus on issues that may appear to be unrelated to the proposals for a new station but which are inextricably linked.
13. The Proof of Evidence recognises the development of the railway infrastructure solution (including railway systems) around which the station proposals were configured. For the purposes of the Proof of Evidence, the railway infrastructure (including railway systems) includes the track, bridges, signalling and telecommunications assets, high voltage power supplies plus traction power via overhead lines and supporting structures.
14. My Proof of Evidence of Evidence sets some engineering context for the Project, focussing on the existing railway and adjacent assets.

15. The Proof of Evidence then describes the development of proposals for railway infrastructure (including railway systems).
16. The Proof of Evidence then describes the development of station infrastructure solutions including the enabling engineering required to support that, such as drainage, structures, landscaping and the like.
17. My Proof of Evidence describes an approach for the construction the works which supports the development of the engineering proposals.
18. It is important to note that the development of the solutions for railway infrastructure (including railway systems) and station infrastructure must be undertaken together in a systematic approach to engineering as there are significant interdependencies. That same logic applies to the approach to construction in a railway environment although it is also necessary to emphasise that there is flexibility in approach to construction methods to deliver the scheme outcomes and my Proof of Evidence does not present a fixed approach to construction, but a feasible one. The responsibility for the final construction methodology will rest with the main works contractor appointed by Network Rail.
19. Section 3 contains information on the Requirements for the CSIE project and should be read in conjunction with the Proof of Evidence from the Project Sponsor, Mr Lewis Wingfield.
20. At the highest level, the requirements call for a new station with 250m long platforms south of Cambridge Station which does not negatively impact on the capacity and performance of the existing railway and which can deliver a prescribed Indicative Train Service Specification ("ITSS"). In general terms, this is the 2020 Timetable with allowance for growth.
21. A project requirement was that the CSIE Project understood the interface with wider Cambridge Corridor Improvements including future accommodations for East West Rail ("EWR"). There were no firm proposals for EWR and other enhancements along the Cambridge Corridor at the start of the CSIE project.

Consequently, the first phase of the CSIE project was to produce a series of engineering solutions for a railway through Shepreth Branch Junction to the south of Cambridge and Coldhams Lane Junction to the north of Cambridge that could deliver an ITSS for 2043. This included possible solutions for a grade separated junction at Shepreth that would support an additional track either side of the existing Up and Down Main lines through the proposed Cambridge South Station site but also concluded that there was sufficient space for 2Nr. additional tracks running to the west of the existing lines in combination with substantial additional cross overs to allow the East West Rail services to traverse the railway to access the through lines in Cambridge Station. These have been referred to as Concept Designs elsewhere in evidence.

22. Section 4 sets the engineering context for the proposals including content on the existing railway infrastructure around which the proposals were configured. Section 4 should be read in conjunction with the Proof of Evidence from Mrs. Sue Brocken (**NRE 5.1**) which describes site drainage and the Proof of Evidence from Mr Geoff Hilling (**NRE 2.1**) which describes traffic and highway matters
23. Section 5 describes the iterative option identification and assessment process for both the proposed reconfiguration of the railway infrastructure (including railway systems) and the proposed station arrangements.
24. Section 5 describes how different railway layouts were developed for station locations in three separate locations between Nine Wells Bridge and Addenbrooks Bridge.
25. The stations were positioned
 - a. To the south of Addenbrooke's Bridge
 - b. To the north of Nine Wells Bridge
 - c. Broadly centrally between Addenbrooke's Bridge and Nine Wells Bridge
26. Each station location could support an entrance to each side of the railway. These layouts were used to support the first round of public consultation.

27. The layouts would not result in delays to the existing service patterns. This is a core project requirement.
28. Additionally, they are unlikely to inhibit proposals for East West Rail which will introduce additional services through Shepreth Branch Junction and will need to approach the east side of Cambridge Station. This was another key project requirement.
29. It is important to clarify that the proposed scheme does not identify land or railway infrastructure proposals beyond that required for the solution for Cambridge South Station.
30. The iterative design process then identified a solution which took additional land at the eastern railway boundary. This provided four key benefits.
 - a. The extent of permanent land take in Hobson's Park could be reduced.
 - b. The interface with the intermediate piers to Nine Wells Bridge was minimised. Consequently, the width of the island platform could be reduced.
 - c. In turn, for a northern station location, the revised alignment could avoid the need to demolish and re-construct Addenbrooke's Bridge. This was a key design development.
 - d. The Up Loop line was positioned to the east of the Up Main to provide the greatest opportunity to use the reduced speed of the loop to minimise the footprint of the scheme to the east of the railway.
31. When considered alongside other track schemes, this track layout became preferred.
32. Fifteen station configurations were studied across the three separate station locations. These included different levels of access at either side of the railway.
33. The station configurations were sifted to six and then three supported by additional engineering development.

34. A final sift workshop identified the preference for a station adjacent to Addenbrooke's Bridge.
35. The station will have a small station building and facilities on both sides of the railway. The principal station access is on the east of the railway with a station forecourt and access to Francis Crick Avenue. There is minimal car parking. The station forecourt is laid out for taxis, drop off and blue badge holders. The station forecourt incorporates cycle storage.
36. The station building to the west of the railway has access for pedestrians and cyclists along with cycle storage. There is a landscaped track alongside the western railway boundary for emergency vehicles.
37. In addition, an extension to the Down Shepreth line through Shepreth Branch Junction was provided and a new crossover was provided south of Cambridge Station.
38. Designs for the preferred option were developed to a level of detail to support the preparation of the Environmental Statement and development work has continued with two key goals:
 - a. Designing for developing stakeholder needs
 - b. Technical Approval
39. Design proposals include a Railway Systems Compound to the west of the railway to the south of Addenbrooke's Relief Road. This is a landscaped compound with a new power supply (DNO) and railway systems equipment to support the operation of the new railway layout.
40. Level crossings must be closed for safety reasons and proposals include a bridge across Hobson's Conduit to provide access and egress from agricultural land.
41. An area of exchange land is also proposed to the south of Hobson's Conduit and this will use the same bridge for access by recreational users.

42. Proposals include arrangements for new authorised access points to enable Network Rail to maintain its new railway infrastructure.
43. Section 6 presents information on the proposed construction arrangements including thinking around how the works will be staged, construction access and references the Code of Construction Practice Part A.
44. The conjunction strategy required access and working space to both sides of the railway through the station area along the extents of the proposed loop line and along the extents of the extension to the Down Shepreth line through Shepreth Branch Junction.
45. The temporary working areas identified in the Application include land in Hobson's Park and it is important to understand that Network Rail's proposals have been refined in this respect. The project generates surplus soils and initial proposals included using some of that material to create additional landscape forms in Hobson's Park. During consultation with stakeholders, that plan has changed such that Network Rail will seek to reinstate landscaping directly impacted by the works as well as around new infrastructure. This has reduced the amount of temporary space requested by approximately 2/3's and this land is no longer identified in the latest version of the Deposited Plans (**NR22**).
46. The operational railway bisects the proposed construction site and so two primary construction compounds were identified to the south of the Addenbrooke's Relief Road. These compounds service a significant amount of the works via the working space identified along each side of the railway and serve to keep construction traffic from Francis Crick Avenue.
47. However, additional satellite compounds are required and this includes space within the northern area of Hobson's Park towards the Guided Busway.
48. Section 7 addresses a number of the points of objection related to my Proof of Evidence and can be categorised as:
 - a. Challenges to the location of the Rail Systems Compound
 - b. Future emergency and maintenance access through Hobson's Park

- c. The need for and/or size of construction compounds and specifically CC1, CC2 and CC3.
 - d. The amount of temporary working space requested in Hobson's Park
 - e. Impact on neighbouring property or development plots
 - f. Requests for protective provisions
 - g. Coordination with other projects including CSET and AstraZeneca's ongoing works.
 - h. Noise and dust during construction
49. This list is not exhaustive and I am aware that discussions with all objectors continues with an aim to reach agreement. Via a combination of adjustments to design proposals during detailed design and construction commitments, it is my professional opinion that the issues raised are capable of resolution
50. Section 8 is a short conclusion and states that it is my professional opinion that the land identified in the Application is appropriate to deliver the CSIE project. This includes land required on a temporary basis to enable the construction of the works and limit the impacts on railway neighbours.
51. Accompanying the Proof of Evidence is a set of Appendices.
52. This is Document Ref NRE 1.3.
53. Appendix A is a simple Glossary of Terms to assist the non-technical readers.
54. Appendix B contains supporting materials of a technical nature to describe Building and Civil engineering assets forming part of the existing railway infrastructure around which proposals are developed.
55. Appendix C also contains supporting materials of a technical nature to describe Railway Systems for track, signalling, telecoms, OLE and E&P forming part of the existing railway infrastructure around which proposals are developed.
56. Appendix D contains a summary of the impact of the scheme on utilities

57. Most of the services infrastructure around the site can be managed by protective measures during construction. This includes Cadent's high pressure gas main across Hobson's Park and below the railway. This was a key project constraint and designs have sought to stay outside the normal exclusion zone.
58. There are one or two exceptions where proposals for service diversions are required. South Staffordshire Water's main through Hobson's Park must be diverted. A private gas main owned by AstraZeneca will need to be diverted
59. Appendix E tabulates the space proofing requirements for station buildings within the Scheme Design.

Name: Andrew Barnes



Signature:

Date: 07 January 2022