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Executive Summary

This Technical Note has been produced by National Grid Electricity Transmission plc (the Applicant) in response to an Action Point addressed to the Applicant arising at Issue Specific Hearing 2 (8 November 2023). Action Point (AP) 2 from the hearing requested the Applicant to *'submit a note that sets out the baseline construction schedule with the critical path analysis shown and to consider the relationship of this to the Baseline Scenario and Scenario 1 (Justification for Construction Working Hours [REP3-045] Table 2.1), and to Requirement 3 in the draft Development Consent Order (DCO). Provide explanation how different milestone dates for scenarios 1 and 2 have been interpreted in Table 2.1 including impact on time limit (Requirement 3)'*.

A schedule for each the Baseline Construction Schedule, Scenario 1 and Scenario 2 (Justification for Construction Working Hours [REP3-045] Table 2.1), is provided in Appendix A. These schedules show an indicative critical path and the impact of reducing the core working hours in Scenario 1 and Scenario 2 compared to those used in the Baseline Construction Schedule and how this results in Outage 4, the first outage in the required sequence of outages, to be missed for Scenario 1 by seven weeks and for Scenario 2 by seven months. This would result in the subsequent sequence of outages to be missed and result in the 2028 delivery date not being met.

1. Introduction

1.1 Purpose of this Technical Note

- 1.1.1 This Technical Note has been produced by National Grid Electricity Transmission plc (the Applicant) in response to an Action Point addressed to the Applicant arising at Issue Specific Hearing 2 (8 November 2023). Action Point (AP) 2 from the hearing requested the Applicant to *'submit a note that sets out the baseline construction schedule with the critical path analysis shown and to consider the relationship of this to the Baseline Scenario and Scenario 1 (Justification for Construction Working Hours [REP3-045] Table 2.1), and to Requirement 3 in the draft Development Consent Order (DCO). Provide explanation how different milestone dates for Scenarios 1 and 2 have been interpreted in Table 2.1 including impact on time limit (Requirement 3)'*.
- 1.1.2 This Technical Note therefore sets out to:
- Explain how the critical path relates to the 'Baseline Construction Schedule' (shown in illustration 2.1 of Environmental Statement (ES) Appendix 4.2: Construction Schedule [APP-091]);
 - Consider the relationship between the Baseline Construction Schedule and Scenario 1 (a reduction in weekend working using core working hours of 07:00 to 19:00 on weekdays and 08:00 to 13:00 on Saturdays, with no working on Sundays) as shown in Table 2.1 of the Justification of Construction Working Hours ([REP3-045]) and to Requirement 3 of the draft Development Consent Order (DCO) (**document 3.1(E)**); and
 - Explain how the milestone dates have been arrived at for both Scenario 1 (as described in the point above) and Scenario 2 (a reduction in weekday and weekend working using the core working hours of 08:00 to 18:00 on weekdays and 08:00 to 13:00 on Saturdays, with no working on Sundays) as shown in Table 2.1 of the Justification of Construction Working Hours ([REP3-045]).
- 1.1.3 To assist, a schedule for each the Baseline Construction Schedule, Scenario 1 and Scenario 2 is provided in Appendix A of this document.

1.2 Background

- 1.2.1 This document and the schedules presented in Appendix A should be read in conjunction with the Justification for Construction Working Hours Technical Note [REP3-045]. That document explains the need for the core working hours defined in Schedule 3, Paragraph 7 (Construction Hours) of the draft DCO (**document 3.1(E)**) and why they are required to meet the essential 2028 delivery date.
- 1.2.2 The Baseline Construction Schedule is presented in ES Appendix 4.2: Construction Schedule [APP-091] and assumes that the grid supply point (GSP) substation is constructed in advance of an order granting development consent, pursuant to the planning permission under the Town and Country Planning Act and associated works pursuant to the Electricity Act 1989. The Alternative Scenario presented in ES Appendix 4.2: Construction Schedule [APP-091] is not considered in this document because the GSP substation is already under construction and therefore it is considered that it is unlikely that the Alternative Schedule is followed.

- 1.2.3 The Baseline Construction Schedule, summarised in Table 2.1 of the Justification for Construction Working Hours Technical Note **[REP3-045]**, is based on using construction working hours of 07:00 to 19:00 on weekdays and 08:00 to 17:00 on Saturdays, Sundays and Bank Holidays, as requested in Schedule 3, Paragraph 7 (Construction Hours) of the draft DCO (**document 3.1(E)**). Under the Baseline Construction Schedule, works are primarily scheduled to be undertaken only on alternating weekends and whilst works may have to occur on consecutive weekends, ordinarily this would be in order to recover delays. Delays may occur for a number of reasons during the works, for example due to encountering unexpected ground conditions, supply chain issues, low productivity, or any restrictions resulting from future unforeseen events (e.g., global pandemic).
- 1.2.4 Scenario 1 introduced in Table 2.1 of the Justification for Construction Working Hours Technical Note **[REP3-045]**, used core working hours of 07:00 to 19:00 on weekdays and 08:00 to 13:00 on Saturdays, with no working on Sundays. This was modelled to show the impact (against the Baseline Construction Schedule) of using the weekend hours requested by Braintree District Council (BDC) and Essex County Council (ECC) in paragraph 17.4.6 of their Local Impact Report (LIR) **[REP1-039]** and by Suffolk County Council (SCC) in paragraph 17.69 of their LIR **[REP1-045]**.
- 1.2.5 Scenario 2 introduced in Table 2.1 of the Justification for Construction Working Hours Technical Note **[REP3-045]**, used core working hours of 08:00 to 18:00 on weekdays and 08:00 to 13:00 on Saturdays, with no working on Sundays. This was modelled to show the impact (against the Baseline Construction Schedule) of using the weekday and weekend hours requested by BDC and ECC in paragraph 17.4.6 of their LIR **[REP1-039]** and by SCC in paragraph 17.69 of their LIR **[REP1-045]**.

2. Discussion

2.1 Construction Schedules

- 2.1.1 The core working hours used in each of the construction schedules provided in Appendix A are shown below (Table 2.1 of this document). A description for what each the Baseline, Scenario 1 and Scenario 2 schedules show is provided in Section 1.2 of this document.

Table 2.1 – Core working hours used in schedules

	Core Working Hours (hrs per day)											
	Baseline				Scenario 1				Scenario 2			
	Mon - Fri	Sat	Sun	Total	Mon - Fri	Sat	Sun	Total	Mon - Fri	Sat	Sun	Total
Week 1	12	10	10	80	12	4	0	64	10	4	0	54
Week 2	12	0	0	60	12	4	0	64	10	4	0	54
Week 3	12	10	10	80	12	4	0	64	10	4	0	54
Week 4	12	0	0	60	12	4	0	64	10	4	0	54
4 Weekly Total	240	20	20	280	240	16	0	256	200	16	0	216

- 2.1.2 The impact of the reduced working hours shown in Table 2.1 above, for Scenario 1 and Scenario 2 (in comparison to the Baseline Construction Schedule), is illustrated by the schedules provided in Appendix A. Comparing these schedules shows how the reduction in working hours from the Baseline to Scenario 1 and then to Scenario 2, results in an elongation in the duration of the same activities. This has a knock on effect to the start of subsequent activities, the overall duration of the programme and meeting the planned outage dates.
- 2.1.3 The planned outages are labelled and shown by the coloured hatched areas on the Gant chart for each of the schedules provided in Appendix A. In both Scenario 1 and Scenario 2 the reduced working hours (in comparison to the Baseline Construction Schedule) and elongation in activity durations, results in the work for Outage 4, at the start of the sequence of outages, occurring after the planned outage date. As a result, the planned window for Outage 4 is missed. Once an outage window is missed, the whole series of subsequent outages would also be missed, resulting in the 2028 completion date not being met. The schedules in Appendix A only accurately show the first missed outage in the sequence of missed outages, after which the programme logic breaks down. It would not be possible to use a later outage in place of one that has been missed earlier in the sequence, for example Outage 5 could not replace and perform the same function as Outage 4. This is because each outage affects a different part of the transmission system. In addition, outages are ordinarily scheduled between March and October and the planned outages are already using the entirety of the available window. The electricity system operator (ESO) has confirmed that once the works planned for Outage 4 begin,

all works to the end of Outage 7 must be completed to ensure security of the transmission system over winter 2027.

2.2 Critical Path

- 2.2.1 An indicative critical path is shown on each of the schedules provided in Appendix A. This is indicative as individual activities are not shown in these schedules and are instead grouped under a summary bar.
- 2.2.2 The critical path for the Baseline Construction Schedule, Scenario 1 and Scenario 2 follows the same sequence of activities. However, due to the elongation in the duration of activities on the critical path as a result of using reduced working hours (compared to the Baseline Construction Schedule), the start of the Outage 4 Works for both Scenario 1 and Scenario 2 is driven by the completion of commissioning (Stour Valley), rather than the planned date for Outage 4, as is the case for the Baseline Construction Schedule. For Scenario 1 the planned start date for Outage 4 is missed by seven weeks and for Scenario 2 the planned Outage 4 start date is missed by seven months. This can be seen in Appendix A by comparing the outage works to the planned outage dates.
- 2.2.3 In the Baseline Construction Schedule, outage works subsequent to Outage 4 (outages 5, 6, 7 and 8) are driven by successful completion of the preceding outage and the planned outage start dates. The critical path therefore follows this sequence of activities. In Scenario 1 and Scenario 2 the critical path ends at Outage 4 as subsequent work cannot be carried out without successful completion of this activity.
- 2.2.4 Some works are included under the summary bar for outages works which occur ahead of their respective outage. This includes certain offline works associated with that outage, such as the construction of pylon foundations and the pre-assembly of pylons.

3. Conclusion

- 3.1.1 A schedule for each the Baseline Construction Schedule, Scenario 1 and Scenario 2, as summarised in the Justification for Construction Working Hours [REP3-045] Table 2.1, is provided in Appendix A. These schedules show an indicative critical path and the impact of reducing the core working hours in Scenario 1 and Scenario 2 when compared to those used in the Baseline Construction Schedule and how this results in Outage 4, the first outage in the required sequence of outages to be missed for Scenario 1 by seven weeks for Scenario 2 by seven months.
- 3.1.2 If Outage 4 is missed the whole sequence of subsequent outages would also be missed. The critical path shown on the schedules for Scenario 1 and 2 in Appendix A ends at Outage 4 as without completion of this activity the subsequent outage works cannot be carried out. Therefore, for both Scenario 1 and Scenario 2 the essential 2028 delivery date would not be met.
- 3.1.3 The core working hours used in the Baseline Construction Scenario which were requested in Schedule 3, Paragraph 7 (Construction Hours) of the draft DCO (**document 3.1(E)**), allow for the 2028 completion date and crucially the planned outage dates to be met, whilst allowing for a certain degree of flexibility to recover delays. Delays may occur for a number of reasons during the works, for example due to encountering unexpected ground conditions, supply chain issues, low productivity, or any restrictions resulting from future unforeseen events (e.g., global pandemic).

References

Justification of Construction Working Hours [REP3-045]

Draft Development Consent Order (**document 3.1(E)**)

Environmental Statement Appendix 4.2: Construction Schedule [APP-091]

Braintree District Council and Essex County Council Local Impact Report [REP1-039]

Suffolk County Council Local Impact Report [REP1-045]

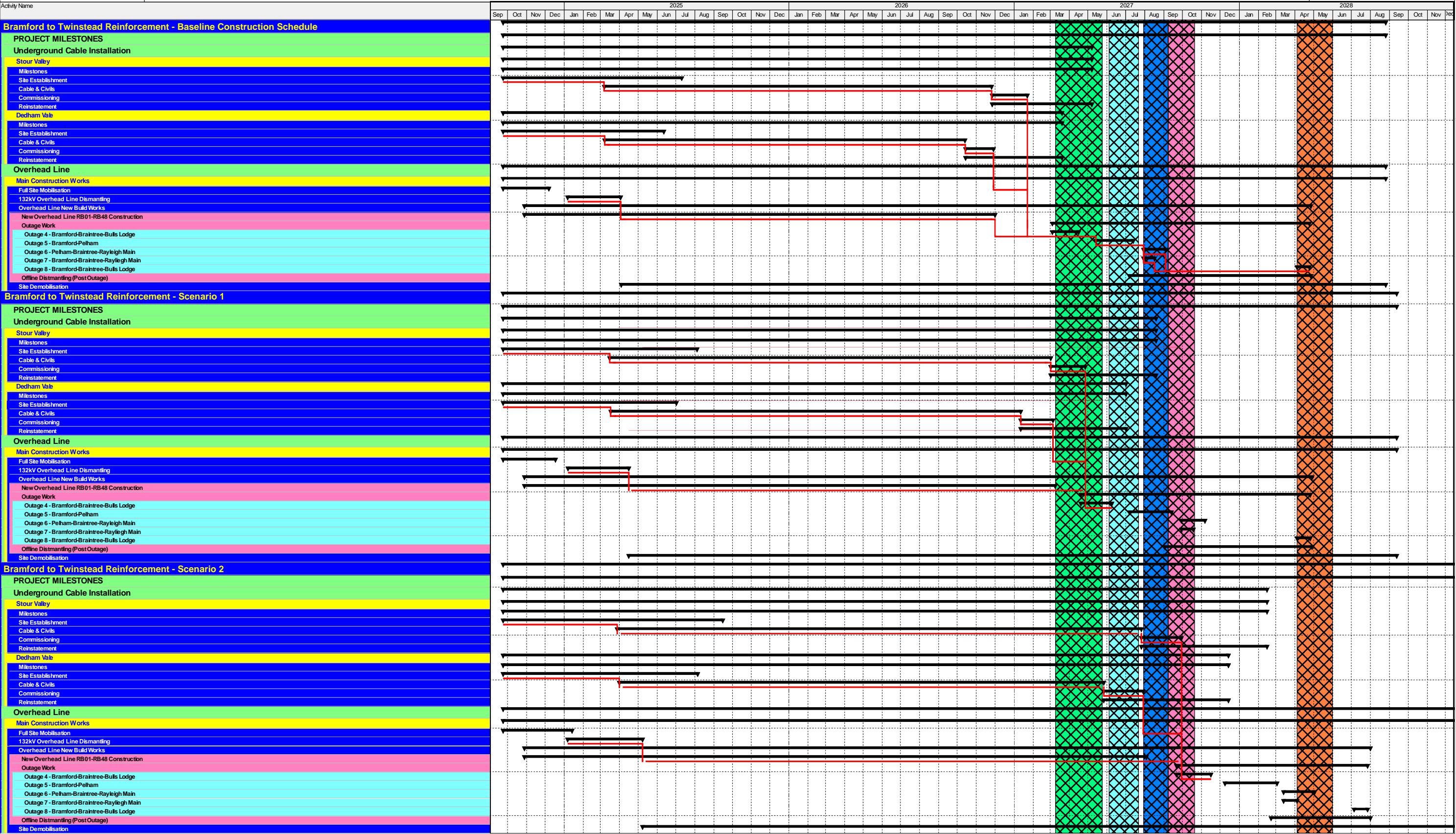
Appendix A

Baseline, Scenario 1 and Scenario 2 Schedules

Bramford to Twinstead Reinforcement - Construction Schedule Comparison

Baseline, Scenario 1 and Scenario 2

Deadline 5



Summary

Critical Path

Outage 4 (Fixed)

Outage 5 (Fixed)

Outage 6 (Fixed)

Outage 7 (Fixed)

Outage 8 (Fixed)

National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152
nationalgrid.com