

**(Annex 8 to ABP: 2 of 3 – DL8)**

**Proposed Lake Lothing Third Crossing (TRO10023)**

**Associated British Ports (20013261)**

**Post Examination Note**

**Impact of Additional Restrictions Imposed by the Scheme of Operation on  
Vessel Transit Times**

At the resumed Issue Specific Hearing 2 (Environment) on 1 April 2019, the Examining Authority ("ExA") requested further information from Associated British Ports ("ABP") regarding the delays arising as a result of the operation of the LLTC bridge openings around the restriction times of the existing Bascule Bridge.

In particular, the specific issue relates to a comparison of the existing AM and PM Bascule Bridge restriction periods and the new restriction periods of the proposed LLTC bridge, proposed in draft Scheme of Operation ("SoO"), and the consequential impact on vessel transit times within the Port of Lowestoft arising from the additional LLTC restriction periods.

This post examination note sets out ABP's consideration of the impact of the additional restrictions imposed by the draft SoO.

**1. Key Inputs**

1.1 The following distances and assumed timings have been applied by ABP to inform the potential future scenarios considered in this note.

- a) Distance between the A47 Bascule Bridge and the LLTC = 850 metres.
- b) Additional vessel minimum safety stand-off (i.e. the minimum safe distance between vessel and bridge), plus an allowance for the width of the bridges = 170 metres. In this regard, it should be noted that this is a minimum distance only suitable for small craft, CTVs or highly manoeuvrable vessels. Larger, less manoeuvrable vessels would need to allow a greater distance/safety margin.
- c) Total minimum vessel transit distance required to clear both bridges = 1020 metres (i.e. 850m + 170m).

- d) Minimum transit time of vessel at harbour speed limit of 4 Knots (2 metres/sec.) = 8 minute 30 seconds. In this assessment, 9 minutes transit time has been used to allow for small variations of speed below 4 knots.
- e) Bascule Bridge cycle time (from initiating opening to leaf locked to allow safe vessel transit) = 2 minutes.
- f) Bascule bridge total cycle time (stop road traffic, vessel passage and resume road traffic) = 6 minutes minimum to 10 minutes maximum.
- g) LLTC anticipated opening cycle time (from initiating opening to leaf locked to allow safe vessel transit) = 3 minutes.
- h) LLTC anticipated total cycle time (stop road traffic, vessel passage and resume road traffic) = 8 minutes minimum to 12 minutes maximum.
- i) Note: maximum cycle times have been used for both Bridges in scenarios where full cycle time is applicable – i.e. 10 minutes for Bascule Bridge and 12 minutes for LLTC.

## 2. Existing Situation – A47 Bascule Bridge

- 2.1 The existing A47 Bascule Bridge operates with an AM restriction of 0815-0900 and a PM restriction of 1700-1745.
- 2.2 The Bascule Bridge AM and PM scenarios prevail irrespective of whether a vessel is sailing or arriving.

### AM Restricted Period

- 2.3 For the AM restriction, in relation to CTV operations or other customer movements, a vessel will need to time its arrival at the Bascule Bridge prior to 0805<sup>1</sup> to ensure a bridge transit can occur prior to the restricted period commencing at 0815. Otherwise, the vessel will be subject to an approximate maximum delay of **56 minutes** (i.e. from 0806-0902), which comprises the buffer time imposed prior to the restricted period commencing (9 mins), the restriction time (45 mins) and the additional time required for the bridge opening sequence time (2 mins).

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<sup>1</sup> Allowing for the 10 minutes referred to 1.1(f) above

### PM Restricted Period

- 2.4 For the PM restriction, a vessel will have to time its arrival at the Bascule Bridge prior to 1650<sup>2</sup> in order to request a bridge transit prior to the restricted period commencing at 1700. Otherwise, the vessel will be subject to an approximate maximum delay of **56 minutes** (i.e. from 1651-1747), as calculated in paragraph 2.3 above.

## **3. Potential Future Scenario – Bascule Bridge and Proposed LLTC**

- 3.1 The proposed LLTC is intended to operate with an AM restriction of 0800-0900 and a PM restriction of 1700-1800, as specified in the SoO.
- 3.2 The in-combination impact of the two bridge restricted periods differs in respect of whether a vessel is transiting inbound or outbound at the Port, during both the AM and PM periods.

### AM Restriction Period - Outward

- 3.3 An outward vessel located to the west of the LLTC must arrive at the LLTC opening position by 0748<sup>3</sup> to ensure a bridge transit can take place before the 0800 proposed restriction commences, otherwise the vessel will be delayed at the LLTC until after 0900 (i.e. after the end of the LLTC AM restricted period). Overall, this would result in an approximate maximum delay of **1 hour 14 minutes** (i.e. from 0749-0903), which comprises the buffer time imposed prior to the restricted period commencing (11 mins), the restriction time (60 mins) and the LLTC bridge opening sequence time (3 mins).

### AM Restriction Period - Inward

- 3.4 An inward vessel requiring a transit to the west of the LLTC must arrive at the Bascule Bridge by 0737, to allow sufficient time for the Bascule Bridge opening sequence (2 mins), transit to LLTC (9 mins) and a full LLTC opening sequence (12 mins) to occur, prior to the commencement of the LLTC restricted period at 0800.
- 3.5 If the vessel arrives at the Bascule Bridge between 0738 and 0805, it will be able to transit through the Bascule Bridge, but not the LLTC, prior to the commencement of the LLTC AM restricted period. If this occurs, the vessel will have to wait until after 0900 in order for the LLTC bridge to open after the end of the restricted period – if it can hold station in the inner harbour between the bridges – resulting in an approximate

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<sup>2</sup> Again allowing for the 10 minutes referred to 1.1(f) above

<sup>3</sup> Allowing for the 12 minutes referred to 1.1(h) above

maximum delay of **1 hour 14 minutes** (i.e. from 0749-0903). This delay is taken from the time from when the vessel arrives at the LLTC 'holding' area to the east of the bridge (i.e. at 0749), and comprises of the wait until the end of the LLTC restriction period (71 mins) and the LLTC opening sequence time (3 mins).

- 3.6 If the vessel arrives at the Bascule Bridge between 0738 and 0805 but cannot hold station in the inner harbour between the bridges, it will be unable to enter the Port until it is able to pass through both bridges in one continuous transit. If this occurs, it will result in an approximate maximum delay of **1 hour 36 minutes** (i.e. from 0738-0904). This comprises time taken waiting in the outer harbour until the end of the Bascule Bridge restricted period (82 mins), opening sequence time of the Bascule Bridge (2 mins), transit time between the two bridges (9 minutes), and the LLTC bridge opening sequence time (3 mins).

*PM Restriction Period - Outward*

- 3.7 An outward vessel located to the west of the LLTC must arrive at the Bascule Bridge by 1650 in order to transit before the restriction commences at 1700. To achieve this, the vessel must arrive at the LLTC by 1638 to provide sufficient time for the LLTC Bridge opening cycle (3 mins) and transit between the two bridges (9 mins), to arrive and transit the Bascule Bridge before the restriction period cut off time. As the LLTC PM restricted period has not yet commenced at 1638, the only additional delay during this outbound transit would be the additional time spent waiting for the LLTC to open (3 mins).
- 3.8 If the vessel arrives at the LLTC between 1639 and 1641, it will be able to transit through the LLTC, but not the Bascule Bridge, prior to the commencement of the Bascule Bridge PM restricted period. If the vessel cannot hold station in the inner harbour between the bridges, it will be unable to leave the Port until it is able to pass through both bridges in one continuous transit. If this occurs, it will result in an approximate maximum delay of **1 hour 35 minutes** (i.e. from 1639-1814), which comprises time taken waiting in the inner harbour (to the west of the LLTC) until the end of the LLTC restricted period (81 mins), the LLTC bridge opening sequence time (3 mins), transit time between the two bridges (9 mins) and the Bascule Bridge opening sequence time (2 mins).

*PM Restriction Period - Inward*

- 3.9 An inward vessel requiring a transit to the west of the LLTC must arrive at the Bascule Bridge by 1637, to allow sufficient time for the Bascule Bridge opening sequence (2

mins), transit to LLTC (9 mins) and full LLTC opening sequence (12 mins) to occur, prior to the commencement of the LLTC restricted period at 1700.

- 3.10 If the vessel arrives at the Bascule Bridge between 1638 and 1650, it will be able to transit through the Bascule Bridge, but not the LLTC, prior to the commencement of the LLTC PM restricted period. If this occurs, the vessel will have to wait until 1800 in order for the LLTC bridge to open after the end of the restricted period – if it can hold station in the inner harbour between the bridges – resulting in an approximate maximum delay of **1 hour 14 minutes** (1649-1803). This delay is taken from the time the vessel would arrive at the LLTC 'holding' area to the east of the bridge, and comprises the wait until the end of the LLTC restriction period (71 minutes) and the LLTC bridge opening sequence time (3 mins).
- 3.11 If the vessel arrives at the Bascule Bridge between 1638 and 1650 but cannot hold station in the inner harbour between the bridges, it will be unable to enter the Port until it is able to pass through both bridges in one continuous transit. If this occurs, it will result in an approximate maximum delay of **1 hour 25 minutes** (i.e. from 1638-1803), which comprises time taken waiting in the outer harbour for Bascule Bridge restriction period (67 mins), the Bascule Bridge opening sequence (2 mins), transit time between the two bridges (9 mins), waiting for the end of the LLTC restriction period (4 mins), and the LLTC bridge opening sequence time (3 mins).

#### 4. Additional Impact of the LLTC restriction periods

- 4.1 By considering the difference between the existing scenario and the future predicted scenarios (as currently envisaged by the draft SoO), the proposed LLTC restricted periods will result in the following additional approximate delays to vessel transits at the Port during the key AM and PM periods:
- a) **AM Outward** – 18 minutes additional delay<sup>4</sup>;
  - b) **AM Inward** – 18 minutes additional delay<sup>5</sup>, or 40 minutes additional delay<sup>5</sup> (if vessel cannot hold station between both bridges);
  - c) **PM Outward** – 3 minutes additional delay, or 39 minutes additional delay<sup>6</sup> (if vessel cannot hold station between both bridges; and

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<sup>4</sup> Calculated as 74 minutes (para 3.3) less 56 minutes (para 2.3) = 18 minutes

<sup>5</sup> Calculated as 96 minutes (para 3.6) less 56 minutes (para 2.3) = 40 minutes

<sup>6</sup> Calculated as 95 minutes (para 3.8) less 56 minutes (para 2.4) = 39 minutes

- d) **PM Inward** – 18 minutes additional delay<sup>5</sup>, or 29 minutes additional delay<sup>7</sup> (if vessel cannot hold station between both bridges).
- 4.2 The AM Outward and PM Inward delays are considered by ABP to be the most critical in terms of CTV operations, as they coincide with the morning and evening journeys to and from offshore wind farms for Operation and Maintenance activities. Applying the Applicant's own estimate of CTV running cost of £1200 per hour<sup>8</sup> at 2015 prices (see Paragraph 3.3.23 of the Applicant's Impact of the Scheme on the Port of Lowestoft - Document SCC/LLTC/EX/59), multiplied over the lifetime of a windfarm, there are significant financial implications for CTV operators if delays of this magnitude are imposed on wind farm operations based in the Inner Harbour to the west of the LLTC bridge.
- 4.3 For other sailings (i.e. of general shipping using the Port), all four additional delays are considered by ABP to equally likely to occur, putting the Port at a significant commercial disadvantage.

## 5. Unhindered Passage Opportunity

- 5.1 Unhindered passage opportunity means that the vessel is able to transit the Bascule Bridge without being affected by the restriction period. That is when the existing Bascule Bridge can be opened and closed before the start of an AM or PM restriction period. The presence of the LLTC imposes an additional time restriction, which varies depending on the restriction period and direction of transit.

### AM Outward

- 5.2 The requirement to transit the LLTC by 0748, as opposed to passing this location at 0756 (without LLTC), has reduced the unhindered transit time window by **8 minutes**.

### AM Inwards

- 5.3 The requirement to transit the Bascule Bridge by 0737, as opposed 0805 (without LLTC), has reduced the unhindered transit time window by **28 minutes**.

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<sup>7</sup> Calculated as 85 minutes (para 3.11) less 56 minutes (para 2.4) = 29 minutes

<sup>8</sup> This figure is derived from secondary analysis of data the following paper: Dalgic, Y., Lazakis, I. & Turan.O (2015). *Investigation of Optimum Crew Transfer Vessel Fleet for Offshore Wind Farm Maintenance Operations*. Wind Engineering volume 39, no. 1, pp 31–52 (Available: <https://pdfs.semanticscholar.org/890d/7676c518649e89ad237a08a9d5efeff84430.pdf>)

PM Outwards

- 5.4 The requirement to transit the LLTC by 1638 as opposed passing this location at 1641 (without LLTC), has reduced the unhindered transit time window by **3 minutes**.

PM Inwards

- 5.5 The requirement to transit the Bascule Bridge by 1637, as opposed 1650 (without LLTC), has reduced the unhindered transit time window by **13 minutes**.

**6. Conclusion**

- 6.1 This analysis sets out the impact of the additional restrictions that would be imposed by the draft SoO on vessel transit times, taking into account the variables and unknowns that inevitably arise in these scenarios, including the actual LLTC cycle times. A further complication is the consideration of whether a vessel can hold station safely in the inner harbour – factoring in vessel manoeuvrability, wind and tidal effects, amongst others.
- 6.2 Overall, in most future scenarios with the addition of the LLTC, there is a potential additional minimum delay of 18 minutes, rising to 40 minutes delay in one scenario (AM Inwards – no ability to hold station). The overall impact of these additional restrictions would be to impose a significant additional financial burden on shipping passing to the west of the proposed LLTC – including that part of the Port most likely to receive additional offshore wind related traffic in the future.
- 6.3 In addition to the actual time delays imposed by the draft SoO, there is also an effect on the unhindered transit opportunities caused by a combination of timing sequences and the transit time between the two crossings. This has the greatest potential effect over the AM restriction periods for an inward vessel, adding an addition delay of approximate 28 minutes.