SILVERTOWN TUNNEL

Volume 8

# 8.119 Applicant's response to question regarding Option Appraisal (Five Case) from the Issue Specific Hearing on 28 March 2017

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MAYOR OF LONDON

TRANSPORT FOR LONDON

EVERY JOURNEY MATTERS

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# Silvertown Tunnel

# Applicant's response to question regarding Option Appraisal (Five Case) from the Issue Specific Hearing on 28 March 2017

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

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# Contents

## List of Tables

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# 1. OPTION APPRAISAL AND THE FIVE CASE MODEL OF BUSINESS CASE DEVELOPMENT

## 1.1 Introduction

1.1.1 The ExA asked during the ISH on 28th March 2017 for further clarification on the appraisal process followed, with a particular reference to the Five Case Business Case model. The information below is supplied to better explain the approach taken to this, and in particular how value for money of the scheme was appraised.

1.1.2 As set out in the Case for the Scheme (APP-093) there are specific problems the Applicant aimed to solve with the Scheme: congestion at the Blackwall Tunnel, incidents at the Blackwall Tunnel, and the lack of cross-river highway resilience. These problems were reflected in the core project objectives, specifically objective P01: To improve the resilience of the river crossings in the highway network in east and southeast London to cope with planned and unplanned events and incidents; and PO2: To improve the road network performance of the Blackwall Tunnel and its approach roads.

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1.1.4 The Case for the Scheme (APP-093) and previous Applicant responses (REP3-030) have set out in some detail the structured option appraisal process followed.

1.1.5 In summary, a very wide set of options was considered and consulted on, very few of which were considered to meet the above core project objectives of solving the problem of congestion at the Blackwall Tunnel, and addressing the critical issue of resilience.

1.1.6 What has perhaps not been sufficiently highlighted in the Applicant's responses to date is the way that economic analysis was used at various stages of this option appraisal, to inform decisions on options.

1.1.7 The Applicant considered economics at each stage of its optioneering process for the Scheme as it moved from strategic options assessment, through to the eventual consideration of very detailed alternative implementations of the tunnel at Silvertown with user charges, which had been found to be the only feasible option capable of fully addressing the core project objectives.

1.1.8 Economic analyses formed an integrated component of this overall optioneering process, and were primarily used to assist in decision making between potentially feasible options which were assessed as being capable of delivering the objectives sought at each stage of the optioneering process. Key analyses undertaken are summarised below.

**Strategic alternatives stage**

1.1.9 At the strategic stage of optioneering, public transport-only options were rejected on the grounds that even a very large package of such options would only modestly address the congestion issues at the Blackwall Tunnel and could not provide additional resilience.

1.1.10 Accordingly, the key alternative option for which economic appraisal is described in this section is the implementation only of a charge at the Blackwall Tunnel, compared to the option of a new crossing at Silvertown accompanied with user charging at the Blackwall Tunnel and the new crossing.

**Highway options in Blackwall area stage**

1.1.11 Once it had been determined that some form of highway link close to the Blackwall Tunnel would be required to fulfil the objectives, the Applicant again considered a number of alternatives, including bridges, lifting bridges, and tunnels.

1.1.12 A fixed bridge was determined to be unfeasible and hence the Applicant considered the economics at this stage of a tunnel at Silvertown and a lifting bridge at Silvertown. This analysis is set out below.

**Silvertown Tunnel optimisation stage**

1.1.13 Having finally determined that a tunnel at Silvertown was the only feasible solution that would fully meet the project objectives, the Applicant conducted a detailed appraisal of various tunnel engineering options, and the option of implementing the new tunnel without imposing charges on the existing crossing.

1.1.14 The key analyses from this stage, immersed vs bored tunnel options, and an option without a charge at Blackwall, are described below.

1.1.15 Finally, the Applicant considered a variety of options for charging at the tunnel (summarised in previous submissions to the examination (appended to response to FWQ SE.3)).

1.1.16 This note sets out key elements of this analysis to demonstrate that economic costs and benefits and value for money were considered carefully during the option appraisal.

# 2. STRATEGIC ALTERNATIVES STAGE

## 2.1 Blackwall Tunnel Charge only

2.1.1 The key feasible alternative at this stage capable of substantially addressing at least the congestion objective was the application of user charging at the Blackwall Tunnel without accompanying highway capacity increase.

2.1.2 This economic assessment therefore compares the results of a TUBA and public transport WebTAG-compliant assessments for the Assessed Case with an option with the Blackwall Tunnel charged but no Silvertown Tunnel. The results are shown in Table 1.

2.1.3 The 'Blackwall Charge Only' option would not incur any investment (PV of £732m in the Assessed Case over 60 years) or tunnel operating costs (PV £100m in the Assessed Case), but would incur charge collection costs(PV £345m in both cases). The Blackwall charge only option would have lower revenues than the Assessed Case, and almost 50% of the combined benefits of the Assessed Case.

2.1.4 In summary, this option of only charging Blackwall would offer much lower benefits but at a much lower cost. However, as set out in the Case for the Scheme this option would not achieve the core project objective of improving the resilience of the local network, would be less effective at reducing Blackwall Tunnel congestion and would offer significantly lower potential for public transport improvements. It would also offer only limited benefits for public transport provision (in the context of which it would be much harder to provide mitigation through improved buses for the low income users of the charged tunnel), and the likelihood of diversion to other crossings would be higher.

2.1.5 For these reasons this option was not taken forward for further economic analysis.

**Table 1: Economic Summary – Blackwall Charge only vs Silvertown Tunnel, £m, PV 2010, 2021 assessment year**

| 2021 only | | | |
|---|---|---|---|
| Public Transport | Assessed Case | Blackwall Charged No ST | Blackwall Charged No ST % |
| Business | £0.57 | £0.00 | -0.11% |
| Commute | £1.12 | -£0.01 | -0.92% |
| Other | £3.64 | -£0.01 | -0.25% |
| | | | |
| Total | £5.33 | -£0.02 | -0.37% |
| | | | |
| PT revenue change | £3.99 | £1.77 | 44.26% |
| | | | |
| Highway | Assessed Case | Blackwall Charged No ST | Blackwall Charged No ST % |
| Business | £20.79 | £10.12 | 48.68% |
| Commute | £3.75 | £2.34 | 62.40% |
| Other | £8.61 | £6.12 | 71.08% |
| | | | |
| Total | £33.15 | £18.58 | 56.05% |
| | | | |
| User Charge | -£37.60 | -£35.54 | 94.52% |
| | | | |
| Combined Benefits | Assessed Case | Blackwall Charged No ST | Blackwall Charged No ST % |
| Commute | £21.36 | £10.12 | 47.37% |
| Business | £4.87 | £2.33 | 47.87% |
| Other | £12.25 | £6.11 | 49.90% |
| | | | |
| Total | £38.48 | £18.56 | 48.24% |

# 3. HIGHWAY OPTIONS IN BLACKWALL AREA STAGE

## 3.1 Silvertown Lifting Bridge

3.1.1 This economic comparison between a Lifting Bridge option and a Tunnel option was undertaken during the earlier option appraisal work. It used a different transport model and scheme assumptions to the final Assessed Case, but enabled an economic comparison between the options based on WebTAG principles, in this case for a 30-year assessment period. This analysis ignored user charges as this was likely to be very similar between the schemes. The results are summarised in Table 2.

3.1.2 The total present value of investment and operating costs was estimated at £404m for the lifting bridge option and £441m for the tunnel option. The estimated time savings were similar, but with the lifting bridge disbenefits were also incurred due to the time delays when the bridge required to be raised. The result of the analysis was that the NPV of the tunnel option was higher at £865m compared to £746m for the lifting bridge.

3.1.3 The economic consequences were very similar, but the lifting bridge was ruled out from further consideration and further economic analysis as it was concluded that it failed key tests (for example, it did not fully provide resilience, as it would close every time a ship went past and would divert traffic to Blackwall, including large vehicles), would also have negative impacts on the environment and would introduce major project design risk.

**Table 2 - AMCB Summary – Silvertown Lifting Bridge vs Tunnel**

| **Analysis of Monetised Costs and Benefits, £000s –** | **Tunnel** | **Lifting Bridge** |
|---|---|---|
| | | |
| Noise (12) | | |
| Local Air Quality (13) | | |
| Greenhouse Gases (14) | £3,908 | £3.908 |
| Journey Quality (15) | | |
| Physical Activity (16) | | |
| Accidents (17) | | |
| Economic Efficiency: All journey time savings | £1,301,962 | £1,145,537 |
| Wider Public Finances ( | | |
| **Present Value of Benefits** | **£1,305,870** | **£1,149,445** |
| | | |
| Broad Transport Budget (10) | £440,584 | £403,716 |
| | | |
| **Present Value of Costs (see notes) (PVC) (10)** | **£440,584** | **£403,716** |
| | | |
| **OVERALL IMPACTS** | | |
| **Net Present Value (NPV) NPV=PVB-PVC** | **£865,286** | **£745,729** |

# 4. SILVERTOWN TUNNEL OPTIMISATION STAGE

## 4.1 Blackwall Tunnel Uncharged with a Charged Silvertown Tunnel

4.1.1 This economic assessment compared the results of a TUBA and public transport WebTAG-compliant assessments for the Assessed Case with an option with the Blackwall Tunnel not charged but with the Silvertown Tunnel included with a charge. The results are shown in Table 3.

4.1.2 In addition to the basic issue with this option that the new capacity would be very little used because of the proximity of the existing uncharged crossing, the 'Blackwall Tunnel Uncharged with Silvertown Charged' option would incur the same capital and operating costs as the Assessed Case, with some reduction in charge collection costs. The option would result in half the benefits of the Assessed Case (despite the lower charge costs to users arising from fewer users paying charges), and user charge revenue would fall dramatically, such that the scheme would not be able to be funded through this method.

4.1.3 The option would improve resilience, although continued high use of the uncharged Blackwall Tunnel would reduce this compared to the Assessed Case and it would not resolve current reliability and congestion issues in the way the Assessed Case would. For all of these reasons this option was not therefore taken forward for further economic analysis.

**Table 3: Economic Summary – Blackwall uncharged (with Silvertown Tunnel) vs Silvertown Tunnel, £m PV2010, 2021 assessment year**

| **2021 only** | | | |
|---|---|---|---|
| **Public Transport** | **Assessed Case** | **Blackwall Uncharged** | **Blackwall Uncharged %** |
| Business | £0.57 | £0.58 | 100.66% |
| Commute | £1.12 | £1.13 | 101.45% |
| Other | £3.64 | £3.66 | 100.58% |
| | | | |
| Total | £5.33 | £5.37 | 100.77% |
| | | | |
| PT revenue change | £3.99 | £2.38 | 59.59% |
| | | | |
| **Highway** | **Assessed Case** | **Blackwall Uncharged** | **Blackwall Uncharged %** |
| Business | £20.79 | £11.39 | 54.79% |
| Commute | £3.75 | £0.61 | 16.27% |
| Other | £8.61 | £2.23 | 25.90% |
| | | | |
| Total | £33.15 | £14.23 | 42.93% |
| | | | |
| User Charge | -£37.60 | -£3.32 | 8.83% |
| | | | |
| Combined Benefits | Assessed Case | Blackwall Uncharged | Blackwall Uncharged % |
| Commute | £21.36 | £11.97 | 56.02% |
| Business | £4.87 | £1.74 | 35.82% |
| Other | £12.25 | £5.89 | 48.07% |
| | | | |
| Total | £38.48 | £19.60 | 50.93% |

## 4.2 Economic appraisal of different Tunnel Options

4.2.1 At an this stage of the work it was clear that in terms of wider economic impacts, all options requiring a user charge would have similar outcomes, and these were therefore not analysed during the optioneering process, but were calculated later for the preferred option.

4.2.2 A further economic appraisal undertaken was for a detailed examination of eight tunnel sub-options, analysing the impacts of the bored and immersed tunnel options, as well as short and long tunnel options, as reported in Chapter 6 of the Case for the Scheme. Full details including costs and quantified risk assessment were reported in the Summary and Comparison of Tunnel Options, TfL, December 2013 (an appendix document to APP-018). This enabled TfL to ensure that the best value for money options were carried forward to further economic appraisal.

4.2.3 These options were assessed as having identical economic and wider economic impact benefits, but different investment cost and environmental impacts, and detailed analysis was undertaken of the costs and impacts of these. The two best performing of these options, an immersed tube and a bored tunnel, were taken forward to the detailed economic analysis described below.

## 4.3 Economic appraisal of Bored vs Immersed Tunnel Options

4.3.1 In accordance with the Five Case Business Case Guidance, a full economic appraisal of the two best performing options (a bored and immersed tube tunnel at Silvertown) against the do-minimum case was carried out and is set out in Appendix H of the Economic Assessment Report for the Silvertown Tunnel, 2014 (an appendix doc to APP-018) and the associated Preliminary Outline Business Case. In accordance with WebTAG, TEE, PA and AMCB tables were produced for these options and the AMCB tables are summarised below in Table 4. This showed that the bored tunnel option resulted in an NPV of £621m and the immersed tunnel resulted in an NPV of £635m, and both options were regarded as high value for money. Given that the economic outcomes were so close, other factors, primarily environmental considerations and project risks were ultimately decisive in the identification of the preferred option of a bored tunnel at Silvertown.

4.3.2 In order to further improve the value for money, the Applicant also used economic analysis to assess the benefits and costs of a very large number of different charging options.

**Table 4 AMCB Summary – Bored vs Immersed Tube Tunnel, £000's**

| | Bored Tunnel | Immersed Tube Tunnel |
|---|---|---|
| Local Air Quality (13) | | |
| Greenhouse Gases (14) | £11,976 | £11,976 |
| Journey Quality (15) | | |
| Physical Activity (16) | | |
| Accidents (17) | -£6,556 | -£6,556 |
| Economic Efficiency: Consumer Users (Commuting) (1a) | £159,345 | £159,345 |
| Economic Efficiency: Consumer Users (Other) (1b) | £105,073 | £105,073 |
| Economic Efficiency: Business Users and Providers (5) | £458,255 | £458,255 |
| Wider Public Finances (Indirect Taxation Revenues) - (11) - sign changed from PA table, as PA table represents costs, not benefits | -£100,366 | -£100,366 |
| | | |
| **Present Value of Benefits (see notes) (PVB), PVB=(12)+(13)+(14)+(15)+(16)+(17)+(1a)+(1b)+(5)+(11)** | **£627,727** | **£627,727** |
| | | |
| Broad Transport Budget (10) | £7,071 | -£6,836 |
| | | |
| **Present Value of Costs (see notes) (PVC) (10)** | **£7,071** | **-£6,836** |
| | | |
| **OVERALL IMPACTS** | | |
| **Net Present Value (NPV) NPV=PVB-PVC** | **£620,656** | **£634,563** |

# 5. CONCLUSION

5.1.1 A thorough option appraisal process following WebTAG guidelines was carried out, including economic analyses of various options. This structured appraisal concluded that only a fixed link in the form of a bored or immersed tunnel could achieve the core project objectives.

5.1.2 The costs and risks of options of this type were investigated further, and the two best performing tunnel options were subject to a full economic appraisal as per the Five Case guidance.

5.1.3 The preferred option was then subject to further value for money appraisal of various types, and a final detailed economic analysis was undertaken.

5.1.4 The Applicant was therefore satisfied that the value for money of the preferred option was carefully considered, that the best alternatives were been compared to each other, and that the best value for money option has been taken forward as the preferred option.