TRANSPORT FOR LONDON

Thamesmead & Beckton Riverside Public Transport Programme

Second Sift Option Assessment Report
September 2023

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Second Sift Option Assessment Report

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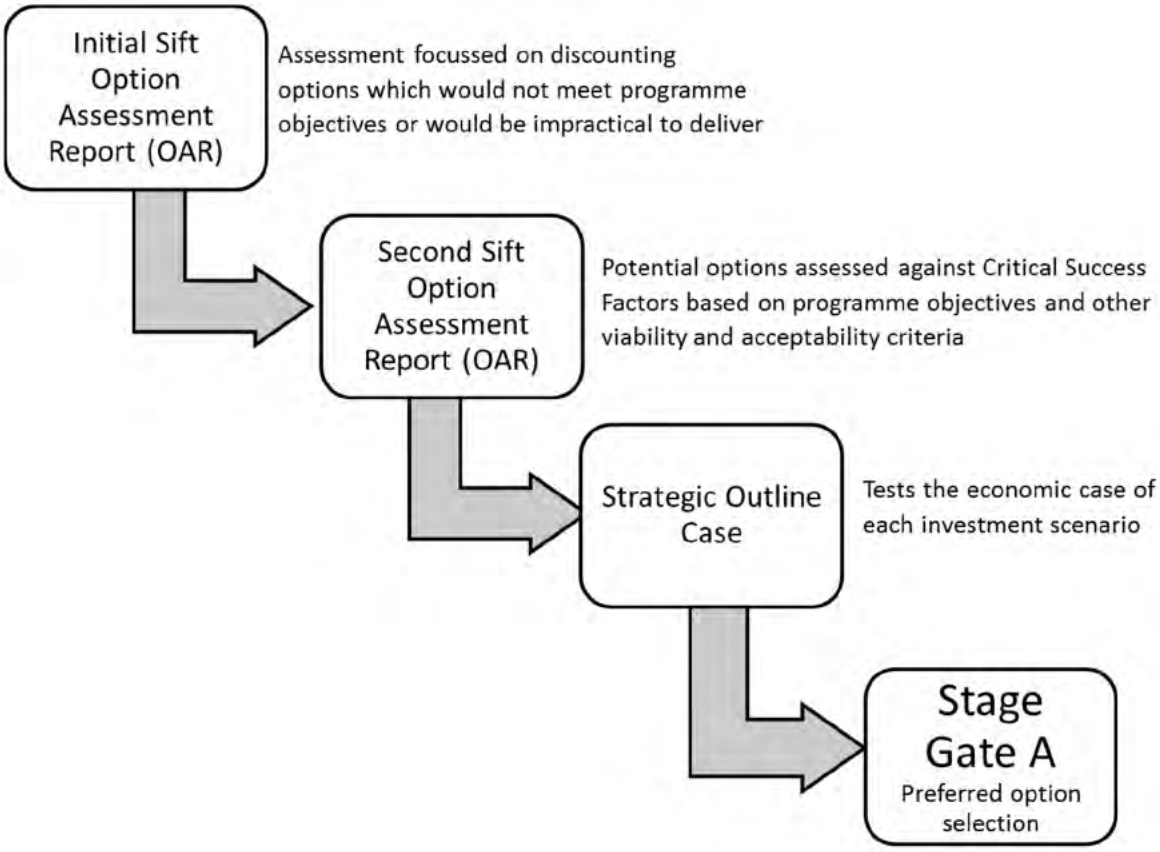
1 Introduction

1.1 Study Purpose

1.1.1 The Thamesmead and Beckton Riverside Public Transport Programme (TBR PTP) is a proposed new public transport scheme in east London. A Strategic Outline Case (SOC) is being developed for the Scheme. This report sets out the assessment of options undertaken as part of the development of the Scheme's Strategic Case, and outlines the rationale for the options tested for more detailed evaluation within the Economic Case. The Economic Case is one of the five Cases in the Scheme's Strategic Outline Case (SOC). The Economic Case is a Cost-Benefit Analysis (CBA) which determines the Scheme options' Value-for-Money (VfM).

1.1.2 This report sets out TfL's approach to a second stage of option development and assessment for the Thamesmead & Beckton Riverside Public Transport Programme. Following an initial option sift, the conclusions of which are detailed in Section 3 of this report, the further development and assessment of a number of bus, heavy rail and light rail options are presented in this report.

Figure 1: The Option Assessment process



1.1.3 Building on the initial option sift, this report details the assessment of the selected options using a number of detailed Critical Success Factors (CSFs). These have been developed to determine the strategic fit, value for money, affordability, achievability and stakeholder acceptability of the options and identify the options to be taken forward for detailed economic appraisal in a Strategic Outline Business Case.

1.2 Programme objectives

1.2.1 Objectives were developed to address the challenges and opportunities locally, in line with national, regional and local policies, and in collaboration with the Steering Group of interested stakeholders.

1.2.2 These objectives are:

- **Place** – In line with the principles of Good Growth, create high-quality spaces to live, work and play and which are inclusive, with access to high quality public transport, green space, and integrated with existing communities
- **Homes** - Unlock and accelerate the delivery of new high quality homes, including the delivery of affordable and family homes in Thamesmead and Beckton Riverside including improving the connectivity and capacity of the public transport network
- **Levelling Up and Economy** - Promote economic growth and regeneration which contributes towards tackling local deprivation, by supporting the creation of enhanced town centres, public services and employment opportunities for local people as well as improving access to jobs, education and amenities and creating a sense of community, local pride and belonging at Beckton Riverside and Thamesmead
- **Connectivity** - Improve cross-river public transport connectivity to reduce barriers to movement between east London, south east London and the wider Thames Estuary Growth Area and delivers enhanced local connectivity through the Healthy Streets agenda in Thamesmead and Beckton Riverside
- **Environment** - Deliver progress towards the UK's commitment to Net Zero by 2050 through the delivery of energy efficient homes and workplaces and a transport network that supports low carbon and low car ownership/car use developments, maximises active travel and supports mode shift away from the car

1.2.3 As well as these five objectives, the Steering Group also agreed that the following factors need to be assessed alongside the objectives:

- **Value for money**: Intervention must demonstrate value for money and be resilient to alternative future demand scenarios
- **Affordability**: The intervention must be affordable and have strong funding prospects

2 Initial sift

2.1 Option Assessment Report

2.1.1 The initial sift, of a long list of potential options, is described in the Option Assessment Report. The outcome is summarised below, but for more details refer to the Initial Sift Option Assessment Report.

2.2 Option identification

2.2.1 A number of potential public transport concepts were identified, based on a review of existing public transport connections in east / south east London, previous studies and key themes in the Mayor's Transport Strategy.

2.2.2 These concepts are presented in Table 1 below in approximate order of scale of intervention (from heavy rail to active travel).

Table 1: Concept options identified

National Rail extension	NR01: National Rail extension from Plumstead to Thamesmead
	NR02: National Rail extension from Plumstead to Belvedere via Thamesmead
Elizabeth Line extension	EL01: Elizabeth Line extension from Abbey Wood to the east
	EL02: Elizabeth Line extension from Custom House to Thamesmead
London Underground extension	LU01: H&C line extension from Barking to Thamesmead
	LU02: H&C line extension from Barking to Thamesmead and Abbey Wood
	LU03: Jubilee line extension from North Greenwich to Thamesmead via Beckton Riverside
London Overground extension	LO1: London Overground extension Barking Riverside – Abbey Wood
	LO2: London Overground extension Barking Riverside – Belvedere
	LO3: London Overground extension Barking Riverside – Woolwich
	LO4: London Overground extension Barking Riverside – Thamesmead
	LO5: London Overground extension Barking Riverside – Beckton Riverside – Gallions Reach
DLR	DLR01: DLR extension from Gallions Reach – Beckton Riverside
	DLR02: DLR extension from Gallions Reach – Thamesmead
	DLR03: DLR extension from Gallions Reach – Abbey Wood
	DLR04: DLR extension from Gallions Reach – Belvedere
	DLR05: DLR extension from Gallions Reach – Barking – Abbey Wood/Belvedere

	DLR06: DLR extension from Woolwich Arsenal – Thamesmead
	DLR07: DLR extension from King George V – Thamesmead
	DLR08: DLR extension from Gallions Reach – Beckton Riverside – Barking Riverside – Dagenham Dock
	DLR09: DLR extension from Gallions Reach to Barking
	DLR10: Pedestrian link bridge between Beckton Riverside and Gallions Reach
Tram	Tram01: tram linking Abbey Wood – Thamesmead
	Tram02: tram linking Abbey Wood – Gallions Reach via Thamesmead and cross-river link
	Tram03: tram linking Abbey Wood – Gallions Reach via Thamesmead and cross-river link
	Tram04: tram linking Abbey Wood – Woolwich
	Tram05: tram linking Gallions Reach – Barking
Light rail line	LR01: Light rail line Gallions Reach to Beckton Riverside
	LR02: Light rail line Abbey Wood to Thamesmead
	LR03: New light rail line Abbey Wood – Thamesmead – Gallions Reach (includes cross-river link)
Bus transit	BT01: Bus transit service linking Abbey Wood – Thamesmead – Woolwich
	BT02: Bus transit service linking Abbey Wood –Thamesmead – Woolwich / Gallions Reach (includes cross-river link)
	BT03: Bus transit service linking Beckton Riverside – Custom House
Enhanced bus services	EB01: Enhanced bus services within the Thamesmead area
	EB02: Enhanced bus services to serve Beckton Riverside
	EB03: Bus-only river crossing between Thamesmead and Gallions Reach
River Bus	RB01: Extension of riverbus RB1 to Thamesmead and Beckton Riverside
	RB02: Thamesmead to Barking Riverside shuttle ferry
Cable car	CC01: Thamesmead – Gallions Reach cable car
	CC02: Thamesmead – Barking Riverside cable car
Personal Rapid Transit	PRT01: Personal rapid transit within Thamesmead
	PRT02: Personal rapid transit within Beckton Riverside
Demand responsive bus services	DRT01: demand responsive bus service in Thamesmead
	DRT02: demand responsive bus service in Beckton Riverside

Car	Car01: Car-based development in Thamesmead
	Car02: Car-based development in Beckton Riverside
	Car03: Car-based development in Thamesmead and Beckton Riverside with a new road crossing across the Thames
Active travel	AT01: Active travel-based development in Thamesmead
	AT02: Active travel-based development in Beckton Riverside

2.3 Assessment criteria (initial sift stage)

2.3.1 The concept options were assessed against a number of criteria:

The programme objectives

2.3.2 The options were first considered against the programme objectives to determine whether or not the option is capable of achieving the aims of the programme.

Other viability and acceptability criteria

2.3.3 As well as achieving the objectives, it is important that work is focussed on options which are broadly feasible in terms of viability and acceptability. Value for money was not explicitly determined at this stage due to the high-level nature of the information available at this stage, but is considered in part (in terms of affordability and ability to meet objectives), and is considered more directly in the next stage of option assessment. In assessing the initial concepts, they have also been evaluated against these additional viability and acceptability criteria:

Strategic

- **Fit against MTS and planning policy** – how well does the concept accord with MTS and planning policies?
- **Impacts on the environment / natural capital** – how does the option impact on the environment, including natural capital, biodiversity, water quality, flooding, noise, urban environment?
- **Distributional impacts** – how does the option impact upon people with protected characteristics (as defined by the Equality Act) or other excluded groups?

Economic

- **Value for money** – is the option likely to provide value for money?

Financial

- **Affordability** – how affordable is construction of the option, taking into account potential for third party funding and revenue?
- **Net operating impact** – once operational, is the option likely to deliver an operating surplus or require ongoing revenue support?

Commercial

- **Commercial viability** – is the project commercially viable?

Management (achievability)

- **Capacity** – does the concept provide sufficient capacity to meet the scale of new demand associated with development plans?
- **Risks/difficulty** – are there major risks which could represent serious threats to cost or deliverability?
- **Land and property impacts** – to what extent might land/property issues be problematic?
- **Public and stakeholder views** – what is the extent of stakeholder support/opposition?

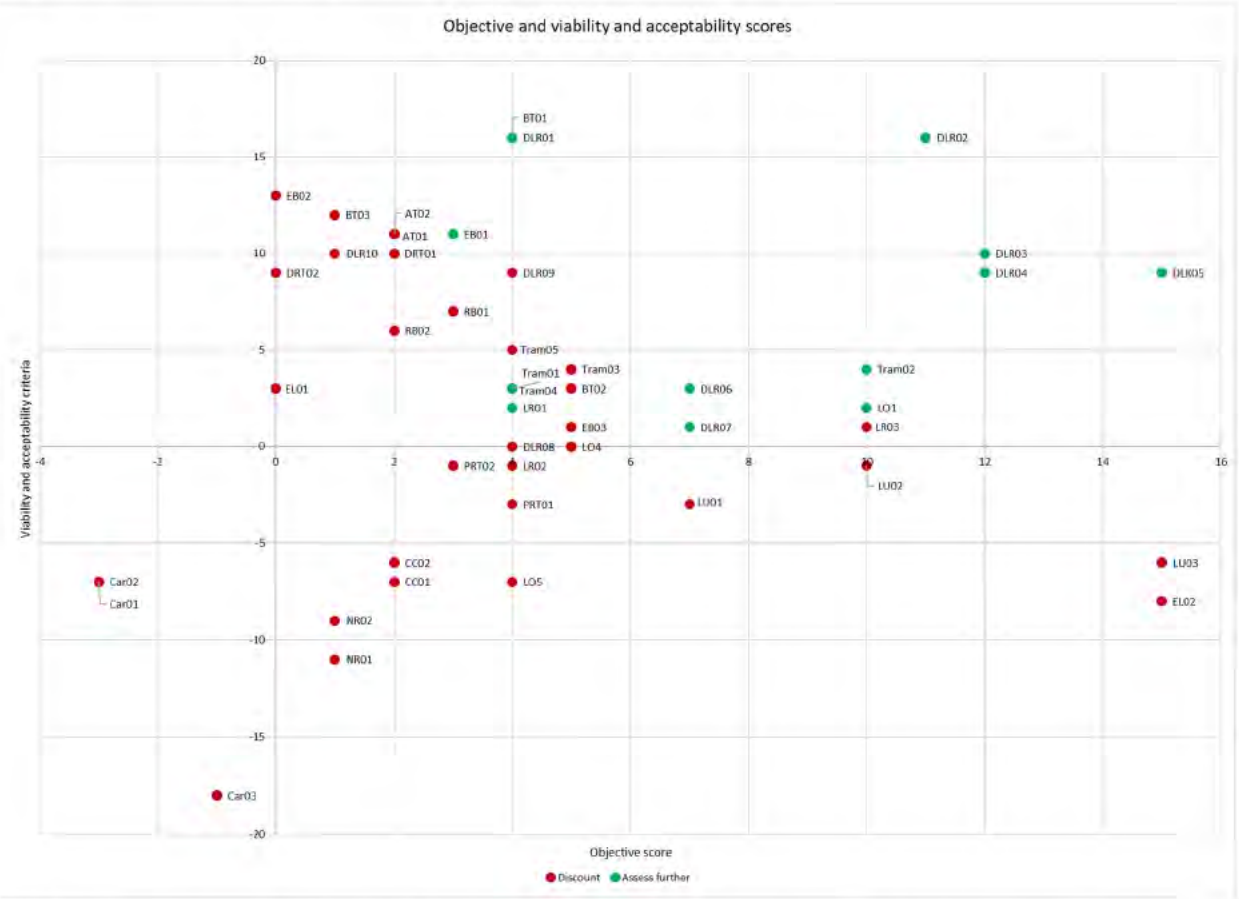
3 Summary of initial sift conclusions

3.1 Summary

3.1.1 The scoring of the options in the preceding chapter provides an overview of the relative strengths and weaknesses of the options. Figure 49 summarises how each option performed against both the objectives and the viability and acceptability criteria, applying points on a scale of -3 to +3 for each objective, and for each viability and acceptability criteria. Note that these scores have **not** been weighted; some criteria are more relevant than others, and in some cases the option may not be plausible but would nevertheless accrue a score on other metrics.

3.1.2 Nevertheless this chart illustrates that overall those options which score poorly on both measures have been discounted, those which score well on both have been selected for further assessment.

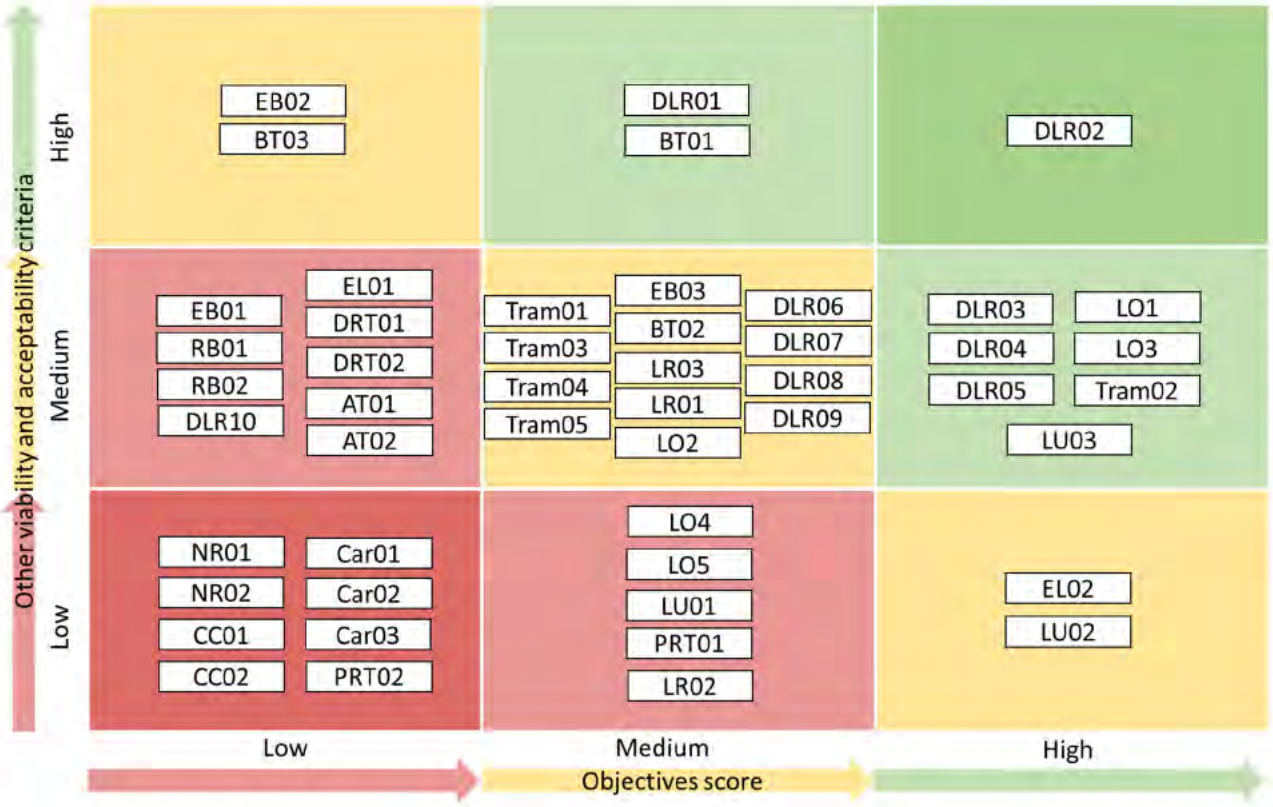
Figure 2: Summary of option scoring



3.1.3 An alternative means of presenting the outcomes is to use a **nine-box model**. In this method, the options are again scored for their achievement against the objectives, and against the viability and acceptability criteria, to classify options as being high/medium/low for each.

3.1.4 The outcomes are shown in Figure 3.

Figure 3: Nine-box model of option assessment outcomes



3.1.5 This methodology illustrates that option **DLR02** (DLR to Thamesmead from Gallions Reach) appears to be the best performing option when considering both the objectives and the viability and acceptability criteria.

3.2 Conclusions

3.2.1 Some heavy rail options (**National Rail, Elizabeth line, London Underground**) would be very high cost, would bring significant additional operating challenges by adding branches to existing lines, and would reduce service to existing customers on already busy sections of those lines, and are therefore operationally impractical. An extension of the Elizabeth line from Abbey Wood may have merit for northern parts of LB Bexley and into north Kent, but would not serve the key study area of this programme.

3.2.2 The **London Overground** extension options (options LO01 to LO05) are high cost and have some significant implications for development in Barking Riverside, where the recently opened line and station would be by-passed in order for trains to enter a tunnel and new subterranean station. But there would be a housing development stimulus effect in Thamesmead as well as strategic benefits in completing an outer orbital link across the Thames, including better connecting Barking Riverside with the Elizabeth line. The

case for options LO01 to LO03 is worth exploring further in the next stage to determine whether the benefits might justify the high costs.

3.2.3 An extension of the **DLR**'s Beckton branch from Gallions Reach (options DLR02 to DLR05) appear to be deliverable and a much lower cost than heavy rail alternatives, and would be a good strategic fit. This concept could effectively serve both the Beckton Riverside and Thamesmead growth areas with sufficient capacity, as well as providing a new river crossing. Longer options are even more effective in delivering passenger benefits, but are unlikely to deliver the same value for money, depending how the additional costs compare with the additional benefits. These are worth exploring further and therefore an extension of the DLR from Gallions Reach is recommended to be considered in the next stage.

3.2.4 The extension of the DLR's Woolwich branch would avoid the construction of a new cross-river tunnel for the DLR but appears to be more challenging overall; reconstruction of Woolwich Arsenal station to increase capacity to accommodate reversing trains to Thamesmead (option DLR06) would be difficult, disruptive and costly to construct, while a branch off the line before Woolwich Arsenal (option DLR07) would reduce capacity to/from Woolwich. In both cases the line loadings on the Woolwich branch would be under increased pressure with passenger crowding impacts, and no direct interchange would be made with the Elizabeth line. Beckton Riverside would remain unserved. Nevertheless these options are worth further consideration alongside other DLR options to understand their relative merits.

3.2.5 Other **light rail** and **tram** options were moderately effective in meeting programme objectives, but would not directly connect the study area with major centres of employment, requiring most customers to change to another mode to complete their journeys, lengthening journeys and reducing passenger and therefore development benefits. Vehicle capacity may be insufficient to cater for the volumes of passengers changing from peak hour trains. They may entail construction of significant amounts of fixed infrastructure akin to a DLR solution (e.g. elevated structures, station interchanges, and in some options cross-river tunnels) but without the benefits of through services into Docklands or central London or the economies of scale of being part of a wider network such as DLR. Nevertheless their lower cost could make some of these options good value and therefore warrant further consideration in the next stage, in particular where tram or light rail could offer a more affordable option.

3.2.6 **Bus**-based options, or options with similar capacity constraints, would not support the full development ambition. However it is necessary to consider low-cost options in the next stage of work to consider how value-for-money of low-cost options compares with larger investments; there may be a place for a low-cost option, either to support an alternative delivery vision (a lower level of development), or to complement a rail service, by providing links on complementary corridors and by providing additional capacity in advance of a rail link, to support early phase development.

3.2.7 A **bus transit** service connecting Thamesmead to Abbey Wood and Woolwich (option BT01) could support some growth in Thamesmead and could complement a rail option, with transit features in terms of capacity and journey time making this a more effective option for rapid population growth than increasing capacity on existing bus services. A bus transit on the northern side (option BT03) is unlikely to have much material impact on growth in Beckton Riverside, given the lack of time savings over buses to the nearest

rail service at Gallions Reach. A tunnel to connect the two areas (option BT02) would add benefits and better fit the objectives, but would also significantly increase costs and would likely not be value for money compared with some other options (e.g. for a similar cost a DLR tunnel would provide higher capacity and direct service into employment centres).

3.2.8 Similarly, **enhanced bus services** would comprise the minimum provision, and could be delivered quickly and incrementally; there is more need for increased capacity in Thamesmead than in Beckton Riverside given the distance from rail connections and levels of bus crowding, although this option alone would not support the scale of growth envisaged.

3.2.9 Some options appear to be impractical to deliver; for example the tall towers required for a **cable car** solution are unlikely to be feasible so close to City Airport given the shipping navigational envelope below, and airport safeguarded surfaces above. Other options may provide useful complementary links – such as a new **river bus** service – but would not be sufficient to underpin large-scale development as the primary public transport service.

3.2.10 It is not possible to rely on non-public transport options to provide the primary transport solution to the planned growth in Thamesmead and Beckton Riverside. Not only would **car**-based development on this scale be contrary to planning, transport and environmental policy, there is insufficient practical capacity to accommodate the volume of generated traffic on the road network. And while **active travel** will play a very important role for local trips and an increasing role for longer journeys, there is a need for enhanced public transport networks and services to serve the development sites in order to support these new communities.

3.2.11 Table 53 summarises the recommendations for each option.

Table 2: Summary of recommendations by option

Concept	Option	Taken forward?
National Rail extension	NR01: National Rail extension from Plumstead to Thamesmead	No
	NR02: National Rail extension from Plumstead to Belvedere via Thamesmead	No
Elizabeth Line extension	EL01: Elizabeth line extension from Abbey Wood to the east	No
	EL02: Elizabeth line extension from Custom House to Thamesmead	No
London Underground extension	LU01: H&C line extension from Barking to Thamesmead	No
	LU02: H&C line extension from Barking to Thamesmead and Abbey Wood	No
	LU03: Jubilee line extension from North Greenwich to Thamesmead via Beckton Riverside	No

London Overground extension	LO1: London Overground extension Barking Riverside – Abbey Wood	Yes
	LO2: London Overground extension Barking Riverside – Belvedere	Yes
	LO3: London Overground extension Barking Riverside – Woolwich	Yes
	LO4: London Overground extension Barking Riverside – Thamesmead	No
	LO5: London Overground extension Barking Riverside – Beckton Riverside – Gallions Reach	No
DLR	DLR01: DLR extension from Gallions Reach – Beckton Riverside	Yes
	DLR02: DLR extension from Gallions Reach – Thamesmead	Yes
	DLR03: DLR extension from Gallions Reach – Abbey Wood	Yes
	DLR04: DLR extension from Gallions Reach – Belvedere	Yes
	DLR05: DLR extension from Gallions Reach – Barking – Abbey Wood/Belvedere	Yes
	DLR06: DLR extension from Woolwich Arsenal – Thamesmead	Yes
	DLR07: DLR extension from King George V – Thamesmead	Yes
	DLR08: DLR extension from Gallions Reach – Beckton Riverside – Barking Riverside – Dagenham Dock	No
	DLR09: DLR extension from Gallions Reach to Barking	No
	DLR10: Pedestrian link bridge between Beckton Riverside and Gallions Reach	No
Tram	Tram01: tram linking Abbey Wood – Thamesmead	Yes
	Tram02: tram linking Abbey Wood – Gallions Reach via Thamesmead and cross-river link	No
	Tram03: tram linking Abbey Wood – Gallions Reach via Thamesmead and cross-river link	No
	Tram04: tram linking Abbey Wood – Woolwich	No
	Tram05: tram linking Gallions Reach – Barking	No
Light rail	LR01: Light rail line Gallions Reach to Beckton Riverside	Yes
	LR02: Light rail line Abbey Wood to Thamesmead	No
	LR03: New light rail line Abbey Wood – Thamesmead – Gallions Reach (includes cross-river link)	No
Bus transit	BT01: Bus transit service linking Abbey Wood – Thamesmead – Woolwich	Yes
	BT02: Bus transit service linking Abbey Wood – Thamesmead – Woolwich / Gallions Reach (includes cross-river link)	No
	BT03: Bus transit service linking Beckton Riverside – Custom House	No

Enhanced bus services	EB01: Enhanced bus services within the Thamesmead area	Yes
	EB02: Enhanced bus services to serve Beckton Riverside	No
	EB03: Bus-only river crossing between Thamesmead and Gallions Reach	No
River Bus	RB01: Extension of riverbus RB1 to Thamesmead and Beckton Riverside	No
	RB02: Thamesmead to Barking Riverside shuttle ferry	No
Cable car	CC01: Thamesmead – Gallions Reach cable car	No
	CC02: Thamesmead – Barking Riverside cable car	No
Personal Rapid Transit	PRT01: Personal rapid transit within Thamesmead	No
	PRT02: Personal rapid transit within Beckton Riverside	No
Demand responsive bus services	DRT01: demand responsive bus service in Thamesmead	No
	DRT02: demand responsive bus service in Beckton Riverside	No
Car	Car01: Car-based development in Thamesmead	No
	Car02: Car-based development in Beckton Riverside	No
	Car03: Car-based development in Thamesmead and Beckton Riverside with a new road crossing across the Thames	No
Active travel	AT01: Active travel-based development in Thamesmead	No
	AT02: Active travel-based development in Beckton Riverside	No

3.2.12 During the next stage of the programme, the shortlisted options will be subject to more detailed assessment of the potential costs, feasibility and transport, housing, and environmental impacts.

4 Second sift: Options and assessment

4.1 Definition of potential options

Overview of potential options

4.1.1 Following the completion of the initial sift, each of the selected public transport concepts were developed in further detail to identify potential route options. These options are summarised in Table 3 below and outlined in more detail in the Appendices.

Table 3: Potential options

Level of intervention	Mode	Option
Lower-cost options (under £50m)	Bus	EB01: Enhanced bus services within the Thamesmead area
	Bus Transit	BT01: Bus Transit corridor between Woolwich, Thamesmead and Abbey Wood
Medium-cost options (£50m - £500m)	DLR	DLR01: DLR extension from Gallions Reach to Beckton Riverside
	Light rail	LR01: Light rail line Gallions Reach to Beckton Riverside
	Tram	Tram01: Tram Abbey Wood to Thamesmead
Higher-cost options (over £500m)	DLR	DLR02a: extension from Gallions Reach to Thamesmead Moorings via Beckton Riverside
		DLR02b: extension from Gallions Reach to Thamesmead Moorings via Thamesmead West
		DLR02c: extension from Gallions Reach to Thamesmead town centre via Beckton Riverside
		DLR03a: extension from Gallions Reach to Thamesmead and Abbey Wood via Harrow Manorway
		DLR03b: extension from Gallions Reach to Thamesmead and Abbey Wood via Abbey Way
		DLR04: extension from Gallions Reach to Thamesmead and Belvedere
		DLR05: extension from Gallions Reach to Thamesmead and Belvedere, and north to Barking
		DLR06: extension from Woolwich Arsenal to Thamesmead
		DLR07: extension from King George V to Thamesmead
	Tram	Tram02: Tram Abbey Wood to Gallions Reach via Thamesmead
	London Over-ground	LO01: London Overground extension from Barking Riverside to Abbey Wood via Thamesmead
		LO02: London Overground extension from Barking Riverside to Belvedere via Thamesmead
		LO03: London Overground extension from Barking Riverside to Woolwich via Thamesmead.

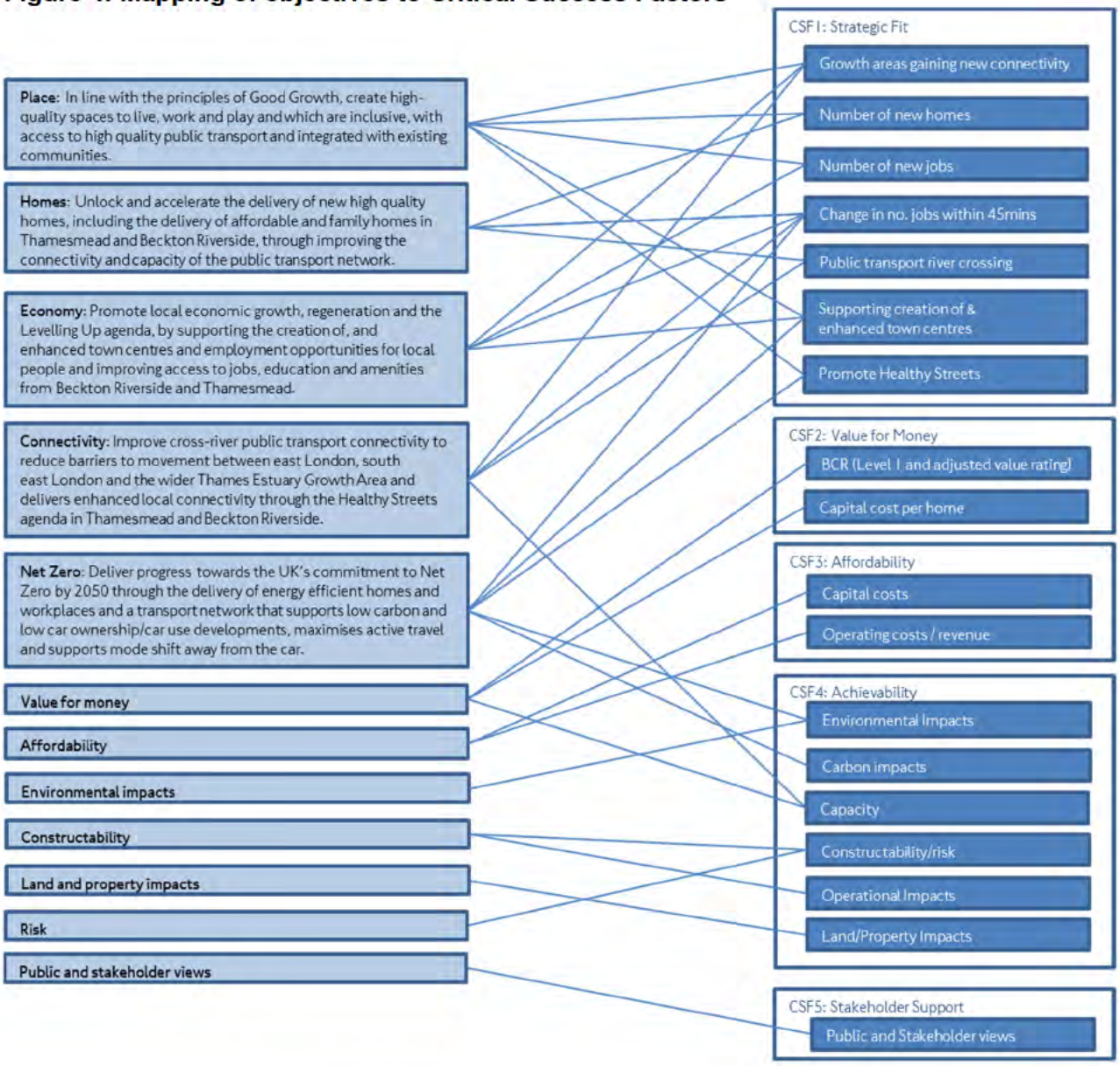
4.2 Assessment criteria

4.2.1 The assessment of the potential options considers the same essential questions as the initial sift – how options fare in terms of meeting the programme objectives, and how well do they perform in terms of viability and acceptability – but with a smaller number of options at the long list stage, and with a greater volume of data available on the options following some technical work, it is possible to base more of the assessment on data rather than professional judgement.

4.2.2 Accordingly, this stage of the assessment uses several CSFs, informed by the data collected in this stage of work where possible, which add a more rigorous basis to the comparison between alternative options.

4.2.3 Some metrics correspond to more than one objective, or viability and acceptability criteria; the linkages are mapped in the figure below, which illustrates which metrics and CSFs correspond to which objective or criteria.

Figure 4: Mapping of objectives to Critical Success Factors



4.2.4 Each Critical Success Factor comprises metrics which allow a scoring to be assigned, in order to aid comparison between options, as outlined below.

Critical Success Factor 1: How well does the option align with the programme objectives?

CSF	Growth areas gaining new connectivity	Number of new homes	Number of new jobs	Change in no. jobs within 45mins
Metric	Number	Number	Number	Number (net change)
Scoring for summary tables:				
3	3+	Gain > 15,000	Gain > 4,000	Gain > 500,000
2	2	Gain 5,000 to 15,000	Gain 2,000 to 4,000	Gain 250,000 to 500,000
1	1	Gain < 5,000	Gain < 2,000	Gain 50,000 250,000
0	0	little/no impact	little/no impact	-50,000 to +50,000
-1	n/a	Loss < 5,000	Loss < 2,000	Loss < 250,000
-2	n/a	Loss 5,000 to 15,000	Loss 2,000 to 4,000	Loss 250,000 to 500,000
-3	n/a	Loss > 15,000	Loss > 4,000	Loss > 500,000

CSF	Public transport river crossing	Supporting creation of & enhanced town centres	Promote Healthy Streets
Metric	No / Indirect / Direct / Strategic	Number	Judgement score
Scoring for summary tables:			
3	Strategic	3+ positively impacted town centres	Significant positive impact
2	Direct	2 positively impacted town centres	Moderate positive impact
1	Indirect	1 positively impacted town centre	Slight positive impact
0	No	0	Neutral impact
-1	n/a	1 negatively impacted town centre	Slight negative impact
-2	n/a	2 negatively impacted town centres	Moderate negative impact
-3	n/a	3+ negatively impacted town centres	Significant negative impact

Critical Success Factor 2: Does the option present good Value for Money?

CSF	Level 1 BCR	Adjusted value rating	Capital cost per home
Metric	BCR	Judgement score	Capital cost (£m, 2022)
Scoring for summary tables:			
3	Very high	Very high	£0m to £24k
2	High	High	£25 to £49k
1	Medium	Medium	£50k to £99k
0	Unclear	Unclear	£100 to £149k
-1	Low	Low	£150 to £199k
-2	Poor	Poor	£200k to £299k
-3	Very poor	Very poor	£300k+

Critical Success Factor 3: Is the option affordable?

CSF	Capital costs	Operating costs / revenue
Metric	Capital cost (£m, 2022)	Judgement score
Scoring for summary tables:		
3	£0 - £49m	Significant operating surplus
2	£50m - £249m	Moderate operating surplus
1	£250m - £499bn	Slight operating surplus
0	£500m - £999m	Neutral / unclear
-1	£1bn - £1.49bn	Slight operating loss
-2	£1.5bn - £1.99bn	Moderate operating loss
-3	£2bn+	Significant operating loss

Critical Success Factor 4: Is the option achievable?

CSF	Environmental Impacts (incl biodiversity, noise, pollution)	Embodied carbon	User carbon	Additional public transport demand relative to option capacity
Metric	Impact	tCO2e	tCO2e	%
Scoring for summary tables:				
3	High positive impact	Reduced emissions > 50,000 tCO2e	Reduced emissions > 80,000 tCO2e	Up to 49%
2	Medium positive impact	Reduced emissions 20,000 to 50,000 tCO2e	Reduced emissions 40,000 to 80,000 tCO2e	50 - 69%
1	Slight positive impact	Reduced emissions < 20,000 tCO2e	Reduced emissions < 40,000 tCO2e	70 - 79%
0	Low impact	Little/no impact	Little/no impact	80 - 89%
-1	Medium impact	Increased emissions < 20,000 tCO2e	Increased emissions < 40,000 tCO2e	90 - 99%
-2	High impact	Increased emissions 20,000 to 50,000 tCO2e	Increased emissions 40,000 to 80,000 tCO2e	100 - 119%
-3	Unacceptable impact	Increased emissions > 50,000 tCO2e	Increased emissions > 80,000 tCO2e	120% +

CSF	Capacity to handle interchange demand	Construction risk/difficulty	Operational Impacts	Land/Property Impacts
Metric	Judgement score	Judgement score	Judgement score	Judgement score
Scoring for summary tables:				
3	Able to accommodate interchange flows	No new construction required	Significant operational benefits	No land/property impacts
2	Likely to be able to accommodate interchange flows	Routine works with little or no construction risk	Moderate operational benefits	No third-party land impacts
1	May be able to accommodate interchange flows	Few construction challenges/risks anticipated	Slight operational benefits	Land impacts only with development partners
0	Neutral	Slight construction challenges/risks anticipated	Neutral	Minimal third-party land impacts
-1	May be unable to accommodate interchange flows	Moderate construction challenges/risks anticipated	Slight operational challenges	Some third-party land impacts beyond development partners
-2	Likely unable to accommodate interchange flows	Significant construction challenges/risks anticipated	Moderate operational challenges	Significant third-party land impacts beyond development partners
-3	Unable to accommodate interchange flows	Deemed not viable to construct / risks too great	Significant operational challenges	Land / property impacts likely to prevent delivery

Critical Success Factor 5: What are the stakeholder views of the option?

CSF	Public and Stakeholder views
Metric	Judgement score
Scoring for summary tables:	
3	Significant public and stakeholder support
2	Moderate public and stakeholder support
1	Slight public and stakeholder support
0	Mixed / neutral / unclear public and stakeholder support / opposition
-1	Slight public and stakeholder opposition
-2	Moderate public and stakeholder opposition
-3	Significant public and stakeholder opposition

5 Assessment of options

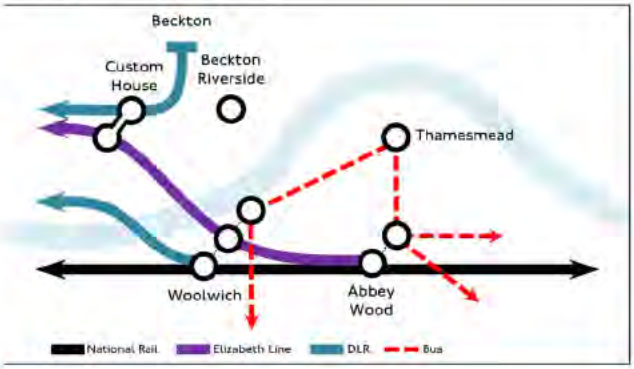
5.1 Lower-cost options

5.1.1 This section outlines the assessment of the options under the lower-cost scenario:

Level of intervention	Mode	Option
Lower-cost options (under £50m)	Bus	EB01: Enhanced bus services within the Thamesmead area
	Bus Transit	BT01: Bus Transit corridor between Woolwich, Thamesmead and Abbey Wood

EB01: Enhanced bus services within the Thamesmead area

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 1 m	£ 0 k

CSF1: Strategic	
Growth areas gaining new connectivity	0
Number of new homes	3000
Number of new jobs	1500
Change in no. jobs within 45mins	0
Public transport river crossing	No
Supporting creation of & enhanced town centres	0
Promote Healthy Streets	0

CSF2: Value for Money	
Level 1 BCR	Medium
Adjusted value rating	Medium
Capital cost per home	0

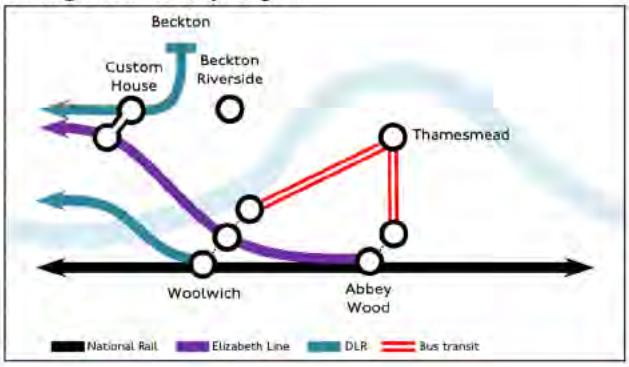
CSF3: Affordability		
Capital cost range (£m, 2022)	0	2
Operating costs / revenue	-1	

CSF4: Achievability	
Environmental Impacts	Low
Embodied carbon (tCO2e)	<100
User carbon (tCO2e)	-12000
Scenario demand relative to option capa	44%
Capacity to handle interchange demand	-1
Construction risk/difficulty	3
Operational Impacts	-1
Land/Property Impacts	3

CSF5: Stakeholder	
Public and Stakeholder views	2

BT01: Bus Transit corridor between Woolwich, Thamesmead and Abbey Wood

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 38 m	£ 13 k

CSF1: Strategic	
Growth areas gaining new connectivity	1
Number of new homes	3000
Number of new jobs	1500
Change in no. jobs within 45mins	0
Public transport river crossing	No
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	2

CSF2: Value for Money	
Level 1 BCR	High
Adjusted value rating	High
Capital cost per home	13

CSF3: Affordability		
Capital cost range (£m, 2022)	25	50
Operating costs / revenue	0	

CSF4: Achievability	
Environmental Impacts	Low
Embodied carbon (tCO2e)	2000
User carbon (tCO2e)	-12000
Scenario demand relative to option capa	28%
Capacity to handle interchange demand	0
Construction risk/difficulty	2
Operational Impacts	1
Land/Property Impacts	3

CSF5: Stakeholder	
Public and Stakeholder views	2

5.2 Summary of lower-cost scenario options

5.2.1 Overall these options compare with one another as illustrated below:

		lower-cost	
Summary	Metric	EB 01	BT 01
Average CSF Score (Range -3 to +3)			
CSF1: Strategic		0.3	0.9
CSF2: VfM		1.7	2.3
CSF3: Affordability		1.0	1.5
CSF4: Achievability		1.4	1.6
CSF5: Stakeholder		2.0	2.0
TOTAL (unweighted)		6.3	8.3
CSF1: Strategic			
Growth areas gaining new connec ivity	no.	0	1
Number of new homes	Total	3,000	3,000
Number of new jobs	Total	1,500	1,500
Change in no. jobs within 45mins	Total	-	-
Public transport river crossing	yes/no	No	No
Supporting creation of & enhanced town centres	no.	0	1
Promote Healthy Streets	score -3 to +3	0	2
CSF2: Value for Money			
Level 1 BCR	VfM category	Medium	High
Adjusted value ra ing	VfM category	Medium	High
Capital cost per home	£k per home	0	13
CSF3: Affordability			
Capital cost approx (£m, 2022)	mean capex	1	38
Operating costs / revenue	score -3 to +3	-1	0
CSF4: Achievability			
Environmental Impacts	impact	Low	Low
Embodied carbon (tCO2e)	tCo2e	<100	2,000
User carbon (tCO2e)	tCo2e	-12,000	-12,000
Scenario demand relative to op ion capacity	%	30%	38%
Capacity to handle interchange demand	score -3 to +3	-1	0
Construction risk/difficulty	score -3 to +3	3	2
Operational Impacts	score -3 to +3	-1	1
Land/Property Impacts	score -3 to +3	3	3
CSF5: Stakeholder			
Public and Stakeholder views	score -3 to +3	2	2

5.2.2 Overall, both options are very achievable, and entail low amounts of embodied carbon to construct. Overall, bus transit performs better than enhanced bus services. This is principally driven by the potential for bus transit to operate more efficiently – with faster journey times, better reliability and higher capacity resulting in lower operating costs, and a better passenger experience leading to more passengers, and therefore better income relative to cost. As a result this option would be more attractive to stakeholders.

5.2.3 Neither option would support significant levels of new growth, but the analysis suggests that bus transit (option BT01) would be beneficial for Thamesmead in supporting lower levels of growth – such as in the period between any growth commencing and the arrival of a higher-capacity service.

5.3 Medium-cost options

5.3.1 This section outlines the assessment of the options under the medium-cost scenario:

Level of intervention	Mode	Option
Medium-cost options (£50m - £500m)	DLR	DLR01: DLR extension from Gallions Reach to Beckton Riverside
	Light rail	LR01: Light rail line Gallions Reach to Beckton Riverside
	Tram	Tram01: Tram Abbey Wood to Thamesmead

DLR01: DLR extension from Gallions Reach to Beckton Riverside

Strategic connectivity diagram

Approx cost (2022)	**Cost / home**
£ 250 m	£ 25 k

CSF1: Strategic	
Growth areas gaining new connectivity	1
Number of new homes	10200
Number of new jobs	1918
Change in no. jobs within 45mins	110000
Public transport river crossing	No
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Very high
Capital cost per home	25

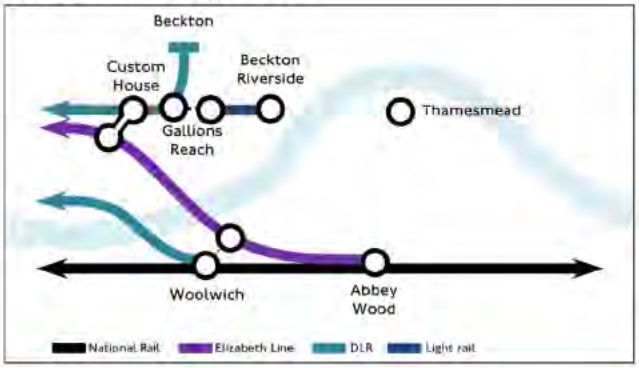
CSF3: Affordability		
Capital cost range (£m, 2022)	200	300
Operating costs / revenue	3	

CSF4: Achievability	
Environmental Impacts	Low
Embodied carbon (tCO2e)	23000
User carbon (tCO2e)	-40000
Scenario demand relative to option capa	43%
Capacity to handle interchange demand	3
Construction risk/difficulty	0
Operational Impacts	0
Land/Property Impacts	1

CSF5: Stakeholder	
Public and Stakeholder views	2

LR01: Light rail line Gallions Reach to Beckton Riverside

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 250 m	£ 25 k

CSF1: Strategic	
Growth areas gaining new connectivity	1
Number of new homes	10200
Number of new jobs	1918
Change in no. jobs within 45mins	55000
Public transport river crossing	No
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Low
Capital cost per home	25

CSF3: Affordability		
Capital cost range (£m, 2022)	200	300
Operating costs / revenue	-1	

CSF4: Achievability	
Environmental Impacts	Low
Embodied carbon (tCO2e)	23000
User carbon (tCO2e)	-40000
Scenario demand relative to option capa	30%
Capacity to handle interchange demand	-2
Construction risk/difficulty	-1
Operational Impacts	-2
Land/Property Impacts	1

CSF5: Stakeholder	
Public and Stakeholder views	1

Tram01: Tram Abbey Wood to Thamesmead

Strategic connectivity diagram

Approx cost (2022)	**Cost / home**
£ 450 m	£ 100 k

CSF1: Strategic	
Growth areas gaining new connectivity	1
Number of new homes	4500
Number of new jobs	2250
Change in no. jobs within 45mins	0
Public transport river crossing	No
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	2

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Poor
Capital cost per home	100

CSF3: Affordability		
Capital cost range (£m, 2022)	350	550
Operating costs / revenue	-1	

CSF4: Achievability	
Environmental Impacts	Low
Embodied carbon (tCO2e)	20000
User carbon (tCO2e)	-18000
Scenario demand relative to option capa	38%
Capacity to handle interchange demand	1
Construction risk/difficulty	0
Operational Impacts	-1
Land/Property Impacts	-1

CSF5: Stakeholder	
Public and Stakeholder views	1

5.4 Summary of medium-cost scenario options

5.4.1 Overall these options compare with one another as illustrated below:

		medium-cost		
Summary	**Metric**	**DLR 01**	**LR 01**	**Tram 01**
Average CSF Score (Range -3 to +3)				
CSF1: Strategic		1.0	1.0	1.0
CSF2: VfM		1.0	0.0	-1.3
CSF3: Affordability		2.0	0.0	0.0
CSF4: Achievability		0.9	-0.1	0.3
CSF5: Stakeholder		2.0	1.0	1.0
TOTAL (unweighted)		**6.9**	**1.9**	**0.9**
CSF1: Strategic				
Growth areas gaining new connectivity	no.	1	1	1
Number of new homes	Total	10,200	10,200	4,500
Number of new jobs	Total	1,918	1,918	2,250
Change in no. jobs within 45mins	Total	110,000	55,000	-
Public transport river crossing	yes/no	No	No	No
Supporting creation of & enhanced town centres	no.	1	1	1
Promote Healthy Streets	score -3 to +3	1	1	2
CSF2: Value for Money				
Level 1 BCR	VfM category	Poor	Poor	Poor
Adjusted value rating	VfM category	Very high	Low	Poor
Capital cost per home	£k per home	25	25	100
CSF3: Affordability				
Capital cost approx (£m, 2022)	mean capex	250	250	450
Opera ing costs / revenue	score -3 to +3	3	-1	-1
CSF4: Achievability				
Environmental Impacts	impact	Low	Low	Low
Embodied carbon (tCO2e)	tCo2e	23,000	23,000	20,000
User carbon (tCO2e)	tCo2e	-40,000	-40,000	-18,000
Scenario demand relative to option capacity	%	43%	30%	38%
Capacity to handle interchange demand	score -3 to +3	3	-2	1
Construction risk/difficulty	score -3 to +3	0	-1	0
Opera ional Impacts	score -3 to +3	0	-2	-1
Land/Property Impacts	score -3 to +3	1	1	-1
CSF5: Stakeholder				
Public and Stakeholder views	score -3 to +3	2	1	1

5.4.2 The assessment shows that the DLR to Beckton Riverside (option DLR01) performs significantly more strongly than the light rail (LR01) and tram (Tram01) options against the criteria. In terms of carbon, all scheme would entail a similar degree of embodied carbon, but there would be greater carbon benefits arising from the DLR and light rail options, as these would deliver a higher number of new homes.

5.5 Higher-cost options

5.5.1 This section outlines the assessment of the options under the higher-cost scenario:

Level of intervention	Mode	Option
Higher-cost options (over £500m)	DLR	DLR02a: extension from Gallions Reach to Thamesmead Moorings via Beckton Riverside
		DLR02b: extension from Gallions Reach to Thamesmead Moorings via Thamesmead West
		DLR02c: extension from Gallions Reach to Thamesmead town centre via Beckton Riverside
		DLR03a: extension from Gallions Reach to Thamesmead and Abbey Wood via Harrow Manorway
		DLR03b: extension from Gallions Reach to Thamesmead and Abbey Wood via Abbey Way
		DLR04: extension from Gallions Reach to Thamesmead and Belvedere
		DLR05: extension from Gallions Reach to Thamesmead and Belvedere, and north to Barking
		DLR06: extension from Woolwich Arsenal to Thamesmead
		DLR07: extension from King George V to Thamesmead
	Tram	Tram02: Tram Abbey Wood to Gallions Reach via Thamesmead
	London Overground	LO01: London Overground extension from Barking Riverside to Abbey Wood via Thamesmead
		LO02: London Overground extension from Barking Riverside to Belvedere via Thamesmead
		LO03: London Overground extension from Barking Riverside to Woolwich via Thamesmead.

DLR02a: extension from Gallions Reach to Thamesmead Moorings via Beckton Riverside

Strategic connectivity diagram

Approx cost (2022)	**Cost / home**
£ 1,000 m	£ 41 k

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	24566
Number of new jobs	5363
Change in no. jobs within 45mins	381000
Public transport river crossing	Direct
Supporting creation of & enhanced town centre	2
Promote Healthy Streets	1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	High
Capital cost per home	41

CSF3: Affordability		
Capital cost range (£m, 2022)	800	1200
Operating costs / revenue	2	

CSF4: Achievability	
Environmental Impacts	High
Embodied carbon (tCO2e)	90000
User carbon (tCO2e)	-96000
Scenario demand relative to option capa	71%
Capacity to handle interchange demand	3
Construction risk/difficulty	-1
Operational Impacts	0
Land/Property Impacts	1

CSF5: Stakeholder	
Public and Stakeholder views	3

DLR02b: extension from Gallions Reach to Thamesmead Moorings via Thamesmead West

Strategic connectivity diagram

Approx cost (2022)	**Cost / home**
£ 1,000 m	£ 70 k

CSF1: Strategic	
Growth areas gaining new connectivity	1
Number of new homes	14366
Number of new jobs	3445
Change in no. jobs within 45mins	270000
Public transport river crossing	Direct
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Medium
Capital cost per home	70

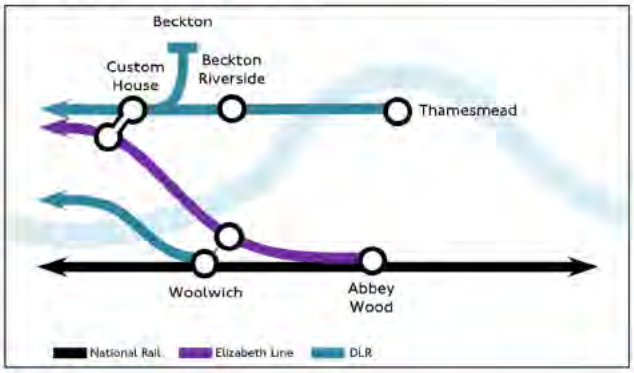
CSF3: Affordability		
Capital cost range (£m, 2022)	800	1200
Operating costs / revenue	1	

CSF4: Achievability	
Environmental Impacts	High
Embodied carbon (tCO2e)	90000
User carbon (tCO2e)	-56000
Scenario demand relative to option capa	49%
Capacity to handle interchange demand	3
Construction risk/difficulty	-1
Operational Impacts	0
Land/Property Impacts	1

CSF5: Stakeholder	
Public and Stakeholder views	2

DLR02c: extension from Gallions Reach to Thamesmead town centre via Beckton Riverside

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 900 m	£ 37 k

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	24566
Number of new jobs	5363
Change in no. jobs within 45mins	381000
Public transport river crossing	Direct
Supporting creation of & enhanced town centres	2
Promote Healthy Streets	1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	High
Capital cost per home	37

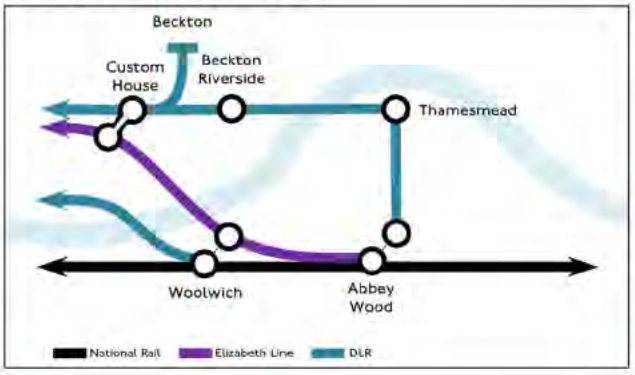
CSF3: Affordability		
Capital cost range (£m, 2022)	700	1100
Operating costs / revenue	2	

CSF4: Achievability	
Environmental Impacts	Medium
Embodied carbon (tCO2e)	81000
User carbon (tCO2e)	-96000
Scenario demand relative to option capa	71%
Capacity to handle interchange demand	3
Construction risk/difficulty	-1
Operational Impacts	0
Land/Property Impacts	1

CSF5: Stakeholder	
Public and Stakeholder views	3

DLR03a: extension from Gallions Reach to Thamesmead and Abbey Wood via Harrow Manorway

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 1,250 m	£ 51 k

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	24566
Number of new jobs	5363
Change in no. jobs within 45mins	355000
Public transport river crossing	Direct
Supporting creation of & enhanced town centres	2
Promote Healthy Streets	-1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Medium
Capital cost per home	51

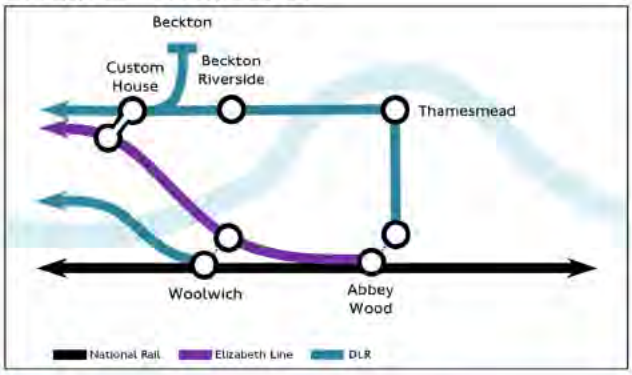
CSF3: Affordability		
Capital cost range (£m, 2022)	1050	1450
Operating costs / revenue	1	

CSF4: Achievability	
Environmental Impacts	High
Embodied carbon (tCO2e)	113000
User carbon (tCO2e)	-96000
Scenario demand relative to option capa	71%
Capacity to handle interchange demand	3
Construction risk/difficulty	-1
Operational Impacts	-1
Land/Property Impacts	-1

CSF5: Stakeholder	
Public and Stakeholder views	3

DLR03b: extension from Gallions Reach to Thamesmead and Abbey Wood via Abbey Way

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 1,350 m	£ 55 k

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	24566
Number of new jobs	5363
Change in no. jobs within 45mins	326000
Public transport river crossing	Direct
Supporting creation of & enhanced town centres	2
Promote Healthy Streets	-1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Medium
Capital cost per home	55

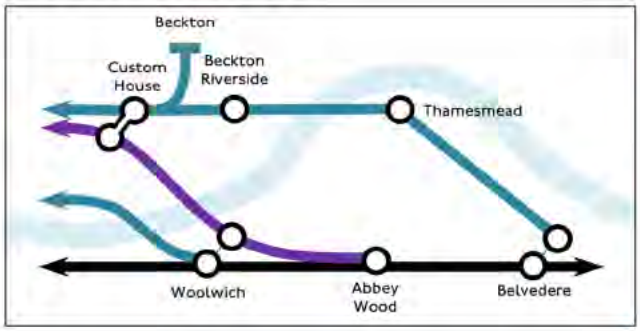
CSF3: Affordability		
Capital cost range (£m, 2022)	1150	1550
Operating costs / revenue	1	

CSF4: Achievability	
Environmental Impacts	High
Embodied carbon (tCO2e)	122000
User carbon (tCO2e)	-96000
Scenario demand relative to option capa	71%
Capacity to handle interchange demand	3
Construction risk/difficulty	-1
Operational Impacts	-1
Land/Property Impacts	-1

CSF5: Stakeholder	
Public and Stakeholder views	3

DLR04: extension from Gallions Reach to Thamesmead and Belvedere

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 1,400 m	£ 57 k

CSF1: Strategic	
Growth areas gaining new connectivity	3
Number of new homes	24566
Number of new jobs	5363
Change in no. jobs within 45mins	384000
Public transport river crossing	Direct
Supporting creation of & enhanced town centres	3
Promote Healthy Streets	-1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Medium
Capital cost per home	57

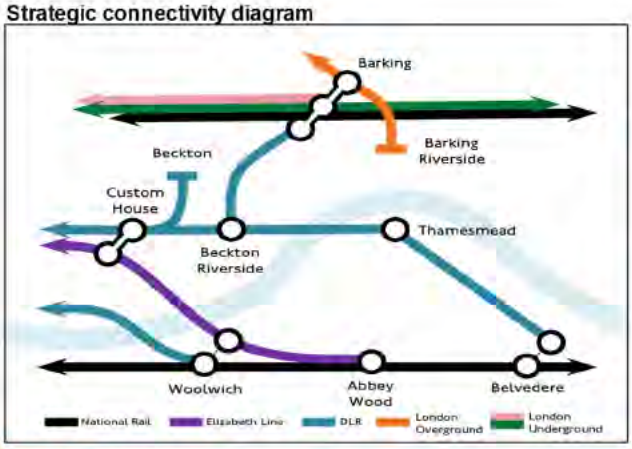
CSF3: Affordability		
Capital cost range (£m, 2022)	1200	1600
Operating costs / revenue	1	

CSF4: Achievability	
Environmental Impacts	High
Embodied carbon (tCO2e)	126000
User carbon (tCO2e)	-96000
Scenario demand relative to option capa	71%
Capacity to handle interchange demand	3
Construction risk/difficulty	-1
Operational Impacts	-1
Land/Property Impacts	-2

CSF5: Stakeholder	
Public and Stakeholder views	3

DLR05: extension from Gallions Reach to Thamesmead and Belvedere, and north to Barking

Strategic connectivity diagram



Approx cost (2022)	Cost / home
£ 2,150 m	£ 73 k

CSF1: Strategic	
Growth areas gaining new connectivity	4
Number of new homes	29566
Number of new jobs	5363
Change in no. jobs within 45mins	573000
Public transport river crossing	Strategic
Supporting creation of & enhanced town centres	3
Promote Healthy Streets	-1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Medium
Capital cost per home	73

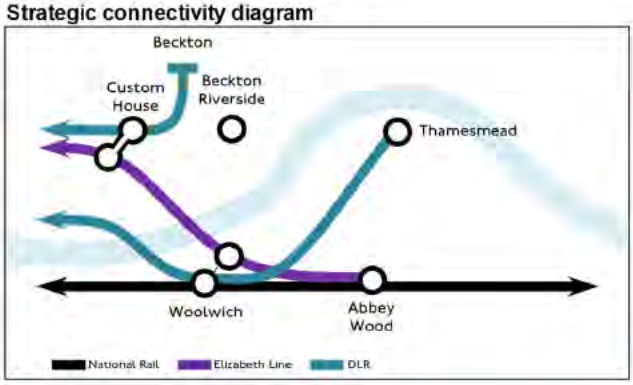
CSF3: Affordability		
Capital cost range (£m, 2022)	1900	2400
Operating costs / revenue	1	

CSF4: Achievability	
Environmental Impacts	High
Embodied carbon (tCO2e)	194000
User carbon (tCO2e)	-116000
Scenario demand relative to option capa	71%
Capacity to handle interchange demand	3
Construction risk/difficulty	-1
Operational Impacts	-2
Land/Property Impacts	-2

CSF5: Stakeholder	
Public and Stakeholder views	3

DLR06: extension from Woolwich Arsenal to Thamesmead

Strategic connectivity diagram



Approx cost (2022)	Cost / home
£ 1,000 m	£ 70 k

CSF1: Strategic	
Growth areas gaining new connectivity	1
Number of new homes	14366
Number of new jobs	3445
Change in no. jobs within 45mins	270000
Public transport river crossing	Indirect
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	-1

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Medium
Capital cost per home	70

CSF3: Affordability		
Capital cost range (£m, 2022)	800	1200
Operating costs / revenue	1	

CSF4: Achievability	
Environmental Impacts	High
Embodied carbon (tCO2e)	90000
User carbon (tCO2e)	-56000
Scenario demand relative to option capa	49%
Capacity to handle interchange demand	3
Construction risk/difficulty	-2
Operational Impacts	-2
Land/Property Impacts	-2

CSF5: Stakeholder	
Public and Stakeholder views	1

DLR07: extension from King George V to Thamesmead

Strategic connectivity diagram

Approx cost (2022)	**Cost / home**
£ 900 m	£ 63 k

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Medium
Capital cost per home	63

CSF3: Affordability		
Capital cost range (£m, 2022)	700	1100
Operating costs / revenue	0	

CSF4: Achievability	
Environmental Impacts	Medium
Embodied carbon (tCO2e)	81000
User carbon (tCO2e)	-56000
Scenario demand relative to option capa	49%
Capacity to handle interchange demand	3
Construction risk/difficulty	-2
Operational Impacts	-2
Land/Property Impacts	-2

CSF1: Strategic	
Growth areas gaining new connectivity	1
Number of new homes	14366
Number of new jobs	3445
Change in no. jobs within 45mins	270000
Public transport river crossing	Indirect
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	-1

CSF5: Stakeholder	
Public and Stakeholder views	0

Tram02: Tram Abbey Wood to Gallions Reach via Thamesmead

Strategic connectivity diagram

Approx cost (2022)	**Cost / home**
£ 1,000 m	£ 81 k

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Low
Capital cost per home	81

CSF3: Affordability		
Capital cost range (£m, 2022)	800	1200
Operating costs / revenue	-1	

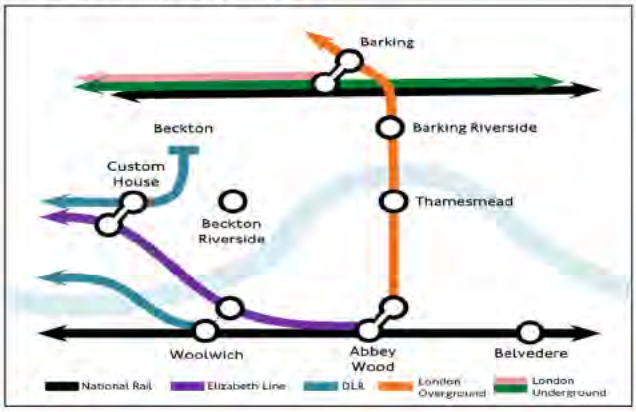
CSF4: Achievability	
Environmental Impacts	Medium
Embodied carbon (tCO2e)	45000
User carbon (tCO2e)	-48000
Scenario demand relative to option capa	273%
Capacity to handle interchange demand	-2
Construction risk/difficulty	-1
Operational Impacts	-1
Land/Property Impacts	-1

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	12283
Number of new jobs	2681.5
Change in no. jobs within 45mins	190500
Public transport river crossing	Indirect
Supporting creation of & enhanced town centres	2
Promote Healthy Streets	2

CSF5: Stakeholder	
Public and Stakeholder views	2

LO01: London Overground extension from Barking Riverside to Abbey Wood via Thamesmead

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 2,250 m	£ 313 k

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	7183
Number of new jobs	1722.5
Change in no. jobs within 45mins	116000
Public transport river crossing	Strategic
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	0

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Low
Capital cost per home	313

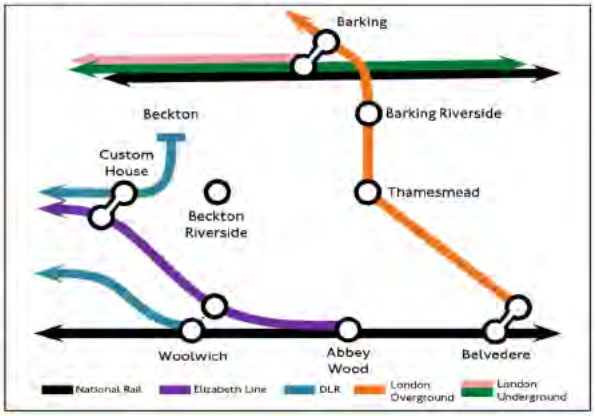
CSF3: Affordability		
Capital cost range (£m, 2022)	2000	2500
Operating costs / revenue	-1	

CSF4: Achievability	
Environmental Impacts	High
Embodied carbon (tCO2e)	203000
User carbon (tCO2e)	-28000
Scenario demand relative to option capa	108%
Capacity to handle interchange demand	-2
Construction risk/difficulty	-1
Operational Impacts	0
Land/Property Impacts	-2

CSF5: Stakeholder	
Public and Stakeholder views	3

LO02: London Overground extension from Barking Riverside to Belvedere via Thamesmead

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 2,250 m	£ 313 k

CSF1: Strategic	
Growth areas gaining new connectivity	3
Number of new homes	7183
Number of new jobs	1722.5
Change in no. jobs within 45mins	114000
Public transport river crossing	Strategic
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	0

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Low
Capital cost per home	313

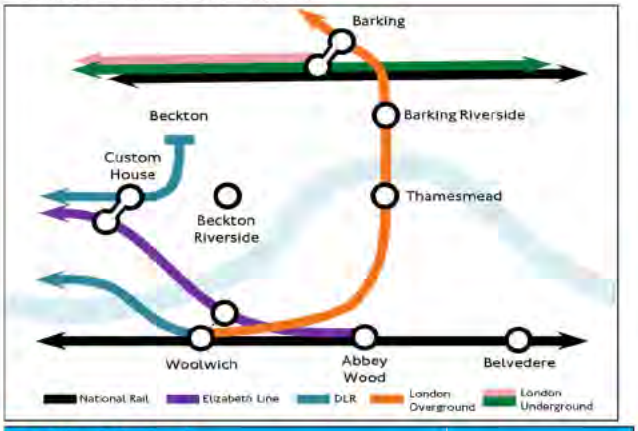
CSF3: Affordability		
Capital cost range (£m, 2022)	1950	2550
Operating costs / revenue	-1	

CSF4: Achievability	
Environmental Impacts	High
Embodied carbon (tCO2e)	203000
User carbon (tCO2e)	-28000
Scenario demand relative to option capa	108%
Capacity to handle interchange demand	-2
Construction risk/difficulty	-1
Operational Impacts	0
Land/Property Impacts	-2

CSF5: Stakeholder	
Public and Stakeholder views	3

LO03: London Overground extension from Barking Riverside to Woolwich via Thamesmead.

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 2,400 m	£ 334 k

CSF1: Strategic	
Growth areas gaining new connectivity	3
Number of new homes	7183
Number of new jobs	1722.5
Change in no. jobs within 45mins	137000
Public transport river crossing	Strategic
Supporting creation of & enhanced town centres	1
Promote Healthy Streets	0

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Low
Capital cost per home	334

CSF3: Affordability		
Capital cost range (£m, 2022)	2100	2700
Operating costs / revenue	-1	

CSF4: Achievability	
Environmental Impacts	Medium
Embodied carbon (tCO2e)	216000
User carbon (tCO2e)	-28000
Scenario demand relative to option capa	108%
Capacity to handle interchange demand	-2
Construction risk/difficulty	-1
Operational Impacts	-2
Land/Property Impacts	-2

CSF5: Stakeholder	
Public and Stakeholder views	3

5.6 Summary of higher-cost scenario options

5.6.1 Overall these options compare with one another as illustrated below:

higher-cost

Summary	Metric	DLR 02a	DLR 02b	DLR 02c	DLR 03a	DLR 03b	DLR 04	DLR 05	DLR 06	DLR 07	Tram 02	LO 01	LO 02	LO 03
Average CSF Score (Range -3 to +3)														
CSF1: Strategic		2.1	1.6	2.1	1.9	1.9	2.1	2.4	1.1	1.1	1.9	1.4	1.6	1.6
CSF2: VfM		0.7	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	-0.7	-2.0	-2.0	-2.0
CSF3: Affordability		0.5	0.0	1.0	0.0	0.0	0.0	-1.0	0.0	0.0	-1.0	-2.0	-2.0	-2.0
CSF4: Achievability		0.4	0.5	0.5	-0.1	-0.1	-0.3	-0.4	-0.3	-0.1	-1.0	-1.4	-1.4	-1.5
CSF5: Stakeholder		3.0	2.0	3.0	3.0	3.0	3.0	3.0	1.0	0.0	2.0	3.0	3.0	3.0
TOTAL (unweighted)		6.7	4.1	7.3	4.7	4.7	4.9	4.1	1.9	1.0	1.2	-0.9	-0.8	-0.9
CSF1 Strategic														
Growth areas gaining new connectivity	no.	2	1	2	2	2	3	4	1	1	2	2	3	3
Number of new homes	Total	24,566	14,366	24,566	24,566	24,566	24,566	29,566	14,366	14,366	12,283	7,183	7,183	7,183
Number of new jobs	Total	5,363	3,445	5,363	5,363	5,363	5,363	5,363	3,445	3,445	2,682	1,723	1,723	1,723
Change in no. jobs within 45mins	Total	381,000	270,000	381,000	355,000	326,000	384,000	573,000	270,000	270,000	190,500	116,000	114,000	137,000
Public transport river crossing	yes/no	Direct	Direct	Direct	Direct	Direct	Direct	Strategic	Indirect	Indirect	Indirect	Strategic	Strategic	Strategic
Supporting creation of & enhanced town centres	no.	2	1	2	2	2	3	3	1	1	2	1	1	1
Promote Healthy Streets	score -3 to +3	1	1	1	-1	-1	-1	-1	-1	-1	2	0	0	0
CSF2 Value for Money														
Level 1 BCR	VfM category	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Adjusted value rating	VfM category	High	Medium	High	Medium	Medium	Medium	Medium	Medium	Medium	Low	Low	Low	Low
Capital cost per home	£k per home	41	70	37	51	55	57	73	70	63	81	313	313	334
CSF3 Affordability														
Capital cost approx (£m, 2022)	mean capex	1000	1000	900	1250	1350	1400	2150	1000	900	1000	2250	2250	2400
Operating costs / revenue	score -3 to +3	2	1	2	1	1	1	1	1	0	-1	-1	-1	-1
CSF4 Achievability														
Environmental Impacts	impact	High	High	Medium	High	High	High	High	High	Medium	Medium	High	High	Medium
Embodied carbon (tCO2e)	tCo2e	90,000	90,000	81,000	113,000	122,000	126,000	194,000	90,000	81,000	45,000	203,000	203,000	216,000
User carbon (tCO2e)	tCo2e	-96,000	-56,000	-96,000	-96,000	-96,000	-96,000	-116,000	-56,000	-56,000	-48,000	-28,000	-28,000	-28,000
Scenario demand relative to option capacity	%	71%	49%	71%	71%	71%	71%	71%	49%	49%	273%	108%	108%	108%
Capacity to handle interchange demand	score -3 to +3	3	3	3	3	3	3	3	3	3	-2	-2	-2	-2
Construction risk/difficulty	score -3 to +3	-1	-1	-1	-1	-1	-1	-1	-2	-2	-1	-1	-1	-1
Operational Impacts	score -3 to +3	0	0	0	-1	-1	-1	-2	-2	-2	-1	0	0	-2
Land/Property Impacts	score -3 to +3	1	1	1	-1	-1	-2	-2	-2	-2	-1	-2	-2	-2
CSF5 Stakeholder														
Public and Stakeholder views	score -3 to +3	3	2	3	3	3	3	3	1	0	2	3	3	3

5.6.2 The assessment shows that the London Overground options performed poorly against the criteria compared with most DLR options, driven primarily by their higher cost and lower housing benefits. This extends to these options' carbon impacts, as these substantial construction projects do not deliver the same levels of low-carbon urban housing and therefore appear to have negative carbon impacts. Of the DLR options, the longest DLR options delivered the highest strategic benefits, but at a higher cost than DLR options to Thamesmead only. Of the Thamesmead options, option DLR02c (Thamesmead via Beckton Riverside) performs most strongly across the criteria as a whole.

5.7 Option combinations

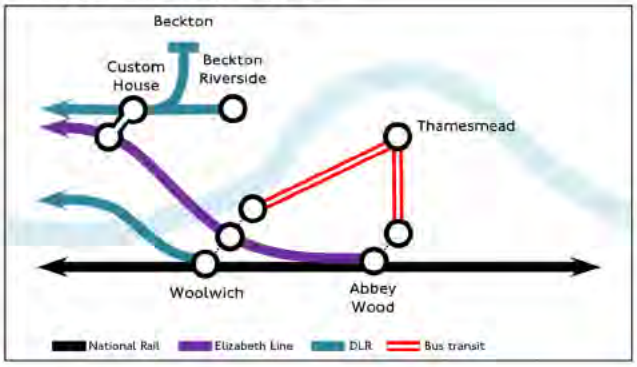
5.7.1 This section outlines the assessment of some combinations of options, where this may work together to fulfil the programme objectives:

Table 4: Option combinations

Rail intervention	Supporting intervention
DLR 01 (Beckton Riverside)	BT 01 (Bus Transit Woolwich – Abbey Wood)
DLR 02c (Thamesmead)	BT 01 (Bus Transit Woolwich – Abbey Wood)
DLR 01 (Beckton Riverside)	Tram 01 (Tram Thamesmead – Abbey Wood)
DLR 02c (Thamesmead)	Tram 01 (Tram Thamesmead – Abbey Wood)

DLR 01 (Beckton Riverside) & BT 01 (Bus Transit Woolwich – Abbey Wood)

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 288 m	£ 22 k

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Very high
Capital cost per home	22

CSF3: Affordability		
Capital cost range (£m, 2022)	225	350
Operating costs / revenue	3	

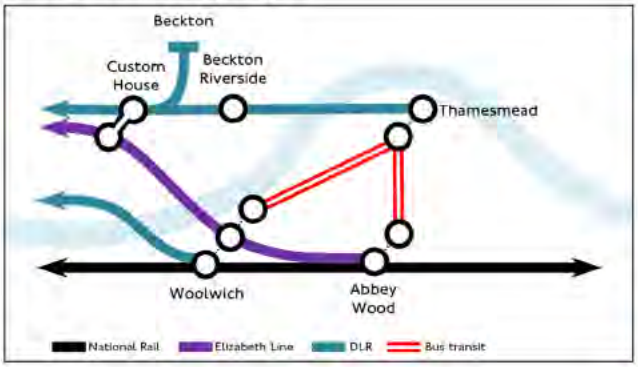
CSF4: Achievability	
Environmental Impacts	Low
Embodied carbon (tCO2e)	24000
User carbon (tCO2e)	-52000
Scenario demand relative to option capa	43%
Capacity to handle interchange demand	0
Construction risk/difficulty	0
Operational Impacts	0
Land/Property Impacts	1

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	13200
Number of new jobs	3418
Change in no. jobs within 45mins	110000
Public transport river crossing	No
Supporting creation of & enhanced town centres	2
Promote Healthy Streets	2

CSF5: Stakeholder	
Public and Stakeholder views	2

DLR 02c (Thamesmead) & BT 01 (Bus Transit Woolwich – Abbey Wood)

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 938 m	£ 38 k

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	High
Capital cost per home	38

CSF3: Affordability		
Capital cost range (£m, 2022)	725	1150
Operating costs / revenue	2	

CSF4: Achievability	
Environmental Impacts	Medium
Embodied carbon (tCO2e)	83000
User carbon (tCO2e)	-96000
Scenario demand relative to option capa	71%
Capacity to handle interchange demand	2
Construction risk/difficulty	-1
Operational Impacts	0
Land/Property Impacts	1

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	24566
Number of new jobs	5363
Change in no. jobs within 45mins	381000
Public transport river crossing	Direct
Supporting creation of & enhanced town centres	2
Promote Healthy Streets	2

CSF5: Stakeholder	
Public and Stakeholder views	3

DLR 01 (Beckton Riverside) & Tram 01 (Tram Thamesmead – Abbey Wood)

Strategic connectivity diagram

Approx cost (2022)	**Cost / home**
£ 700 m	£ 53 k

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	13200
Number of new jobs	4168
Change in no. jobs within 45mins	110000
Public transport river crossing	No
Supporting creation of & enhanced town centres	2
Promote Healthy Streets	2

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	High
Capital cost per home	53

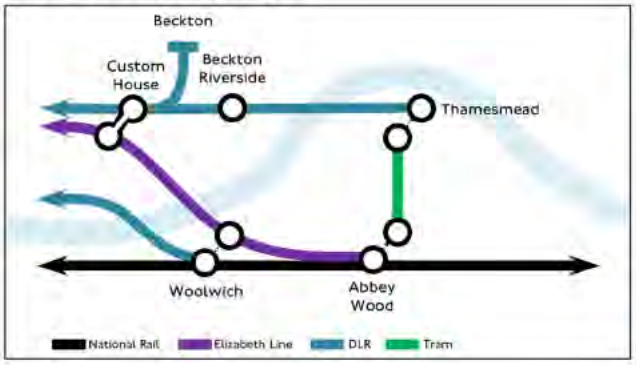
CSF3: Affordability		
Capital cost range (£m, 2022)	550	850
Operating costs / revenue	0	

CSF4: Achievability	
Environmental Impacts	Low
Embodied carbon (tCO2e)	43000
User carbon (tCO2e)	-52000
Scenario demand relative to option capa	43%
Capacity to handle interchange demand	2
Construction risk/difficulty	0
Operational Impacts	-1
Land/Property Impacts	1

CSF5: Stakeholder	
Public and Stakeholder views	2

DLR 02c (Thamesmead) & Tram 01 (Tram Thamesmead – Abbey Wood)

Strategic connectivity diagram



Approx cost (2022)	**Cost / home**
£ 1,450 m	£ 59 k

CSF1: Strategic	
Growth areas gaining new connectivity	2
Number of new homes	24566
Number of new jobs	5363
Change in no. jobs within 45mins	381000
Public transport river crossing	Direct
Supporting creation of & enhanced town centres	2
Promote Healthy Streets	2

CSF2: Value for Money	
Level 1 BCR	Poor
Adjusted value rating	Medium
Capital cost per home	59

CSF3: Affordability		
Capital cost range (£m, 2022)	1150	1750
Operating costs / revenue	0	

CSF4: Achievability	
Environmental Impacts	Medium
Embodied carbon (tCO2e)	101000
User carbon (tCO2e)	-96000
Scenario demand relative to option capa	71%
Capacity to handle interchange demand	2
Construction risk/difficulty	-1
Operational Impacts	-1
Land/Property Impacts	1

CSF5: Stakeholder	
Public and Stakeholder views	3

5.8 Summary of combinations of options

5.8.1 Overall these options compare with one another as illustrated below:

		Combined options			
Summary		DLR01 & BT01	DLR02c & BT01	DLR01 & Tram01	DLR02c & Tram01
Average CSF Score (Range -3 to +3)					
CSF1: Strategic		1.6	2.3	1.6	2.3
CSF2: VfM		1.3	0.7	0.3	0.0
CSF3: Affordability		2.0	1.0	0.0	-0.5
CSF4: Achievability		0.6	0.4	0.8	0.1
CSF5: Stakeholder		2.0	3.0	2.0	3.0
TOTAL (unweighted)		**7.5**	**7.3**	**4.7**	**4.9**
CSF1: Strategic					
Growth areas gaining new connectivity	no.	2	2	2	2
Number of new homes	Total	13,200	24,566	13,200	24,566
Number of new jobs	Total	3,418	5,363	4,168	5,363
Change in no. jobs within 45mins	Total	110,000	381,000	110,000	381,000
Public transport river crossing	yes/no	No	Direct	No	Direct
Supporting creation of & enhanced town centres	no.	2	2	2	2
Promote Healthy Streets	score -3 to +3	2	2	2	2
CSF2: Value for Money					
Level 1 BCR	VfM category	Poor	Poor	Poor	Poor
Adjusted value rating	VfM category	Very high	High	High	Medium
Capital cost per home	£k per home	22	38	53	59
CSF3: Affordability					
Capital cost approx (£m, 2022)	mean capex	288	938	700	1450
Operating costs / revenue	score -3 to +3	3	2	0	0
CSF4: Achievability					
Environmental Impacts	impact	Low	Medium	Low	Medium
Embodied carbon (tCO2e)	tCo2e	24,000	83,000	43,000	101,000
User carbon (tCO2e)	tCo2e	-52,000	-96,000	-52,000	-96,000
Scenario demand relative to option capacity	%	43%	71%	43%	71%
Capacity to handle interchange demand	score -3 to +3	0	2	2	2
Construction risk/difficulty	score -3 to +3	0	-1	0	-1
Operational Impacts	score -3 to +3	0	0	-1	-1
Land/Property Impacts	score -3 to +3	1	1	1	1
CSF5: Stakeholder					
Public and Stakeholder views	score -3 to +3	2	3	2	3

5.8.2 Pairing option DLR01 (Beckton Riverside) with either bus transit (BT01) or Tram (Tram01) options provides benefits, but the attainment of overall objectives is still weak, with the delivery of development and associated benefits still poor compared with options that deliver a rail service to Thamesmead.

5.8.3 With a DLR extension to Thamesmead (option DLR02c), the bus transit (BT01) performs better than a Tram (Tram01) as a supporting measure. This is principally driven by the large difference in cost, with the Tram option considerably more expensive than bus transit, but delivering a similar impact in housing and connectivity.

5.8.4 Overall the pairing of DLR to Thamesmead (DLR02c) with bus transit (BT01) appears to be an effective option at meeting the programme objectives.

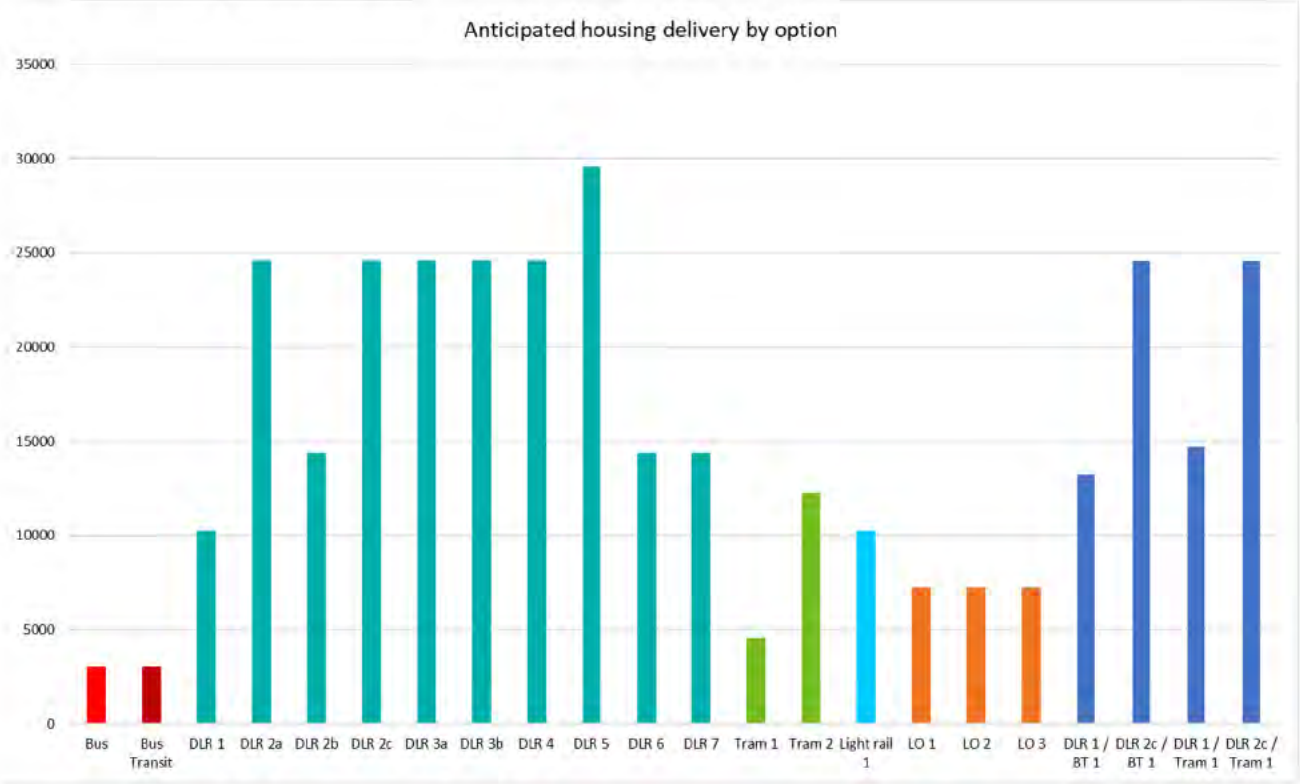
6 Comparison metrics

6.1 Summary of housing delivery

6.1.1 Given that the primary driver of the programme is to enable new housing to be built in the designated growth areas of Thamesmead and Beckton Riverside, an important strategic consideration is the number of new homes which would be enabled.

6.1.2 Figure 6 below illustrates the anticipated volume of new homes which would be enabled by each option.

Figure 5: Anticipated housing delivery by option



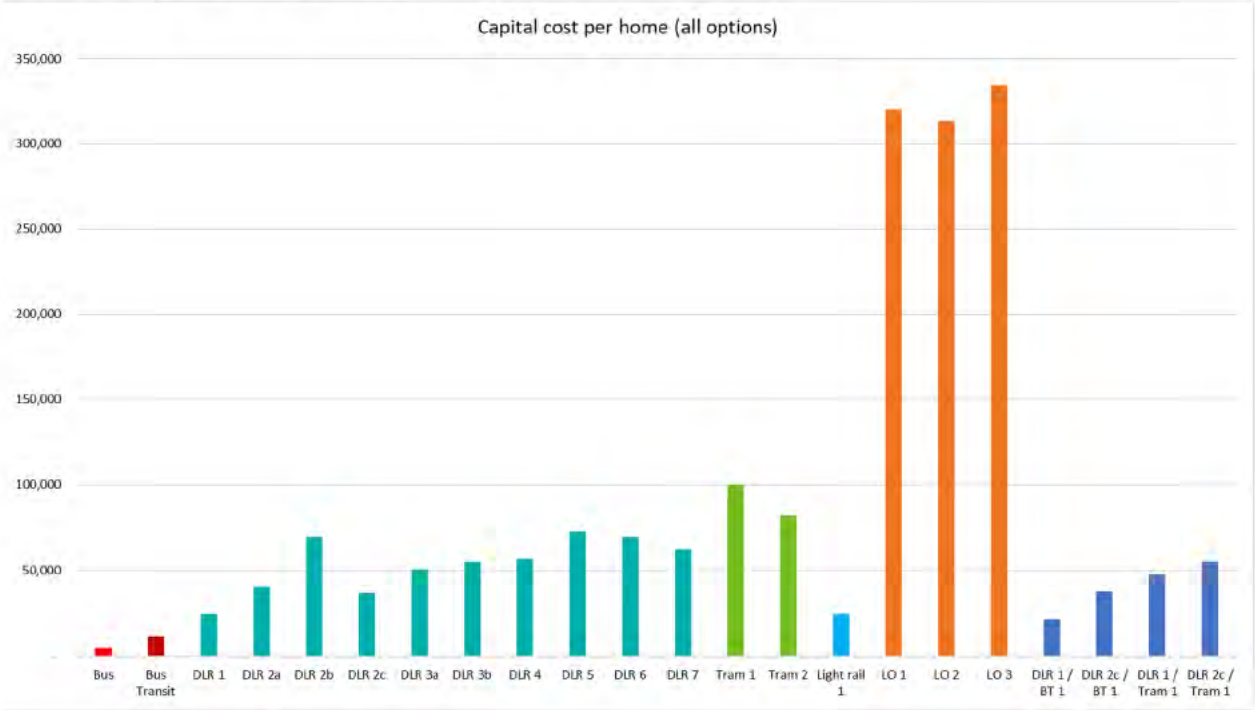
6.1.3 The DLR options deliver the highest volumes of housing of the options considered, as it provides a high capacity, and direct services into major employment centres.

6.2 Summary of cost per home

6.2.1 Another important consideration is value for money, such as the cost of the option relative to the number of new homes which would be enabled. This section illustrates how the capital cost of each scheme compares in terms of housing enabled; however it is important to consider also the ongoing financial sustainability of the options. Currently the DLR typically makes an operating surplus (fate revenue exceeds operating cost), while bus, tram and Overground services tend to make an operating loss.

6.2.2 Figure 6 below illustrates the capital cost per new home for the various potential options.

Figure 6: Capital cost per new home



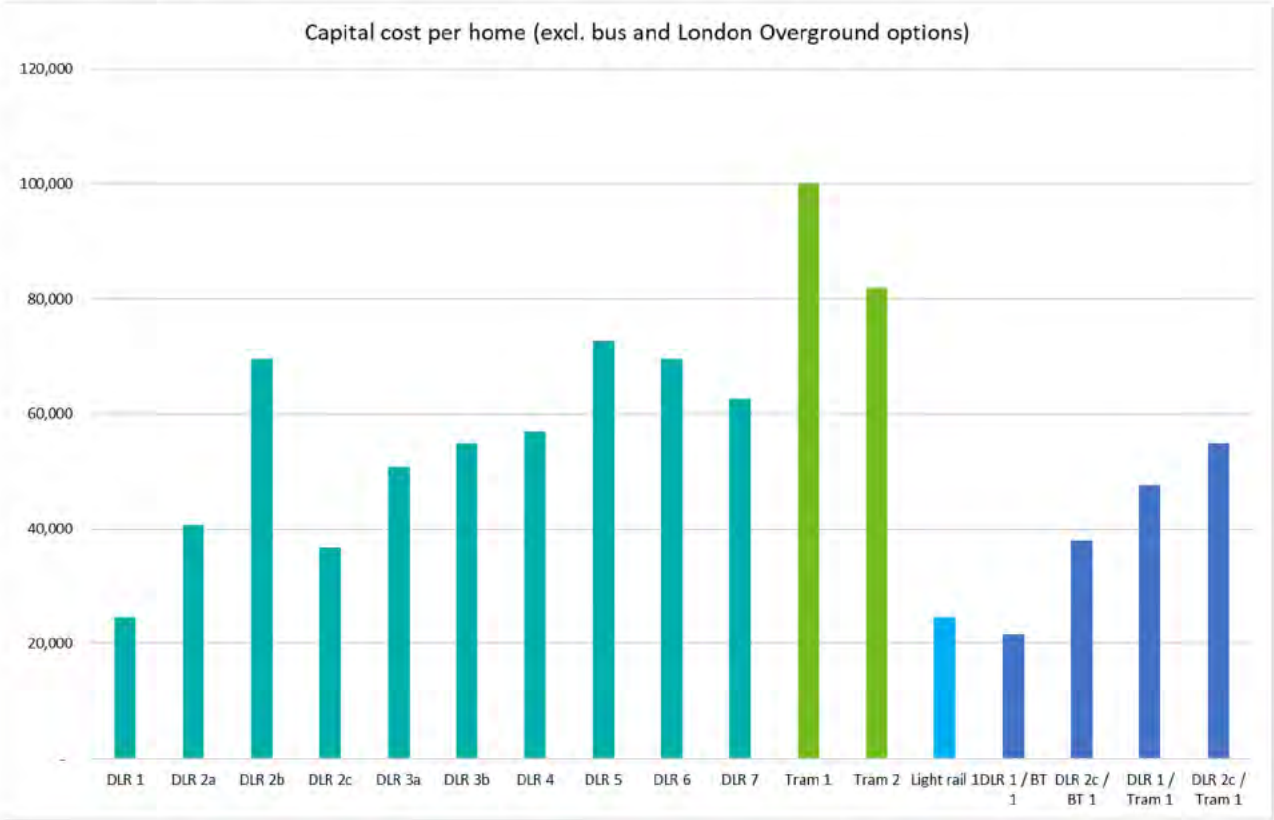
6.2.3 The high capital cost of the London Overground options, and lower housing outcomes than other options, makes the London Overground options considerably poorer value when considering their impact specifically on enabling/supporting the delivery of new homes, which is a key driver of this programme. (This is only one metric - the London Overground does have other benefits, such as orbital connectivity, which benefit passengers in the wider area.)

6.2.5 The lowest cost-per-home outcome is from the bus and Bus Transit scenarios; these require no or very minor infrastructure, yet could support some new housing. However, the volumes of housing are low for these options, little or no more housing than the 'deadweight' assumption of what could come forward in the absence of any transport intervention. In addition, work undertaken by Newbridge and Gerald Eve for Homes England concurred with the landowner that even such low levels of housing are not financially viable in the absence of a rail connection, stating:

> "whilst a bus transit scheme with a suitable frequency and reliable would be attractive to developers and residents, the quantum and density of development in Thamesmead it could support would not prove viable."

6.2.6 If the London Overground and bus-based options are omitted from the graph (see Figure 7) (the former because the cost per home is an order of magnitude greater than the other options, and the latter because they deliver very little housing above the 'do nothing' scenario), it is possible to see more clearly some of the difference in cost-per-home between the options which deliver a moderate-to-high volume of new homes.

Figure 7: Capital cost per new home (excl. bus and Overground)



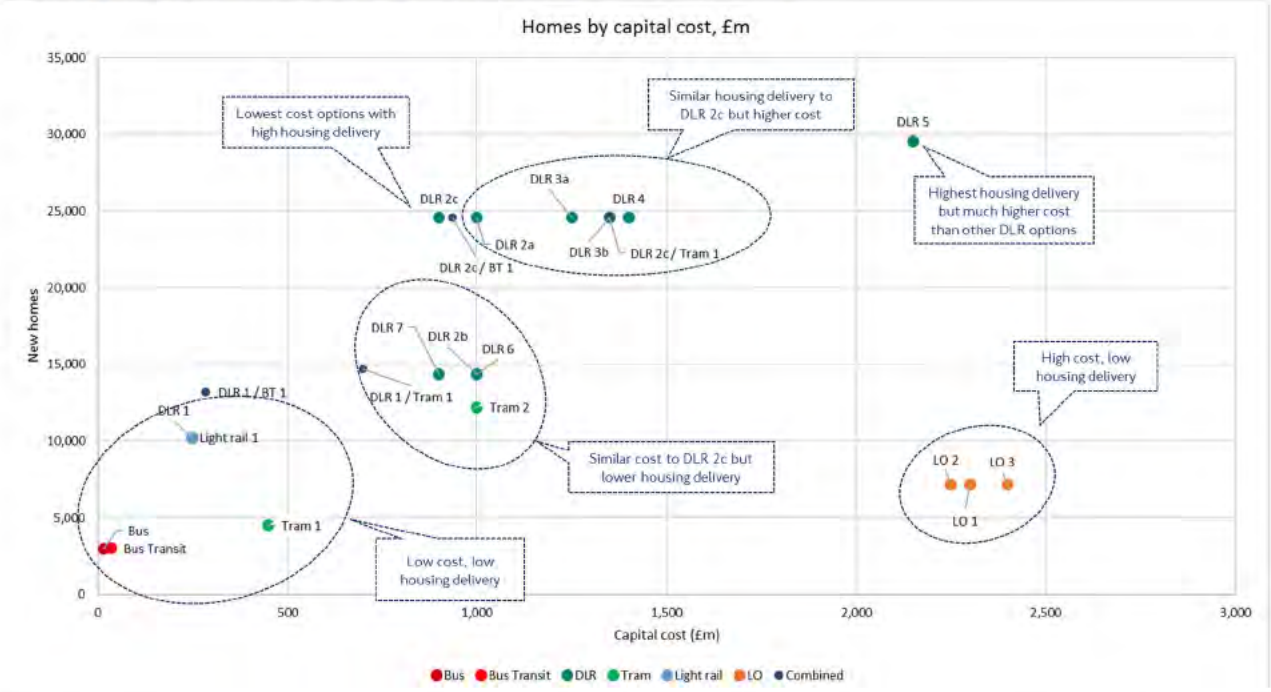
6.2.7 Overall the shortest DLR extension to Beckton Riverside (DLR01) provides the lowest cost per home, alongside the Light Rail (Gallions Reach to Beckton Riverside) option, (LR01) although the former has the significant advantage of offering through journeys from Beckton Riverside, which would deliver higher passenger benefits and a greater

impact on housing viability. The next lowest cost option per home is the DLR to Beckton Riverside and Thamesmead (option DLR 2c).

6.2.8 Longer DLR extensions can deliver the same, or higher, levels of new development, but would not increase housing outcomes in proportion to the increase in cost.

6.2.9 Another way to visualise the cost per home is in a scatter diagram, which illustrates the scale of potential housing impact, as well as the relationship with the capital cost.

Figure 8: Scatter diagram of capital cost and new homes



6.2.10 Figure 8 above illustrates while the cost of delivering bus-based options is low, the housing impact is also low. The very highest number of new homes would be enabled by option DLR 05 (which includes a link to Barking, and an assumption that this could open up some new development sites), but that option comes in at a considerably higher cost than other DLR options, and the housing potential along that corridor is untested.

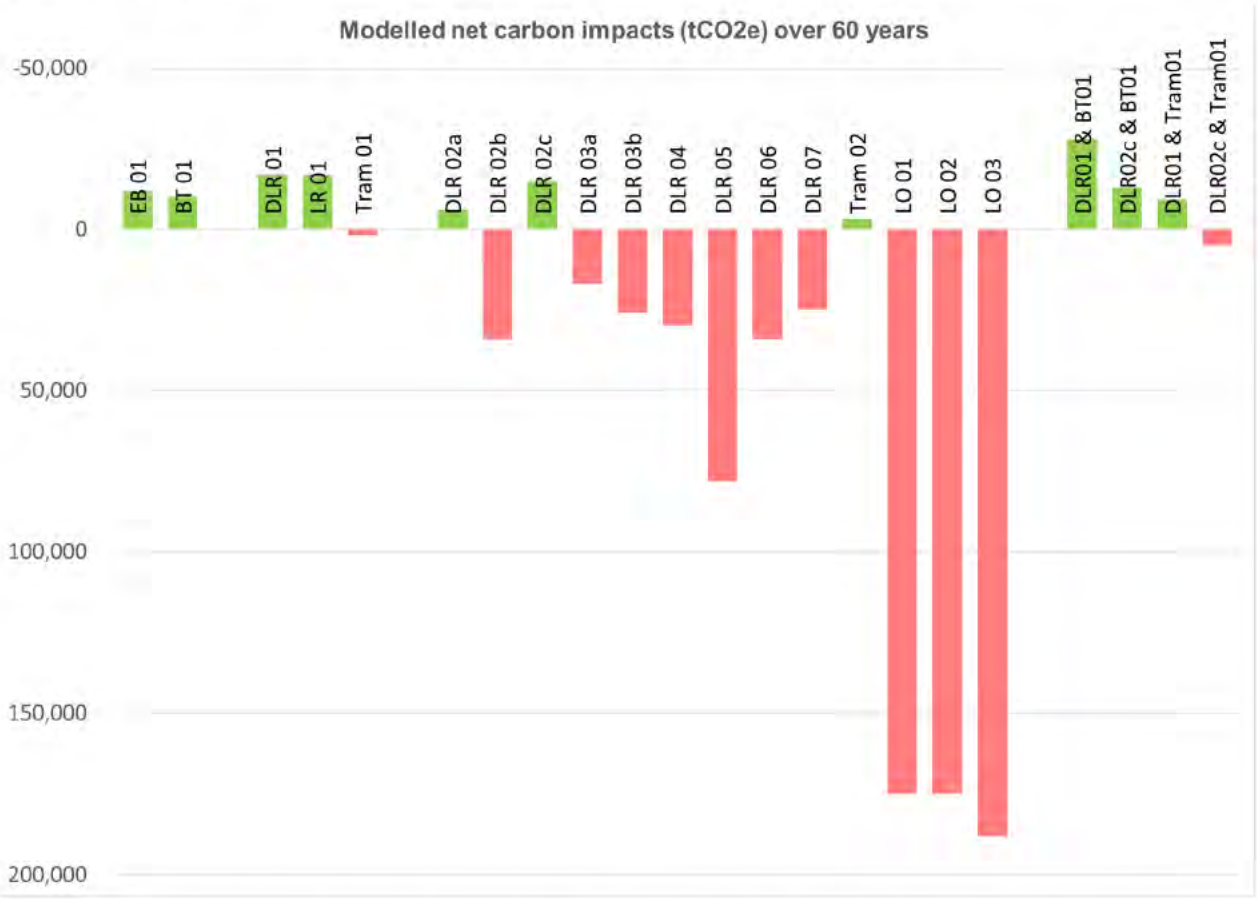
6.3 Carbon impacts

6.3.1 One objective of the programme is to contribute to Net Zero, by enabling the construction of low-car new neighbourhoods, in which low-carbon lifestyles will be embedded for generations by providing dense, walkable neighbourhoods, connected to the wider city by electric mass transit.

6.3.2 Figure 9 illustrates the potential net carbon impact over 60 years of each option, with the embodied carbon of each option set against the carbon outcomes of each option in terms of housing delivery. Net carbon has been identified based on the difference between embodied carbon and user carbon calculated for each option in section 5. It

therefore presents only an indicative assessment of net carbon. For example, at this stage there is no calculation of operational carbon so this is excluded, although all options are assumed to use carbon-neutral power in operation.

Figure 9: Net carbon (tCO2e) over 60 years



6.3.3 This assessment suggests that options EB01 (enhanced bus), BT01 (bus transit), DLR01 (DLR to Beckton Riverside), DLR02a and DLR02c (DLR to Thamesmead via Beckton Riverside) and Tram02 (tram from Gallions Reach to Abbey Wood) could be carbon-positive over the appraisal period, delivering greater carbon savings than expended in their construction, while other options could be carbon-negative overall.

7 Summary of assessment

7.1 Assessment summary table

7.1.1 The preceding chapters set out the assessment of each potential option, as well as some combinations of options which could potentially address the objectives. The Assessment Framework can be seen at Appendix 1, and a summary is shown below.

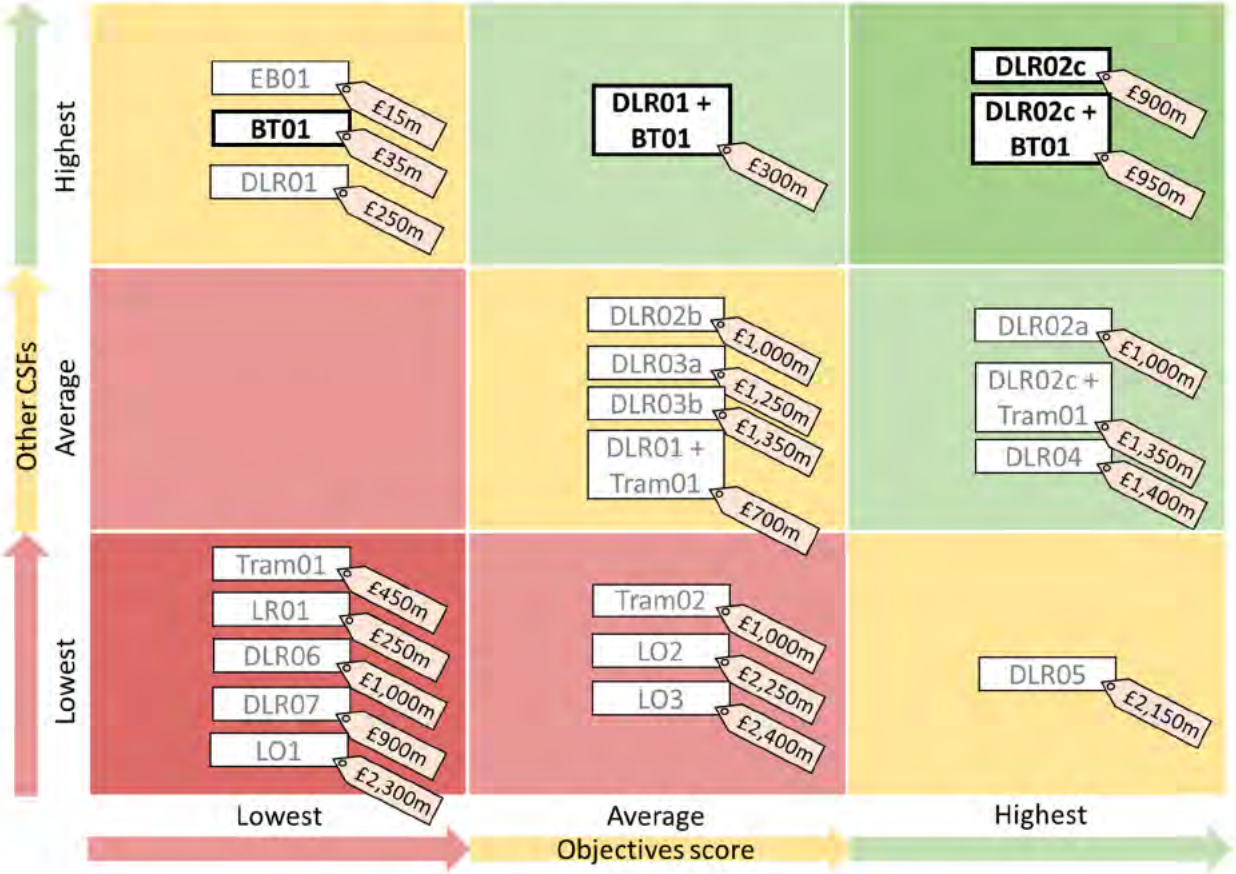
Table 5: Summary of assessment scores

		CSF1: Strategic	CSF2: VfM	CSF3: Affordability	CSF4: Achievability	CSF5: Stakeholder	Total Score
Lower-cost	EB 01	0.3	1.7	1.0	1.4	2.0	**6.3**
	BT 01	0.9	2.3	1.5	1.6	2.0	**8.3**
Medium-cost	DLR 01	1.0	1.0	2.0	0.9	2.0	**6.9**
	LR 01	1.0	0.0	0.0	-0.1	1.0	**1.9**
	Tram 01	1.0	-1.3	0.0	0.3	1.0	**0.9**
Higher-cost	DLR 02a	2.1	0.7	0.5	0.4	3.0	**6.7**
	DLR 02b	1.6	0.0	0.0	0.5	2.0	**4.1**
	DLR 02c	2.1	0.7	1.0	0.5	3.0	**7.3**
	DLR 03a	1.9	0.0	0.0	-0.1	3.0	**4.7**
	DLR 03b	1.9	0.0	0.0	-0.1	3.0	**4.7**
	DLR 04	2.1	0.0	0.0	-0.3	3.0	**4.9**
	DLR 05	2.4	0.0	-1.0	-0.4	3.0	**4.1**
	DLR 06	1.1	0.0	0.0	-0.3	1.0	**1.9**
	DLR 07	1.1	0.0	0.0	-0.1	0.0	**1.0**
	Tram 02	1.9	-0.7	-1.0	-1.0	2.0	**1.2**
	LO 01	1.4	-2.0	-2.0	-1.4	3.0	**-0.9**
	LO 02	1.6	-2.0	-2.0	-1.4	3.0	**-0.8**
	LO 03	1.6	-2.0	-2.0	-1.5	3.0	**-0.9**
Combined	DLR 01 & BT 01	1.6	1.3	2.0	0.6	2.0	**7.5**
	DLR 02c & BT	2.3	0.7	1.0	0.4	3.0	**7.3**
	DLR 01 & Tram	1.6	0.3	0.0	0.8	3.0	**5.7**
	DLR 02c & Tram	2.3	0.0	-0.5	0.1	3.0	**4.9**

7.1.2 Another means of illustrating the comparison of options is to use a nine-box model, in which the options' fit against the objectives is set against the other critical success factors (CSFs).

7.1.3 Figure 10 below shows how the options compare when grouped into the nine-box model, using the unweighted average scores given above. The approximate capital cost at 2021 prices is also shown, given the critical consideration of affordability.

Figure 10: Nine-box model of potential options (including approximate capital cost)



7.1.4 The best performing options when considered this way (top right box) are:

- DLR02c (DLR to Thamesmead via Beckton Riverside)
- DLR02c with BT01 (bus transit Woolwich to Abbey Wood).

7.2 Conclusions

7.2.1 The key conclusions from this stage are:

- Only rail options would support the capacity needs of the full transformational housing vision in the study area. A DLR extension to Thamesmead from Gallions Reach (Option DLR02c) would be the lowest-cost option for providing rail access to both Opportunity Areas. A DLR extension to Thamesmead from the Woolwich Arsenal branch was also considered (Options DLR06 and DLR07), however these options would be a similar cost to an extension from Gallions Reach, would be challenging to construct, and likely to exacerbate crowding issues on the Woolwich branch; meanwhile Beckton Riverside would not be served by these options, and therefore the benefits would be considerably lower despite a similar cost.

- London Overground options were considered, but these options would entail the abandonment of the recently constructed Barking Riverside line (and construction of a new sub-surface station), and would not serve the Beckton Riverside growth opportunity. They would provide good strategic connectivity for the wider area but would be less effective at meeting the programme driver of enabling housing, and would have a capital cost and embodied carbon impact of around double some of the DLR options.

- Tram options would not provide through services to Docklands or central London. They would provide a high quality local service, but would have capacity constraints relative to the scale of development envisaged if provided as a local shuttle (Option Tram01); if a cross-river connection was included to provide greater capacity and connectivity (Option Tram02), it would have a capital cost comparable to the DLR alternatives while not providing a direct link into key employment areas.

- A DLR extension from Gallions Reach to Beckton Riverside only (DLR01) would be feasible, and lower cost than an extension across the Thames to Thamesmead. Although this would not meet the programme objectives in full, progressing this option allows consideration of a phased approach, whereby an onward extension to Thamesmead could be delivered as a second phase (e.g. if development sites in Beckton Riverside were to be progressed earlier than Thamesmead). Delivering an extension to Thamesmead in two phases, would, however, increase the cost, and would delay the realisation of the benefits of the scheme in Thamesmead.

- A bus transit corridor between Woolwich and Abbey Wood (BT01) would not deliver the transformational impacts of a rail-based intervention but could be built more quickly and at a much lower cost, supporting the first stages of new development in advance of a new rail link, and providing complementary connectivity alongside a rail link.

7.3 Options shortlisted for economic appraisal

7.3.1 Three scenarios have been taken forward for more detailed economic appraisal in the Economic Case, including the land use and housing development impacts based on their ability to provide required public transport capacity, connectivity and development viability for Beckton Riverside and Thamesmead sites.

Table 6: Options shortlisted for detailed economic appraisal

Scenario	Transport change
Low-cost	**Option BT 01** Woolwich-Abbey Wood Bus Transit
Transformational	**Option BT 01 with DLR 02c** Woolwich – Abbey Wood Bus Transit DLR to Thamesmead via Beckton Riverside
Less ambitious option	**Option BT 01 with DLR 01** Woolwich – Abbey Wood Bus Transit DLR to Beckton Riverside

7.3.2 The "Low cost" option is the provision of bus transit between Woolwich and Abbey Wood (Option BT01). This would comprise capacity and frequency enhancements to existing bus services to provide additional public transport capacity across the Thamesmead area, with limited stops and a high degree of bus priority. While the scheme could theoretically provide capacity for some housing delivery it is not expected to deliver the uplift in development viability needed to support significant development by itself. As a result, this option is considered complementary to the delivery of a rail-based option but has been included as its significantly lower cost means it could be a quick win to support, rather than unlock, regeneration in Thamesmead.

7.3.3 The "Less Ambitious" and "Transformational" options incorporate the "Low Cost" option (bus transit between Woolwich and Abbey Wood) plus changes to the DLR network. The "Less Ambitious" option includes an extension of the DLR to a new station at Beckton Riverside (Option DLR01) – a 1km extension from the existing DLR network. Whilst this would provide enhanced public transport connectivity at Beckton Riverside and facilitate development there, the housing potential in Thamesmead would not be realised.

7.3.4 The "Transformational" option includes an extension of the DLR to Thamesmead via Beckton Riverside (Option DLR02c). The extension runs from the existing Gallions Reach station to new stations in Beckton Riverside and Thamesmead (via a tunnelled cross-river connection) – a 3 km extension from the existing DLR network. This is predicted to lead to development at both Beckton Riverside and Thamesmead Waterfront. This option would enable the full transformation of Beckton Riverside and Thamesmead supporting 25,000 to 30,000 new homes and would leverage a significant increase in economic growth and social value in new and existing town centres.

7.3.5 The Economic Case sets out the analysis of these scenarios.

Appendix A Assessment table

		Summary						CSF1: Strategic							CSF2: Value for Money			CSF3: Affordability		CSF4: Achievability								CSF5: Stake-holder	Comments
		CSF1 Strategic	CSF2 VfM	CSF3 Affordability	CSF4 Achievability	CSF5 Stakeholder	TOTAL (unweighted)	Growth areas gaining new connectivity	Number of new homes	Number of new jobs	Change in no. jobs within 45mins	Public transport river crossing	Supporting creation of & enhanced town centres	Promote Healthy Streets	Level 1 BCR	Adjusted value rating	Capital cost per home	Capital cost approx (£m, 2022)	Operating costs / revenue	Environmental Impacts	Embodied carbon (tCO2e)	User carbon (tCO2e)	Scenario demand relative to option capacity	Capacity to handle interchange demand	Construction risk/difficulty	Operational Impacts	Land/Property Impacts	Public and Stakeholder views	
		no.	Total	Total	Total	yes/no	no.	score -3 to +3	VfM category	VfM category	£k per home	mean capex	score -3 to +3	impact	tCO2e	tCO2e	%	score -3 to +3	score -3 to +3	score -3 to +3	score -3 to +3	score -3 to +3	score -3 to +3	
lower-cost	EB 01	0.3	1.7	1.0	1.7	2.0	6.6	0	3,000	1,500	-	No	0	0	Medium	Medium	0	1	-1	Low	<100	-12000	30%	-1	3	-1	3	2	Very low cost and highly deliverable, but limited impact on housing delivery and limitations on capacity
	BT 01	0.9	3.0	1.5	2.0	2.0	9.4	1	3,000	1,500	-	No	1	2	High	High	13	38	0	Low	2000	-12000	38%	0	2	1	3	2	Low cost and very deliverable; could support early growth in Thamesmead but limited impact on housing delivery and limitations on capacity
medium-cost	DLR 01	1.0	1.0	2.0	1.2	2.0	7.2	1	10,200	1,918	110,000	No	1	1	Poor	Very high	25	250	3	Low	23000	-40000	43%	3	0	0	1	2	Very good value for money, would deliver growth in Beckton Riverside but not in Thamesmead
	LR 01	1.0	0.0	0.0	-0.2	1.0	1.8	1	10,200	1,918	55,000	No	1	1	Poor	Low	25	250	-1	Low	23000	-40000	30%	-2	-1	-2	1	1	High overhead cost compared with DLR and requires additional interchange so passenger benefit limited. Would not serve Thamesmead
	Tram 01	1.0	-1.3	0.0	0.3	1.0	1.0	1	4,500	2,250	-	No	1	2	Poor	Poor	100	450	-1	Low	20000	-18000	38%	1	0	-1	-1	1	High cost compared with BT01 (incl new mode overheads e.g. depot) for similar benefits (still requires change to access the rail network unlike DLR options)
higher-cost	DLR 02a	2.1	0.7	0.5	0.3	3.0	6.6	2	24,566	5,363	381,000	Direct	2	1	Poor	High	41	1000	2	High	90000	-96000	71%	3	-1	0	1	3	High value for money, would deliver growth in Beckton Riverside and Thamesmead. Higher costs and impacts than DLR02c with similar benefits
	DLR 02b	1.6	0.0	0.0	0.7	2.0	4.2	1	14,366	3,445	270,000	Direct	1	1	Poor	Medium	70	1000	1	High	90000	-56000	49%	3	-1	0	1	2	Would deliver growth in Thamesmead but not in Beckton Riverside despite similar costs to options which serve both
	DLR 02c	2.1	0.7	1.0	0.5	3.0	7.3	2	24,566	5,363	381,000	Direct	2	1	Poor	High	37	900	2	Medium	81000	-96000	71%	3	-1	0	1	3	High value for money, would deliver growth in Beckton Riverside and Thamesmead
	DLR 03a	1.9	0.0	0.0	-0.2	3.0	4.7	2	24,566	5,363	355,000	Direct	2	-1	Poor	Medium	51	1250	1	High	113000	-96000	71%	3	-1	-1	-1	3	Good connectivity by linking to Abbey Wood but the additional costs and impacts of this section do not deliver more housing in the growth areas
	DLR 03b	1.9	0.0	0.0	-0.2	3.0	4.7	2	24,566	5,363	326,000	Direct	2	-1	Poor	Medium	55	1350	1	High	122000	-96000	71%	3	-1	-1	-1	3	Good connectivity by linking to Abbey Wood but the additional costs and impacts of this section do not deliver more housing in the growth areas
	DLR 04	2.1	0.0	0.0	-0.3	3.0	4.8	3	24,566	5,363	384,000	Direct	3	-1	Poor	Medium	57	1400	1	High	126000	-96000	71%	3	-1	-1	-2	3	Benefits for Belvedere and link to North Kent Line but the additional costs and impacts of this section do not deliver more housing in the growth areas
	DLR 05	2.4	0.0	-1.0	-0.5	3.0	3.9	4	29,566	5,363	573,000	Strategic	3	-1	Poor	Medium	73	2150	1	High	194000	-116000	71%	3	-1	-2	-2	3	Very good connectivity benefits by creating outer orbital link but the significant additional costs do not deliver more housing in the growth areas
	DLR 06	1.1	0.0	0.0	-0.3	1.0	1.8	1	14,366	3,445	270,000	Indirect	1	-1	Poor	Medium	70	1000	1	High	90000	-56000	49%	3	-2	-2	-2	1	Complex to enlarge the sub-surface Woolwich Arsenal station to allow through trains to reverse; would not serve Beckton Riverside
	DLR 07	1.1	0.0	0.0	-0.2	0.0	1.0	1	14,366	3,445	270,000	Indirect	1	-1	Poor	Medium	63	900	0	Medium	81000	-56000	49%	3	-2	-2	-2	0	Would split the existing Woolwich Arsenal branch, reducing service to Woolwich and would not serve Beckton Riverside
	Tram 02	1.9	-0.7	-1.0	-1.5	2.0	0.7	2	12,283	2,682	190,500	Indirect	2	2	Poor	Low	81	1000	-1	Medium	45000	-48000	273%	-2	-1	-1	-1	2	Good local connectivity but a cross-river tunnel makes the cost similar to DLR, which would offer direct service to Docklands without the need to interchange
	LO 01	1.4	-2.0	-2.0	-1.5	3.0	-1.1	2	7,183	1,723	116,000	Strategic	1	0	Poor	Low	313	2250	-1	High	203000	-28000	108%	-2	-1	0	-2	3	Very high cost. Would be a strategically useful orbital connection but in terms of this programme's objectives it enables fewer homes than DLR alternatives and would not serve Beckton Riverside.
	LO 02	1.6	-2.0	-2.0	-1.5	3.0	-0.9	3	7,183	1,723	114,000	Strategic	1	0	Poor	Low	313	2250	-1	High	203000	-28000	108%	-2	-1	0	-2	3	Very high cost. Would be a strategically useful orbital connection but in terms of this programme's objectives it enables fewer homes than DLR alternatives and would not serve Beckton Riverside.
	LO 03	1.6	-2.0	-2.0	-1.7	3.0	-1.1	3	7,183	1,723	137,000	Strategic	1	0	Poor	Low	334	2400	-1	Medium	216000	-28000	108%	-2	-1	-2	-2	3	Very high cost. Would be a strategically useful orbital connection but in terms of this programme's objectives it enables fewer homes than DLR alternatives and would not serve Beckton Riverside.
Combined options	DLR01 & BT01	1.6	1.3	2.0	0.7	2.0	7.6	2	13,200	3,418	110,000	No	2	2	Poor	Very high	22	288	3	Low	24000	-52000	43%	0	0	0	1	2	Very high value for money, would deliver Beckton Riverside growth but limited impact on Thamesmead
	DLR02c & BT01	2.3	0.7	1.0	0.3	3.0	7.3	2	24,566	5,363	381,000	Direct	2	2	Poor	High	38	938	2	Medium	83000	-96000	71%	2	-1	0	1	3	High value for money, would deliver growth in Beckton Riverside and Thamesmead. BT01 would support early phases of development prior to DLR opening
	DLR01 & Tram01	1.6	0.3	0.0	0.8	2.0	4.7	2	13,200	4,168	110,000	No	2	2	Poor	High	53	700	0	Low	43000	-52000	43%	2	0	-1	1	2	High value for money (driven by DLR01); would deliver Beckton Riverside growth but limited impact on Thamesmead
	DLR02c & Tram01	2.3	0.0	-0.5	0.2	3.0	5.0	2	24,566	5,363	381,000	Direct	2	2	Poor	Medium	59	1450	0	Medium	101000	-96000	71%	2	-1	-1	1	3	Medium value for money, would deliver growth in Beckton Riverside and Thamesmead. Tram01 would likely not be delivered much before DLR so limited use for early phases