Annex 1: London simulator Phase 2 results summary

The Greater London Authority has recently completed a second phase of work on the London simulator model, in partnership with Swiss firm Greenwood Strategic Advisors. This work has enhanced the simulator's power to tell us about London and how major investments impact the city as a whole.

In particular, the London simulator now disaggregates between inner and outer London, allowing us to analyse the differing impacts of investments between the city centre and surrounding boroughs. Importantly, the model also now incorporates land use data. This means that, as in reality, the knock-on effects of infrastructure projects that we simulate in the model are constrained by land availability.

The table below summarises results from seven scenario analyses conducted in Phase 2 for current or prospective infrastructure investments. These results show, for instance, the number of housing units and jobs expected to be directly and indirectly unlocked by infrastructure projects, as well as the net present value of the investments (calculated based on predicted uplift in London tax revenues to HM Treasury minus growth in government back-spend to London). The NPV-cost ratios in the last row of the table below show the expected size of this additional value to Treasury generated by each simulated project relative to its construction cost.

These figures provide a valuable additional lens to traditional project appraisal techniques for assessing which potential infrastructure investments would be most beneficial to the city as a whole.

	Sutton Tram	**Crossrail to Ebbsfleet**	**Bakerloo Line Extension Phase 1 + 2**	**Royal Docks**	**Digital**	**Northern Line Extension**	**South London Metro-isation**
Simulated differences resulting from these investments as of or in 2050							
Population	+23,000	+47,000	+98,000	+66,000	+40,000	+46,000	+134,000
Housing Units	+7,000	+16,000	+32,000	+19,000	-3,000	+14,000	+48,000
Jobs	+12,000	+27,000	+71,000	+40,000	+20,000	+41,000	+74,000
Business Space (m^2)	+69,000	+248,000	+99,000	+530,000	+103,000	+381,000	+302,000
Cost (£ Billions)	£0.5	£1	£9.6	£0.31	V low	£1.1	£2.7
NPV (£ Billions)[1]	£1.8	£3.9	£16	£12.7	V high	£9.2	£15
NPV/Cost	3.6	3.9	1.7	41	V high	8.4	5.6

[1]Discount rate of 3.44% is 2005-2015 average of 10-year Gilt rates

The analysis indicates that most of the simulated projects would have a positive net present value-to-cost ratio. In most cases the NPV-cost ratios are lower in this second phase of work than was the case for the first phase results reported in the 'Mind the Gap' report. This is primarily because the newly introduced land use data has placed a significant constraint on housing and business space growth generated by infrastructure investments, which wasn't there before.

The simulator was also used to simulate the impact of Crossrail 2, producing a NPV-cost ratio of 0.5. An important reason for this low ratio is that a significant portion of the housing anticipated to be directly enabled by Crossrail 2 is not expected to be delivered until after 2050, and so was not captured in the model results.

Notes:
NB(1) The Crossrail to Ebbsfleet scenario was modified to only include the cost and benefits of the portion of the proposed project within London's boundaries.

NB(2) The BLE scenario includes the costs of both the physical line extension and the planned train upgrade programme for the line as a whole.

NB(3) The cost of London-wide digital upgrades will be largely met by the private sector. The model only accounts for the small investments required of the public sector.