

Fleet Reliability and EV State of Good Repair

- 1.1 This Appendix expands on the background of the Fleet Programmes captured in Section 3 of this Submission.
- 1.2 There are 619 customer serving trains, across eleven lines, made up of nine fleets. Currently LU owns 85 per cent of LU Passenger Rolling Stock. The Northern Line fleet, 95TS is not owned by LU and is maintained through a contract with Alstom.
- 1.3 Fleet is a highly safety critical asset controlled by a set of legislations and standards. Whilst the Fleet Programme undertakes the complex performance improvements and regulatory projects to maintain passenger service at current levels; the Fleet Heavy Overhaul Programme focuses primarily on the underside of the vehicles (equivalent to ensuring a car meets its mandatory MOT requirements to keep it safe and reliable until it's next MOT, which in the case of fleet could be up to 9 years away depending on age, condition and duty).
- 1.4 The schedule of interventions is led by the various factors listed in the main text - Figures A1 and A2 below shows an overview of the fleet numbers and fleet ages.

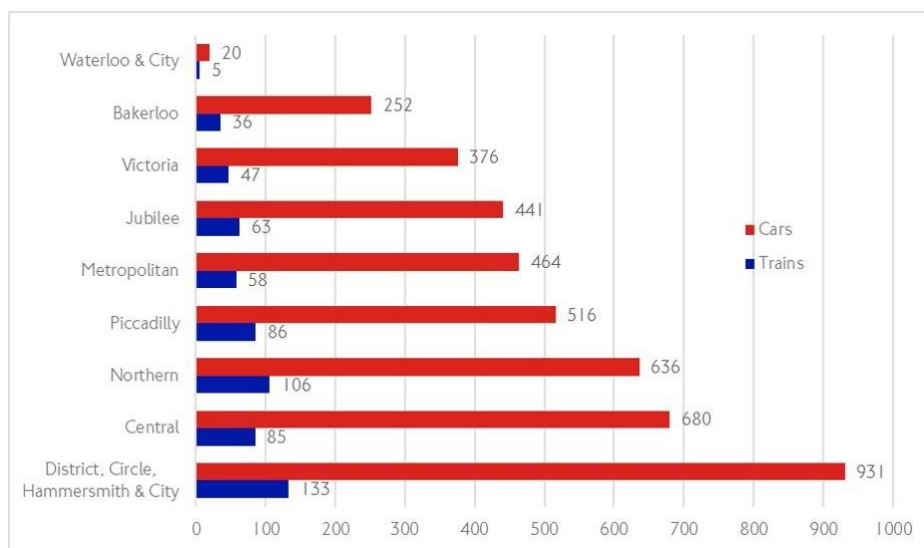


Figure A1: LU passenger vehicle fleet numbers

			Line	Fleet	Approx Year of introduction	Age
			Bakerloo	1972 TS	1974	46
			Piccadilly	1973 TS	1975	45
			Central	1992 TS	1994	26
			Waterloo & City	1992 TS	1994	26
			Jubilee	1996 TS	1997	23
			Northern	1995 TS	1998	22
			Victoria	2009 TS	2009	11
			Metropolitan	S8	2010	10
			District, Circle, Hammersmith & City	S7	2012	8
			Total			Avg age 24

Figure A2: Passenger fleet age

- 1.5 Figure A3 shows that the Bakerloo and Central lines have the highest frequency of faults, i.e. the lowest Mean Distance Between Failures (MDBF) of 8,000kms – 10,000kms. It also shows that the general trend, between 2017/18 and 2019/20, has been an increasing number of failures, illustrated by the declining MDBF (Piccadilly, Jubilee, Northern, Victoria, Metropolitan and Sub-Surface lines).

	Fleet	Age	Utilisation in AM peak	Utilisation Off-peak	Annual Opex per car (£k) Routine Maintenance	Service Failures (past 4 years) per train	Mean Distance Between Failure ('000kms)		
							17/18	19/20	Target 20/21
Ageing	Bakerloo (72 TS)	46	86%	81%	65	70	10	10	10
	Piccadilly (73 TS)	45	92%	79% N	69	34	31	23	24
	Central & W&C (92 TS)	26	92% / 100%	78% N /60%	64	128	8	8	10
Mid life	Jubilee (96 TS)	23	92%	76% N	48	67	24	15	21
	Northern (95 TS)	22	91%	76% N	61 *1	33	33	20	24
Newer	Victoria (09 TS)	11	87%	64% N	47	29	40	45	37
	Met-S8 (S Stock)	10	83%	61%	43	23	36	23	30
	SSR-S7 (S Stock)	8	82%	70%	43	23	60	32	38

Figure A3: Mean Distance Between Failures

- 1.6 Figure A4 shows the direct relationship of the recent investments in renewing and replacing of EVs and their State of Good Repairs. Continued investments are critical to maintain LU's ability to provide EV support to track renewal programme.

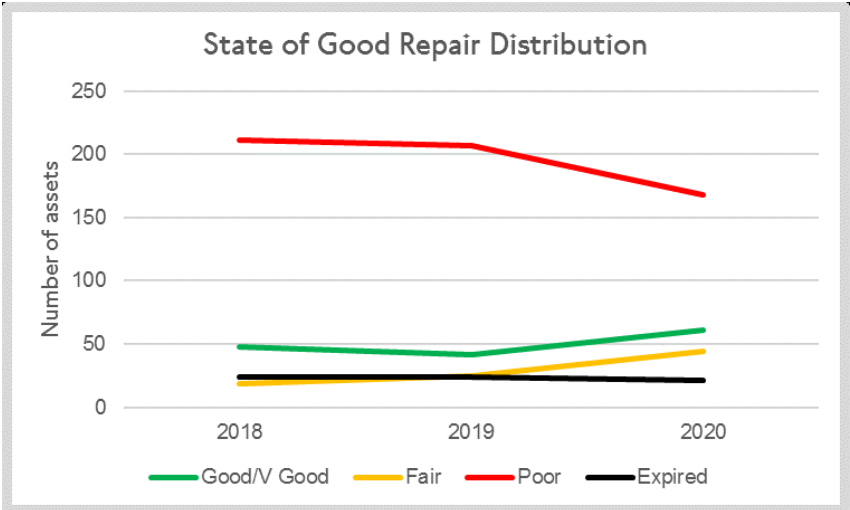


Figure A4: State of Good Repair of Engineering Vehicles