Luton Rising
Our airport.
Our community.
Our planet.

February 2023

London Luton Airport Expansion

Planning Inspectorate Scheme Ref: TR020001

Volume 7 Other Documents

7.04 Need Case

Appendices

Application Document Ref: TR020001/APP/7.04

APFP Regulation: 5(2)(q)

The Planning Act 2008

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

London Luton Airport Expansion Development Consent Order 202x

7.04 NEED CASE - APPENDICES

Regulation number:	Regulation 5(2)(q)
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Appendix A: GaWC World Cities

Alpha Cities		Beta Cities		Gamma Cities	
London	Alpha ++	Washington DC	Beta +	San Jose	Gamma +
New York	Alpha ++	Dallas	Beta +	Kolkata	Gamma +
Hong Kong	Alpha +	Bogota	Beta +	Charlotte	Gamma +
Singapore	Alpha +	Miami	Beta +	St Louis	Gamma +
Shanghai	Alpha +	Rome	Beta +	Pune	Gamma +
Beijing	Alpha +	Hamburg	Beta +	Antwerp	Gamma +
Dubai	Alpha +	Houston	Beta +	Rotterdam	Gamma +
Paris	Alpha +	Berlin	Beta +	Adelaide	Gamma +
Tokyo	Alpha +	Chengdu	Beta +	Porto	Gamma +
Sydney	Alpha	Dusseldorf	Beta +	Baku	Gamma +
Los Angeles	Alpha	Tel Aviv	Beta +	Guadalajara	Gamma +
Toronto	Alpha	Barcelona	Beta +	Ljubljana	Gamma +
Mumbai	Alpha	Budapest	Beta +	Qingdao	Gamma +
Amsterdam	Alpha	Doha	Beta +	Algiers	Gamma +
Milan	Alpha	Lima	Beta +	Suzhou	Gamma +
Frankfurt	Alpha	Copenhagen	Beta +	Belfast	Gamma +
Mexico City	Alpha	Atlanta	Beta +	Glasgow	Gamma +
Sao Paulo	Alpha	Bucharest	Beta +	Medellin	Gamma +
Chicago	Alpha	Vancouver	Beta +	Cologne	Gamma +
Kuala Lumpur	Alpha	Brisbane	Beta +	Phnom Penh	Gamma +
Madrid	Alpha	Cairo	Beta +	Islamabad	Gamma +
Moscow	Alpha	Beirut	Beta +	Phoenix	Gamma +
Jakarta	Alpha	Auckland	Beta +	Riga	Gamma +
Brussels	Alpha	Ho Chi Minh City	Beta	Tbilisi	Gamma +
Warsaw	Alpha -	Athens	Beta	Kunming	Gamma +
Seoul	Alpha -	Denver	Beta	Ahmedabad	Gamma +
Johannesburg	Alpha -	Tianjin	Beta	Dar Es Salaam	Gamma +
Zurich	Alpha -	Abu Dhabi	Beta	Hefei	Gamma +
Melbourne	Alpha -	Perth	Beta	Orlando	Gamma +
Istanbul	Alpha -	Casablanca	Beta	Baltimore	Gamma +
Bangkok	Alpha -	Kiev	Beta	Durban	Gamma
Stockholm	Alpha -	Montevideo	Beta	Vilnius	Gamma
Vienna	Alpha -	Oslo	Beta	Gothenburg	Gamma
Guangzhou	Alpha -	Helsinki	Beta	San Juan	Gamma
Dublin	Alpha -	Chennai	Beta	Nantes	Gamma
Taipei	Alpha -	Hanoi	Beta	Ankara	Gamma
Buenos Aires	Alpha -	Nanjing	Beta	Santo Domingo	Gamma
San Francisco	Alpha -	Philadelphia	Beta	Wroclaw	Gamma
Luxembourg	Alpha -	Cape Town	Beta	Ottawa	Gamma
Montreal	Alpha -	Hangzhou	Beta	Dakar	Gamma

Alpha Cities		Beta Cities		Gamma Cities	
Munich	Alpha -	Nairobi	Beta	Malmo	Gamma
Delhi	Alpha -	Seattle	Beta	Bristol	Gamma
Santiago	Alpha -	Manama	Beta	Tirana	Gamma
Boston	Alpha -	Karachi	Beta	Colombo	Gamma
Manila	Alpha -	Rio De Janeiro	Beta	Turin	Gamma
Shenzhen	Alpha -	Chongqing	Beta	Valencia (Spain)	Gamma
Riyadh	Alpha -	Panama City	Beta	Guayaquil	Gamma
Lisbon	Alpha -	Wuhan	Beta -	Taizhong/Taichung	Gamma
Prague	Alpha -	Manchester	Beta -	Managua	Gamma
Bangalore	Alpha -	Geneva	Beta -	La Paz	Gamma
		Osaka	Beta -	Nashville	Gamma
		Stuttgart	Beta -	Tegucigalpa	Gamma
		Belgrade	Beta -	Haikou	Gamma
		Calgary	Beta -	Wellington	Gamma
		Monterrey	Beta -	Port Louis	Gamma -
		Kuwait City	Beta -	Accra	Gamma -
		Caracas	Beta -	Asuncion	Gamma -
		Changsha	Beta -	Bilbao	Gamma -
		Bratislava	Beta -	Maputo	Gamma -
		Sofia	Beta -	Douala	Gamma -
		San Jose (CR)	Beta -	Nassau	Gamma -
		Zagreb	Beta -	Harare	Gamma -
		Dhaka/Jahangir Nagar	Beta -	Poznan	Gamma -
		Xiamen	Beta -	Luanda	Gamma -
		Tampa	Beta -	Cleveland	Gamma -
		Zhengzhou	Beta -	Fuzhou	Gamma -
		Tunis	Beta -	Nagoya	Gamma -
		Almaty	Beta -	Kansas City	Gamma -
		Shenyang	Beta -	Katowice	Gamma -
		Lyon	Beta -	Malaga	Gamma -
		Minneapolis	Beta -	Queretaro	Gamma -
		Nicosia	Beta -	Harbin	Gamma -
		San Diego	Beta -	Milwaukee	Gamma -
		Amman	Beta -	Penang	Gamma -
		Xi’an	Beta -	Salt Lake City	Gamma -
		Guatemala City	Beta -	Columbus (Ohio)	Gamma -
		Dalian	Beta -	Kaohsiung	Gamma -
		St Petersburg	Beta -	Limassol	Gamma -
		Lagos	Beta -	Sacramento	Gamma -

Alpha Cities		Beta Cities		Gamma Cities	
		Quito	Beta -	Belo Horizonte	Gamma -
		Jinan	Beta -	Lausanne	Gamma -
		San Salvador	Beta -	Taiyuan	Gamma -
		Kampala	Beta -	Edmonton	Gamma -
		George Town (Cayman)	Beta -		
		Muscat	Beta -		
		Detroit	Beta -		
		Edinburgh	Beta -		
		Jeddah	Beta -		
		Hyderabad	Beta -		
		Lahore	Beta -		
		Austin	Beta -		

Appendix B: Forecasting Assumptions

UK GDP Growth Assumptions			
Scenario Name	Central	High	Low
Source	OBR 50th Percentile	OBR 70th Percentile	OBR 30th Percentile
Probability	60%	20%	20%
2020	-9.4%	-9.4%	-9.4%
2021	7.5%	7.5%	7.5%
2022	3.8%	4.7%	2.9%
2023	1.8%	3.1%	0.5%
2024	2.1%	3.6%	0.7%
2025	1.8%	3.1%	0.4%
2026	1.7%	3.0%	0.4%
2027	1.5%	1.8%	1.2%
2028	1.5%	1.8%	1.2%
2029	1.5%	1.8%	1.2%
2030	1.5%	1.8%	1.2%
2031 to 2050	1.5%	1.8%	1.2%

Source: OBR

Overseas GDP Growth												
World Area	**Southern Europe**			**Rest of Europe**			**OECD**			**Rest of World**		
Scenario Name	**Central**	**High**	**Low**	**Central**	**High**	**Low**	**Central**	**High**	**Low**	**Central**	**High**	**Low**
Probability	**60%**	**20%**	**20%**	**60%**	**20%**	**20%**	**60%**	**20%**	**20%**	**60%**	**20%**	**20%**
2020	-5.8%	-5.8%	-5.8%	-4.4%	-4.4%	-4.4%	-3.9%	-3.9%	-3.9%	-1.3%	-1.3%	-1.3%
2021	5.2%	5.2%	5.2%	3.9%	3.9%	3.9%	5.7%	6.9%	4.6%	7.4%	7.4%	7.4%
2022	4.5%	5.4%	3.6%	3.9%	4.7%	3.1%	3.3%	3.9%	2.6%	6.1%	7.3%	4.8%
2023	3.4%	4.1%	2.7%	2.2%	2.6%	1.8%	2.2%	2.6%	1.7%	5.7%	6.8%	4.6%
2024	2.9%	3.5%	2.4%	1.6%	1.9%	1.3%	1.8%	2.2%	1.5%	5.2%	6.2%	4.1%
2025	2.7%	3.3%	2.2%	1.4%	1.6%	1.1%	1.7%	2.0%	1.4%	4.8%	5.8%	3.8%
2026	2.5%	3.1%	2.0%	1.3%	1.5%	1.0%	1.6%	2.0%	1.3%	4.5%	5.4%	3.6%
2027	2.4%	2.8%	1.9%	1.2%	1.5%	1.0%	1.6%	1.9%	1.3%	4.3%	5.1%	3.4%
2028	2.2%	2.7%	1.8%	1.2%	1.4%	1.0%	1.6%	1.9%	1.3%	4.1%	4.9%	3.3%
2029	2.1%	2.6%	1.7%	1.2%	1.4%	0.9%	1.6%	1.9%	1.3%	3.9%	4.7%	3.1%
2030	2.0%	2.5%	1.6%	1.1%	1.4%	0.9%	1.5%	1.8%	1.2%	3.7%	4.5%	3.0%
2031 to 2050	2.0% - 1.5%	2.4% - 1.8%	1.6% - 1.2%	1.1% - 0.9%	1.3% - 1.1%	0.9% - 0.7%	1.5% - 1.2%	1.8% - 1.4%	1.2% - 1.0%	3.6% - 1.8%	4.3% - 2.2%	2.9% - 1.4%

Source: OECD and York Aviation

Other Demand Assumptions									
Input	ETS Allowance Prices			CORSIA Unit Price			Oil Price		
Scenario	Central	High	Low	Central	High	Low	Central	High	Low
Probability	60%	20%	20%	60%	20%	20%	60%	20%	20%
2020	£21	£21	£21	£3	£3	£3	$57	$94	$37
2021	£48	£48	£48	£3	£3	£3	$59	$96	$39
2022	£59	£71	£50	£3	£3	£3	$99	$99	$99
2023	£71	£95	£53	£3	£3	£3	$94	$101	$87
2024	£82	£118	£55	£4	£4	£4	$90	$103	$77
2025	£94	£141	£57	£4	£4	£4	$86	$106	$68
2026	£105	£164	£60	£4	£4	£4	$82	$108	$60
2027	£116	£187	£63	£5	£5	£5	$79	$110	$53
2028	£128	£211	£65	£5	£5	£5	$75	$113	$47
2029	£139	£234	£68	£6	£6	£6	$77	$116	$48
2030	£150	£257	£71	£6	£6	£6	$79	$118	$49
2031 - 2040	£162 - £264	£280 - £489	£73 - £83	£7 - £132	£34 - £287	£7 - £15	$81 - $90	$120 - $130	$50 - $55
2041 – 2050	£276 - £378	£496 - £568	£84 - £96	£157 - £378	£315 - £568	£16 - £37	$90	$130	$55

Source: Department for Transport and Department for Business, Energy & Industrial Strategy

Appendix C: Indicative Busy Day Timetable at 32 mppa

Indicative Busy Day Timetable for an August Day

Note that destinations are purely indicative and not the result of detailed route by route forecasting.

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0001	0005	Boeing B737-Max10	HER	Arr	220
XX0002	0005	Airbus A320neo	PRN	Arr	186
XX0003	0005	Airbus A320neo	KIV	Dep	186
XX0004	0010	Airbus A321neo	LUZ	Arr	239
XX0005	0015	Airbus A321neo	PRG	Arr	239
XX0006	0015	Airbus A320neo	LCJ	Arr	186
XX0007	0020	Airbus A320neo	DBV	Arr	186
XX0008	0020	Airbus A321neo	MAH	Arr	235
XX0009	0025	Airbus A320neo	ZAG	Arr	186
XX0010	0035	Airbus A320neo	MLA	Arr	186
XX0011	0110	Airbus A321neo	SKG	Arr	235
XX0012	0110	Airbus A320neo	TLV	Arr	186
XX0013	0110	Airbus A321neo	SPU	Arr	239
XX0014	0115	Boeing B737-Max10	ACE	Arr	220
XX0015	0120	Airbus A320neo	ALC	Arr	186
XX0016	0120	Airbus A320neo	IBZ	Arr	186
XX0017	0130	Airbus A320neo	LIS	Arr	186
XX0018	0210	Boeing B737-Max10	DLM	Arr	220
XX0019	0215	Airbus A321neo	LCA	Arr	239
XX0020	0235	Airbus A320neo	AGP	Arr	186
XX0021	0555	Airbus A321neo	PLQ	Dep	239
XX0022	0555	Airbus A320neo	VLC	Dep	186
XX0023	0555	Airbus A321neo	HRG	Dep	235
XX0024	0555	Airbus A321neo	HER	Dep	239
XX0025	0600	Airbus A320neo	AMS	Dep	186
XX0026	0600	Airbus A321neo	PMI	Dep	235
XX0027	0605	Boeing B737-Max10	JSI	Dep	220
XX0028	0605	Airbus A320neo	ALC	Dep	186
XX0029	0605	Airbus A320neo	TGM	Dep	186
XX0030	0605	Airbus A320neo	MAH	Dep	186
XX0031	0605	Airbus A320neo	CDG	Dep	186
XX0032	0610	Airbus A320neo	PMO	Dep	186
XX0033	0615	Boeing B737-Max10	SSH	Arr	220
XX0034	0615	Airbus A320neo	PRN	Dep	186
XX0035	0615	Airbus A320neo	NAP	Dep	186
XX0036	0615	Airbus A321neo	AGP	Dep	235
XX0037	0620	Airbus A320neo	SPU	Dep	186
XX0038	0620	Airbus A320neo	TLS	Dep	186

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0039	0620	Airbus A321neo	ATH	Dep	235
XX0040	0625	Boeing B787-8	JFK	Arr	291
XX0041	0625	Boeing B737-Max10	CFU	Dep	220
XX0042	0625	Airbus A320neo	HAM	Dep	186
XX0043	0625	Airbus A320neo	SKP	Dep	186
XX0044	0630	Boeing B737-Max8	DUB	Dep	200
XX0045	0630	Boeing B737-Max8	BZR	Dep	200
XX0046	0630	Airbus A320neo	KEF	Dep	186
XX0047	0630	Boeing B737-Max8	LPA	Dep	200
XX0048	0630	Boeing B737-Max8	FRA	Dep	200
XX0049	0635	Airbus A321neo	FAO	Dep	235
XX0050	0635	Airbus A320neo	KRK	Dep	186
XX0051	0635	Airbus A320neo	SXF	Dep	186
XX0052	0640	Airbus A320neo	TGD	Dep	186
XX0053	0645	Airbus A320neo	SSH	Arr	186
XX0054	0645	Airbus A320neo	LWO	Arr	186
XX0055	0645	Boeing B787-8	EWR	Arr	219
XX0056	0645	Boeing B787-8	CUN	Arr	288
XX0057	0645	Boeing B737-Max8	ATH	Dep	200
XX0058	0650	Airbus A321LR	IAD	Arr	161
XX0059	0650	Airbus A321neo	BTS	Arr	239
XX0060	0650	Airbus A321neo	KSC	Dep	239
XX0061	0650	Airbus A321neo	BRI	Dep	239
XX0062	0650	Boeing B737-Max8	AGP	Dep	200
XX0063	0650	Airbus A321neo	ALC	Dep	239
XX0064	0650	Airbus A320neo	AGP	Dep	186
XX0065	0655	Boeing B787-9	AUH	Arr	299
XX0066	0655	Boeing B787-8	DOH	Arr	254
XX0067	0700	Airbus A321neo	KUN	Dep	239
XX0068	0700	Airbus A321neo	BCN	Dep	235
XX0069	0700	Airbus A321neo	ACE	Dep	235
XX0070	0700	Airbus A321neo	ZAG	Dep	239
XX0071	0700	Airbus A320neo	JTR	Dep	186
XX0072	0705	Airbus A321neo	CND	Arr	239
XX0073	0705	Airbus A320neo	LIS	Dep	186
XX0074	0705	Airbus A320neo	GRX	Dep	186
XX0075	0710	Airbus A321neo	VNO	Arr	239
XX0076	0710	Airbus A321neo	AMS	Arr	210
XX0077	0710	Airbus A320neo	MRS	Dep	186
XX0078	0710	Airbus A321neo	BOJ	Dep	239
XX0079	0710	Airbus A320neo	FUE	Dep	186
XX0080	0710	Boeing B737-Max8	PLQ	Dep	200
XX0081	0715	Airbus A321neo	SCV	Arr	239

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0082	0715	Airbus A320neo	RIX	Arr	186
XX0083	0715	Airbus A320neo	TLV	Dep	186
XX0084	0715	Airbus A320neo	BSL	Dep	186
XX0085	0720	Boeing B787-10	DXB	Arr	330
XX0086	0720	Airbus A321neo	MXP	Dep	235
XX0087	0720	Airbus A321neo	IEV	Dep	239
XX0088	0720	Airbus A320neo	NCE	Dep	186
XX0089	0725	Airbus A320neo	WRO	Arr	186
XX0090	0725	Airbus A320neo	MSQ	Arr	186
XX0091	0725	Boeing B737-Max8	VRN	Dep	189
XX0092	0725	Airbus A320neo	LWO	Dep	186
XX0093	0725	Airbus A321neo	BTS	Dep	239
XX0094	0730	Airbus A320neo	CLJ	Arr	186
XX0095	0730	Airbus A321neo	SOF	Arr	239
XX0096	0730	Airbus A321neo	LCA	Dep	239
XX0097	0730	Airbus A320neo	GVA	Dep	186
XX0098	0735	Airbus A320neo	CRA	Arr	186
XX0099	0735	Airbus A321neo	WAW	Arr	239
XX0100	0735	Airbus A320neo	IAS	Arr	186
XX0101	0735	Airbus A321neo	JMK	Dep	235
XX0102	0740	Airbus A321neo	CFU	Dep	235
XX0103	0745	Airbus A320neo	EDI	Arr	186
XX0104	0745	Boeing B787-8	MCO	Arr	288
XX0105	0745	Airbus A320neo	RIX	Dep	186
XX0106	0750	Airbus A321neo	VNO	Dep	239
XX0107	0755	Airbus A321neo	KTW	Arr	239
XX0108	0755	Airbus A321neo	GDN	Arr	239
XX0109	0755	Airbus A321neo	BUD	Arr	239
XX0110	0755	Airbus A321neo	AMS	Dep	210
XX0111	0800	Airbus A321neo	KRK	Arr	239
XX0112	0800	Airbus A320neo	WRO	Dep	186
XX0113	0800	Airbus A321neo	SOF	Dep	239
XX0114	0800	Airbus A320neo	CTA	Dep	186
XX0115	0800	Boeing B737-Max10	NBE	Dep	220
XX0116	0805	Dash-8-Q400	GLA	Arr	76
XX0117	0805	Airbus A320neo	MAD	Arr	186
XX0118	0805	Boeing B737-Max8	MLA	Dep	200
XX0119	0805	Airbus A320neo	CDG	Dep	186
XX0120	0805	Airbus A320neo	MSQ	Dep	186
XX0121	0805	Boeing B737-Max10	ALC	Dep	220
XX0122	0810	Embraer E190-E2	EDI	Arr	110
XX0123	0815	Dash-8-Q400	ABZ	Arr	76
XX0124	0815	Airbus A320neo	CLJ	Dep	186

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0125	0815	Airbus A321neo	WAW	Dep	239
XX0126	0815	Airbus A320neo	EDI	Dep	186
XX0127	0820	Airbus A320neo	GLA	Arr	186
XX0128	0820	Airbus A350-900	YYZ	Arr	330
XX0129	0820	Airbus A320neo	CRA	Dep	186
XX0130	0820	Airbus A320neo	IAS	Dep	186
XX0131	0825	Boeing B737-Max9	TLV	Arr	175
XX0132	0830	Airbus A320neo	TSR	Arr	186
XX0133	0830	Airbus A320neo	KIV	Arr	186
XX0134	0835	Airbus A320neo	VAR	Arr	186
XX0135	0835	Airbus A321neo	GDN	Dep	239
XX0136	0835	Dash-8-Q400	GLA	Dep	76
XX0137	0840	Airbus A320neo	MXP	Arr	186
XX0138	0840	Airbus A321neo	KTW	Dep	239
XX0139	0840	Airbus A321neo	BUD	Dep	239
XX0140	0840	Airbus A321neo	KRK	Dep	239
XX0141	0840	Embraer E190-E2	EDI	Dep	110
XX0142	0845	Boeing B737-Max8	SNN	Arr	200
XX0143	0845	Boeing B787-8	DOH	Dep	254
XX0144	0845	Dash-8-Q400	ABZ	Dep	76
XX0145	0845	Airbus A320neo	MAD	Dep	186
XX0146	0850	Airbus A321neo	OTP	Arr	239
XX0147	0850	Airbus A320neo	GLA	Dep	186
XX0148	0855	Airbus A320neo	AMS	Arr	186
XX0149	0855	Boeing B737-Max8	ATH	Arr	200
XX0150	0900	Airbus A320neo	TSR	Dep	186
XX0151	0900	Airbus A320neo	KIV	Dep	186
XX0152	0905	Airbus A320neo	VAR	Dep	186
XX0153	0905	Boeing B787-8	CUN	Dep	288
XX0154	0910	Airbus A320neo	CDG	Arr	186
XX0155	0910	Boeing B737-Max8	SNN	Dep	200
XX0156	0910	Boeing B787-9	AUH	Dep	299
XX0157	0915	Airbus A320neo	MXP	Dep	186
XX0158	0920	Airbus A321neo	ORY	Arr	210
XX0159	0925	Boeing B737-Max8	TGM	Arr	189
XX0160	0925	Airbus A320neo	AMS	Dep	186
XX0161	0925	Boeing B787-8	EWR	Dep	219
XX0162	0925	Boeing B737-Max8	ATH	Dep	200
XX0163	0930	Boeing B737-Max8	DUB	Arr	200
XX0164	0935	Airbus A321neo	AMM	Arr	230
XX0165	0935	Airbus A321neo	OTP	Dep	239
XX0166	0940	Airbus A320neo	INV	Dep	186
XX0167	0940	Boeing B787-8	JFK	Dep	291

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0168	0950	Boeing B737-Max8	OTP	Arr	189
XX0169	0950	Boeing B737-Max9	TLV	Dep	175
XX0170	0950	Airbus A321LR	IAD	Dep	161
XX0171	0955	Boeing B737-800W	BCM	Arr	189
XX0172	0955	Boeing B737-800W	IAS	Arr	189
XX0173	1000	Boeing B737-Max8	NOC	Dep	200
XX0174	1000	Boeing-787-10	DXB	Dep	330
XX0175	1000	Airbus A321neo	ORY	Dep	210
XX0176	1010	Boeing-787-8	JFK	Arr	291
XX0177	1010	Boeing B737-Max8	TGM	Dep	189
XX0178	1015	Boeing B737-800W	LCA	Arr	189
XX0179	1015	Boeing B737-Max8	FRA	Arr	200
XX0180	1020	Airbus A321neo	BGO	Dep	239
XX0181	1030	Airbus A321neo	KEF	Arr	235
XX0182	1035	Airbus A320neo	TLS	Arr	186
XX0183	1035	Boeing B737-Max8	OTP	Dep	189
XX0184	1035	Airbus A321neo	AMM	Arr	230
XX0185	1040	Airbus A320neo	BUD	Arr	186
XX0186	1040	Boeing B737-800W	BCM	Dep	189
XX0187	1040	Boeing B737-800W	IAS	Dep	189
XX0188	1040	Boeing B737-Max8	INI	Dep	200
XX0189	1050	Boeing B737-Max8	BZR	Arr	200
XX0190	1050	Airbus A320neo	SXF	Arr	186
XX0191	1055	Airbus A320neo	BFS	Arr	186
XX0192	1100	Airbus A320neo	HAM	Arr	186
XX0193	1100	Boeing B737-800W	LCA	Dep	189
XX0194	1105	Airbus A320neo	BSL	Arr	186
XX0195	1105	Airbus A320neo	OPO	Dep	186
XX0196	1110	Airbus A320neo	CDG	Arr	186
XX0197	1110	Airbus A321neo	BTS	Dep	239
XX0198	1110	Airbus A320neo	BUD	Dep	186
XX0199	1115	Boeing B737-Max8	CPH	Dep	200
XX0200	1120	Airbus A321neo	AYT	Arr	235
XX0201	1120	Airbus A320neo	LYS	Dep	186
XX0202	1125	Airbus A321neo	PLQ	Arr	239
XX0203	1125	Airbus A320neo	BFS	Dep	186
XX0204	1130	Airbus A320neo	GVA	Arr	186
XX0205	1130	Airbus A320neo	MAH	Arr	186
XX0206	1130	Airbus A320neo	VLC	Arr	186
XX0207	1130	Airbus A320neo	KLX	Dep	186
XX0208	1130	Airbus A321neo	KEF	Dep	235
XX0209	1135	Airbus A320neo	EDI	Arr	186
XX0210	1135	Airbus A320neo	IOM	Dep	186

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0211	1140	Airbus A321neo	PMI	Arr	235
XX0212	1140	Airbus A350-900	YYZ	Dep	330
XX0213	1145	Dash-8-Q400	GLA	Arr	76
XX0214	1150	Airbus A320neo	MRS	Arr	186
XX0215	1150	Embraer E190-E2	EDI	Arr	110
XX0216	1155	Airbus A321neo	MXP	Arr	235
XX0217	1155	Airbus A320neo	MAD	Arr	186
XX0218	1200	Airbus A320neo	EDI	Dep	186
XX0219	1200	Airbus A320neo	HAJ	Dep	186
XX0220	1200	Boeing-787-8	MCO	Dep	288
XX0221	1205	Airbus A320neo	NCE	Arr	186
XX0222	1205	Airbus A320neo	SPU	Arr	186
XX0223	1205	Airbus A320neo	ALC	Arr	186
XX0224	1205	Airbus A320neo	TGD	Arr	186
XX0225	1210	Airbus A321neo	SUJ	Dep	239
XX0226	1210	Airbus A320neo	FAO	Dep	186
XX0227	1215	Airbus A321neo	BCN	Arr	235
XX0228	1215	Airbus A321neo	ZAG	Arr	239
XX0229	1215	Dash-8-Q400	GLA	Dep	76
XX0230	1220	Airbus A320neo	AMS	Arr	186
XX0231	1220	Boeing B737-Max8	VRN	Arr	189
XX0232	1220	Airbus A320neo	PMI	Dep	186
XX0233	1220	Embraer E190-E2	EDI	Dep	110
XX0234	1225	Airbus A320neo	NAP	Arr	186
XX0235	1230	Airbus A321neo	AGP	Arr	235
XX0236	1230	Airbus A320neo	KRK	Arr	186
XX0237	1230	Airbus A320neo	TGM	Arr	186
XX0238	1230	Airbus A320neo	LIS	Dep	186
XX0239	1230	Airbus A320neo	RHO	Dep	186
XX0240	1235	Boeing B737-Max8	PLQ	Arr	200
XX0241	1235	Airbus A321neo	PSA	Dep	235
XX0242	1235	Airbus A320neo	MAD	Dep	186
XX0243	1240	Airbus A320neo	CLJ	Arr	186
XX0244	1240	Airbus A320neo	PMO	Arr	186
XX0245	1240	Airbus A321neo	AYT	Dep	235
XX0246	1240	Airbus A321neo	VCE	Dep	235
XX0247	1240	Airbus A320neo	PRG	Dep	186
XX0248	1245	Airbus A320neo	AMS	Dep	186
XX0249	1245	Airbus A320neo	VIE	Dep	186
XX0250	1250	Airbus A321neo	KSC	Arr	239
XX0251	1250	Airbus A321neo	ALC	Arr	239
XX0252	1250	Airbus A320neo	BCN	Dep	186
XX0253	1255	Airbus A321neo	FAO	Arr	235

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0254	1255	Airbus A320neo	PRN	Arr	186
XX0255	1255	Airbus A320neo	GRX	Arr	186
XX0256	1255	Airbus A320neo	AGP	Dep	186
XX0257	1300	Boeing-787-10	DXB	Arr	330
XX0258	1300	Boeing B737-Max8	FNI	Dep	200
XX0259	1305	Boeing B737-Max8	NOC	Arr	200
XX0260	1305	Airbus A320neo	INV	Arr	186
XX0261	1305	Airbus A321neo	OTP	Arr	239
XX0262	1305	Airbus A320neo	AGP	Arr	186
XX0263	1305	Airbus A321neo	WRO	Dep	239
XX0264	1310	Airbus A320neo	KEF	Arr	186
XX0265	1310	Airbus A320neo	LIS	Arr	186
XX0266	1310	Airbus A321neo	MAD	Dep	235
XX0267	1310	Airbus A320neo	ZRH	Dep	186
XX0268	1310	Airbus A320neo	CLJ	Dep	186
XX0269	1315	Airbus A321neo	SOF	Arr	239
XX0270	1315	Airbus A320neo	SKP	Arr	186
XX0271	1315	Airbus A320neo	LCA	Dep	186
XX0272	1320	Boeing B737-Max8	CHQ	Dep	189
XX0273	1325	Airbus A320neo	SXF	Dep	186
XX0274	1325	Airbus A320neo	LJU	Dep	186
XX0275	1330	Airbus A321neo	KUN	Arr	239
XX0276	1330	Boeing B737-Max8	AGP	Arr	200
XX0277	1330	Airbus A321neo	BRI	Arr	239
XX0278	1335	Airbus A321neo	GVA	Dep	235
XX0279	1335	Airbus A321neo	KRK	Dep	239
XX0280	1335	Airbus A321neo	LPA	Dep	239
XX0281	1335	Airbus A320neo	SPC	Dep	186
XX0282	1340	Boeing-787-8	DOH	Arr	254
XX0283	1345	Airbus A321neo	AMS	Arr	210
XX0284	1345	Airbus A320neo	BFS	Dep	186
XX0285	1345	Airbus A321neo	OTP	Dep	239
XX0286	1345	Airbus A320neo	BTS	Dep	186
XX0287	1350	Boeing B737-Max10	JSI	Arr	220
XX0288	1350	Airbus A320neo	ABZ	Dep	186
XX0289	1350	Airbus A320neo	LJU	Dep	186
XX0290	1355	Airbus A321neo	WAW	Arr	239
XX0291	1355	Airbus A320neo	TLV	Dep	186
XX0292	1355	Boeing B737-Max8	NOC	Dep	200
XX0293	1355	Airbus A320neo	BOD	Dep	186
XX0294	1355	Airbus A321neo	SOF	Dep	239
XX0295	1405	Boeing B737-Max10	CFU	Arr	220
XX0296	1405	Boeing B737-Max10	ALC	Arr	220

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0297	1410	Airbus A320neo	KTW	Arr	186
XX0298	1415	Airbus A321neo	DTM	Dep	235
XX0299	1415	Airbus A321neo	SKG	Dep	239
XX0300	1415	Boeing B737-Max8	DUB	Dep	200
XX0301	1420	Boeing-787-8	JFK	Dep	291
XX0302	1425	Airbus A320neo	IOM	Arr	186
XX0303	1430	Airbus A321neo	BUD	Arr	239
XX0304	1430	Airbus A321neo	ATH	Arr	235
XX0305	1430	Airbus A321neo	AMS	Dep	210
XX0306	1435	Airbus A321neo	IEV	Arr	239
XX0307	1435	Airbus A321neo	WAW	Dep	239
XX0308	1440	Airbus A321neo	BGO	Arr	239
XX0309	1445	Airbus A321neo	CFU	Arr	235
XX0310	1445	Boeing-787-10	DXB	Dep	330
XX0311	1450	Airbus A320neo	KTW	Dep	186
XX0312	1455	Airbus A321neo	BOJ	Arr	239
XX0313	1500	Boeing B737-Max8	BGY	Arr	200
XX0314	1505	Boeing B737-Max8	ATH	Arr	200
XX0315	1505	Airbus A320neo	CTA	Arr	186
XX0316	1505	Boeing B737-Max10	ADB	Dep	220
XX0317	1510	Airbus A320neo	LYS	Arr	186
XX0318	1510	Airbus A321neo	BUD	Dep	239
XX0319	1515	Boeing B737-Max8	MLA	Arr	200
XX0320	1515	Boeing B737-Max10	NBE	Dep	220
XX0321	1515	Airbus A321neo	ATH	Dep	235
XX0322	1520	Airbus A320neo	JTR	Arr	186
XX0323	1520	Airbus A321neo	HER	Arr	239
XX0324	1520	Airbus A320neo	CDG	Dep	186
XX0325	1520	Airbus A321neo	TIA	Dep	239
XX0326	1525	Boeing B737-Max8	CPH	Arr	200
XX0327	1525	Dash-8-Q400	GLA	Arr	76
XX0328	1525	Airbus A321neo	ATH	Dep	239
XX0329	1525	Boeing B737-Max8	BGY	Dep	200
XX0330	1530	Embraer E190-E2	EDI	Arr	110
XX0331	1530	Boeing-787-8	DOH	Dep	254
XX0332	1535	Airbus A320neo	AMS	Arr	186
XX0333	1535	Airbus A320neo	HAJ	Arr	186
XX0334	1535	Boeing B737-Max10	TFS	Dep	220
XX0335	1540	Boeing-787-9	AUH	Arr	299
XX0336	1540	Airbus A320neo	GLA	Dep	186
XX0337	1540	Airbus A321neo	LCA	Dep	239
XX0338	1545	Boeing B737-Max8	BLQ	Arr	200
XX0339	1550	Boeing B737-Max8	LPA	Arr	200

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0340	1555	Airbus A320neo	GDN	Arr	186
XX0341	1555	Airbus A321neo	SPU	Dep	239
XX0342	1555	Airbus A320neo	BFS	Dep	235
XX0343	1555	Dash-8-Q400	GLA	Dep	76
XX0344	1600	Airbus A320neo	FUE	Arr	186
XX0345	1600	Boeing B737-Max10	NBE	Arr	220
XX0346	1600	Boeing B737-Max8	BCN	Dep	200
XX0347	1600	Embraer E190-E2	EDI	Dep	110
XX0348	1600	Airbus A320neo	TUN	Dep	186
XX0349	1600	Airbus A321neo	TLL	Dep	239
XX0350	1605	Airbus A321neo	JMK	Arr	235
XX0351	1610	Airbus A321neo	ACE	Arr	235
XX0352	1610	Airbus A320neo	VLC	Arr	186
XX0353	1610	Boeing B737-Max8	BLQ	Dep	200
XX0354	1615	Airbus A320neo	OPO	Arr	186
XX0355	1615	Dash-8-Q400	ABZ	Arr	76
XX0356	1615	Airbus A321neo	AMS	Dep	235
XX0357	1615	Boeing B737-Max8	KIR	Dep	200
XX0358	1620	Airbus A320neo	EDI	Dep	186
XX0359	1625	Airbus A321neo	BTS	Arr	239
XX0360	1625	Airbus A320neo	GDN	Dep	186
XX0361	1635	Airbus A321neo	WAW	Arr	239
XX0362	1635	Boeing B737-Max8	DUB	Dep	200
XX0363	1640	Airbus A320neo	BFS	Arr	186
XX0364	1640	Boeing B737-Max8	ALC	Dep	200
XX0365	1645	Airbus A321neo	NAP	Dep	235
XX0366	1645	Dash-8-Q400	ABZ	Dep	76
XX0367	1650	Airbus A320neo	IBZ	Dep	186
XX0368	1650	Airbus A320neo	MLA	Dep	186
XX0369	1650	Airbus A320neo	VLC	Dep	186
XX0370	1655	Boeing B737-Max10	DLM	Dep	220
XX0371	1700	Boeing B737-Max8	NOC	Arr	200
XX0372	1700	Airbus A320neo	BUD	Arr	186
XX0373	1700	Airbus A320neo	PRG	Arr	186
XX0374	1700	Boeing B737-Max8	INI	Arr	200
XX0375	1705	Airbus A320neo	ABZ	Arr	186
XX0376	1705	Airbus A321neo	OTP	Arr	239
XX0377	1705	Airbus A321neo	POZ	Dep	239
XX0378	1710	Airbus A320neo	SVQ	Dep	186
XX0379	1715	Boeing B737-Max8	DUB	Arr	200
XX0380	1715	Boeing B737-Max8	FNI	Arr	200
XX0381	1715	Airbus A321neo	WAW	Dep	239
XX0382	1720	Airbus A320neo	ZRH	Arr	186

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0383	1725	Boeing B737-Max8	OTP	Arr	189
XX0384	1725	Boeing B737-Max8	FRA	Dep	200
XX0385	1730	Airbus A321neo	DTM	Arr	235
XX0386	1730	Airbus A321neo	ORY	Arr	210
XX0387	1730	Airbus A321neo	FAO	Dep	235
XX0388	1730	Airbus A320neo	BUD	Dep	186
XX0389	1735	Airbus A320neo	PRN	Dep	186
XX0390	1740	Airbus A321neo	PSA	Arr	235
XX0391	1740	Airbus A320neo	SXF	Arr	186
XX0392	1740	Boeing B737-Max8	RMU	Dep	200
XX0393	1745	Airbus A321neo	VCE	Arr	235
XX0394	1745	Airbus A321neo	WRO	Arr	239
XX0395	1745	Airbus A320neo	FCO	Dep	186
XX0396	1745	Airbus A321neo	OTP	Dep	239
XX0397	1745	Boeing B737-Max8	TRS	Dep	200
XX0398	1750	Airbus A320neo	PMI	Arr	186
XX0399	1750	Airbus A320neo	BOD	Arr	186
XX0400	1750	Airbus A320neo	BCN	Dep	186
XX0401	1800	Airbus A320neo	MXP	Arr	186
XX0402	1800	Airbus A320neo	BCN	Arr	186
XX0403	1805	Airbus A321neo	LCA	Arr	239
XX0404	1805	Airbus A321neo	HRG	Arr	235
XX0405	1810	Airbus A320neo	VIE	Arr	186
XX0406	1810	Boeing B737-Max8	BZG	Dep	200
XX0407	1810	Boeing B737-Max8	OTP	Dep	189
XX0408	1815	Airbus A320neo	ZRH	Dep	186
XX0409	1815	Airbus A320neo	MUC	Dep	186
XX0410	1815	Airbus A321neo	SZZ	Dep	239
XX0411	1815	Airbus A321neo	ORY	Dep	210
XX0412	1820	Airbus A321neo	SUJ	Arr	239
XX0413	1820	Airbus A321neo	LIS	Dep	235
XX0414	1825	Airbus A320neo	FAO	Arr	186
XX0415	1825	Airbus A321neo	TLS	Dep	235
XX0416	1830	Airbus A320neo	LJU	Arr	186
XX0417	1830	Airbus A320neo	LIS	Arr	186
XX0418	1830	Airbus A320neo	CDG	Arr	186
XX0419	1830	Boeing B737-Max8	NRN	Arr	200
XX0420	1830	Airbus A320neo	NTE	Dep	186
XX0421	1830	Airbus A320neo	NCE	Dep	186
XX0422	1830	Airbus A320neo	MXP	Dep	186
XX0423	1835	Airbus A320neo	SSH	Dep	186
XX0424	1840	Airbus A320neo	RIX	Arr	186
XX0425	1840	Airbus A320neo	TLV	Arr	186

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0426	1840	Airbus A320neo	BTS	Arr	186
XX0427	1840	Airbus A320neo	LJU	Arr	186
XX0428	1845	Airbus A320neo	GLA	Arr	186
XX0429	1845	Airbus A321neo	MAD	Arr	235
XX0430	1850	Airbus A321neo	WAW	Arr	239
XX0431	1850	Airbus A320neo	BFS	Arr	186
XX0432	1850	Airbus A320neo	INV	Dep	186
XX0433	1850	Airbus A321neo	LUZ	Dep	239
XX0434	1850	Airbus A320neo	AMS	Dep	186
XX0435	1855	Airbus A320neo	SXF	Dep	235
XX0436	1855	Boeing B737-Max8	NRN	Dep	200
XX0437	1900	Airbus A320neo	PMI	Arr	186
XX0438	1900	Dash-8-Q400	GLA	Arr	76
XX0439	1900	Airbus A321neo	GLA	Dep	235
XX0440	1900	Airbus A320neo	CDG	Dep	186
XX0441	1905	Boeing B737-Max8	FAO	Arr	200
XX0442	1905	Airbus A321neo	AMS	Arr	235
XX0443	1905	Airbus A321neo	KEF	Dep	239
XX0444	1905	Airbus A320neo	PRG	Dep	186
XX0445	1910	Embraer E190-E2	EDI	Arr	110
XX0446	1910	Airbus A320neo	RIX	Dep	186
XX0447	1915	Airbus A320neo	AGP	Arr	186
XX0448	1915	Airbus A321neo	KRK	Arr	239
XX0449	1915	Airbus A320neo	EDI	Dep	186
XX0450	1915	Airbus A320neo	LCJ	Dep	186
XX0451	1920	Airbus A320neo	EDI	Arr	186
XX0452	1920	Airbus A320neo	AGP	Dep	186
XX0453	1920	Airbus A320neo	ARN	Dep	186
XX0454	1920	Airbus A320neo	JER	Dep	186
XX0455	1920	Airbus A320neo	ZAG	Dep	186
XX0456	1930	Airbus A320neo	KLX	Arr	186
XX0457	1930	Boeing-787-10	DXB	Arr	330
XX0458	1930	Airbus A321neo	MAH	Dep	235
XX0459	1930	Airbus A321neo	WAW	Dep	239
XX0460	1930	Airbus A320neo	PMI	Dep	186
XX0461	1930	Boeing B737-Max8	FAO	Dep	200
XX0462	1935	Boeing B737-Max8	DUB	Arr	200
XX0463	1940	Boeing B737-Max8	KIR	Arr	200
XX0464	1940	Airbus A320neo	AMS	Arr	186
XX0465	1940	Airbus A321neo	MAD	Arr	210
XX0466	1945	Dash-8-Q400	GLA	Dep	76
XX0467	1950	Airbus A321neo	AMS	Arr	210
XX0468	1950	Airbus A321neo	HAM	Arr	235

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0469	1950	Embraer E190-E2	EDI	Dep	110
XX0470	1955	Boeing B737-Max8	SNN	Arr	200
XX0471	1955	Airbus A320neo	IBZ	Dep	186
XX0472	1955	Airbus A321neo	BFS	Dep	235
XX0473	2000	Airbus A321neo	BUD	Arr	239
XX0474	2000	Airbus A321neo	LIS	Dep	239
XX0475	2000	Boeing B737-Max8	ORK	Dep	200
XX0476	2000	Airbus A320neo	LUX	Dep	186
XX0477	2005	Boeing B737-Max8	DUB	Dep	200
XX0478	2010	Airbus A320neo	AMS	Dep	186
XX0479	2015	Dash-8-Q400	ABZ	Arr	76
XX0480	2020	Airbus A321neo	KTW	Arr	239
XX0481	2020	Boeing B737-Max8	SNN	Dep	200
XX0482	2020	Airbus A321neo	MAD	Dep	210
XX0483	2020	Airbus A321neo	HAM	Dep	230
XX0484	2030	Boeing B737-Max8	GRO	Arr	200
XX0485	2030	Airbus A321neo	BTS	Arr	239
XX0486	2030	Airbus A320neo	ALC	Dep	186
XX0487	2035	Airbus A320neo	GDN	Arr	186
XX0488	2035	Airbus A321neo	AMS	Dep	210
XX0489	2035	Boeing-787-9	AUH	Dep	299
XX0490	2040	Airbus A321neo	BUD	Dep	239
XX0491	2045	Airbus A320neo	VAR	Arr	186
XX0492	2045	Dash-8-Q400	ABZ	Dep	76
XX0493	2055	Airbus A321neo	VNO	Arr	239
XX0494	2100	Boeing B737-Max8	EIN	Arr	200
XX0495	2100	Airbus A321neo	KTW	Dep	239
XX0496	2100	Boeing B737-Max8	GRO	Dep	200
XX0497	2105	Airbus A320neo	SBZ	Arr	186
XX0498	2105	Boeing B737-Max8	BCN	Arr	200
XX0499	2105	Airbus A320neo	GDN	Dep	186
XX0500	2105	Airbus A321neo	BTS	Dep	239
XX0501	2110	Airbus A320neo	CLJ	Arr	186
XX0502	2110	Airbus A320neo	TSR	Arr	186
XX0503	2110	Boeing B737-Max8	FRA	Arr	200
XX0504	2115	Airbus A321neo	SOF	Arr	239
XX0505	2115	Airbus A321neo	OTP	Arr	239
XX0506	2115	Airbus A320neo	VAR	Dep	186
XX0507	2125	Boeing B737-Max8	EIN	Dep	200
XX0508	2130	Boeing-787-10	DXB	Dep	330
XX0509	2140	Airbus A320neo	AMS	Arr	186
XX0510	2140	Airbus A321neo	SKG	Arr	239
XX0511	2140	Airbus A321neo	VNO	Dep	239

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0512	2150	Airbus A320neo	DEB	Arr	186
XX0513	2150	Airbus A320neo	SBZ	Dep	186
XX0514	2155	Airbus A321neo	SPU	Arr	239
XX0515	2155	Airbus A320neo	NTE	Arr	186
XX0516	2155	Airbus A320neo	JER	Arr	186
XX0517	2155	Airbus A321neo	POZ	Arr	239
XX0518	2155	Airbus A320neo	CLJ	Dep	186
XX0519	2155	Airbus A320neo	TSR	Dep	186
XX0520	2155	Airbus A321neo	SOF	Dep	239
XX0521	2155	Airbus A321neo	OTP	Dep	239
XX0522	2200	Airbus A321neo	BJV	Arr	235
XX0523	2205	Airbus A321neo	GLA	Arr	235
XX0524	2205	Airbus A320neo	RHO	Arr	186
XX0525	2210	Airbus A321neo	GVA	Arr	235
XX0526	2215	Airbus A320neo	EDI	Arr	186
XX0527	2215	Airbus A320neo	INV	Arr	186
XX0528	2215	Airbus A321neo	TIA	Arr	239
XX0529	2215	Airbus A320neo	CDG	Arr	186
XX0530	2220	Boeing B737-Max10	NBE	Arr	220
XX0531	2220	Airbus A320neo	ZRH	Arr	186
XX0532	2220	Boeing B737-Max8	CHQ	Arr	189
XX0533	2220	Airbus A320neo	DEB	Dep	186
XX0534	2225	Boeing B737-Max8	TRS	Arr	200
XX0535	2225	Airbus A321neo	TLL	Arr	239
XX0536	2240	Boeing B737-Max8	ALC	Arr	200
XX0537	2240	Airbus A320neo	TUN	Arr	186
XX0538	2240	Airbus A321neo	SCV	Dep	239
XX0539	2240	Airbus A321neo	CND	Dep	239
XX0540	2245	Airbus A320neo	MUC	Arr	186
XX0541	2245	Airbus A321neo	TLS	Arr	235
XX0542	2250	Airbus A321neo	BFS	Arr	235
XX0543	2255	Boeing B737-Max8	BZG	Arr	200
XX0544	2255	Airbus A321neo	NAP	Arr	235
XX0545	2255	Airbus A321neo	LPA	Arr	239
XX0546	2255	Airbus A321neo	SZZ	Arr	239
XX0547	2255	Airbus A321neo	BJV	Dep	235
XX0548	2300	Airbus A320neo	BCN	Arr	186
XX0549	2310	Airbus A320neo	NCE	Arr	186
XX0550	2310	Airbus A320neo	LUX	Arr	186
XX0551	2315	Boeing B737-Max8	DUB	Arr	200
XX0552	2315	Boeing B737-Max8	ORK	Arr	200
XX0553	2315	Airbus A320neo	IBZ	Arr	186
XX0554	2320	Airbus A320neo	SVQ	Arr	186

Flight Reference No.	Time	Aircraft Type	To/From (Airport Code)	Arr/Dep	Seats
XX0555	2320	Airbus A320neo	SPC	Arr	186
XX0556	2325	Airbus A321neo	ATH	Arr	239
XX0557	2325	Airbus A320neo	PRG	Arr	186
XX0558	2325	Airbus A321neo	ATH	Arr	235
XX0559	2330	Airbus A320neo	KIV	Arr	186
XX0560	2340	Airbus A320neo	FCO	Arr	186
XX0561	2340	Airbus A320neo	LCA	Arr	186
XX0562	2345	Boeing B737-Max8	RMU	Arr	200
XX0563	2345	Airbus A321neo	FAO	Arr	235
XX0564	2350	Boeing B737-Max10	ADB	Arr	220
XX0565	2355	Airbus A321neo	SXF	Arr	235

Appendix D: Airfield Capacity Validation Study

D1 Introduction

D1.1 Context for Airfield Capacity Validation Study

D1.1.1 This appendix sets out the validation undertaken to ensure that the capacity of the proposed layout of the airfield at 21.5, 27 and 32 mppa is sufficient to handle the projected demand. The focus of this validation has been to ensure that the hourly runway movement rate is sufficient to support forecast demand, having regard to the taxiway and apron layout and the implications for the acceptable level of aircraft delay and general functioning of the airfield.

D1.1.2 The modelling tested the requirement for enhancements to the layout of the airfield at different levels of throughput rather than necessarily testing the precise configuration at each assessment phase. The airfield layouts proposed at each assessment phase reflect the outcome of the modelling what is required at 21.5, 27 and 32 mppa.

D2 Fast-Time Simulation Modelling

D2.1.1 The capacity provided by the airfield layout in different configurations has been assessed using ArcPORT[1], ArcPORT simulates the movement of aircraft at the airport and within the immediate airspace to test and examine the expected performance of the proposed layouts. This provides assurance that the airfield can handle forecast demand without aircraft delay reaching an unacceptable threshold, which is taken to be 10 minutes on average at peak periods consistent with the delay threshold typically applied in declaring runway capacity at coordinated airports.

D2.1.2 The model necessarily cannot fully model tactical interventions by air traffic controllers to manage the flow of aircraft and mitigate against delay pm the day and, therefore, the model results are inherently conservative in terms of the level of predicted delays.

D3 Key Inputs and Assumptions

D3.1.1 The modelling has been carried out based on observations of how the airport was operated in 2016 and 2019, taking into account current ATC practices for aircraft movement and sequencing across existing apron areas, taxiways and the runway. These observations carried out at the airport were supplemented with practices employed at other airports with high intensity use of a single runway.

D3.1.2 Busy Day Timetables (BDTTs) have been developed to reflect the expected airline schedules based on the passenger forecasts at each assessment phase. As the airport grows to handle 32 mppa, it is expected that the profile of demand will continue to be dominated by pronounced morning and evening peak periods. Whilst it is expected that the peak periods will become slightly more spread out throughout the day as the airport grows, there remain substantial peaks of demand as set out in **Section 7**.

[1] Arcport – a specialist fast time simulation modelling package used to measure the capacity of airports across the world.

D3.1.3 These BDTTs are indicative and have not been fully optimised to ensure a smooth flow of movements within each hour as would be the practice when scheduling at a coordinated airport. Hence, this adds another layer of conservatism into the modelling in terms of the levels of delay projected. However, for the purpose of this validation exercise, it has been assumed that aircraft operate to schedule and allowance has not been made for 'schedule shift' due to delayed aircraft departures or arrivals, which could lead to some bunching of movements. On balance, it is considered that the analysis presents a robust estimate of the future performance of the airfield.

D3.1.4 The BDTTs for commercial passenger aircraft were augmented with and allowance for fixed wing business aviation movements, based on the profile of demand that was observed on the busiest day at the airport in 2019 but, as the airport grows, it is assumed that such demand is likely to be displaced by commercial passenger aircraft movements during the night and in peak periods, reflecting the priority given to regular scheduled services within the slot allocation regime.

D3.1.5 The structure of airspace within the immediate vicinity of the airport, including arrival and departure routes, has been modelled to replicate its current configuration. Hence, capacity was constrained to some degree by the existing structure of departure routes, particularly when the airfield is operating in a westerly configuration as aircraft follow the same route for a some time before diverging onto different routes. The modelling does not rely on any future changes in airspace design to achieve the projected aircraft movement rates2.

D3.1.6 Easterly and westerly operations were simulated for each assessment phase layout at 21.5, 27 and 32 mppa. Some further analysis was undertaken of details of the layout which were run for westerly operations only, as the airport operates in westerly operations approximately 70% of the time, and capacity is more constrained compared to the easterly direction due to later divergence of the departure routes. A number of variant layouts were also tested to validate the timing of the requirement for RETs, for example.

D3.1.7 The model was run ten times for each scenario on a 'random seed' basis3. An element of variation was included within each run to reflect real-world airport operations. For example, departing flights were modelled to pushback from their stand within a randomised ± 5-minute distribution of the scheduled time.

D4 Outputs

D4.1.1 Outputs are reported and assessed in terms of the mean and 95th percentile maximum delay incurred during peak periods, with significant outliers removed.

[2] It is recognised that a process of airspace modernisation is ongoing and this may result in some changes to flightpaths in the vicinity of the airport and, to the extent that these allowed more dispersal of departure tracks, this would tend to result in higher capacity and reduced delays compared to those modelled for this assessment.

[3] Random seeding relates to the randomised sequencing of events between simulation runs reflecting some variation in the sequencing of arrivals and departures. If non-randomised seeding is used, each of the ten simulation runs would effectively follow the same pattern, which could potentially fail to highlight capacity constraints or other negative impacts if a relatively well sequenced pattern is repeated ten-times over.

Assessments of take-off queue length and other operational factors are based upon observations within the first of the ten runs for each scenario.

D4.1.2 Delay statistics correspond to two-hour morning and evening peak periods and, therefore, may overstate delay impacts relative to assessment over three-hours, as is the common approach adopted for busy airports. The morning peak period analysed is between 07:00 and 08:55. The evening peak period analysed was between 18:30 and 20:25. The busy hour analysed was between 07:00 and 08:00 reflecting the principal morning departure peak. Maximum delay statistics refer to the 95th percentile of maximum delay.

D4.1.3 The maximum simulated hourly runway movement rate is reported on a rolling hour basis. For the purpose of this analysis, runway demand is driven solely by the BDTT and may not reflect the maximum capacity attainable under each configuration. Table D.1 lists the scenarios that were tested at 21.5, 27 and 32 mppa.

Table D.1: Modelled Scenarios

21.5 mppa	27 mppa	32 mppa
21/1W: Base Layout – Westerly Operations	27/1W: Base Scenario – Westerly Operations	32/1W: Base Scenario – Westerly Operations
21/1E: Base Layout – Easterly Operations	27/1E: Base Scenario – Easterly Operations	32/1E: Base Scenario – Easterly Operations
	27/2W: Scenario without Rapid Exit Taxiway – Westerly Operations	32/2W: Scenario with Additional End Link Taxiway – Westerly Operations
	27/2E: Scenario without Rapid Exit Taxiway – Easterly Operations	32/3W: Scenario with Additional End Link Taxiway and no Rapid Exit Taxiway – Westerly Operations
	27/3W: Scenario without Rapid Exit Taxiway, with Existing Alpha Link – Westerly Operations	32/4W: Scenario with Revised End Link Taxiway – Westerly Operations

D5 21.5 mppa

D5.1 Core Inputs and Assumptions

D5.1.1 Aircraft movements within the BDTT were allocated to stands on a priority basis whereby contact stands in and around T1 were the first priority, followed by remote stands in and around T1 and, lastly, stands in the east were used as an overspill to reflect the anticipated commercial preferences of airlines.

21/1W: Base Scenario – Westerly Operations

D5.1.2 **Figure D.1** illustrates the airfield design tested in Scenario 21/1W. The scenario includes an extension to taxiway Alpha, as planned as part of Project Curium[4].

Figure D.1: Airfield Design for Scenario 21/1W

D5.1.3 All departing aircraft were assumed to enter the runway using the end link forming the extended Taxiway Alpha, including the eastern taxiway that will be constructed in advance of the Proposed Development. All arriving aircraft were assumed to vacate the runway at the existing Taxiway Hotel, which is the penultimate end link from the west in the westerly direction. **Table D.2** presents the results of the modelling for Scenario 21/1W.

Table D.2: Scenario 21/1W, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
36	37	4
Delay Metric[5]	**Arrivals**	**Departures**
Mean Peak Hour Delay	00:45	01:22
Maximum Peak Hour Delay	01:35	06:14
Mean Morning Peak Delay	00:48	01:51
Maximum Morning Peak Delay	02:34	06:32
Mean Evening Peak Delay	00:19	02:11
Maximum Evening Peak Delay	01:06	06:02

D5.1.4 Movements during the morning peak period incur the most significant delay, with the average maximum delay to departing aircraft reaching 06:32. Departures during the evening peak also incur average delays in excess of six minutes at 06:02, which is well within tolerable levels of delay for an airport handling 21.5 mppa. The extension to Taxiway Alpha eliminates the need for departing aircraft to backtrack on the runway for departure so keeping delays well below the average of 10 minutes at this throughput, even during peak periods.

21/1E: Base Scenario – Easterly Operations

D5.1.5 **Figure D.2** illustrates the airfield design tested in Scenario 21/1E. The layout of the airfield is identical to the layout tested in Scenario 21/1W, although the airfield has been configured for easterly operations.

Figure D.2: Airfield Design for Scenario 21/1E

D5.1.6 All departing aircraft were assumed to enter the runway using the westernmost end link. All aircraft vacated the runway at the penultimate end link from the east. **Table D.3** presents the results of the modelling for Scenario 21/1E.

[4] Project Curium was the project carried out by LLAOL to increase capacity at the airport to 18 mppa and which gained planning consent in 2014.
[5] Time units = (mm:ss)

Table D.3: Scenario 21/1E, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
36	38	4

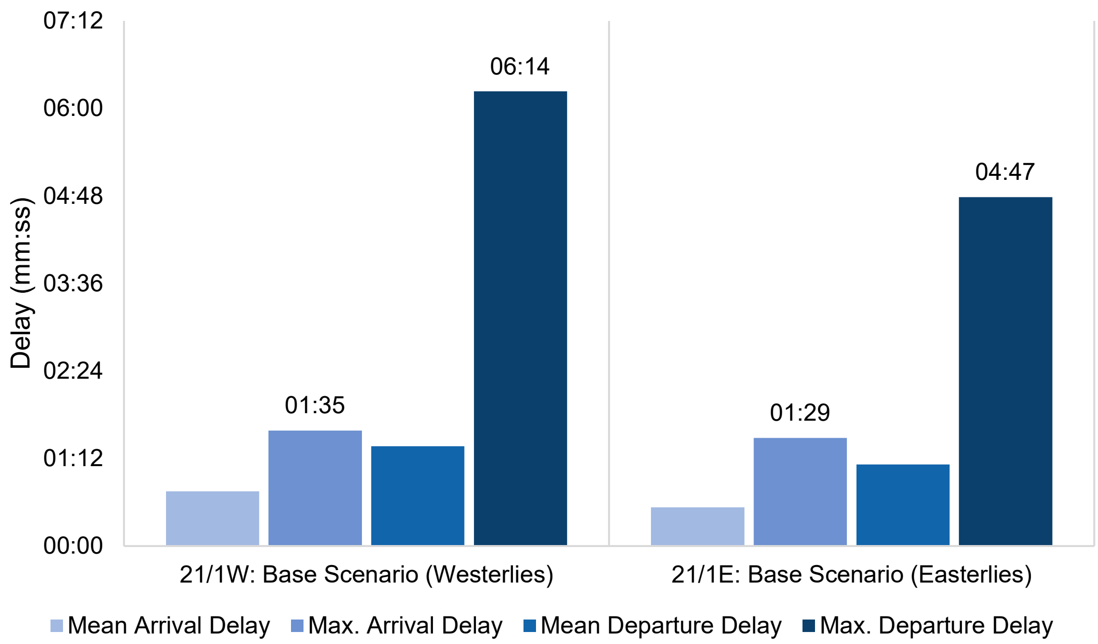
Delay Metric	Arrivals	Departures
Mean Peak Hour Delay	00:32	01:07
Maximum Peak Hour Delay	01:29	04:47
Mean Morning Peak Delay	00:32	02:01
Maximum Morning Peak Delay	01:48	06:05
Mean Evening Peak Delay	00:16	02:01
Maximum Evening Peak Delay	01:06	05:02

D5.1.7 Movements during the morning peak period incur the most significant delay, with the average maximum delay to departing aircraft reaching 06:05. Departures during the evening peak period also incur an average maximum delay of over five minutes, at 05:02. Average delays were low and well within acceptable levels.

D5.2 Key Findings at 21.5 mppa

D5.2.1 **Figure D.3** compares the mean and maximum delays to arrivals and departures in the busy hour across the two 21.5 mppa scenarios that were tested.

Figure D.3: Peak Hour Delays Across 21.5 mppa Scenarios



D5.2.2 Overall, average delays are slightly lower, when the airfield is operating in an easterly configuration as the easterly departure routes allow for a reduced time separation requirement between subsequent departures in some circumstances. In both easterly and westerly operations, however, the maximum average delays to arrivals and departures are both within comfortable tolerance for an airport handling 21.5 mppa, well below the 10 minute average criterion.

D5.2.3 Some supplementary analysis was undertaken to consider specific aspects of the Phase 1 21.5 mppa plan.

Impact of Pushbacks from TDOZ Stands

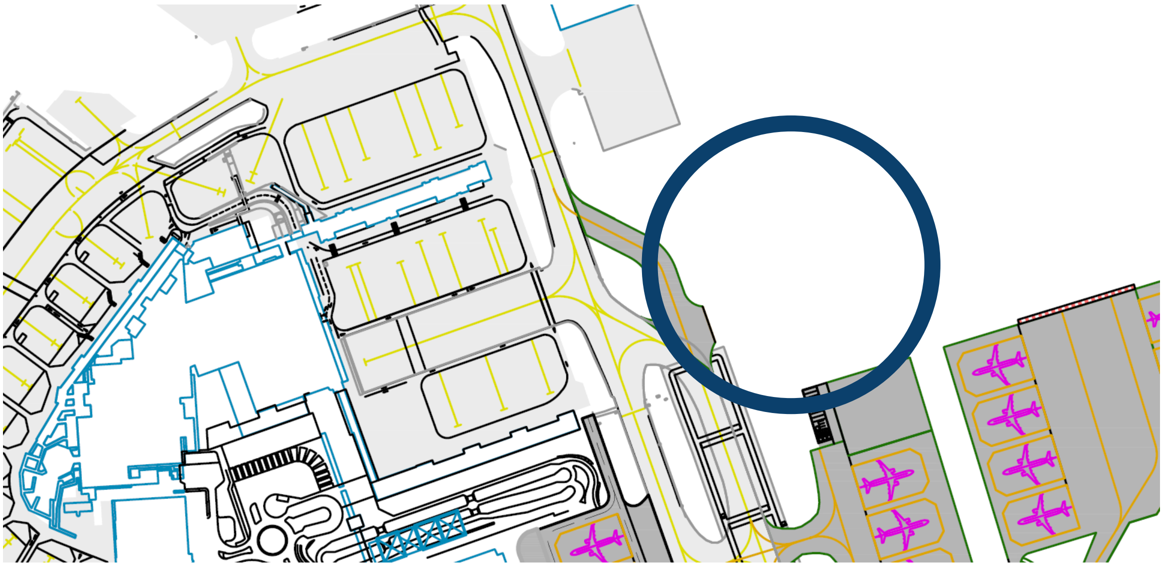
D5.2.4 There was some concern that the push back from the new baseline stands adjacent to Taxiway Delta could lead to delays to aircraft using that taxiway.

D5.2.5 The modelling confirmed that, providing that Taxiway Foxtrot (or Golf) is always available as a through route (i.e., not closed for the construction of the Luton DART extension to T2), pushbacks from T-DOZ stands are unlikely to cause congestion issues providing they are mainly used for early departures ahead of the peak 0700 – 0800 hour when arrivals intensify and separate taxiways for aircraft arriving or departing are necessary. This can be adequately managed through detailed stand planning.

Proposed Link from Taxiway Foxtrot to Delta

D5.2.6 A further test was carried out to test whether congestion could be caused at the junction of the cul-de-sac between Piers A and B (East Apron) and Taxiway Delta. The modelling showed that provision of an additional link from the northern end of Taxiway Foxtrot to the north of the taxilane entrance to the cul-de-sac, highlighted in **Figure D.4**, is critical to maintaining taxiway flow around T1 at 21.5 mppa.

Figure D.4: Location of Proposed Link from Taxiway Foxtrot to Taxiway Delta



Temporary Closure of Taxiways Delta or Foxtrot to Facilitate Construction of DART Extension

D5.2.7 There will need to be some closure of the main north-south taxiways to facilitate the extension of the DART to T2. Modelling was undertaken to test the potential implication of Taxiway Delta or Foxtrot being closed before the completion of the new Taxiway Golf serving the stands to the west of T2. The modelling showed that operational impact of temporarily closing Taxiways Delta or Foxtrot to allow construction of the DART extension to T2 would be substantial at 21.5 mppa. It is highly likely to lead to gridlock across the southern part of the airfield as separate taxiways for arriving and departing aircraft are essential to maintain flow during peak periods. Hence, Taxiway Golf needs to be delivered earlier to allow for construction of the DART extension.

Relocation of ERUB for Second Parallel Taxiway

D5.2.8 Modelling showed that retention of ERUB in its current location is acceptable at 21.5 mppa. A second parallel taxiway, which would be in place of the ERUB, is not necessary at 21.5 mppa. However, should the ERUB stands be used intensively by operational aircraft in peak periods at Phase 1, this would have an unacceptable impact on aircraft movement along the main Taxiway Alpha. Hence, any use of stands in the vicinity of the ERUB should be confined to long-stopping aircraft operating outside of the peak.

Impact of GSE Movements Across Taxiways Delta and Foxtrot to East Apron

D5.2.9 As long as stands in the east are predominantly used for overnight parking of aircraft and early departures, bussing across the taxiway north of the extended

Foxtrot link[6] would be generally contained within the very early morning period where departing aircraft dominate the flow and crossings of the single taxiway adjacent to the North Apron are unlikely to give rise to congestion and delay to any substantial degree.

Initial Extension of Taxiway Alpha

D5.2.10 The extension of Taxiway Alpha to form the longer parallel taxiway, as planned as part of Project Curium, is necessary at 21.5 mppa to enable the required runway movement rate to be achieved as the need for aircraft backtracking for departure is minimised to ensure that delays are within acceptable levels.

D6 27 mppa

D6.1 Core Inputs and Assumptions

D6.1.1 Across all scenarios at 27 mppa, it was assumed that T2 would be capable of handling approximately 7 mppa. Hence, in the initial gating analysis, flights from the BDTT were allocated to T2 that would deliver approximately 7 mppa on an annualised basis from the busy day. The remainder of flights were allocated to T1. The use of contact stands was prioritised, followed by remote stands, with stands on the South Apron having the last priority to reduce the impact of pushbacks blocking Taxiway Alpha at higher overall movement levels.

27/1W: Base Scenario – Westerly Operations

D6.1.2 **Figure D.5** illustrates the airfield design tested in Scenario 27/1W. All departing aircraft are assumed to enter the runway using the eastern end link. 100% of arriving Code C (or smaller) aircraft vacated the runway using the RET, and

D6.1.3 100% of Code E arrivals exited the runway using the penultimate link towards the west. **Table D.4** presents the results of the modelling for scenario 27/1W.

D6.1.4 Departures during the morning peak incur the highest maximum delay at 17:51, falling to a maximum delay of 10:01 during the evening peak. However, mean delays were well within the 10 minute criterion. Arrival delays were lower in all cases.

[6] It should be noted that Taxiway Foxtrot is used for de-icing aircraft from T1 and this would restrict its use during severe winter conditions. In such circumstances, it is accepted that the achievable runway movement rate would be reduced and, in any event, demand would be expected to be lower during winter periods.

Figure D.5: Airfield Design for Scenario 27/1W

Table D.4: Scenario 27/1W, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
43	44	8

Delay Metric	Arrivals	Departures
Mean Peak Hour Delay	05:08	06:22
Maximum Peak Hour Delay	12:43	17:51
Mean Morning Peak Delay	04:03	05:56
Maximum Morning Peak Delay	11:37	17:06
Mean Evening Peak Delay	00:46	02:53
Maximum Evening Peak Delay	03:24	10:01

27/1E: Base Scenario – Easterly Operations

D6.1.5 **Figure D.6** presents the airfield design that was tested in Scenario 27/1E. The airfield design is identical to Scenario 27/1W, but the airfield is configured for easterly operations.

Figure D.6: Airfield Design for Scenario 27/1E

D6.1.6 50% of departing Code C (or smaller) aircraft were assumed to enter the runway via the end link, whilst the remainder used the next link to the east. 100% of Code E departures entered the runway at the end link. 100% of Code C (or smaller) arrivals vacated the runway using the RET, and 100% of Code E arrivals vacated the runway at the end link. **Table D.5** presents the modelling results of this scenario.

Table D.5: Scenario 27/1E, Modelling Results

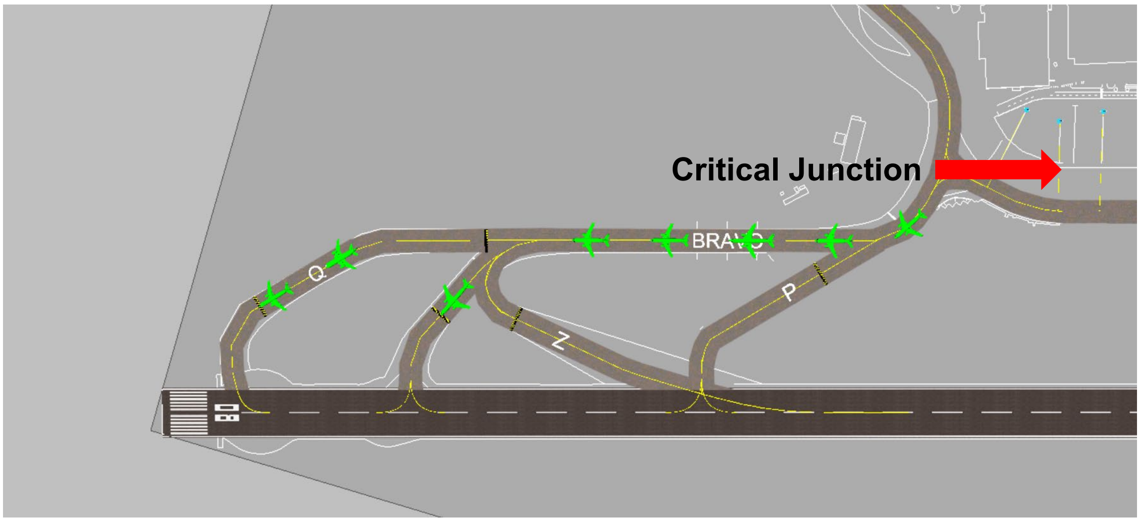
Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
43	48	6

Delay Metric	Arrivals	Departures
Mean Peak Hour Delay	00:42	04:38
Maximum Peak Hour Delay	02:03	15:55
Mean Morning Peak Delay	00:56	04:27
Maximum Morning Peak Delay	03:43	15:38
Mean Evening Peak Delay	00:14	02:42
Maximum Evening Peak Delay	00:54	08:56

D6.1.7 The benefit of easterly operations, which increases runway capacity due to the favourable configuration of departure routes, clearly presents itself within the results. Delays in all cases are lower than in the westerly direction.

D6.1.8 Whilst easterly operations allow for an enhanced runway movement rate, there is some potential for the departure queue for RWY 08 to propagate along Bravo towards the critical junction with Alpha as shown in **Figure D.7**.

Figure D.7: Easterly Departure Queue Extending to Alpha / Bravo Junction



D6.1.9 It is considered that this risk could be managed by ground controllers, who may delay pushback clearances if the risk of a junction blockage occurs.

27/2W: Scenario without Rapid Exit Taxiway – Westerly Operations

D6.1.10 **Figure D.8** presents the airfield design that was tested in Scenario 27/2W. The layout does not include the provision of RETs.

Figure D.8: Airfield Design for Scenario 27/2W

D6.1.11 In this scenario, 100% of Code C (or smaller) arrivals are assumed to vacate the runway using the existing Taxiway Hotel, and 100% of Code E arrivals vacate using the penultimate end link. **Table D.6** presents the modelling results of this scenario.

Table D.6: Scenario 27/2W, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
43	44	8

Delay Metric	Arrivals	Departures
Mean Peak Hour Delay	05:11	06:35
Maximum Peak Hour Delay	13:10	16:58
Mean Morning Peak Delay	03:28	05:50
Maximum Morning Peak Delay	11:17	16:18
Mean Evening Peak Delay	00:48	02:52
Maximum Evening Peak Delay	03:21	10:04

D6.1.12 The removal of the RETs does not have an overly adverse impact on aircraft delays compared to Scenario 27/1W, and the required runway rate is maintained. Aircraft delays closely resemble delays seen in Scenario 27/1W. These factors suggest that the provision of RETs at 27 mppa would deliver a marginal benefit to westerly operations.

27/2E: Scenario without Rapid Exit Taxiway – Easterly Operations

D6.1.13 **Figure D.9** presents the airfield design that was tested in Scenario 27/2E. The airfield design is similar to Scenario 27/2W, but the existing Taxiway Alpha link is retained at the eastern end of the runway.

D6.1.14 50% of departing Code C (or smaller) aircraft entered the runway via the end link, whilst the remainder were assumed to use the next link to the east. 100% of Code E departures entered the runway at the end link. 100% of Code C (or smaller) arrivals vacated the runway using the existing Taxiway Alpha, and 100% of Code E arrivzals vacated the runway at the end link. **Table D.7** presents the modelling results of this scenario.

Figure D.9: Airfield Design for Scenario 27/2E

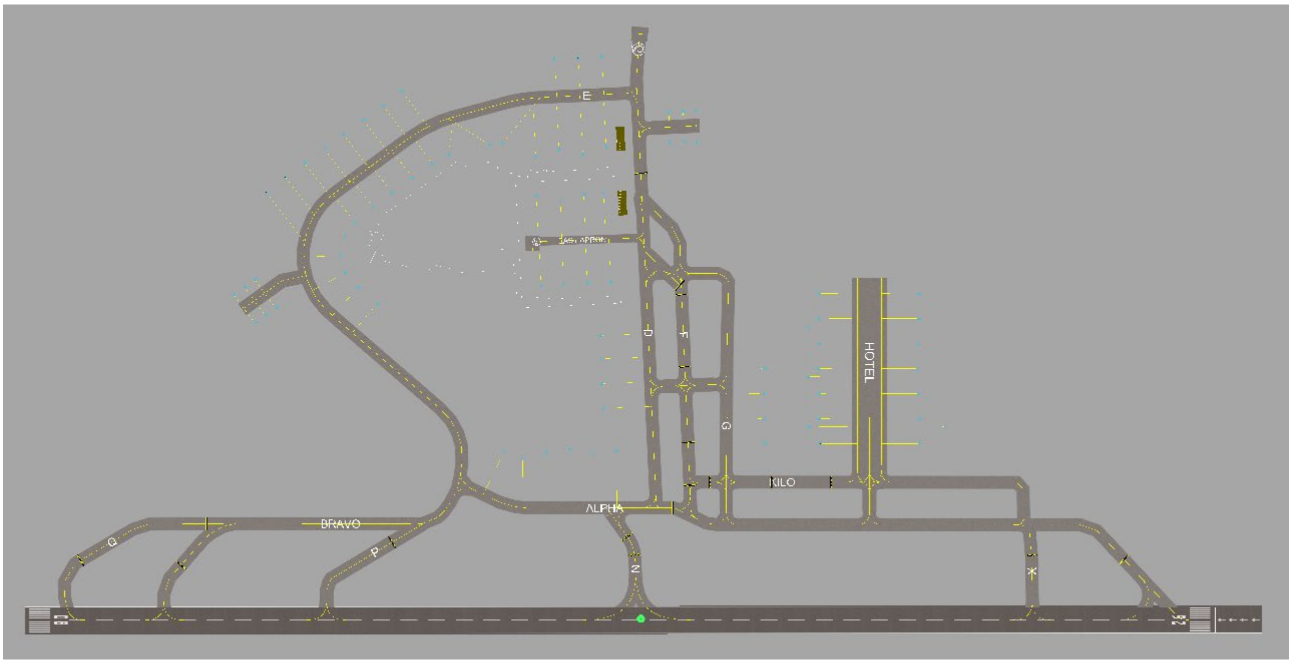


Table D.7 : Scenario 27/2E, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
41	46	8
Delay Metric	**Arrivals**	**Departures**
Mean Peak Hour Delay	00:53	05:38
Maximum Peak Hour Delay	02:31	16:23
Mean Morning Peak Delay	00:50	05:03
Maximum Morning Peak Delay	03:00	15:55
Mean Evening Peak Delay	00:19	02:55
Maximum Evening Peak Delay	01:12	09:41

D6.1.15 This analysis confirmed that the provision of the RET at the eastern end of the runway was not critical to attaining the required runway movement rate at 27 mppa.

27/3W: Scenario without Rapid Exit Taxiway, with Existing Alpha Link – Westerly Operations

D6.1.16 **Figure D.10** illustrates the airfield design tested in Scenario 27/3W. The airfield design is identical to Scenario 27/2E, but the airfield is configured for westerly operations.

Figure D.10: Airfield Design for Scenario 27/3W

D6.1.17 30% of Code C (or smaller) departures from T2 were assumed to enter the runway at the existing Taxiway Alpha link, with the remainder entering via the end link. 70% of Code C (or smaller) departures from T1 entered the runway at the end link, with the remainder entering via the existing Taxiway Alpha link. These proportions were allocated to simulate an element of mixing between T1 and T2 departures that would be able to use Taxiway Alpha for an intersection departure and those that would require the full runway length provided by the end link. 100% of Code E aircraft entered the runway via the end link. 100% of Code C (or smaller) arrivals vacated the runway using the existing Taxiway Hotel, and 100% of Code E arrivals vacated using the penultimate end link. **Table D.8** presents the results of this scenario.

Table D.8: Scenario 27/3W, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
41	45	8

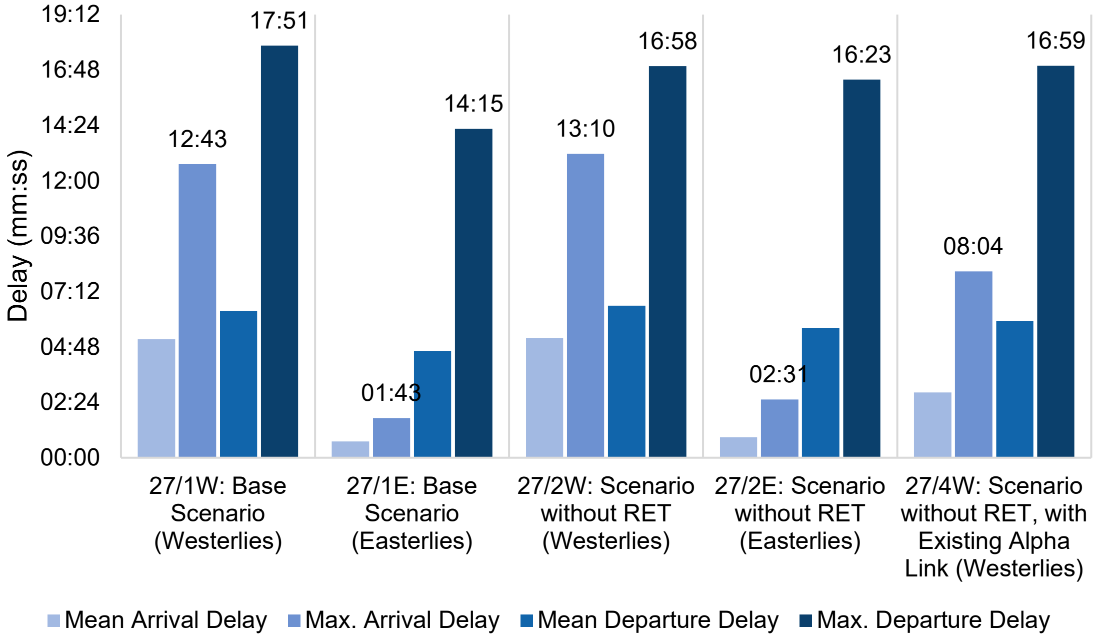
Delay Metric	Arrivals	Departures
Mean Peak Hour Delay	02:50	05:55
Maximum Peak Hour Delay	08:04	16:59
Mean Morning Peak Delay	02:47	05:48
Maximum Morning Peak Delay	07:59	17:15
Mean Evening Peak Delay	00:39	02:38
Maximum Evening Peak Delay	02:23	08:24

D6.1.18 The retention of the existing Taxiway Alpha link, in addition to the extended in link, allows controllers to efficiently sequence aircraft for departure based on the optimum SID split. The benefit of two end links is somewhat understated within the modelling results, as the model is unable to dynamically prioritise departures based on the optimum sequence of departures by SID. However, compared to the results for Scenario 27/1W, delays in this scenario are still reduced during most periods. The maximum delay to arrivals during the busy hour falls from 12:43 to 08:04, and the maximum delay to departures falls from 17:06 to 16:59.

D6.2 Key Findings at 27 mppa

D6.2.1 **Figure D.11** compares the mean and maximum delays to arrivals and departures in the busy hour across the five 27 mppa scenarios that were tested.

Figure D.11: Peak Hour Delays Across 27 mppa Scenarios



D6.2.2 The maximum delay to departures in westerly scenarios is broadly consistent across all scenarios, at around 17 minutes, which indicates the RETs deliver no significant benefit to westerly operations. However, the lack of an early runway exit would have a more material impact in easterly operations, where the modelling suggests maximum departure delay would increase by approximately two and a half minutes but delays in all scenarios are within acceptable levels, indicating that the provision of the RETs at 27 mppa is not critical and construction can be phased.

Second Parallel Taxiway

D6.2.3 The ERUB needs to be relocated from its current location at 27 mppa to provide a second parallel taxiway to allow access for arrivals to T2 that is separate from the departure queue. The need for this relocation to occur at 27 mppa was tested and it was confirmed that this was essential enable the airfield to function. Both taxiways need to be Code E capable to avoid congestion.

D6.2.4 **Figure D.12** demonstrates an example of a Code E arrival (circled in red) using the second parallel taxiway to bypass the departure queue.

Figure D.12: Code E Arrival Bypassing Departure Queue on Second Parallel Taxiway

Rapid Exit Taxiways

D6.2.5 The modelling suggests there is limited gain from having RETs up to 27 mppa, particularly during westerly operations, which is the prevailing configuration at the airport. However, construction will be phased as they are needed beyond this movement level.

Runway End Links

D6.2.6 Extending the parallel taxiways to reach each end of the runway is not essential to support operations at 27 mppa. However, modelling has confirmed the importance of having two entrances to the runway to enable the optimum sequencing of departures.

D6.2.7 If the RETs are constructed at 27 mppa, then some departures may be able to enter the runway using the RETs or via the existing runway entry links.

D7 32 mppa

D7.1 Core Inputs and Assumptions

D7.1.1 At 32 mppa, it is assumed that T2 would be capable of handling approximately 12 mppa, and T1 would handle approximately 20 mppa. The use of contact stands were prioritised, followed by remote stands, with stands on the South Apron having the last priority to reduce the impact of pushbacks blocking Taxiway Alpha.

D7.1.2 Business aviation movements were moved to the hours adjacent to the busy hour.

D7.1.3 To prevent the build-up of an excessive departure queue and to aid the general flow of airfield circulation, departing aircraft are only given pushback clearance in the model if the number of aircraft outbound to the departure runway is less than nine. This is counted as a delay.

32/1W: Base Scenario – Westerly Operations

D7.1.4 **Figure D.13** illustrates the airfield design tested in Scenario 32/1W.

Figure D.13: Airfield Design for Scenario 32/1W

D7.1.5 All departing aircraft were assumed to enter the runway using the eastern end link. 100% of arriving Code C (or smaller) aircraft vacated the runway using the RET, and 100% of Code E arrivals exited the runway using the penultimate link towards the west. **Table D.9** presents the results of the modelling for Scenario 32/1W.

Table D.9: Scenario 32/1W, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
45	49	10

Delay Metric	Arrivals	Departures
Mean Peak Hour Delay	04:46	07:48
Maximum Peak Hour Delay	12:48	20:47
Mean Morning Peak Delay	03:34	06:58
Maximum Morning Peak Delay	11:33	19:57
Mean Evening Peak Delay	00:55	02:52
Maximum Evening Peak Delay	04:09	08:31

D7.1.6 Departures during the peak hour incur the highest maximum delay at 20:47, falling to a maximum delay of 08:31 during the evening peak period. Arrivals during the peak hour incur a maximum delay of 12:48. Average delays are well within the 10 minute criterion.

32/1E: Base Scenario – Easterly Operations

D7.1.7 **Figure D.14** presents the airfield design that was tested in Scenario 32/1E. The airfield design is identical to Scenario 27/1W, but the airfield is configured for easterly operations.

Figure D.14: Airfield Design for Scenario 32/1E

D7.1.8 50% of departing Code C (or smaller) aircraft were assumed to enter the runway via the end link, whilst the remainder used the next link to the east. 100% of Code E departures entered the runway at the end link. 100% of Code C (or smaller) arrivals vacated the runway using the RET, and 100% of Code E arrivals vacated the runway at the end link. **Table D.10** presents the modelling results of this scenario.

Table D.10: Scenario 32/1E, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
45	51	7

Delay Metric	Arrivals	Departures
Mean Peak Hour Delay	02:18	05:25
Maximum Peak Hour Delay	06:32	14:49
Mean Morning Peak Delay	01:48	04:33
Maximum Morning Peak Delay	05:59	14:09
Mean Evening Peak Delay	00:55	02:40
Maximum Evening Peak Delay	03:54	08:57

D7.1.9 The maximum delay to departing aircraft in the peak hour falls from 20:47 in westerly operations to 14:49 in easterly operations. A maximum of 51 movements per hour are simulated in this scenario. Mean delays are within the 10 minute criterion.

D7.1.10 Similarly to Scenario 27/1E, there is some potential for the departure queue for RWY 08 to propagate along Bravo towards the critical junction with Alpha. This risk would be managed by ground controllers, who may delay pushback clearances if the risk of a junction blockage occurs. This risk is mitigated within the model as departing aircraft are only given pushback clearance if the number of aircraft outbound to the runway is less than nine.

32/2W: Scenario with Additional End Link Taxiway – Westerly Operations

D7.1.11 **Figure D.15** presents the airfield design that was tested in Scenario 32/2W. The airfield sees the addition of a taxiway link to the far eastern end of the runway.

Figure D.15: Airfield Design for Scenario 32/2W

D7.1.12 100% of Code E departures were assumed to use the far eastern end link to enter the runway. 100% of Code C (or smaller) departures from T1 (including business aviation movements) used the penultimate end link for departure, and 100% of Code C (or smaller) departures from T2 used the far eastern end link for departure. This is a nominal split between T1 and T2 departures to apportion a reasonable spread of departures between each end link. 100% of Code C (or smaller) arrivals vacate the runway using the RET, and 100% of Code E arrivals vacate the runway using the penultimate end link. **Table D.11** details the results of this scenario.

Table D.11: Scenario 32/2W, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
45	51	8

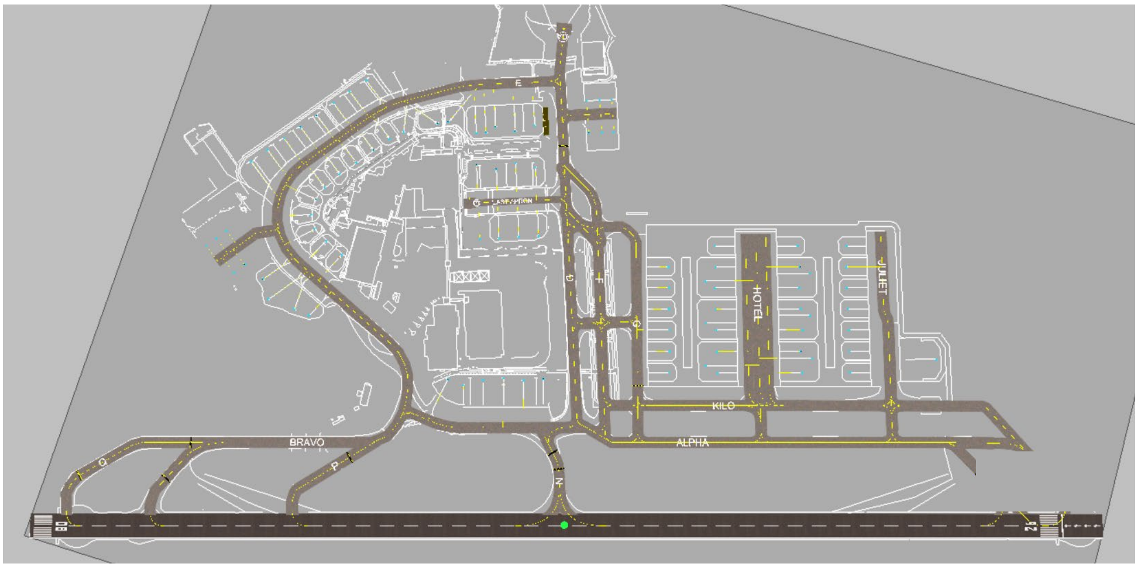
Delay Metric	Arrivals	Departures
Mean Peak Hour Delay	03:49	06:03
Maximum Peak Hour Delay	09:35	19:55
Mean Morning Peak Delay	02:42	05:33
Maximum Morning Peak Delay	08:27	17:57
Mean Evening Peak Delay	00:49	02:45
Maximum Evening Peak Delay	03:19	08:20

D7.1.13 Maximum delay to departures during the morning peak hour are below 20 minutes, at 19:55. This scenario achieves a total of 51 movements per hour, which matches the maximum simulated throughput of the 32/1E. Mean delays are well within the 10 minute criterion.

32/3W: Scenario with Additional End Link Taxiway and no Rapid Exit Taxiway – Westerly Operations

D7.1.14 **Figure D.16** presents the airfield design that was tested in Scenario 32/3W. The airfield layout includes the additional end link taxiway, but removes the RET.

Figure D.16: Airfield Design for Scenario 32/3W



D7.1.15 100% of Code E departures were assumed to use the far eastern end link to enter the runway. 100% of Code C (or smaller) departures from T1 (including business aviation movements) used the penultimate end link for departure, and 100% of Code C (or smaller) departures from T2 used the far eastern end link for departure. This is a nominal split between T1 and T2 departures to apportion a reasonable spread of departures between each end link. 100% of Code C (or smaller) arrivals vacate the runway using the existing Taxiway Hotel, and 100% of Code E arrivals vacate the runway using the penultimate end link. **Table D.12** details the results of this scenario.

Table D.12: Scenario 32/3W, Modelling Results

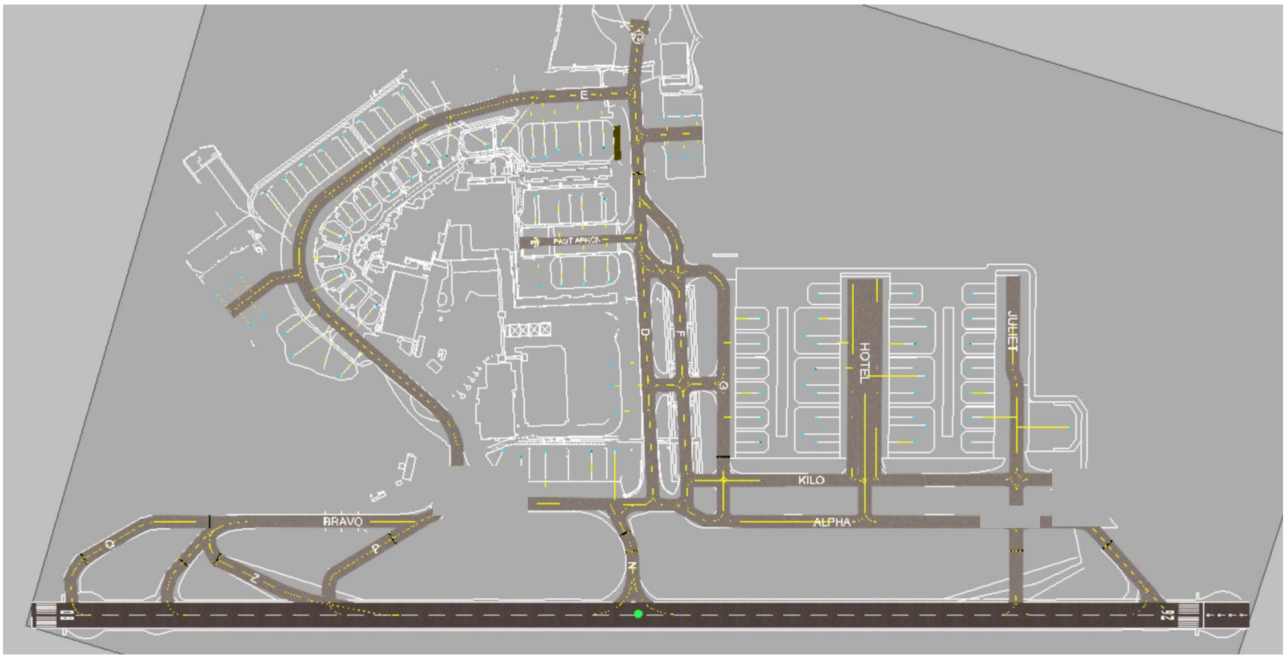
Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
45	49	10
Delay Metric	**Arrivals**	**Departures**
Mean Peak Hour Delay	04:24	07:27
Maximum Peak Hour Delay	10:44	21:05
Mean Morning Peak Delay	03:28	06:27
Maximum Morning Peak Delay	10:56	20:20
Mean Evening Peak Delay	00:59	02:41
Maximum Evening Peak Delay	03:41	08:50

D7.1.16 The results indicate that the RETs deliver a material benefit at 32 mppa. In this scenario without RETs, the maximum departure delay in the peak hour exceeds 21 minutes. Although mean delays remain within acceptable levels, the increase in maximum delay indicates that RETs are required at 32 mppa.

32/4W: Scenario with Revised End Link Taxiway – Westerly Operations

D7.1.17 **Figure D.17** illustrates the airfield design that was test in Scenario 32/4W. The end link taxiway to the far east has been revised to reduce the extent of earthworks that would be required to deliver an end link to RWY 26, and the existing Taxiway Alpha link has been retained.

Figure D.17: Airfield Design for Scenario 32/4W



D7.1.18 100% of Code E departures were assumed to use the far eastern end link to enter the runway. 70% of Code C (or smaller) departures from T1 (including business aviation movements) used the existing Taxiway Alpha link to access the runway, with the remainder using the far eastern end link. 70% of Code C (or smaller) departures from T2 used the far eastern end link to access the runway, with the remainder using the existing Taxiway Alpha link. These splits were used to apportion a reasonable spread between departures on each end link, and to model the impact of aircraft from different terminals accessing the runway via different links with conflicting outbound routes. 100% of Code E arrivals used the penultimate end link to vacate the runway, and 100% of Code C (or smaller) arrivals vacated via the RET. **Table D.13** shows the results of this scenario.

Table D.13: Scenario 32/4W, Modelling Results

Maximum Scheduled Hourly Movements (clock hour)	Maximum Simulated Runway Movement Rate (rolling hour)	Maximum Length of Departure Queue
45	51	9

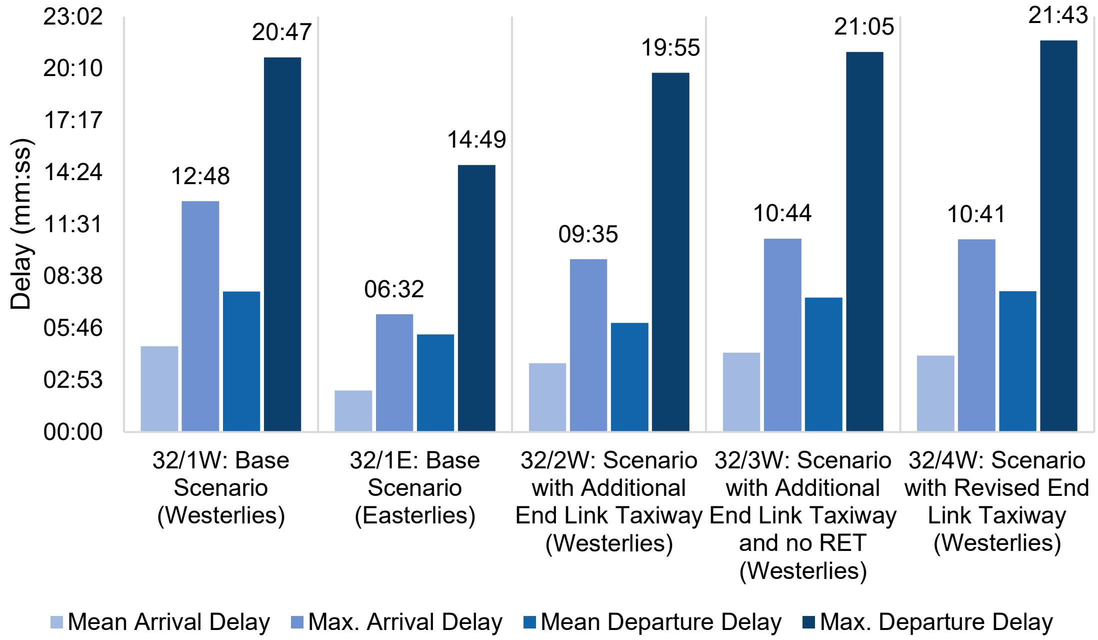
Delay Metric	Arrivals	Departures
Mean Peak Hour Delay	04:24	07:27
Maximum Peak Hour Delay	10:44	21:05
Mean Morning Peak Delay	03:28	06:27
Maximum Morning Peak Delay	10:56	20:20
Mean Evening Peak Delay	00:59	02:42
Maximum Evening Peak Delay	03:41	08:50

D7.1.19 Whilst peak hour departure delays increase from 19:55 in Scenario 32/2W with the 'optimum' end link layout to 21:05 in this scenario with the revised end link, both layouts simulated a maximum of 51 movements in the rolling hour. This supports suggestions that two end links for the sequencing of departures is essential at higher mppa throughputs.

D7.2 Key Findings at 32 mppa

D7.2.1 **Figure D.18** compares the mean and maximum delays to arrivals and departures in the busy hour across the five 32 mppa scenarios that were tested.

Figure D.18: Peak Hour Delays Across 32 mppa Scenarios



D7.2.2 The additional end link taxiway, as modelled in Scenario 32/2W, reduces maximum departure delay to under 20 minutes in the peak hour. The revised end link taxiway, as modelled in Scenario 32/4W, increases delay in the peak hour versus the base scenario, however, this is increase is likely to reflect the model's inability to tactically coordinate departures. The revised end link taxiway does provide some benefit over the base scenario during the morning peak period, as demonstrated in **Annex A**, albeit not significantly.

D7.2.3 The maximum delay to departures in the scenario without the RET (32/3W) is over one minute higher compared to the most similar scenario with the RET (32/2W). This suggests the RET is necessary to keeping delays during busy periods within acceptable levels at 32 mppa.

Code E Capability of Second Parallel Taxiway

D7.2.4 The second (inner) parallel taxiway should be able to handle Code E aircraft at 32 mppa, as Code E arrivals to T2 during the morning peak would otherwise have to join the departure queue to access the apron.

Rapid Exit Taxiways

D7.2.5 The modelling suggests there is a benefit to providing RETs at 32 mppa. Ultimately, the RETs support the high-intensity operation of the single runway and would be necessary to support a goal of 51 movements per hour.

End Taxiway Links

D7.2.6 Taxiway extensions to both ends of the runway are essential at 32 mppa. In the westerly direction the extension facilitates separate queues for T1 and T2 departures and allows for the sequencing of departures based on the optimum combination of departures by SID. In the easterly direction, the extension mitigates the risk of the departure queue extending to the critical junction of Bravo and Alpha.

D8 Conclusions

D8.1.1 This study validated the proposed airfield design of the airport airfield at 21.5, 27 and 32 mppa, as it expands to handle up to 32 mppa. ArcPORT, a specialised fast time simulation software designed for the aviation industry, was used to simulate the forecast busy day at each mppa interval. Iterations of the proposed airfield layouts were modelled to test the impact of changes to the designs.

D8.1.2 At 21.5 mppa, the modelling suggests that the planned extension of Taxiway Alpha, as included in Project Curium, delivers material benefit to airfield operations at peak times.

D8.1.3 The modelling suggested there would be limited gain from constructing RETs at 27 mppa, however, it was found that the provision of a Code E compliant parallel taxiway above the existing Taxiway Alpha was necessary to facilitate unimpeded access to T2 for arriving aircraft during peak periods.

D8.1.4 RETs were found to deliver a more material impact at 32 mppa. The RETs are ultimately necessary to support up to 51 movements per hour. Two links at each end of the runway were critical for sustaining high intensity use of the runway.

ANNEX

Results for 21.5 mppa Scenarios

Time Units = (mm:ss)	Arrivals & Departures				Arrivals			Departures					
	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	Max Simulated Rolling Hour Runway Rate	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	AM Peak Period (0700 - 0855)		PM Peak Period (1830 - 2025)		Busy Hour (0700 - 0800)	
Max delay = 95% interval	Total Delay	Total Delay	Total Delay	Rwy Movements	Total Delay	Total Delay	Total Delay	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue
Scenario 23/1W: Base Scenario – Westerly Operations	Mean = 01:37 Max = 06:23	Mean = 01:07 Max = 04:21	Mean = 01:09 Max = 05:16	37	Mean = 00:48 Max = 02:34	Mean = 00:19 Max = 01:06	Mean = 00:45 Max = 01:35	Mean = 01:51 Max = 06:32	4	Mean = 01:47 Max = 05:15	4	Mean = 01:22 Max = 06:14	3
Scenario 23/1E: Base Scenario – Easterly Operations	Mean = 01:35 Max = 06:17	Mean = 01:17 Max = 05:01	Mean = 01:07 Max = 05:04	38	Mean = 00:32 Max = 01:48	Mean = 00:16 Max = 01:06	Mean = 00:32 Max = 01:29	Mean = 02:01 Max = 06:05	4	Mean = 02:01 Max = 05:02	3	Mean = 01:07 Max = 04:47	3

Results for 27 mppa Scenarios

	Arrivals & Departures				Arrivals			Departures					
Time Units = (mm:ss)	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	Max Simulated Rolling Hour Runway Rate	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	AM Peak Period (0700 - 0855)		PM Peak Period (1830 - 2025)		Busy Hour (0700 - 0800)	
Max delay = 95% interval	Total Delay	Total Delay	Total Delay	Rwy Movements	Total Delay	Total Delay	Total Delay	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue
Scenario 27/1W: Base Scenario – Westerly Operations	Mean = 05:04 Max = 15:41	Mean = 01:55 Max = 08:01	Mean = 06:04 Max = 16:19	44	Mean = 04:03 Max = 11:37	Mean = 00:46 Max = 03:24	Mean = 05:08 Max = 12:43	Mean = 05:56 Max = 17:06	8	Mean = 02:53 Max = 10:01	4	Mean = 06:22 Max = 17:51	8
Scenario 27/1E: Base Scenario – Easterly Operations	Mean = 03:11 Max = 12:36	Mean = 01:34 Max = 05:33	Mean = 03:27 Max = 14:00	48	Mean = 00:56 Max = 03:03	Mean = 00:14 Max = 00:54	Mean = 00:42 Max = 01:43	Mean = 04:17 Max = 13:18	6	Mean = 02:42 Max = 08:06	4	Mean = 04:38 Max = 14:15	6
Scenario 27/2W: without Rapid Exit Taxiway –	Mean = 04:54	Mean = 01:54	Mean = 06:04	44	Mean = 03:28	Mean = 00:48	Mean = 05:11	Mean = 05:50	8	Mean = 02:52	2	Mean = 06:35	8

Time Units = (mm:ss) Max delay = 95% interval	Arrivals & Departures				Arrivals			Departures					
	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	Max Simulated Rolling Hour Runway Rate	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	AM Peak Period (0700 - 0855)		PM Peak Period (1830 - 2025)		Busy Hour (0700 - 0800)	
	Total Delay	Total Delay	Total Delay	Rwy Movements	Total Delay	Total Delay	Total Delay	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue
Westerly Operations	Max = 15:07	Max = 08:19	Max = 15:55		Max = 11:17	Max = 03:21	Max = 13:10	Max = 16:18		Max = 10:04		Max = 16:58	
Scenario 27/2E: without Rapid Exit Taxiway – Easterly Operations	Mean = 03:40 Max = 14:56	Mean = 01:53 Max = 09:05	Mean = 03:55 Max = 15:04	46	Mean = 00:50 Max = 03:00	Mean = 00:19 Max = 01:12	Mean = 00:53 Max = 02:31	Mean = 05:03 Max = 15:55	8	Mean = 02:55 Max = 09:41	3	Mean = 05:38 Max = 16:23	8
Scenario 27/3W: without Rapid Exit Taxiway, with Existing Alpha Link – Westerly Operations	Mean = 04:35 Max = 15:18	Mean = 01:34 Max = 07:11	Mean = 05:15 Max = 16:04	45	Mean = 02:47 Max = 07:59	Mean = 00:39 Max = 02:23	Mean = 02:50 Max = 08:04	Mean = 05:48 Max = 17:15	8	Mean = 02:38 Max = 08:24	4	Mean = 05:55 Max = 16:59	8

Results for 32 mppa Scenarios

	Arrivals & Departures				Arrivals			Departures					
Time Units = (mm:ss)	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	Max Simulated Rolling Hour Runway Rate	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	AM Peak Period (0700 - 0855)		PM Peak Period (1830 - 2025)		Busy Hour (0700 - 0800)	
Max delay = 95% interval	Total Delay	Total Delay	Total Delay	Rwy Movements	Total Delay	Total Delay	Total Delay	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue
Scenario 32/1W: Base Scenario – Westerly Operations	Mean = 05:48 Max = 17:47	Mean = 02:08 Max = 08:03	Mean = 06:43 Max = 19:48	49	Mean = 03:34 Max = 11:33	Mean = 00:55 Max = 04:09	Mean = 04:46 Max = 12:48	Mean = 06:58 Max = 19:57	10	Mean = 02:52 Max = 08:31	6	Mean = 07:48 Max = 20:47	10
Scenario 32/1E: Base Scenario – Easterly Operations	Mean = 03:34 Max = 13:05	Mean = 01:47 Max = 07:11	Mean = 04:16 Max = 14:10	51	Mean = 01:48 Max = 05:59	Mean = 00:55 Max = 03:54	Mean = 02:18 Max = 06:32	Mean = 04:33 Max = 14:09	7	Mean = 02:40 Max = 08:57	3	Mean = 05:25 Max = 14:49	7
Scenario 32/2W: with Additional End Link Taxiway –	Mean = 04:37	Mean = 01:45	Mean = 05:35	51	Mean = 02:42	Mean = 00:49	Mean = 03:49	Mean = 05:33	8	Mean = 02:45	4	Mean = 06:03	8

Time Units = (mm:ss) Max delay = 95% interval	Arrivals & Departures				Arrivals			Departures					
	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	Max Simulated Rolling Hour Runway Rate	AM Peak Period (0700 - 0855)	PM Peak Period (1830 - 2025)	Busy Hour (0700 - 0800)	AM Peak Period (0700 - 0855)		PM Peak Period (1830 - 2025)		Busy Hour (0700 - 0800)	
	Total Delay	Total Delay	Total Delay	Rwy Movements	Total Delay	Total Delay	Total Delay	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue	Total Delay	Max Dep. Queue
Westerly Operations	Max = 16:26	Max = 06:59	Max = 17:50		Max = 08:27	Max = 03:19	Max = 09:35	Max = 17:57		Max = 08:20		Max = 19:55	
Scenario 32/3W: with Additional End Link Taxiway, no Rapid Exit Taxiway – Westerly Operations	Mean = 05:22 Max = 18:59	Mean = 01:53 Max = 07:08	Mean = 06:28 Max = 18:55	49	Mean = 03:28 Max = 10:56	Mean = 00:59 Max = 03:41	Mean = 04:24 Max = 10:44	Mean = 06:27 Max = 20:20	10	Mean = 02:41 Max = 08:50	5	Mean = 07:27 Max = 21:05	10
Scenario 32/4W: with Revised End Link – Westerly Operations	Mean = 05:41 Max = 18:58	Mean = 01:58 Max = 07:26	Mean = 06:30 Max = 20:22	51	Mean = 02:56 Max = 09:13	Mean = 00:51 Max = 03:53	Mean = 04:15 Max = 10:41	Mean = 06:52 Max = 20:22	9	Mean = 02:42 Max = 08:50	3	Mean = 07:49 Max = 21:43	9

Appendix E: Approach to Socio-Economic Impact Assessment

E1 Introduction

E1.1.1 This appendix sets out the approach that was taken to assessing the socio-economic impacts of the Proposed Development. It provides information on the assessment of the direct, indirect and induced impacts, collectively referred to as the operational impacts, the wider economic impact, and the high-level socio-economic cost benefit analysis.

E2 Assessing the Operational Socio-Economic Impacts

E2.1.1 The current operational impact of London Luton Airport and the potential impacts associated with expansion have been the subject of detailed assessment by Oxford Economics (OE)[7]. This research sets out a comprehensive assessment of the economic impact of the airport and robustly ensures that the 'true' airport related economic activity at the airport is identified as distinct from broader economic activity that is located at or in the immediate vicinity of the airport but that is not engaged in delivering air transport related services[8].

E2.1.2 The direct employment impact of the airport in 2019 has been estimated using data from a range of sources including a detailed telephone survey of on-site companies at the airport and analysis of the Inter Departmental Business Register (IDBR). The corresponding contribution to GDP has then been estimated by applying productivity estimates from OE's regional databank to the employment results for each sector.

E2.1.3 The indirect and induced impacts associated with the operation of the airport have been estimated using data collected on supply chain purchases combined with OE's economic models, based on inter-regional input-output tables. This approach is based on established academic techniques initially developed by Flegg and Webber[9]. This approach involves constructing regional input-output models by applying Location Quotients (LQs) and regional size adjustments to the standard UK input-output tables. OE's regional model was used to provide data on LQ's and regional employment.

E2.1.4 The future economic impact of operations at the airport has been assessed by OE based on the demand forecasts set out in **Section 7**. Different activities at the airport have been tied to growth in different types of demand, notably passenger numbers, air transport movements, cargo tonnage or business aviation movements. The drivers for different employment segments are summarised in **Table E.1**.

[7] The Economic Impact of London Luton Airport – Oxford Economics (2022), Appendix 11.1 to the PEIR.
[8] This also means that the results of this study are not directly comparable with previous economic impact studies undertaken on the airport to support the Project Curium planning application and considerable care should be taken in making comparisons.
[9] Flegg A. T. and Webber C. D. (1997) On the appropriate use of location quotients in generating regional input-output tables: reply, Reg. Studies 31, 795−805.

Table E.1: Summary of employment drivers

Employment Driver	Employment Category
Passengers	Passenger Airlines, Bus Services, Car Park Services, Taxis, Airport Facilities Maintenance, Border Force, Customs, Police, Ground Handling, In-flight Catering, Tourist Services, Retail, Hotels, Restaurants, Car Rental, Airport Management, Other Security
Freight Tonnage	Cargo Airline, Freight Forwarder, Warehousing
Air Transport Movements	Air Traffic Control, Fire Service, Aircraft Cleaning, Aviation Related Training, Fuelling Companies
MRO Space	Aircraft Maintenance, Repair and Overhaul, Aircraft Parts Supplier, Aviation Related Manufacturing
Business Aviation Movements	Aircraft Charter, Fixed Based Operator
Historic Trend in Administrative Employment	Head office related functions

Source: Oxford Economics/York Aviation

E2.1.5 In estimating future employment levels, account has been taken of the effect of opening a second passenger terminal, with the consequent need for duplication of some facilities and functions. Hence, directly terminal related employment was increased by 15% in the year that T2 is expected to open to account for some relative loss of staff productivity in the short-term due to the need to duplicate some activities across the two terminals.

E3 Assessing the Wider Socio-Economic Impacts

E3.1.1 The effects on GVA and employment supported by inward investment, trade and competitiveness effects are considered holistically as an overall effect on productivity in the study area economies stemming from the connectivity provided to business travellers by the airport. The approach used examines the patterns of travel for business passengers from the CAA Passenger Survey 2019, as reported in **Section 3**, and OAG data, identifying surface origins, potential alternative airport options, direct and indirect routings, and air fares. It, ultimately, assesses the generalised cost of travelling via the airport and the next best alternative to completing the same journey. A price elasticity based on the DfT's aviation forecasts research[10] was then applied to the generalised cost differential to identify the number of passengers that would no longer fly if they were forced to use the alternate to the airport.

E3.1.2 The results of this analysis were then used to estimate the role that the airport plays in supporting productivity in the Luton, the Three Counties, the Six Counties and across the UK. These impacts were calculated using a statistical relationship

[10] Department for Transport (2022). Econometric Models to Estimate Demand Elasticities for the National Air Passenger Demand Model.

originally developed by Oxford Economics as part of research undertaken for Transport for London around the Airports Commission process[11]. This relationship correlates the level of business air travel and air freight from an area to total factor productivity in the economy. It identified an econometric relationship whereby a 10% increase in combined business air travel and air freight would result in a 0.5% increase in productivity in the economy. The employment associated with this increased GVA was assessed based on the average GVA per job across the study areas, allowing for the fact that a large proportion of the GVA gain will not result in additional employment but be reflected in increased individual productivity.

E3.1.3 The impact on inbound tourism to the Local Area and London has been assessed in terms of the impact on GVA and employment. The impact on GVA has been assessed based on the expenditure injection from inbound tourists to the relevant study area. The impact has been based on VisitBritain data on overseas tourism expenditure patterns[12], the GB Tourism Survey[13] for domestic tourism expenditure patterns and the CAA Passenger Survey 2019 data for volumes of visitors to the study areas. Employment effects were estimated based on the average GVA per job in tourism and associated sectors in London, based on ONS data. An indirect and induced multiplier for the tourism sector has been applied to the direct tourism effects. This has been calculated for each study area.

E4 Socio-Economic Cost Benefit Analysis

E4.1.1 The purpose of the cost benefit analysis is to consider the broader effects on socio-economic welfare associated with the development and it places the emphasis on whether the expansion of the airport will result in a more efficient allocation of resources across the economy. It examines whether the key actors (passengers, producers, and the Government) in the market will be better or worse off as a result of the airport's growth in line with the Proposed Development as opposed to the Fallback Case.

E4.1.2 This approach is similar in concept to the economic elements of the DfT's WebTAG appraisal approach for public sector investment in transport and other schemes. It should, however, be emphasised that it is not a WebTAG appraisal and is not intended to be one. The purpose of this analysis is to provide a broad assessment of the impacts of the Proposed Development from a socio-economic welfare perspective. WebTAG is not intended for assessing the impact of private sector investments and is not a commonly used standard in assessing airport socio-economic effects in relation to planning decisions. The purpose of WebTAG is to access the comparative impact of alternative government interventions not to assess the merits of an individual application. The analysis undertaken here is intended to provide a supplementary view on the potential socio-economic merits of the Proposed Development that sits alongside the primary assessment of the impacts on GVA and jobs.

E4.1.3 This high level assessment focuses on the following main metrics:

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[11] Impacts on the UK Economy through the Provision of International Connectivity ,Oxford Economics, 2013.
[12] Can be accessed at https://www.visitbritain.org/inbound-trends-uk-nation-region-county.
[13] The GB Tourist 2019 Annual Report , Kantar 2020.

a. Journey Time Savings – the impact on passengers travel times from the Proposed Development has been considered based on the demand forecasts, CAA Passenger Survey data, travel times derived from Google Maps, and values of time taken from the Airports Commission[14]. The analysis considers the travel time for a passenger to London Luton Airport compared to the travel time for the next most popular alternative for the given passenger segment for the route in question. Where the travel time via Luton Airport is shorter, this represents an efficiency gain to passengers and society;

b. Air Fare Savings – the air fares paid by passengers using the airport with the Proposed Development were compared to the air fares available from the next most popular alternate in each case based on the results of the CAA Passenger Survey. Where the fare at the airport is lower than the alternative, this represents a gain to passengers. Air fares for London Luton Airport and its competitors have been estimated based on data from the CAA Passenger Survey;

c. Producer Surpluses – this examines the additional profits that will accrue across the London system airports from the additional passengers that can be accommodated as a result of the Proposed Development. The number of additional passengers has been estimated on the basis an analysis of the generalised costs of travel via the airport compared to the next best alternative drawing on data from the CAA Passenger Survey, OAG and Google Maps. Additional profits have been based on the estimated relation between operating profit per passenger, taken from LLAOL's annual report and accounts, and airport scale;

d. Air Passenger Duty – the estimated additional APD revenue accruing to the UK Government from the additional passengers flying as a result of the Proposed Development has been based on the same generalised cost assessment described in c. and the existing rates of APD, allowing for the upcoming reduction in rates for domestic flights;

e. Construction Costs – the construction costs of the Proposed Development represent a cost to society and hence are included within the socio-economic cost benefit analysis;

f. Carbon Costs – the full range of carbon emissions associated with the Proposed Development, i.e. those relating to additional flights, increased airport operations, growing surface access journeys and the construction programme, have been monetised using the BEIS guidance on carbon valuation[15]. The quantum of carbon emissions associated the Proposed Development is taken from the **Greenhouse Gas Assessment** in **Chapter 12** of the **ES** and reflects the Do Minimum Case and the Green House

[14] Economy: Transport Economic Efficiency Impacts. Airports Commission (2015). Page 16.
[15] Valuation of greenhouse gas emissions: for policy appraisal and evaluation. BEIS (2021)

Gases Core Planning Case[16]. It should be noted that the BEIS carbon values do not reflect the damage cost to society from the emissions but societal investment costs required to abate these emissions. It should also be made clear that these costs are reported here for completeness and to ensure the assessment is conservative. It has been made quite clear through policy that carbon emissions are a matter for national policy and not an issue for individual planning decisions as set out in **Section 4**.

Furthermore, it should also be remembered that the cost of carbon is an explicit driver of the demand forecasts that support this application. As such, the investment required to abate carbon emissions is internalised within the demand forecasts and, as such, the costs of carbon should not, therefore, be a determining factor within the socio-economic cost benefit analysis. As a result, the socio-economic cost benefit results are reported with and without the carbon costs.

E4.1.4 The socio-economic cost benefit analysis uses a 60 year appraisal period, in line with common practice for major airport infrastructure projects. Costs and benefits are discounted in line with HM Treasury Green Book guidance on discount rates.

[16] The Greenhouse Gas Core Planning Case assessment presented in the ES chapter has a slightly different scope to assessment to that applied in the other environmental aspects such as air quality and noise reported in this ES. This difference in approach is taken due to the unique circumstances around how aviation GHG emissions are managed at an international and national level and the surrounding policy framework.

Appendix F: Socio-Economic Impact Sensitivity Tests

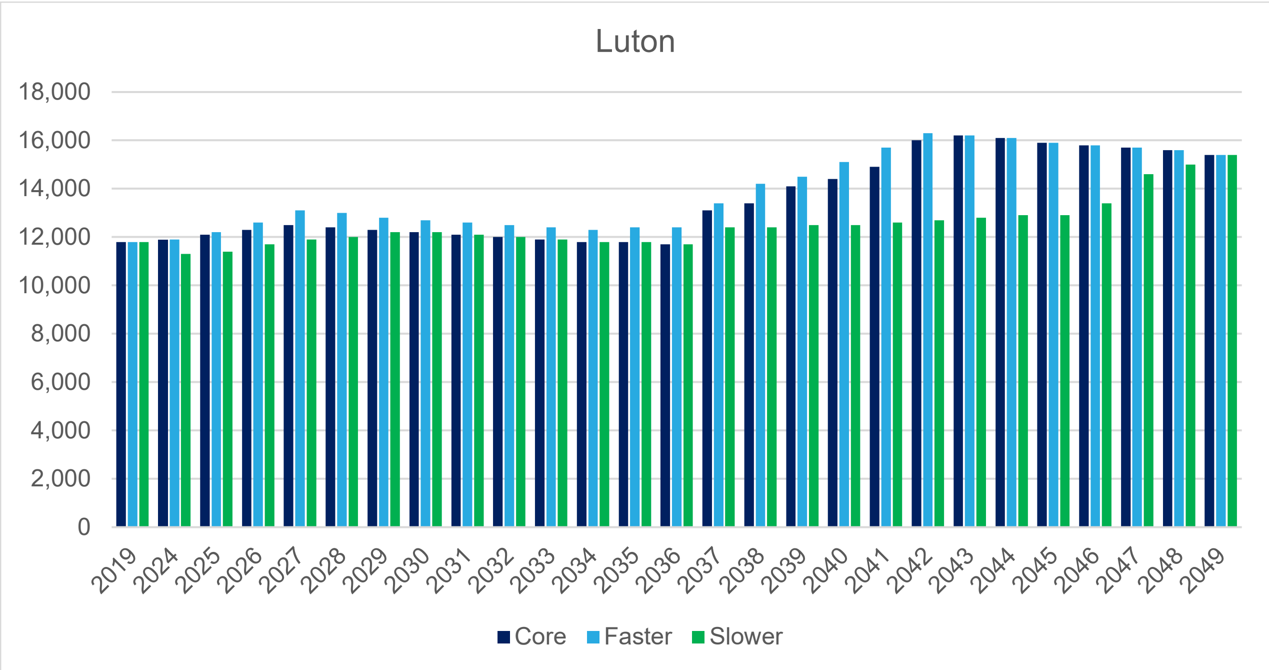
F1 Introduction

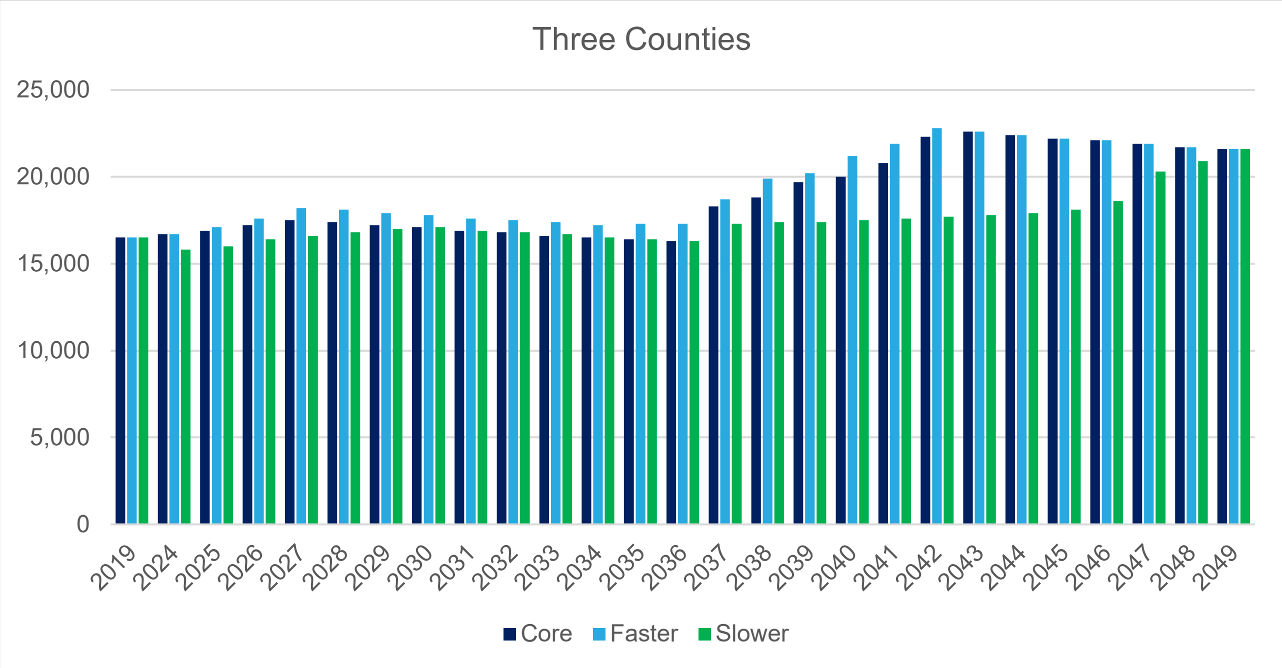
F1.1.1 The socio-economic impact assessment described in **Section 9** focusses on the impacts associated with the Core Planning Case. The socio-economic assessment has also considered the impacts associated with the Faster and Slower Growth Cases. Ultimately, the Faster and Slower Growth Cases see the airport attain the core passenger thresholds described above but in either earlier or later years. This does affect the level of impacts delivered but this effect is limited as, ultimately, the primary driver of impact, air traffic, is the same. Any differences effectively reflect the impact of productivity over time.

F2 Operational Socio-Economic Impacts

F2.1.1 The differences between the total operational employment and GDP impact for the Faster and Slower Growth cases in each of the study areas compared to the Core Planning Case impacts are shown in **Figures F.1** and **F.2**. This demonstrates quite clearly the convergence of impacts over time.

Figure F.1: Difference in operational employment impacts between the Faster and Slower Growth Cases and the Core Planning Case




Three Counties
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20,000
15,000
10,000
5,000
0
2019
2024
2025
2026
2027
2028
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2030
2031
2032
2033
2034
2035
2036
2037
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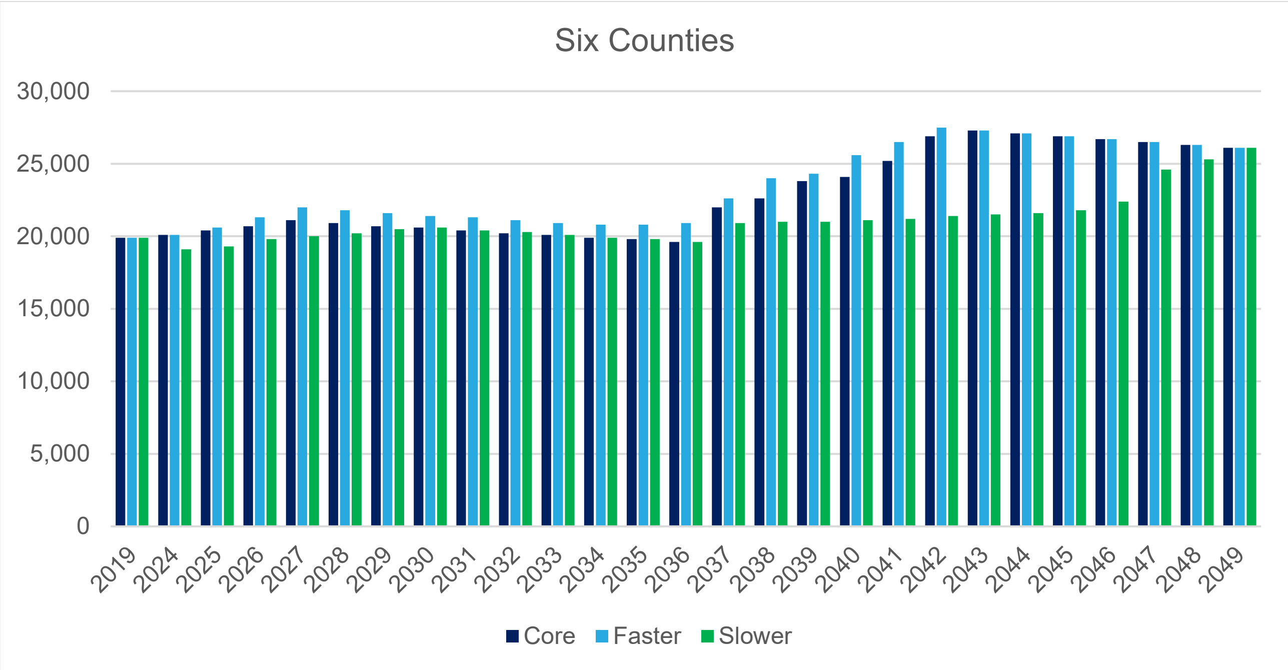
2049
Core
Faster
Slower


Six Counties
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25,000
20,000
15,000
10,000
5,000
0
2019
2024
2025
2026
2027
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2030
2031
2032
2033
2034
2035
2036
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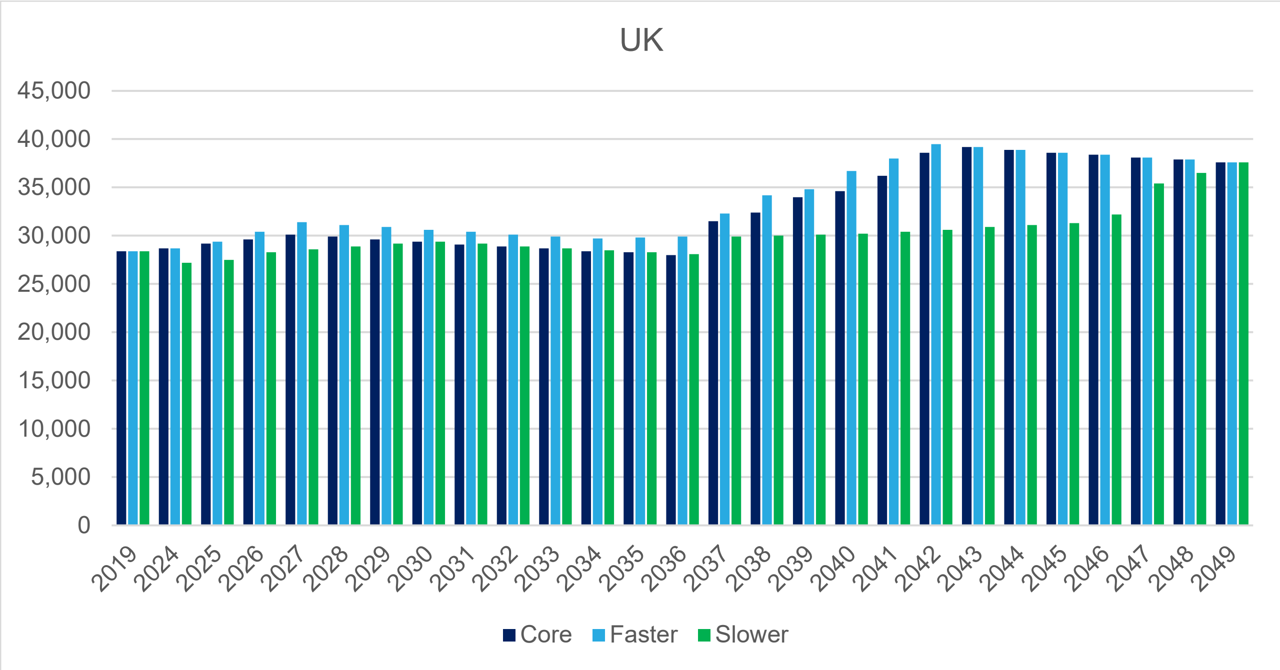
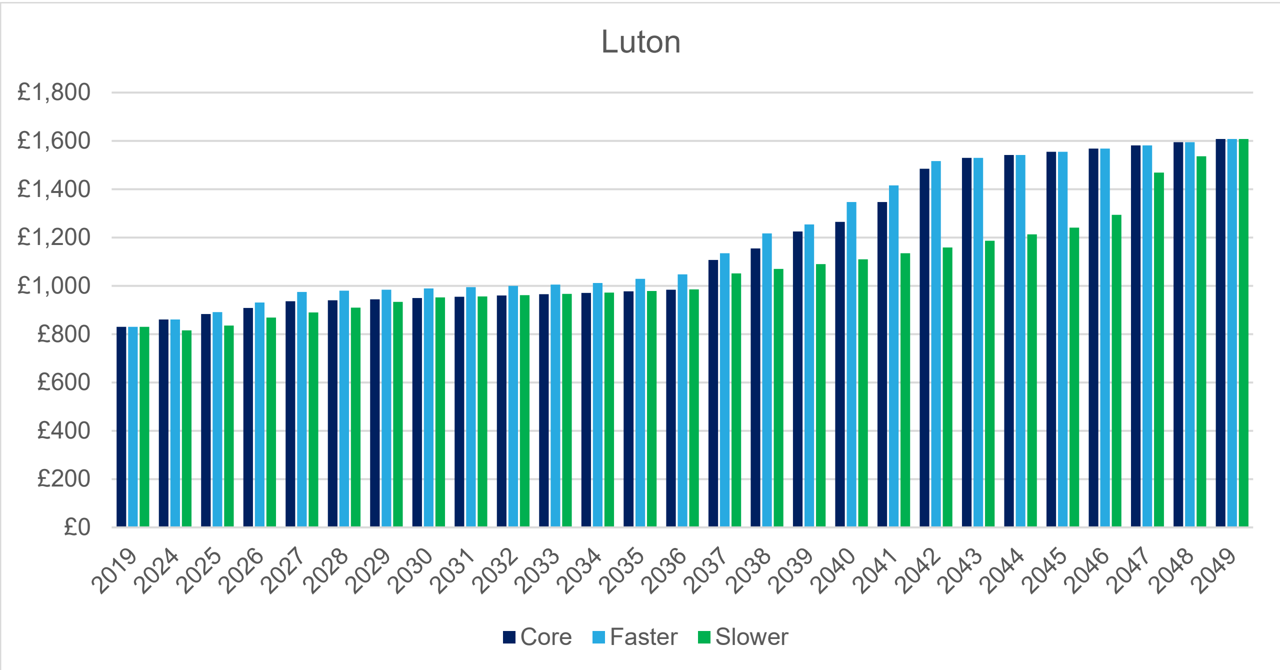
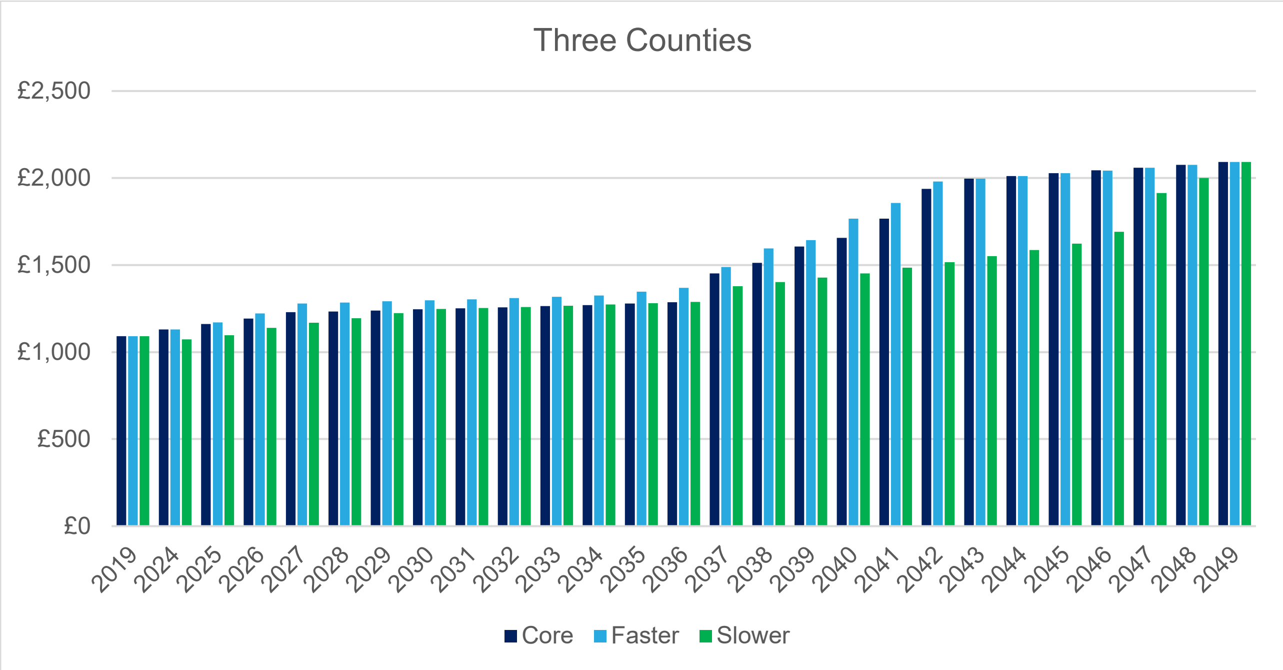
2049
Core
Faster
Slower



Source: Oxford Economics

Figure F.2: Difference in operational GDP impacts between the Faster and Slower Growth Cases and the Core Planning Case (£ million)




Three Counties
£2,500
£2,000
£1,500
£1,000
£500
£0
2019
2024
2025
2026
2027
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2030
2031
2032
2033
2034
2035
2036
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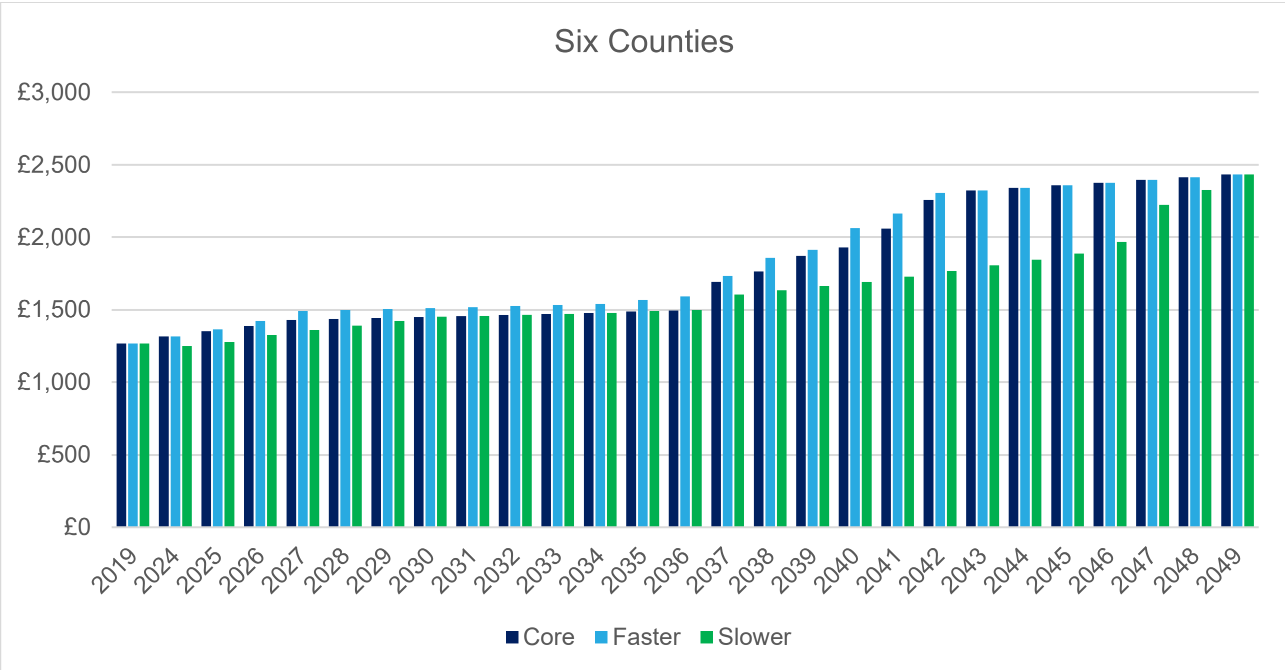
2049
Core
Faster
Slower


Six Counties
£3,000
£2,500
£2,000
£1,500
£1,000
£500
£0
2019
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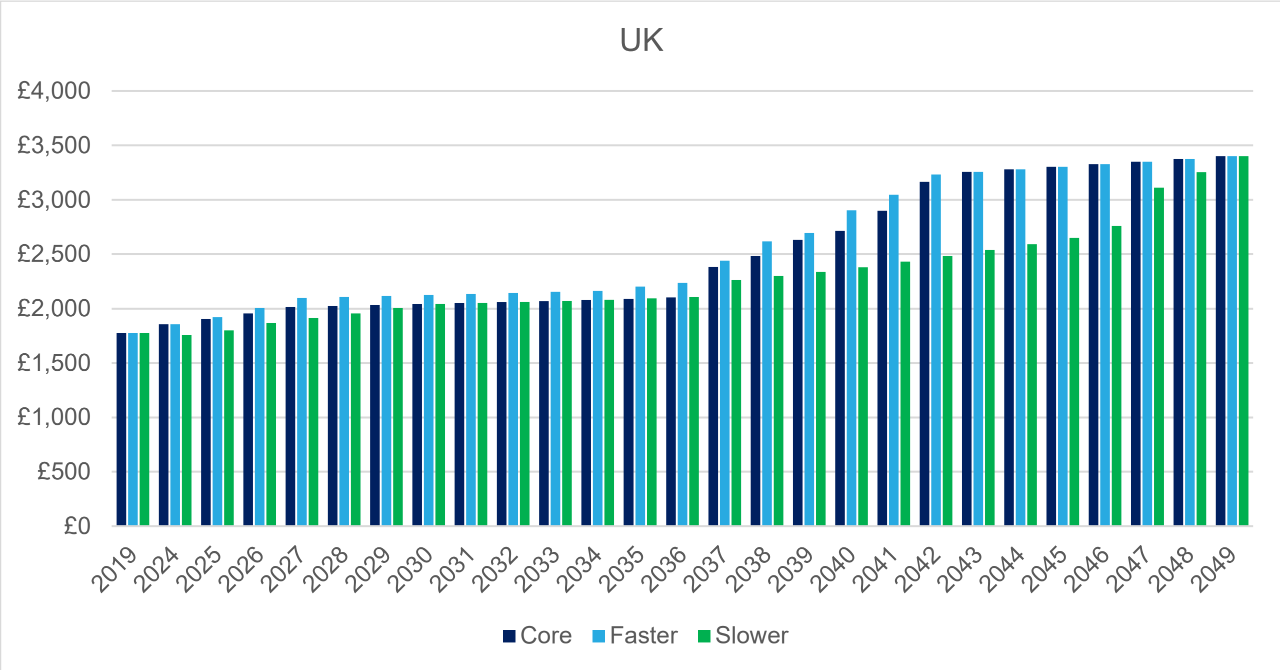
2049
Core
Faster
Slower



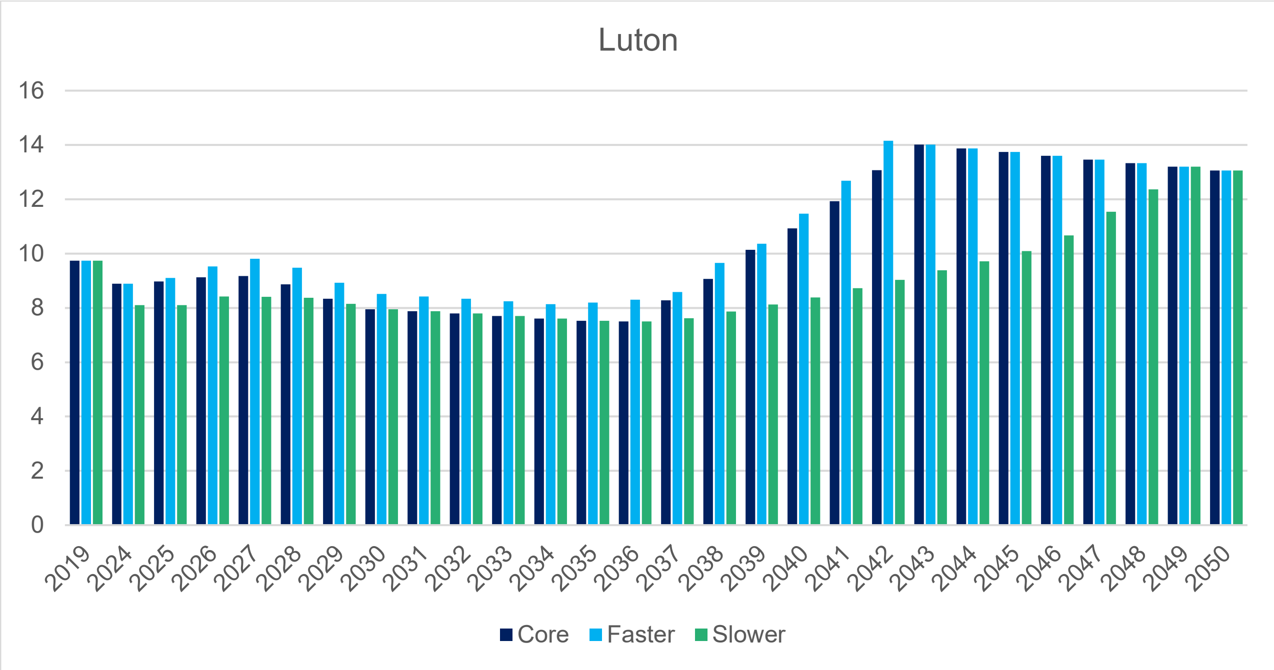
Source: Oxford Economics

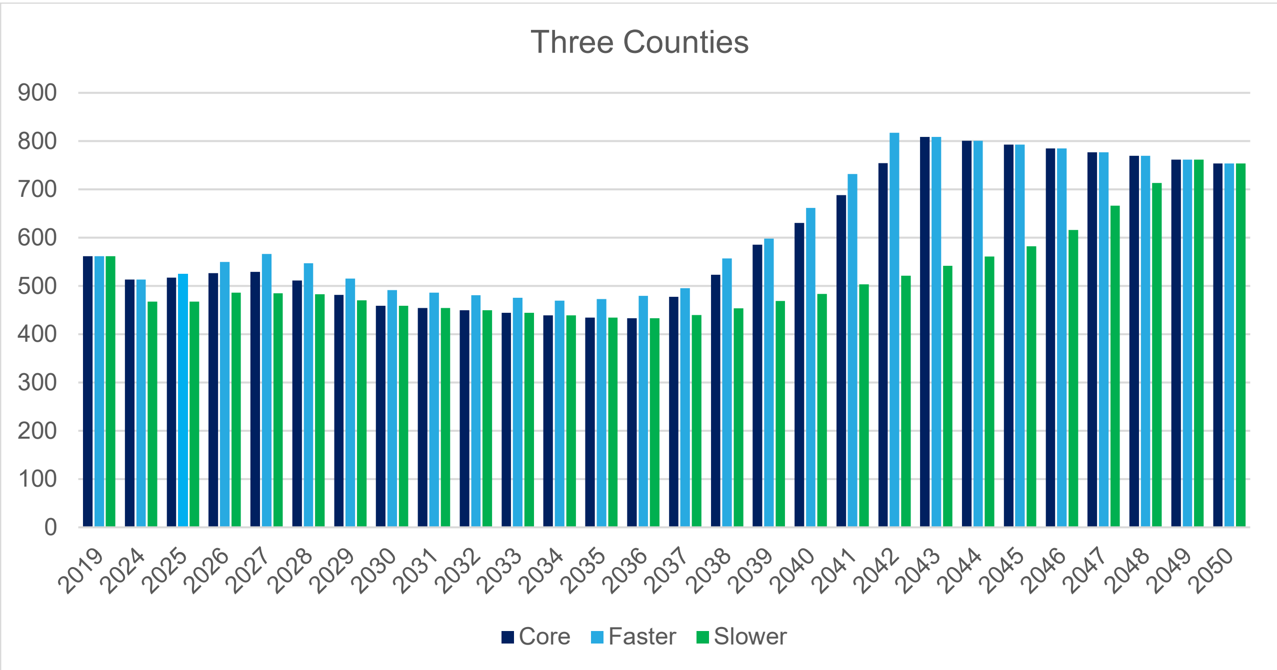
F3 Wider Economic Impacts

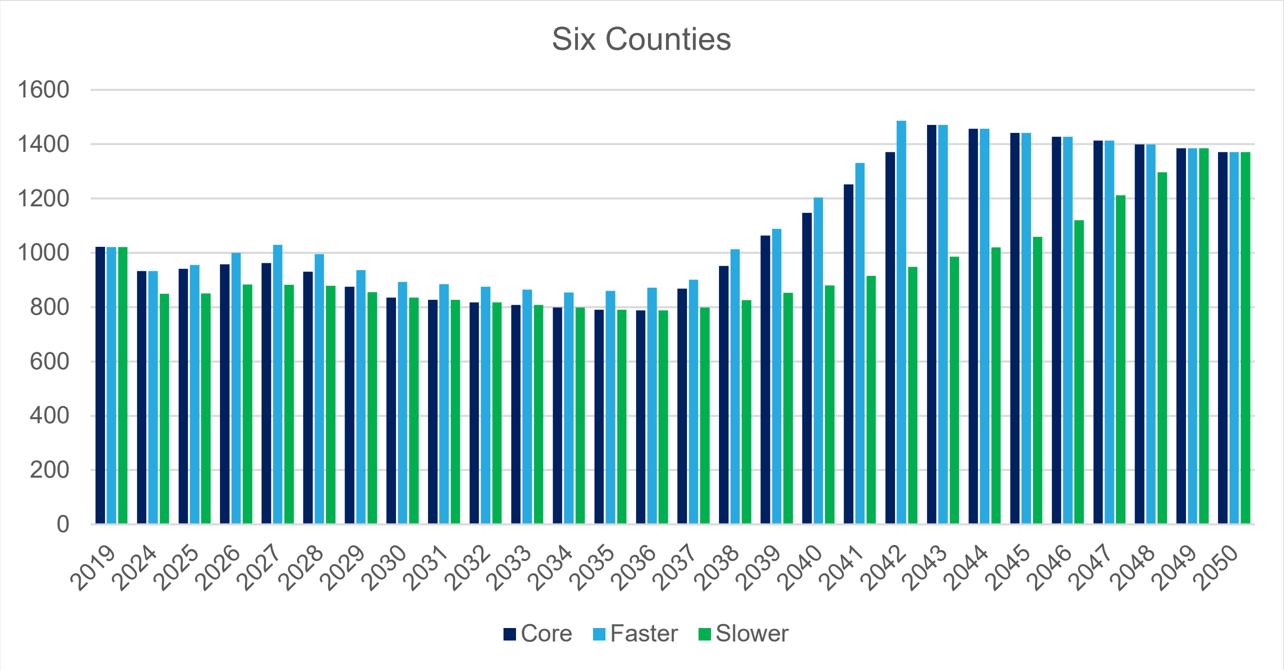
F3.1.1 As with operational economic impacts, the Faster and Slower Growth Cases result in similar wider economic impacts to the Core Case. This is not surprising given that the volumes of passengers are the same. However, the effects of productivity over time do mean that there are differences in employment impacts at the same throughput at different points in time. However, ultimately, the different cases converge at 32 mppa.

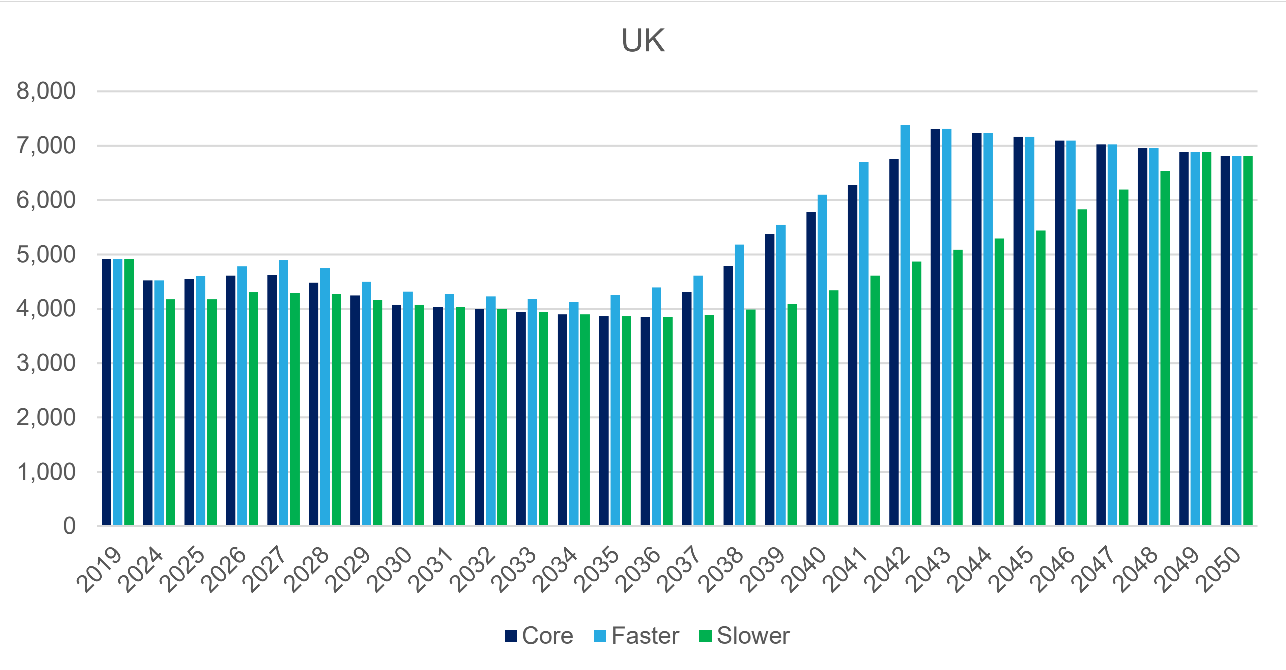
F3.1.2 **Figures F.3 (employment)** and **F.4 (GDP)** show the business productivity benefits associated with the Core, Faster and Slower Growth cases over time.

Figure F.3: Difference in business productivity employment impacts between the Faster and Slower Growth Cases and the Core Planning Case



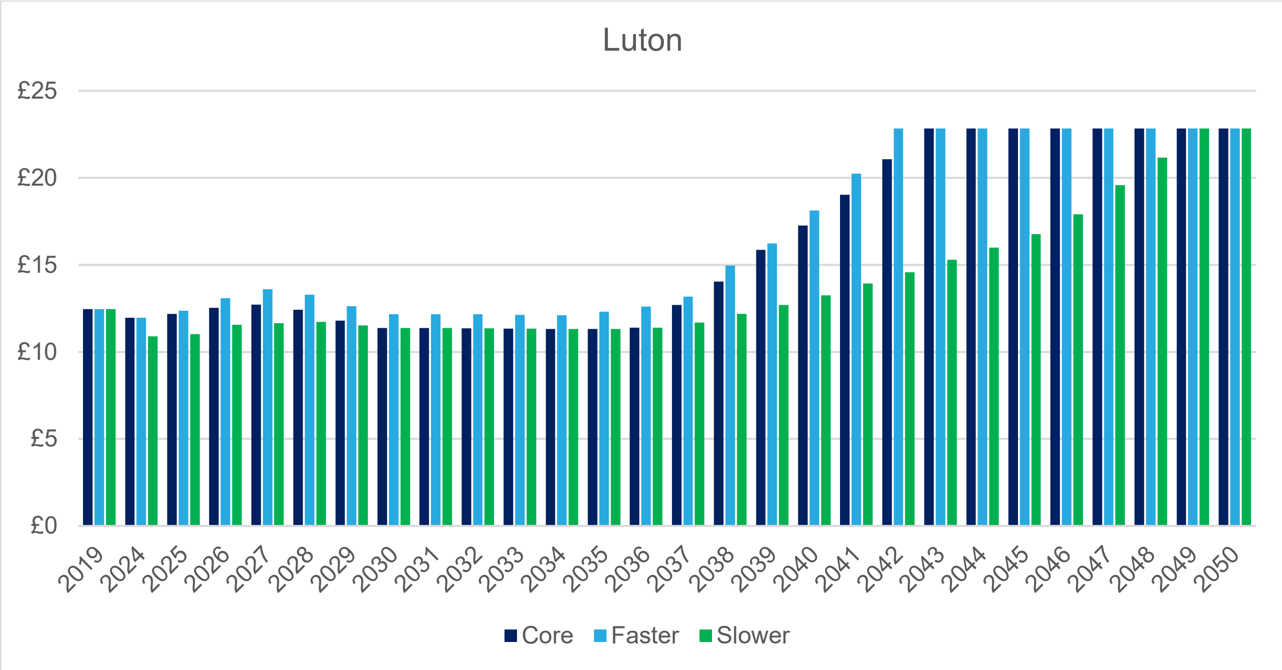


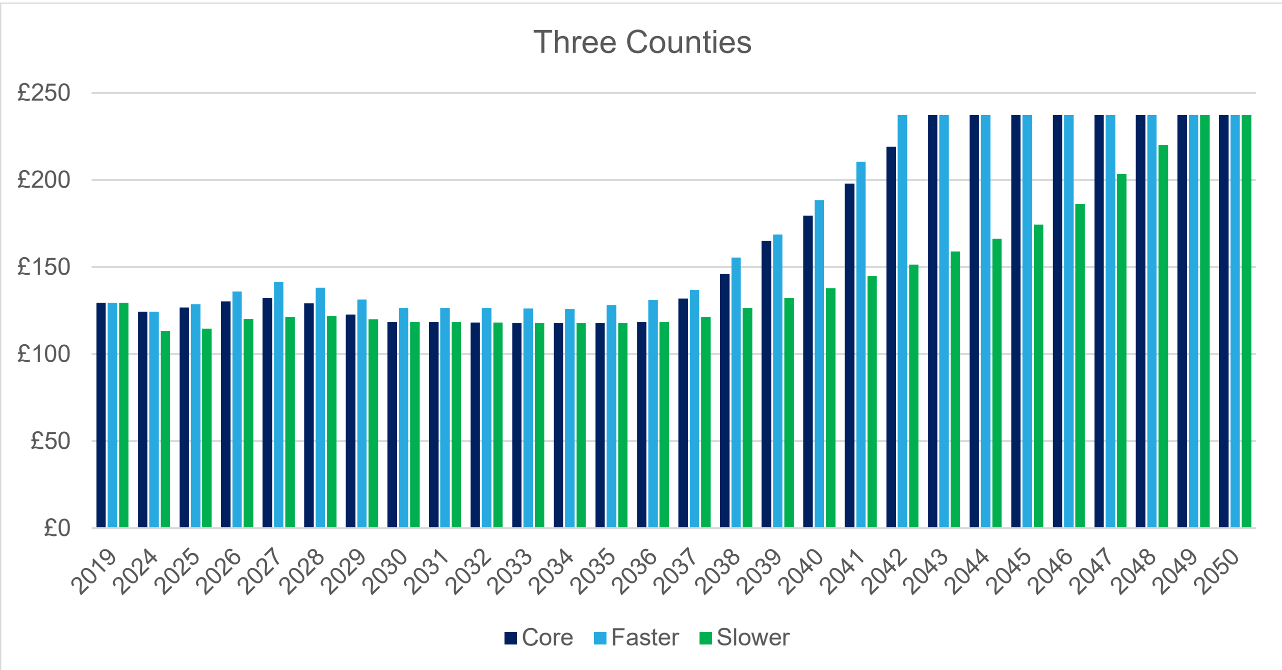


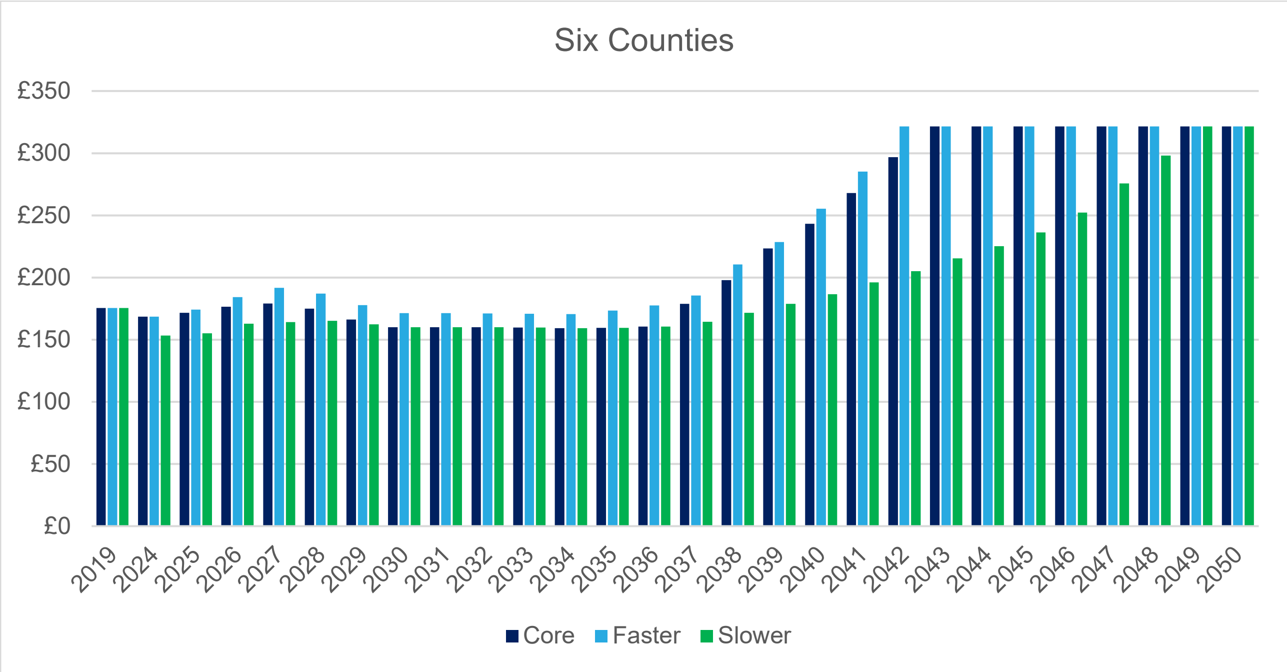


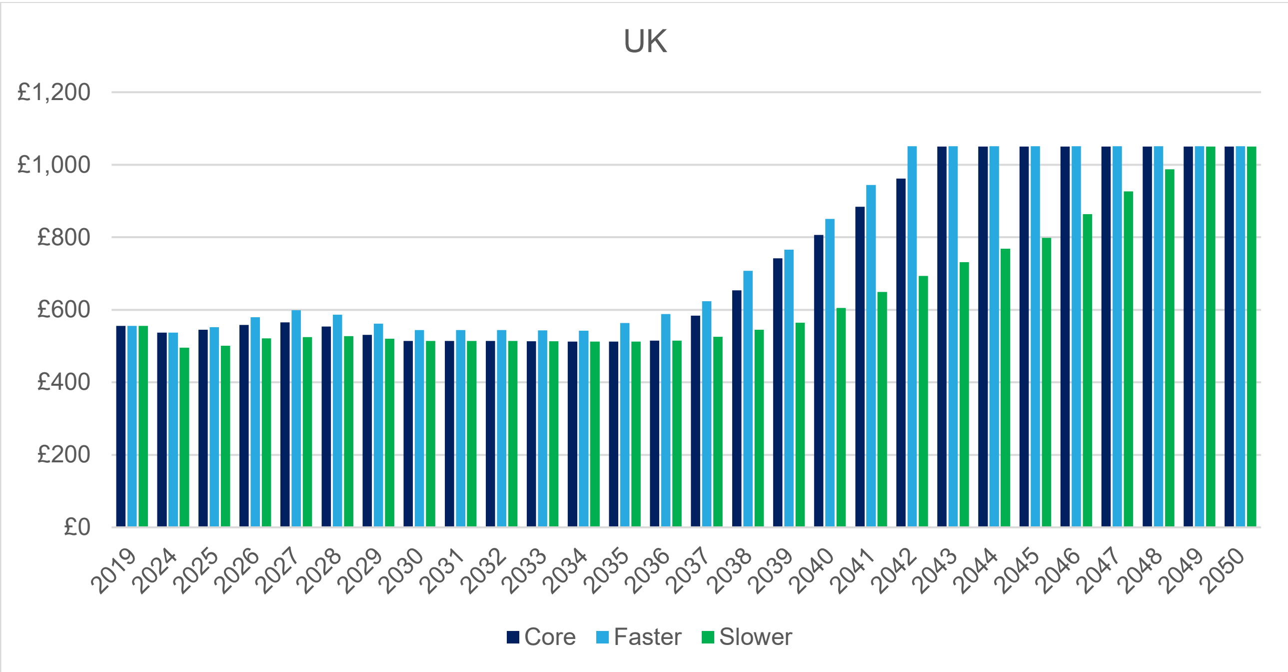
Source: York Aviation

Figure F.3: Difference in business productivity GDP impacts between the Faster and Slower Growth Cases and the Core Planning Case



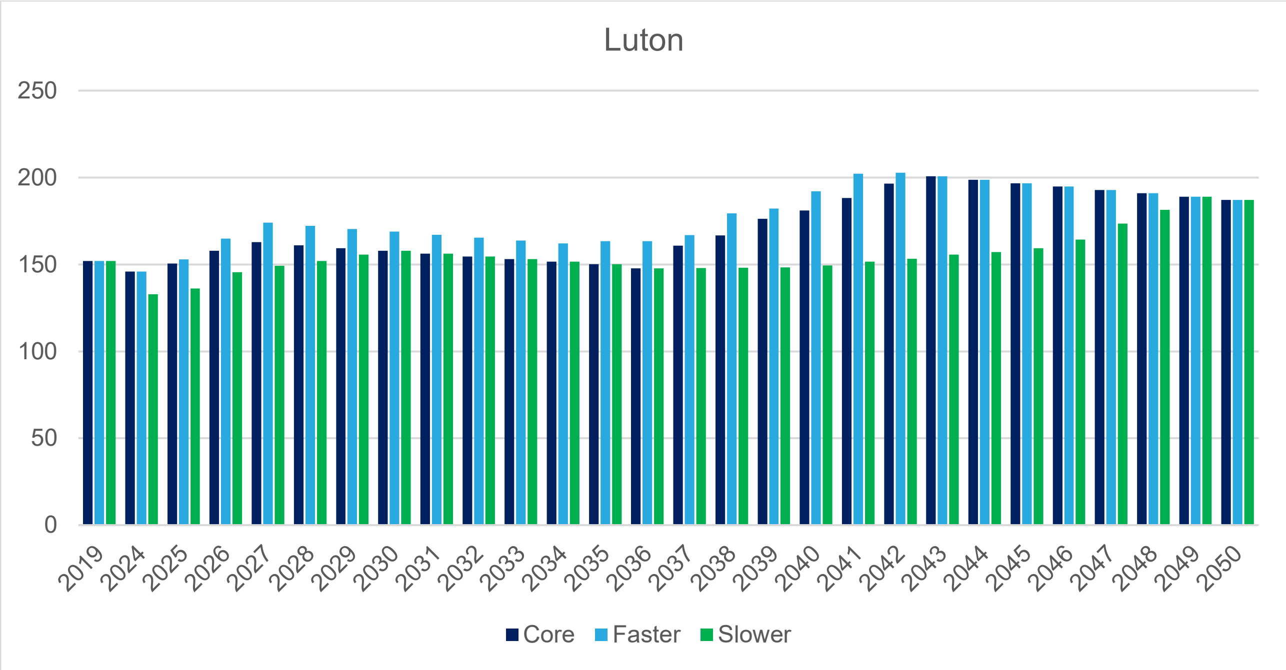


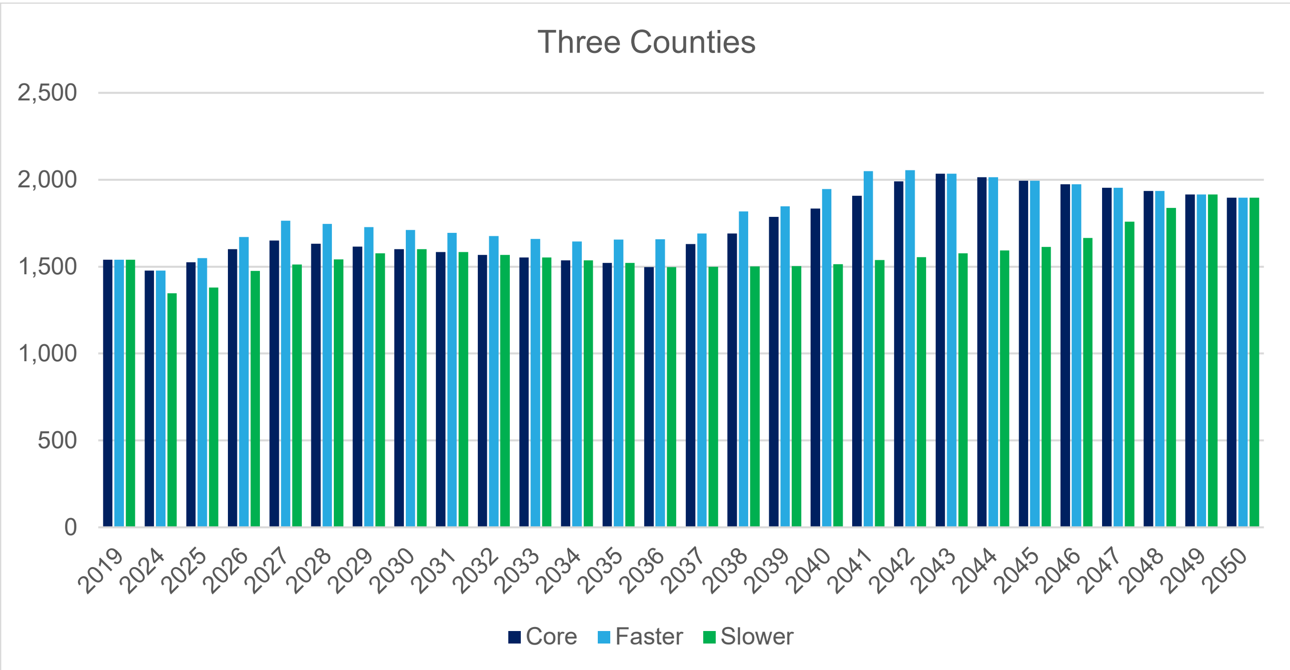


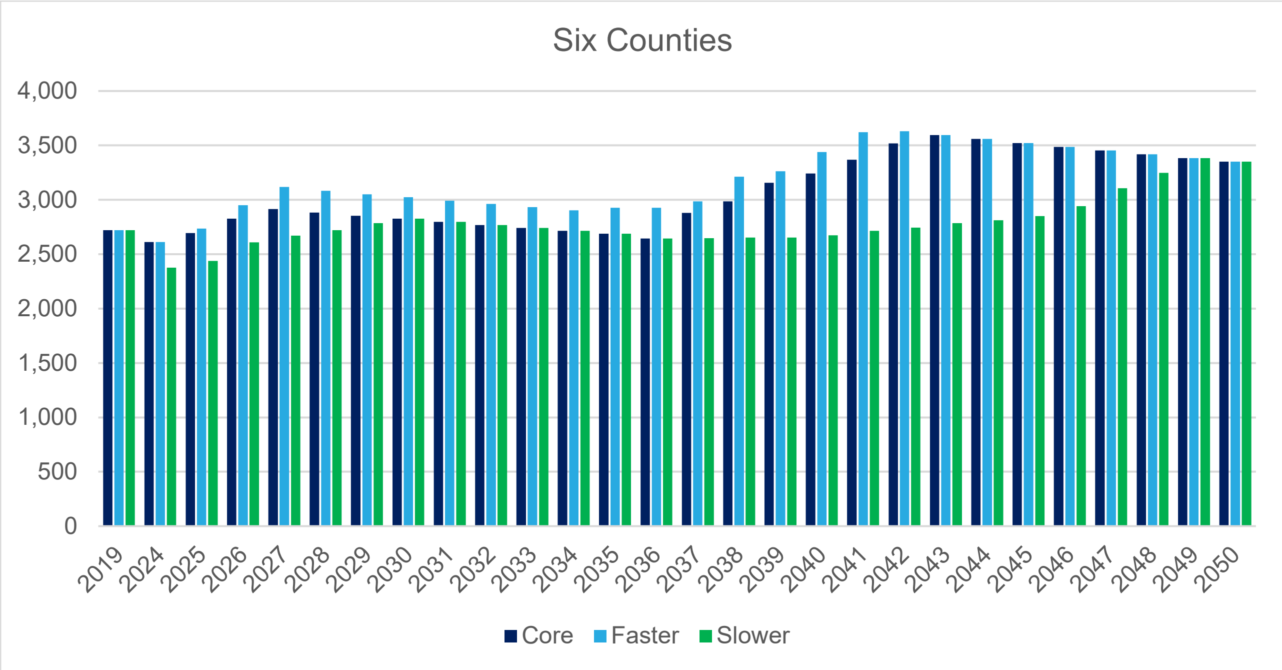


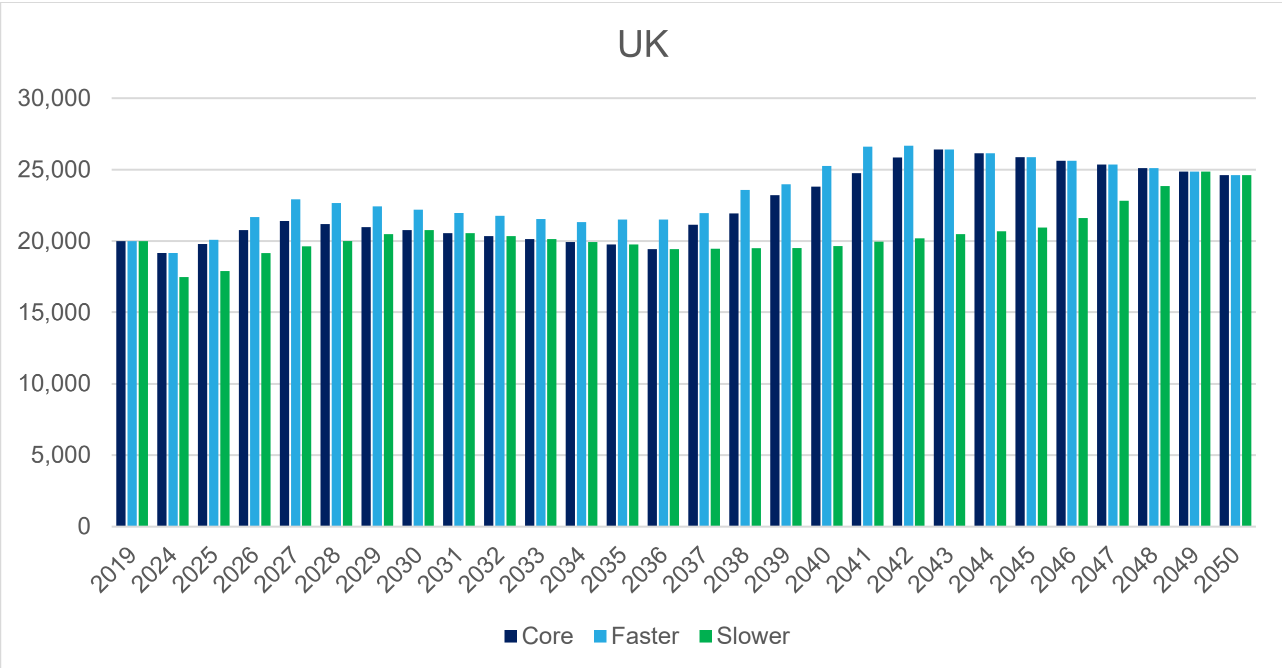
Source: York Aviation

Figure F.4: Difference in inbound tourism employment impacts between the Faster and Slower Growth Cases and the Core Planning Case





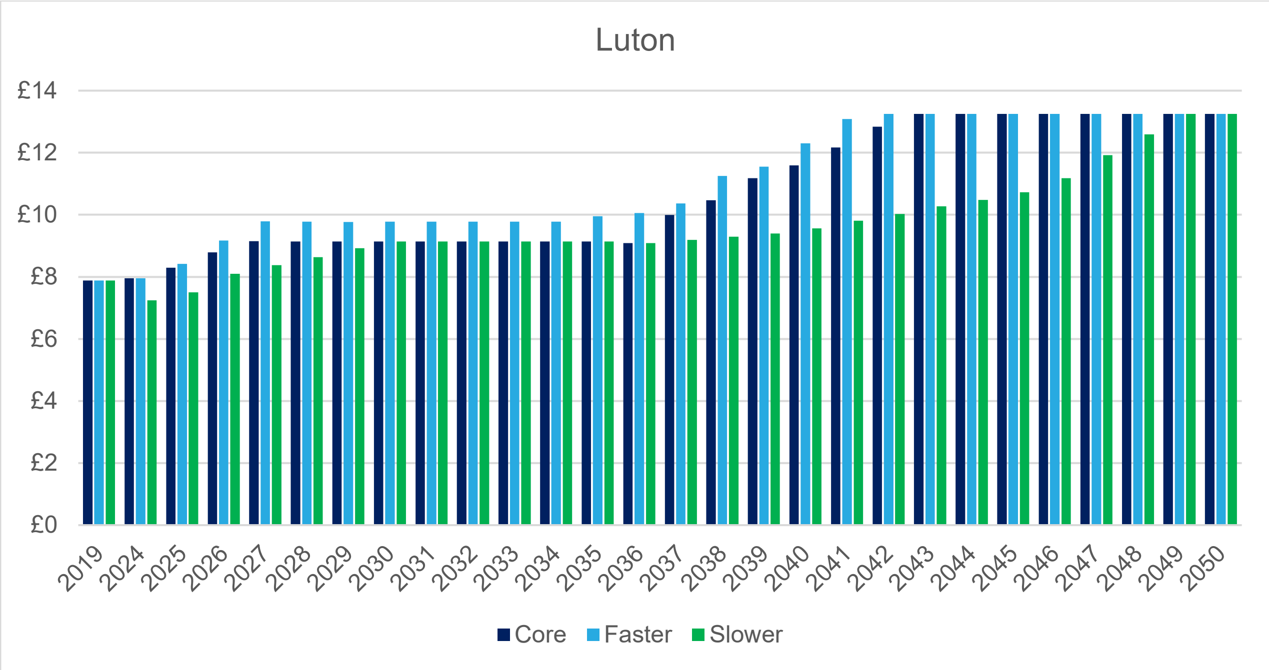


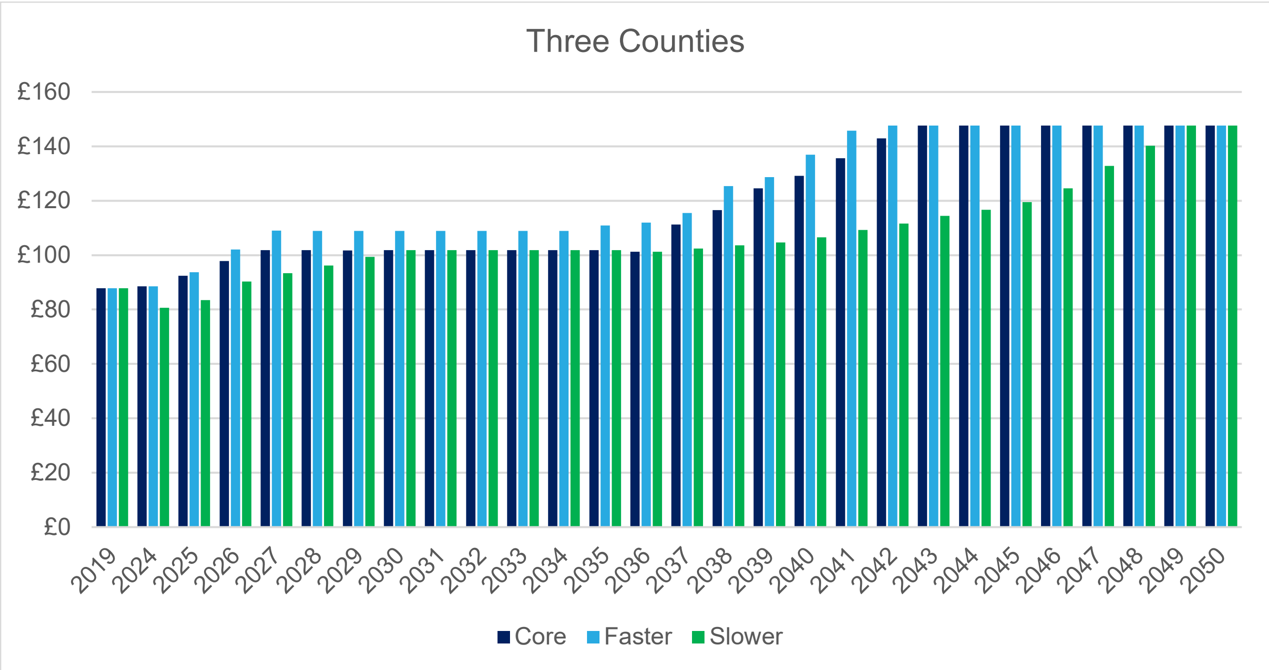


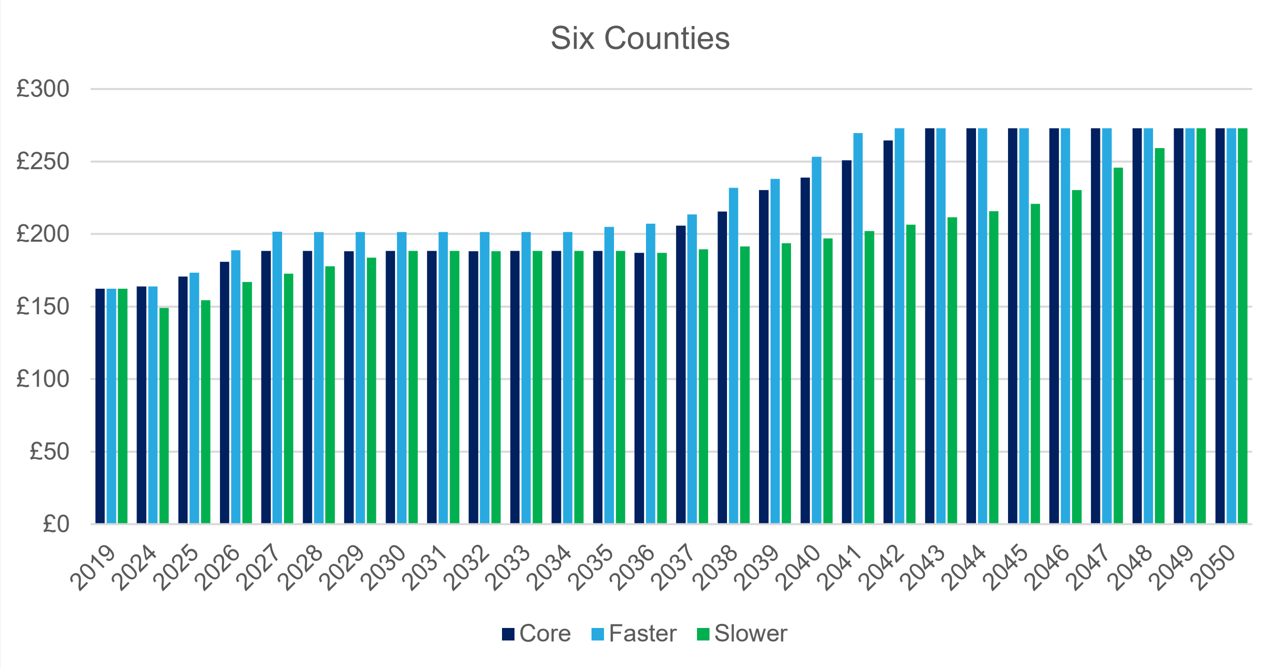
Source: York Aviation

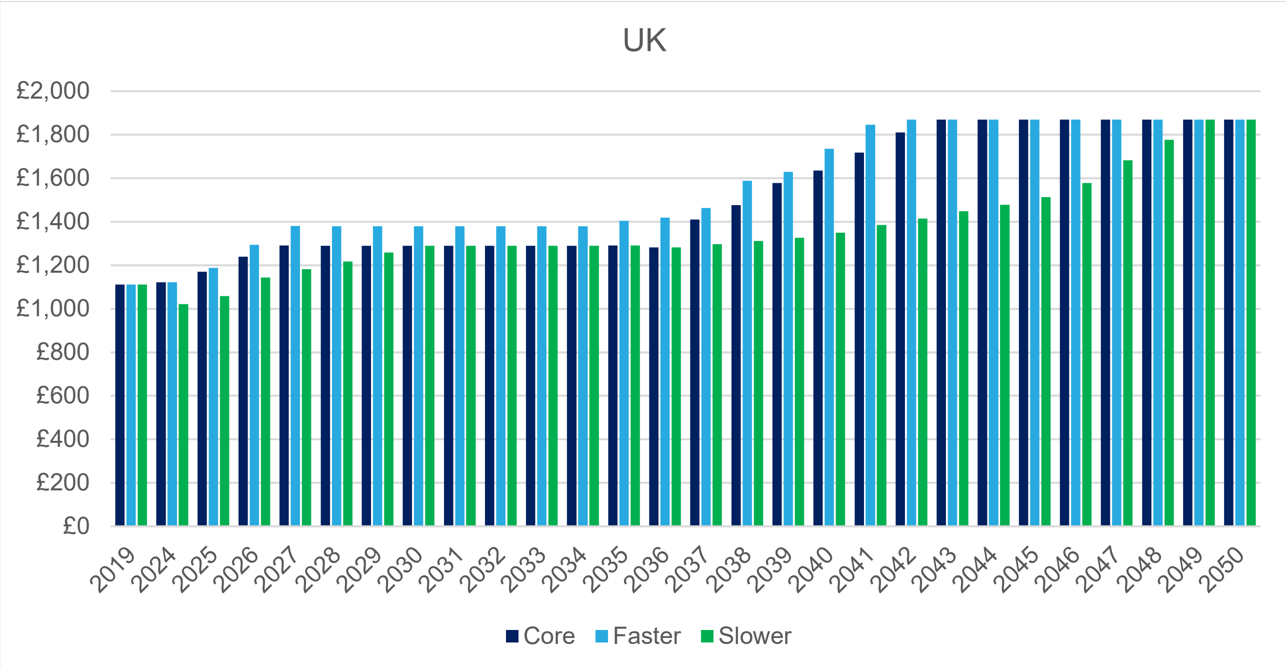
F3.1.3 **Figures F.5 (employment)** and **F.6 (GDP)** provide the same analysis for inbound tourism impacts. The pattern of the results is the same. While there are differences individual years due to speed of growth and underlying productivity growth, the scenarios converge as they reach 32 mppa.

Figure F.5: Difference in inbound tourism GDP impacts between the Faster and Slower Growth Cases and the Core Planning Case









Source: York Aviation