

Traffic management strategy

Proven and tested traffic measures will support GRN implementation

The traffic management strategy for the 2024 Budapest Olympic and Paralympic Games aspires to:

- Deliver short and reliable travel times for the Games Family
- Safeguard resilience in the event of unexpected issues
- Allow the city to function properly

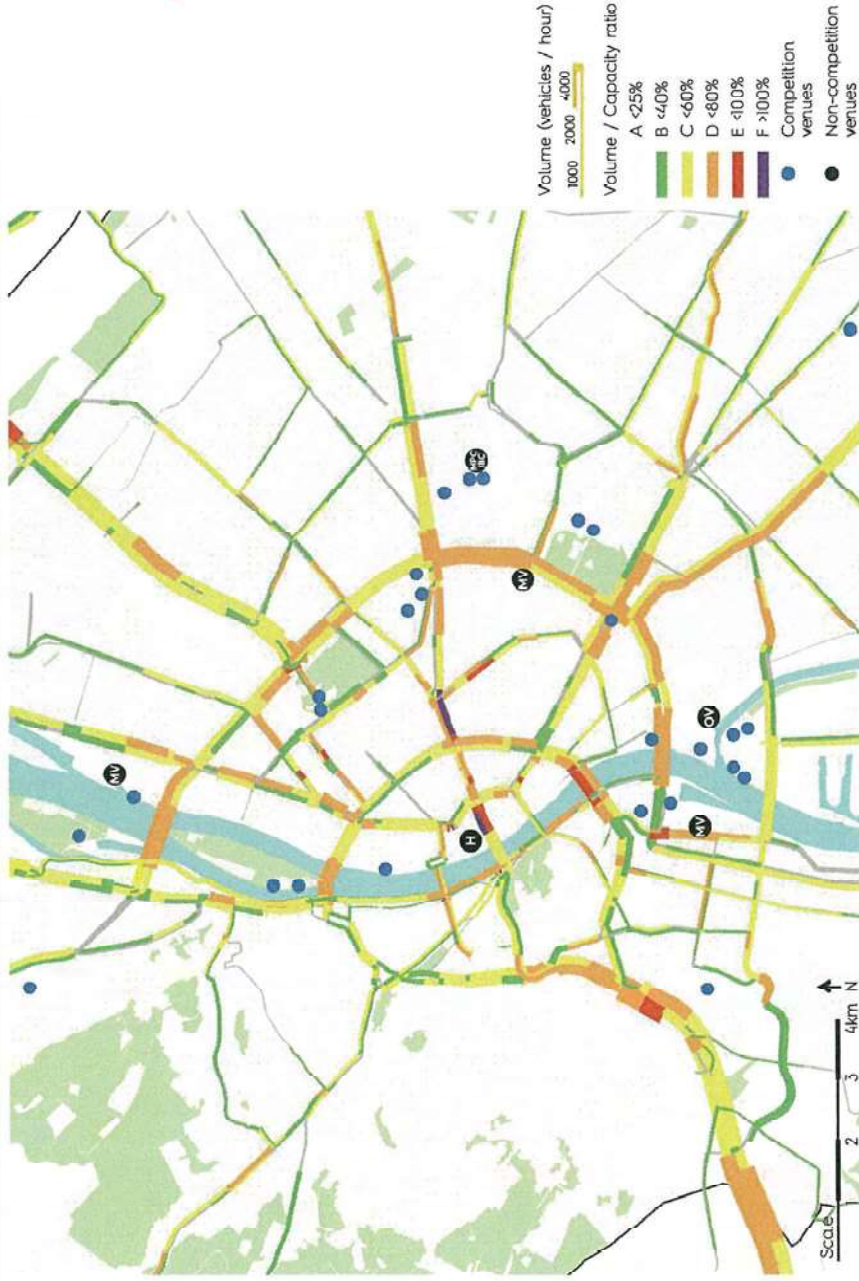
Budapest has a benign traffic environment as evidenced by its ranking in the TomTom traffic index (108th). This allows attaining the above goals by introducing realistic measures and initiatives. The latter have been developed and optimised using the city's proven transport model, which has been calibrated for summer conditions. By considering all transport and traffic enhancements and the 2024 demand, Budapest 2024 has elected to apply the following measures, restrictions and initiatives:

1. Extension of the already implemented freight delivery restrictions
2. Prohibition of on-street parking along GRN and other key parts of the city road network
3. Prevention of left turns as required
4. Targeted ban of access to key road networks (such as the M3 motorway) from certain entry gates and for peak times
5. Diversion of road trips made by city commuters to an alternative network
6. Mode shift from private to public transport as a result of the sophisticated Games travel demand management strategy

Figure 1 presents the city traffic conditions during the afternoon rush hour of the busiest day of the Games (Day 11, 17:00 - 18:00), when the above measures and the GRN are implemented. Traffic conditions are acceptable along the entire network. In the limited areas where congestion builds up, targeted interventions will be developed to streamline traffic flows.

A key enabler of the traffic strategy is Games Travel Demand Management (TDM) initiatives to be designed and implemented by BODA. TDM will influence the travel behaviour of citizens and spectators and will impact on

FIGURE 1 - CITY TRAFFIC CONDITIONS DURING THE AFTERNOON RUSH HOUR OF THE BUSIEST DAY OF THE GAMES (DAY 11, 17:00 - 18:00)



the routes, times of journey and modes. Targeted travel advice will be provided to spectators, businesses, regular public transport users and road users through a variety of information channels and methods. All stakeholders will have the information required to make their travel decisions and avoid expected or evolving hotspots.

In terms of Games time traffic operational measures, and in line with previous Games experiences, Budapest 2024 will examine the deployment of on-street police officers, adjustments of traffic signals, temporary changes in bus stops and pedestrian crossings, and prohibition of road works. Road signage and marking will provide clear and unambiguous directions to Games Family drivers and other road users.

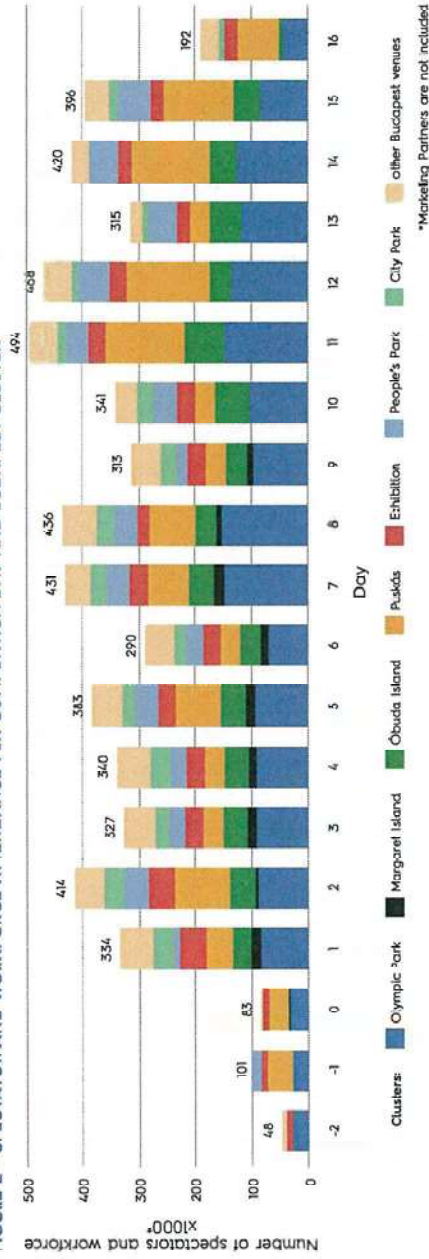
Transport demand of spectators and workforce

Balanced Master Plan leads to moderate transport demand per cluster

Day 11 will be the peak day of the Budapest 2024 Olympic Games with about 516 000 spectators and workforce throughout Hungary, 494 000 of whom will visit the Budapest venues (see Figure 2).

Olympic Park and Puskás are the busiest clusters with hourly peaks of 45 000 and 55 000 spectators and workforce respectively (see Table 3). Comparing with recent summer Games, this hourly peak demand is moderate, allowing for improved client experience and more effective transport and last mile operations. These demand estimates result from sophisticated modelling that has incorporated robust ticket sales estimates, as well as spectator and workforce travel behaviour from previous Games, adapted to the local environment.

FIGURE 2 - SPECTATOR AND WORKFORCE ATTENDANCE PER COMPETITION DAY AND BUDAPEST CLUSTER



Strengthening of transport systems for the Games

A mature public transport system, suitably strengthened, will provide superior transport experience for spectators and workforce

Budapest's robust public transport supports over 62% of the city's three million daily motorised trips through multiple mature systems: metro, suburban rail, light rail (tram), bus, trolley bus, and river transport. These systems will be strengthened appropriately in order to serve the Games and city needs.

Table 3 presents the estimated origins of spectator and workforce trips per Budapest cluster, obtained by appropriate gravity models that reflect local conditions. Using these estimates Budapest's transport mode provided the loading of all public transport systems during Games peaks. All identified gaps have been addressed fully in the Spectator and Workforce Transport Plan (SWTP) by introducing targeted strengthening initiatives of public transport as listed in Table 4.

The results of SWPT are presented in Table 5 and Figure 6, indicating that the capacity of the related public transport systems may comfortably serve demand. Specifically, as illustrated in Figure 6 SWTP satisfies the combined Games and background demand during the peak day of the Games (Day 11, 17:00 - 18:00). Similar results have been obtained for the peak day and hour of each of the seven clusters.

Metro, tram, rail or river services offer direct access for spectators and workforce to 28 of the 30 venues in Budapest. The remaining two venues are served through smart shuttle bus connections. The average distance between public transport station(s) and the front-of-house entries of clusters and stand-alone venues, weighted by venue visits, is less than 550 metres.

TABLE 3 - ORIGINS OF SPECTATORS AND WORKFORCE PER KEY BUDAPEST AREA (%)

Venue Cluster	Key Budapest areas							G - North West Pest County	H - North East Pest County	I - South East Pest County	J - South West Pest County
	A - North Buda	B - North Pest	C - Downtown Area	D - South Buda	E - Inner North Pest	F - South Pest					
1 - Olympic Park Cluster	10.4	13.3	8.0	12.3	12.6	25.2	3.8	3.5	5.0	5.9	
2 - Margaret Island Cluster	13.3	14.2	10.4	15.6	14.3	14.2	4.5	3.7	3.6	6.2	
3 - Obuda Island Cluster	13.3	14.5	10.3	15.3	14.2	14.3	4.6	3.8	3.6	6.1	
4 - City Park Cluster	12.4	15.3	9.4	13.9	13.9	17.4	4.4	4.0	3.8	5.6	
5 - Ruskó's Cluster	12.8	14.3	10.2	15.2	14.1	15.5	4.3	3.7	3.8	6.1	
6 - Exhibition Cluster	9.8	16.2	7.1	10.3	12.1	26.3	3.8	4.3	5.5	4.6	
7 - People's Park Cluster	12.3	14.0	9.8	14.7	13.9	17.3	4.1	3.7	4.2	6.0	



- International Airport
- Park and Ride
- Major Railway Stations
- Venue Clusters

In addition to strengthening public transport, the city's existing extensive network of cycleways (80 km) and comfortable walkways, which serve 12 million trips per day, will be enhanced and integrated to form the Active Route Network (ARN) of Figure 7. The ARN links venue clusters with key demand generators through pedestrian pathways and cycleways, many of which are at-grade in place. Using the ARN, four clusters may be reached from the city centre in less than 16 minutes by bicycle, all seven clusters in less than 40 minutes, while 23 out of 31 venues are within a 23 minute bicycle ride.

TABLE 4 - STRENGTHENING INITIATIVES OF PUBLIC TRANSPORT SYSTEMS AND OF THE ARN

System/ network	Strengthening initiative	Project in questionnaire	Outcome
Metro system	- Upgrade of Metro line 1	36	- Capacity enhancement from 5 400 to 6 000 pax / hr / dir - Reliability enhancement - Fully accessible in 2024 (currently not accessible) - Client experience enhancement - Integration with tram network
	- Upgrade of Metro line 2	42	- Accessibility enhancement of two more stations (total 5 out of 11 stations accessible in 2024) - Reliability enhancement
	- Upgrade of Metro line 3	37	- Accessibility enhancement of 11 more stations (total 13 out of 20 stations accessible in 2024) - Enhanced client experience
Suburban rail system	- Integration of H6 / H7 suburban lines to tram network	38	- Integration of suburban and urban public transport networks - Capacity enhancement from 7 500 to 9 000 pax / hr / dir - Reliability enhancement - Client experience enhancement - Fully accessible
	- Reconstruction of H8 and H9 lines	39	- Capacity enhancement from 3 500 to 6 200 pax / hr / dir - Reliability enhancement - Client experience enhancement - Fully accessible in 2024 (currently not accessible)
Tram system	- Upgrade of Tram line 1	40 / 42	- Integration with a significant rail station - Capacity enhancement from 5 700 to 8 900 pax / hr / dir - Enhanced client experience
	- Upgrade of Tram lines 2 and 51	41	- Capacity enhancement from 5 300 to 11 400 pax / hr / dir - Reliability enhancement - Accessibility enhancement - Enhanced client experience
	- Upgrade of stops	42	- Fully accessible in 2024 (currently 186 out of 643 stops are accessible) - Enhanced client experience
ARN	- Development of new pedestrian ways	35	- Traffic calming and traffic restriction zone development - Walking share increase - Accessibility enhancement
	- Development of new cycleways	48	- Continuous main cycling network development - Cycling share increase - Integration to reach all Gamas clusters
Other	- Development of Órmezó intermodal hub	47	- Integration enhancement of Metro, tram, rail, urban and suburban bus services - Enhanced client experience
	- Construction of railway connection of Liszt Ferenc International Airport	46	- Enhancement of public transport connectivity of the airport (20 minute travel time to the city centre) - Integration enhancement with urban and suburban networks - Enhanced client experience
	- Purchase of new bus and trolley bus vehicles	n / a	- Reliability enhancement - Fleet fully accessible in 2024 (currently 75% of bus and 50% of trolley bus vehicles are accessible) - Enhanced client experience
	- Dedicated bus shuttles	n / a	- Direct public transport connectivity to venues - Supplementing required capacity - Enhanced client experience

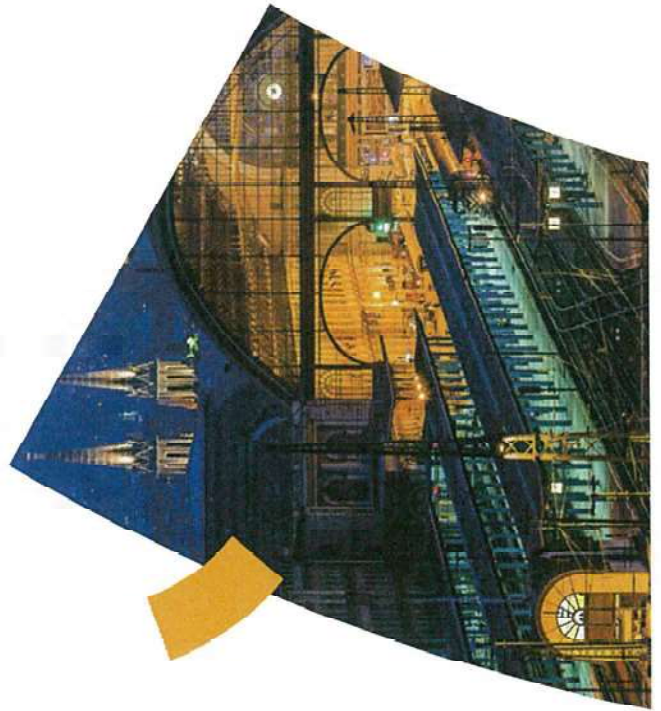


TABLE 5 - CAPACITY OF PUBLIC TRANSPORT SYSTEMS SERVING EACH CLUSTER VS SPECTATOR AND WORKFORCE DEMAND

Cluster	System	Total capacity per train / tram / bus	Peak headway / direction in 2024	Peak capacity / hour / direction in 2024	Number of directions	Peak capacity / hour for all directions (2024)	Total capacity for cluster (pax / hr for all directions)	Peak spectator and workforce arrivals (pax / hr)	Peak spectator and workforce departures (pax / hr)	Peak spectator and workforce crossover (pax / hr)	
Olympic Park Cluster	Tram	T1	2	8 940	2	17 880	71 400	38 100	27 500	40 400	
		T2	2	6 000	1	6 000					
	River	T4	4	5 250	1	5 250					
		T6	4	5 250	1	5 250					
		T5	2	5 361	1	5 361					
		S-Bahn	8	9 600	2	19 200					
Bus	Games shuttle bus	1	6 000	2	12 000						
	D11, D12 and D13	15	500	1	500						
Buda Triathlon Centre / Uske Arena	Tram	T1	2	8 940	2	17 880	28 800	6 100	6 400	-	
		T17	8	1 560	2	3 120					
	River	T41	15	760	2	1 520					
		T47	8	1 600	2	3 200					
		T56	8	1 520	2	3 040					
		T3	5	1 763	1	1 763					
Tram	T51	2	5 361	2	10 722	12 500	7 800	10 000	-		
	Games shuttle bus				as needed						
Margaret Island Cluster	Tram	T4	4	5 250	2	10 500	22 500	4 000	6 000	6 500	
		T6	4	5 250	2	10 500					
Budapest Aquatics Centre	River	D13	15	500	3	1 500	58 300	10 500	10 900	19 400	
		M3	3	19 728	2	39 456					
	Metro	T1	2	8 940	2	17 880	23 900	3 400	3 400	-	
		D11, D12, D13	15	500	2	1 000					
	Obuda Velodrome	Railway	H5	5	9 048	2	18 096	34 000	6 300	6 300	-
			Rail line 2	30	2 400	2	4 800				
Obuda Arena	Suburban rail	D12, D13	15	500	2	1 000	23 900	3 400	3 400	-	
		H5	5	9 048	2	18 096					
City Park Cluster	Tram	T1	2	8 940	2	17 880	23 900	10 900	9 900	9 300	
		M1	2	6 000	1	6 000					
Puskás Cluster	Metro	T1	2	8 940	2	17 880	74 800	54 400	54 700	65 600	
		M2	2	19 957	2	39 914					
	Tram	M4	3	14 880	1	14 880	52 800	12 600	14 700	10 500	
		T1	2	8 940	2	17 880					
Exhibition Cluster	Metro	T24	5	2 160	1	2 160	52 800	12 600	14 700	10 500	
		M2	2	19 957	1	19 957					
	Tram	T1	2	8 940	2	17 880	52 800	12 600	14 700	10 500	
		T28	12	775	2	1 550					
		T37	12	775	2	1 550					
		T3	6	2 000	2	4 000					
Suburban rail	T62	12	775	2	1 550	52 800	12 600	14 700	10 500		
	H8	10	4 176	1	4 176						
	HP	10	2 088	1	2 088						

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People's Park Cluster	Metro	M3	3	19 728	2	39 456	83 000	16 500	20 500	27 100	
	Tram	T1	293	2	8 940	2					17 880
		T24	200	6	2 000	2					4 000
		T28	155	15	620	2					1 240
		T62	155	15	620	2					1 240
		S-Bahn	1 200	8	9 600	2					19 200
Etele Volleyball Arena	Metro	M4	3	14 880	1	14 880	32 800	10 800	10 800	-	
	Tram	T1	293	2	8 940	2					17 880
Obuda Mountain Bike Centre	Tram	T1	293	2	8 940	1	8 940	12 800	10 300	10 300	-
		T17	195	8	1 560	1	1 560				
		T19	195	8	1 560	1	1 560				
		T41	190	15	760	1	760				
Boszik Stadium	Tram	T42	155	15	620	1	620	5 700	5 300	6 500	-
		T50	171	4	2 563	2	5 126				
		Games shuttle bus									



FIGURE 6 - LOADING OF PUBLIC TRANSPORT SYSTEMS DURING THE AFTERNOON RUSH HOUR OF THE BUSIEST DAY OF THE GAMES (DAY 11, 17:00 - 18:00)

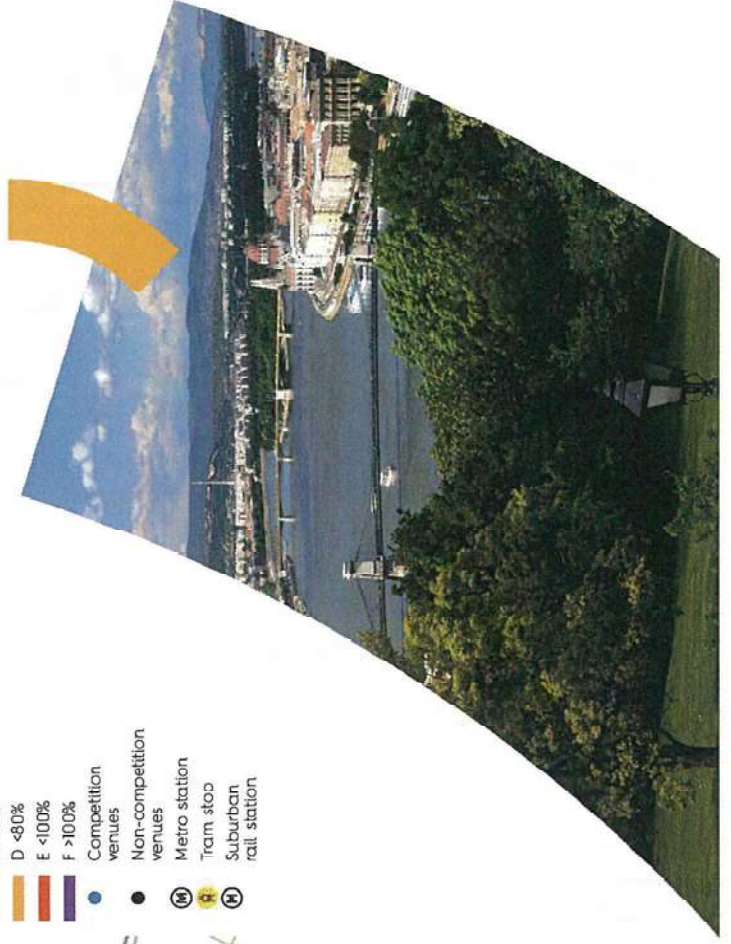


FIGURE 7 - THE ACTIVE ROUTE NETWORK

