

MANTRA

The impact of automated trucks on traffic efficiency on motorways

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- Microsimulation of the potential impacts of automation on KPIs
- Cars in an urban environment
- Trucks on Motorways



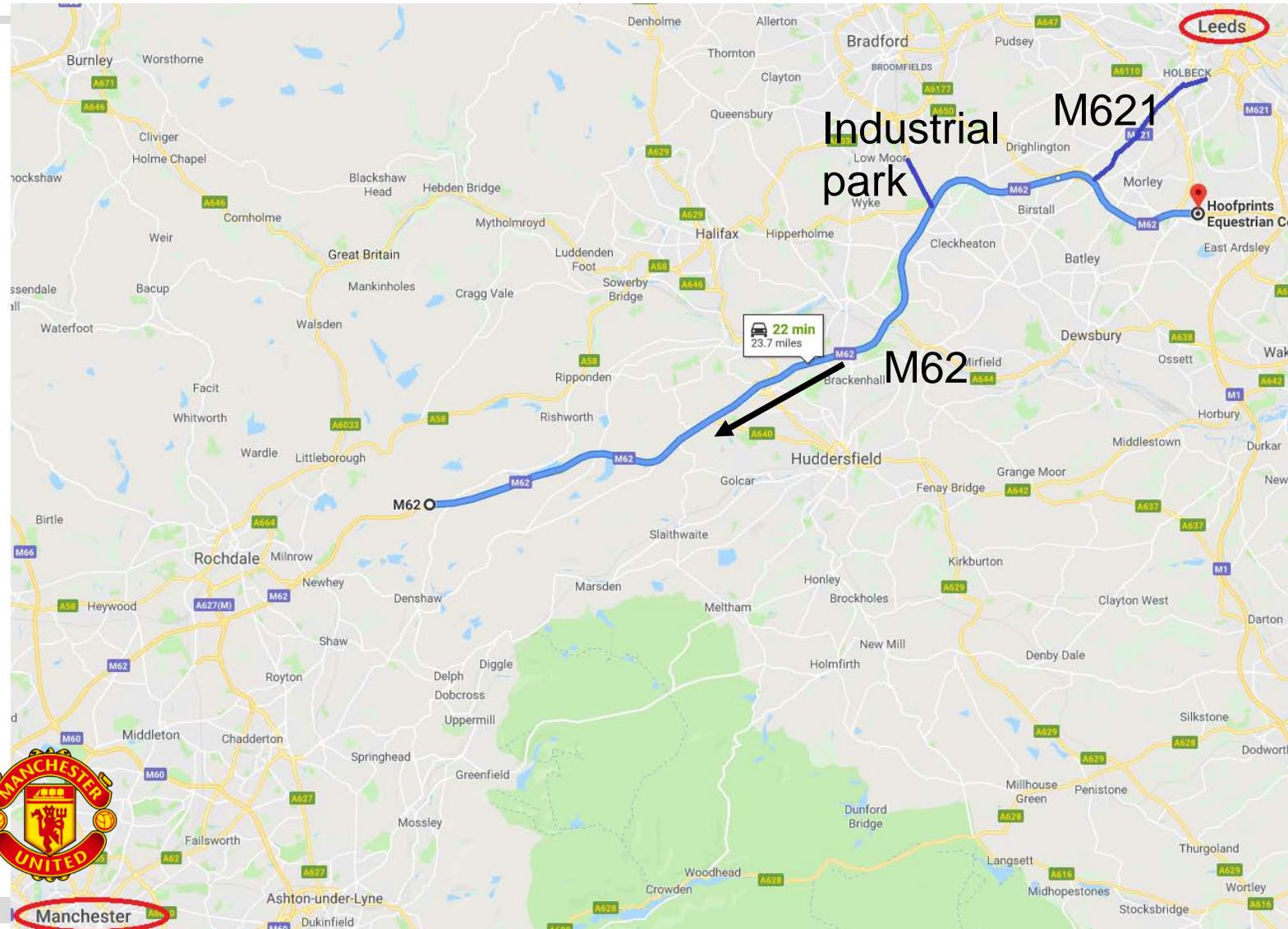
Chosen route

Real road

M62 + M621

Leeds towards
Manchester

Part of the main east-
west corridor in northern
England



Chosen route

Peak period
(7am-8am)

Real traffic from
Highways
England
counters

Plenty of trucks:
3.5% ~ 15.5%



Chosen route

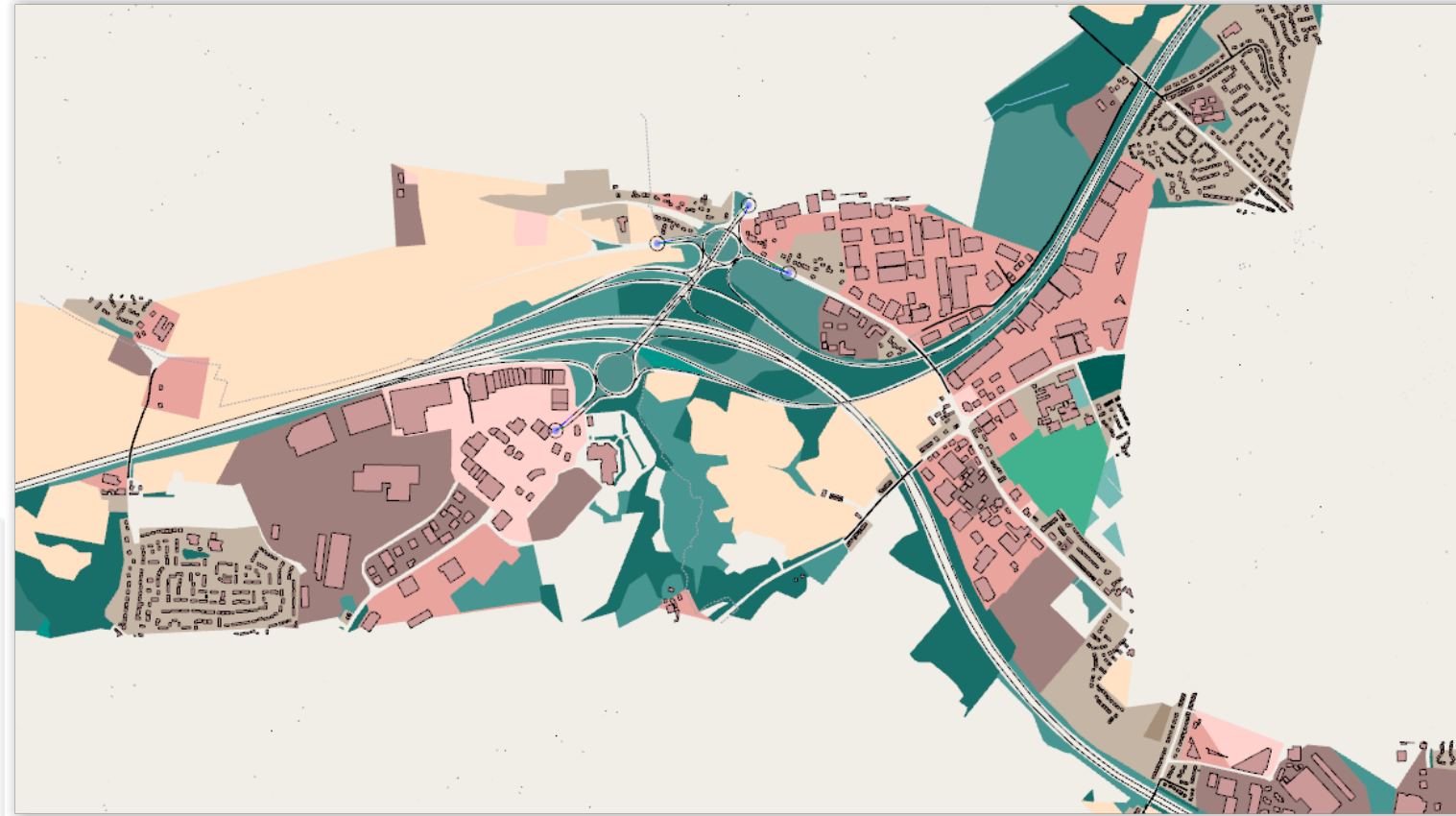
Weaving section
(7 junctions)

Uphill section

~39 km



- Aimsun
- Real number of lanes (motorway + ramp)
- Calibrated using traffic flow and vehicle types near diff. junctions



Automated truck behaviour

- Desired speed fixed at 85 km/h (no distribution)
- Reaction time quicker (auto. 0.4 sec; trucks 0.8, cars 0.8-1.2)
- Coupling allowed (CACCC plug-in of Aimsun)
 - » Auto. Trucks “couple” if they are within 200m of each other
 - » Coupled trucks travel very closely – 4m (alt. scenario 10 m)
 - » Maximum no. of coupled trucks not limited ... yet
- Overtaking gap acceptance not shortened

Automated truck behaviour

- Acceleration-deceleration unchanged
- Automated truck penetration: 25%, 50%, 75%, 100% (non-linearity expected) of trucks
- Different lengths of trucks (distributed)
- All other vehicles (cars, vans, manual trucks) unchanged
- Demand unchanged – so capacity changes included only partially (say, vehicles blocked on entry)

KPIs to be computed

- Average travel time/vehicle type
- Total travel time
- Delays (or not) on ramps
- Average speed/vehicle type
- Speed distribution/vehicle type
- Energy?

- Preliminary run results (CACCC gap 3m)
- Average time in that segment (seconds)

		Car	Van	Man. truck	Auto truck
Junction 27/28	Baseline	139.45	147.5	168.73	0
	Automated	138.45	146.63	0	162.75
Junction 26/27	Baseline	376.33	423.83	533.17	0
	Automated	284.08	315.44	0	377.42



Substantial changes – two motorway merging at 27. Plenty of vehicles leaving the motorway at 26, too. A lot weaving

- Test the effects of weight on slopes
- Maximum length of coupled trucks
- Run the scenarios (penetration, gap distance and CACC)
- Compute other KPIs

Any comments or questions?