	A	B	C	D	E	F	G	H	I
1	**Appendix 1.** Full list of sustainable urban mobility Indicators from Sdoukopoulos, et al. (2019) associated with the derived Social Foundation, in which the direct/indirect relation to the Social Floor, the sustainable direction (which describes the directional change to the indicator that would be considered "sustainable progress" relative to an ecological or social goal), and need order satisfier level were assessed.								
2									
3			**Ecological Ceiling**			**Social Foundation**			
4	**Theme**	**Indicator**	**Threshold**	**Dir.**	**DPSIR**	**Threshold**	**Dir.**	**Order Satisfier**	**Interlinkages discussion/commentary**
5	Accessibility	Share of population living within 300–500m from public transport stations/stops				Mobility poverty	+	4th	
6	Active citizens	Degree to which public is involved in transport planning process						NA	
7	Affordability	Share of household income devoted to transport				Transport affordability	-	3rd	
8	Air pollutant emissions	Air pollutant emissions (mass unit) per capita	Output-Based Thresholds	-	Pressure	Exposure to transport externalities	-	NA	Decreasing air pollution would benefit both ecological. aspects and social aspects
9	Air quality	Concentrations (µg/m3) of air pollutant emissions	Output-Based Thresholds	-	State	Exposure to transport externalities	-	NA	Decreasing air pollution would benefit both ecological. aspects and social aspects
10	Commuting	Average commuting travel time	Output-Based Thresholds	-	Driver	Accessibility poverty	-	3rd	Decreasing commuting times (particularly by motorized modes) would benefit both ecological aspects and social aspects. Long commutes limit time available for other need-satisfying activities. However, an improved measurement would be commuting time by transport mode, for while biking may have a longer commuting time, it could potentially be more ecologically and socially beneficial (provided that there are other mobility options available for those unable to cycle). Additionally, less time spent idling would reduce the operational time of vehicles leading to less emissions.
11	Contribution to economy and development	Share of GDP contributed by transport sector/Share of GVA generated by transport sector						NA	
12	Cultural aspects	Degree to which cultural aspects are considered in transport planning						NA	
13	Demographic and socio-economic characteristics	GDP per capita						NA	Income brackets would be more relevant, and particularly in consideration of equality across genders and age brackets
14	Economic productivity	Ratio of public transport revenues to the respective maintenance and operation cost						NA	
15	Energy efficiency	Ratio of passenger-km travelled to the respective energy consumption	Output Based Thresholds	+	Driver			NA	
16	Fossil fuel energy consumption	Per capita fossil fuel energy consumption by transport sector	Output Based Thresholds	-	Driver			NA	

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17	Fragmentation	Fragmentation of urban space	Land Conversion	-	Driver	Exposure to transport externalities	-	NA	Decreasing fragmentation would benefit both ecological. and social aspects. Ecologically, lower fragmentation would lead to less impacts on biodiversity by maintaining greater habitat continuity and decreasing collisions with wildlife. Fragmentation can additionally lead to greater car dependency if active transport mode infrastructure considerations are not taken within the development. Socially, fragmentation can lead to social exclusion and greater inequality through the spatial segregation of urban populations (Landman 2011; Bolay et al. 2005).
18	Freight transport	Modal split of freight transport/Average freight transport speed and reliability							Freight is known to be responsible for noise and some specific emissions categories, but these indicators inherently include freight and we thus consider it to be too indirect to be included
19	GHG emissions	Greenhouse gas emissions per capita	Output-Based Thresholds	-	Pressure	Mobility poverty / Accessibility poverty		NA	Decreasing GHG emissions would benefit ecological aspects. It would also contribute to the Social Foundation in the long term and globally by mitigating climate change. However, in certain conditions it could impact SF negatively. For example, if the response to the climate change DPS system was rationing or taxation of emissions, these policies could potentially reduce accessibility of those who live in car-dependent locations and/or can not afford low-impact vehicles (e.g. electric). It could contribute to poverty in other life domains by reducing resources available for them.
20	Hazardous materials and environmental damages	Number of tonne-km referring to transport of hazardous materials by mode							This indicator could be improved by assessing the amount of hazardous materials spilled or emitted, as just saying how much is transported tells very little and was considered too indirect for inclusion
21	Health impacts	Number of chronic respiratory illnesses, asthma attacks, respiratory restricted activity days and premature deaths due to air pollution				Exposure to transport externalities	-		
22	Impacts to habitats	Annual number of collisions with wildlife	Biodiversity loss	-	Pressure				
23	Impacts to sites of historical and architectural importance	Deterioration of historical buildings and other cultural assets due to acidification							
24	Infrastructure	Road network length per 1.000 inh.	Output-Based Thresholds/ Land-system change	-	Driver	Accessibility poverty	+	4th	Limiting the expansion of roads would reduce ecological impacts (as larger road networks can be linked to greater travel volume, as well as increased impacts to land-use change and biodiversity, and exposure to transport externalities) associated with road creation, but could limit access to mobility.

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25	Integrated planning	Degree to which transport planning is comprehensive by considering all significant impacts and using the best evaluation practices							
26	Land consumption	Area taken by transport infrastructure	Land Conversion	-	Driver	Exposure to transport externalities	-	NA	Decreasing the area taken by transport infrastructure would stand to decrease the amount of land consumption as well the externalities associated with transport.
27	Liveable public space and amenities	1. Total area of green spaces and parks per capita	1. Land Conversion	+	Pressure	Exposure to transport externalities	+	NA	Contextually, the most untouched land that can be left the better, but for an already occupied urban space increased green space stands to benefit both land conversion as well as exposure to transport externalities
28		2. Green areas as a share of the total urban area	2. Land Conversion	+	Pressure	Exposure to transport externalities	+		
29	Non-motorised modes	Share of trips by non-motorised modes	Output-Based Thresholds	+	Driver	Mobility poverty / Accessibility poverty		3rd	Trips by non-motorized modes have much lower ecological impact than by motorized modes (are positive to the EC), but if this is connected to a low access to any motorized transport (e.g., public transportation) and good local accessibility of services, and reduces the ability to reach essential services by people (particularly those unable to travel on foot or by bicycle), this could potentially be a negative impact on the SF.
30	Parking	Share of free parking spaces							Encourages personal automobility, thus leading to increased environmental impacts. In the context of high car dependence (lack of other mobility options) it might improve transport affordability
31	Public expenditures, investments and subsidies in transport system	Public subsidies to transport system							
32	Public transport	Share of trips by public transport	Output-Based Thresholds	+	Driver	Mobility poverty		4th	Trips by public transport have typically lower ecological impacts than by private cars (are positive to the EC), but if travel by public transport leads to overly long or inconvenient trips, this could potentially lead to a negative impact on the SF.
33	Recycling	Recycling rate for end-of-life vehicles	Output Based Thresholds	+	Driver				
34	Renewables and alternative fuels	Share of renewable energy in total energy consumption by transport sector	Output Based Thresholds	+	Driver				
35	Resource use	Total volume of raw materials used in vehicle manufacturing	Output Based Thresholds	-	Driver				
36	Safety	Number of road fatalities per 100,000 inh.				Exposure to transport externalities	-	NA	
37	Security	Share of population feeling safe from violations and other relevant incidents during traveling				Exposure to transport externalities	+	NA	

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38	Social equity	Equity/justice of exposure to air pollution emissions				Exposure to transport externalities - Indirect	+	NA	
39	Traffic congestion	Average time spent travelling under congested conditions per year per capita	Output-Based Thresholds	-	Driver	Accessibility poverty	-	3rd	Decreasing traffic congestion would benefit both ecological and social aspects.
40	Traffic noise	Traffic noise levels/Share of population exposed to noise levels above the statutory threshold				Exposure to transport externalities	-	NA	
41	Transport costs and prices	Fuel prices and taxes	Output-based threshold	+	Driver	Mobility poverty	-	3rd	Ecologically, increased fuel prices and taxes may lead to less car-dependent development and increased use of public and active transport modes. However, from a social perspective higher fuel prices and taxes can lead to lower transport affordability and mobility poverty.
42	Transport efficiency	Occupancy rate of passenger vehicles	Output Based Thresholds	+	Driver				
43	Transport external costs	Total cost due to transport externalities				Exposure to transport externalities	-	NA	
44	Trips to/from school	Modal split of trips to school/Share of children driven to school by car	Output Based Thresholds	-	Driver				This technically could only be for the latter part since modal split is dependent on the EMF of the mode
45	Urban planning and land-uses	Population density	Output-Based Thresholds/ Land-system change		Driver	Accessibility poverty/ Exposure to transport externalities		NA	Population density is considered to be an ambiguous indicator both for its impact on the EC as well as the SF, where while population density has been noted to be correlated with decreased energy use in transport (Rode et al. 2014), and associated lower emissions, it can additionally be linked to greater congestion and ambiguous impacts. Socially, while densification can potentially lead to increased accessibility, it also can be linked to increased costs of living and decreased access to green spaces, which represent externalities, with the potential for these impacts often requiring contextualization (Dempsey et al. 2012). The indirect effects of this indicator represent a driver with an unclear connection to the states and pressures, if lacking context.
46	Vehicles fleet	Number of cars per 1,000 inh.	Output-Based Thresholds	-	Driver	Mobility poverty	+	4th	Reduced fleet ownership benefits the environment, but if this comes at the expense of the ability to reach essential services by many people (i.e., leading to transport poverty) and access to lower-impact travel modes is not provided, this could potentially be a negative impact on the SF.
47	Waste	Transport of solid waste per capita							

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48	Water run-off	Transport infrastructure impervious area per capita	Freshwater use	-	Driver	Exposure to transport externalities	-	NA	Decreasing the amount of impervious area of transport infrastructure would provide an ecological benefit by reducing water cycle impacts associated with urban development (Burian and Pomeroy 2010). Socially, the decreasing the impervious area would reduce externalities associated with flood risks, as well as provide a greater ability of an urban area to provide access to water and hygienic services to its population.