Medan, Indonesia

Sustainable Urban Mobility Plan — Completed

Basic information

Urban area	→	3,094.85 km²
Population (metropolitan area)	→	4,944,979
Growth rate	→	+1.1%
GDP per capita	→	USD 12,400
Baseline motorisation rate	→	485 motorcycles/1,000 inhab. 82 cars/1,000 inhab.
Modal share		
Public transport: 6% of which	→	Minibus: 94% Bus: 5% Train: 1%
On-demand transport services: 7% of which	→	Tuk-tuk: 40% Ojek: 50% Taxi: 10%
Private transport: 72% of which	→	Car: 23% Motorcycle: 77%
Non-motorised transport: 15% of which	→	Walking: 94% Cycling: 6%
Transport emissions per capita	→	0.5 ton of CO_2-eq
Exposure to climate change	→	HIGH

Context

Medan, located in northern Sumatra, is the capital and largest city of North Sumatra Province and the fourth-largest city in Indonesia. Mebidangro plays a major role in Indonesia's economy. It hosts Belawan, the country's third-largest container port, and Kualanamu International Airport, Indonesia's fifth-busiest airport. With an economic growth rate of 6.4%, above the national average, the region is a strategic hub for industrial and logistics.

Support from the Partnership

Technical Assistance: Support to develop a Sustainable Urban Mobility Plan (SUMP)
Funded by: Agence Française de Développement (AFD) through MobiliseYourCity Asia
Funding amount: EUR 510,155
Implemented by: AFD
Local counterpart: North Sumatra Province (and the representatives of the Medan Metropolitan Area authorities from Kota Medan, Kota Binjai, Kabupaten Deli Serdang and Kabupaten Karo)
Consultant(s) involved: Egis
Final Sump report: Sustainable Urban Mobility Plan for Medan Metropolitan Area (SUMP Mebidangro) - Final Report I MobiliseYourCity

SUMP Summary

SUMP Status	Adopted
SUMP Development Timeline	Medan joined MobiliseYourCity in Q1 2020 MobiliseDays in Q4 2020 Start of SUMP in Q3 2020 Completion of SUMP in Q2 2022 SUMP de facto approved (no formal adoption)
SUMP Vision	"A sustainable, inclusive and integrated mobility system for the Medan metropolitan area that supports economic development, improves citizens' quality of life and protects the environment. The SUMP emphasises a modal shift from private vehicles to public transport and non-motorised modes, improved road safety, affordable mobility and strengthened governance." (SUMP report, p.80)
Key expected results (GHG, modal share and access)	Quantitative targets include: • Public transport share: increase from 10 % (baseline) to 23 % by 2035 • GHG reduction: cut per-capita transport emissions from 549 kg to 517 kg CO_2eq by 2035 • Accessibility: raise the share of the population with access to mass transit within 750 m from 3.8 % to 11.1 % • Safety: reduce the fatality rate from 10,4 to 4,9 deaths per 100,000 inhabitants • Affordability: limit transport expenditures to ≈5 % of household disposable income for the second quintile
Total SUMP Investment Requirement	The action plan includes more than 40 measures, with a total CAPEX of about EUR 3,5 billion and cumulative OPEX of approximately EUR 1,3 billion up to 2040. The main cost drivers are the LRT and tram network (around EUR 2,9 billion) and the BRT system, with Line 1 estimated at EUR 115–145 million and additional corridors at EUR 100–165 million per corridor.

SUMP preparation process and stakeholder involvement

The SUMP was developed between 2019 and 2022 following the MobiliseYourCity methodology. It involved multiple workshops, stakeholder consultations and technical studies.

A steering committee composed of provincial authorities (North Sumatra), municipal governments (Medan, Binjai, Deli Serdang, Karo), the Ministry of Transport, the Ministry of National Development Planning (BAPPENAS), and donors (AFD, World Bank) guided the process.

Technical committees brought together transport agencies, public works departments, BAPPEDA, cooperatives, civil society organisations, women's associations and people with disabilities.

Household surveys, traffic counts, onboard counts and stakeholder interviews were conducted in 2020–2021. Official SUMP approval by decree requires prior provincial-level approval. Board counts and stakeholder interviews were conducted in 2020–2021.

Diagnosis of urban mobility in Medan

Infrastructure and accessibility: A network in need of integration

The spatial diagnosis reveals a strong mismatch between urban expansion and the provision of transport infrastructure. While road infrastructure is extensive, it is primarily designed for private vehicles and lacks safe, continuous facilities for pedestrians and cyclists. Public transport routes are fragmented, with limited intermodality and weak connections between modes.

Accessibility to high-capacity public transport remains low for large parts of the metropolitan population. This spatial imbalance reinforces dependence on cars and motorcycles and limits access to jobs, education, and services, particularly for peripheral communities.

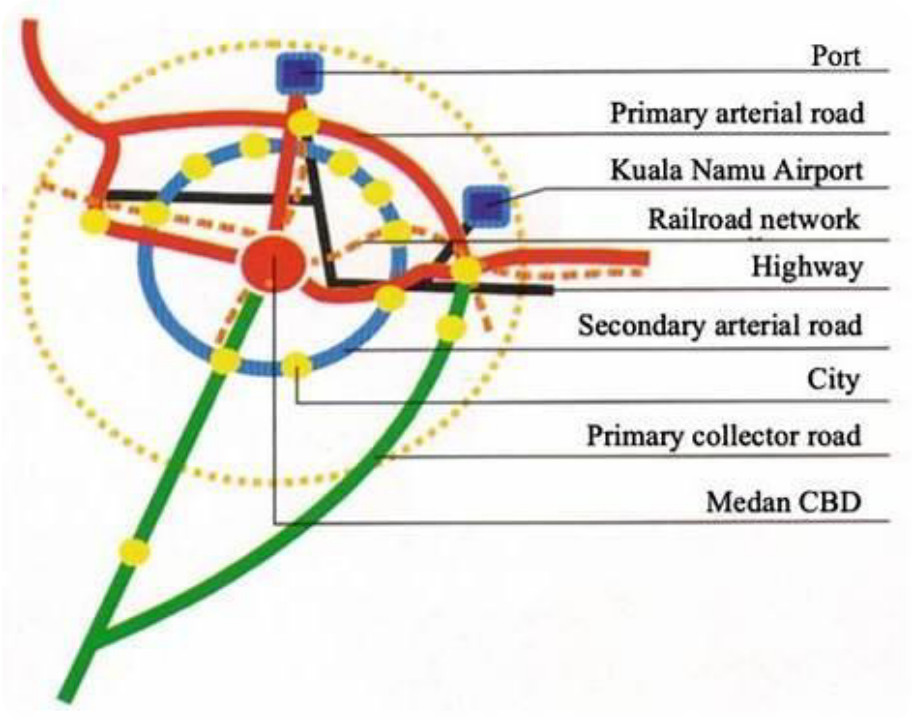

Figure 1 Medan's primary transport network and key nodes (Port–Airport–CBD)

Baseline mobility conditions and modal split: A system dominated by motorcycles

Mobility in the Medan metropolitan area (Mebidangro) is currently overwhelmingly dominated by private motorised transport, in particular motorcycles. The SUMP baseline shows that around 70% of all trips are made using private vehicles, with motorcycles accounting for the vast majority of this share. Public transport accounts for only a single-digit share of trips, while non-motorised modes (walking and cycling) play a marginal role despite short average trip distances.

This modal structure is the result of decades of road-oriented urban expansion, limited investment in public transport, and the absence of an integrated metropolitan mobility authority. As a result, congestion is high on the main corridors, travel times are unreliable, and transport costs burden households, especially those without access to private vehicles.

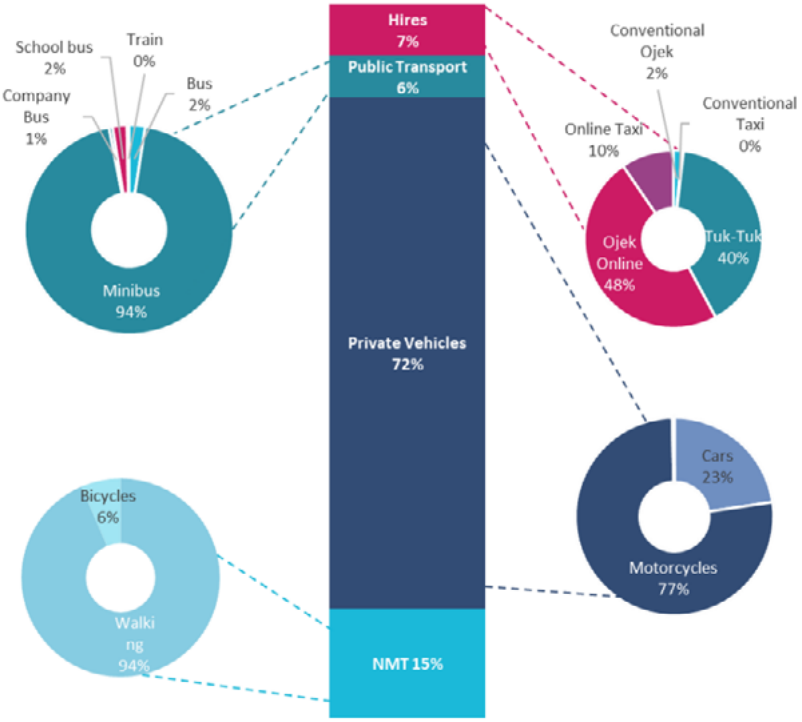

Figure 2 Modal share of declared trips in household interviews

Institutional and regulatory context: Fragmentation as a structural constraint

The SUMP diagnosis identifies institutional fragmentation as one of the most critical barriers to sustainable mobility in Mebidangro. Responsibilities for transport planning, infrastructure, regulation, enforcement, and service delivery are spread across multiple municipalities, the province, and national agencies, with limited coordination mechanisms.

While several regulations and planning instruments exist, they are not consistently aligned at the metropolitan scale, resulting in disconnected investments and weak enforcement. Public transport services, particularly minibuses, operate under fragmented cooperative arrangements with limited oversight, constraining service quality and reform.

Road safety and fatalities: A silent public health crisis

Road safety emerges as one of the most alarming findings in the SUMP diagnosis. The metropolitan area records high numbers of traffic fatalities and serious injuries, with motorcycles disproportionately represented among victims. Young men and economically active age groups are particularly affected, creating significant social and economic losses.

Spatial analysis in the report shows that accidents and fatalities are concentrated along major arterial roads and access corridors, often where high speeds mix with informal crossings, roadside activities, and insufficient pedestrian infrastructure. Safety risks are further amplified by weak enforcement and limited road-user education.

Social and environmental dimensions: Inequality, emissions, and livability

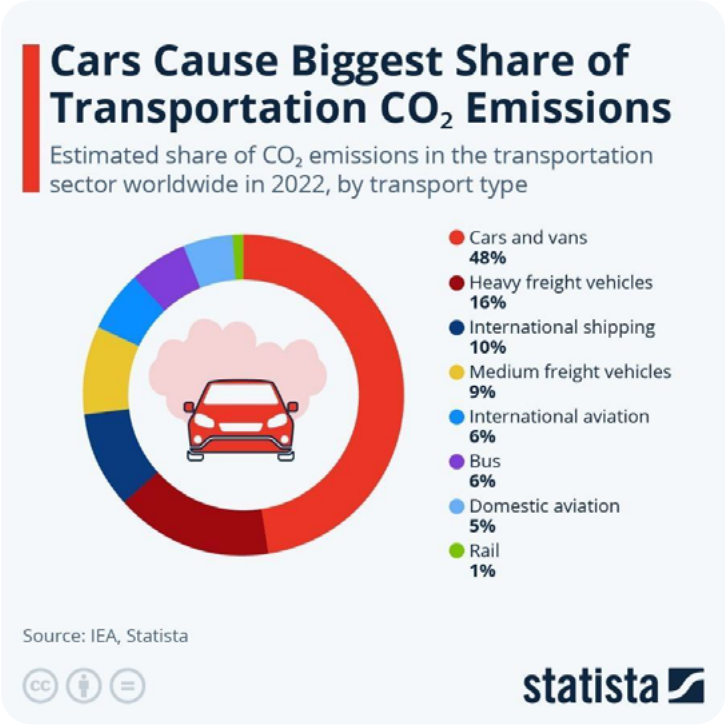

Figure 3 Global transport CO_2 emissions by mode (2022)

The current mobility system in Mebidangro generates significant social and environmental externalities. Transport-related greenhouse gas emissions are estimated at around 0.5 t CO_2-eq per capita, driven mainly by the motorcycle-dominated fleet and growing car ownership. Air quality issues are particularly acute along congested corridors, affecting daily exposure for large segments of the population.

Socially, the SUMP highlights pronounced e. Women rely more heavily on public transport and walking, yet face safety, comfort, and affordability constraints. Lower-income households spend a disproportionately high share of income on transport. At the same time, persons with disabilities and older people face severe accessibility barriers due to poor sidewalk quality and vehicle design.

These findings reinforce the case for inclusive mobility investments.

SUMP visions and goals

> "Mebidangro will provide sustainable, inclusive and integrated mobility that supports economic development, protects the environment and improves quality of life for all residents."

The goals are grouped into three thematic pillars:

Develop sustainable infrastructure: deploy a mass transit network (BRT, LRT, tram, and waterbus), improve walking and cycling networks, optimise paratransit, and modernise road infrastructure.

Enhance accessibility and equity by ensuring affordable mobility for all, integrating fares across modes, improving safety and comfort, and prioritising women and vulnerable groups.

Strengthen governance and financing: establish a metropolitan mobility authority, develop sustainable funding mechanisms (land-value capture, corporate mobility tax), build institutional capacity and improve data collection.

Quantitative objectives include: (i) doubling public transport share to 23 % by 2035, (ii) increasing non-motorised mode share to >20 %, (iii) cutting per-capita GHG emissions by ~6 %, (iv) reducing fatalities by more than 50 %, and (v) limiting transport expenditures to 5 % of household income.

Test scenarios and selected scenario

The SUMP assessed three scenarios: Reference, Scenario 1 (central) and Scenario 2 (ambitious). The Reference case assumes continuation of current trends, limited investments and no change in modal share. Scenario 1 envisions a moderate BRT programme and some pedestrian improvements. Scenario 2 adds a comprehensive rail network, expansive BRT corridors, extensive sidewalks and cycleways, parking management and freight regulations. Scenario 2 delivers the greatest benefits but requires significant investment (CAPEX ≈ IDR 54 trillion). Local authorities and stakeholders selected Scenario 2 because it maximises social and environmental benefits while remaining technically feasible.

Evaluation horizon

Impacts were evaluated for 2025 and 2035. Scenario 2 significantly outperforms the reference case across all indicators, as shown in the impacts table below.

SUMP key measures

Cluster	Measure	Cost estimate (EUR)[1]	Proposed financing source	Implementation schedule
Urban Planning & NMT	Action 01 A – Car-free zones (permanent closure)	77,300,000	APBD	2022-2027
Urban Planning & NMT	Action 01 B – Car-free zones (temporary/ periodical closure)	118.500 (77,300 + 41,200/year)	APBD	2022-2027
Urban Planning & NMT	Action 02 – Comfortable & safe sidewalks	35,000,000	APBD (Regional & Municipal Budgets)	2023-2024
Urban Planning & NMT	Action 03 – Mixed-use zones in urban centres	Cost varies by site	Unknown	2023-2028
Urban Planning & NMT	Action 04 – Regulation to restrict urban sprawl	515,000	APBD	2023-2028
Urban Planning & NMT	Action 05 – Framework for TOD developments	Cost depends on studies/ consultation	APBN	2022-2025
Urban Planning & NMT	Action 06 – Land value capture mechanism	412,000	APBD	2023-2028
Urban Planning & NMT	Action 07 – Safe NMT and bicycle lanes	14,100,000	APBD	2022–2026
Road Network (Private)	Action 08 – Circular roads	13,600,000	APBD	2023-2026
Road Network (Private)	Action 09 – Enhance Medan–Berastagi road link	1,550,000	APBD	2023-2026
Road Network (Private)	Action 10 – Standardised road signage	CAPEX 154,500,000; OPEX 5,150/year	APBD	2023-2025
Road Network (Private)	Action 11 – Traffic calming measure	Cost depends on design	Unknown	2023-2026
Road Network (Private)	Action 12 – Reinforce the driving license process	No additional cost	Unknown	2023-2024
Road Network (Private)	Action 13 – One-way streets	154,500	APBD	2023-2025
Road Network (Private)	Action 14 – Park and ride at transit hubs	1,800,000 + maintenance	Unknown	2023-2025
Road Network (Private Vehicles & Public Transport)	Action 15 – Key multimodal hubs	Cost varies widely	Private finance leveraged	2023-2026
Road Network (Private)	Action 16 – Traffic regulation enforcement & campaigns	515,000	APBD	2022-2024

[1] Exchange rate (USD→EUR): 1 USD = 0.85 EUR

Cluster	Measure	Cost estimate (EUR)[1]	Proposed financing source	Implementation schedule
Road Network (Private)	Action 17 – Quality road network	1,550,000	APBD	2023-2025
Road Network (Private)	Action 18 – Limit the circulation of freight vehicles	515,000	APBD	2023-2024
Public Transport	Action 19 – BRT Line 1	113,300,000	APBD	2023-2028
Public Transport	Action 20 – Wider BRT network	Corridor H: 87,600,000; Corridor T: 82,400,000	APBD + central gov + intl partners	2022-2030
Public Transport	Action 21 – Implement waterbuses	CAPEX 21,700,000; OPEX 7,530,000/ year	Provincial budget + central gov	2023-2028
Public Transport	Action 22 – Urban rapid rail lines	CAPEX 2,266,000,000; OPEX 51,500,000/ year	Multi-level budgets	2022-2038
Public Transport	Action 23 – Improve existing rail services	1,030,000	Central gov (APBN)	2022-2026
Public Transport	Action 24A – Minibuses routing & ops	1,800,000	APBD	2022-2023
Public Transport	Action 24B – Minibuses quality & comfort	772,500	APBD	2022-2023
Public Transport	Action 25 – Service of existing bus transport	1,030,000	APBD	2023-2024
Public Transport	Action 26 – School buses	8m bus: 30,900; 12m: 51,500,000; articulated: 77,300; operation	APBD	2023
Public Transport	Action 27 – Promote public transportation	CAPEX 103,000	APBD province	2023-2028
Digitalization	Action 28 – Mobility as a service	51,500,000	APBD + central gov + intl partners	2022-2024
Digitalization	Action 29 – Monitoring system Mebidangro	Cost depends on scale	APBD + central gov + intl partners	2025
Digitalization	Action 30 – Real-time passenger info systems	Per bus: 7,700; per train: 15,500; per station: 38,600; OCC: 4,120,000; OPEX 720,000/year	APBD + central gov + intl partners	2022-2026
Digitalization	Action 31 – Fare intermodality	1,550,000	APBD + central gov	2025-2026
Governance	Action 32 – Mebidangro mobility authority	Depends on ambition	Cost-sharing	2023-2027
Governance	Action 33 – Minibus organisation reform	4,120,000	APBD + central gov	2023-2028
Governance	Action 34 – Corporate tax on mobility	Cost depends on surveys + implementation	APBD + APBN + intl partners	2024-2027
Governance	Action 35 – Technical assistance	128,700/year	APBN + foreign	2022-2026
Governance	Action 36 – Separate rail infra & ops	No cost generated	/	2023-2028
Governance	Action 37 – Taxing motorised vehicles on urban roads	Unknown	APBD + APBN + intl partners	2022-2029
Environment	Action 38 – Incentives to reduce fuel consumption	35 - 72 EUR per car	APBD + APBN	2022-2025
Environment	Action 39 – Renewable energies for rail transportation	Unknown	APBD + APBN + partners	2023-2028
Environment	Action 40 – Renewable energies for road PT	OPEX: 308,900 per vehicle; alternative brands 585,000; hydrogen CAPEX 1,170,000	APBD + APBN	2023-2028

Cluster	Measure	Cost estimate (EUR)[1]	Proposed financing source	Implementation schedule
Environment	Action 41 – Renewable energies for private vehicles	Charging station: 5,150 purchase; 1,030/year maintenance; home chargers 773; motorcycle purchase 1,030; cars 226,600k	Unknown	2023-2025
Environment	Action 42 – Cleaner fuels & engines	1,030,000	APBD	2023-2025
Environment	Action 43 – Installation of air quality stations	772,500,000	APBD	2023-2025
Environment	Action 44 – Communities engagement	515,000	APBD	2023-2024

SUMP expected results and impacts

Indicator	Impact 2035 (SUMP vs BAU)	Baseline - 2020	Projected 2035 BAU	Projected 2035 SUMP scenario
Total annual GHG emissions (Mt CO_2eq)	−0.618 t CO_2eq or 15% reduction	2225 t CO_2eq	3196 t CO_2eq	2578 t CO_2eq
Annual transport-related GHG emissions per capita (kg CO_2eq/capita)	−124 kg CO_2eq/capita	549 kg CO_2eq/ capita	641 kg CO_2eq/ capita	517 kg CO_2eq/capita
Access Increase in the proportion of the population living within 750 m or less of a mass transit stop	+7.3%	3.8%	3.8%	11.1%
Air pollution Decrease in the mean $PM_{2.5}$ concentration at road-based monitoring stations	N/A	N/A	N/A	N/A
Modal share Increase in the modal share of trips by public transport, walking, and cycling	Public transport: 13.7%NMT: 0% of total trips **TOTAL: 13.7%**	Public transport: 9.6%NMT: 15% of total trips **TOTAL: 24.6%**	Public transport: 9.6%NMT: 15% of total trips **TOTAL: 24.6%**	Public transport: 23.3%NMT: 15% of total trips **TOTAL: 38.3%**
Road safety Decrease in traffic fatalities within the urban area (per 100,000 inhabitants)	−9.0 fatalities/ 100,000 hab	10.4 fatalities/ 100,000 hab	13.9 fatalities/ 100,000 hab	4.9 fatalities/ 100,000 hab (Target)
Affordability of public transport Share of disposable household income spent on public transport for the second quintile income group	−15.5%	13.0%	20.5%	5.0% (Target)

Insights from practice: lessons learned from the SUMP development process

Leveraging innovative data and inclusive engagement to build a strong evidence base

The Medan SUMP demonstrates that combining advanced data tools with structured stakeholder engagement is essential to developing a strategic, widely supported mobility framework. The use of telecom data for diagnostics enabled a precise and reliable analysis of home-to-work commuting patterns, significantly improving the understanding of mobility behaviour and travel demand across the Medan Metropolitan Area. This innovative approach strengthened the credibility of the baseline analysis and informed scenario development with robust evidence. At the same time, stakeholder engagement was prioritised throughout every phase of the process. Workshops, consultations, and technical discussions ensured broad participation in shaping scenarios and defining the action plan. This inclusive process fostered consensus, enriched decision-making, and built strong local ownership of the SUMP measures. As a result, Mebidangro's SUMP is now used by the Ministry of Transport as a reference model to show other Indonesian cities what a comprehensive, data-driven mobility plan should include.

Embedding resilience and crisis preparedness into mobility planning

The SUMP places strong emphasis on integrating resilience into transport infrastructure and service design. During the diagnostic phase, planners identified that disaster management and contingency planning were not systematically embedded in mobility planning processes. The report therefore recommends that all infrastructure and service investments be designed with consideration of natural hazards and public health crises, including careful site selection, upgraded materials, and risk-sensitive engineering standards. It also highlights the importance of organisational contingency plans, staff training programmes, and robust communication systems to ensure operational continuity during floods, earthquakes, or pandemics. Reflecting on the COVID-19 experience, the SUMP encourages the adoption of non-motorised transport solutions and digital tools that reduce physical contact, as well as resilient and cleaner design features in vehicles and stations. The key lesson is that future SUMPs should integrate risk management and crisis preparedness into both infrastructure planning and institutional arrangements to safeguard investments and maintain service continuity.

Establishing integrated governance and sustainable financing from the outset

A central insight from the Medan SUMP process is the importance of aligning governance structures and financing mechanisms early in the planning cycle. The diagnosis highlights that fragmented institutional responsibilities and limited metropolitan-level coordination have constrained service quality and delayed project implementation. The absence of an integrated metropolitan transport authority has also limited access to certain forms of national funding. In response, the SUMP proposes establishing a metropolitan transport authority, reforming the minibus sector, and introducing innovative funding instruments, such as corporate mobility taxes and land value capture. Strengthening fiscal management and clarifying responsibilities across municipal and provincial levels are seen as prerequisites for delivering complex mass-transit projects. The lesson for future SUMP processes is clear: institutional integration and sustainable financing structures must be addressed alongside infrastructure planning to ensure effective implementation.

Ensuring equity through participatory and inclusive planning

The Medan SUMP illustrates the value of embedding inclusion into both diagnostics and solution design. The process combined extensive data collection, including one of the largest mobility surveys conducted in Indonesia, with participatory methods such as focus groups, interviews, and workshops. Importantly, women's groups, persons with disabilities, and older people were actively involved, in some cases for the first time in mobility planning discussions. The SUMP highlights the need to continue incorporating vulnerable groups in planning, to design inclusive infrastructure such as safe sidewalks and accessible stations, and to improve the clarity and usability of transport information. It also recognises the importance of empowering women and persons with disabilities within transport agencies and adapting fare structures to reflect diverse user needs. The overarching lesson is that evidence-based planning, combined with meaningful stakeholder participation, produces solutions that are more equitable, more broadly supported, and ultimately more sustainable.

SUMP finance leverage

Leveraged financing (resulting from or enabled by the SUMP preparation process)

Description	Source of financing	Type	Status	Amount (EUR)
Loan to build the 1st BRT line	World Bank[2]	Loan	Secured	190,000,000
	AFD[3]	Loan	Secured	34,000,000
	Domestic finance	Budget allocation	Secured	85,000,000

Description	Source of financing	Status	Amount (EUR)
Technical assistance for establishing the BRT Management Institution of Medan	UK-PACT Grant	Secured	N/A

[2] https://www.infrapppworld.com/update/world-bank-approved-financing-for-indonesia-mass-transit-ppp-project
[3] https://www.afd.fr/en/actualites/communique-de-presse/40-million-euros-loan-afd-enhance-urban-mobility-and-accessibility-indonesia-mass-transit-program-support-project-mastran

Perspectives for SUMP implementation

TransMebidang BRT: moving from planning to physical implementation

Medan's SUMP foresees the rollout of dedicated mass transit infrastructure as a cornerstone of near-term implementation, and this is already materialising in 2024–2025 with the TransMebidang Bus Rapid Transit (BRT). By early 2025, the first station at Lapangan Merdeka had been completed and prepared for operations, with electric buses beginning to serve the corridor. This infrastructure work reflects a multi-year collaboration between the City of Medan and international partners, including the Institute for Transportation and Development Policy (ITDP), which helped structure the transitory design and operational frameworks. The TransMebidang BRT is part of a broader mass transit initiative supported by the national Indonesia Mass Transit (MASTRAN) project, which channels significant funding (approximately EUR 189,1 million) through the Ministry of Transportation to develop sustainable BRT systems in Medan and Bandung. Implementation work on corridors, stations, and electrified bus fleets is expected to continue through 2025–2027.

Highlights in the past year

BRT service expansion and institutional synergy with national programmes[4]

In parallel with station delivery, stakeholder coordination is underway to scale the BRT system across the Medan, Binjai, and Deli Serdang corridors. In October 2025, provincial authorities and representatives from the Ministry of Transportation and the World Bank convened to speed up BRT implementation and strengthen institutional alignment. This reflects Medan's integration into national mass transit programmes and underscores the importance of multi-level cooperation for sustainable mobility outcomes. Discussions and coordination in 2025 emphasise the need to align local planning with national policy, financing readiness and operational frameworks.

Last updated December 2025

[4] https://dishub.sumutprov.go.id/2025/10/08/rapat-progres-dan-rencana-implementasi-brt-mebidang/