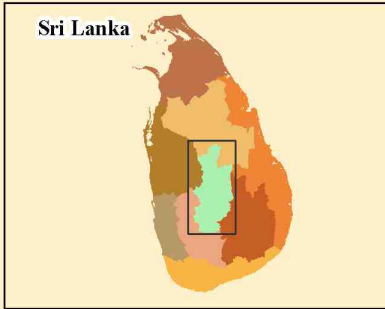




KANDY CITY TRANSPORT STUDY

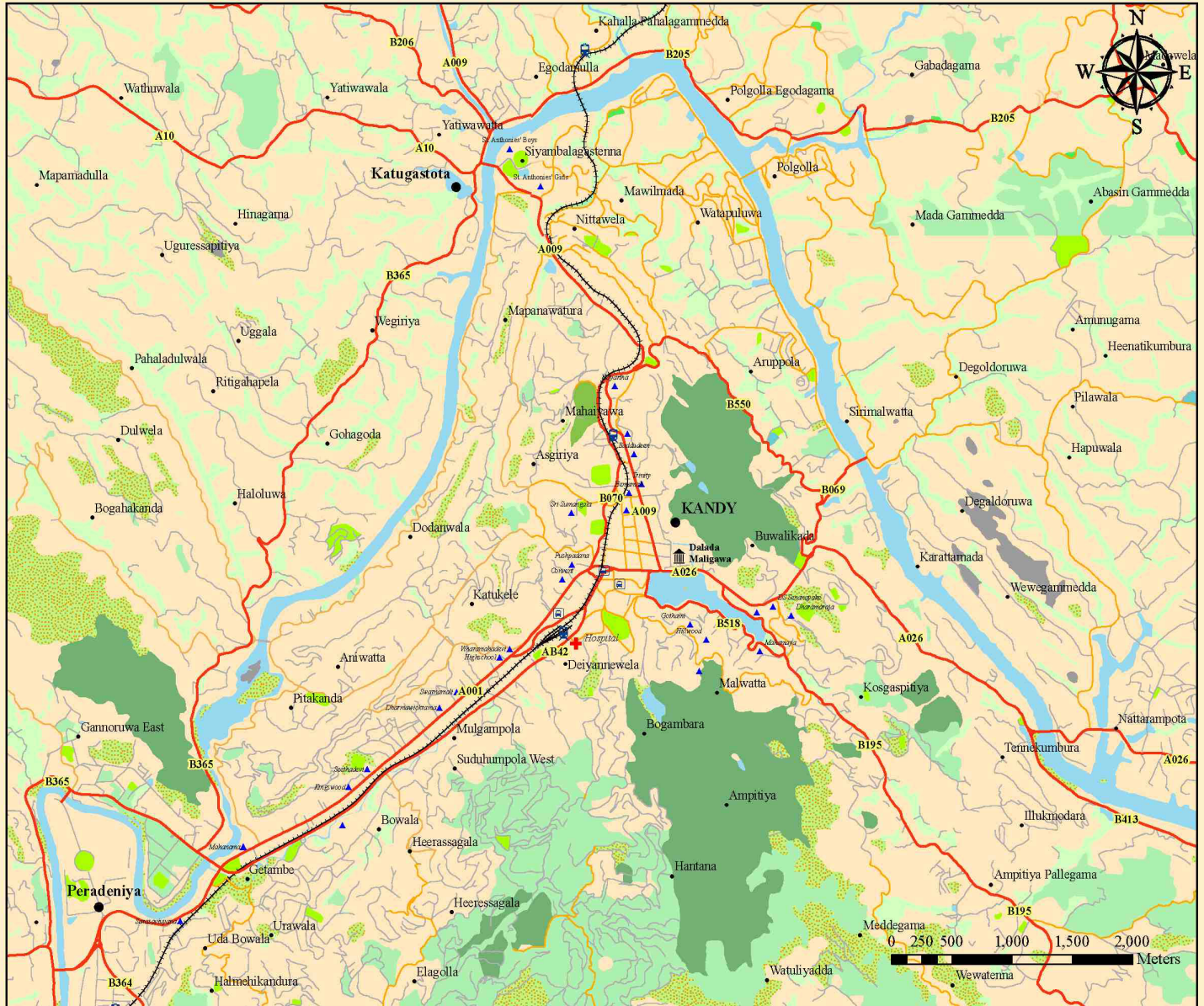
Department of Transport & Logistics Management,
University of Moratuwa
in association with the University of Peradeniya

11th August 2011



Legend

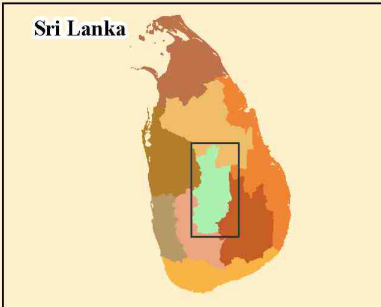
- Primary Roads
- Secondary Roads
- Other Roads
- Streams/Tanks/Lakes
- Tea/Rubber/Coconut
- Paddy Lands
- Forests
- Scrubs
- Play Grounds/Parks
- Railway Stations
- Bus Terminals
- Schools



Kandy City Transport Study

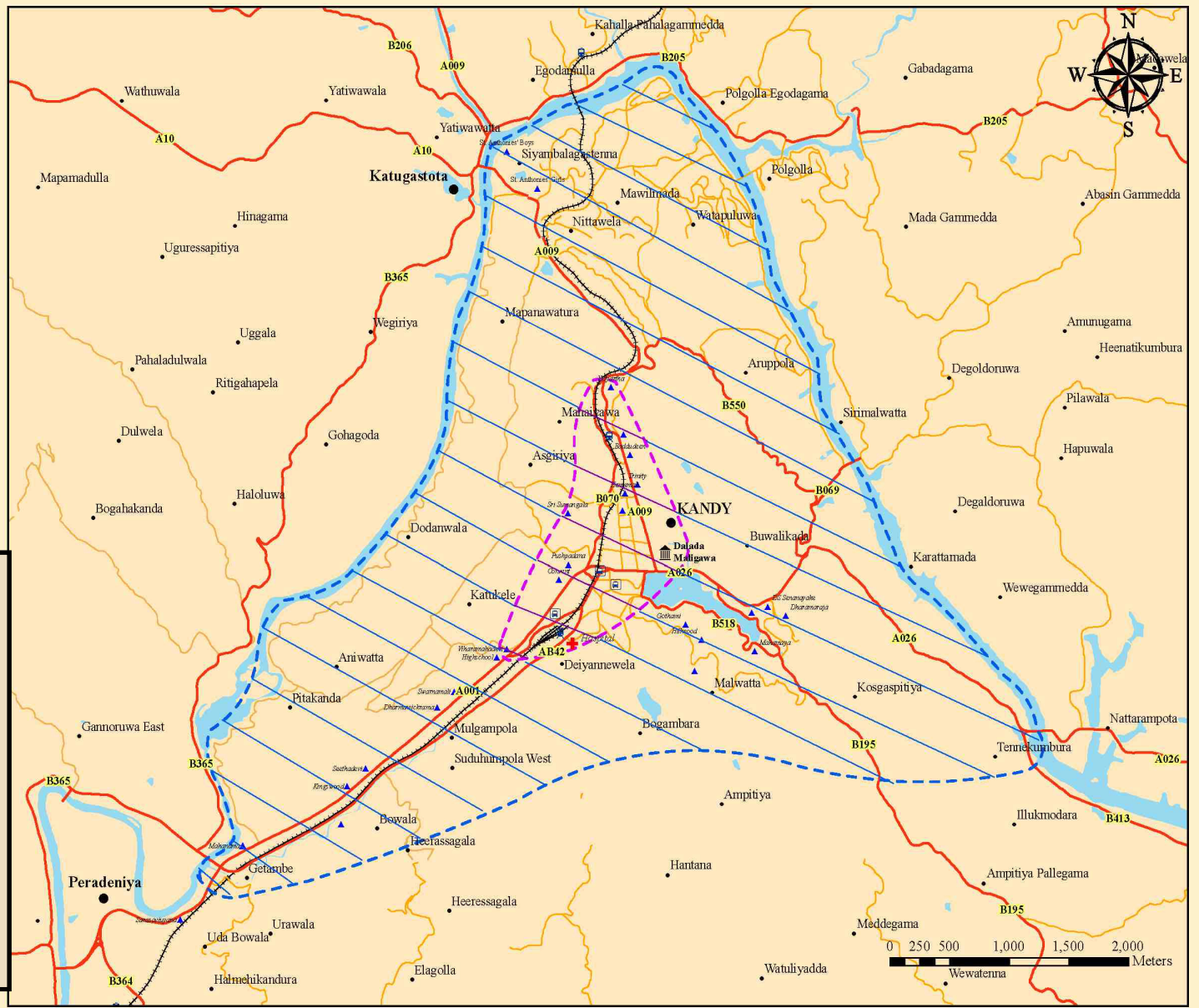
Map 2-1: Kandy City and Its Environ

University of Moratuwa in association with
University of Peradeniya
July 2011



Key Facts

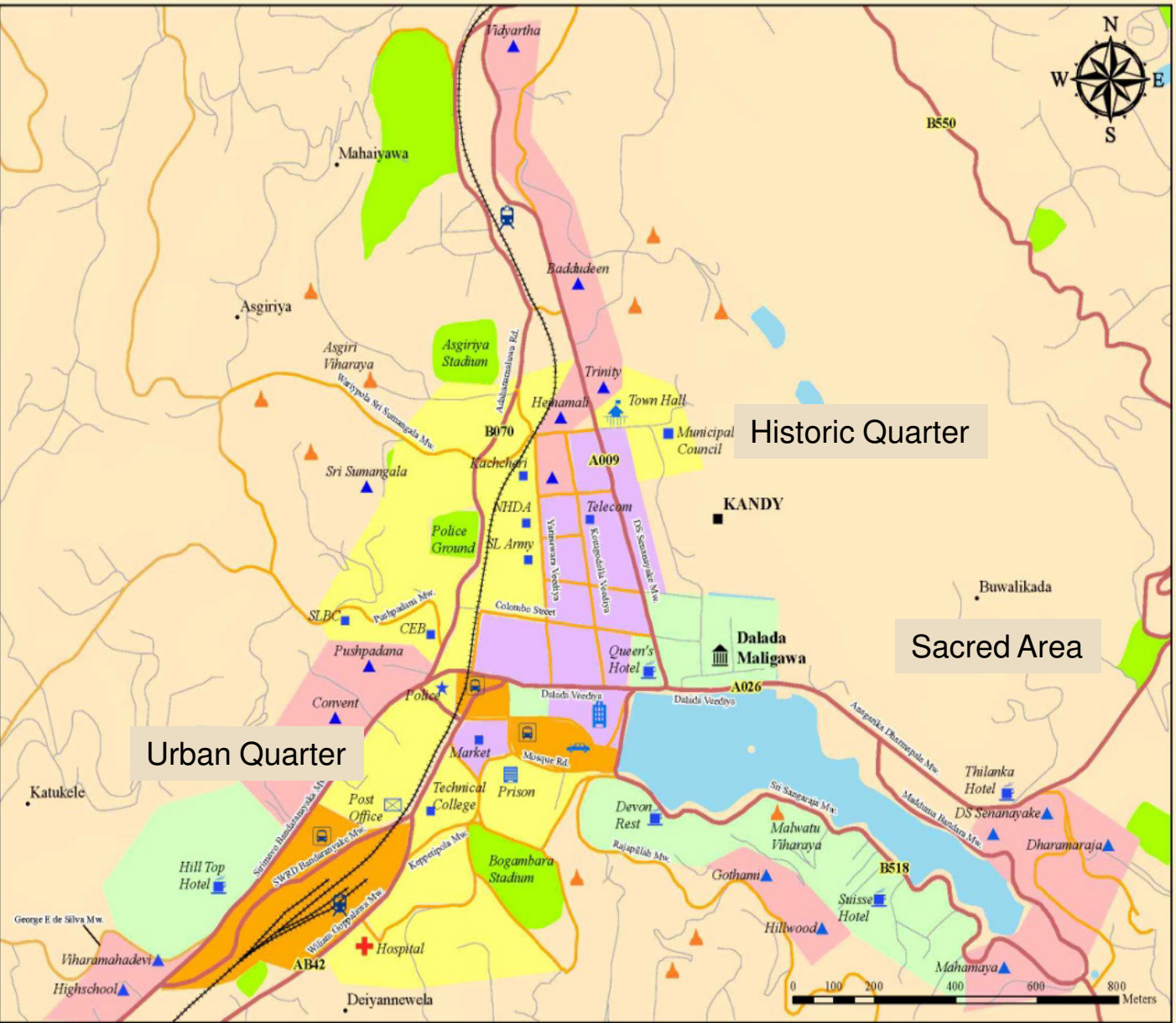
- *Population - 130,000*
- *Land - approx 12 sq km*
- *Vehicles – 20,000*
- *School Children- 60,000*
- *Employees- 90,000*
- *Other Arrivals – 200,000*
- *Vehicle Arrivals- 56,000*
- *A World Heritage City*

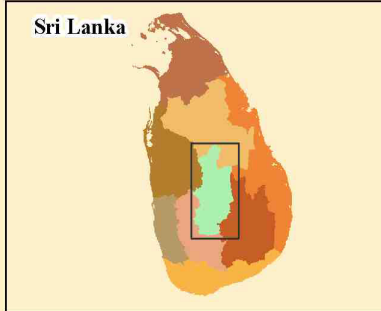




Legend

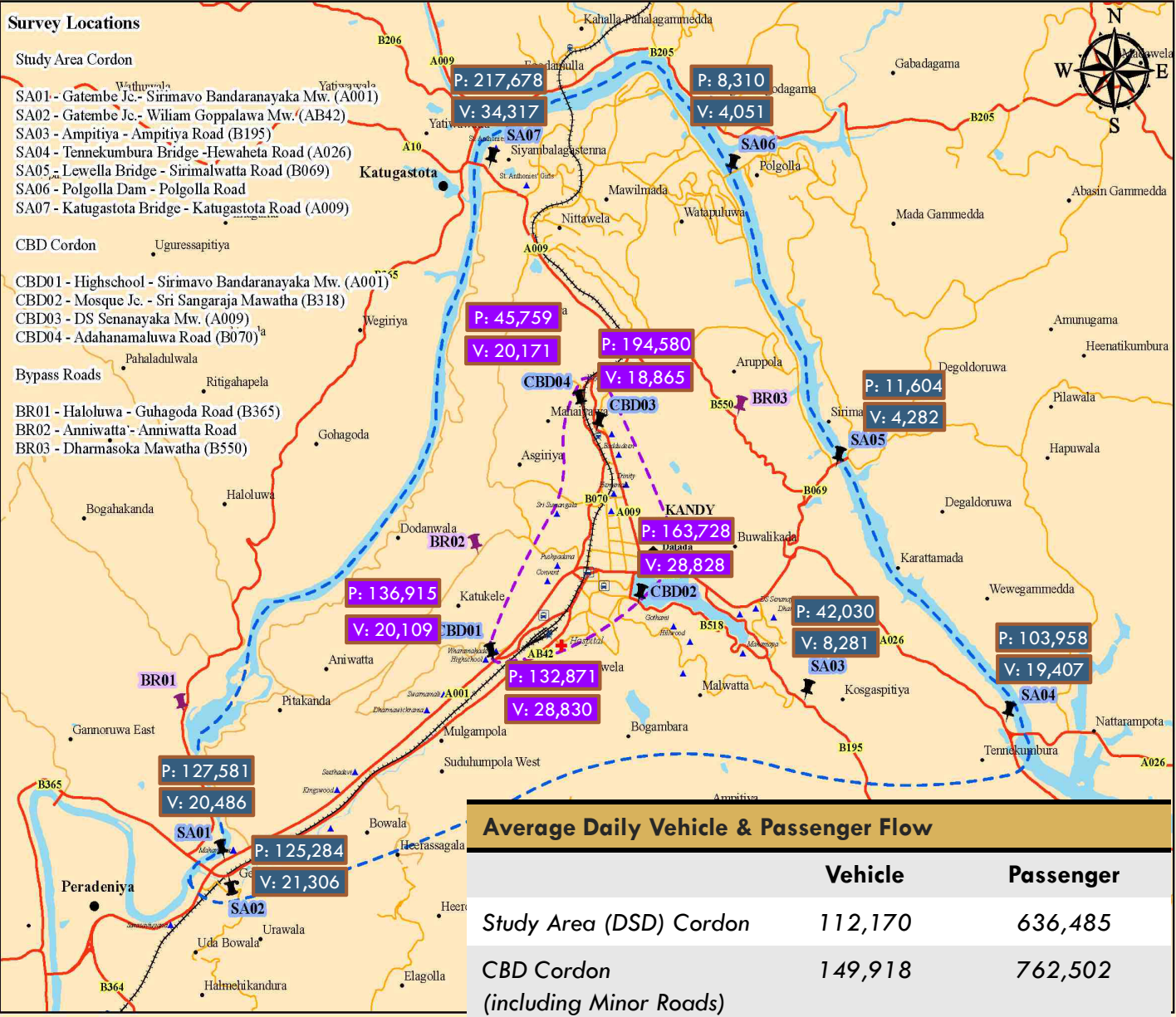
- Hotels
- Other Buildings
- Schools
- Transport
- Admin. & Services Zone
- Commercial Zone
- Recreational/Sacred Zone
- Educational Zone
- Play Grounds/Parks
- Railway Stations
- Bus Terminals





Legend

- Survey Locations
- CBD Cordon
- Study Area Boundary
- Primary Roads
- Secondary Roads
- Streams/Tanks/Lakes
- Railway Stations
- Bus Terminals
- Schools

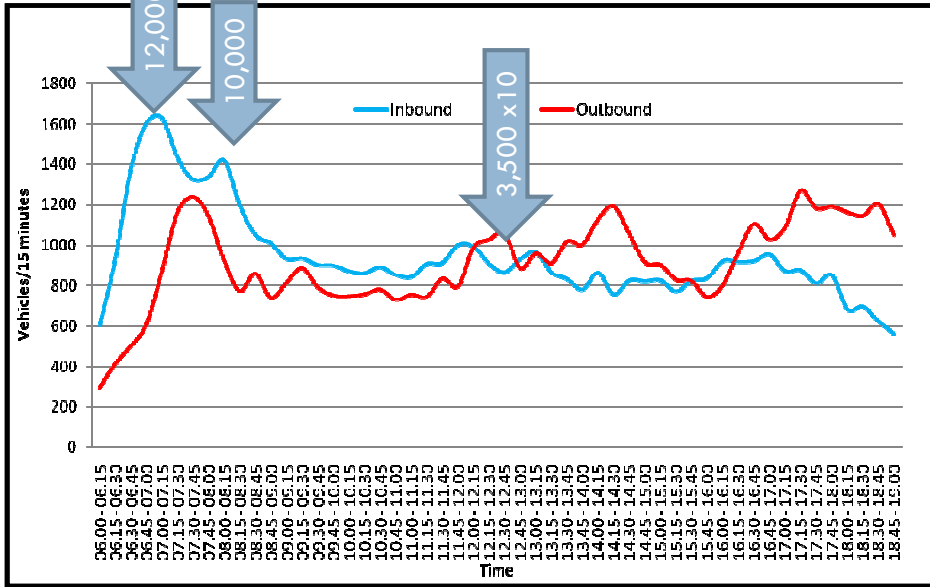


Average Daily Vehicle & Passenger Flow

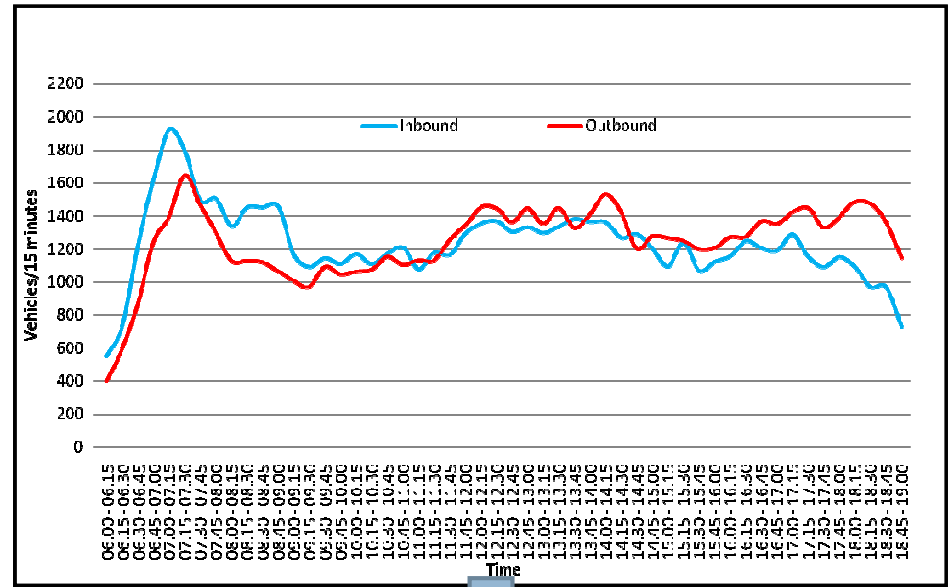
	Vehicle	Passenger
Study Area (DSD) Cordon	112,170	636,485
CBD Cordon (including Minor Roads)	149,918	762,502

Variation of Traffic Flow Rate at Study Area Cordon (12 hours)

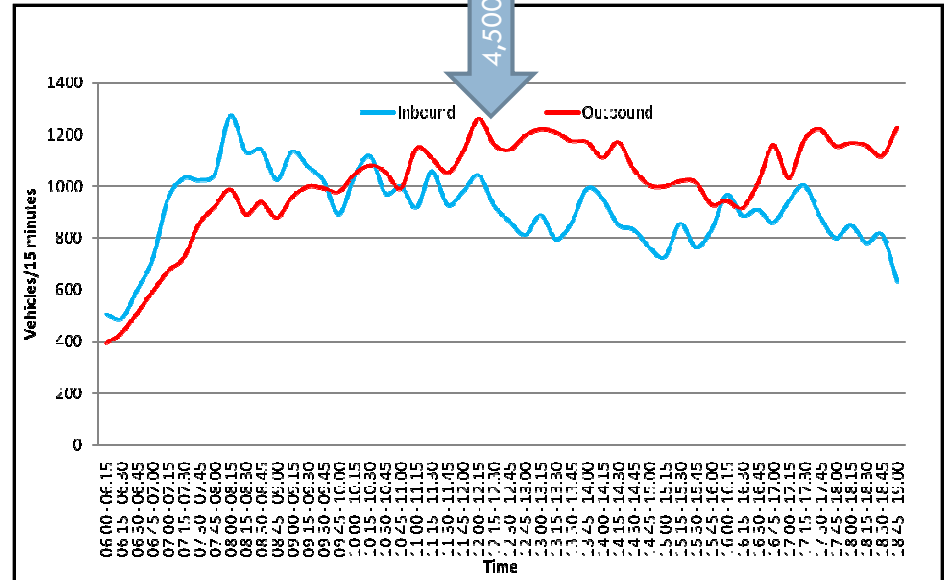
DSD Cordon (On a Weekday)



CBD Cordon (On a Weekday)

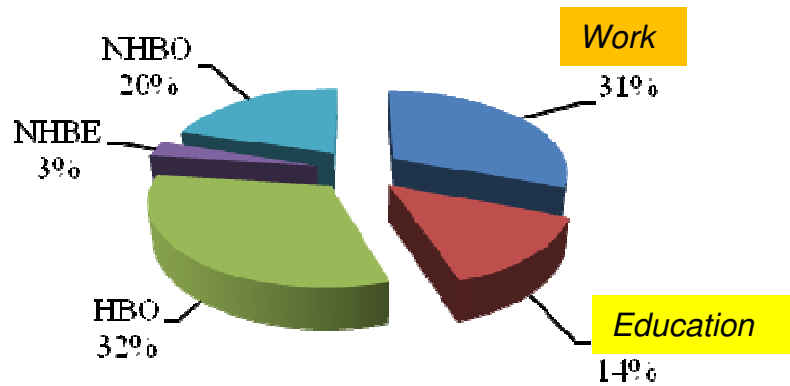


CBD Cordon (On a Saturday)

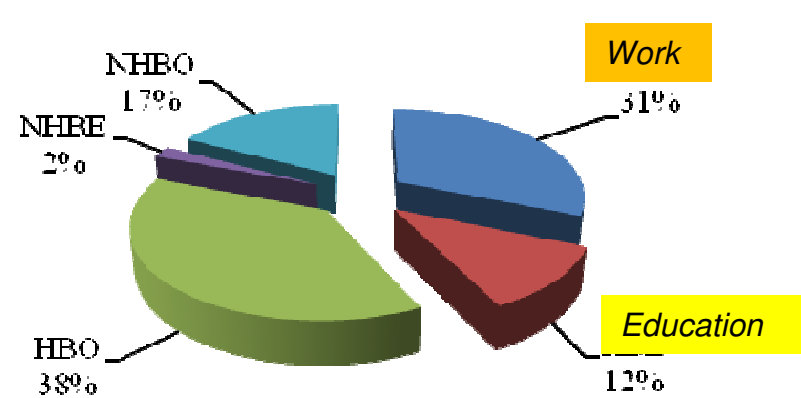


Trip purpose Distribution

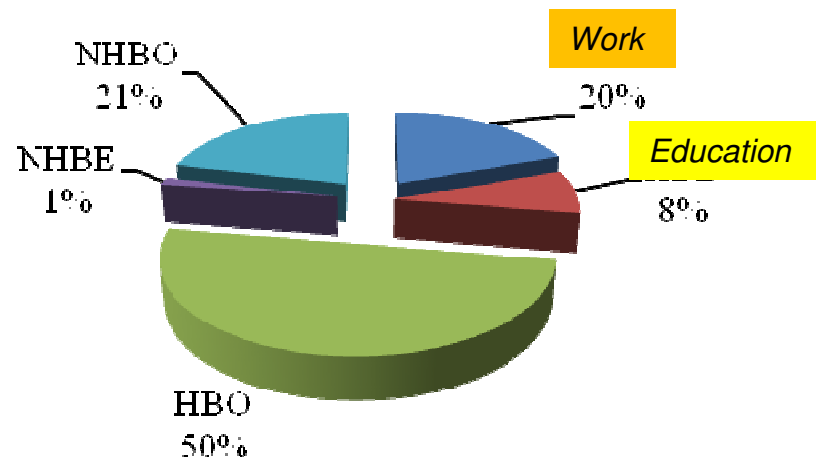
DSD Cordon (On a Weekday)



CBD Cordon (On a Weekday)



CBD Cordon (On a Saturday)



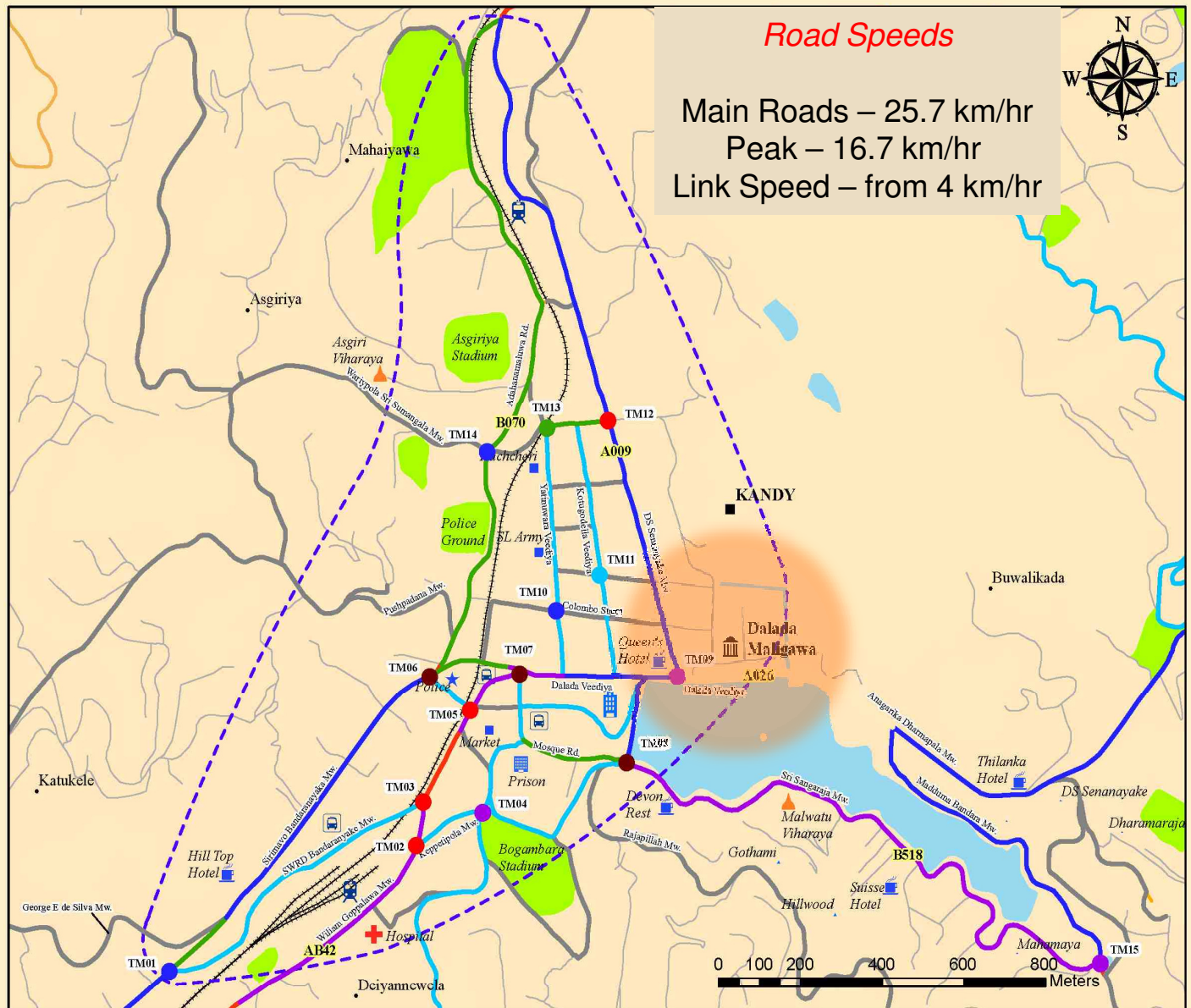


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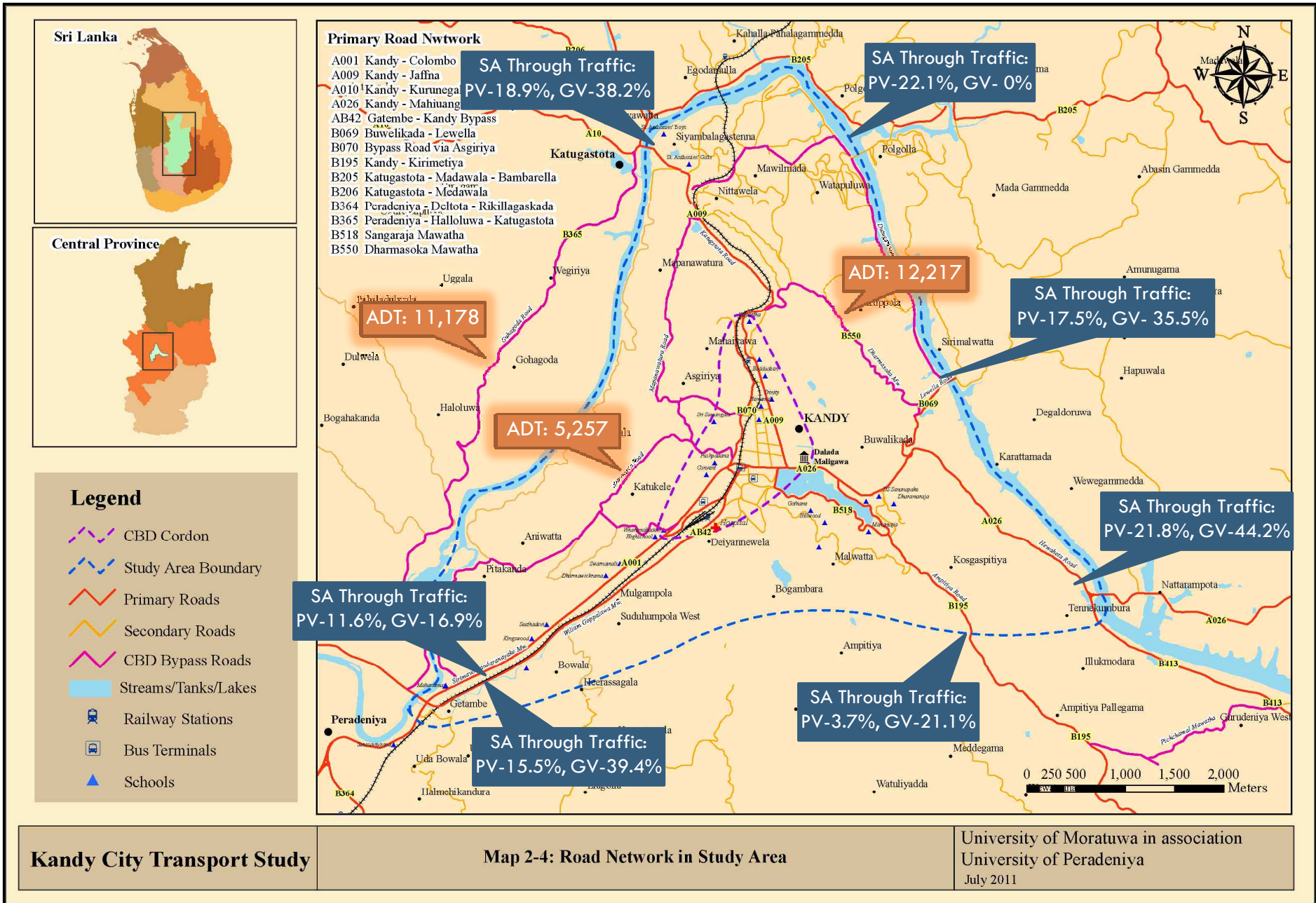
- Railway Stations
- Bus Terminals

Average Daily Traffic

- Below 10,000 ADT
- 10,000 - 15,000 ADT
- 15,000 - 20,000 ADT
- 20,000 - 25,000 ADT
- 25,000 - 30,000 ADT
- 30,000 - 35,000 ADT
- Over 35,000 ADT



Bypass Traffic



School Transport



Map 4-2: Location of Schools in Study Area

University of Moratuwa in association
University of Peradeniya
July 2011

Profile

	Schools in SA (Nos.)	Students (Nos.)
Major	23	63,000
Minor & International	12	Appr. 7,000
Total	35	Appr.70,000

Modal Split

Mode	Share (%)
Walk	8.0
Bicycle	0.0
3 Wheeler	10.5
Private vehicles	15.7
Public bus	23.8
School van	33.9
Motor Cycles	4.5
Train	0.5
School bus	3.1
	100.0

1,000 school vans carry 20,000 students
10,000 private vehs carry 20,000 students
300 buses carry 15,000 students

Bus Transport



3 Terminals- 600 m apart

4,800 carry 200,000 people a day

Only 100 buses ply through the city

80,000 access bus stands by walking

120,000 access by bus

50,000 have both trip ends outside the DSD

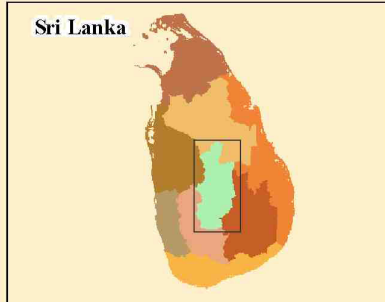
Kandy City Transport Study



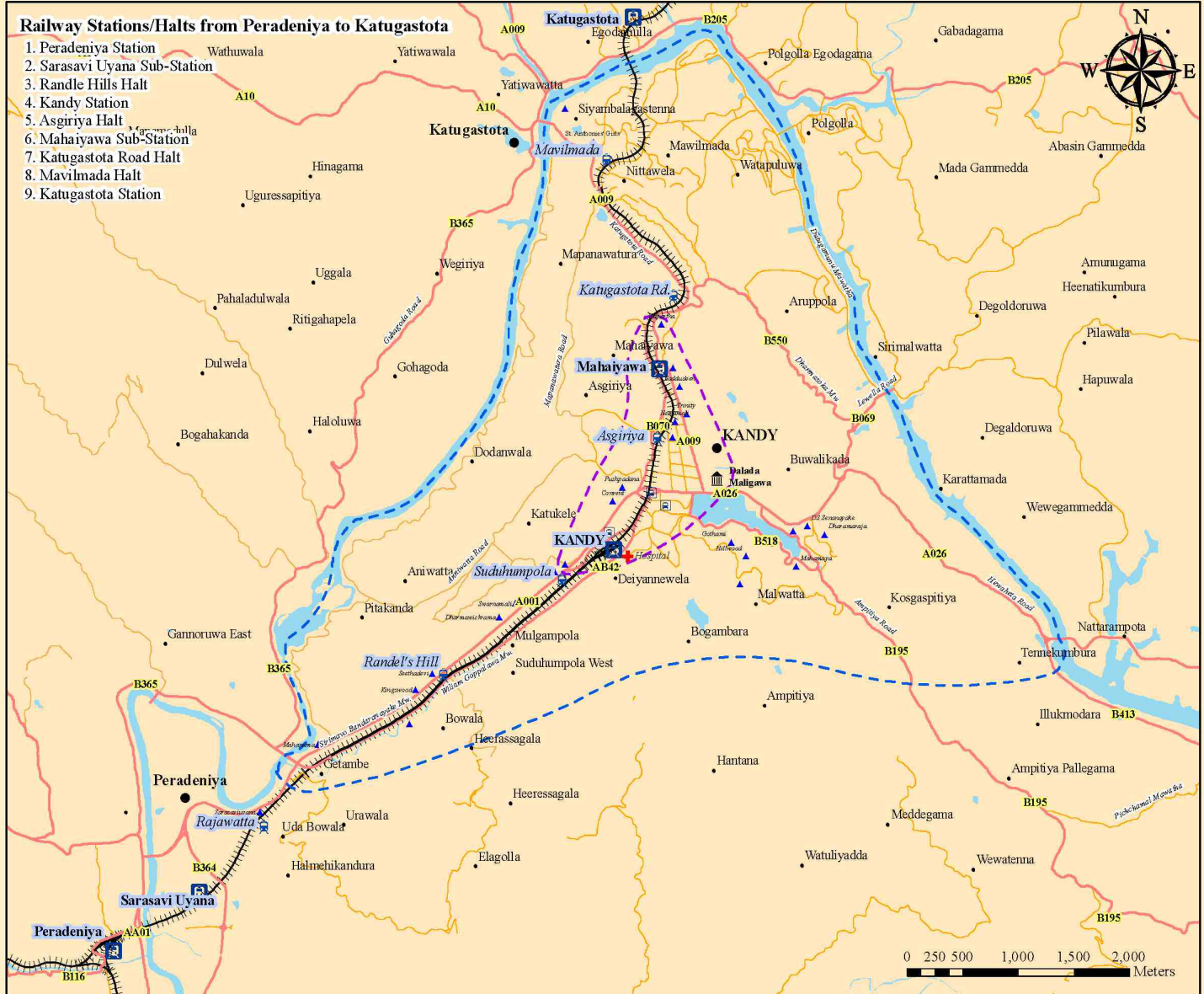
Map 6-2: Bus Routing & Functional Arrangement for Bus Terminal at Good Shed

University of Moratuwa in association with University of Peradeniya
July 2011

Railway



11 km -Peradeniya to Katugastota
 9 stations
 20 trains/day
 Speeds comparable to road
 Carried 1% of traffic
 Kandy traffic 3,000
 Only 300 school children



Parking



Legend

- Railway Stations
- Bus Terminals

Capacity of Off-Street Parkings

- Below 25 Vehicles
- 25 - 50 Vehicles
- Above 50 Vehicles

(Extensive Bus parks do not indicate)

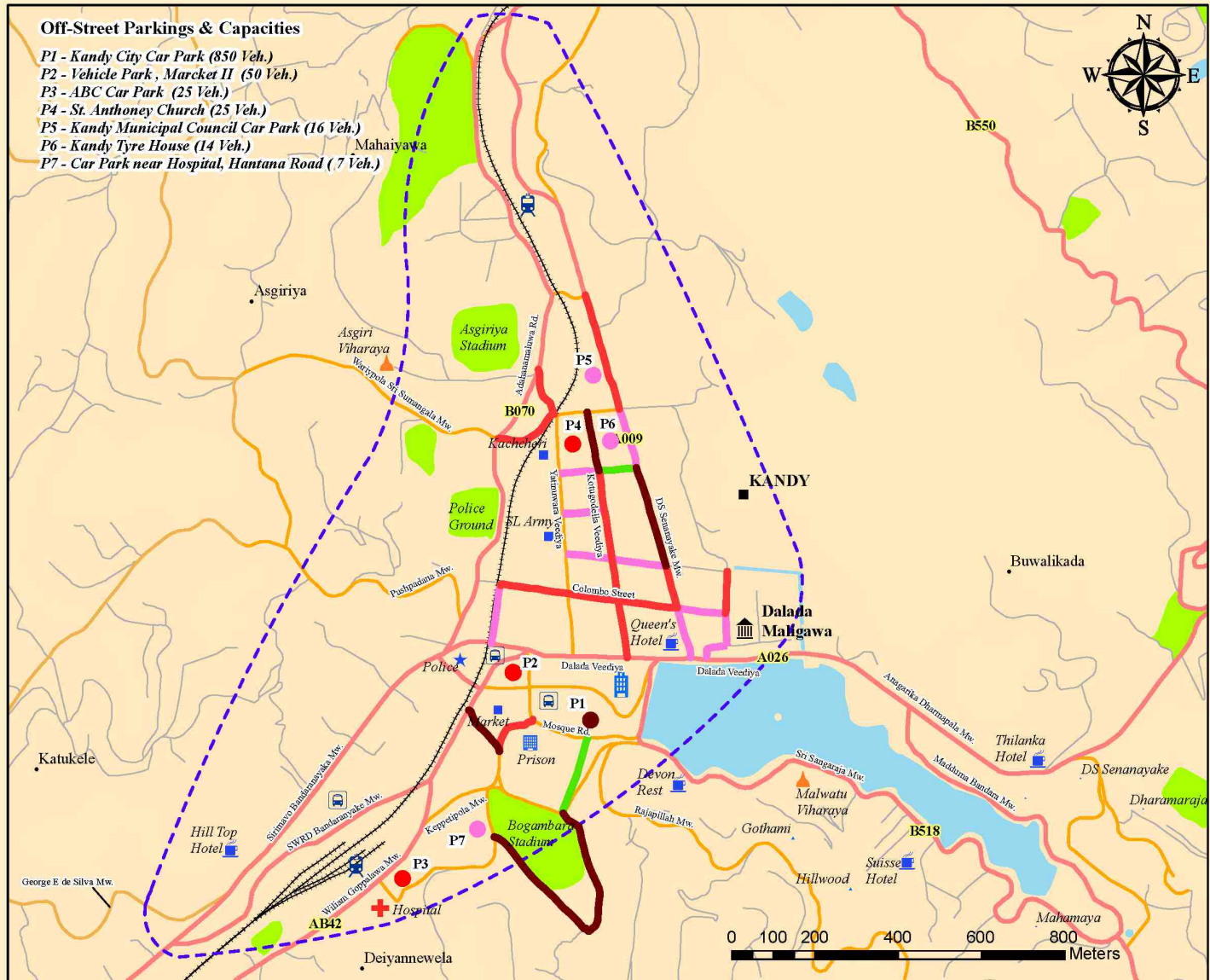
Utilization of Off-Street Parkings (As a percentage of available capacity)

- 100 - 125 %
- 125 - 150%
- Above 150%

Extensive Bus parkings & streets with utilization below capacity level do not indicate)

Off-Street Parkings & Capacities

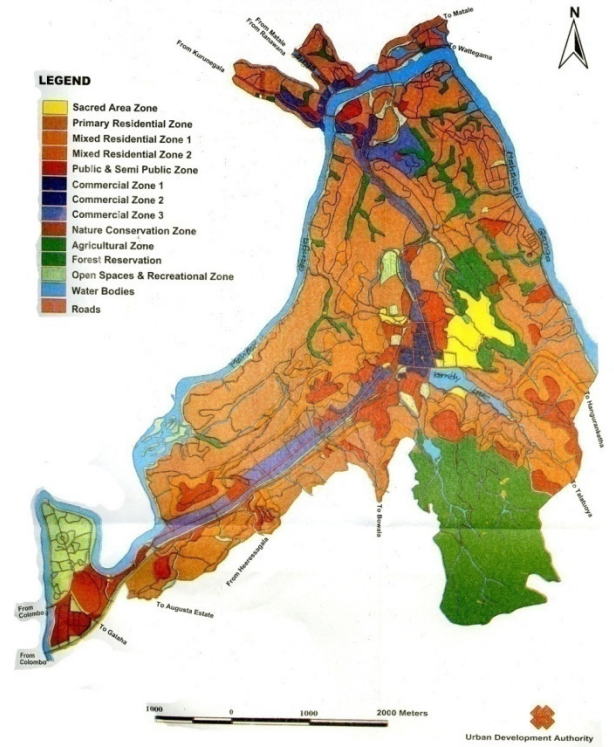
- P1 - Kandy City Car Park (850 Veh.)
- P2 - Vehicle Park, Market II (50 Veh.)
- P3 - ABC Car Park (25 Veh.)
- P4 - St. Anthony Church (25 Veh.)
- P5 - Kandy Municipal Council Car Park (16 Veh.)
- P6 - Kandy Tyre House (14 Veh.)
- P7 - Car Park near Hospital, Hantana Road (7 Veh.)



Issue #1: Land Use in a Heritage City



Zoning Plan 2002 - 2016
Municipal Council Area - Kandy



Issue #2: Inadequate Road Space for Demand

- Traffic and Passenger Counts at DSD Cordon
 - 1998 → 30,000 vehicles (with 4,800 buses) carry 320,000 passengers.
 - 2011 → 56,000 vehicles (with 4,800 buses) carry 320,000 passengers.
- This reflects a growth rate of 5% per annum or a doubling of road space required every 14 years.
- School vans do not show a significant change.
- Public transport has fallen from 67% (1998) to 64% (2011)
- If Public Transport Share falls to 50%, the vehicle inflow will increase to 100,000 vehicles OR
- If maximum vehicle inflow is 75,000, buses must carry 55% share.

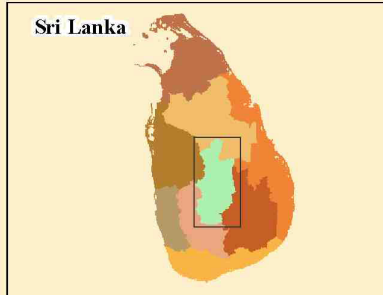
Issue #3: Inefficient Bus Operations

- Buses provide the bulk of the transport requirement carrying 64% of passengers at the DSD and 56% at the CBD.
- Termination of Services and Lack of Through Services -100% of local and 90% of provincial services terminate in centre.
- Terminating buses cause parking problems.
- Over 2x80,000 pedestrian movements plus 2x50,000 bus to bus transfers are caused daily.
- No proper Terminal – handles 400,000 passengers
- No Integration of Terminals, generates large pedestrian flows
- One-way System increases bus circulation and pedestrian access.
- No Short Run Urban Routes

Issue #4: Excessive Pedestrian Activity in CBD

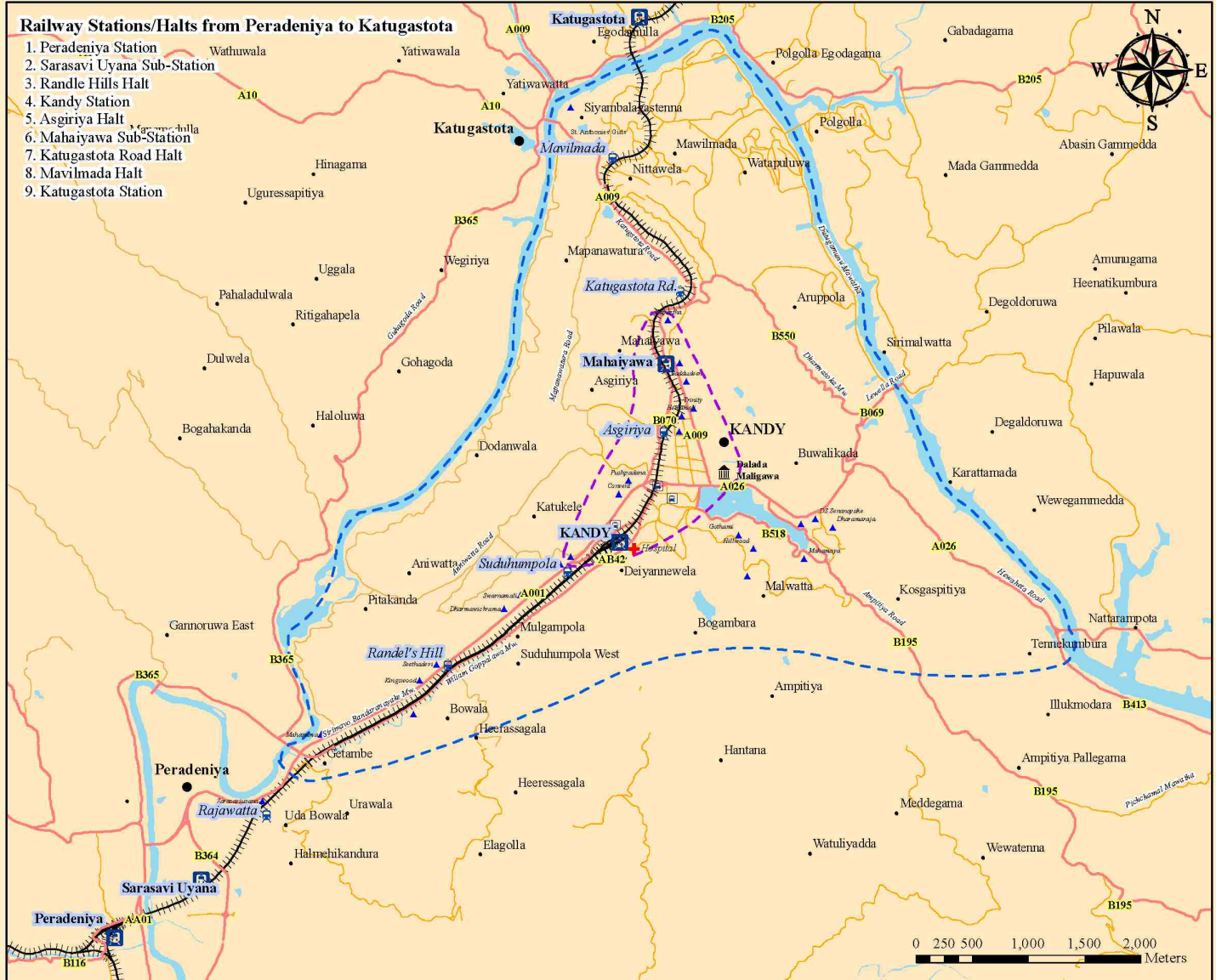


Issue #5: Underutilisation of the Railway Network

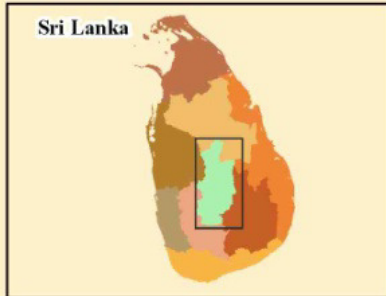


Legend

- CBD Cordon
- Study Area Boundary
- Primary Roads
- Secondary Roads
- Streams/Tanks/Lakes
- Railway Stations
- Railway Halts
- Bus Terminals
- Schools



Issue #6: School Transport

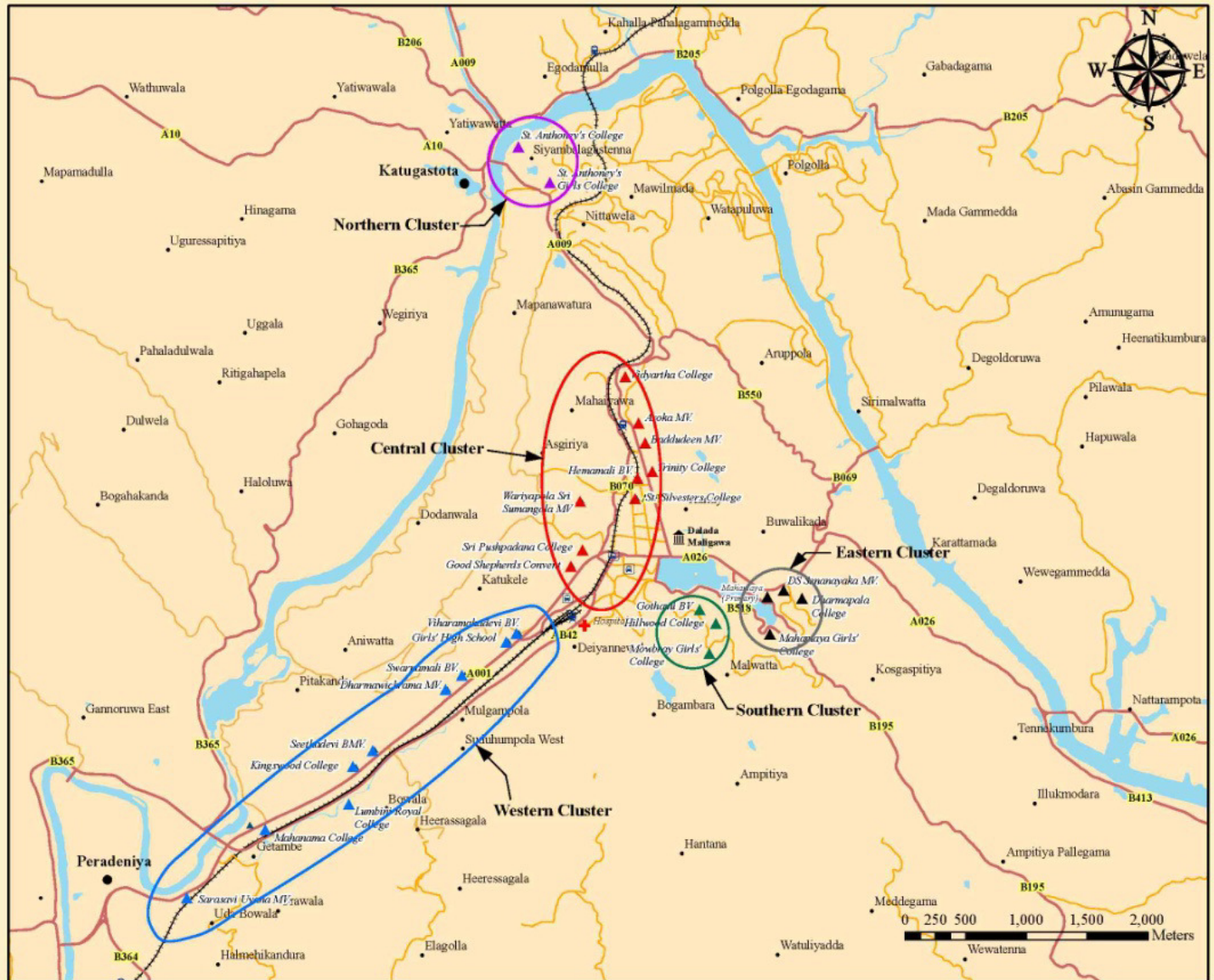


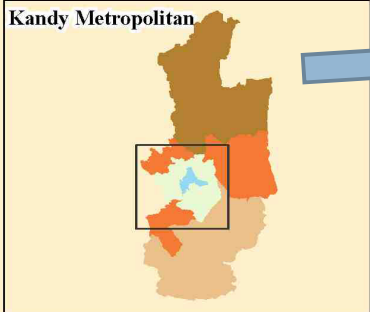
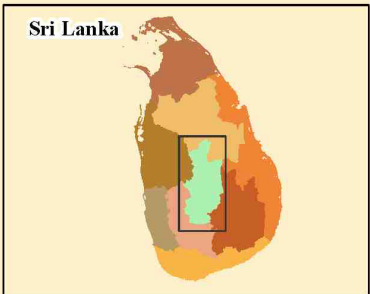
Legend

- Primary Roads
- Secondary Roads
- Streams/Tanks/Lakes
- Railway Stations
- Bus Terminals

Schools

- Central Cluster
- Eastern Cluster
- Western Cluster
- Northern Cluster
- Southern Cluster

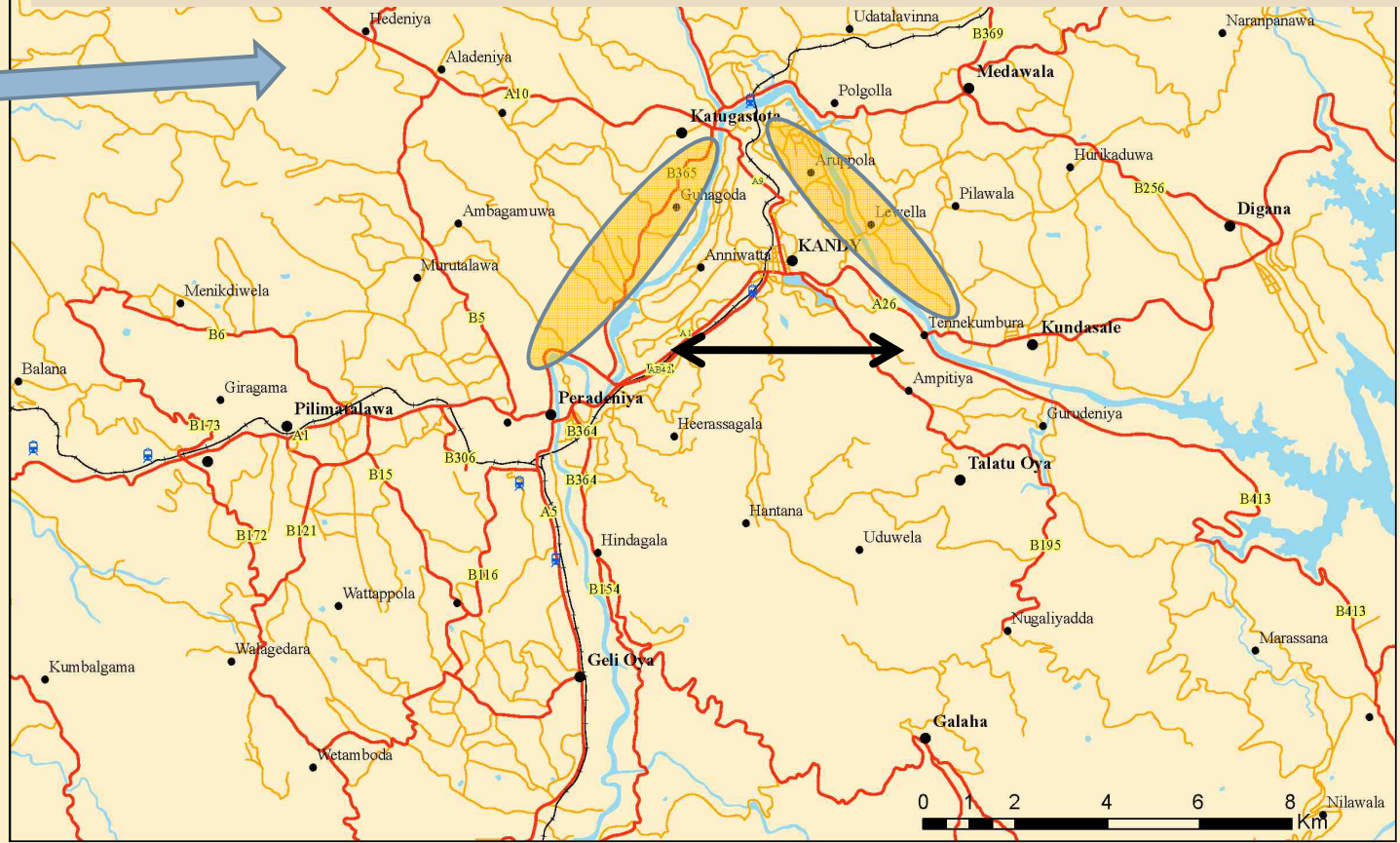




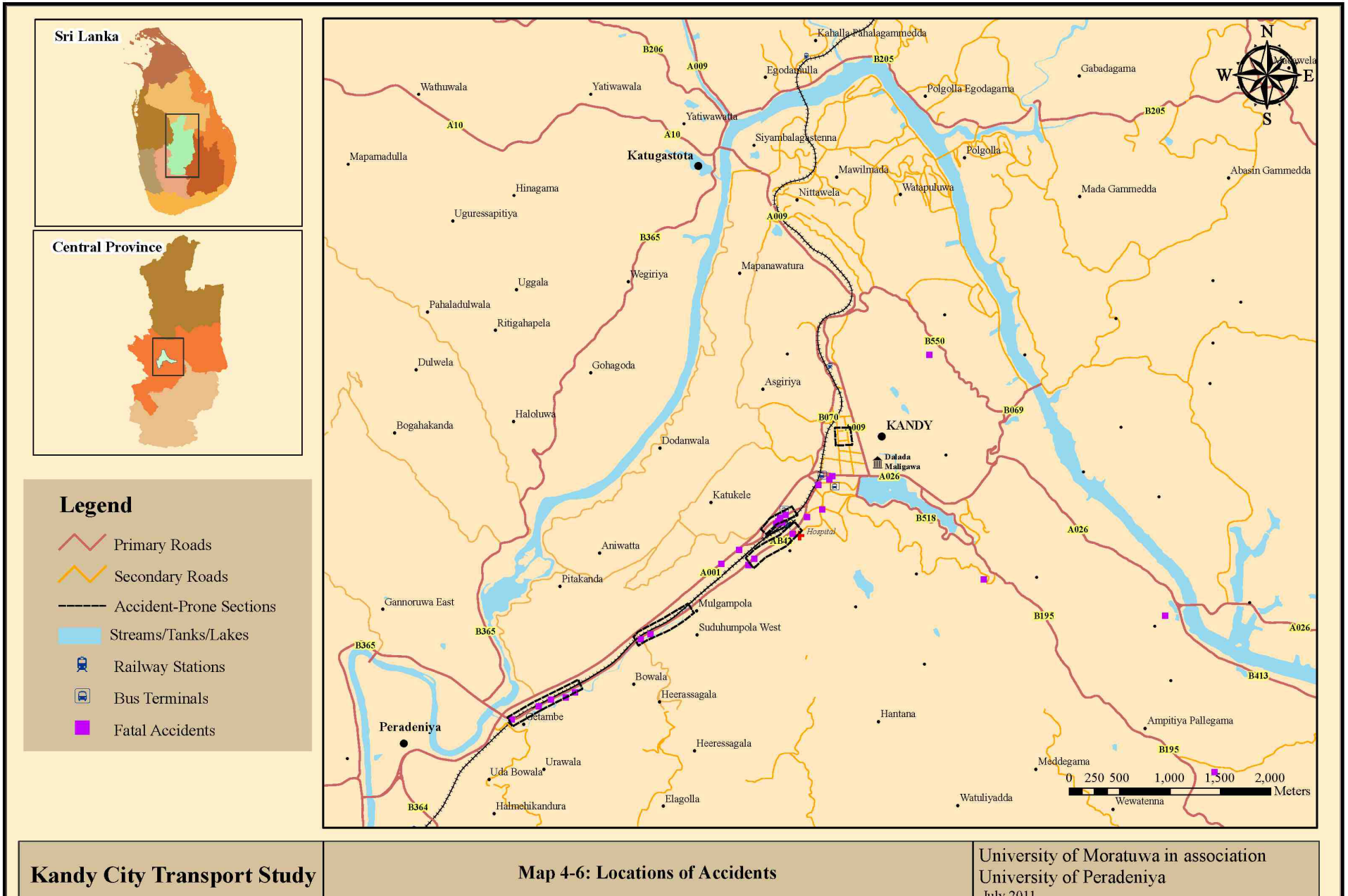
- **#7: Connectivity to Proposed Colombo-Kandy Alternate Highway**
- **#8: Increasing Access to Areas Bounded by the Mahaweli Ganga**
- **#9: Inadequate Bypass Arrangements for CBD and Kandy City**
- **#10: Traffic Congestion on Major and Minor Roads**

Legend

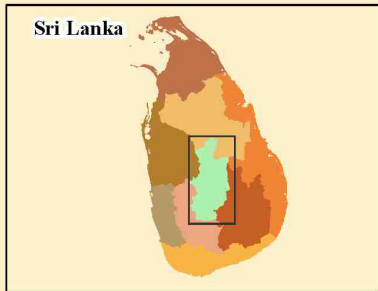
- Sub-Urban Centers
- Main Towns
- 🚂 Rail Stations
- 🔴 Primary Roads
- 🟡 Secondary Roads
- 🚊 Rail Road
- 🌊 Streams/Tanks/Lakes



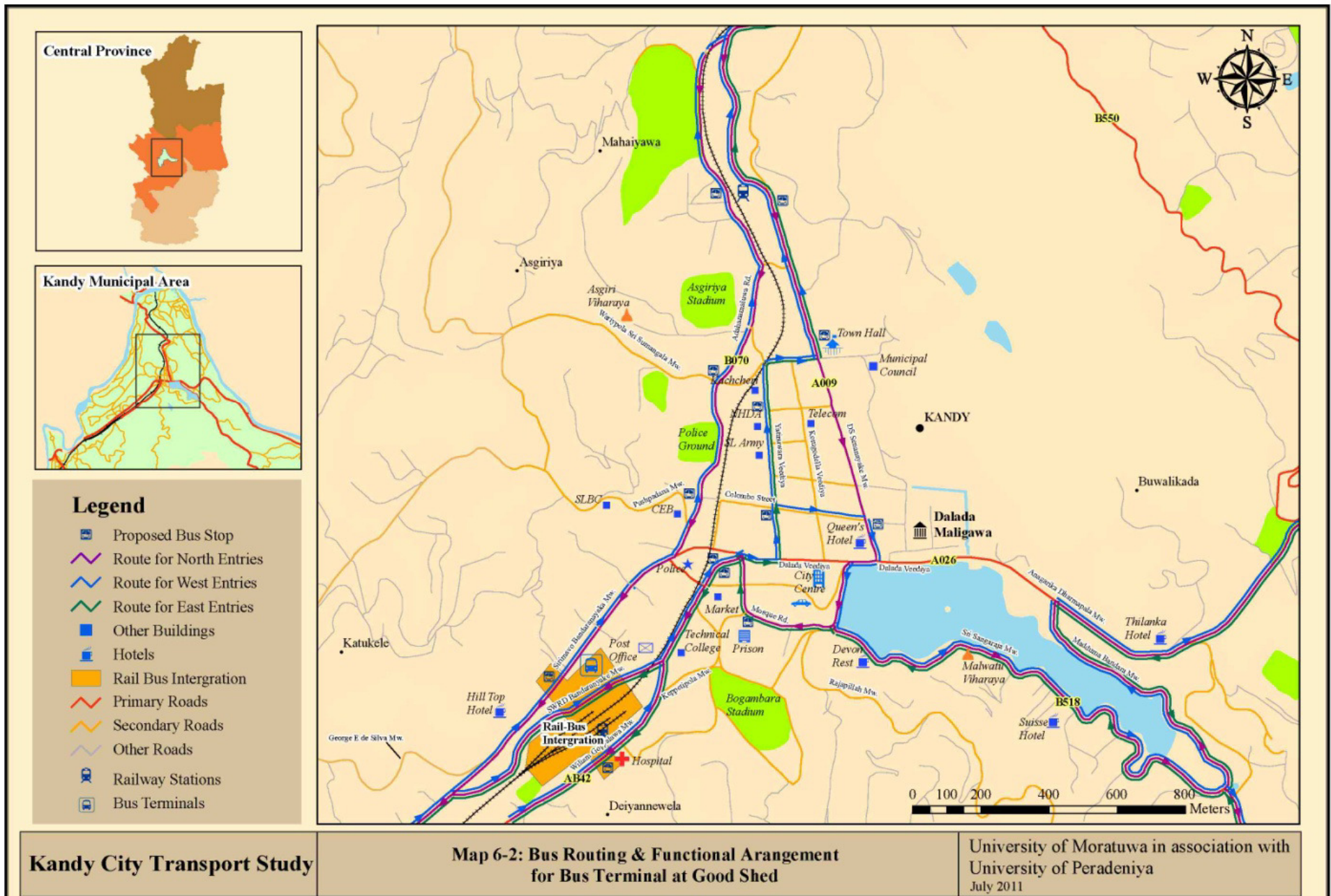
Issue #11: Road Safety



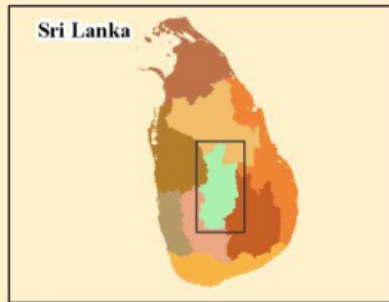
Recommendation #1: Land Use



Recommendation #2: Re-routing Bus Services



Recommendation #3: New Commuter Railway Service

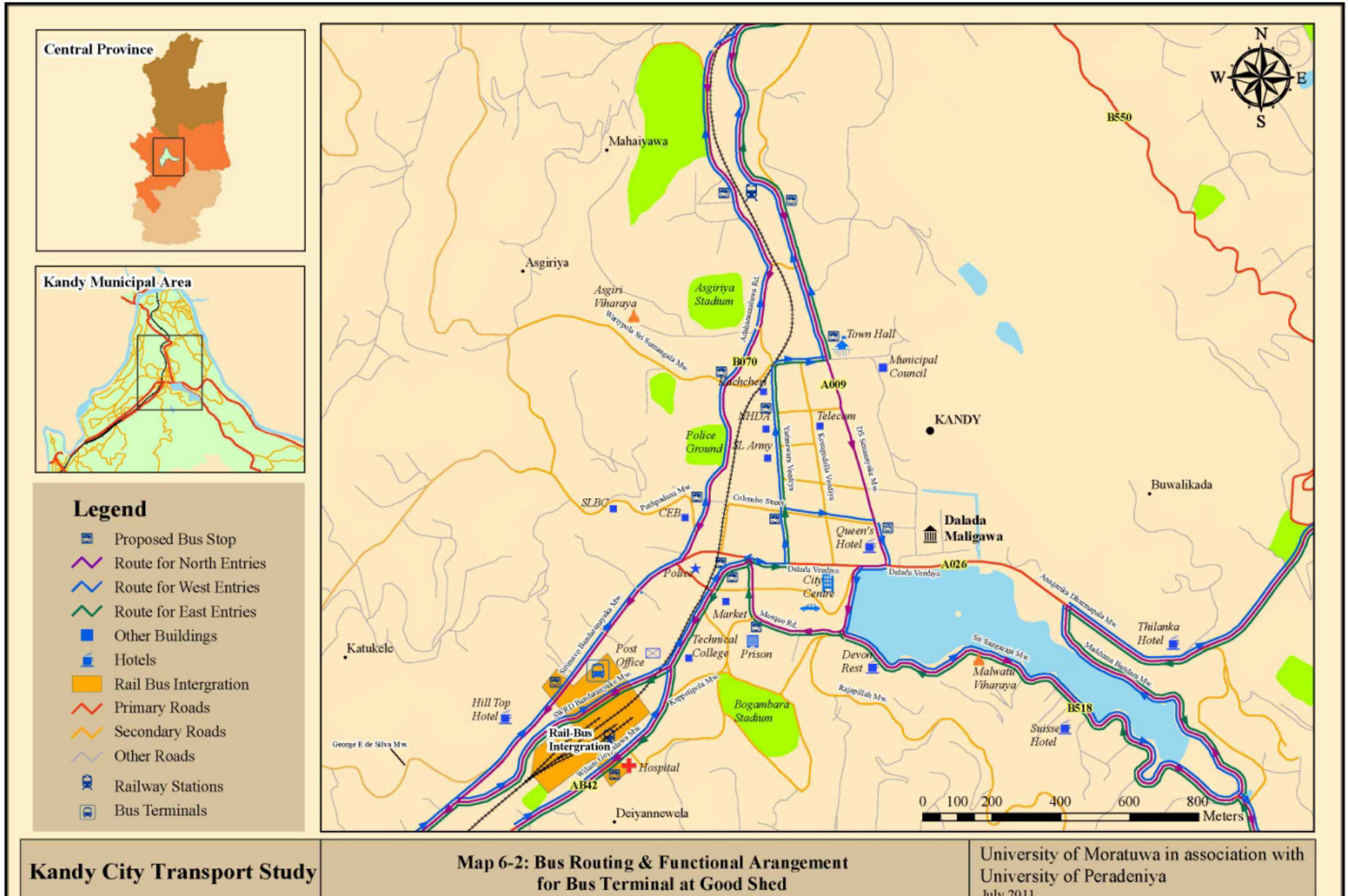


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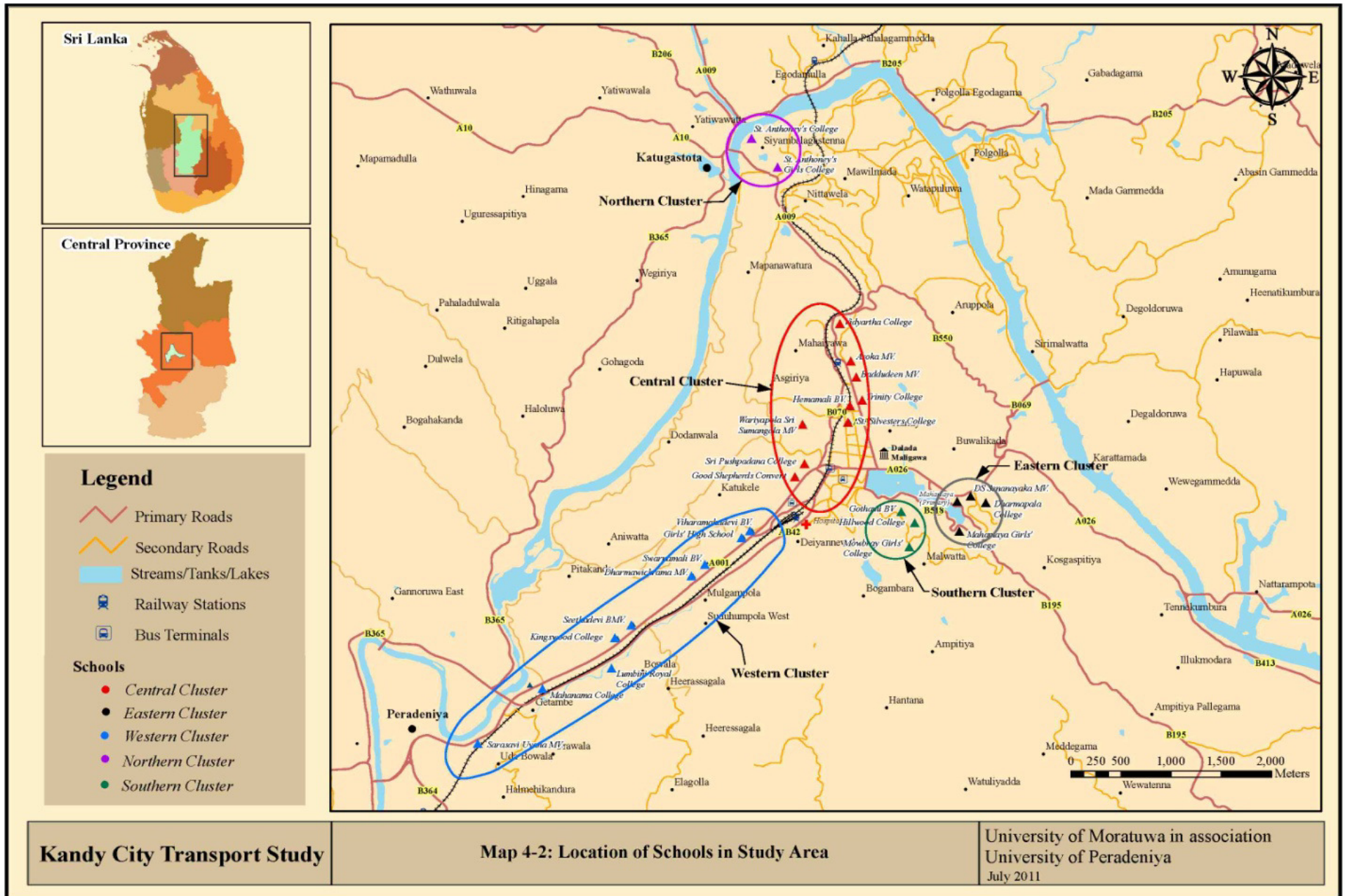
- Railway Stations
- Proposed Stations
- 500 m Wide Corridor
- Primary Roads
- Secondary Roads
- Streams/Tanks/Lakes
- Bus Terminals
- Schools



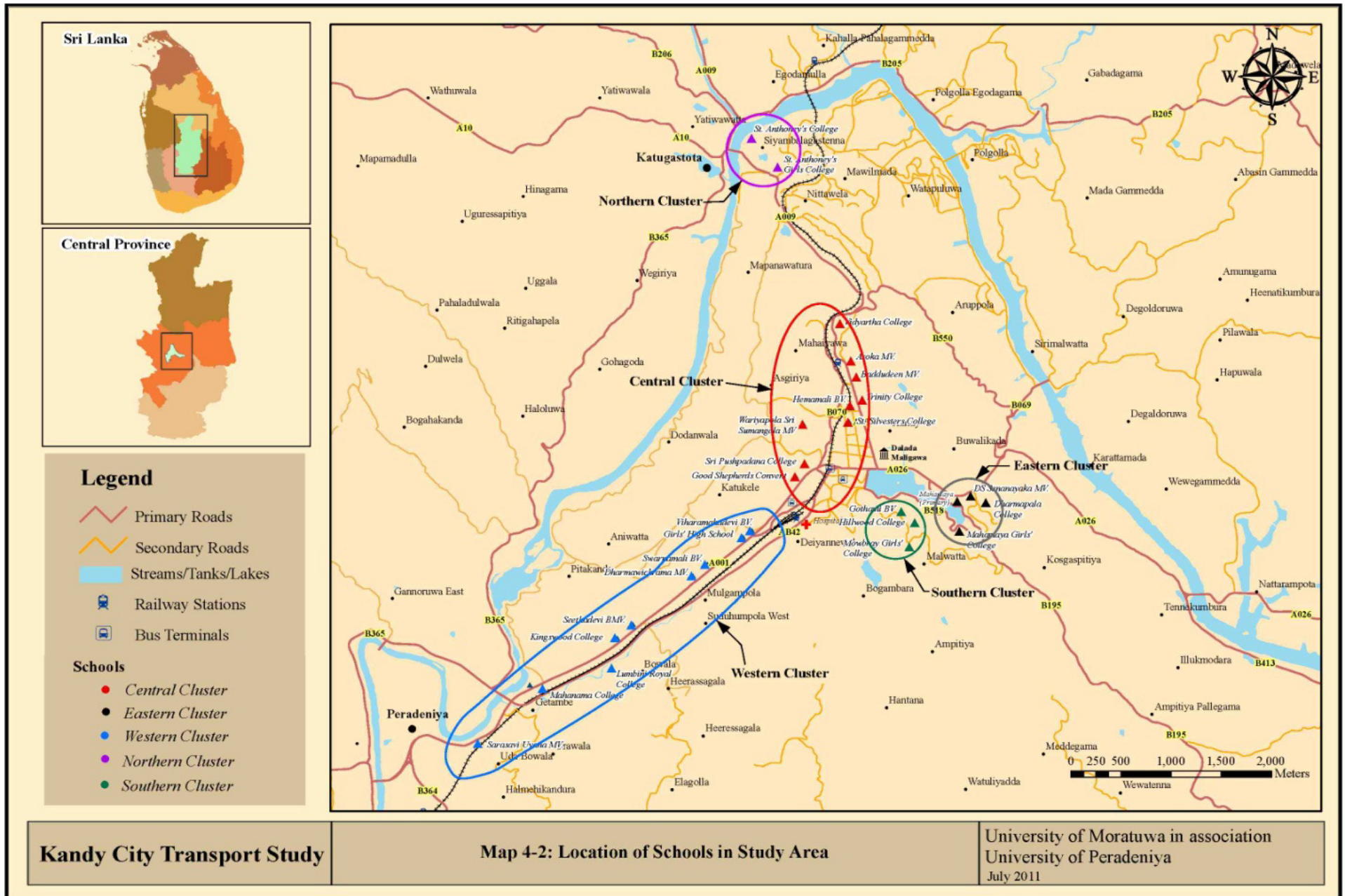
Recommendation #4: Integrated Public Transport Terminal



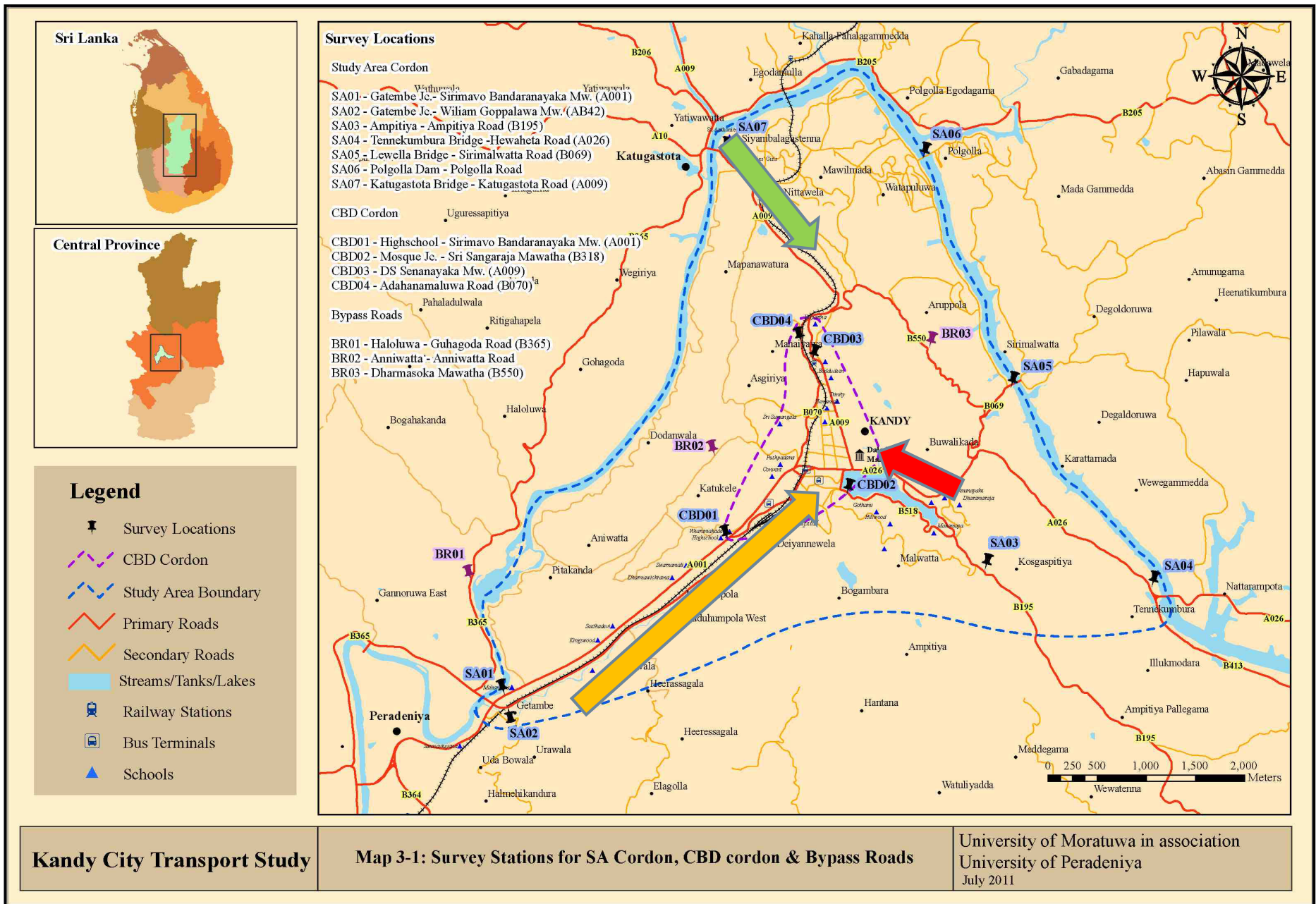
Recommendation #5: School Transport



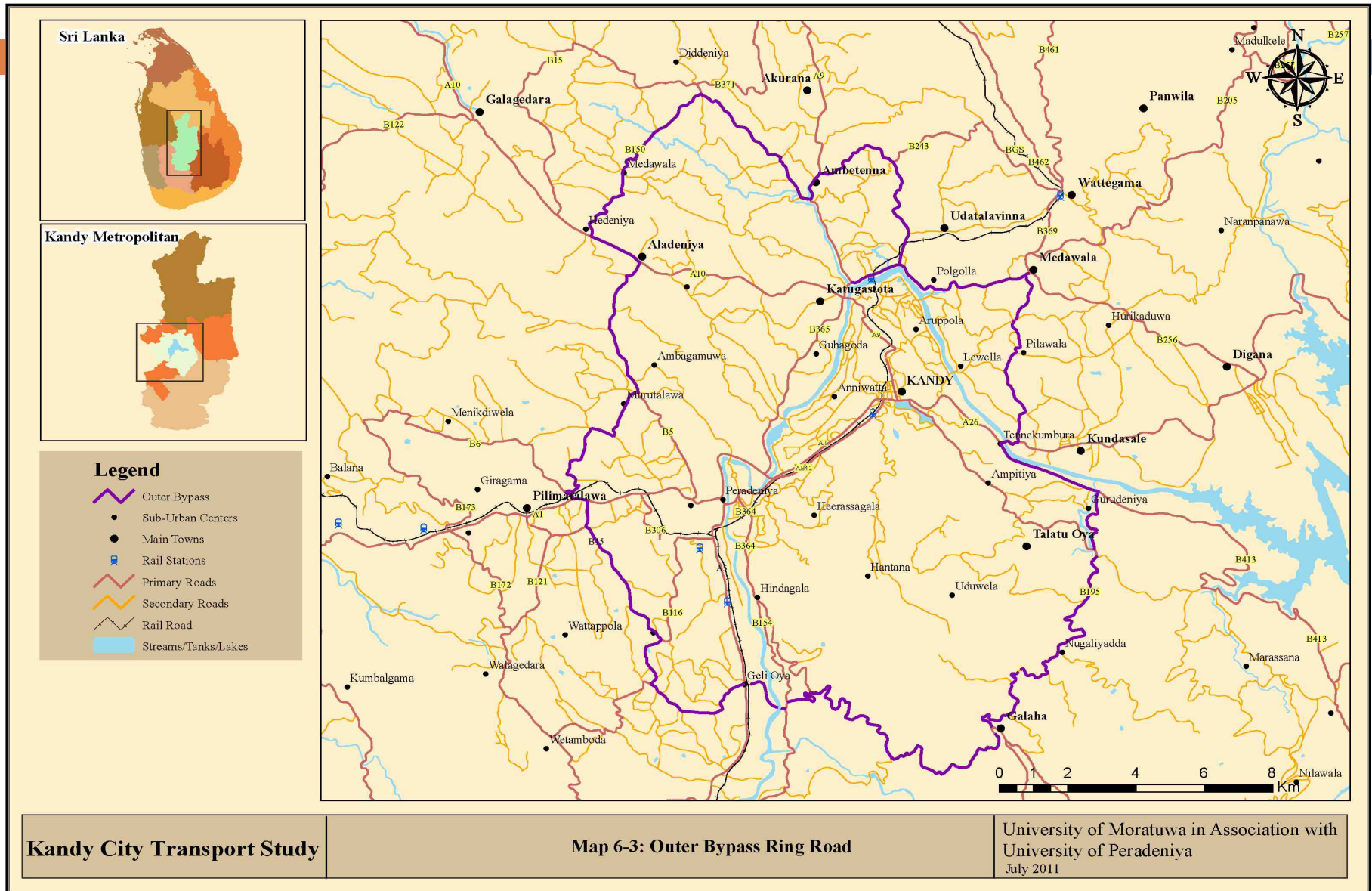
Recommendation #6: Pedestrianised Area



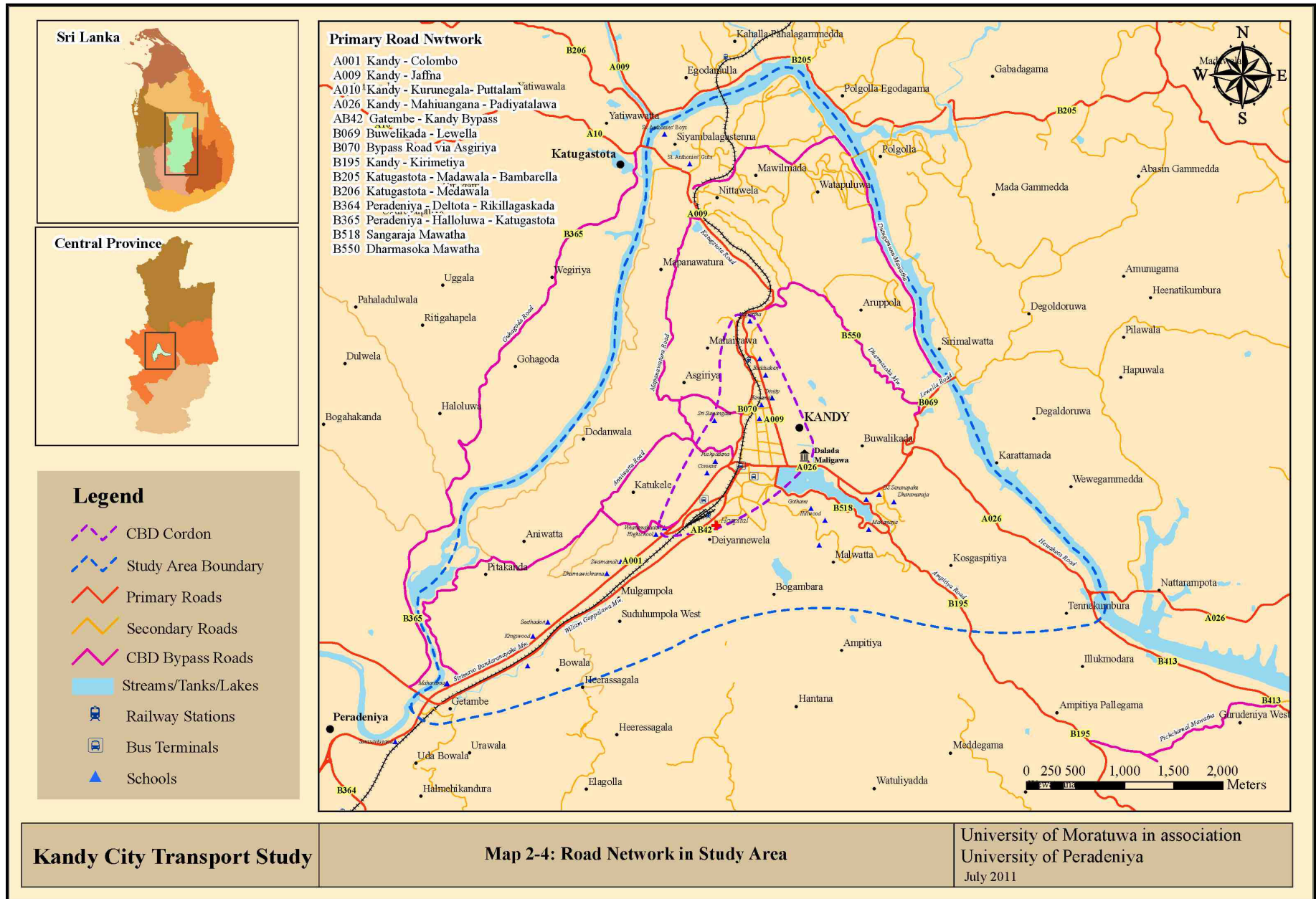
Recommendation #7: Improvement of Main Corridors



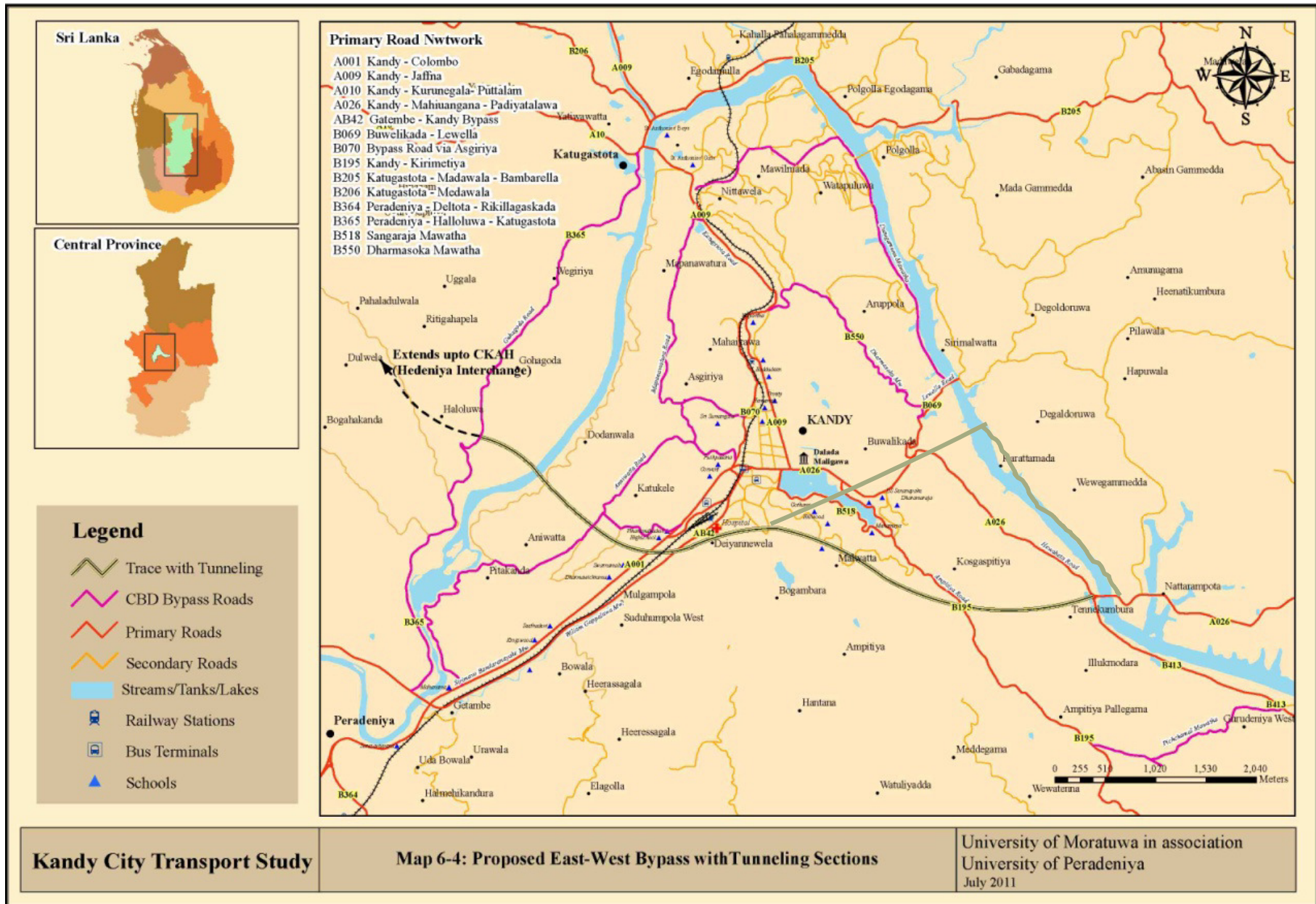
Recommendation 5b: Development of By-Passes (not recommended)



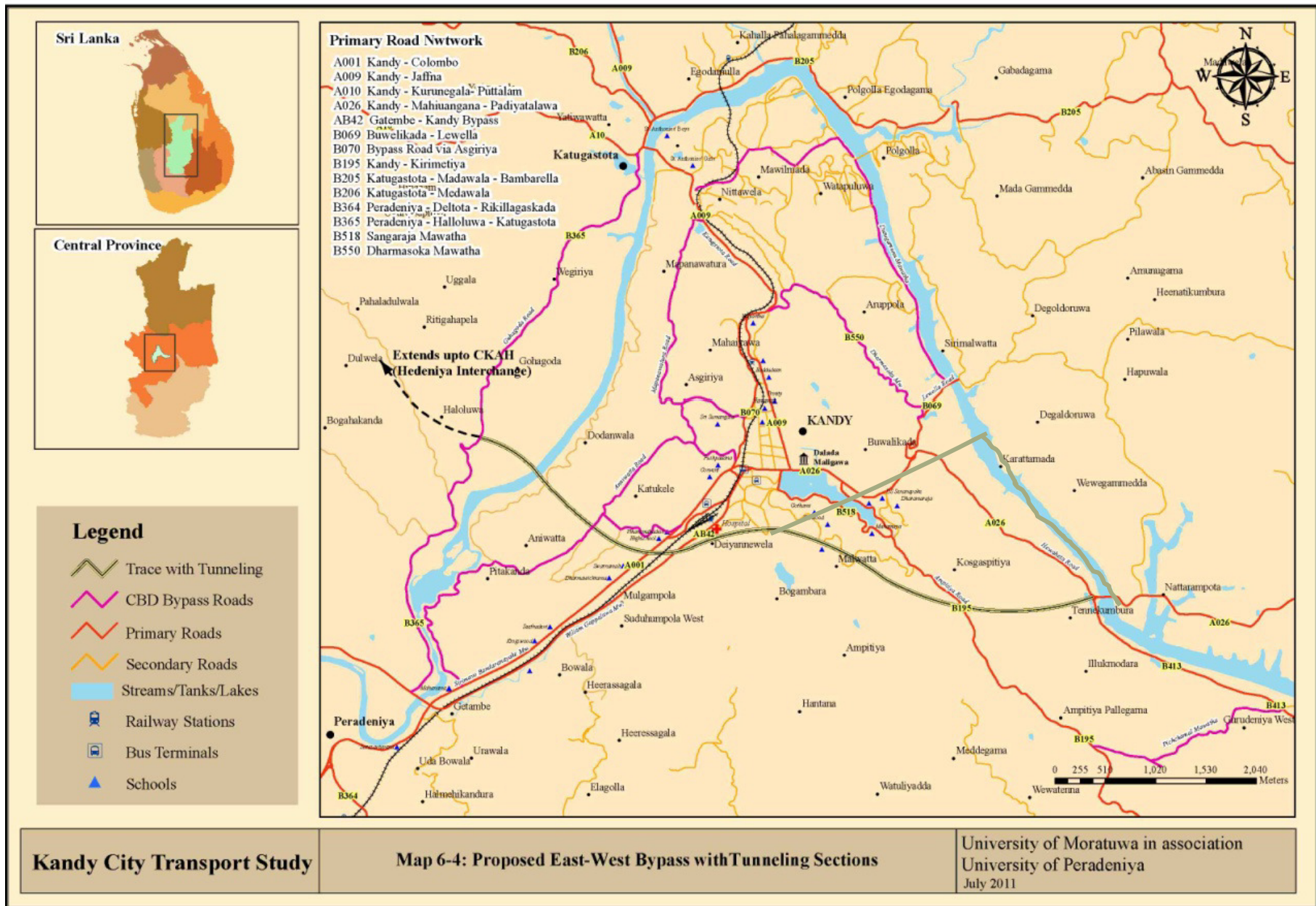
Recommendation #8: Development of Inner Bypass



Recommendation #9: Opening New By-Pass (Tunnel)



Recommendation # 10: Improving Tourist attraction to Kandy



Recommendations 11: Others

- A. General Improvements including Safety**
- B. Traffic Management**
- C. Parking**
- D. Traffic Restraint**

Strategic Plan

Stage 1

- Gazetting of Strategic Development Plan
- Creation of Basic Infrastructure for Satellite City at Peradeniya (Rs 2.2bn)
- Double Tracked Suburban Rail Operation between Peradeniya and Kandy (Rs 4bn)
- Tunnel from Thennekumbura to William Gopallawa Mw (Rs 8.2bn)
- Integrated Transport Terminal at Good shed (Rs 300 mn)
- Re routing local bus routes through the city (Rs 300 mn)
- Improvements to Junctions and Traffic Circulation System (Rs 690 mn)
- Development Pedestrian Path network (Rs 20 mn)
- School Van Clustering Scheme (Rs 5 mn)

Strategic Plan

Stage 2

- Creation of Basic Infrastructure for Satellite City at Katugastota (Rs 2.0)
- Double Tracked Suburban Rail Operation between Kandy and Katugastota (Rs 8bn)
- Improvement of Guhagoda Road by-pass (Rs 288 mn)
- Improvement of Dharmasoka Mawatha by-pass (Rs 210mn)
- Improvement of Dutugemunu Mawatha By-pass (Rs 246 mn)
- Improvement of Kuda Ratwatte By-pass (Rs 468 mn)
- Improvement of Pichchamal Mawatha by-pass (Rs 140 mn)

Strategic Plan

Stage 3

- Creation of Basic Infrastructure for Satellite City at Digana (Rs 1.8bn)
- Railway Extension to Digana (Rs 11.8bn)
- Extension of Tunnel from William Gopallawa to Hedeniya (CKAH) Interchange - (Rs 3.8bn)
- New by-pass from Thennekumbura to Katugastota (Rs 335 mn)
- Electronic Road Pricing System (Rs 1.3bn)

Creation of Basic Infrastructure for Satellite City at Peradeniya

Institutional Framework	Urban Development Authority
Description of Work	This includes providing land and developing it for the required quality infrastructure that is required to make Peradeniya as a Satellite city that would attract around 10,000 jobs currently taking place in the Kandy CBD. This should also include space for schooling for at least 10,000 students and a integrated bus and rail terminal capable of handling the above traffic as well as the current traffic at Peradeniya. Given the scarcity of land multi story complexes are encouraged for commercial and official spaces. The land and infrastructure may be developed by the UDA and private sector invited for constructing buildings. The integrated public transport terminal may be considered as a PPP project. The land already earmarked called Eriyagama could also be developed as part of this project.

Costs

Cost Estimate	Cost of land filling, service roads and other services may be estimated as Rs 575 million. The building spaces required for all the different activities identified above may be estimated at Rs 2,163 million.
Duration of Project	Three Years (2012-2015)
Maintenance/Operating Cost per year	Under PPP where private sector will put up the capital it is expected that the maintenance and operating costs will be borne by the private company and the cost received through user fees.
Life of Project (yrs)	10 years

Benefits

Description of Benefits	Will reduce the demand for travel to Kandy town by 1/6 th , It is assumed that approximately 30,000 of the current trips ends in the Kandy CBD can be terminated at the new satellite city. This would reduce around 10,000 vehicle trips travelling between Peradeniya and Kandy. There would be an estimated 2 minute travel time saving for those travelling to Kandy from Peradeniya due to this. 50% of total vehicle operating cost and travel time savings will be considered as net savings. Other land use development benefits will not be included.
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Estimated Quantifiable Value of Benefits for Life Time	The total benefits for a 10 year period amounts to an estimated Rs 14.8 billion in 2011 prices returning an EIRR of 33%.
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Non Quantifiable Benefits	<ul style="list-style-type: none"> • Financial Viability for PPP 7 • Economic Viability 10 • Regional Development Impacts 10 • Environmental Impacts 6 • Social Impacts 6 • Equitable (Distribution of Costs & Benefits) 5
<u>Rating as follows:</u>	
<i>Excellent 10; Very Good 9; Good 8; Moderately Positive 7; Marginally Positive 6; No Impact- 5; Marginally Negative 4; Moderately Negative 3; Poor</i>	