

Transferring Emme turning movements to SIDRA network using Python

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*Presentation at the SIDRA User Group Meeting
Sydney, 30 August 2019*



TRANSPORT MODELLING

Background

NETWORK LAYOUT

Network: N101 [AM_0500_0900]

New Network:
Network Category: (Name)

4N

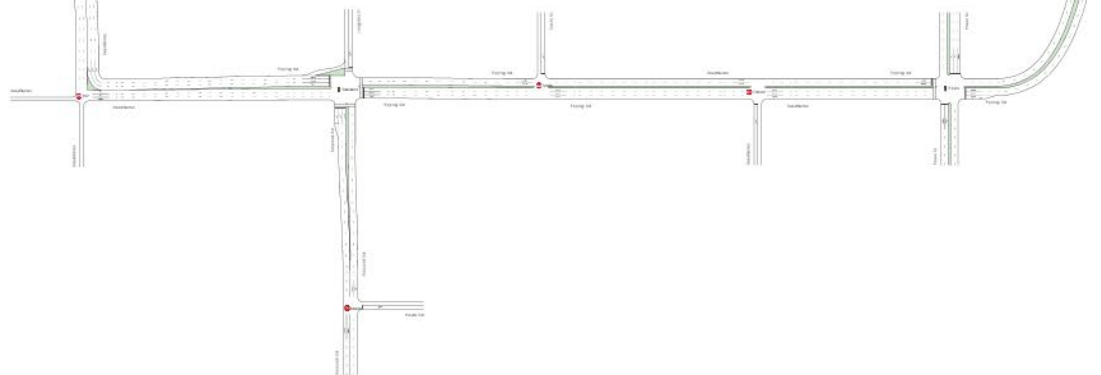
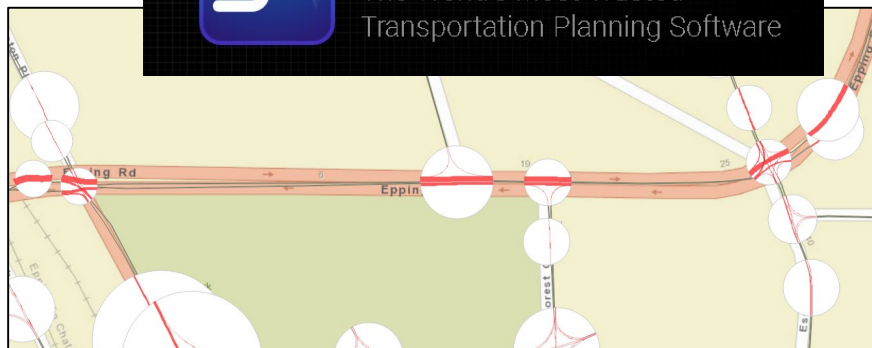


SIDRA INTERSECTION 8

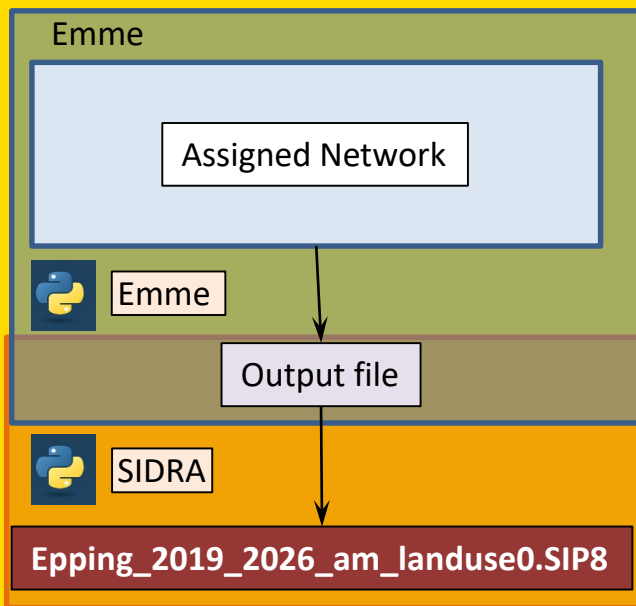


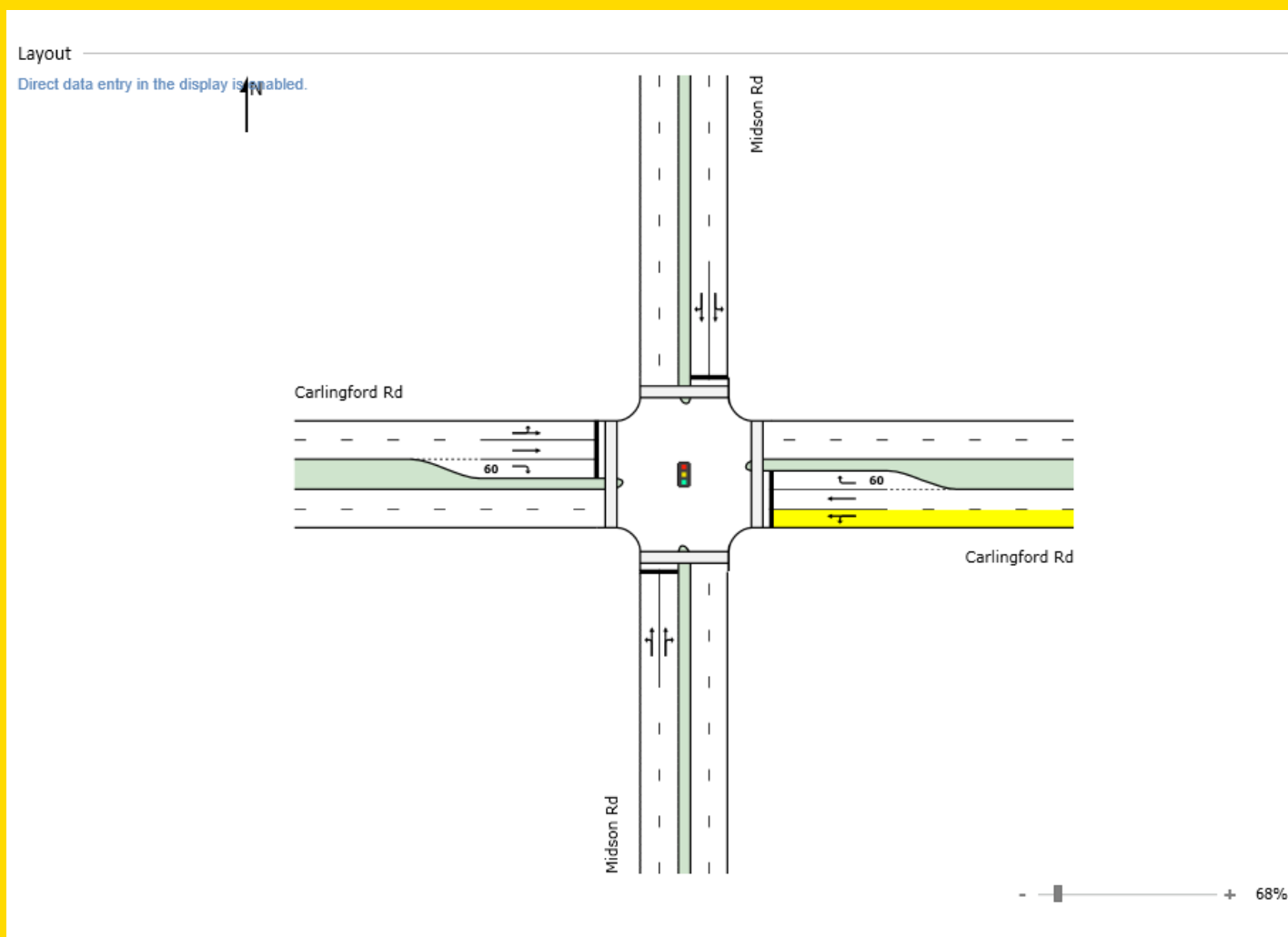
Emme

The World's Most Trusted
Transportation Planning Software



Site ID	CDC ID	Site Name
Milison	NA	Coringland Rd Milison Rd 0800
Ward	NA	Coringland Rd Ward St 0800
Cliff	NA	Coringland Rd Cliff Rd 0800
Hawson	NA	Coringland Rd Hwy St 0800
Carl Glee	NA	Coringland Rd Glee Rd 0800
Skawoff	NA	Skawoff Rd High St on ramp 0800

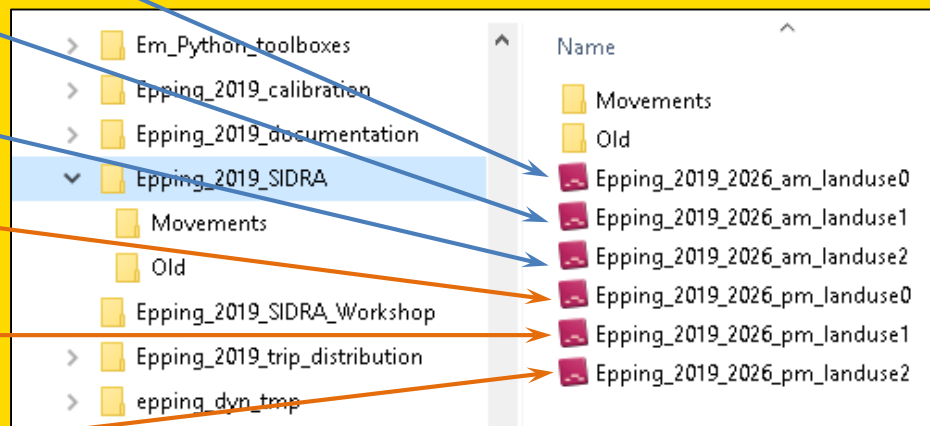




A “Typical” intersection in the Epping Network



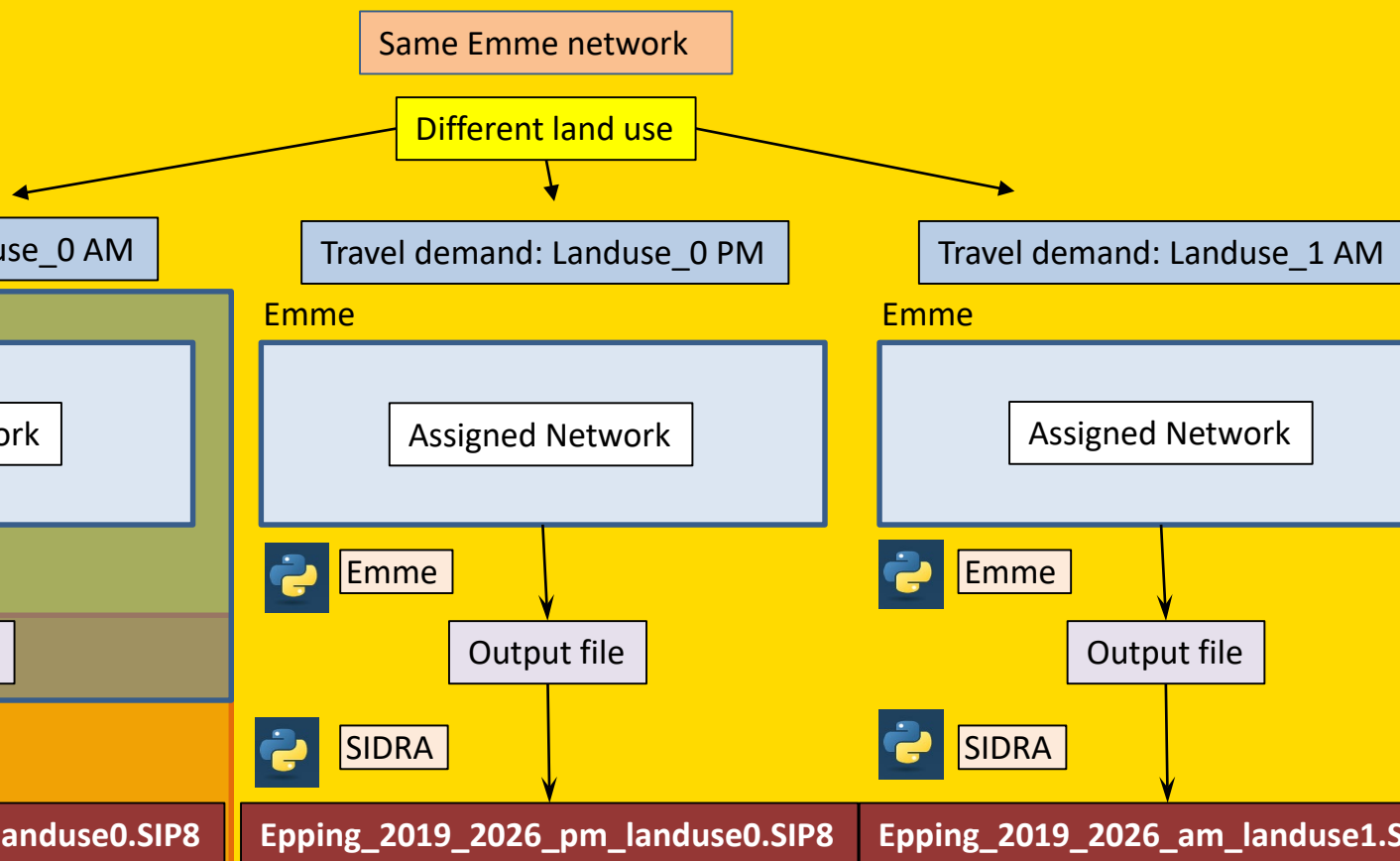
Landuse_0	AM
Landuse_1	AM
Landuse_2	AM
Landuse_0	PM
Landuse_1	PM
Landuse_2	PM



If we did not automate this, we would have to transfer the numbers manually



TRANSPORT MODELLING



Same SIDRA network
Different turning movements





TRANSPORT
MODELLING

WHAT'S BEHIND THE SCREEN?



Emme

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Emme Modeller

SIDRA INTERSECTION 8

[Resources home](#) / [SIDRA INTERSECTION](#) / [SIDRA UTILITIES and API](#)

SIDRA API Workshop Presentation Material

Modified on: 2019-05-07 21:26:31 +1000

// About the SIDRA API Workshop held in Melbourne, 26 November 2018

SIDRA SOLUTIONS hosted a half-day workshop to facilitate improved use of the SIDRA Application Programming Interface (API) in Melbourne on 26 November 2018. The workshop included presentations by SIDRA INTERSECTION developers and users on a number of practical SIDRA API program examples. The slide presentation files in PDF format, a transcript of workshop presentations and discussions and the complete set of SIDRA BATCH Python sample program using SIDRA API prepared by SIDRA SOLUTIONS are given below.

A	
11	Click the Open SIDRA INTERSECTION Project File button to browse for the Project file (extension .sip\$).
12	Click the Save SIDRA INTERSECTION Project File button if you wish to save the changes made to the Project file as a result of the use of this Excel application.
13	
14	
15	Site:
16	Select the Site using the drop-down box below.
17	
18	
19	
20	Get Volumes
21	Gets volume and related data for the selected Site from the Project database and puts data in the Volume Input sheet.
22	No processing performed. Data in SIDRA INTERSECTION Project file will not be affected.
23	
24	Process (No Volume Update)
25	Processes selected Site using volumes contained within the Project. Populates "Output" sheets with Site output.
26	Volumes and related data in the Volume Input sheet will be ignored and data in the SIDRA INTERSECTION Project file will not be affected.
27	
28	Update Volumes & Process Copy Dynameq turns Extract Green times
29	Processes specified Site using volumes from Volume Input sheet. Populates "Output" sheets with Site output.
30	Data in the SIDRA INTERSECTION Project file will be replaced by the volume data and related parameters in the Volume Input sheet when the Project file is saved (any existing Site data will be overwritten).
31	
32	Copy Volume Output to Volume Input
33	Copies and pastes vehicle volumes from tables in the Volume Output sheet to those in the Volume Input sheet.
34	
35	Clear
36	Closes the SIDRA INTERSECTION Project, clears the "Output" sheets, and sets the values in the Volume Input sheet to defaults and hides the volume input tables.
37	

☐	Slice 1	FAL
☐	Slice 2	FAL
☐	Slice 3	FAL
☐	Slice 4	FAL
☐	Slice 5	FAL
☐	Slice 6	TR
☐	Slice 7	FAL
☐	Slice 8	FAL

Messy – but automated

What's behind the Screen?

INTERSECTION - Site1

Intersection Properties

Quick Input

Approach Editor

Site Data

Site Name: Site1
Site ID: 101
Site Category: (None)
Site Title: New Site

Approach Geometry

Name: RoadName
Leg Geometry: Two Way
Approach Distance: 500.0 m
Exit Distance: Program

Approach Data

Extra Bunching: Program

Signals

Area Type Factor: 1.0

Selected Leg: South

Legend

- Leg exists
- Leg does not exist
- Leg selected (Leg exists)
- Leg selected (Leg does not exist)

VOLUMES - Site1

Vehicle Volumes Volume Factors

Import Volume Data Quick Input View Display

Approach Selector

Volume Data Settings for Site

Unit Time for Volumes: 60 minutes
Peak Flow Period: 30 minutes
Volume Data Method: Total & %

The Peak Flow Period parameter for the Site will not affect Network analysis results. The corresponding parameter appears in the Network Data dialog.

Movement Volumes for Selected Approach (Per 60 Minutes)

From South to Exit:	W	N	E
	L2	T1	R2
Total (veh)	1	1	1
Light Vehicles (%) *	100 %	100 %	100 %
Heavy Vehicles (%)	0 %	0 %	0 %
Input Check	OK	OK	OK

* LV (%) values are specified

0 - 6

0 - 4

0 - 2

Help OK Cancel Apply Process Site

```

1 = 4
R1 = 5
R2 = 6
R3 = 7

class LegDirections(Enum):
    South = 0
    SouthEast = 1
    East = 2
    NorthEast = 3
    North = 4
    NorthWest = 5
    West = 6
    SouthWest = 7

class PySIAP:
    def __init__(self):
        self.siapi = SIAPComPy.ISIAP(w32c.Dispatch("SIDRASolutions.SI.API.SIAP"))
        ##self.siapi = SIAPComPy.SIAP() # *** notice: this would not work ***

    def _GetDirectionName(self, direction):
        if (direction == 0):
            return "South"
        elif (direction == 1):
            return "SouthEast"
        elif (direction == 2):
            return "East"

```

SIDRA API Python code

Same logic applies to the other legs



TRANSPORT
MODELLING

IN EMME



```
node_i = turn.i_node
node_i_x = node_i.x
node_i_y = node_i.y

node_j = turn.j_node
node_j_x = node_j.x
node_j_y = node_j.y

node_k = turn.k_node
node_k_x = node_k.x
node_k_y = node_k.y

if node_j != last_node_j:
    last_node_j = node_j

# approach - south = 0
if str(node_j) == "9999":
    to_be_printed = False
else:
    dist_y = abs(node_i.y - node_j.y)
    if (node_i.y < node_j.y) & (abs(node_i.x - node_j.x) < dist_y):
        approach = 0

# approach - north = 4
if (node_i.y > node_j.y) & ((node_i.x - node_j.x) < dist_y):
    approach = 4

# approach - west = 6
dist_x = abs(node_i.x - node_j.x)
if (node_i.x < node_j.x) & (abs(node_i.y - node_j.y) < dist_x):
    approach = 6

# approach - east = 2
if (node_i.x > node_j.x) & (abs(node_i.y - node_j.y) < dist_x):
    approach = 2

if str(node_k) == "9999":
    not_print = True
else:
    dist_y = abs(node_j.y - node_k.y)
    if (node_j.y < node_k.y) & (abs(node_j.x - node_k.x) < dist_y):
        departure = 4

    if (node_j.y > node_k.y) & (abs(node_j.x - node_k.x) < dist_y):
        departure = 0
    dist_x = abs(node_j.x - node_k.x)
    if (node_j.x < node_k.x) & (abs(node_j.y - node_k.y) < dist_x):
        departure = 2

    if (node_j.x > node_k.x) & (abs(node_j.y - node_k.y) < dist_x):
        departure = 6

if turn.auto_volume > 0 & to_be_printed:
    integer_volume = int(turn.auto_volume + 0.5)
    tmp_str = (required_intersection_name + ", " +
               str(approach) + ", " + str(departure)
               + ", " + str(integer_volume) + "\n")
    out_file.writelines(tmp_str)

out_file.close()
```

The X and Y coordinates of the “from node” relative to the X and Y coordinates of the intersection is used to determine the approach direction (0, 2, 4, or 6)

The same logic is used to determine the departure direction (0, 2, 4, 6)

This project only used “auto” volumes.



TRANSPORT
MODELLING

EMME OUTPUT



Snippet of output file: name of Site, approach direction, departure direction, light volume

heavy volume – not used in this project

Carlingford_Rd_Beecroft_Rd_1700,	6,	4,	0,	1
Carlingford_Rd_Beecroft_Rd_1700,	6,	0,	28,	1
Carlingford_Rd_Beecroft_Rd_1700,	4,	6,	2,	1
Carlingford_Rd_Beecroft_Rd_1700,	4,	0,	1,	1
Carlingford_Rd_Beecroft_Rd_1700,	0,	4,	12,	1
Carlingford_Rd_Beecroft_Rd_1700,	0,	6,	3,	1
Beecroft_Rd_High_St_1700,	2,	4,	6,	1
Beecroft_Rd_High_St_1700,	2,	6,	8,	1
Beecroft_Rd_High_St_1700,	2,	0,	0,	1
Beecroft_Rd_High_St_1700,	4,	2,	29,	1
Epping_Rd_Blaxland_Rd_1700,	2,	6,	14,	1
Epping_Rd_Blaxland_Rd_1700,	4,	2,	0,	1
Epping_Rd_Blaxland_Rd_1700,	4,	0,	2,	1
Epping_Rd_Blaxland_Rd_1700,	0,	6,	1,	1
Epping_Rd_Blaxland_Rd_1700,	0,	4,	1,	1
Epping_Rd_Blaxland_Rd_1700,	6,	2,	26,	1
Epping_Rd_Blaxland_Rd_1700,	6,	0,	3,	1

1's indicate light vehicles only

SIDRA site name

From , To direction

Volume



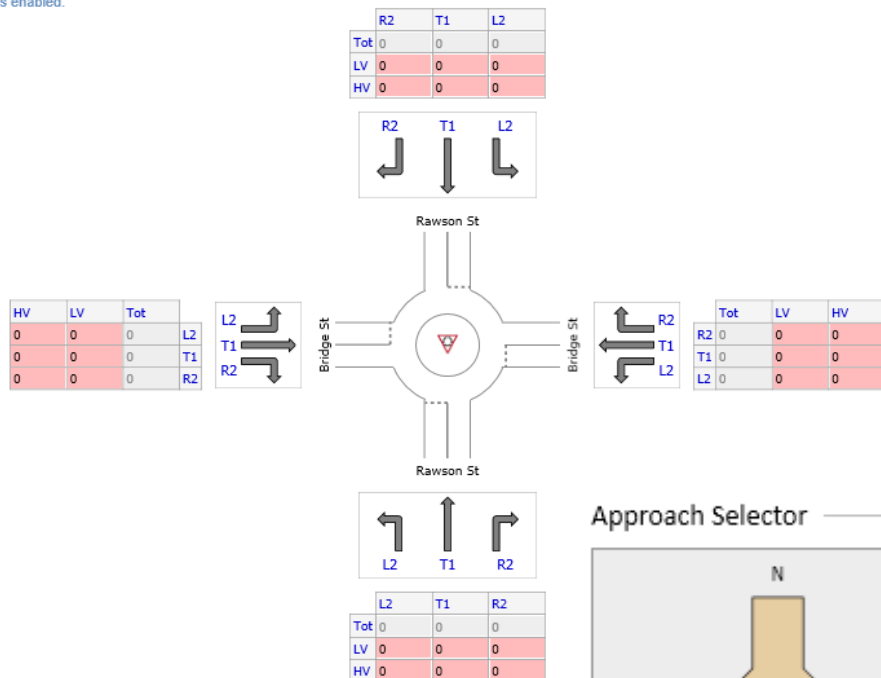
EXAMPLE



Example

volumes

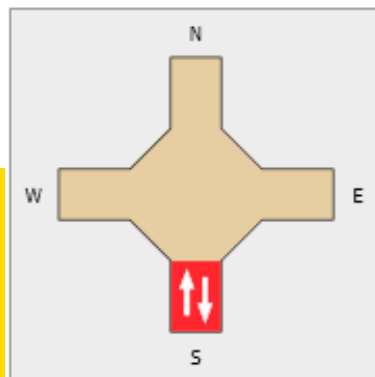
Direct data entry in the display is enabled.



“Separate” is in
“Volume Data Method”

Set the “light” volumes in
this case to 0 and “heavy”
volumes to 0

Approach Selector



Rawson St

Specify the Volume Data Settings
before entering Movement Volumes.

The Unit Time for Volumes and Peak
Flow Period apply to both Vehicle
and Pedestrian movements.

Volume Data Settings for Site

Unit Time for Volumes: 60 minutes

Peak Flow Period: 30 minutes

Volume Data Method: Separate

The Peak Flow Period
results. The correct

Movement Volumes for Selected Approach (Per 60 Minutes)

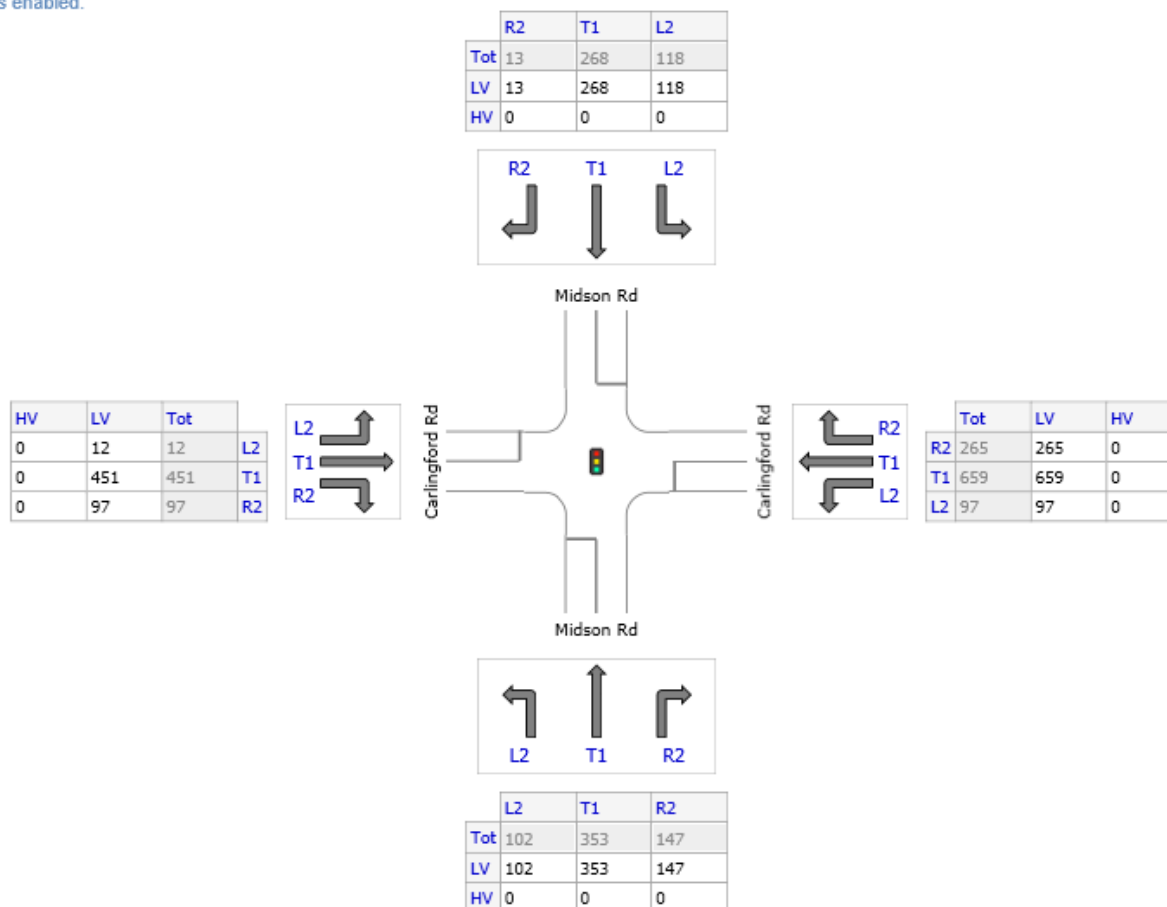
From South to Exit:	W	N	E
	L2	T1	R2
Total (veh) *	0	0	0
Light Vehicles (veh)	0	0	0
Heavy Vehicles (veh)	0	0	0
Input Check	Error	Error	Error

* Total (veh) values are calculated from other volumes specified



Volumes

Direct data entry in the display is enabled.



All light vehicle volumes have been changed from 0 to a different number



CHECK IF IT WORKED



TRANSPORT MODELLING

Check to see if it worked

Epping_2019_2026_am_landuse1 - SIDRA INTERSECTION 8.0 NETWORK

File Site Network Route Tools Settings Licensing

Process Layout Add Rotate Clone Import Move Up Move Down Delete Input Report Approach Distances CCG Phase Sequence Network Summary Network Displays Lane Displays Signal Offsets Network Graphs Network Variable Run Midblock Flows Lane Changes Network Flows Network Site Flows Lane Flows

PROJECT: Epping_2019_2026_am_landuse1

Midblock Flows - AM_0800_0900 [N]

Midblock Inflow (positive) and Outflow (negative) value determined as the difference between upstream and downstream demand flow rates (veh/h)

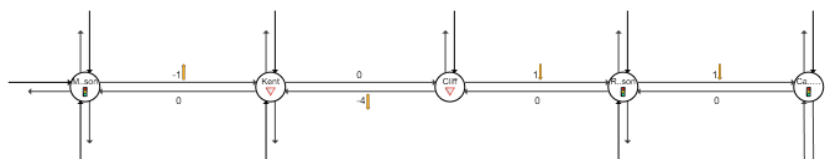
Network: N101 (AM_0800_0900)

Open Network
Network Category: (None)
Network Cycle Time: 70 seconds (Network Optimum Cycle Time - Minimum Delay)

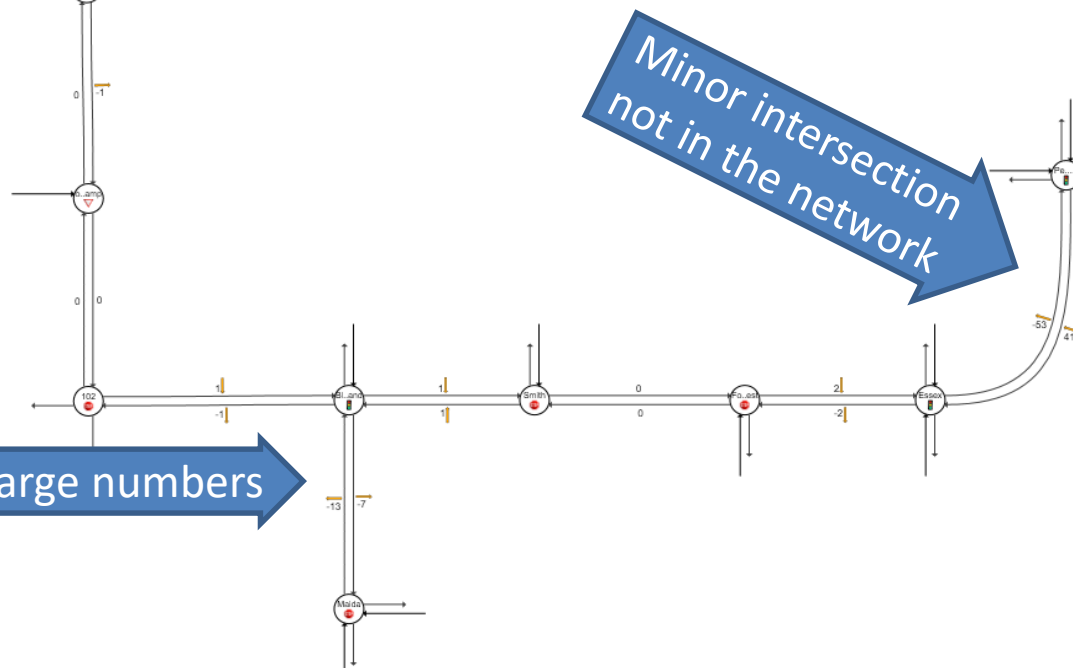
Click the Inflow / Outflow values for details in pop-up boxes.

Open All Popups

All Movement Classes



Expect max diff = ± 2





PYTHON CODE ITSELF



Emme Notebook

```
# Important Notice:
# Install "Python for Window Extensions" pypiwin32 package before running this sample:
# * install through pip: run the command "pip install pypiwin32", or
# * download the package from https://pypi.python.org/pypi/pypiwin32
# The "pip.exe" file is located in the folder "<Python_install_folder>\Scripts", e.g. "C:\Program Files (x86)\Python36-32\Scripts\"
#
# The file "SIAPIComPy.py" is generated by the pypiwin32 package. You can use this
# existing one, or create one by yourself. The instructions to create it are given below.
# 1. Open "Command Prompt"
# 2. Run "<Python_install_folder>\Lib\site-packages\win32com\client\makepy.py"
# 3. Select "SIDRA INTERSECTION 8.0 API (8.0)" in the popup "Select Library" window, click "OK"
# 4. Copy the generated "A073B4B7-AFE5-4EE8-A7D3-6FFEB4FFEB09x0x8x0.py" file to the folder of
#    this script file and rename it to "SIAPIComPy.py".

import win32com.client as w32c
import pythoncom
from enum import Enum
import SIAPIComPy
```

Install
Instructions

There is also plenty of material online to help
install all of the required modules to Python



Inputs into the code and possible adjustments

```
turn_volume_files = ["C:\\Epping_2019_trip_distribution\\Outputs\\2026_AM_landuse_0_sidra_turns.txt",
                    "C:\\Epping_2019_trip_distribution\\Outputs\\2026_PM_landuse_0_sidra_turns.txt",
                    "C:\\Epping_2019_trip_distribution\\Outputs\\2026_AM_landuse_1_sidra_turns.txt",
                    "C:\\Epping_2019_trip_distribution\\Outputs\\2026_PM_landuse_1_sidra_turns.txt",
                    "C:\\Epping_2019_trip_distribution\\Outputs\\2026_AM_landuse_2_sidra_turns.txt",
                    "C:\\Epping_2019_trip_distribution\\Outputs\\2026_PM_landuse_2_sidra_turns.txt"]

sidra_project_files = ["C:\\Epping_2019_SIDRA\\Epping_2019_2026_am_landuse0.sip8",
                     "C:\\Epping_2019_SIDRA\\Epping_2019_2026_pm_landuse0.sip8",
                     "C:\\Epping_2019_SIDRA\\Epping_2019_2026_am_landuse1.sip8",
                     "C:\\Epping_2019_SIDRA\\Epping_2019_2026_pm_landuse1.sip8",
                     "C:\\Epping_2019_SIDRA\\Epping_2019_2026_am_landuse2.sip8",
                     "C:\\Epping_2019_SIDRA\\Epping_2019_2026_pm_landuse2.sip8"]

for j in range(len(turn_volume_files)):
    turn_volume_file = turn_volume_files[j]
    sidra_project_file = sidra_project_files[j]

    f=open(turn_volume_file, "r")
    contents = f.read()
    contents = contents.replace("\n",", ")
    split_contents1 = contents.split(", ",-1)
```

Emme
Output Files

SIDRA
Project Files



3 POSSIBLE AREAS TO CHECK



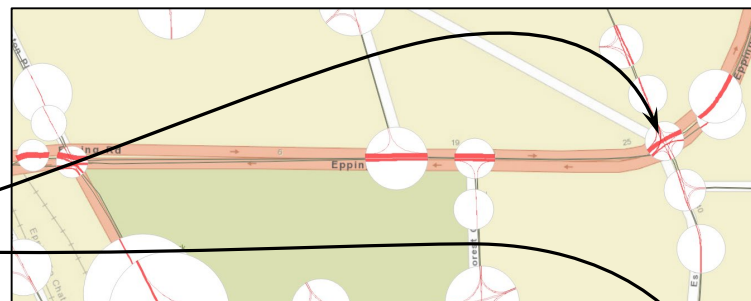
TRANSPORT MODELLING

3 Possible Areas to Check

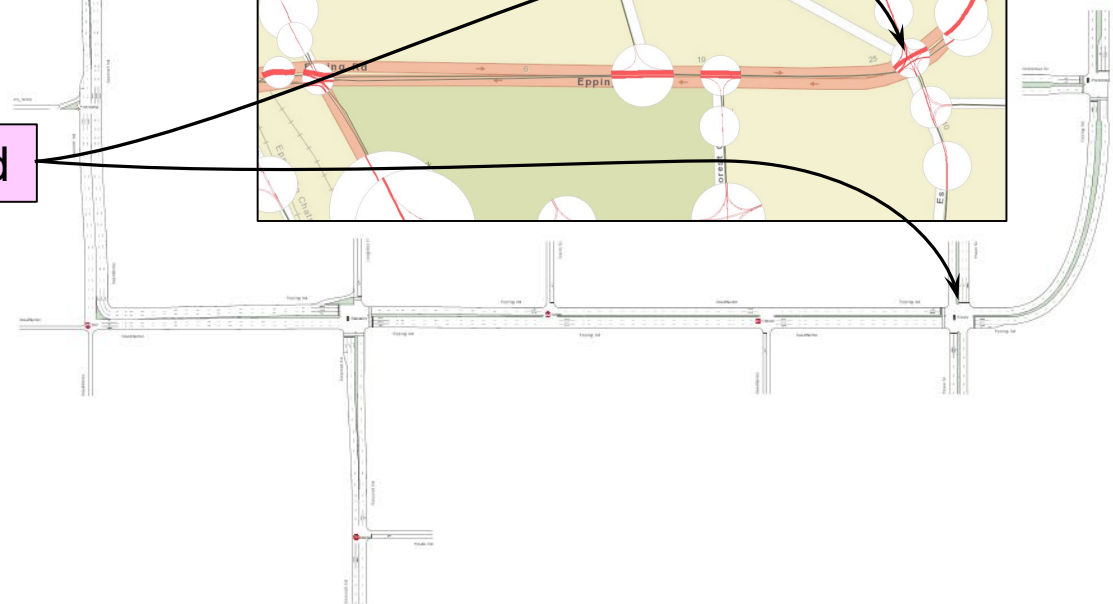
NETWORK LAYOUT

Network: N101 [AM_0800_0800]

Node Network
Network Category: (None)



Emme node correctly identified



SITES IN NETWORK

Site ID	CCID	Site Name
Bulbin	NA	Carrington Rd Midway Rd 0800
Claret	NA	Carrington Rd West St 0800
Claret	NA	Carrington Rd Cliff Rd 0800
Claret	NA	Carrington Rd Hay St 0800
Claret	NA	Carrington Rd Besscroft Rd 0800
Claret	NA	Besscroft Rd High St on ramp 0800

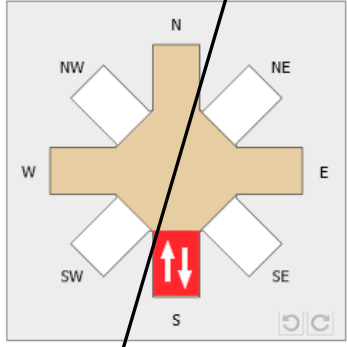


3 Possible Areas to Check

INTERSECTION - Carlingford_Rd_Midson_Rd_0800

Intersection Properties

Approach Editor



Selected Leg: South

Legend

- Leg exists
- Leg does not exist
- Leg selected (Leg exists)
- Leg selected (Leg does not exist)

Site Data

Site Name: Carlingford_Rd_Midson_Rd_0800

Site ID: Midson

Site Category: (None)

Site Title: Carlingford Rd - Midson Rd

Approach Geometry

Name: Midson Rd

Leg Geometry: Two Way

Changes are not allowed to the Leg Geometry of a Site which is included in a Network.

Approach Distance: 500.0 m

Exit Distance: Program

Approach Data

Extra Bunching: Program

required intersections -----
required_intersections = "10940", "310"

"31014", "15610",
"10939", "11336",
"11706", "30039",
"30049", "14185",
"11707", "23596",
"31031",
"10940", "15610",
"10939", "11706",
"14185", "11707"]

SIDRA Intersection names -----

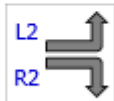
intersection_names = ["Carlingford_Rd_Midson_Rd" + "_" + time, "Carlingford_Rd_Kent_St" + "_" + time,
"Carlingford_Rd_Cliff_Rd" + "_" + time, "Carlingford_Rd_Ray_St" + "_" + time,
"Carlingford_Rd_Beecroft_Rd" + "_" + time, "Beecroft_Rd_High_St" + "_" + time,
"Epping_Rd_Blaxland_Rd" + "_" + time, "Epping_Rd_Smith_St" + "_" + time,
"Epping_Rd_Forrest_Grove" + "_" + time, "Epping_Rd_Essex_St" + "_" + time,
"Epping_Rd_Pembroke_St" + "_" + time, "Blaxland_Rd_Maida_Rd" + "_" + time,
"Beecroft_Rd_High_St_on_ramp" + "_" + time,
"Carlingford_Midson_signals_only", "Carlingford_Rd_Ray_St_signals_only",
"Carlingford_Rd_Beecroft_Rd_signals_only", "Epping_Rd_Blaxland_Rd_signals_only",
"Epping_Rd_Essex_St_signals_only", "Epping_Rd_Pembroke_St_signals_only"]



3 Possible Areas to Check

Double Check the 0's

HV	LV	Tot
0	0	0
0	1603	1603

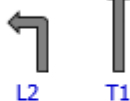


Carlingford Rd

Beecroft Rd

Beecroft Rd

	R2	T1
Tot	289	1205
LV	289	1205
HV	0	0



	L2	T1
Tot	465	772
LV	465	772
HV	0	0

HV	LV	Tot
0	109	109
0	1503	1603



Carlingford Rd

Beecroft Rd

Beecroft Rd

	R2	T1
Tot	289	1205
LV	289	1205
HV	0	0



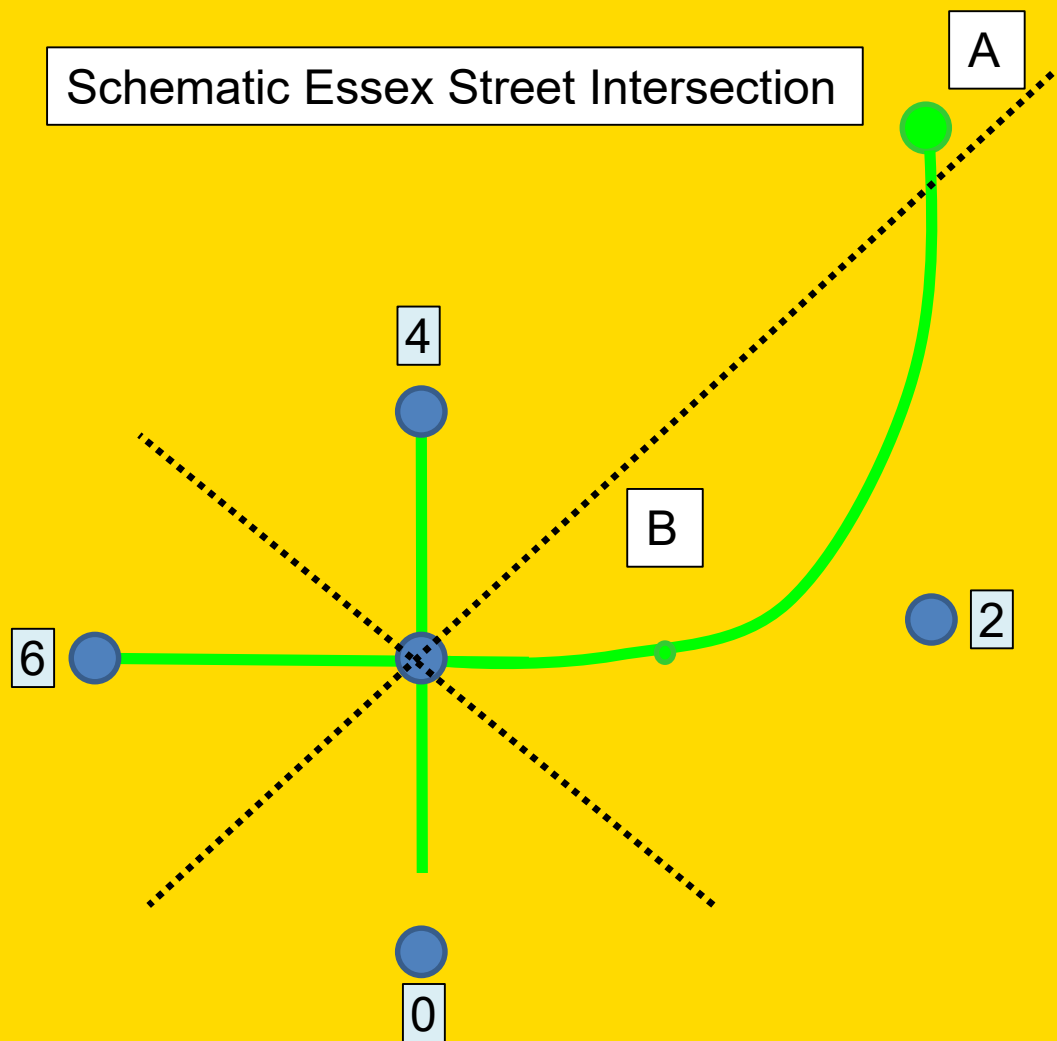
	L2	T1
Tot	465	772
LV	465	772
HV	0	0

Correct Value



3 Possible Areas to Check

Schematic Essex Street Intersection





SHORTFALLS



File | Site | Network | Route | Tools | Settings | Licensing

Input Comparison | Output Comparison | Project | User Report

PROJECT: Epping_2019_2026_pm_landuse2

NETWORKS

- PM_signals_only
- PM_1630_1730

Selected Network: PM_signals_only

NETWORK INPUT

- Network Data
- Define CCGs
- Network Timing
- Network Demand & Sensitivity
- Network Routes

SITES IN NETWORK

- Carlingford_Rd_Midson_Rd_signals_only
- Carlingford_Rd_Ray_St_signals_only
- Carlingford_Rd_Beecroft_Rd_signals_only

Generate this report

Execute this network

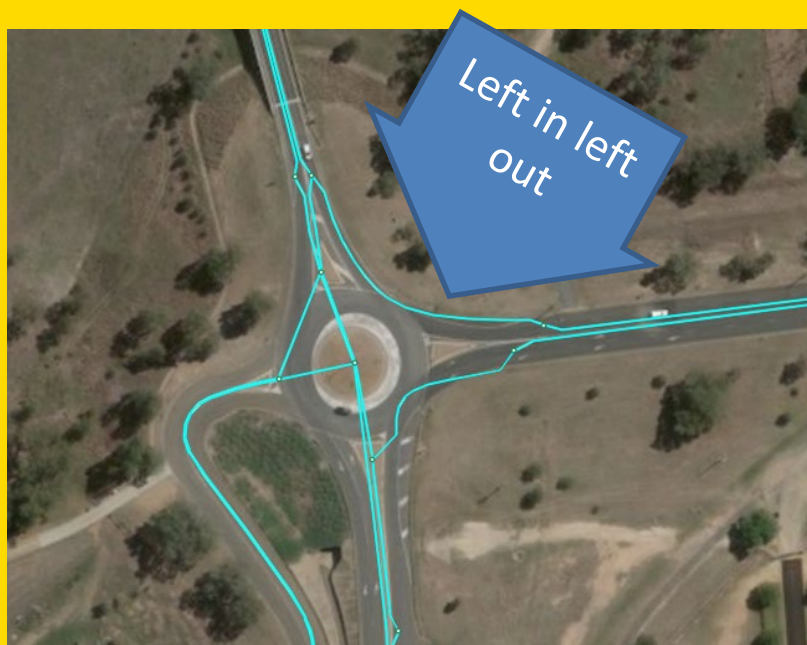
Process Network must be run after movements have been updated

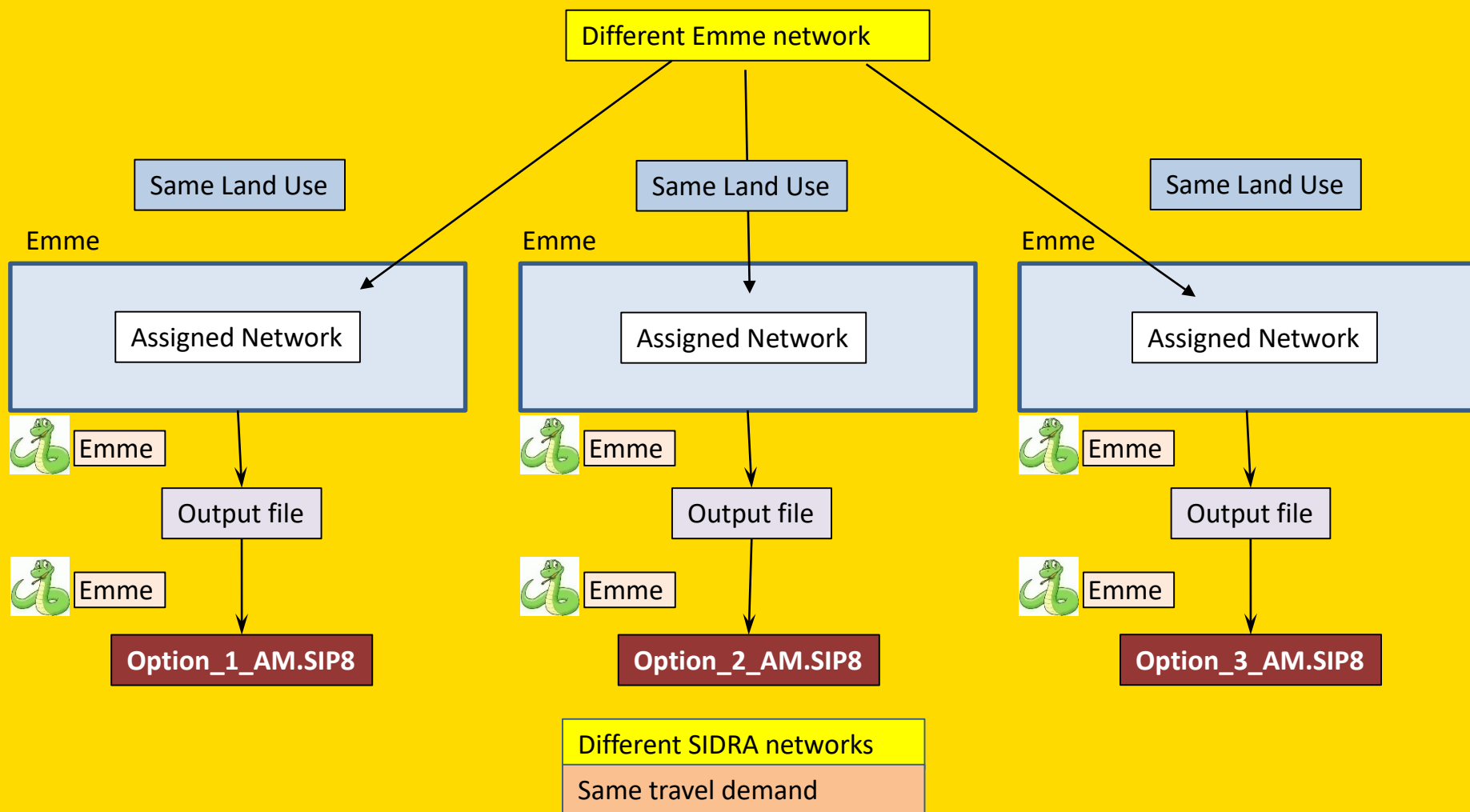
No Script to run special reports such as EMM

SIDRA Network needs to be built manually, i.e. Lane Geometry



POSSIBILITIES







Mainly, you can recalculate volume
every site in the network at the push of a
button:

The Existing Network has:

3 Intersections

Approx. 100 movements per intersection

3 Land uses

1. All and PM

BIG

13 x 12 x 3 x 2

All needing to be manually put into SIDRA



QUESTIONS ?