

Q-Traf

A Macroscopic Road Traffic Model

Version 1307

Users Manual

Table of contents

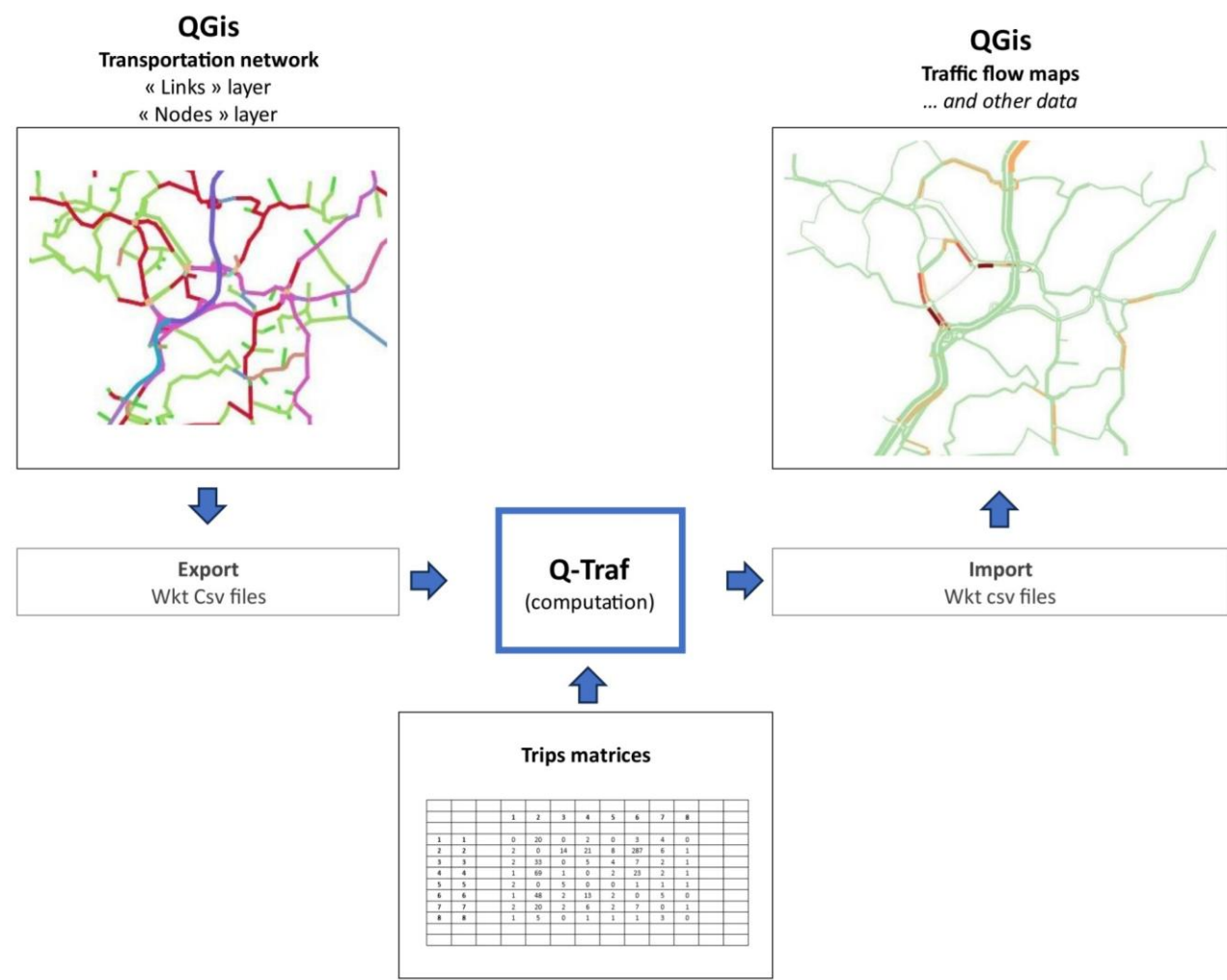
What is Q-Traf ?	5
Get started - Calculate your first assignment with one of the examples provided	6
1. Files and folders.....	9
The 3 file formats – txt, csv and wkt csv.....	9
The 2 csv formats	9
How to manipulate a csv files with a spreadsheet software (LibreOffice, OpenOffice, Excel) - csv files ↔ xlsx files.....	11
The QGis “wkt csv” file format	12
How to manipulate the wkt csv files	13
WKT csv files ↔ QGis layer	13
Q-Traf folders and files.....	23
The folders tree structure.....	23
The result files	25
The input data files.....	28
Q-traffic input files – List, structure and location.....	31
The file « network_links_wkt_csv »	31
The file « network_zones_wkt_csv »	34
The file « network_poles_correspondances_wkt_csv » (or P&R) (to do)	36
The files « matrices_csv ».....	37
2. Network and zones modelling.....	38
How to create a network – With QGIS.....	38
How to modify a network (with QGIS)	38
How to export / save a « network.shp » file to a « network.csv » file	38
Zones and virtual connectors	44
Connectors	45

How to define connectors	45
Connector category	47
Links categories	47
Links.....	48
Prohibiting Turning movements	48
Prohibiting U-turns.....	49
Roundabouts	50
Generalized cost of a link / path.....	51
Without penalty	51
With Penalty	51
Generalized cost of a path.....	51
3. Method of traffic assignment.....	52
4. Link Travel Time (flow rate) functions	53

In this document, the examples and illustrations are given for these softwares :

- GIS : QGIS
- Spreadsheet software : OpenOffice and Excel

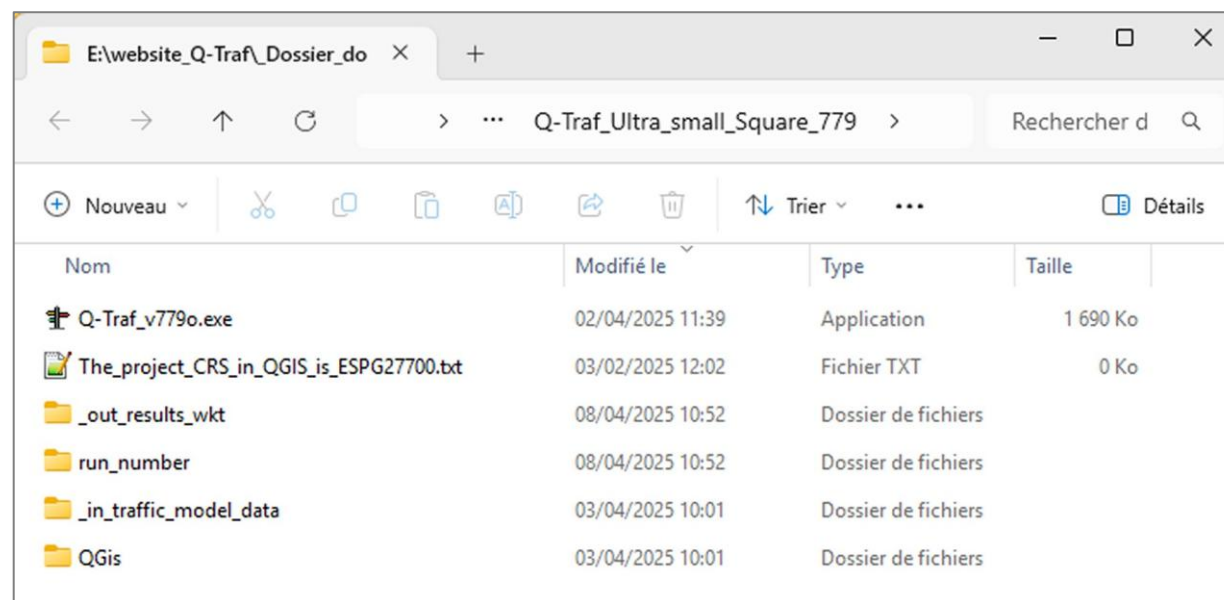
What is Q-Traf ?



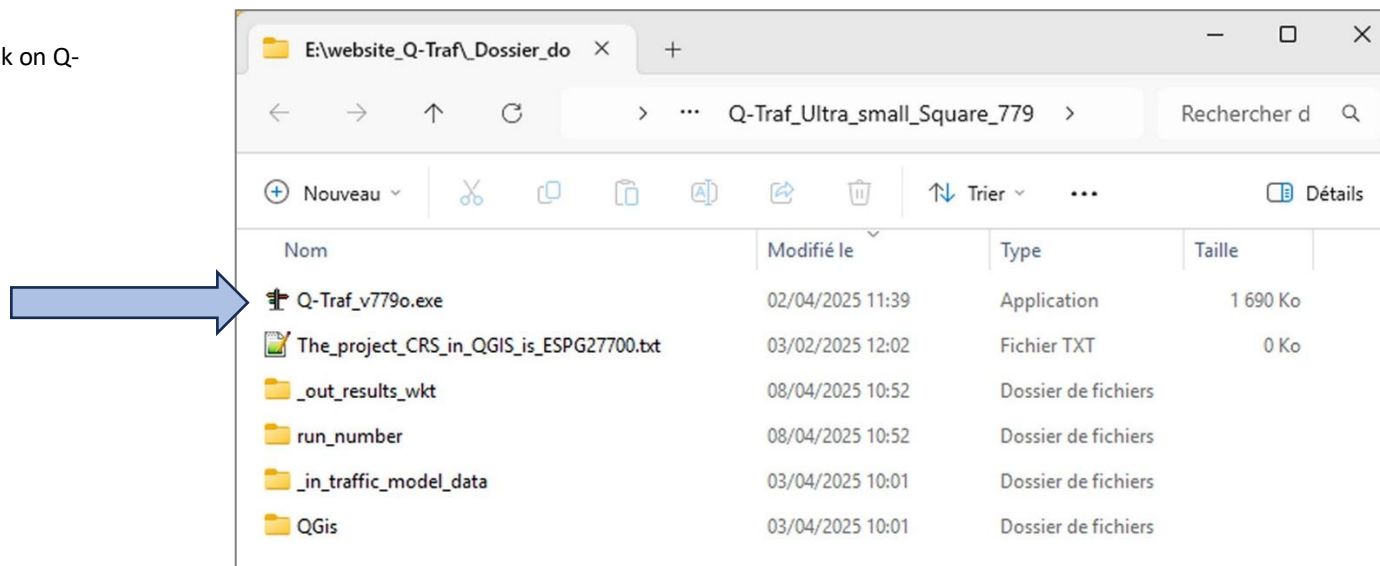
Get started - Calculate your first assignment with one of the examples provided

1. Download an example from the website
2. Unzip the folder
3. In the folder unzipped, run Q-Traf_vXXX.exe
4. The results are created in the folder « Results ». The results (*.csv files) can be open directly in QGIS (see “The file formats”).

Open the folder of your project, or one of the folder-example provided (here Ultra_small_square) :)



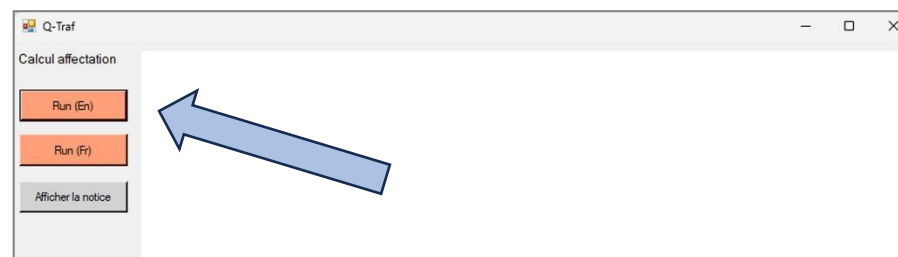
Launch Q-Traf (double click on Q-Traf_vxxx.exe) :



The window of the program Q-Traf pops-up :

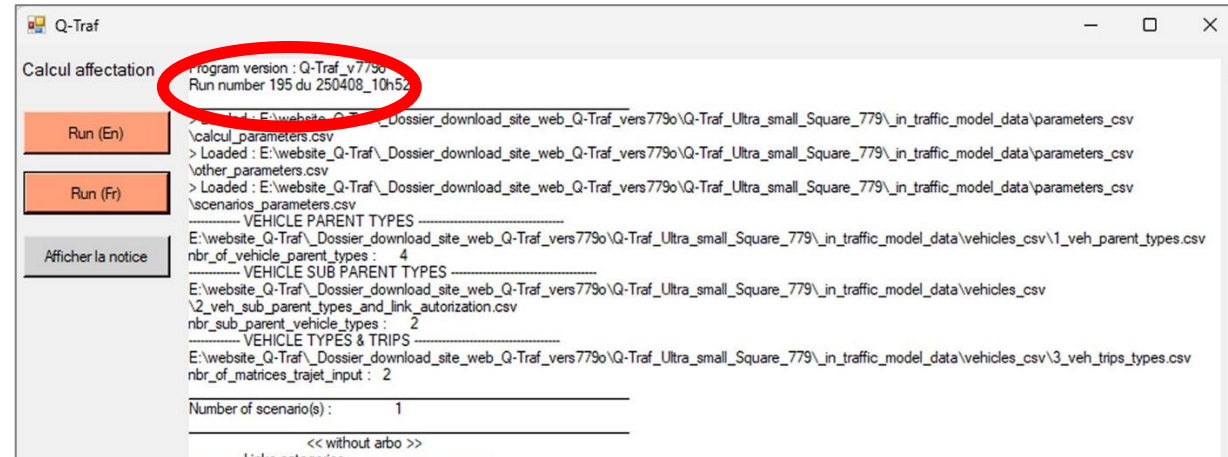


Click « Run (En) » :

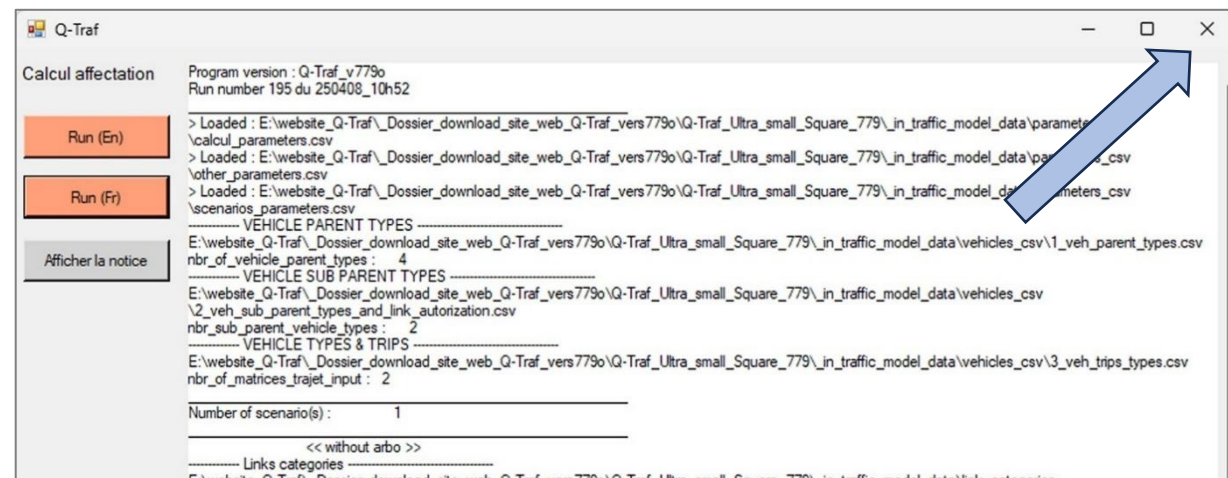


Wait (a few seconds) until the calculations are finished :

Note the run number



Close the window :



1. FILES AND FOLDERS

The 3 file formats – txt, csv and wkt csv

Q-Traf uses 3 types of files :

	format	File format	How to read it	
GIS layers - Links - Nodes - Results (flows, speed, level of service, ...)	WKT CSV	*.csv	Import / export directly with QGIS or opened with a spreadsheet Software (Excel, LibreOffice, OpenOffice)	
Other txt data (some results, Log file, ...)	TXT	*.txt		A *.xlsx (Excel) copy is provided for each file. Not used by Q-Traf, these files are simpler to manipulate and can store graphic formatting

The 2 csv formats

CSV, for « Comma-Separated Values », is a text file format used to store tables / tabular data, where each line represents a record, and columns / fields. It is widely used for data exchange between applications, especially spreadsheets and databases, due to its simplicity and ease of use.

There are 2 main csv formats in the world :

	Column separator	Decimal separator	quotes	
				variant
US-En	Comma “,”	Dot “.”	If there is a comma in a cell, the cell content must be in quotes	All cells are in quotes
Eu	Semicolon “;”	Comma “,”	If there is a semicolon in a cell, the cell content must be in quotes	All cells are in quotes

An example of a US-En csv file with 4 columns and 3 lines :

A, b, c, d

1, 17, red, -92
89, 2, "ballon, kite", 17

- ⇒ **Q-Traf automatically identifies and reads the US-En and Eu variants**
- ⇒ **The Result wkt csv files are automatically in the format defined in the user's Windows OS**

How to manipulate a csv files with a spreadsheet software (LibreOffice, OpenOffice, Excel) - csv files ↔ xlsx files

With OpenOffice :

Import de texte - [all_veh_Scen1_Net_2025_mat_2025_PPH_run196.csv]

Importer

Jeux de caractères : **Unicode (UTF-8)**

Langue : **Par défaut - Français (France)**

À partir de la ligne : **1**

Options de séparateur

☐ Largeur fixe

☒ Séparé par

☐ Tabulation ☐ Virgule ☐ Autres

☒ Point-virgule ☐ Espace

☐ Fusionner les séparateurs

Séparateur de texte : **;**

Autres options

☐ Champ entre guillemets comme texte

☐ Détecter les nombres spéciaux

Champs

Type de colonne : **Standard**

Standard	Standard	Standard
1 WKT	row	Flow_TV_e
2 MULTILINESTRING ((213051 894146, 213173 894146))	1	24
3 MULTILINESTRING ((213050 894234, 213051 894146))	2	38
4 MULTILINESTRING ((213051 894303, 213050 894234))	3	12
5 MULTILINESTRING ((212899 894146, 212900 894056))	4	329
6 MULTILINESTRING ((212899 894234, 212899 894146))	5	118
7 MULTILINESTRING ((212898 894297, 212899 894234))	6	29

OK Annuler Aide

The QGIS “wkt csv” file format

QGIS can export layers as csv files.

There are named wkt csv files, as :

- There are csv files (see above)
- The first line contains the column headers / name of the fields.
- Every other line is an element/record
- Each column contains one type of data / field.
- the first column is always called WKT (for “Well Known Text”), and contains the coordinates of the records, with a format defined by QGIS

For instance, the wkt csv file from an exported line layer:

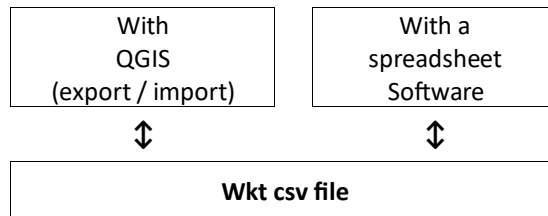
	A	B	C	D	E	F	G	H	I	J
1	WKT	row	Flow_TV_all	Flow_uvp_po	Class_car	Class_truck	Class_bus	Class_ped	Mat_VL1	Mat_PL1
2	"MULTILINESTRING ((213051 894146,213173 894146))"	1	24	24	24				24	
3	"MULTILINESTRING ((213050 894234,213051 894146))"	2	38	38	38				38	
4	"MULTILINESTRING ((213051 894303,213050 894234))"	3	12	12	12				12	
5	"MULTILINESTRING ((212899 894146,212900 894056))"	4	329	329	329				329	
6	"MULTILINESTRING ((212899 894234,212899 894146))"	5	118	118	118				118	
7	"MULTILINESTRING ((212898 894297,212899 894234))"	6	29	29	29				29	
8	"MULTILINESTRING ((212899 894146,212779 894146))"	7	195	195	195				195	
9	"MULTILINESTRING ((213051 894146,212899 894146))"	8	83	83	83				83	

For a line layer, the format of the first column is :

- "MULTILINESTRING ((X1 Y1, X2 Y2, ...))"
- The decimal separator of the coordinates is the dot

How to manipulate the wkt csv files

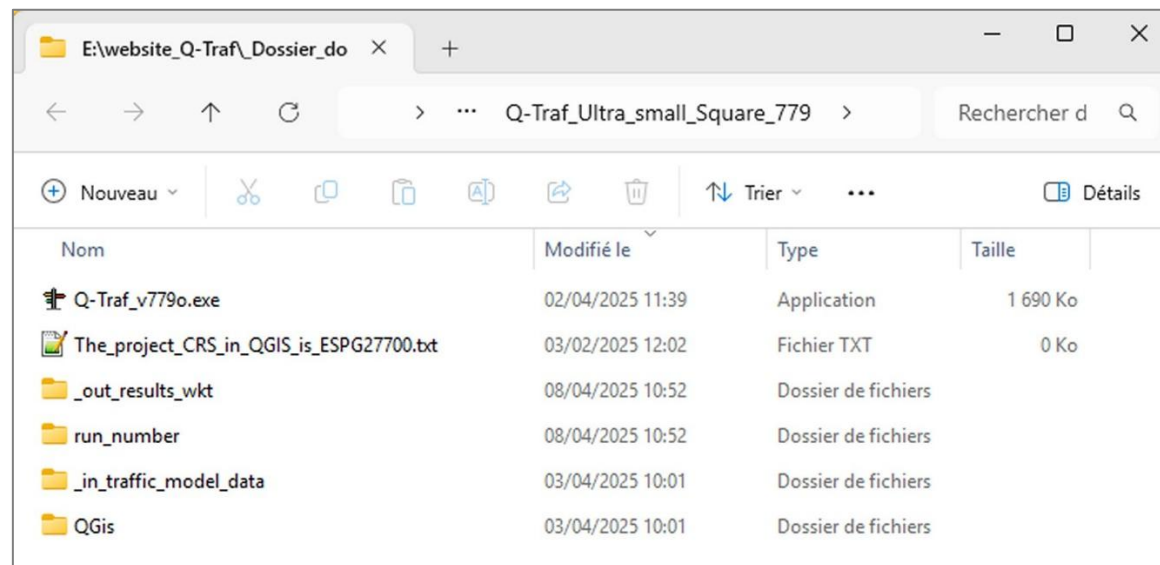
There are 2 ways to manipulate the wkt csv files :



WKT csv files ↔ QGIS layer

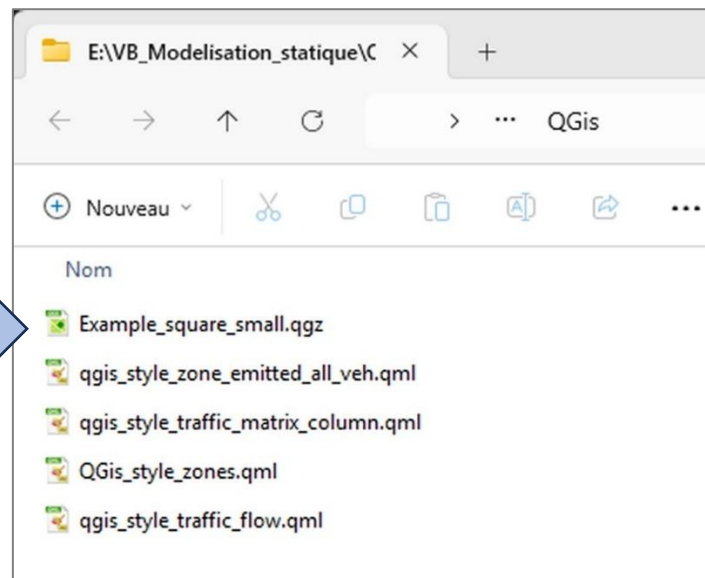
How to open (and visualize) a WKT csv files in QGis (links file, nodes file, results of an assignment)

1 – Open the folder QGIS



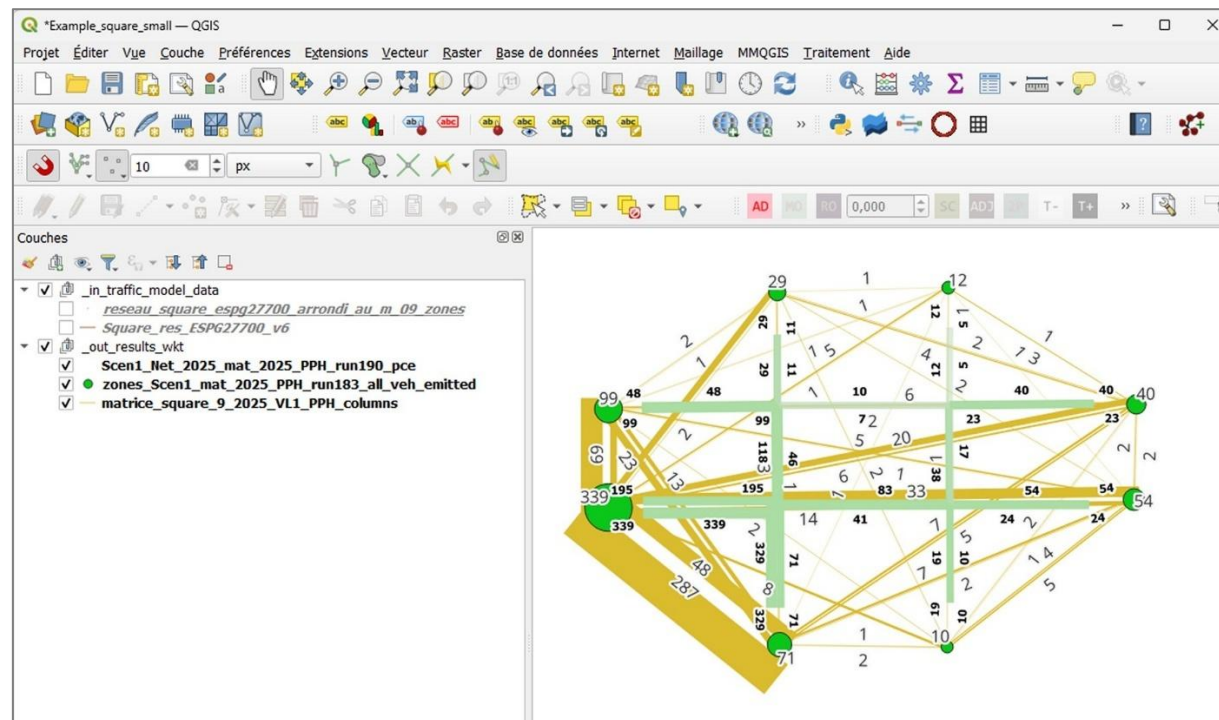
Open the project QGIS (or simply QGIS if no project have been created)

(QGIS need to be installed on the computer)



QGIS is now open with the project

(or without a project, in case of a first opening.
In this case, choose a CRS which will be your CRS by
default -and the CRS of all the files- and save the
project)

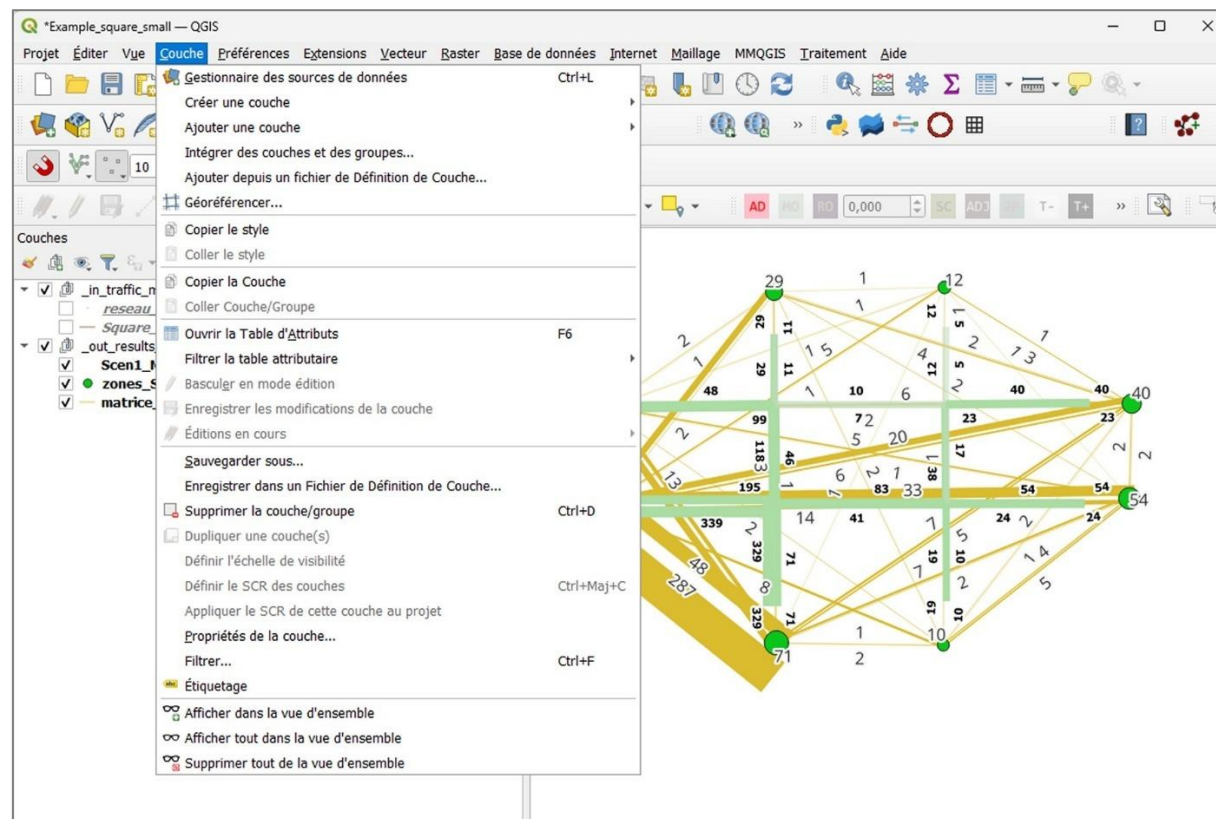


Import your wkt csv file (result, ...)

Here we will choose the hourly traffic flow in pce (personal car equivalent) in the « Results » folder

Choose :

- Layer
- Add a layer
(This opens the window on the right)
- Add a text delimited layer (which is the *.csv file)



Choose the file :

« pce_Scen1_Net_2025_mat_2025_PPH_run196.csv »

Beware of these 3 options to select :

- « **semicolon** » is essential
- Well known text (WKT)
- SCR : Choose the SCR by default of the project, the second item in the drop down list

Gestionnaire des sources de données | Texte Délimité

Nom de fichier

Nom de la couche Codage UTF-8

Format de fichier

☐ CSV (virgule) ☐ Tab ☐ Colonne ☐ Espace

☐ Délimiteur de l'expression régulière ☒ Point-virgule ☐ Virgule Autres

☒ délimiteurs personnalisés Guillemet Echappement

Options des champs et enregistrements

Nombre de lignes à ignorer ☐ Virgule en séparateur décimal

☒ en-têtes en 1ère ligne ☐ Réduire les champs

☒ Détection des types de champs ☐ Ignorer les champs vides

Valeurs booléennes personnalisées

Vrai Faux

Définition de la géométrie

☐ point ☐ Well known text (WKT) ☐ Pas de géométrie (juste la table)

Champ de géométrie Type de géométrie Détecter

SCR de la géométrie Project CRS: EPSG:27700 - OSGB36 / British National Grid

Paramètres de la couche

Échantillon de données

Veuillez sélectionner un fichier en entrée

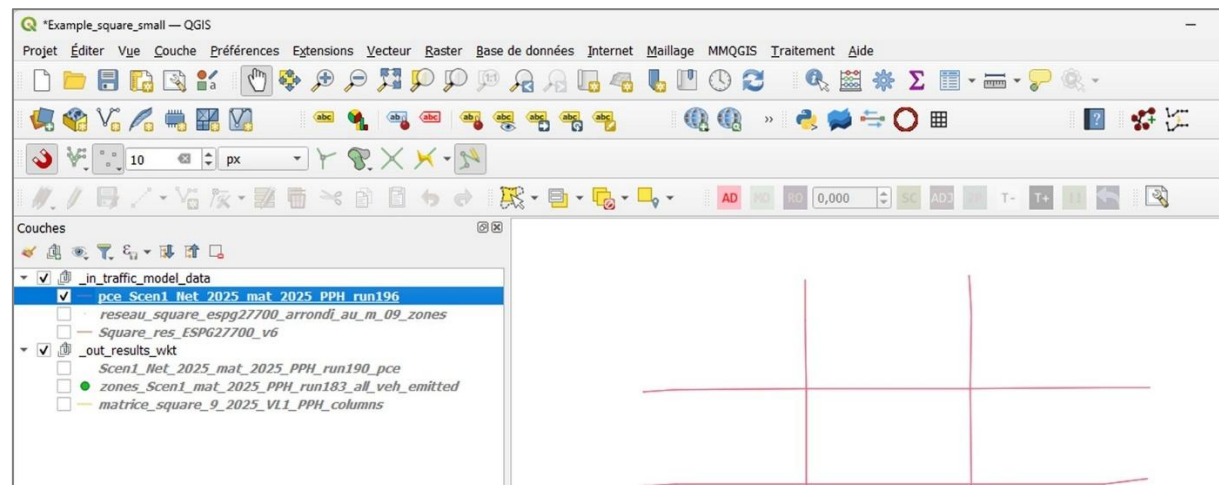
Fermer Ajouter Aide

Then click « Add » then « Close »

The new file is then imported in your QGIS project.

Note that only the lines are drawn.

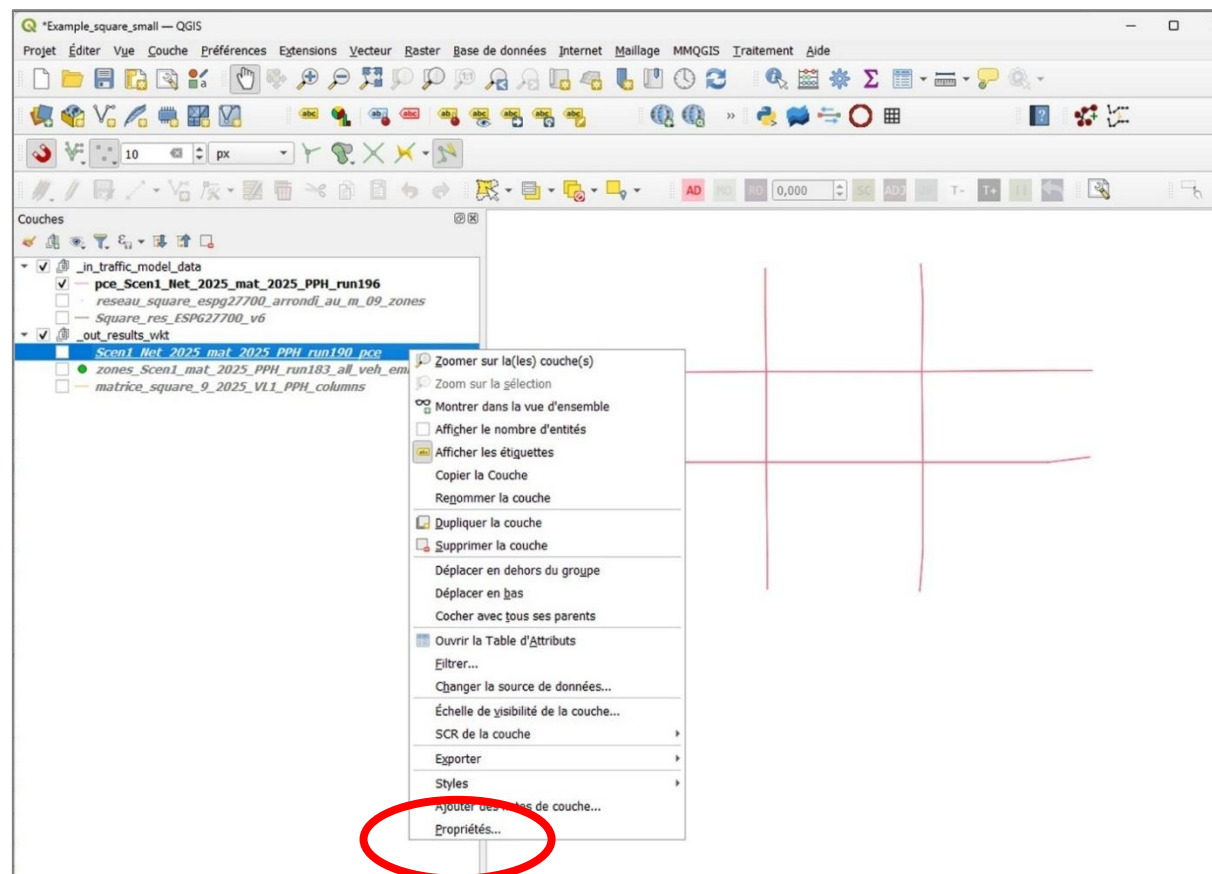
The layer contains all the data, but they are not drawn, as there is no graphical parameters defined.



To apply the graphical parameters, you need to copy/paste them from a layer of the same type :

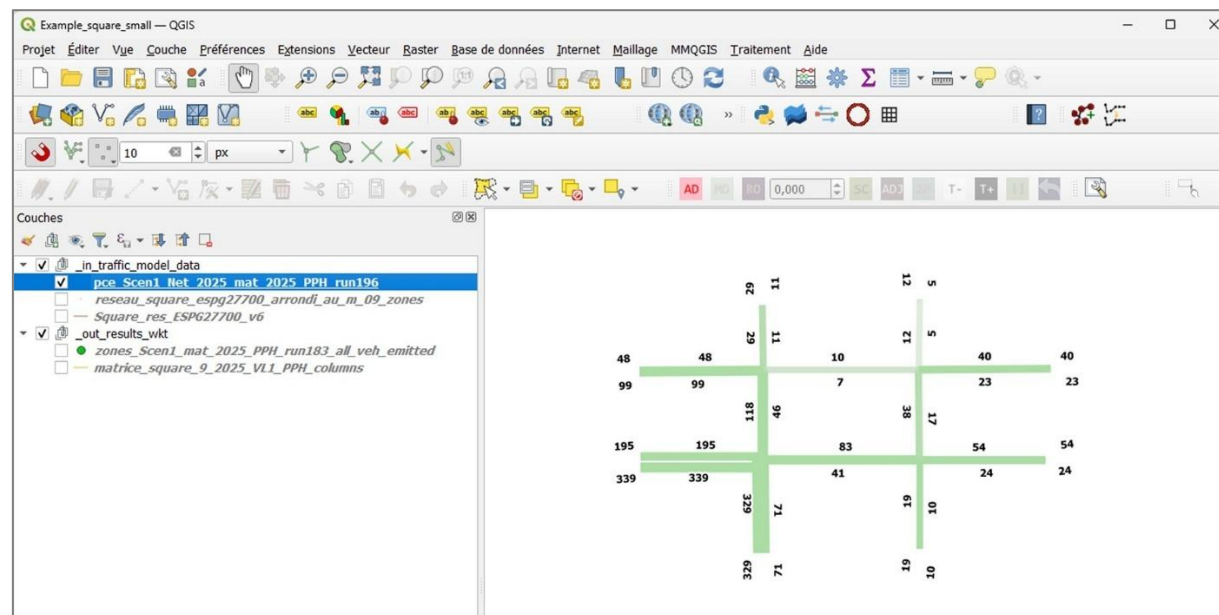
Right-click on an existed layer of the same type >
Styles > copy

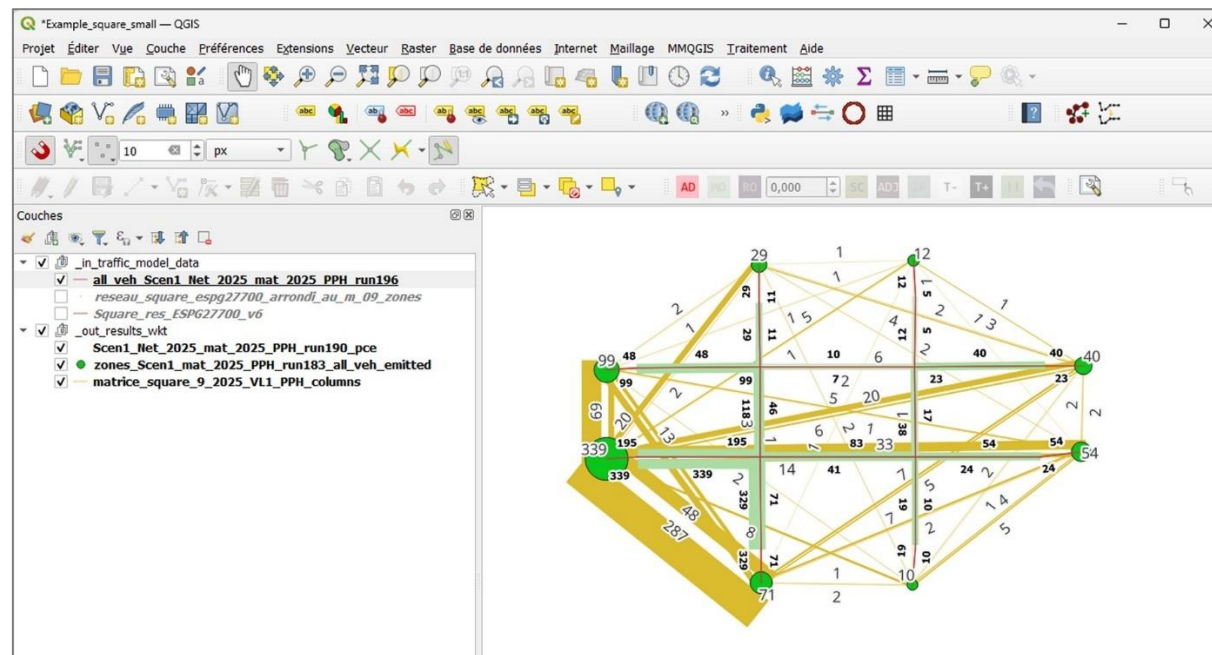
Then Styles > Paste on the new layer



...

Right-click on your newly imported layer, then choose
« styles > Paste »



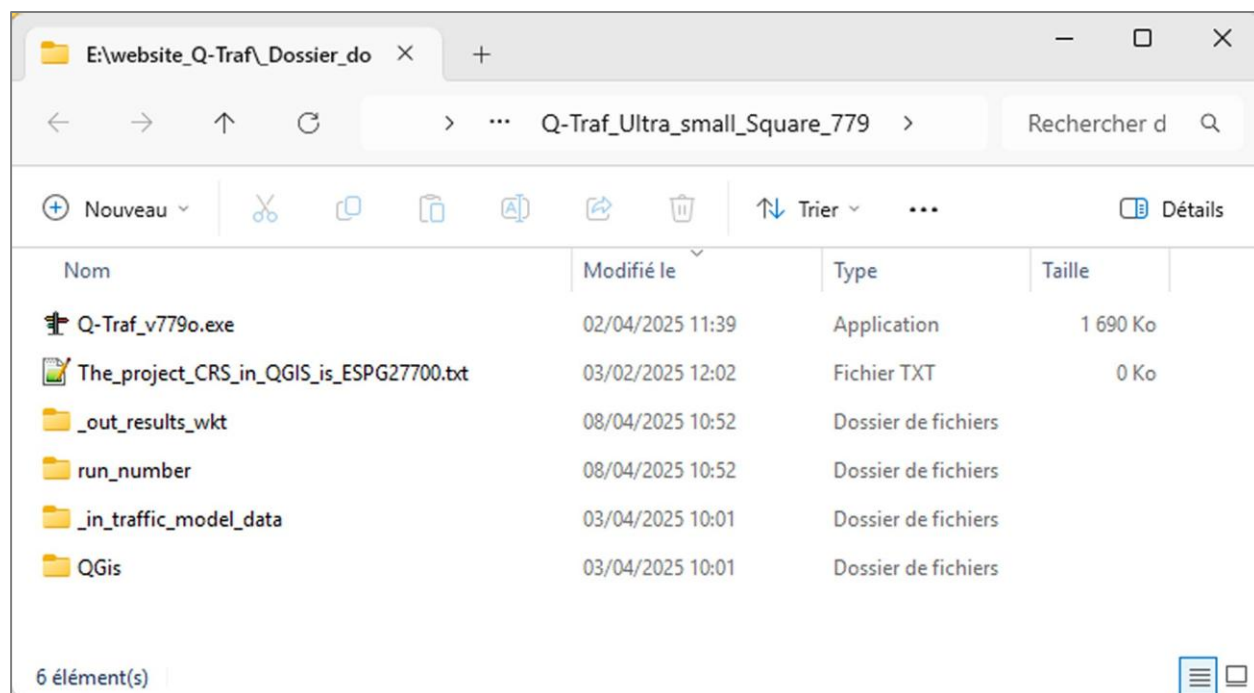


How to export / create a WKT csv files in QGis (links file, nodes file) (to do)

Empty paragraph

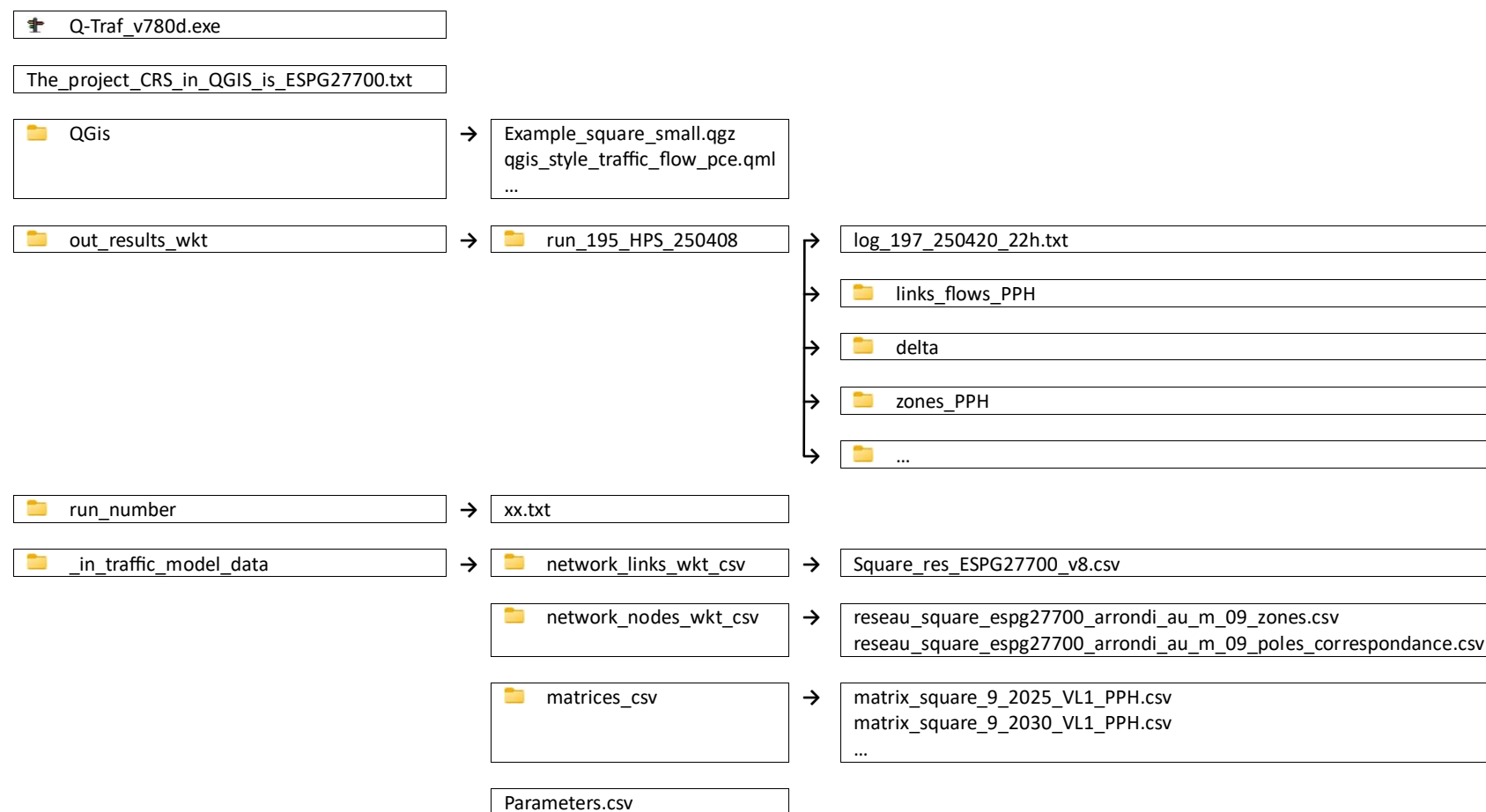
Q-Traf folders and files

The folders tree structure



⇒ You must **NOT** change these folder names :

- « in_traffic_model_data »
- « out_results_wkt »
- « run_number »



After all the data is completed, double-click on the program « Q-Traf_v....exe ». After a few seconds a sub-folder result « xxxx » is created in the folder « _out_results_wkt ».

The files in this sub-folder result are :

- WKT csv files, which can be import in a GIS
- Txt files

The result files

Files type

The files « result » are :

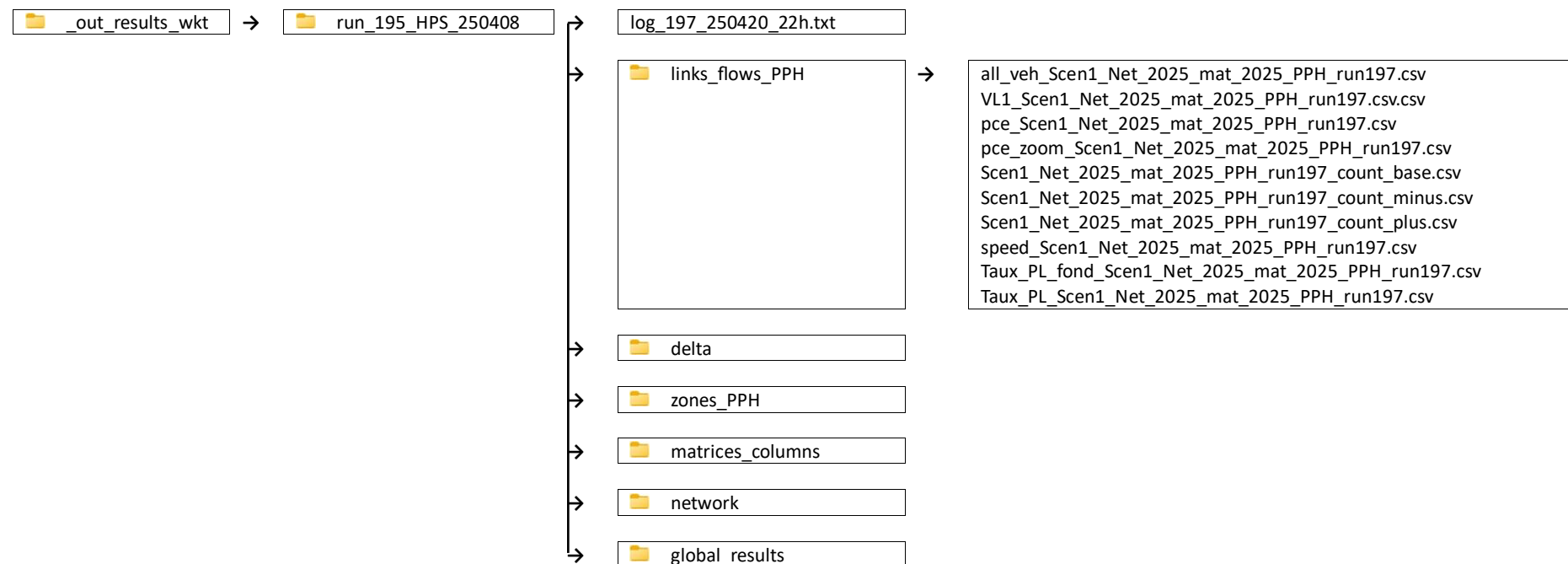
- Wkt csv for most of the files
- *.csv for the general results
- *.txt for the log file

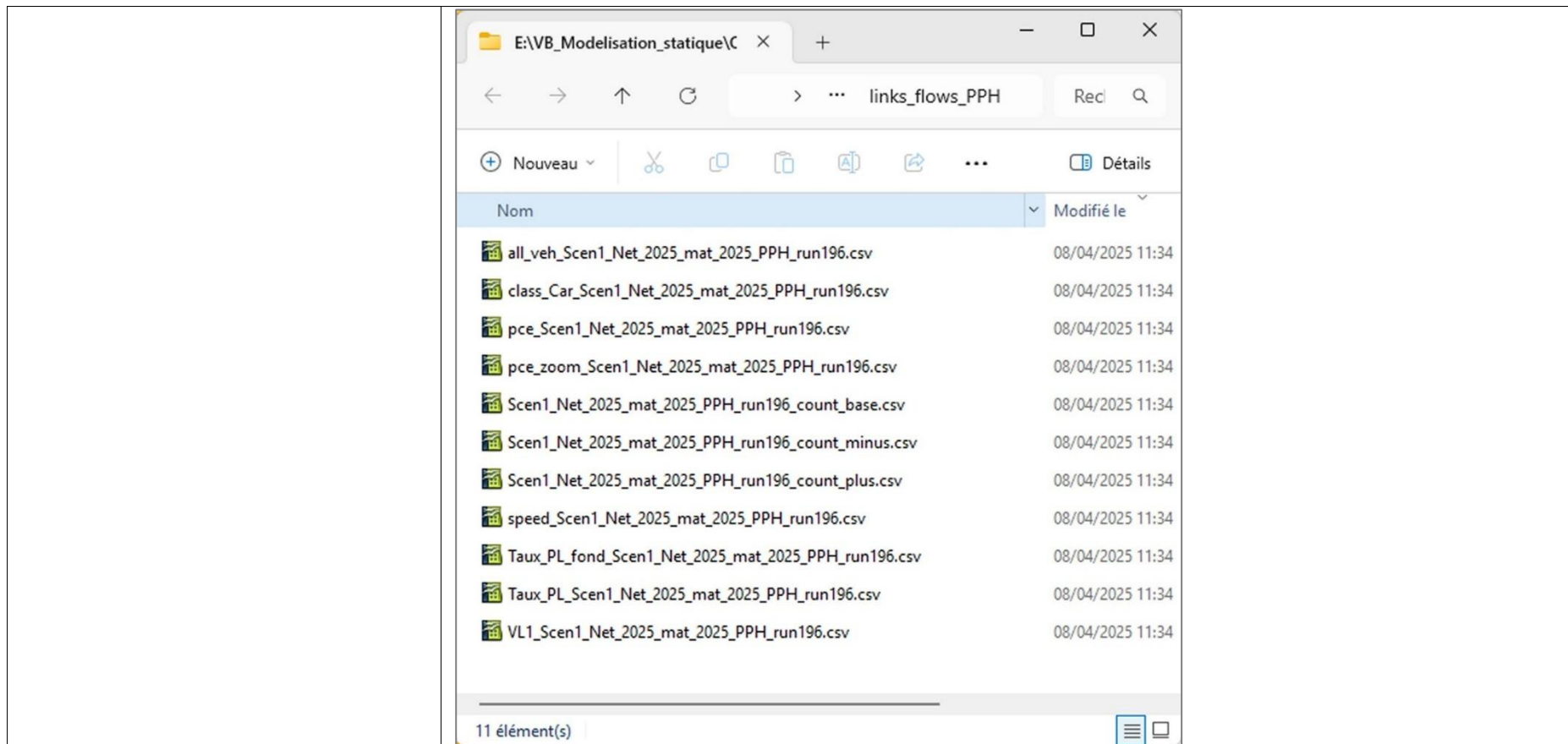
All the *.csv files can be :

- directly imported in QGis (see « How to open the csv files in QGis ») without modification (except for the « Global results »). They are all in the format WKT (Well Known Text)
- or
- opened with a spreadsheet Software (Excel, LibreOffice, OpenOffice)

Location of the files

The result files of the calculations are in the folder « _out_results_wkt » :





The input data files

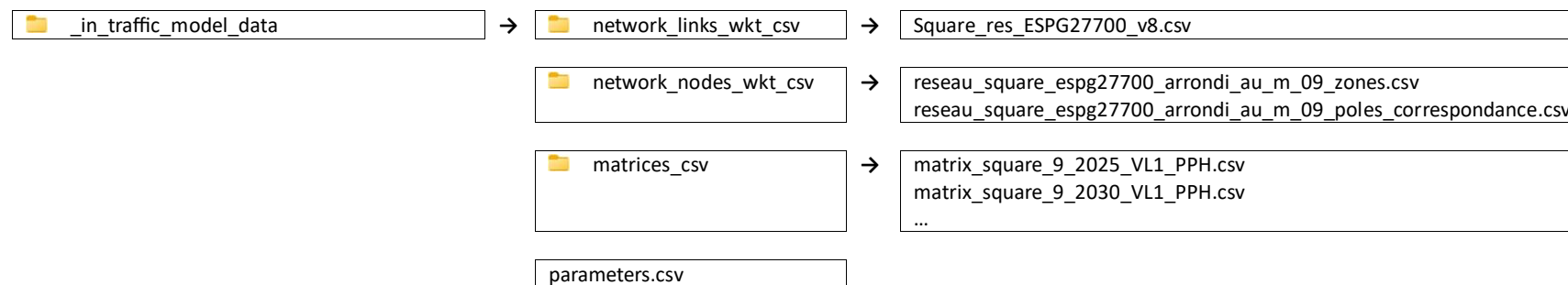
Empty paragraph

How to manipulate the input data files – Excel, the « .csv » format, the wkt csv files ...

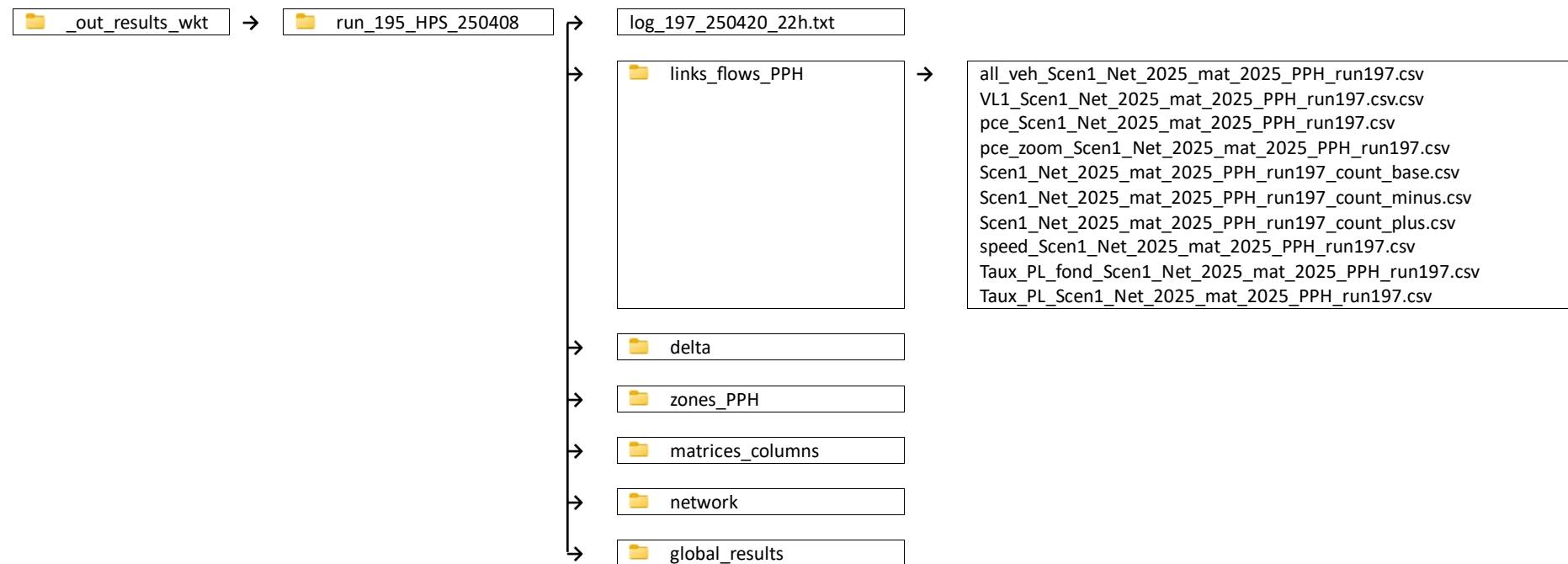
Empty paragraph

How to modify your input data

Empty paragraph

The Input data folder tree structure

⇒ You must **NOT** change the names of these folders.

The Results folder tree structure

Q-traf input files – List, structure and location

The file « network_links_wkt_csv »

	Column 1	2	3	4	5	6	7	
Line 1	WKT	Row_qgis	Nœud_A	Nœud_B	Longueur	category	PEN_VLx100	...
2	MULTILINESTRING ((213050 894146,213173 894146))	1			122	31		
3	MULTILINESTRING ((213050 894234,213050 894146))	2			88	31		
4	MULTILINESTRING ((213050 894234,213177 894235))	3			127	31		
	...							

List of fields

Column	FIELD	TYPE	Remark	Example
			<i>In QGis, the names of the fields can only contain 8 characters (or less) All the name longer are truncated. Hence the « network number 1 » must be renamed « Netwo_01 »</i> <i>The name of the fields are not important : The <u>order of the fields</u> must NOT be changed.</i>	
1	WKT	String / text	Necessary for QGis You must not rename this field	See above
2	Row_qgis	integer	Necessary	1
3	Nœud_A	Integer	Deprecated	
4	Nœud_B	Integer	Deprecated	
5	Longueur	Integer	Necessary (in meter)	237
6	category	Integer	Necessary Id links category	12
7	PEN_VLx100	Integer	empty or an integer Empty or 100 : No penalty 200 : Generalized cost x 2 50 : Generalized cost / 2	

8	PEN_PLx100	Integer	empty or an integer	
9	PEN_Tcx100	Integer	empty or an integer	
10	avec_arbo	Integer	empty or 1	
11	TV_HPM	Integer	empty or an integer	
12	perso1	Integer	empty or an integer	
13	TV_HPS	Integer	empty or an integer	
14	perso2	Integer	empty or an integer	
15	TV_JO	Integer	empty or an integer	
16	perso3	Integer	empty or an integer	
17	Netwo_01	Integer	List of authorized vehicle sub-classes (cf tab « Vehicles ») for each link of the <u>network 1</u> Empty if the link is barred	12
18	Netwo_02	Integer	List of authorized vehicle sub-classes (cf tab « Vehicles ») for each link of the <u>network 2</u> Empty if the link is barred	
...	...	...		
	RE_DELTA	integer	empty - deprecated	

- ⇒ The first column « WKT » is automatically calculated by QGis
- ⇒ The other columns (except 2 and 5) must be completed by the user (with a spreadsheet Software (Excel, LibreOffice, OpenOffice) or with QGis)

Minimum file

An assignment can be calculated with at least the 5 following columns filled in:

	Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Line	WKT	Row_qgis			Length	category											Netwo_01	
1																		
2	MULTILINESTRING ((213050 894146,213173 894146))	1			122	31											1	
3	MULTILINESTRING ((213050 894234,213050 894146))	2			88	31											1	
4	MULTILINESTRING ((213050 894234,213177 894235))	3			127	31											1	
	...																	

Columns 2 “Row” and 5 “Length”

These 2 columns must be filled in with QGis just before exporting the file :

- Row must be recalculated with QGis
- Length must be recalculated with QGis

The file « network_zones_wkt_csv »

⇒ The name of the nodes file to use is specified in the file « scenarios_parameters.csv »

	Column 1	2	3	4	5	6	7	8	9	10	11	12
Line	WKT	Id	Name	X	Y	field_5_1	field_6_1	type	field_9	Netwo_1	Netwo_2	Netwo_3
2	POINT (212898.195447096 894334.517873702)	1				zone	prio	1		1	1	1
3	POINT (212749.334210669 894144.399215944)	2				zone	prio	1		1	1	1
4	POINT (213213.758967013 894151.647141312)	3				zone	prio	1		1	1	1
...	POINT (212749.334210669 894231.931853094)	4				zone	prio	1		1	1	1
	POINT (213048.729281685 894021.184484669)	5				zone	prio	1		1	1	1
	POINT (212900.9831107 894023.414615552)	6				zone	prio	1		1	1	1
	POINT (213215.989097896 894235.277049418)	7				zone	prio	1		1	1	1
	...	...				...	...	...		...	...	

List of fields

Column	FIELD	TYPE	Remark	Example
			In QGis, the names of the fields can only contain 8 characters (or less) All the name longer are truncated. Hence the « network number 1 » must be renamed « Netwo_01 » The name of the fields are not important : The <u>order of the fields</u> must NOT be changed.	
1	WKT	String / text	Necessary for QGis You must not rename this field	See above
2	Id	integer	Necessary – The ID of the zone – The same ID in the matrices	1
3	Name	String		
4	X			

5	Y											237
6	field_5_1	Integer										12
7	field_6_1	Integer										
8	type	Integer										
9	field_9	Integer										
10	Netwo_01	Integer	List of authorized vehicle sub-classes (cf tab « Vehicles ») for each link of the network 1 Empty if the link is barred									1
11	Netwo_02	Integer										125
12	...											

- ⇒ The first column « WKT » is automatically calculated by QGis
- ⇒ The other columns must be completed by the user (with a spreadsheet Software (Excel, LibreOffice, OpenOffice) or with QGis)

Minimum file

An assignment can be calculated with at least the 3 following columns filled in :

	Column 1	2	3	4	5	6	7	8	9	10	11	12
Line	WKT	Id								Netwo_1		
2	POINT (212898.195447096 894334.517873702)	1								1		
3	POINT (212749.334210669 894144.399215944)	2								1		
4	POINT (213213.758967013 894151.647141312)	3								1		
	...	...								...		

The file « network_poles_correspondances_wkt_csv » (or P&R) (to do)

⇒ The name of the « P+R » file to use is specified in the file « scenarios_parameters.csv »

WKT	id	name
POINT (445000 216000)	1	

The files « matrices_csv »

Name

- ⇒ The name of the matrices must be : « **suffix** » & « **name of the matrix** » & « **name of the vehicles** » & « **period of analysis** » & « **.csv** »
- « **suffix** » is defined in the file « scenarios_parameters.csv »
 - « **name of the matrix** » is defined in the file « scenarios_parameters.csv »
 - « **name of the vehicles** » is the name defined in the file « 3_veh_....csv »
 - « **period of analysis** » (hour or day) is the name defined in the file « scenarios_parameters.csv »

Structure

	column	2	3	4	4								
Line													
2				1	2	3	4	5	6	7	8		
3													
4	1	1		0	20	0	2	0	3	4	0		
5	2	2		2	0	14	21	8	287	6	1		
6	3	3		2	33	0	5	4	7	2	1		
	4	4		1	69	1	0	2	23	2	1		
	5	5		2	0	5	0	0	1	1	1		
	6	6		1	48	2	13	2	0	5	0		
	7	7		2	20	2	6	2	7	0	1		
	8	8		1	5	0	1	1	1	3	0		

Line 2 : Id zones Destination

Column 2 : Id zones Origine

... as defined in the file « network_node.csv »

2. NETWORK AND ZONES MODELLING

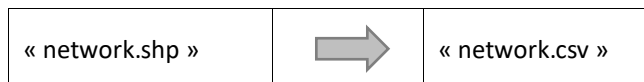
How to create a network – With QGIS

Empty paragraph

How to modify a network (with QGIS)

How to export / save a « network.shp » file to a « network.csv » file

Once you have modified your network with QGIS (as a *.shp file), you need to export it as a *.csv file, which will be directly used by Q-Traf.



You need to do the 3 following steps :

1. Recalculate the field « Row » (every time as a precaution, but theoretically only necessary in case of new links added)
(round the coordinates)
2. Recalculate the field « length »
3. Export the file in « csv » format, with specific format

Select the network layer, then select « Layer properties », then « Fields » :

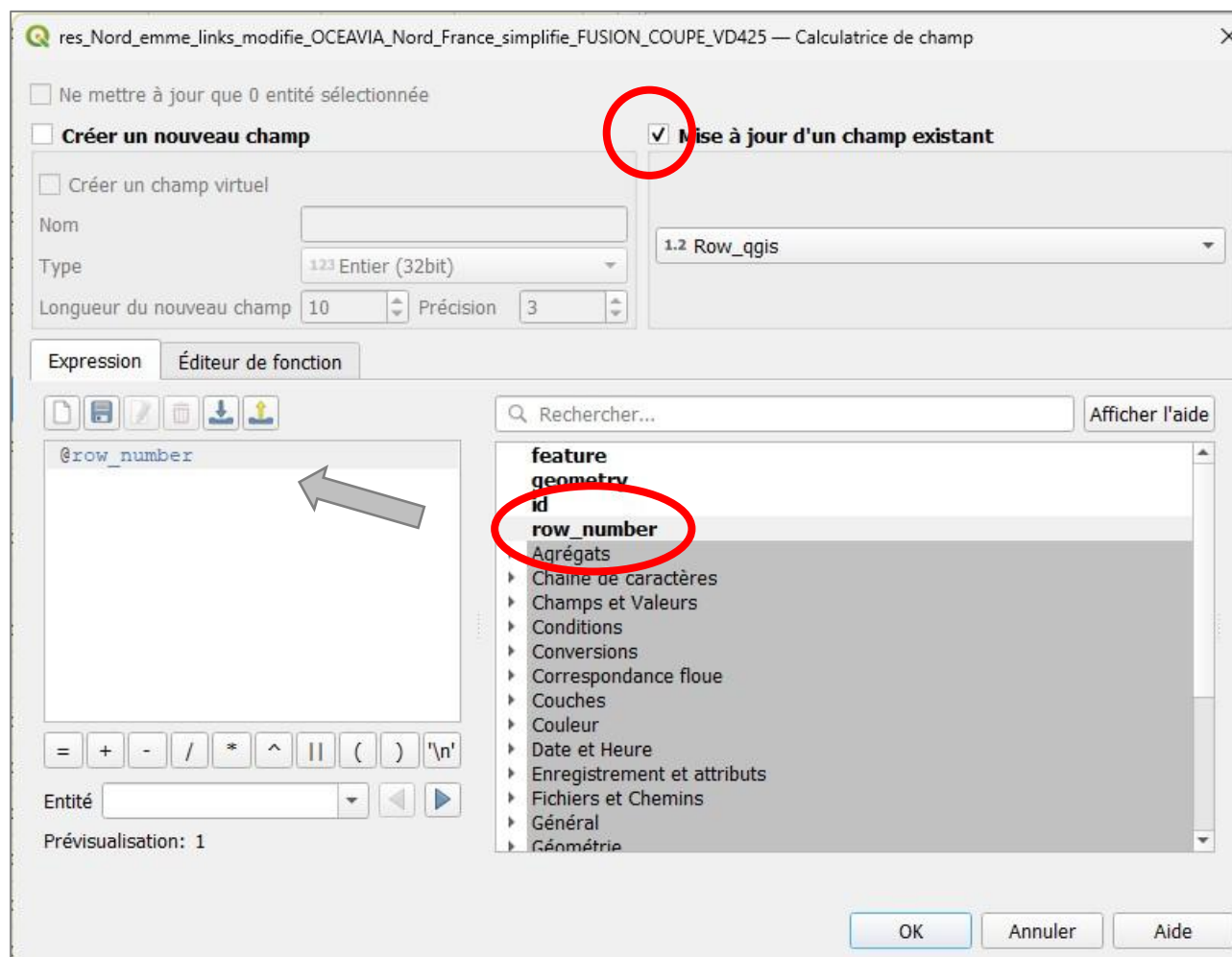
In « edit mode » ( selected), select the field « Row_qgis » :

Propriétés de la couche - res_Nord_emme_links_modifie_OCEANIA_Nord_France_simplifie_FUSION_COUPE_VD425 — Champs

Information
Source
Symbologie
Étiquettes
Masques
Vue 3D
Diagrammes
Champs
Formulaire d'attributs
Jointures
Stockage auxiliaire
Actions
Infobulles

Nom	Alias	Type	Type identifié	Longueur	Précision	C
Row_qgis		Décimal (double)	Real	20	0	
Noeud_A		Texte (chaîne de caractères)	String	254	0	
Noeud_B		Texte (chaîne de caractères)	String	254	0	
Longueur		Décimal (double)	Real	20	0	
Category		Décimal (double)	Real	20	0	
PEN_VLx100		Décimal (double)	Real	20	0	
PEN_PLx100		Décimal (double)	Real	20	0	
PEN_TCx100		Entier (64bit)	Integer64	10	0	
avec_arbo		Entier (64bit)	Integer64	10	0	
TV_HPM		Décimal (double)	Real	20	0	
perso1		Entier (64bit)	Integer64	10	0	
TV_HPS		Décimal (double)	Real	20	0	
perso2		Entier (64bit)	Integer64	10	0	
TV_JO		Décimal (double)	Real	20	0	
perso3		Entier (64bit)	Integer64	10	0	
R01_22_REF		Décimal (double)	Real	20	0	

Activate « Update a field », then choose « row number » (by double-clicking), then click « OK » :



In « edit mode » () , select the field « Length » :

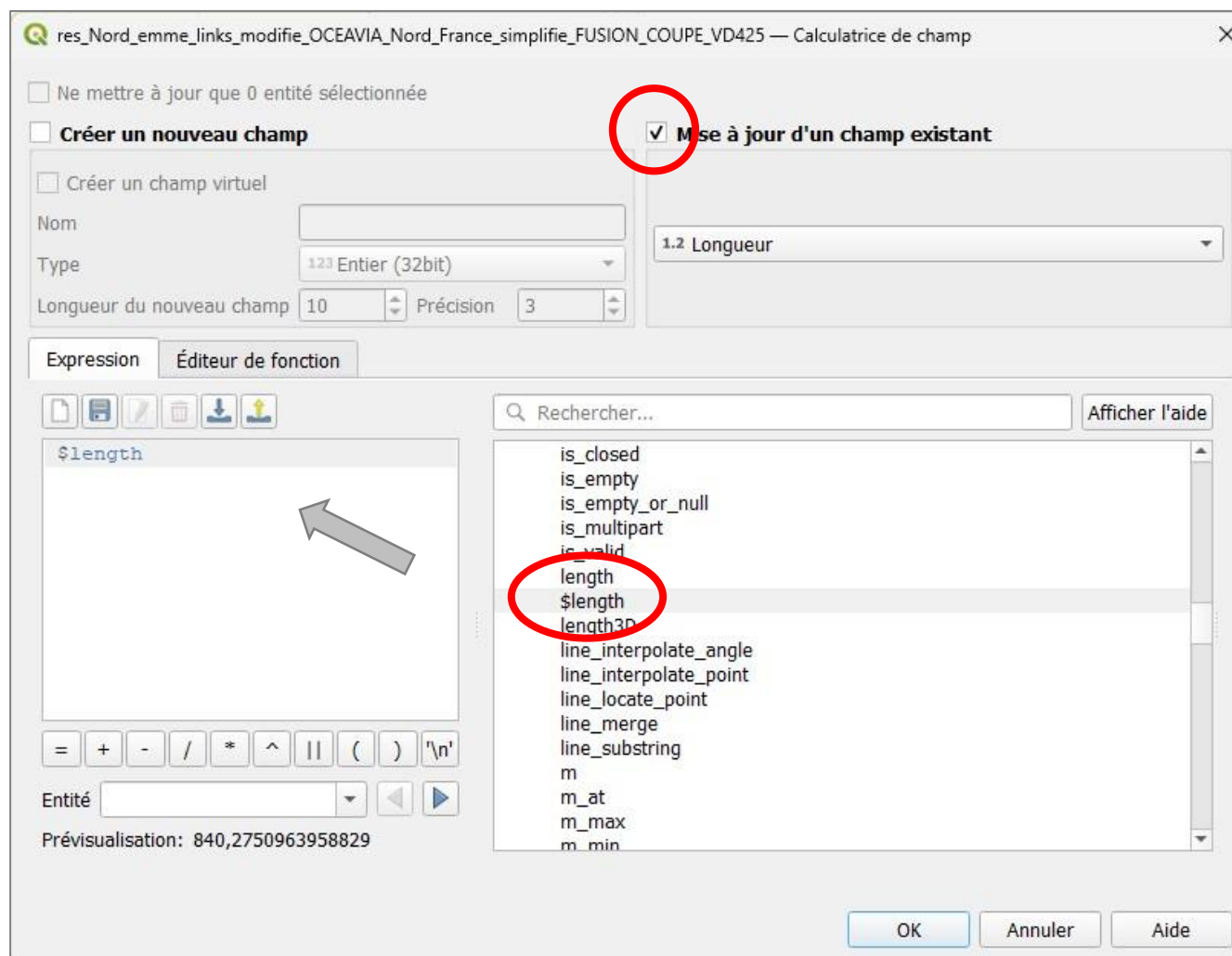
Propriétés de la couche - res_Nord_emme_links_modifie_OCEANIA_Nord_France_simplifie_FUSION_COUPE_VD425 — Champs



Nom	Alias	Type	Type identifié	Longueur	Précision	C
Row_qgis		Décimal (double)	Real	20	0	
Noeud_A		Texte (chaîne de caractères)	String	254	0	
Noeud_B		Texte (chaîne de caractères)	String	254	0	
Longueur		Décimal (double)	Real	20	0	
Category		Décimal (double)	Real	20	0	
PEN_VLx100		Décimal (double)	Real	20	0	
PEN_PLx100		Décimal (double)	Real	20	0	
PEN_TCx100		Entier (64bit)	Integer64	10	0	
avec_arbo		Entier (64bit)	Integer64	10	0	
TV_HPM		Décimal (double)	Real	20	0	
perso1		Entier (64bit)	Integer64	10	0	
TV_HPS		Décimal (double)	Real	20	0	
perso2		Entier (64bit)	Integer64	10	0	
TV_JO		Décimal (double)	Real	20	0	
perso3		Entier (64bit)	Integer64	10	0	
R01_22_REF		Décimal (double)	Real	20	0	

Information
Source
Symbologie
Étiquettes
Masques
Vue 3D
Diagrammes
Champs
Formulaire d'attributs
Jointures
Stockage auxiliaire
Actions
Infobulles

Activate « Update a field », then select « Geometry » then « \$length » :



Select the network layer, then select « Export ». In the window :

Enregistrer la couche vectorielle sous...

Format: Valeurs séparées par une virgule [CSV]

Nom de fichier: res_Nord_emme_links_modifie_OCEAVIA_Nord_France_simplifie_FUSION_COUPE_VD426

Nom de la couche:

SCR: EPSG:3950 - RGF93 v1 / CC50

Encodage: UTF-8

☐ N'enregistrer que les entités sélectionnées

▼ Sélectionner les champs à exporter et leurs options d'export

Nom	Nom d'export	Type	Remplacer avec les valeurs affichées
☒ Row_qgis	Row_qgis	Real	☐ Utiliser Plage
☒ Noeud_A	Noeud_A	String	☐ Utiliser Plage
☒ Noeud_B	Noeud_B	String	☐ Utiliser Plage
☒ Longueur	Longueur	Real	☐ Utiliser Plage
☒ Category	Category	Real	☐ Utiliser Plage
☒ PEN_VLx100	PEN_VLx100	Real	☐ Utiliser Plage

Sélectionner tout Tout désélectionner

☐ Utiliser des alias pour le nom exporté

☐ Remplacer toutes les valeurs brutes des champs sélectionnés par les valeurs affichées

☒ Persistance des métadonnées de la couche

▼ Géométrie

Type de géométrie: Polyligne

☐ Forcer le type multiple

☐ Inclure la dimension z

☐ Emprise (actuel : aucun)

▼ Options de la couche

CREATE_CSVT: NO

GEOMETRY: AS_WKT

LINEFORMAT: <Défaut>

SEPARATOR: SEMICOLON

STRING_QUOTING: IF_NEEDED

WRITE_BOM: NO

☒ Ajouter les fichiers sauvegardés à la carte OK Annuler Aide

Choose « CSV »
Rename your file

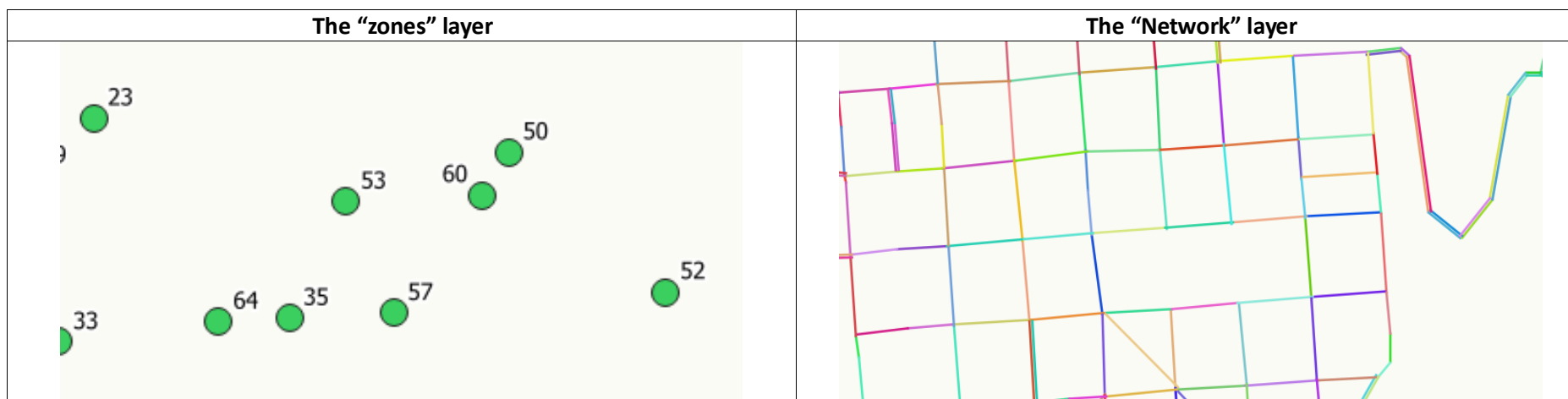
Choose « Polyline » or « multiline »

VERY IMPORTANT : Choose « AS WKT » (the first column will contains the coordinates of the links)

Choose « If needed », otherwise QGIS adds a lots of ‘ ’

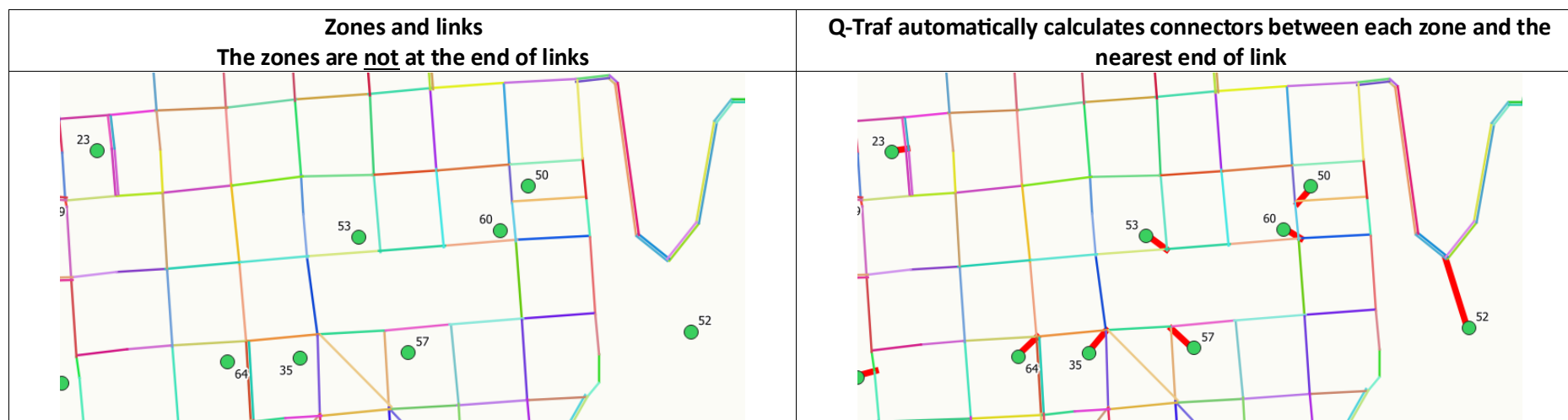
Zones and virtual connectors

Since the "zones" and the "network" are two separate QGIS layers ("point" and "line"), their consistency is not always guaranteed.



"Zones" do not need to be located at the exact end of the links.

- ⇒ Q-Traf automatically calculates the connectors between each zone and the nearest end of the link.
- ⇒ Note that there is one and only one connector per zone



⇒ The connectors -or virtual connectors- are **not** displayed in the results

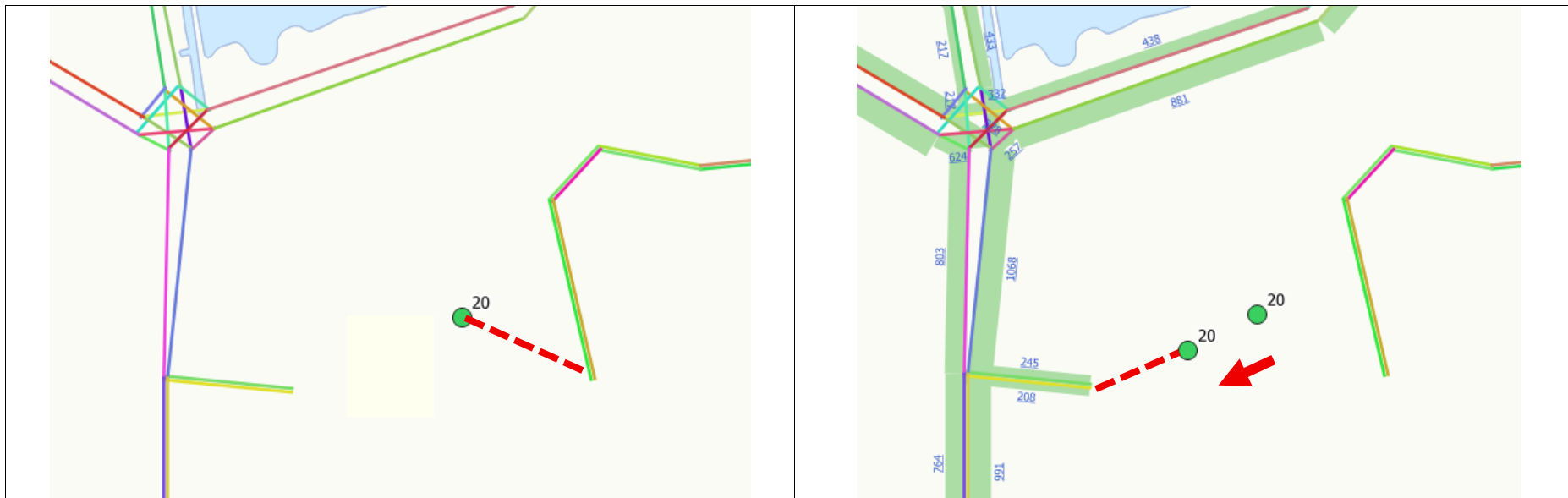
Connectors

How to define connectors

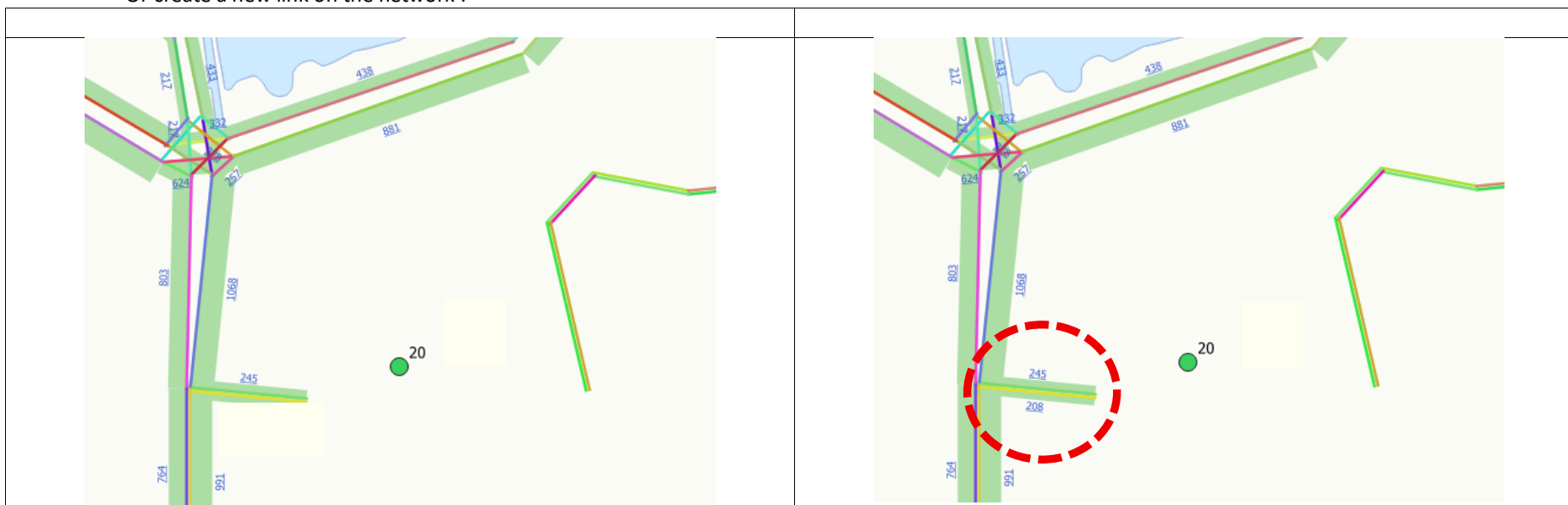
What if a connector is not connected to the “right” end of a link ?

There are 2 solutions:

- Move the zone closer to the right end of the link



- Or create a new link on the network :



- ⇒ The second solution allows to control the traffic flow on the connector
- ⇒ Caution : If the nearest link is prohibited to a (sub-class) vehicle, no traffic will be generated for that sub-class.

Connector category

The link ID category of the connectors is 10.

- ⇒ Don't use this value for other standard links

The connector capacity must be sufficient.

- ⇒ Connectors are always open to all (sub-type) vehicles. Permission can only be set for “zones” and “links”.

Links categories

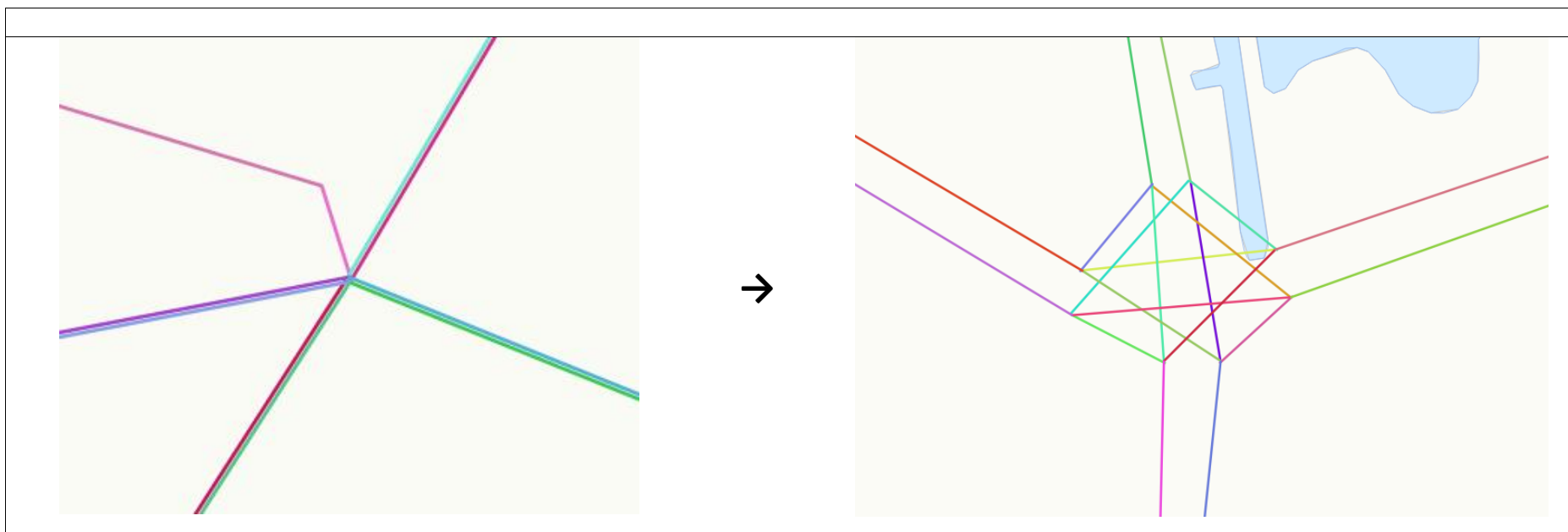
The link category ID must be between 10 and 120 (values 1 to 9 are unused).
10 is reserved for the virtual connectors.

Links

Links are all one-way. A two-way road requires two links.

Prohibiting Turning movements

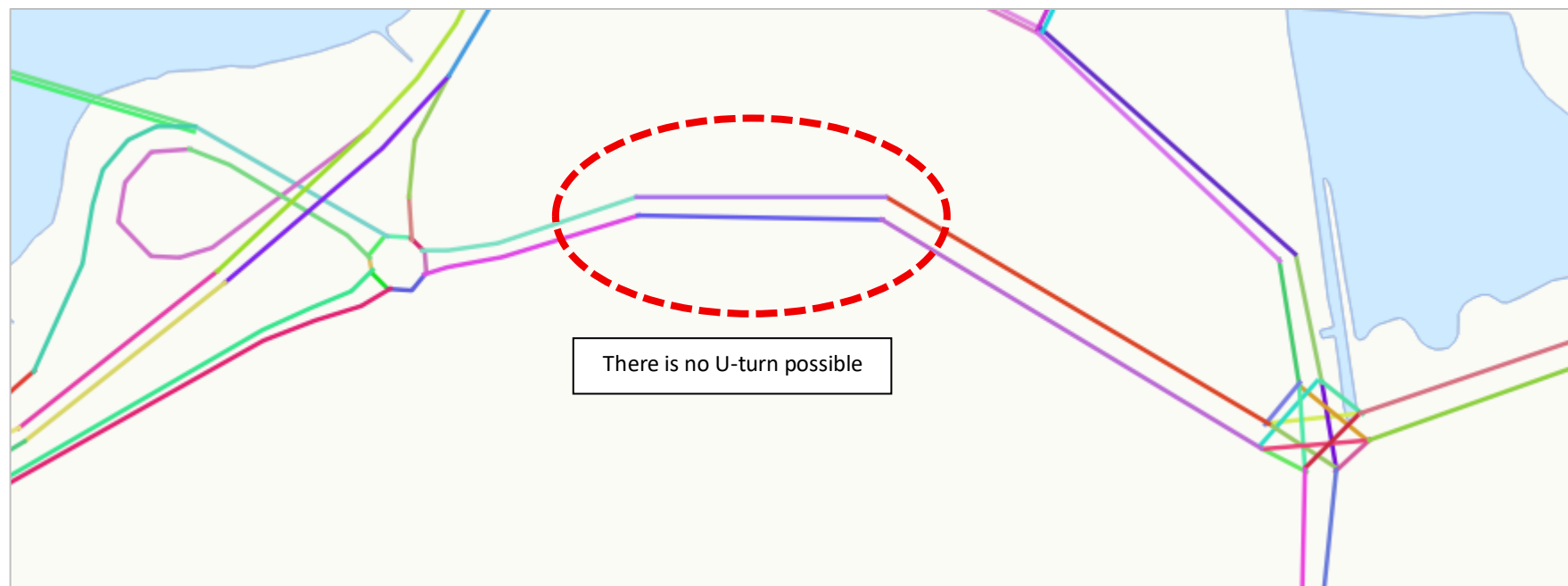
There is no possibility to directly prohibit a turning movement. To do so, the intersections must be coded as follows :



The corresponding link can then be prohibited for certain vehicle sub class.

Prohibiting U-turns

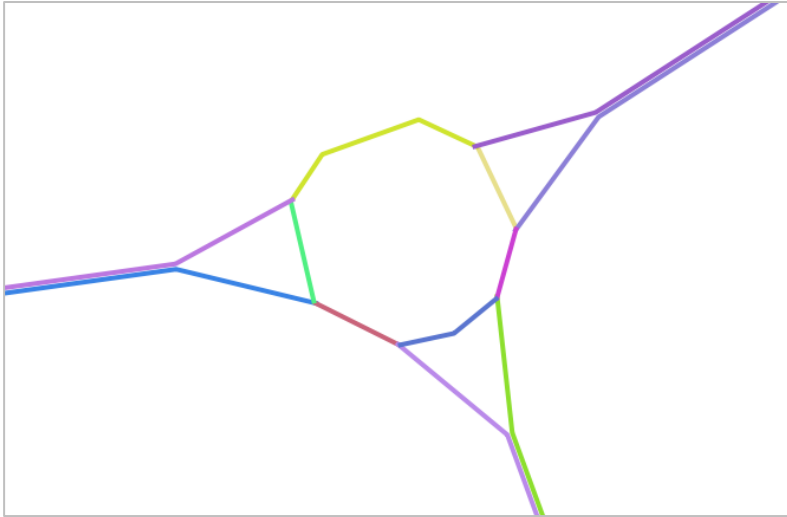
There is no possibility to prohibit a U-turn directly. To do so, both directions of a link must be coded independently, separated by a few meters (at least 2), as follows :



- ⇒ It is not necessary to do this for every link. If a large number of vehicles make a U-turn in the middle of a road, it underlines a real situation / problem with the network, not a modelling problem.

Roundabouts

The best practice to code roundabouts is the following :



This ensures :

- There is no U-turn possible
- All the traffics on the roundabout are known

Generalized cost of a link / path

Without penalty

Generalized cost of a link = coefficient_a x travel time (second) + length (meter)

With Penalty

Generalized cost of a link = (cost_factor_x100_troncon / 100) x (coefficient_a x travel time (second) + length (meter))

Generalized cost of a path

Generalized cost of a Path = $\sum$ (Generalized cost of the links of the path)

3. METHOD OF TRAFFIC ASSIGNMENT

The algorithm used in Q-Traf is the Method of Successive Averages ("MSA"). The MSA is a convergence algorithm towards the user equilibrium.

In the first iteration, link flows are calculated on the basis of the free network. This is on all or nothing assignment.

At each following iteration i :

- The link flows at the beginning of the iteration are : $(\text{link flows})_{i-1}$
- The new shortest paths are calculated on the basis of the link flows of the previous iteration : $(\text{link flows})_{i-1}$
- 100 % of the traffic is assigned to the new shortest path : $(\text{Link flows on the shortest path})_i$

The new link flows at the end of the iteration i are :

$$(\text{link flows})_i = \alpha (\text{link flows})_{i-1} + \beta (\text{link flows on the shortest path})_i$$

Where:

$\alpha + \beta = 1$ (the total volume of traffic is unchanged)
and
 β must be between $1/i$ and $1/i^2$ (to ensure convergence)

β is here equal to $1/i^{(3/2)}$

So :

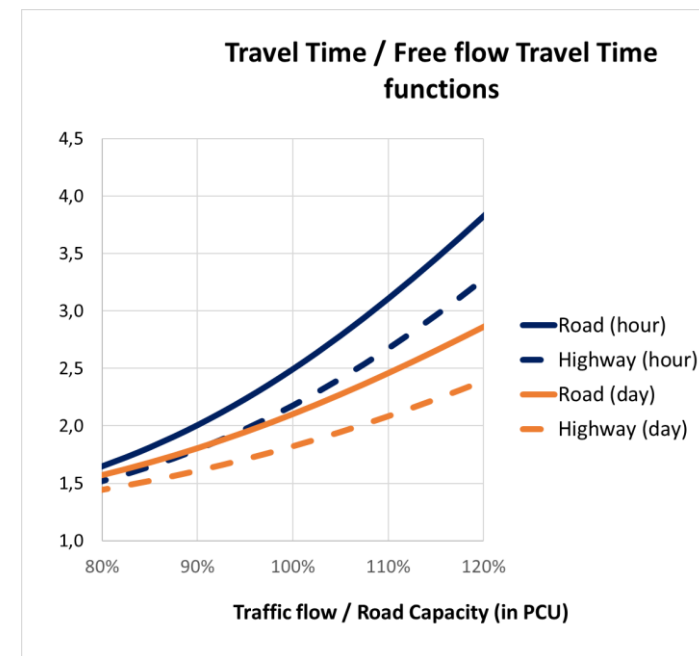
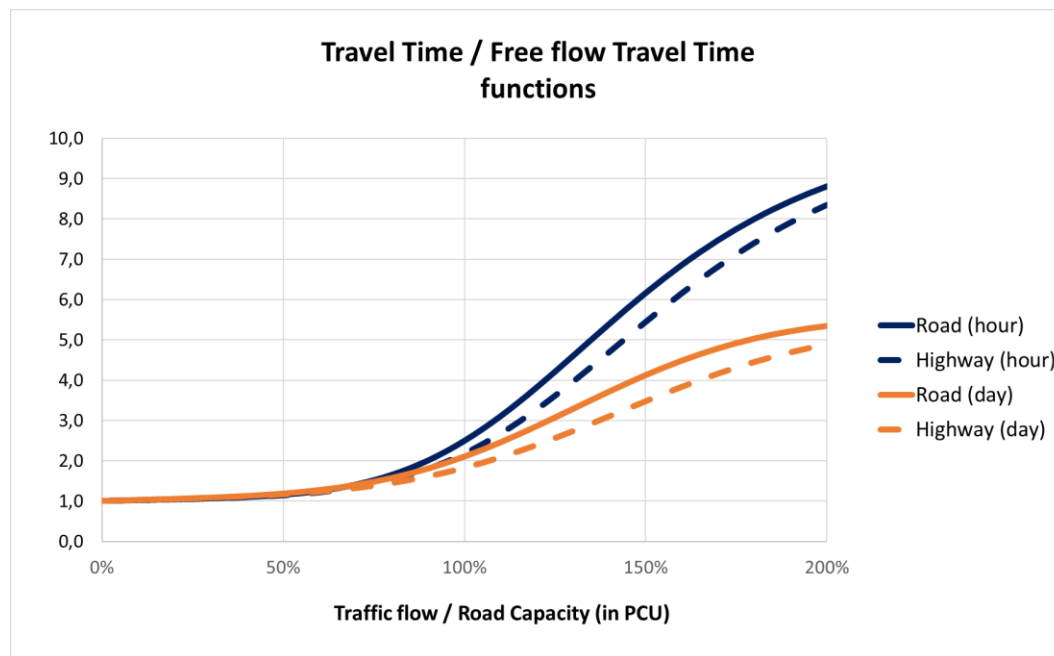
- For $i > 1$, all the assignments are done on the basis of a full charged network
- At each iteration new shortest paths can be found and added
- The more iterations, the less weight for the first iterations

4. LINK TRAVEL TIME (FLOW RATE) FUNCTIONS

There are currently 2 types of functions Delay(flow), for :

- Free-flow / grade-separated roads (highway)
- Other roads

... which are specified in the field “Free-flow / grade-separated roads” in the link categories



- ⇒ The increase of travel time is less important for highways; thus, in case of high traffic volume (and high congestion), highways attract relatively more traffic than other smaller roads
- ⇒ The travel time for daily period is inferior to the travel time for hourly period. It is the consequence of the ponderation of low traffic period (night) and heavy traffic period (peak hours), in the average “Traffic Flow / Road Capacity” ratio (note that the daily capacity is also not 24xhourly capacity).