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Danube Cycle Plans

Danube Cycle Plans

Assessment of cycling infrastructure and investment necessities for DanuVelo

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Danube Cycle Plans | Policies, plans and promotion for more people cycling in the Danube region

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More information about Danube Cycle Plans
and the project activities & results are available on:
http://www.interreg-danube.eu/approved-projects/danube-cycle-plans

Table of contents

Introduction 4

1. STEP ONE: Define routes to be used for the Danube Cycle Route Network a.k.a. DanuVelo 6

1.1 Getting from NCRN to DCRN 6

1.2 Cross border cycle routes 7

1.3 Core Network density 7

2. STEP TWO: Assess the route condition levels of the proposed DCRN 9

2.1 Good enough cycling infrastructure - GECI 9

2.2 Adjusting Existing Adequate Roads – adjusting them for cycling - AEAR 11

2.3 construction improvement needed for Existing service, forest or field paths – CINE 14

2.4 New cycling infrastructure needed - NECI 15

2.5 Public transport option - PUTR 16

3. STEP THREE: Create a database of DCRN for all partners 18

3.1. Qgis 18

3.2 Choose your Qgis person/team 19

3.3 Getting to the database 19

Setting up the program 19

Determining the infrastructure category 20

Analysing data 21

Exporting data 21

4. STEP FOUR: Calculate the investment needs 22

4.1 Cost analysis case study 22

4.2 Running m or m^2 23

4.3 Calculation approach 23

4.4 Investment plan 24

Sources 26

Introduction

Dear partner,
this document will guide you on the path of collecting data on current cycling infrastructure and investment necessities for the Danube Cycle Route Network (DCRN) in your country.

> *The DCRN will be a macro-regional network of cycle routes of different categories that connects the participating countries in the Danube region.* ***The DCRN will consist of the EuroVelo routes and the highest level of the national cycle routes.*** *It will consider the requirements of both, leisure cycling and bicycle commuting. Special focus will be given to cross-border sections linking national cycle route networks leading to a consolidated transnational cycle route network. Defining the DCRN will help national and regional governments to identify, design and prioritize main cycling corridors. The DCRN will be delivered as a set of GIS shapefiles of the routes and the necessary attribute data, which can easily be included in different mapping and analytical tools.*[1]

Your assessment of the situation of cycling infrastructure in your country will serve as a base point for the development of the investment strategy for the **DCRN**, in the future known as "**DanuVelo"**. Complexity of the task at hand demands a **structured and detail oriented approach** while keeping in mind the **big picture**. At the same time, due to constraints of resources, this will be a **rough assessment of the current status** and as such will provide very **generalized investment necessities** for your countries' DCRN.
In order to collect as much information as you can about the status of cycling infrastructure and investment needs for your country, best practice would be to contact as many relevant stakeholders (municipalities, regions, ministries, cycling infrastructure experts etc.) to provide you with the information you need. Great questions to ask are:

- Where are the **current cycle routes routed**? Where are the **planned** cycle routes routed?
- What is the **quality** of the specific roads through municipality or region? What is the **traffic volume** at different sections, at what sections is **visibility** an issue, what is **safety** like? Where are the **black spots**?
- Do you have **cost analysis** of previous cycle infrastructure construction projects in your municipality / region / country (you will need it for the cost assessment)?

Then follow the steps for assessing the current infrastructure status and investment needs for DCRN network:

STEP ONE: Define routes of your national cycle route network to be used for the Danube Cycle Route Network a.k.a. DanuVelo – your Core Cycle Route Network
STEP TWO: Assess the route condition levels of the proposed CCRN
STEP THREE: Create a database of CCRN for all partners
STEP FOUR: Calculate the investment needs for the CCRN.

1 Danube Cycle Plans Application Form, page 45

In the end, there are two outputs we want to achieve:

- One is a digital map, connecting all the participating countries CCRN, which are interconnected into DCRN and deserving of the name DanuVelo.
- The second is the calculation of further investment needs for the full implementation of the DCRN/DanuVelo.

Thank you all for all your hard work invested in this demanding but very important task.

If there is the need for clarifications, please contact Gregor Steklačič at gregor.steklacic@gov.si or Katarina Sladoljev at katarina.sladoljev@gov.si.

Email the completed assessment to gregor.steklacic@gov.si and katarina.sladoljev@gov.si **by February 28th 2022.**

1.STEP ONE: Define routes to be used for the Danube Cycle Route Network a.k.a. DanuVelo

"The functional requirement for a successful cycling infrastructure is that traveling from point A to point B should be convenient and quick, and the journey should be a safe and pleasant experience".[2]

1.1 GETTING FROM NCRN TO DCRN

Part of the Danube Cycle Plans project is determining the whole National Cycling Route Network for each partner, following the Guidelines to Define NCRN, published in April 2021.
Guidelines were written for determining the whole National Cycling Route Network, with different levels of cycling routes ranging from long distance to regional to local routes. For **DCRN** we will be integrating partnering countries' "Core Cycle Route Networks (CCRNs)", consisting of **EuroVelo** routes and selection[3] of the **highest (long-distance) level of defined national cycle routes**[4] into one comprehensive transnational network. For this purpose, in border regions CCRNs will also use small parts of regional and local routes for the purpose of cross-border connection. In the end, DanuVelo will be in hierarchy and density for most partnering countries somewhere between EuroVelo and National Network.

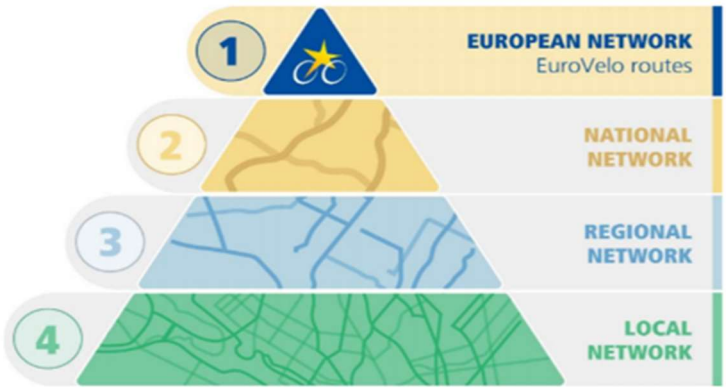

Figure 1 Hierarchical structure of a cycle network (ECS Handbook for route inspectors 2021).
In the hierarchy, EV is on the top, since it is the least dense network. Most of the countries have made the EV routes part of their National Network. DanuVelo will be positioned between the two, since most countries will make a selection of the highest level routes of NCRN to become part of DanuVelo.

2 Collection of Cycle Concepts 2012 https://www.cycling-embassy.org.uk/document/collection-cycle-concepts-2012
3 Amount of the highest level of national cycle routes implemented into CCRN depends on the density of each countries' NCRN. For some countries (like Slovenia, Croatia, Romania) it will mean all highest level of national cycle routes will be used and for some (Czech, Hungary) the selection of the routes that can be well integrated into a transnational network will be necessary.
4 Guidelines to Define NCRN , division of levels on the example of Slovenia, page 16.

When deciding on **where** to route your CCRN that will be integrated with other countries' CCRNs into DCRN, have in mind **who we are doing this for**.

Our cyclist is a frequent user of cycling infrastructure. During the week (s)he uses bicycle as a transport option for commuting in both dry and wet weather and during the weekend and vacation (s)he is a cycling tourist, who uses the bicycle as a main mode of daily transportation on their multi-day cycling trips within or outside of the country in dry weather. (S)he rides a trekking or touring bicycle that can be used both on asphalt and compact gravel and is usually loaded with paniers carrying work related things or luggage. Our cyclist wants a safe and direct infrastructure in urban areas for purposes of daily commuting and at the same time scenic connection between major cities/towns and tourist attractions along the way for exploring the country in free time. If comparing with the ECS standards, it is a regular cycle tourist we are creating the DanuVelo for.

Ideal outline of the Core Network

- **Border to border** national cycling routes, **connecting across the border** with neighbouring country's national cycling routes
- **Point A to point B** routes – no loops
- **Cheaper option for construction** – when possible, using current infrastructure, existing paths and trails and adjusting them for cyclists.

1.2 CROSS BORDER CYCLE ROUTES

One of the guiding principles for outlining the DanuVelo is **regional connectivity** of the defined national core networks leading to a consolidated transnational cycle route network. Hence **bi (or tri)-lateral agreements** should be made with the neighbouring countries on where the core networks connect across the border **prior to finalizing the DCRN**.

In practice that means, that sometimes a route that you initially planned as a long distance cycling route doesn't work for this purpose in its entire length, so you "cut out" it's ends and replace them with a **regional or local cycling route, to connect across the border** with the core cycling route of your neighbours.

1.3 CORE NETWORK DENSITY

The core network consists of main national cycling connections, which are further on dispersed to regional and local cycling connections. Therefore, the density of the core network should not be too dense, and should really just be the "main blood line" for cycling through the country. Consider having **not more than 100m of core network per 1 km^2 of the total area of the country.**

Example: For Slovenia that means, that we should have 2.027 km or less of DCRN (area of Slovenia is 20.271 km2 x 0,1 km = 2.072 km). But in practice, we have currently planned 1228 km of DCRN (which is approx. 60 m of infrastructure per km2).
That means that, off course, a dense overall cycling network is more than desired, but for the purpose of creating a DanuVelo only the special few – (inter)nationally relevant - routes should be chosen.

On example from Slovenia you can see, there are multiple cycling routes in the overall country's cycling infrastructure network, but only 8 are temporarily looked at for the DCRN.

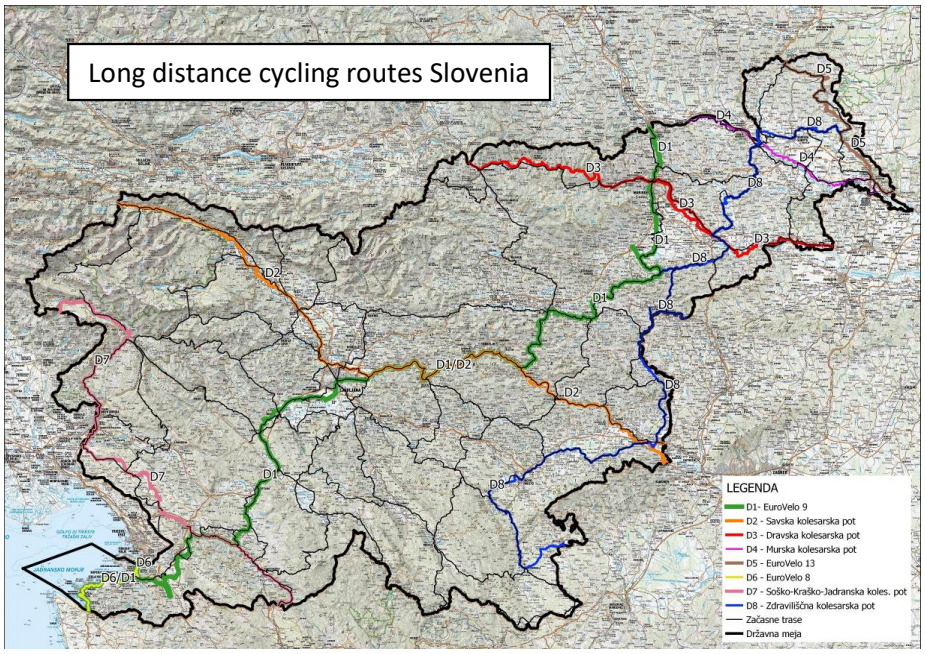

Figure 2 Slovenia's long-distance cycling routes that will represent CCRN are in color. Black lines represent the second level of NCRN.

For the minimum density we recommend that is higher than the Euro Velo density and that it is aligned with bordering countries in terms of continuity of transnational cycle routes.
You can also refer to European Certification Standards – Handbook for route inspectors 2018[5] (or if you have it available, ECS Handbook for route inspectors 2021) and to Catalogue of Cycling-friendly Infrastructure Standards for the Danube Countries for a deeper dive into the standards of well-designed cycle routes.

[5] https://eurovelo.com/download/document/ECS-Manual-2018_04_16.pdf

2. STEP TWO: Assess the route condition levels of the proposed DCRN

4 categories for classifying the status of current (cycling) infrastructure (described in more detail below):

1. **Good enough cycling infrastructure (GECI)** - fulfilling the current minimum standards in the country, investment is not needed apart from marking the road as a cycling route.
2. **Adjusting Existing Adequate Roads (AEAR)** - local roads fulfilling the criteria of good visibility, low traffic, firm surface that can be adjusted for cycling with calming the traffic, speed barriers, painting cycle lanes, sharrows, etc.
3. **Construction improvement needed for existing service, forest and field roads (CINE)** – compacting gravel, improving drainage, maybe paving, etc. for the usage of cyclist
4. **New cycling infrastructure needed (NECI)** – where traffic volume exceeds 2000+ cars/day on a route section with speed limits over 40km/h (even better 30 km/h) or where it is not safe for cycling regardless of the traffic volume and speed or where the existing cycling infrastructure doesn't meet the current minimum standards in the country.
5. **Public transport option (PUTR)** – the sections where it is hard or impossible to cycle (high mountain passes or river crossing) but the existing public transport lines enable the transfer by train, bus or ferry

Each country has a different (or no) standard for cycling infrastructure, so here each partner has to adjust the assessment to their country. Guidance that we propose is that when you have good enough cycling infrastructure (GECI), you leave it as it is (for now), even though it does not align completely with the DCP project document Cycling friendly infrastructure standards for the Danube Countries. When however assessing other three categories (AEAR, CINE, NECI) try to comply with the infrastructure standards in at least 80% of the route.

2.1 GOOD ENOUGH CYCLING INFRASTRUCTURE - GECI

The cycling infrastructure (cycling paths, tracks and lanes) fulfils the current standards for cycling, traffic speed on road is limited to 30 km/h or less, traffic volume is low or the regime is defined as a traffic calming zone. Investment is not needed apart from sign posting the cycling infrastructure as a cycling route with traffic signs.

Project is co-funded by the European Union funds (ERDF,IPA).

"In case the bicycle traffic is organised differently in different directions, …, the worst-case scenario should be assumed."[6] For example, cycling infrastructure has to be built in two ways of riding, otherwise, it's considered, that it is not existent.
Examples of category 1 infrastructure:

Figure 3 Road with speed limit 30 km/h is acceptable for cyclist when the traffic volume is 2000 cars/day or less

Figure 4 Existing cycling infrastructure in urban area

[6] ECS Handbook for route inspectors – Long Manual, page 17

Figure 5 Traffic calming zone

Figure 6 Existing Cycling track in non-urban area

2.2 ADJUSTING EXISTING ADEQUATE ROADS – ADJUSTING THEM FOR CYCLING - AEAR

Local paved roads, with traffic volume up to 2.000 cars/day and good visibility and where the speed limits can be lowered, **adjusted for safe cycling** with traffic calming measures, speed barriers, painting cycle lanes or sharrows. Investment cost is low, adjustment can be done in shorter time and with lower amount of legal paperwork. In addition to that, compact, good gravel, can be used by cyclists on touring and trek bicycles outside of the urban areas also in the rain.

Figure 7 Low traffic village road

Figure 8 Low traffic good visibility rural road, can be used for cycling with traffic calming measures

Example of good enough gravel, that can be categorized as paved road:

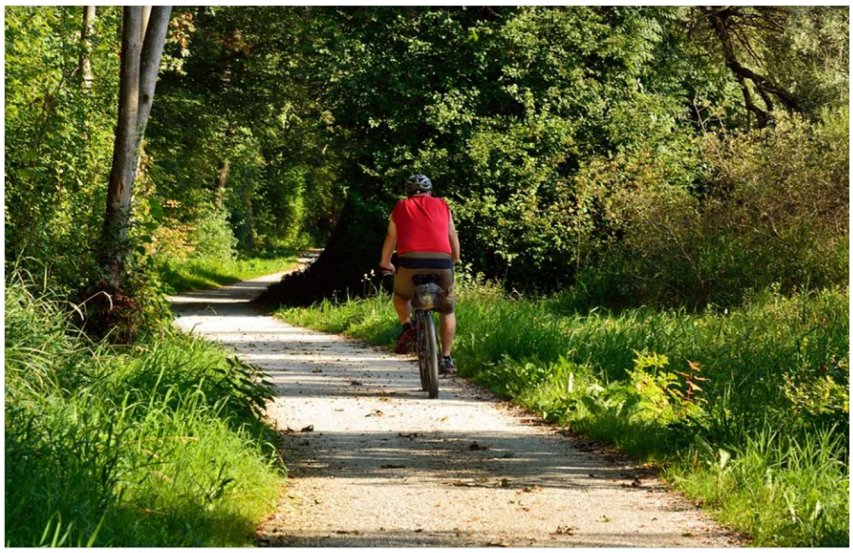

Figure 9 Forest compact gravel path

In order to have the best data possible to assess this category, collect as many information on the current traffic volumes for your country. For example, in Slovenia, average daily traffic (ADT) is measured for all state managed national and regional roads and available at the Agency of Republic Slovenia for infrastructure. Traffic on local roads is usually lower than parallel state managed road, and this way you can have a rough estimation on traffic volume for the section you are assessing. Generally, all countries have some sort of a system for collecting data on traffic volume so hopefully those are readily accessible for you.

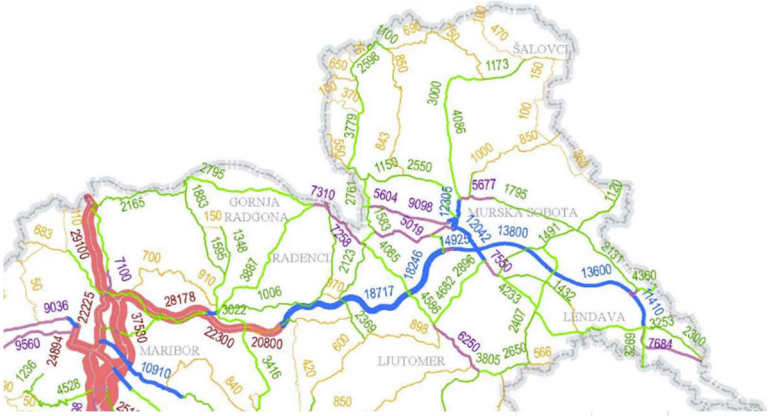

Figure 10 A part of the map of Slovenia with ADT information

2.3 CONSTRUCTION IMPROVEMENT NEEDED FOR EXISTING SERVICE, FOREST OR FIELD PATHS – CINE

These existing service, forest or field paths, categorized or non-categorized, mainly gravel roads in poor condition, can be used for cycling if their quality is improved. That is done by compacting the gravel, improving drainage, maybe paving, legally categorizing roads into public roads and so on. Improvement of these roads requires more time, paperwork and money.
We believe that paved cycling infrastructure for commuting purposes is needed close to urban centres, so we propose building new infrastructure, that should be added in category 4, in the distance of at least 5km from the end of the urban area.

Examples of category three infrastructure:

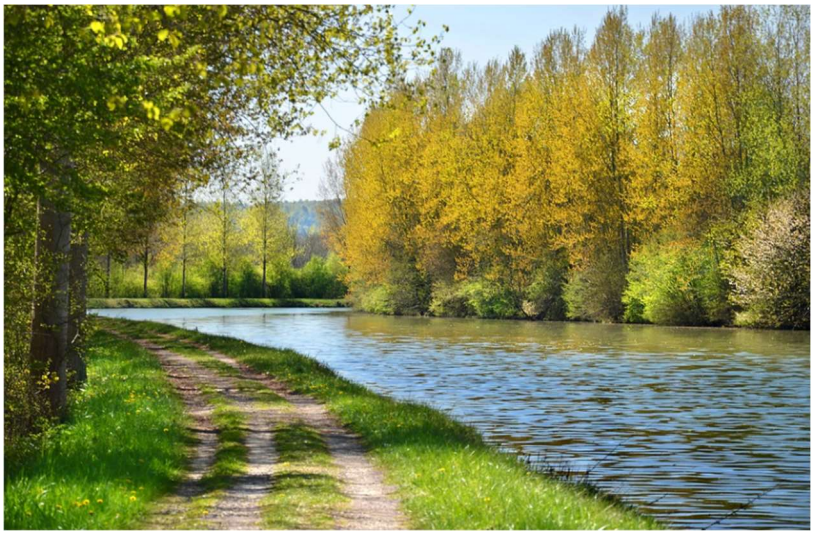

Figure 11 Tow path that needs upgrading to become part of the Cycling route

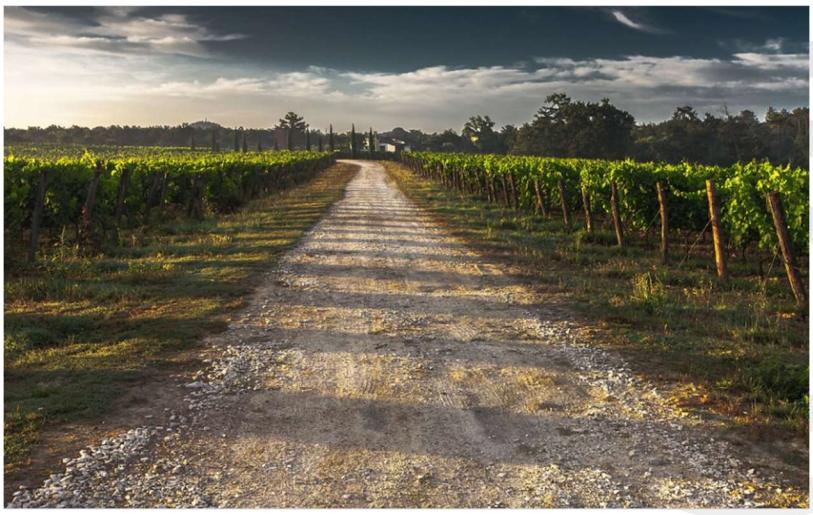

Figure 12 Vineyard roads are popular with cyclists, but have to sometimes be upgraded

2.4 NEW CYCLING INFRASTRUCTURE NEEDED - NECI

When traffic volume exceeds 2000 cars/day and speed limits are over 40 km/h or any other condition for the safety of cyclists is not met, the new cycling infrastructure should be built.

Figure 11 Traffic jam in a city

Figure 12 Busy road where new cycling infrastructure has to be built

Traffic density:

For traffic volume we will use as the minimum standard the standard proposed by Croatian partners in the Catalogue of Cycling-friendly Infrastructure Standards for the Danube Countries. In the **assessment** phase we are making the exception in the last two columns, where the traffic volume is up to 2000 vehicles/day but the speed limit is 80 and 90 km/h. We want to set a standard, that whenever the speed limit is more than 70km/h in sections with cyclists, at least administrative

measures of lowering the speed limit to max 70km/h have to be put in place with traffic signs "Cyclists on the road" added and preferably also the traffic calming measures implemented (category 2 – AEAR). If that is not viable, new infrastructure needs to be built.

	speed km/h	30	40	50	60	70	80	90	
v/h	v/d								
50	417								road
250	2083								track
500	4167								lane
1200	10000								
2000	16667								mixed
2500	20833								

Table 1 Speed limit traffic density matrix to define appropriate cycle infrastructure, proposed as DCP standard (Belamarić)

2.5 PUBLIC TRANSPORT OPTION - PUTR

To enable coherent international cycle route network which in sections runs through mountain valleys of tourism importance, and these can only be reached crossing high mountain passes, the public transport can be used to overcome the height difference and steep slopes. These are special sections where no investment is planned, because the terrain does not meet the standards of longitudinal slope. The big and wide rivers (like Danube) with rare and narrow bridges are also big barriers to having coherent routes connecting both sides of a river. If a regular ferry line exists there, they could be used as an option for overcoming an "obstacle" that would otherwise not allow for the long distance route to be connected end to end.

When assessing part of the cycling route with this category please keep in mind that you want to keep the cyclist on the bicycle as long as possible and the shortest amount of time needed on public transport. So for example, if there are 2 mountain passes in the stretch of 60km of the cycle route, each in the length of 10 km, and the cyclist can use public transport in the sections of the mountain pass and cycle the rest, please mark that accordingly. In that case, you don't mark the whole 60 km as PUTR, but only sections, where the cyclist would really need to (and able to) use public transport. A good practice is to track the availability of public transport in those sections so you know if the option of using it daily is actually possible or not.

Figure 133 Bike transfer by regular train line

Figure 144 Bike transfer by bike trailer in summer season

3. STEP THREE: Create a database of DCRN for all partners

As a part of Deliverable D.T2.3.1 Cycling Infrastructure Database, we aim to create a **database** summarizing the current conditions of cycling infrastructure of the Danube Cycle Route Network based on the data provided by the PPs. Infrastructure conditions and investment necessities should be visualized in **GIS shapefile**.

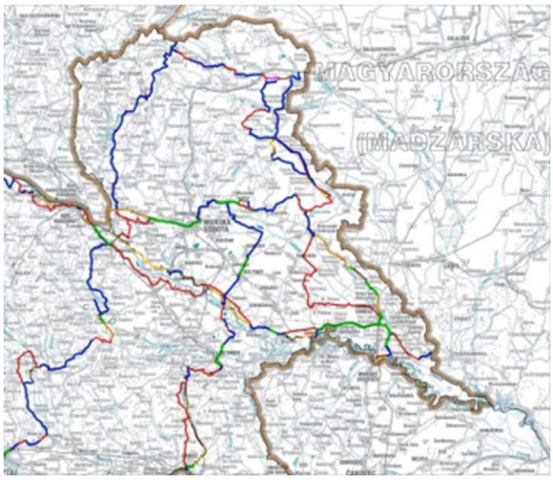

Figure 15 Example of more detailed cycle routes in the Pomurje statistical region [7] of Slovenia, where different lines mark different categories of the infrastructure:

- *Green line - **Good enough cycling infrastructure GECI***
- *Blue line - **Adjusting Existing Adequate Roads AEAR***
- *Brown line - **Construction improvement needed CINE***
- *Yellow line - **New cycling infrastructure needed NECI***
- *Red line - temporary course of the route until the construction of the missing cycle path (not needed for this task)*

This step is so closely connected with step #2 that it's almost the same one. We expect most of the partners to work on these two steps at the same time. Step #3 will serve not just as a visual presentation but also as a **base for further calculations of investment needs** for cycling infrastructure.

3.1. QGIS

For a common database we will use QGIS, a free and open-source geographic information system[8] in a form of a cross-platform application that supports viewing, editing and analysis of geospatial data.

[7] Guidelines to Define NCRN

[8] https://www.qgis.org/en/site/index.html

3.2 CHOOSE YOUR QGIS PERSON/TEAM

Each partner has to define ideally a team of two people in charge of creating the database in Qgis. It would be best if they have experience with Qgis or some other program for editing shapefiles or at least with programs for route mapping like Strava, Google Earth, Ridewithgps or similar. The process is not very complex, but it does require **spatial orientation** and **good computer skills**.
Why a team? Because deciding which one of the five categories a section of cycling route falls into, will sometimes be tricky and debatable and it will be helpful to have two sets of eyes on it to assess it as well as possible.

3.3 GETTING TO THE DATABASE

We are creating written and video step by step instructions on using the program and a workshop together with a Slovene Qgis expert, for creating a database with attributes needed for further analysis, which will be available beginning of December 2021.

Setting up the program

1. Download program Qgis. We recommend the **version 3.16**, since it's a stable version with not a lot of bugs.

2. Download and install needed plugins and layers for your country. As a base layer, we propose the google earth view, ortophoto or similar aero photography recording, which will show as much as possible the situation on the ground. We suggest putting **XYZ google maps** as a base layer (http://mt0.google.com/vt/lyrs=y&hl=en&x={x}&y={y}&z={z}). Instructions on how to do it are described in video). You will need it for determining the attributes and categories of infrastructure as accurately as possible. Be mindful to check the year of recording.

3. For assessing the quality of the infrastructure, Google maps street view is also a great tool.

4. Check the coordinate system your data is written in. Hopefully it's harmonised with European coordinate reference system[9]. It should be EPSG:3857, prescribed by directive INSPIRE [10] and based on European horizontal coordinate system (ETRS89). If it is not, please contact Gregor Steklačič and Katarina Sladoljev and we will look for solutions.

[9] http://www.crs-geo.eu/
[10] https://inspire.ec.europa.eu/theme/rs:1

Determining the infrastructure category

5. Import the files for your core network into Qgis and transform them to shape files (.shp) if they are written in a different format (gpx, kml). **Name each route**, so you have a reference when later analysing data. We propose naming with Country code and number. For example, we named ours SI1, SI2, SI3. When we connect routes among neighbouring countries, we will define also the DanuVelo numbering and names.

6. Choose one route of your core network and start the assessment process. Based on the layer you are using, you should be able to view km after km of the core network and assess the quality of infrastructure.

7. Depending on the (non) existence and quality of the cycling infrastructure, virtually "cut" the route in sections where one category ends and the other begins (e.g. if the condition changes from AEAR to NECI "cut" the route) and label it as one of the 4 categories.

8. Your attribute table should have at least 6 columns (you can have more for your own purpose, if you want, but for DanuVelo we would need these 6, so that all partners have the same). Please create the following 6 columns (it's hard to add them later, so it's better to have more from the start):

    I. DanuVelo column – this is where we will add the naming for different DanuVelo routes once we combine all the partner's routes. Leave this one blank.

    II. CCRN – Name of the Core Cycling Route you are assessing. Core Cycling Routes of all partners combined will create Danube Cycling Route Network.

    III. National label – within countries each route usually has a different name or number. This will help keep track of where the part you are assessing is located.

    IV. Managing body – define the manager (national/regional/local government/administration) of the section of the road/cycling infrastructure. This will be useful for the investment analysis.

    V. Category – use one of the five categories defined above (GECI, AEAR, CINE, NECI, PUTR), to categorize the quality of the infrastructure

    VI. Length - the length of each section will be calculated automatically by implementing mathematical function in the programme (see video).

DanuVelo	CCRN	National label	Managing body	Category	Length
	SI1	R21	Regional	AEAR	477
	SI1	D7	Local	NECI	2.423
	SI1	G14	National	GECI	1.577
	SI1	D7	Local	CINE	1.299
	SI1	R5	National	PUTR	12.634

Table 2 Attribute table example for Slovenia

9. If you notice there is a better infrastructure option close by, you can **edit the existing route** and **move the line to the preferred location/route**. Keep in mind though, that you should be authorized to dedicate that infrastructure for public use.

Analysing data

10. Open attribute table and export the data to Microsoft Excel. With analysing the attribute grid, we can calculate the cumulative lengths of each category of the route. We need the lengths per category for calculating the approximate investment needs. More about investment calculations in the chapter below.

11. When two or more core network routes **overlap** for a significant length, we need to be careful not to duplicate the investment cost.

Exporting data

12. When you are all set and done, export the CCRN with attributes, in ESRI Shapefile (*.shp) format and send it to Gregor and Katarina for combining all routes into one DanuVelo network.

4.STEP FOUR: Calculate the investment needs

"Three and a half meter wide traffic lane can sustain approximately 2000 people in cars per hour, or in the same time, 14.000 people on bikes."[11]

Based on step three we will be able to calculate the investment needs for each of the core network routes. Even though the investment needs for cycling infrastructure can reach high sums, it's always good to remind ourselves what are the socioeconomic effects of cycling, and what they amount to if translated into costs.

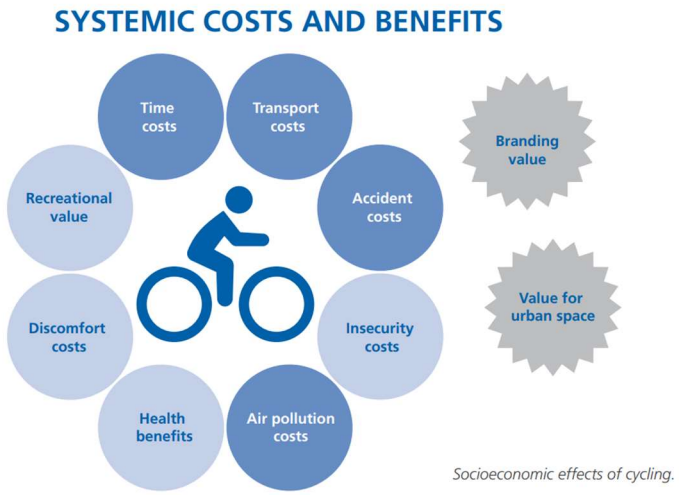

Figure 16 Collection of Cycle Concepts 2012

4.1 COST ANALYSIS CASE STUDY

When assessing the investment needs, good practice is to **collect as many case studies or cost analysis of previous cycle infrastructure adjustment/construction projects** in the country as possible, which will serve as a basis for calculating the approximate price for **running km** for adjusting existing infrastructure for cycling or **m^2** for constructing new one.

[11] Figueroa, M. J. in dr. (2012). Global energy assesment – towards a sustainable future. Chapter 9 – energy and use – Transport. Cambridge: Cambridge university press

4.2 RUNNING M OR M^2

For the **first 3 categories** (1. good enough existing cycling infrastructure - GECI, 2. Adjusting existing adequate roads - AEAR and 3. Construction improvement needed for existing service, forest and field roads - CINE) the calculation should be done for the **running m** of the infrastructure. The costs in these cases are much lower than costs of building new infrastructure, so they should be calculated separately.
The price of **new cycling infrastructure – NECI** (4th category) varies immensely depending on terrain (flat vs. hilly), type of settlement (urban vs. rural), complexity (special structures like bridges, tunnels, underpasses…) and other factors. For establishing a common denominator, calculation of approximate price is set to **m^2** of new infrastructure and varies from country to country.

4.3 CALCULATION APPROACH

Acknowledging that different project partners have different access to information and case studies and depending on what kind of data can be obtain on previous cycle infrastructure construction projects, there are a couple of options for making the calculation for **new cycling infrastructure**.
We decided for an **overall average calculation approach**. For this, we need to **average the costs for all types of new cycling infrastructure construction**, including rural, urban, flat, hilly construction with special structures (bridges, tunnels) and **use that price for all construction needs**. This is a good option, when you have a lot of different cycling construction projects cost analysis and you can confidently estimate a good enough average.

EXAMPLE:
For each of the categories, we had to calculate the average price for different construction needs.
For **GECI** we calculated the costs for labelling the existing cycling infrastructure with new signage. That costs us approx. 1 EUR/m of infrastructure.
Adjusting existing adequate roads (**AEAR**) demands horizontal and vertical traffic signalling, building some speed barriers, adjusting safety with traffic calming measures… We calculated that this costs us around 10 EUR/m.
When construction improvement (**CINE**) like compacting the gravel, improving drainage, paving, legally categorizing roads into public roads and so on is needed, the investment requires more time and paperwork and consequently money. In Slovenia, that is around 50 EUR/m.
For new cycling infrastructure (**NECI**), including special objects, we calculated, that approx. cost comes up to **188 EUR/m^2** in Slovenia. We calculated this based on over 40 cycle infrastructure projects, averaging the total cost for all different kinds of terrain and complexity.
The public transport option **(PUTR)** does not require any new investment. The service should already be on place, therefore the cost is 0 EUR. What is needed in this category is communicating the schedules and possibilities of public transport with the users of cycle route.

In your report, please **clarify the process of assessing the price/m²** or per **running km** of construction and share the calculations with the partners.

4.4 INVESTMENT PLAN

Once you have the costs estimated, it is time to make an investment plan calculation. In Office Excel, create a similar grid to the one below for EACH of the Core Cycle Routes in your country. For each route, the Qgis programme will calculate the sum length of each category of investment necessities. You can find that data in the attribute table in Qgis. When you multiply it with the investment cost estimation per category and with width per category, you will end up with the reward for all your hard work, an investment plan for each route.

Cycle Route SL1 - Eurovelo 9 150 km

Investment necessities	LENGHT (in m)	INVESTMENT COST per m2	WIDTH	INVESTMENT PLAN
Good enough cycling infrastructure – GECI	31.572	1,00 €	1,00	31.572,00 €
Adjusting existing adequate roads - AEAR	48.297	10,00 €	1,00	482.970,00 €
Construction improvement needed – CINE	25.847	50,00 €	1,00	1.292.350,00 €
New cycling infrastructure needed - NECI	44.284	188,00 €	3,50	29.138.872,00 €
Public transport option - PUTR	0	0,00 €	0,00	0,00 €
	150.000			30.945.764,00 €

Cycle Route SL2 - Savska cycle route 192 km

Investment necessities	LENGHT (in m)	INVESTMENT COST per m2	WIDTH	INVESTMENT PLAN
Good enough cycling infrastructure – GECI	64.827	1,00 €	1,00	64.827,00 €
Adjusting existing adequate roads - AEAR	51.982	10,00 €	1,00	519.820,00 €
Construction improvement needed – CINE	28.579	50,00 €	1,00	1.428.950,00 €
New cycling infrastructure needed - NECI	34.612	188,00 €	3,50	22.774.696,00 €
Public transport option - PUTR	12.650	0,00 €	0,00	0,00 €
	192.650			24.788.293,00 €

Table 3 Example of infrastructure investment needs for 2 CCR for Slovenia

If you do not have a lot of your own cycling construction cost analysis available, good documents to refer to for more approximation on construction costs are The Costs of Cycling Infrastructure Factsheet by ECF and Collection of Cycle Concepts 2012 published by the Cycling Embassy of Denmark, page 106.

Typical costs per category

euro/km	
50,000	Simple cycle track in easy terrain outside built-up area, no significant challenges
200,000	Mixed localisations and solutions, some challenges to overcome
500,000	Urban area, or difficult terrain, or cycle highway standard[1] in easy terrain
1,500,000	Cycle highway standard in urban area
10,000,000	Cycle bridge over a major river or other obstacles, elevated track

Figure 17 The Costs of Cycling Infrastructure Factsheet by ECF

Sources

- Danube Cycle Plans Application Form: https://workplace.umweltbundesamt.at/sites/0415/Documents/Main%20Project%20Documents/Application%20Form.pdf
- Collection of Cycle Concepts 2012: https://www.cycling-embassy.org.uk/document/collection-cycle-concepts-2012
- Guidelines to Define NCRN: http://www.interreg-danube.eu/uploads/media/approved_project_public/0001/44/ca2643f02335ee2be8a59a87efe32304069b3a94.pdf
- European Certification Standards – Handbook for route inspectors 2018: https://eurovelo.com/download/document/ECS-Manual-2018_04_16.pdf
- ECS Handbook for route inspectors 2021: https://pro.eurovelo.com/download/document/ECS-quality-criteria-2021.pdf
- Catalogue of Cycling-friendly Infrastructure Standards for the Danube Countries
- Danube wide infrastructure standards: https://workplace.umweltbundesamt.at/sites/0415/Documents/Meetings%20and%20Events/4th_Partner_SteeringCommittee_Meeting_Ruse/DCP_HR_Catalogue_Danube%20wide%20infrastructure%20standards.pdf
- Qgis: https://www.qgis.org/en/site/index.html
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- Figueroa, M. J. in dr. (2012). Global energy assessment – towards a sustainable future. Chapter 9 – energy and use – Transport. Cambridge: Cambridge university press
- The Costs of Cycling Infrastructure Factsheet by ECF: https://ecf.com/system/files/The_Costs_of_Cycling_Infrastructure_Factsheet.pdf
- Open data of Slovenia: https://podatki.gov.si/dataset/pldp-karte-prometnih-obremenitev
- Pixabay – photos of infrastructure: www.pixabay.com