Pre-Survey Report for Transports

## **MYRSKY: TERVOLA – KUORINKI**

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Reported by:

Approved by:

Antti Koivula Matti Koivula

Elina Hassinen



Karjalankatu 15 28130, PORI Finland www.vuorsola.fi

# Vuorsola

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## **1 BACKGROUND OF THIS REPORT**

This report has been made as an assignment for Myrsky Energia Oy. Its purpose is to preliminary describe the transportation options and plans of a project that is under planning.

The report describes options and plans concerning the transport of heavy transformers as well as wind turbine components.

This report is made as a "desktop" survey. The report has been written using information available at the time of making the report. Vuorsola Oy is not responsible for possible incomplete or incorrect information, nor for changes to circumstances or other reported matters after the time of making the report.



## 2 THE PROJECT

Myrsky Energia Oy is planning to build Vestas V172 or similar wind turbines and 63-80MVA 110kV powerstation to TERVOLA - KUORINKI windpark.



Planned transformer:

Planned turbine type:

1 X Max power 63-80MVA, 110kV, transport weight 80t

Vestas V172 or similar, blade length 85m, heaviest component 105t



## **3 SUGGESTED PORT**

Geographically the best option would be to transport the transformer from Port of Kemi to the powerplant/wind park. Turbine components will use the same port.

Port of Kemi has the capacity and equipment needed for handling the windmill components and the transformer. Port of Kemi is one of the Finland's main ports for projects. There is suitable access from the port to main road 4 with blade transports. With transformer transports and other turbine component transports there is suitable access to destination through the city of Kemi.

Here is link for Port of Kemi's own website for more detailed information about the port: <a href="https://www.portofkemi.fi/en/">https://www.portofkemi.fi/en/</a>



## 4 TRANSPORT FOR TRANSFORMER

#### Route 4.1 Tervola Isonpalonperä Tossava Lehmikumpu Mikkotervonperä Vojakkalanaho Arpela Nelostie 433 Hosioaho Järkänmäki Yliaakkola Viitala Könölä Pellonperä Jouttiaap Tör Viitakoski Alakoski <u>däko</u>ski Pykälä Puukko Oravakangas laula Rajala Lammaskoski Ruotta 🚘 1 h 15 min llolansaari 80,1 km uikkosenpää Kapernaumi Heikinjuntinperä elä C Lonola Parpala Laivaniemi Keminma Kaakamo Pömiö oto Ala-Kaakamo Kangas Päivärinne Kaivola Välli Taipaleenkylä Hepola E8 Viantie Ajoksentie 713 O Saukkoranta E8 Simo

https://maps.app.goo.gl/F3HwJUXxYA8t3H1p8

Port of Kemi - 920 - Peurasaarentie - Sysimönkatu - Kalkkinokantie - Ouluntie – Valtakatu - Asemakatu - Lapintie – Koivuharjunkatu - Särmääjänkatu – Lapintie – 926 – 9267 – 19575 – 19534 – 4 – Nelostie 433 (66.017186, 24.709703)



Number	Km	Coordinates N/W	Мар	Transport road	Class	Action
1.	6- 13km	65.712688, 24.605263	Map 1	City of Kemi	4	Simulations and full route survey needed to determine modifications.
2.	16km	65.787788, 24.561988	Map 2	Turn from 926 to 926	1	Easy section
3.	35km	65.930454, 24.716583	Map 3	Turn from 926 to 9267	1	Easy section
4.	36km	65.933845, 24.694376	Map 4	Turn from 9267 to 19575	1	Easy section
5.	54km	65.810055, 24.546589	Map 5	Turn from 19575 to 19534	1	Easy section
6.	57km	65.838818, 24.511300	Map 6	Turn from 19534 to 4	1	Easy section

### 4.2 Special Notes About the Route

### Classification of constructional measures

Class	Category	Description
1	Easy section	Minor modifications needed, like e.g. removing road
1		signs or arranging a parking section
	Moderate section	Modifications necessary, like e.g. removing signs,
2		fixing a traffic refuge or pedestrian path, covering
2		with steel or concrete plates and other smaller road
		constructions or modifications
	Complex section	Large modifications necessary, like e.g. removing
		crash barriers, reconstruction of roundabouts,
		establishment of turn tunnels, road enlargements,
2		turning maneuver in general, private and
5		undeveloped properties are affected, traffic lights
		and streetlamps must be removed, considerable
		long-term construction site with a high licensing
		effort.
	Difficult section	Passage is doubtful, some additional investigations
4		are necessary (e.g. expertise, swept path analysis,
		simulations, bearing capacity tests or dummy runs).

### In simulations:

- 📃 Driveable Area
- Obstacle (Not passable. Traversable if the height of the obstacle allows it)
- Tire tracks of tractor
- Tire tracks of trailer
- Area covered by vehicle combination
- Area covered by cargo



1.

8 (33)

6-13km Map 1 Class 4 Simulations and full route survey needed to determine exact modifications. This is a complex section. Possible tree removal and fillings on private land. (See chapter 4.5)



Map 1 – City of Kemi.



Map 2 Class 1 2. 16km Should be easy section with only minor modifications. Tomionkatu Kaukokiito K 921 926 921 None of the second Tomionkatu Maijasentie 9202 Scandia Rent 🖗

Map 2 – Turn from 926 to 926.



3.	35km	Map 3	Class 1		
Should be easy section with only minor modifications.					



Map 3 – Turn from 926 to 9267.



### PRE-SURVEY FOR TRANSPORTS 11 (33) MYRSKY: TERVOLA – KUORINKI

4.	36km	Map 4	Class 1				
Should b	Should be easy section with only minor modifications.						



Map 4 – Turn from 9267 to 19575.



5.	54km	Map 5	Class 1
Should b	be easy se	ction with only minor modifications.	



Map 5 – Turn from 19575 to 19534.



### PRE-SURVEY FOR TRANSPORTS 13 (33) MYRSKY: TERVOLA – KUORINKI

6.	57km	Map 6	Class 1
Should b	e easy see	ction with only minor modifications.	



Map 6 – Turn from 19534 to 4.





### 4.3 Suggested Handover Point

Suggested handover point is located on road 4 on point 66.017185, 24.709709. The handover point could also be before the given point or after it if there is suitable access to the site road.

At the handover point there is going to be need for filling.



### 4.4 Preliminary Transport Permit

Preliminary transport permit has been applied on 1.11.2023. The Preliminary transport permit (12166/2023) was accepted 13.11.2023 with conditions. The preliminary transport permit 12166/2023 is for 160t transformer transport via the same route.

These conditions are bridge control (sillanvalvontaehto), review of bridge bearing capacity calculation for one bridge (sillan laskentaehto) and possibility for weighing condition to demonstrate that axle weights remain within the specified limits.

There is one bridge on the route that's the load-bearing capacity of the bridge must be reviewed according to the preliminary transport permits conditions. On the route there are also six or less bridges that need to pass under supervision. The bridge controls and other conditions will become more exact with the transport permits. Then it is possible to know what components will have the bridge control and which are those supervised bridges.

The preliminary transport permit was applied with the estimated dimensions and weight of the 160t transformer. It is the limiting component on the route in another project so it can be estimated that route is suitable also for 80t transformer transport. More exact conditions regarding the 80t transformer transport will become clear after the transport permits.

With the preliminary transport permit for the 160t transformer it's possible to transport up to 160t transformer to Tervola – Kuorinki wind park.

NOTE! The preliminary transport permit for the route has been applied for a much heavier transformer. Therefore, there might be less conditions for 80t transformer transport. The conditions regarding 80t transformer transport will become clear after transport permits.



### 4.5 Other Notes

The transport route runs across the city of Kemi. Although the suggested route is a special transport route there might be modifications needed. City of Kemi is heavily investing its road infrastructure thus there is and there has been lot of road work going on lately and at the moment. Therefore, it's to be expected that the route and it's needed modifications might change over a period. Vuorsola Oy is having conversations with the Port of Kemi about the access from the Port through the city and if there are some plans to change that soon.

Vuorsola Oy has used this route through the city of Kemi before. From the transport perspective it's suitable for the transport of the turbine components with some modifications. From the transports point of view the opinion is that the routes road geometry is suitable for these transports but The Centre for Economic Development, Transport and the Environment (ELY-keskus) determines whether the road condition is suitable for transports. In the preliminary transport permit Technical Director Mika Grönvall from city of Kemi states that the route part that runs across city of Kemi is a special transport route, and it can be used for that purpose.

It is expected that due to the route going through city of Kemi, the transport permit could have condition related to the times of the transports. It's most likely that transport will have to take place at night.

The route is simulated for the transformer transports to see that the route is suitable for the transports with modifications. Vuorsola Oy suggest that new simulations are made with the full route survey and exact dimensions for the transformer when those are confirmed.

NOTE! The Taivalkoski dam bridge will undergo renovations during the summer of 2024. According to the preliminary estimate, road 9267 (Taivalkoskentie) will be closed from May 1 to October 15, 2024.

The suitability of the route for transports depends on:

-Review of the bridge bearing capacity concludes that the bearing capacity of the bridge is suitable for the transport

-Transport permit is granted



#### **TRANSPORT FOR TURBINE COMPONENTS** 5

### 5.1 Route for blades



https://maps.app.goo.gl/DrcD5995VagevbDT6

Port of Kemi – 920 – 4 – Nelostie 433 (66.017186, 24.709703)



Number	Km	Coordinates N/W	Мар	Transport road	Class	Action
7.	7km	65.715925, 24.615479	Map 7 & Sim 1	Turn from 920 to 4	4	Simulations needed to determine modifications.
8.	19km	65.818094 <i>,</i> 24.493895	Map 8	Turn from 4 to 4	4	Simulations needed to determine modifications.

### 5.2 Special Notes About the Route for blades

### Classification of constructional measures

Class	Category	Description
1	Easy section	Minor modifications needed, like e.g. removing road
-		signs or arranging a parking section
	Moderate section	Modifications necessary, like e.g. removing signs,
2		fixing a traffic refuge or pedestrian path, covering
2		with steel or concrete plates and other smaller road
		constructions or modifications
	Complex section	Large modifications necessary, like e.g. removing
		crash barriers, reconstruction of roundabouts,
		establishment of turn tunnels, road enlargements,
2		turning maneuver in general, private and
Э		undeveloped properties are affected, traffic lights
		and streetlamps must be removed, considerable
		long-term construction site with a high licensing
		effort.
	Difficult section	Passage is doubtful, some additional investigations
4		are necessary (e.g. expertise, swept path analysis,
		simulations or dummy runs).

### In simulations:

- 📃 Driveable Area
- Obstacle (Not passable. Traversable if the height of the obstacle allows it)
- Tire tracks of tractor
- Tire tracks of trailer
- Area covered by vehicle combination
- Area covered by cargo



7.	7km	Map 7	Class 4
Fillings a	ind lamp p	poles etc. to be removed. Simulations needed and route needs to b	e measured to
determi	ne exact r	nodifications.	



Map 7 – Turn from 920 to 4.



Sim 1 – Turn from 920 to 4. When planning traffic controlling it needs to be considered that the blade sweep area also covers the next ramp. Extra escort cars might be needed.



8.	19km	Map 8	Class 4
Fillings a	ind lamp i	poles etc. to be removed. Simulations needed to determine exact m	nodifications



Map 8 – Turn from 4 to 4.





### 5.3 Route for main components and tower sections

https://maps.app.goo.gl/F3HwJUXxYA8t3H1p8

Port of Kemi - 920 - Peurasaarentie - Sysimönkatu - Kalkkinokantie - Ouluntie – Valtakatu - Asemakatu - Lapintie – Koivuharjunkatu - Särmääjänkatu – Lapintie – 926 – 9267 – 19575 – 19534 – 4 – Nelostie 433 (66.017186, 24.709703)



Number	Km	Coordinates N/W	Мар	Transport road	Class	Action
9.	6- 13km	65.712688, 24.605263	Map 9	City of Kemi	4	Simulations and full route survey needed to determine modifications.
10.	16km	65.787788, 24.561988	Мар 10	Turn from 926 to 926	2	Moderate section
11.	35km	65.930454 <i>,</i> 24.716583	Map 11	Turn from 926 to 9267	4	Simulations and full route survey needed to determine modifications.
12.	36km	65.933845, 24.694376	Map 12	Turn from 9267 to 19575	4	Simulations and full route survey needed to determine modifications.
13.	54km	65.810055, 24.546589	Map 13 & Sim 2	Turn from 19575 to 19534	4	Simulations and full route survey needed to determine modifications.
14.	57km	65.838818, 24.511300	Map 14	Turn from 19534 to 4	4	Simulations and full route survey needed to determine modifications.

## 5.4 Special Notes About the Route for main components and tower sections



Class	Category	Description	
1	Easy section	Minor modifications needed, like e.g. removing road	
-		signs or arranging a parking section	
	Moderate section	Modifications necessary, like e.g. removing signs,	
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### Classification of constructional measures

### In simulations:

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- Area covered by vehicle combination
- Area covered by cargo



9.

24 (33)

Class 4

6-13km Map 9

Simulations and full route survey needed to determine exact modifications. This is a complex section. Tree removal and fillings on private land. (See chapter 5.7).



Map 9 – City of Kemi.





Map 10 – Turn from 926 to 926.



11.	35km	Map 11	Class 4	
Simulations and full route survey needed to determine exact modifications. Filling needed and/or				
railing removal. Possible removal of lamp poles. According to the preliminary estimate, road 9267				
(Taivalkoskentie) will be closed from May 1 to October 15, 2024				



Map 11– Turn from 926 to 9267.



12.	36km	Map 12	Class 4
Simulations and full route survey needed to determine exact modifications. Filling needed.			
Possible work with overhead cables. Tree removal.			



Map 12 – Turn from 9267 to 19575.



13.54kmMap 13 & Sim 2Class 4Simulations and full route survey needed to determine exact modifications. Filling needed. Filling<br/>of traffic divider. Removal of lamp poles.Filling



Map 13 – Turn from 19575 to 19534.



Sim 2 – Turn from 19575 to 19534.



14.	57km	Map 14	Class 4	
Simulati	ons and fu	Ill route survey needed to determine exact modifications. F	illing of traffic divider.	
Possible work with overhead cables.				



Map 14 – Turn from 19534 to 4.





### 5.5 Suggested Handover Point

Suggested handover point is located on road 4 on point 66.017185, 24.709709. The handover point could also be before the given point or after it if there is suitable access to the site road.

At the handover point there is going to be need for fillings and tree removal both from the road area and private land.



### 5.6 Preliminary Transport Permit

Preliminary transport permit has been applied on 1.11.2023. The Preliminary transport permit (12166/2023) was accepted 13.11.2023 with conditions. The preliminary transport permit 12166/2023 is for 160t transformer transport via the same route.

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There is one bridge on the route that's the load-bearing capacity of the bridge must be reviewed according to the preliminary transport permits conditions. On the route there are also six or less bridges that need to pass under supervision. The bridge controls and other conditions will become more exact with the transport permits. Then it is possible to know what components will have the bridge control and which are those supervised bridges.

The preliminary transport permit was applied with the estimated dimensions and weight of the 160t transformer. It is the limiting component on the route in another project so it can be estimated that the route is suitable also for 80t transformer transport as well as the turbine component transport. More exact conditions regarding the 80t transformer and the turbine components transport will become clear after the transport permits.

NOTE! The preliminary transport permit for the route has been applied for a much heavier transformer. Therefore, there might be less conditions for 80t transformer transport. The conditions regarding 80t transformer and the turbine component transports will become clear after transport permits.



### 5.7 Other Notes

The transport route runs across the city of Kemi. Although the suggested route is a special transport route there might be modifications needed. City of Kemi is heavily investing its road infrastructure thus there is and there has been lot of road work going on lately and at the moment. Therefore, it's to be expected that the route and it's needed modifications might change over a period. Vuorsola Oy is having conversations with the Port of Kemi about the access from the Port through the city and if there are some plans to change that soon.

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It is expected that due to the route going through city of Kemi, the transport permit could have condition related to the times of the transports. It's most likely that transport will have to take place at night.

The route is simulated for the transformer transports to see that the route is suitable for the transports with modifications. Vuorsola Oy suggest that new simulations are made with the full route survey and exact dimensions for the turbine components when those are confirmed.

The suitability of the route for transport depends on whether the transport permit is granted. Because the preliminary transport permit was applied with the estimated dimensions of the 160t transformer any possible transport conditions for the blades, or the main components and tower sections will become clear after the transport permit has been granted.

For the turbine component transport the limiting factor with a view to a transport permit is total weight. Transport equipment and combinations needs to be calculated and optimized correctly under some requirements to ensure that the transport permit is granted.

Even though almost all the special notes about the route are marked with class 4 (as red) the passage is not doubtful. It just means that the more exact simulations and a full route survey is needed to determine possible modifications and to confirm that the route is suitable for the transports. For example, the amount of overhead cable work will be confirmed when the turbine components dimensions are confirmed, and the route is measured.

The route is quite tight for V172 size blades and other turbine components so when planning to increase the size of the components (for example blade length increase to 100m), the route must be further explored with route survey and simulations. If the diameter of 100m blade



NOTE! The Taivalkoski dam bridge will undergo renovations during the summer of 2024. According to the preliminary estimate, road 9267 (Taivalkoskentie) will be closed from May 1 to October 15, 2024.

The suitability of the route for transports depends on:

-Review of the bridge bearing capacity concludes that the bearing capacity of the bridge is suitable for the transport -Transport permit is granted

## 6 CONCLUSIONS

The transport route is suitable for transport with some modifications. A full route survey including more exact simulations is needed to determine necessary modifications. Modifications might include fillings, removal of lamp poles, traffic signs and trees, and other needed modifications. Cost estimate for these road modifications can be estimated after a full route survey and final simulations.

The suitability of the route for transport depends on whether the transport permit is granted. In the preliminary transport permit Technical Director Mika Grönvall from city of Kemi states that the route is a special transport route, and it can be used for that purpose.

NOTE! The Taivalkoski dam bridge will undergo renovations during the summer of 2024. According to the preliminary estimate, road 9267 (Taivalkoskentie) will be closed from May 1 to October 15, 2024.

### 6.1 Next steps

-Bridge bearing capacity (sillan laskentaehto) must be considered before applying for the transport permit

- -Full route survey for transformer/turbine transports.
- -Cost estimate for road modifications.
- -Permitting road modifications.
- -Transport permit for each component.

-Project execution.