Regione Liguria	Comune Cairo Montenotte	Comune Savona	Provincia Savona
REGIONE LIGURIA			PAR PARIBVS

PARCO EOLICO DI SAVONA - LOC. PIANDELMELO (9 MW)

Report di viabilità

Rel. 16

Progetto definitivo

Rev. 00 - Novembre 2023

IL PROGETTISTA

ING. SAMUELE VIARA
Via Damilano, 24
12049 - TRINITA' (CN)

ORDINE DEGLI INGEGNERI DELLA PROVINCIA DI CUNEO
A1949 Dott. Ing. Samuele Viara

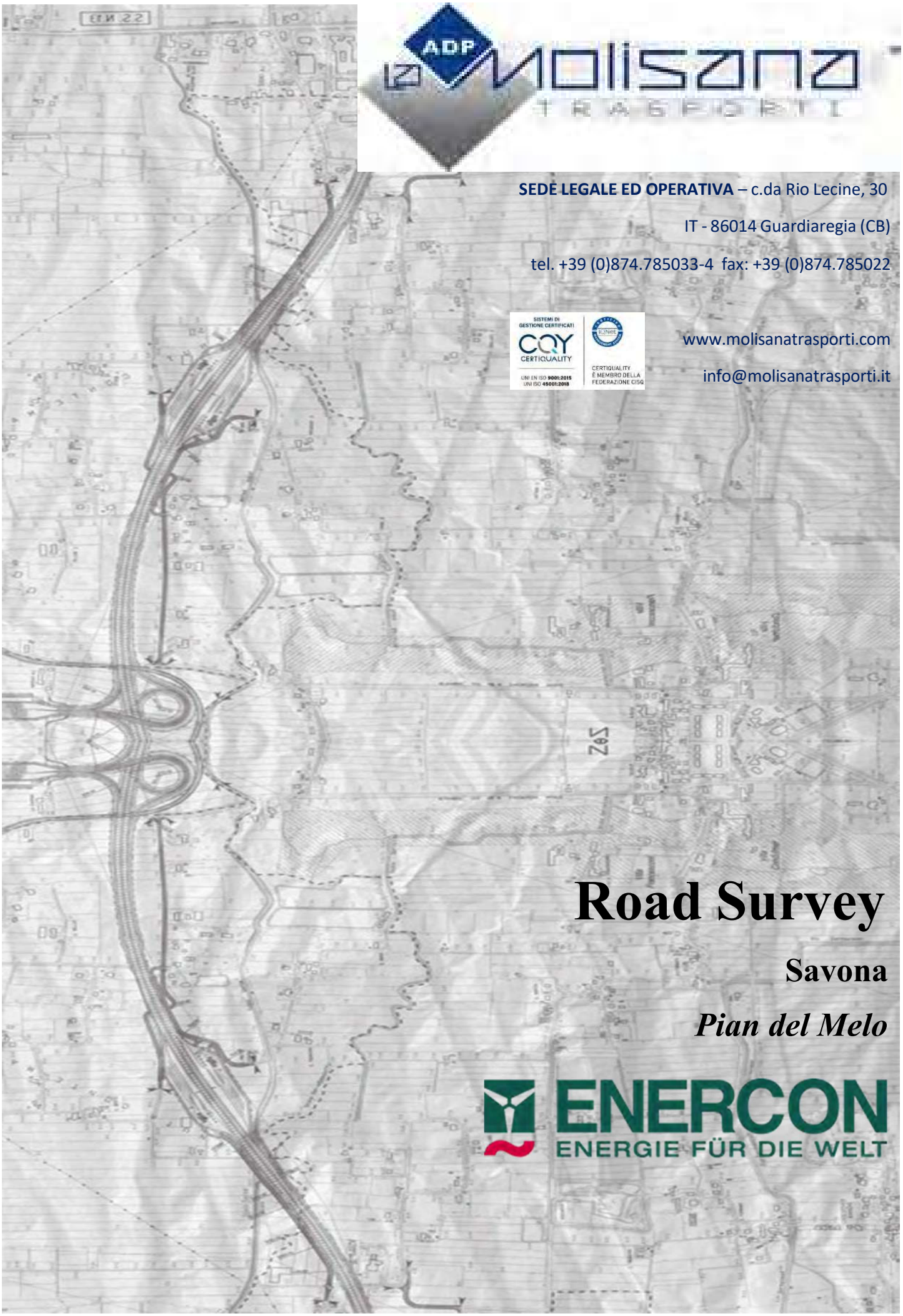
Bissi Marco
05.12.2023
11:11:16
GMT+00:00

Firmato digitalmente da
samuele viara
O = Ordine degli Ingegneri della Provincia di Cuneo
C = IT

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Con Unico Socio

Società soggetta all'attività di direzione e coordinamento di Bissi Holding S.p.A.



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Road Survey

Savona

Pian del Melo

ENERCON

ENERGIE FÜR DIE WELT

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1. Project description

Project	W- Savona Pian del Melo
State	Italy
Location	I-17100 Savona
Scope	Transport and Logistics
Transport	Wind Turbine Components
Place of Loading	Savona Harbor
WEC Type	ENERCON E138 E1 on 111m steel tower

2. Preamble

The project of this transport feasibility draft is the establishment of a wind power plant in the territory of Savona.
The road survey was conducted 04^{h} of November 2021 in order to verify the transport possibilities of ENERCON E138 turbine types, on 111m tower.

Important note: for the 111m HST tower, sections n.1, n.2 and transition steel/MST section n.3 highlighted in yellow on the following packing list, are not considered feasible for transportation from Savona port.
It is for that reason highly recommended to favor a different tower configuration, possibly taking into account any tubular sections having a diameter greater than 3,70m should not exceed 21,00m in length.

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3. Packing list

ENERCON
ENERGY FOR THE WORLD

ENERCON GmbH
Dreekamp 5
D-26605 Aurich

Project:

24/11/2021 **1 E-138 E3 EP3 WEC**

Emden-

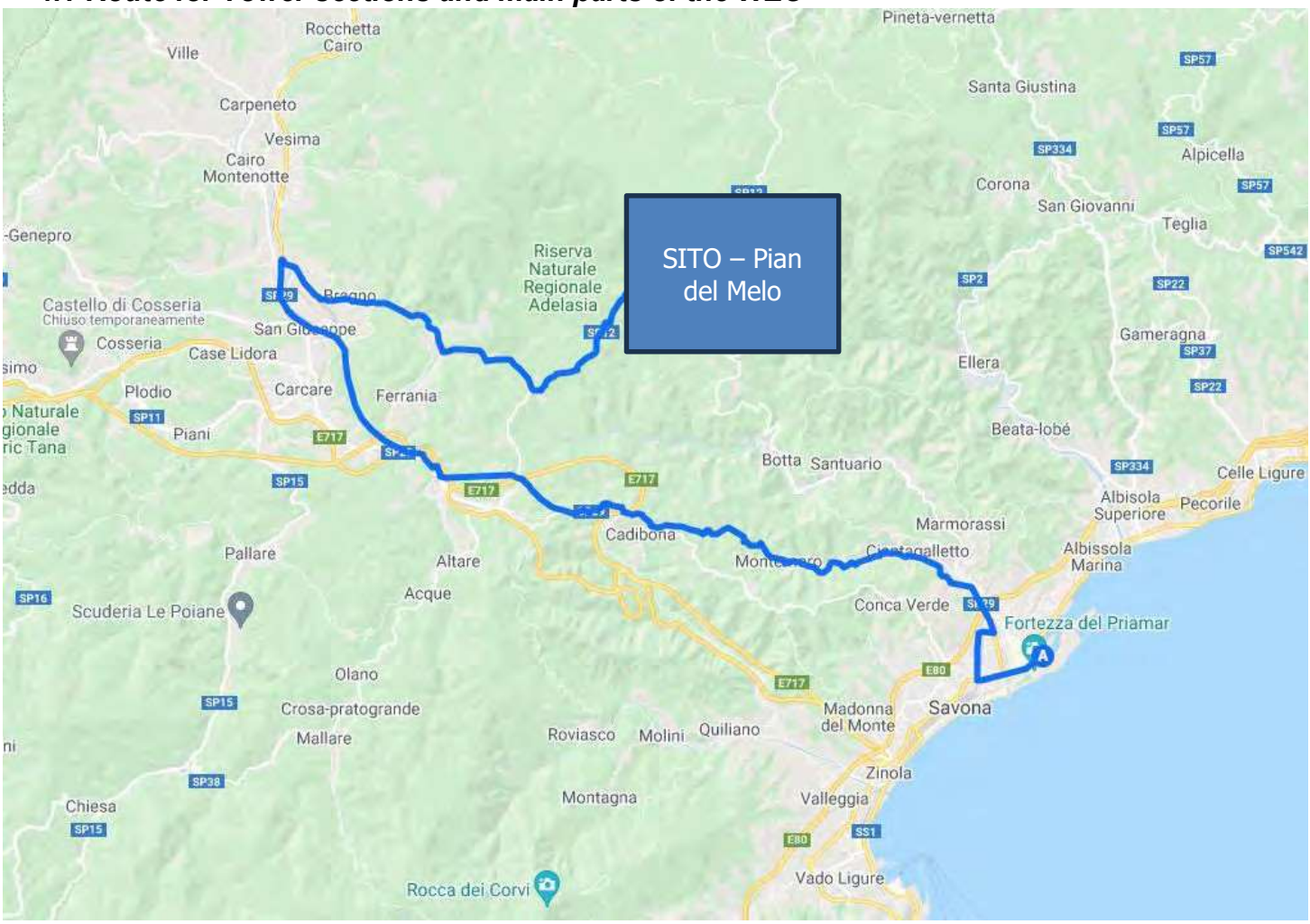
no official measurements - ESTIMATED PACKING - FINAL PACKING LIST TO FOLLOW!

Pos.	Quantity	Description	Stackable	Deck option	Truck info per WEC	Max. length m	Max. width m	Max. height m	Single gross weight
		CONVERTER							
1	1	E-Nacelle	no	no		14,00	4,99	3,40	80,00
2	1	20' s.o. Box assembly material - may contain dangerous goods -	yes	yes		6,10	2,44	2,60	6,00
3	1	Hub on steel support	no	no		3,82	4,25	3,89	40,00
4	1	Generator - rotor central part on steel support incl. bearing unit	no	no		9,23	4,91	2,93	44,50
5	2	Generator - rotor side part on steel support	no	no	1 platform truck, side parts nested	8,01	2,32	1,65	9,50
6	1	Generator - stator half 12 o'clock on steel support	no	no		8,85	4,86	3,24	38,00
7	1	Generator - stator half 6 o'clock on steel support	no	no		8,85	4,47	3,24	38,00
8	3	E-138 **E2/E3** RB with flange frame and tip-support Frame position on A) 0m and B) app. 55,45m Standard 0°-Orientation	yes, 3-high	yes	Trailer Setup	68,62	3,92	3,35	23,70
9	3 b	E-138 **E2/E3** RB with flange frame and tip-support Frame position on A) 0m and B) app. 55,45m Alternative 18°-Orientation f. Shipping	yes, 3-high	yes	Trailer Setup	68,62	3,59	3,69	23,70
10	3 c	E-138 **E2/E3** RB with flange frame and tip-support Frame position on A) 0m and B) app. 55,45m Dolly Configuration	no	Road only	Dolly Setup	67,87	3,94	3,40	25,39
11	1	20' s.o. Box or FR, Grid Connection Material	yes	yes		6,10	2,44	2,60	8,50
12	1	20' s.o. Box, Tower Cable	yes	yes		6,10	2,44	2,60	8,50
13	1	20' s.o. FR, External Staircase for Steel Towers (ST), max. 2 PSP/FR (seatransport only)	yes	yes		6,10	2,44	2,60	10,00
		TOWER							
1	1	Tower Base Control Unit (TBCU)							
2	1	20' s.o. FR E-Module EP3-EM-05 assembly container	yes	yes		6,10	2,44	2,60	10,00
3	1	20' s.o. FR heat exchange unit; 2 PSP / FR	yes	yes		6,10	2,44	2,60	10,00
4	1	external staircase on 20' s.o. FR, max. 2 PSP/FR (seatransport only)	yes	yes		6,10	2,44	2,60	4,50
5	1	steel tower section 1 (net-length in m 28,50 flange 4,05 / 4,28) unpacked on saddles	no	yes	Adapter for clamp trailer required	28,64	4,28	4,43	54,36
6	1	steel tower section 2 (net-length in m 28,50 flange 4,28 / 4,30) unpacked on saddles	no	yes		28,64	4,30	4,45	66,57
7	1	**TRANSITION** Steel/MST tower section 3 (net-length in m 24,10flange 4,30 / 4,27) unpacked on saddles	no	yes	vessel bridge or **HAWART** Adapter required	24,24	4,30	4,45	79,26
8	2	Delivery Unit MST Section 4 Tower Shells 40' s.o. FR	yes	yes		12,19			25,00
9	2	Delivery Unit MST Section 5 Tower Shells 40' s.o. FR	yes	yes		12,19			30,00
10	1	DU-HRC1-1 Tower Bolts 20' s.o. Box	yes	yes		6,10	2,44	2,60	20,00
11	1	DU-CP Tower Coupling Plates 20' s.o. Box	yes	yes		6,10	2,44	2,60	20,00
12	1	DU-INT1-7 Tower Internals 40' s.o. Box	yes	yes		12,19	2,44	2,60	20,00
13	1	Foundation basket incl. load ring, 40' s.o. box Predelivery six weeeks before	yes	yes		12,19	2,44	2,60	20,00

4. External transport route

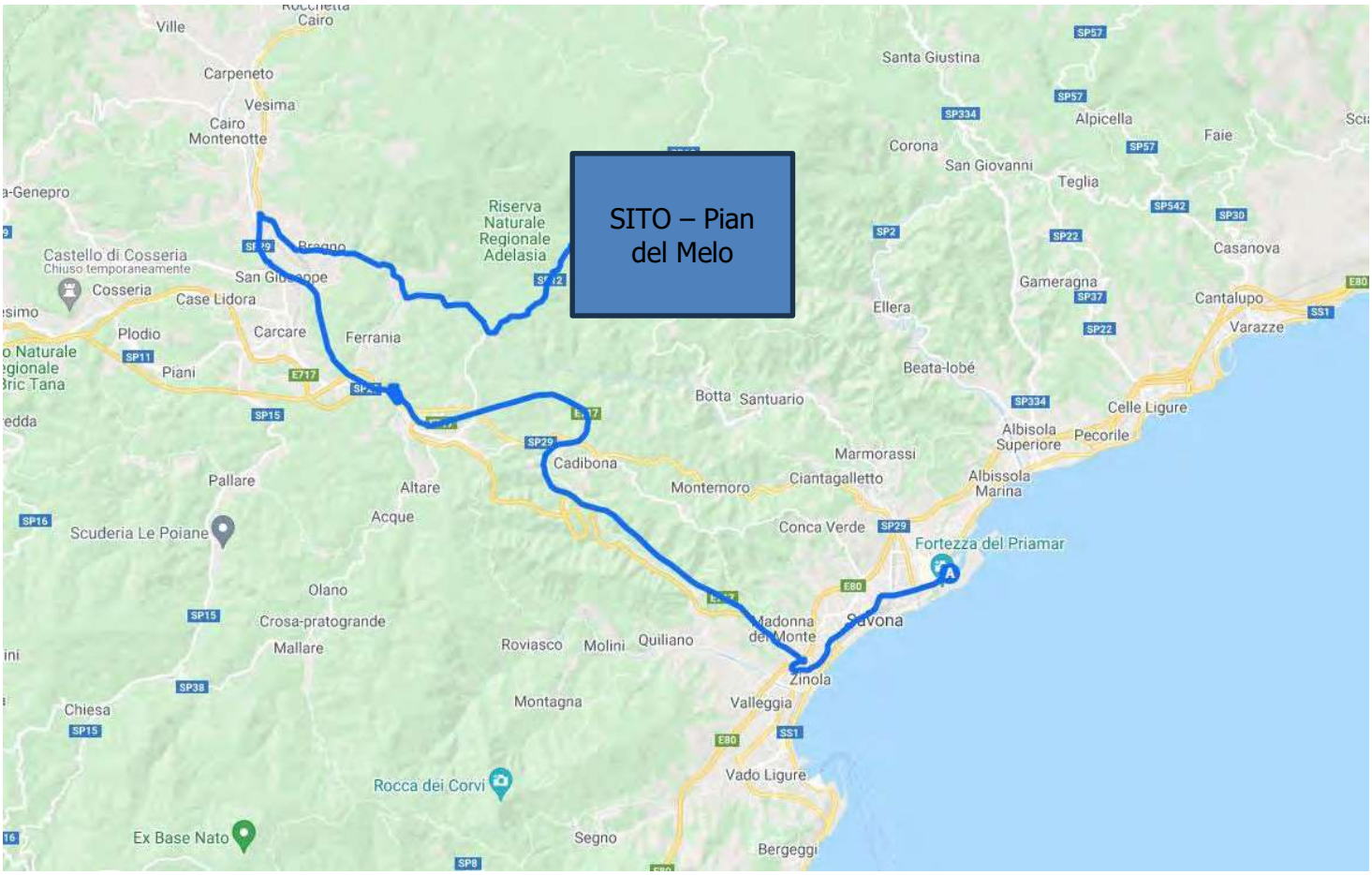
Loading all components at Savona Port is, to date, the only achievable option for the transports to the project location. However, due to many restrictions currently in force and affecting the transports, the vehicles are bound to follow separate routes according to the conveyed loads.

4.1 Route for Tower sections and main parts of the WEC



Savona Port ► SS.1 ► Via vittime di Brescia ► Via Risorgimento ► Via baracca ► SP.29 ► SP.36 ► SP.12 ►Via Chiaravalle►Site access.

4.2 Route for blades



Savona Port ► SS.1 ► C.so Svizzera ► A6 Motorway access ►
► *Vernazza autogru* depot ► A6 Motorway from *Savona* to *Altare* exit ►
► SP.29 ► SP.36 ► SP.12 ►Via Chiaravalle►Site access.

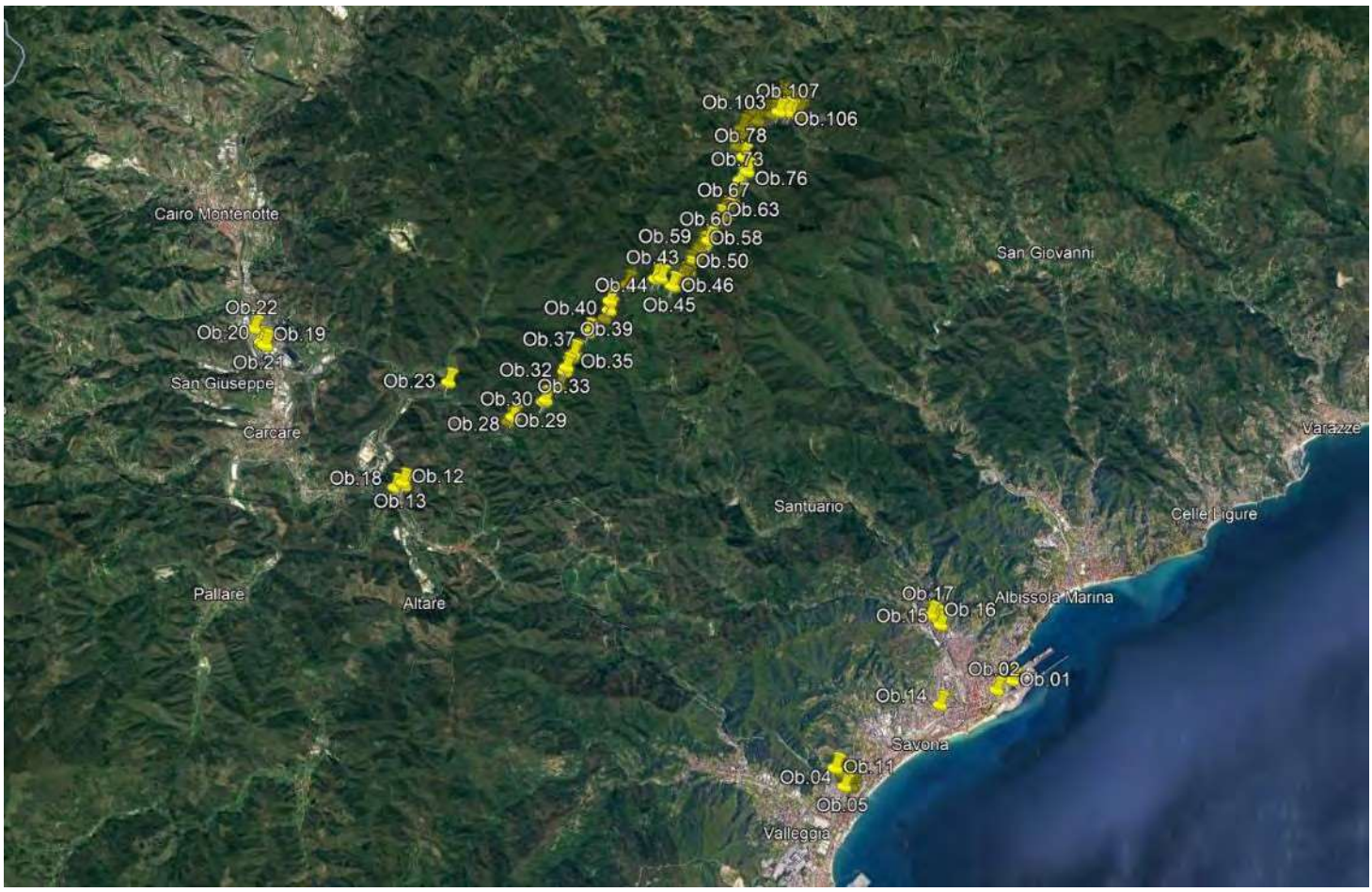
NOTE: Due to weight restrictions in force on the A6, the feasibility for the transports on the section between Savona and Altare is at all times subject to the approval by the motorway authority.

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5. Observations map and required road adjustments



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Observation 01
GPS Coord. 44°18'27.71"N 8°29'19.38"E

Savona harbor exit gate for all loads.
The blades will be mounted at the harbor directly onto the blade lifter and will navigate the entire route in such configuration.

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Observation 02

GPS Coord. 44°18'21.00"N 8°29'04.08"E

This roundabout is to navigate against the traffic flow

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Observation 03

GPS Coord. 44°17'13.05"N 8°26'40.87"E

BLADES

From C.so Svizzera, the blade lifter will take the exit towards the A6 Motorway entrance.

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Observation 04

GPS Coord. 44°17'13.25"N 8°26'33.83"E

BLADES

Just before the motorway tollgates, the blade lifter will start a reverse maneuver, against the traffic flow, towards *Vernazza Autogru* depot.

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Observation 05

GPS Coord. 44°17'13.22"N 8°26'34.34"E

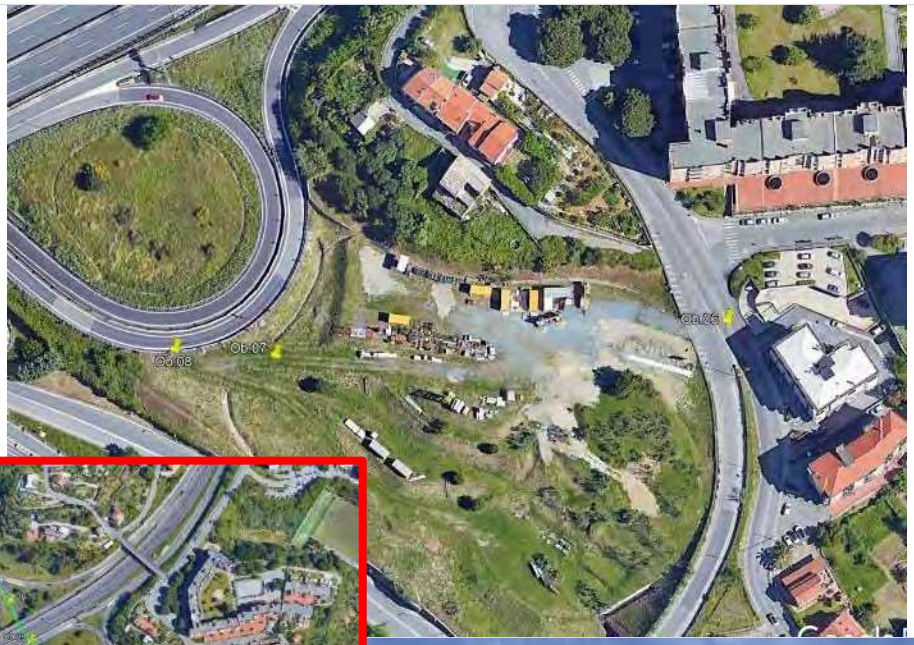
BLADES

Reverse maneuver against the traffic flow, towards *Vernazza Autogru* depot.

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Observation 06

GPS Coord. 44°17'19.49"N 8°26'44.10"E

BLADES

Proceeding in reverse, the blade lifter will enter the Vernazza Autogru depot.

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Observation 07
GPS Coord. 44°17'18.85"N 8°26'38.12"E

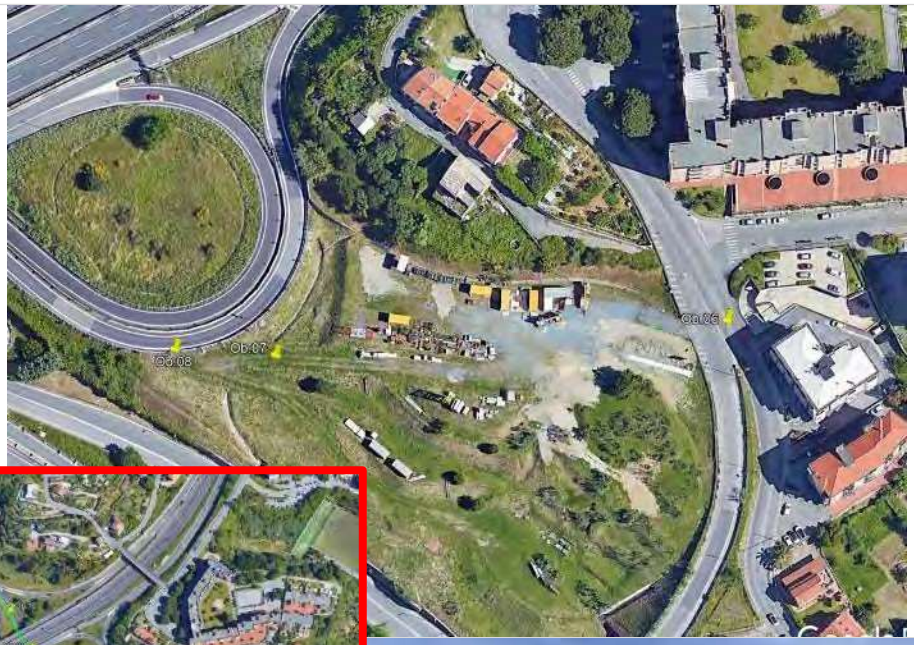
BLADES

Directly from the *Vernazza Autogru* depot, a special opening needs to be required, removing the highlighted guard-rail section, for entering onto the A6 motorway.

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Observation 08

GPS Coord. 44°17'18.84"N 8°26'36.74"E

BLADES

The highlighted guard-rail section needs to be removed
Entrance on A6 motorway and proceeding against traffic towards the exchange point at Ob.11

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Observation 09

GPS Coord. 44°17'20.43"N 8°26'33.09"E

BLADES

On the A6 motorway, proceeding against traffic towards the exchange point at Ob.11

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Observation 10

GPS Coord. 44°17'22.25"N 8°26'31.87"E

BLADES

On the A6 motorway, proceeding against traffic towards the exchange point at Ob.11

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Observation 11

GPS Coord. 44°17'25.60"N 8°26'24.47"E

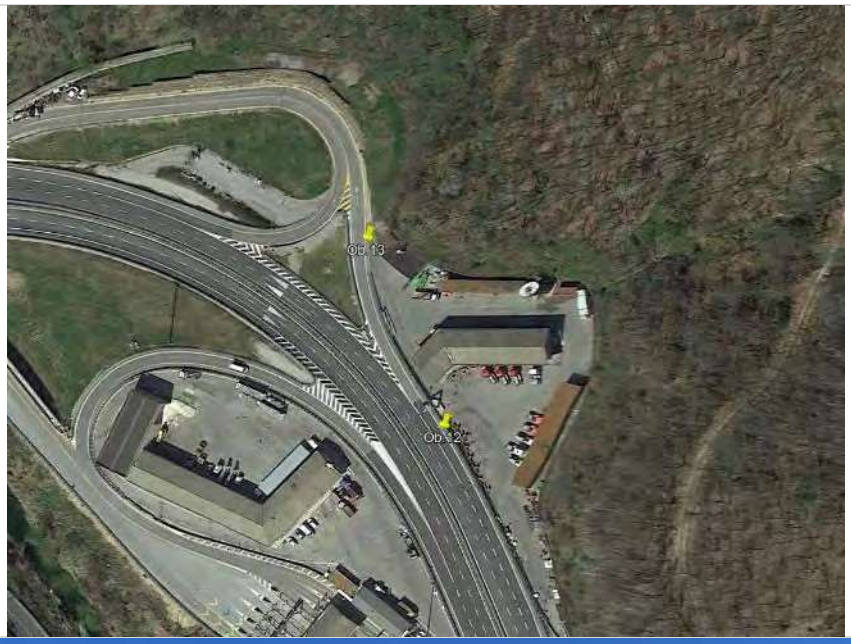
BLADES

Exchange point where the transports will re-engage the carriageway in the right direction. Necessary to open the gate at the centre of the traffic divider

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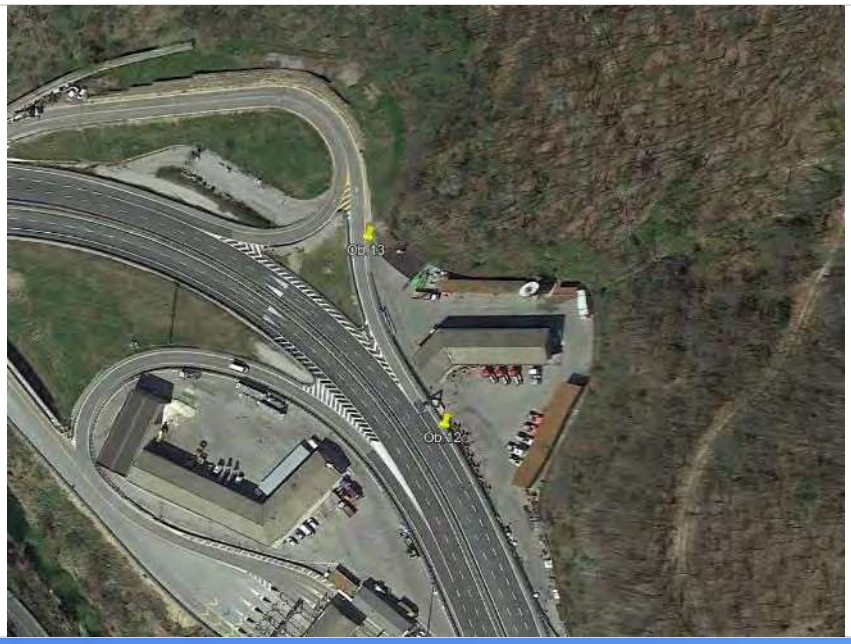


Observation 12
GPS Coord. 44°20'45.15"N 8°19'24.61"E
BLADES Exit at Altare

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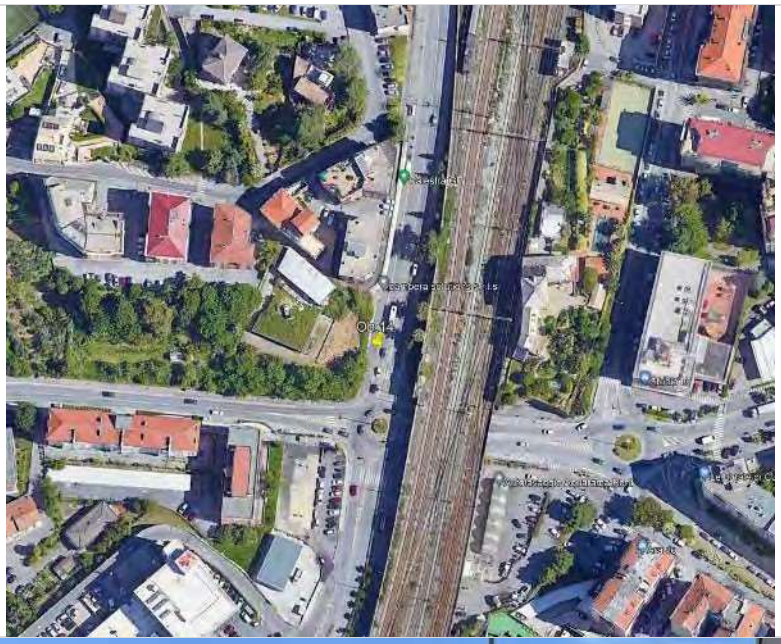


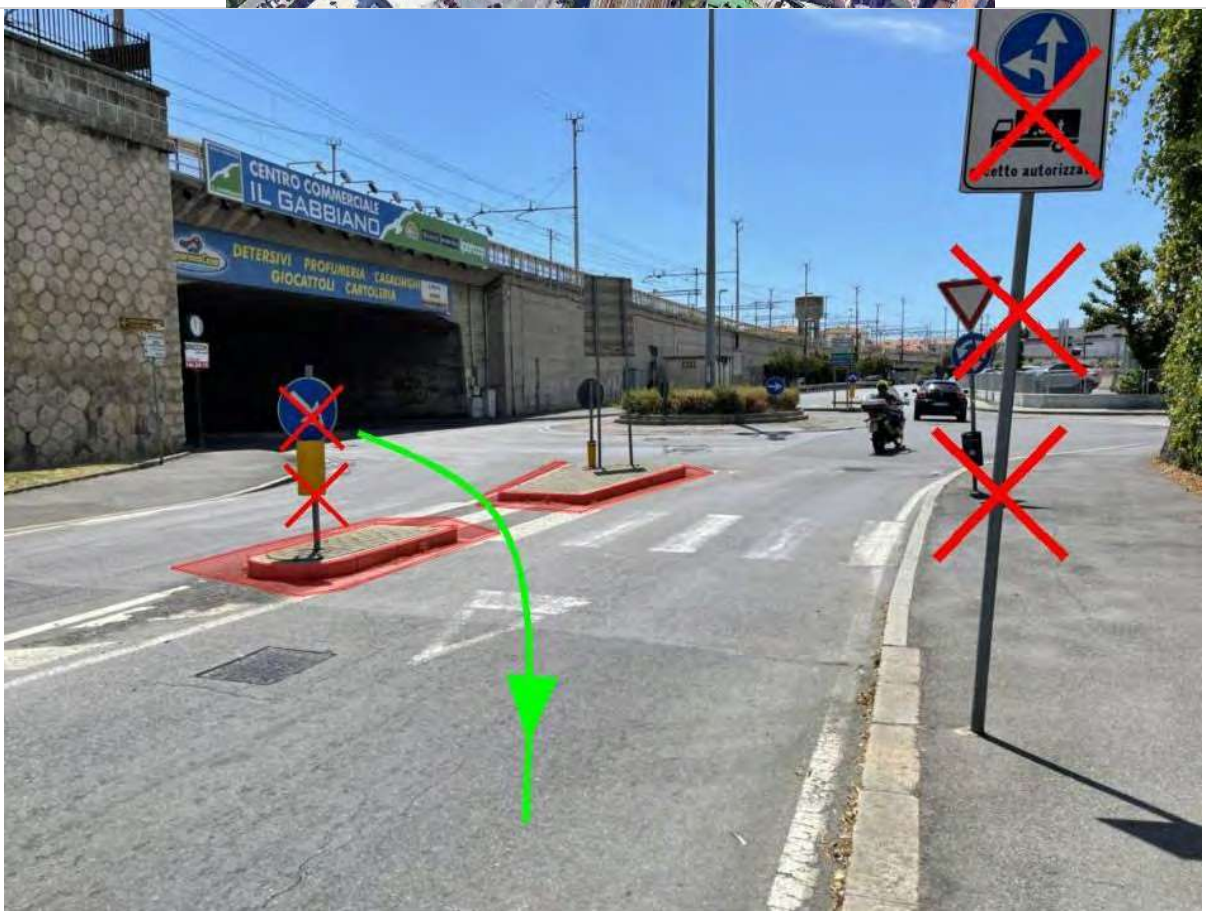
Observation 13
GPS Coord. 44°20'47.46"N 8°19'23.30"E
BLADES Proceeding towards Altare tollgate

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Observation 14

GPS Coord. 44°18'10.63"N 8°28'08.16"E

TOWER SECTIONS AND MAIN WEC PARTS
Remove the highlighted road signs and flatten the 2 traffic islands

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Observation 15
GPS Coord. 44°19'06.95"N 8°28'08.66"E

TOWER SECTIONS AND MAIN WEC PARTS
Remove the highlighted road signs

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Observation 16

GPS Coord. 44°19'11.31"N 8°28'05.03"E

TOWER SECTIONS AND MAIN WEC PARTS
Remove the highlighted road signs

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Observation 17
GPS Coord. 44°19'14.39"N 8°27'58.75"E

TOWER SECTIONS AND MAIN WEC PARTS
Remove the highlighted road signs

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Observation 18

GPS Coord. 44°20'43.87"N 8°19'15.60"E

From this point onwards, all following observations apply to all transports, being the final and common part of their individual routes

Cut around 5m on the side of the roundabout

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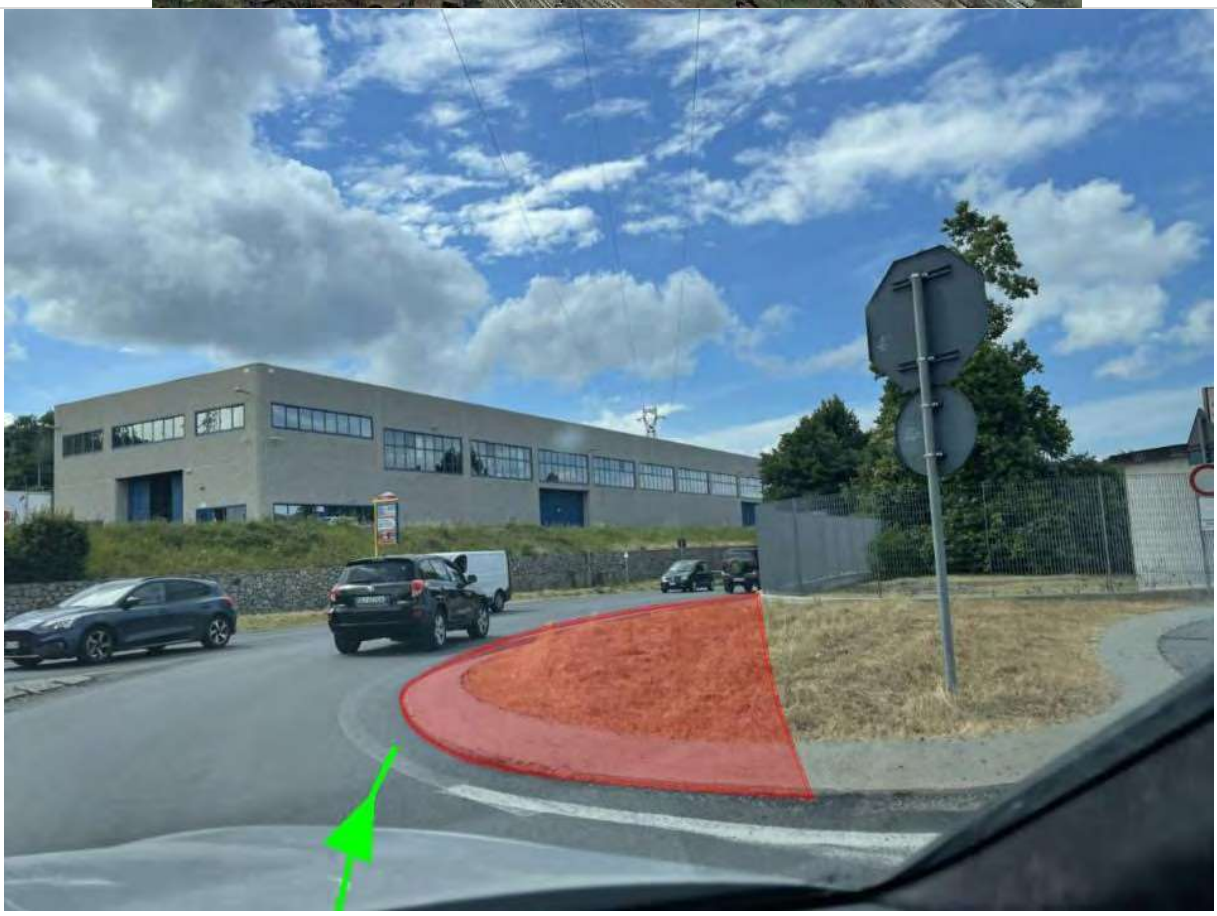
Observation 19
GPS Coord. 44°22'22.01"N 8°17'08.31"E
Proceeding against the traffic flow, it is necessary to create a feasible path, allowing to navigate the roundabout through its centre

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Observation 20
GPS Coord. 44°22'23.37"N 8°17'05.71"E
Flatten the highlighted area on the right, making it serviceable for the transports.

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Observation 21
GPS Coord. 44°22'24.04"N 8°17'04.41"E

Flatten the highlighted area on the left, making it serviceable for the transports
View from the front side in the following observation.

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Observation 22
GPS Coord. 44°22'34.48"N 08°16'57.23"E
Create a suitable transshipment area for tower sections.

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Observation 23
GPS Coord. 44°21'57.11"N 08°20'07.43"E
Widen on the right side

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Observation 24

GPS Coord. 44°21'29.44"N 08°21'06.51"E

Cut the vegetation on the right as shown
Widen on the left side

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Observation 25
GPS Coord. 44°21'29.70"N 08°21'08.85"E
Cut the vegetation as shown

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Observation 26

GPS Coord. 44°21'29.70"N 08°21'08.85"E

Cut the vegetation as shown and widen on the right

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Observation 27
GPS Coord. 44°21'29.74"N 08°21'08.88"E
Cut the vegetation as shown

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Observation 28
GPS Coord. 44°21'32.87"N 08°21'10.74"E
Cut the vegetation as shown

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Observation 29
GPS Coord. 44°21'43.35"N 08°41'40.76"E
Cut the vegetation as shown

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Observation 30
GPS Coord. 44°21'44.42"N 08°21'43.19"E
Cut the vegetation as shown

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Observation 31
GPS Coord. 44°21'53.39"N 08°21'56.35"E
Cut the vegetation as shown

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Observation 32
GPS Coord. 44°22'04.25"N 08°22'02.32"E
Cut the vegetation as shown

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Observation 33
GPS Coord. 44°22'07.00"N 08°22'03.84"E
Cut the vegetation as shown

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Observation 34
GPS Coord. 44°22'13.33"N 08°22'09.16"E
Cut the vegetation as shown

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Observation 35
GPS Coord. 44°22'15.98"N 08°22'10.39"E
Cut the vegetation as shown

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Observation 36
GPS Coord. 44°22'16.77"N 08°22'13.38"E
Cut the vegetation as shown

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Observation 37
GPS Coord. 44°22'31.14"N 08°22'24.96"E
Cut the vegetation as shown

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Observation 38
GPS Coord. 44°22'40.63"N 08°22'40.90"E
Cut the vegetation on both sides as shown

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Observation 39
GPS Coord. 44°22'46.29"N 08°22'45.39"E
Cut the vegetation as shown

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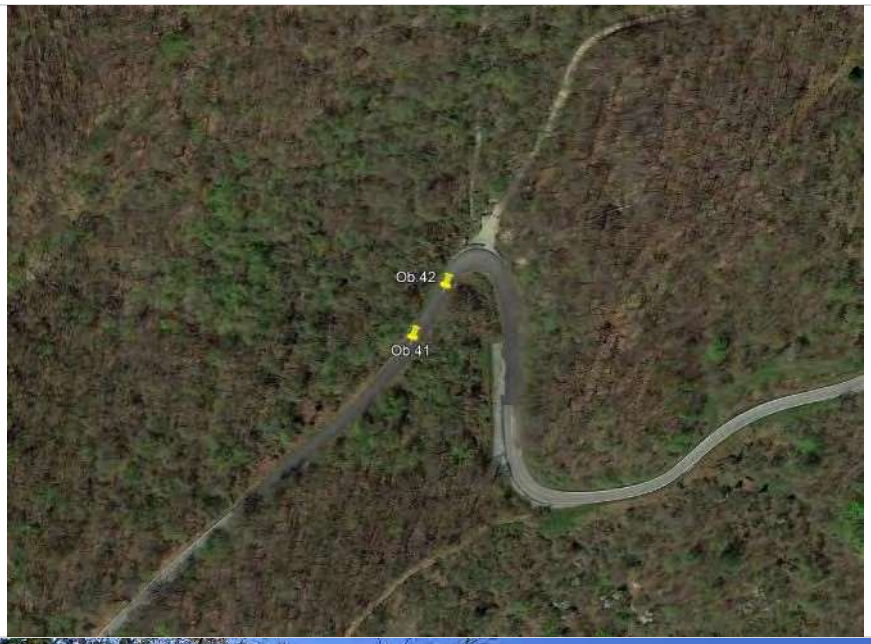


Observation 40
GPS Coord. 44°22'52.62"N 08°22'46.11"E
Cut the vegetation as shown

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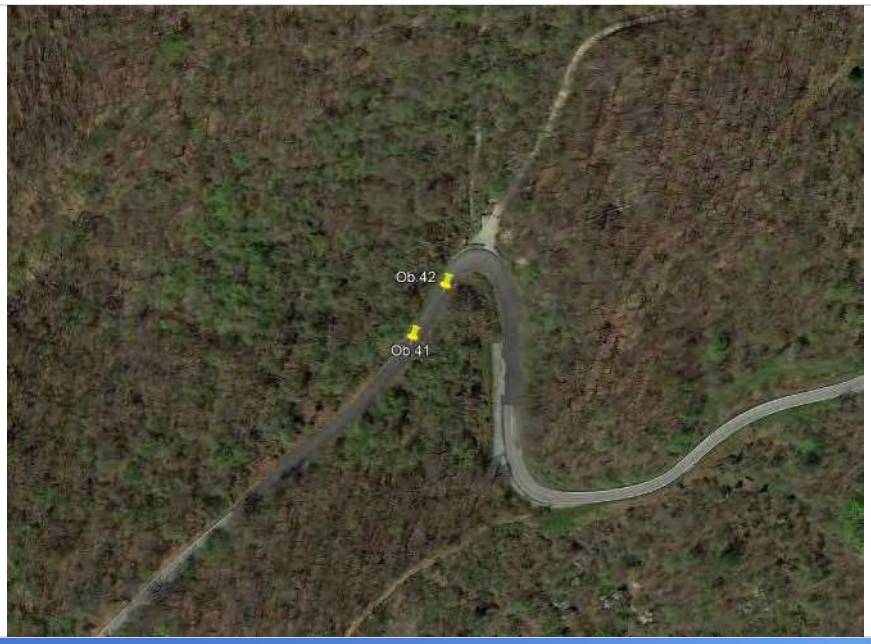


Observation 41
GPS Coord. 44°23'02.97"N 08°23'02.64"E
Cut the vegetation as shown

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Observation 42
GPS Coord. 44°23'03.81"N 08°23'03.40"E
Widen around 6mt on the whole internal side of the curve

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6. Conclusions

The present assessment is carried out to ascertain the feasibility of transporting ENERCON E138 turbine components, based on the circumstances to date (November 2021) on the inspected roads;

IMPORTANT NOTE: tower sections n.1, n.2 and transition steel/MST section n.3 in the provided packing list of the turbine parts are not feasible for transportation on the only accessible route to site from Savona port.
It is for that reason highly recommended to favor a different tower configuration, possibly taking into account any tubular sections having a diameter greater than 3,70m should not exceed 21,00m in length.

This document is complementary to ENERCON's transport guidelines and, in case of any controversy; ENERCON's specifications shall always prevail;

If required, the observations and comments stated herein will be furnished with a topographic study provided by the wind farm owner, proving the entire route is ensured for every load and in accordance to ENERCON's transport specifications;

This road survey report has been elaborated foreseeing transports from Savona harbor to the site only and does not cover conveyances in other directions. Should any different condition arise, a timely route study is indispensable before making plans for components being transferred elsewhere;

The road modifications, probable studies on weight capacity bearings, provisional safety signage and subsequent refurbishing demanded by the road authorities - i.e. road furniture replacement, backfilling, safety barrier installation etc., do not fall into the responsibility of the haulage company and are not considered in this study;

The transport route is to be ensured with at least 6m clearance, free from every obstacle on either side of the road. All roads must be levelled, compacted and cleared from all branches jutting out into the carriageway or from any interfering overhead cable that could inhibit the actions of the blade lifter, especially along the curves;

Obtaining transport permits will be at all times subject to the restrictions in force when placing applications for the effective transports.

Considering the road arrangements beyond the access points are ensured as per Enercon's transportation specs, the observations listed in this report allow a practicability for the transports until the site access roads shown in observation n.83.

Throughout the entire transportation period, all roads are to maintain free and practicable, safeguarding every feature mentioned in the transport specifications provided by Enercon;

In case of transport overhangs flying over private properties, the wind farm owner will make all necessary negotiations also with those landowners.

In order to make certain the delivery of all components on all installation pads, a test run should be scheduled prior to the effective transportation commencement.