Engineering & Construction

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AZIENDA CON SISTEMA GESTIONE
UNI EN ISO 9001:2015
UNI EN ISO14001:2015
OHSAS 18001:2007

GRE CODE
GRE.EEC.R.25.IT.W.15001.00.116.00

PAGE
1 di/of 77

TITLE*:** **Road Survey** ***AVAILABLE LANGUAGE: **ITA**

ROAD SURVEY

CANDELA

BISCOTTI
GIANLUCA
BIAGIO
21.12
.2020
15:50:18
UTC

File: GRE.EEC.R.25.IT.W.15001.00.116.00 Road Survey.docx

REV.	DATE	DESCRIPTION	PREPARED	VERIFIED	APPROVED
00	18/12/2020	*Emissione*	BFP Papapicco	BFP Miglionico	BFP Biscotti

PROJECT / PLANT	GRE CODE																		
	GROUP	FUNCION	TYPE	ISSUER		COUNTRY		TEC	PLANT					SYSTEM		PROGRESSIVE			REVISION
	GRE	EEC	R	2	5	I	T	W	1	5	0	0	1	0	0	1	1	6	0	0

CLASSIFICATION	UTILIZATION SCOPE	*Basic Design, Detailed Design, Issue for Construction, etc.*

INDICE

1. PREMESSA

Il presente documento si basa sullo studio di road survey redatto da ENEL GREEN POWER ITALIA s.r.l. che se ne assume ogni responsabilità circa i contenuti, per cui la società BFP s.r.l. declina ogni responsabilità circa i contenuti dello studio che rappresenta lo stato iniziale di sviluppo progettuale.

La proposta progettuale è finalizzata alla realizzazione di un impianto eolico per la produzione di energia elettrica da fonte rinnovabile eolica, costituito da n. 8 aerogeneratori, ciascuno di potenza nominale pari a 6,0 MW per una potenza complessiva di 48,00 MW, da realizzarsi nella Provincia di Foggia, nel territorio comunale di Candela, in cui ricadono gli aerogeneratori e parte dell'elettrodotto esterno, mentre nel territorio comunale di Ascoli Satriano ricade la restante parte dell'elettrodotto esterno e le opere di connessione alla RTN.

Figura 1 - **Inquadramento geografico**

Per quanto concerne lo studio della viabilità per il trasporto dei componenti degli aereogeneratori si fa riferimento alle relazioni ad opera della Savino Del Bene S.p.A. e della Tuvia Italia S.p.a. di seguito riportate.

A completamento del presente documento, si faccia riferimento agli elaborati grafici di dettaglio GRE.EEC.D.26.IT.W.15001.00.118.0A - GRE.EEC.D.26.IT.W.15001.00.117.0A che riportano rispettivamente su ortofoto e su Carta Tecnica Regionale l'analisi svolta.

SAVINO DEL BENE®
Global Logistics and Forwarding Company

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Savino Del Bene S.p.A.

TFS2-Harbour Suitability

Client : ENEL

INTRODUCTION

This report provides the Barletta, Molfetta and Manfredonia preliminary harbours suitability for abnormal transports of wind elements.

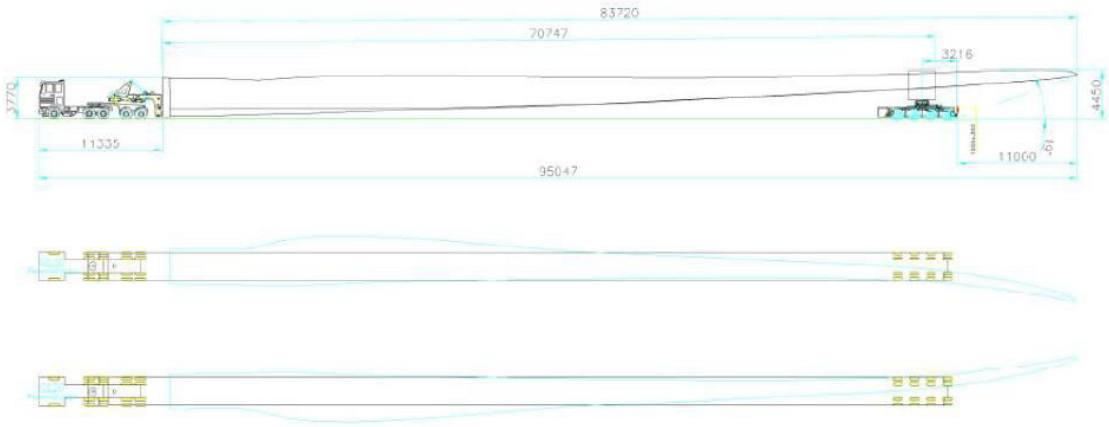
Preliminary information provided by this document is based on dimensions and weight stated by Client as per table underneath.

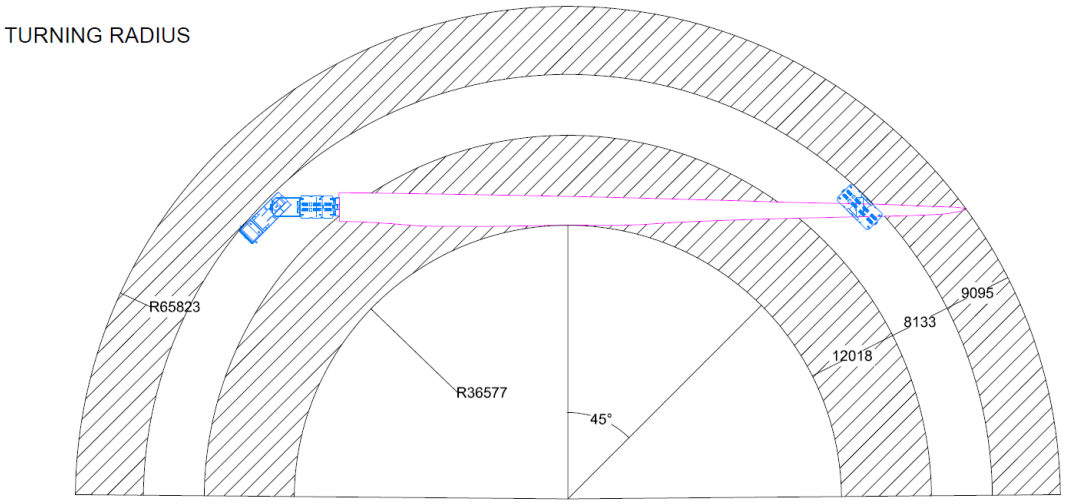
Denomination	Length [mm]	Width [mm]	Height [mm]	Unit Weight [Kg]
Section 1	13.540	4.700	4.700	84.941
Section 2	18.190	4.670	4.670	85.087
Section 3	23.740	4.400	4.400	84.979
Section 4	27.000	4.430	4.430	74.187
Section 5	29.945	3.560	3.560	65.517
Nacelle	14.614	4.720	3.405	98.000
Drive Train	6.680	3.200	2.300	76.300
Rotor Hub	4.636	4.184	4.005	54.900
Blade	83.720	4.657	4.321	24.600
Transformer	NA	NA	NA	17700
Generator	NA	NA	NA	16500

Considering the size and weight of the items to be transported, SDB has identified as suitable ports:

- Manfredonia Port: Blades
- Barletta Port : Towers-Nacelles-Drive Train-Hub

Here below is reported the technical transport drawing of the blade which is considered a “critical convoy”.





As already mentioned before, Manfredonia port is the only port which could be chosen to discharge this item, because it has the spaces, the cranes and the viability more suitable for blade transport.

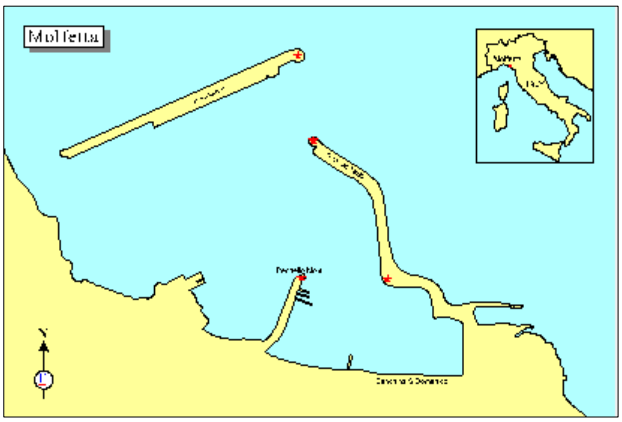
LOCATIONS OF WORK

MOLFETTA PORT, ITALY

World Port Number :	PO1927	**UN LOCODE :**	ITMOL

PORT DESCRIPTION

Location: Molfetta is located on the E coast of Italy, 12nm N of Bari.



General overview: The port is completely artificial and is bounded by a breakwater and 2 quays, Molo Foraneo facing NW and Molo Pennello facing N. The breakwater shelters the port from N'ly and NW'ly winds. The port has one quay for bulk and dry cargoes. Principal imports include coal, petroleum products, timber and general cargo. Exports include edible oils, wine, bricks and sulphate of carbon.

Traffic figures: Approx 130,000t of cargo handled annually.

Load line zone: Summer.

Max size: LOA 160m, beam 15m, draught 6.0m, 10,500GT

BERTHS AND CARGO

Names/nos: The harbour has 2 moles with quays on the inner side of both moles. The outer section of E mole, Molo Forane, length 190m has a depth alongside of 7.0m.

Cranes: max crane capacity at the berth and at the storage area 2x 20 ton.

Storage area: 1000sqm

Ballast/slop reception: Slop reception can be provided by a private firm using road tankers.
Facilities available for normal quantities of dirty ballast water and oily tank washings.

Access gate: standard trailer only.

Access in port: Molfetta port access is only possible by asking the Molfetta port Authority permission. The validity of the document is 5 years.

Security: The port is International Ship and Port Facility Security (ISPS) compliant.
The International Ship and Port Facility Security (ISPS) Code is an amendment to the Safety of Life at Sea (SOLAS) Convention (1974/1988) on Maritime security including minimum security arrangements for ships, ports and government agencies. Having come into force in 2004, it prescribes responsibilities to governments, shipping companies, shipboard personnel, and port/facility personnel to "detect security threats and take preventive measures against security incidents affecting ships or port facilities used in international trade."

In all port is present a video monitoring system security.

Safety: There are no specific safety requirements.
1. Cargo Manifest for Discharge
2. Dangerous Cargo Manifest
3. Cargo Plan.

Port Authority: Port Authority of the Levant of Bari.

Port Authority contact:

Address: SEDE COMANDO: Banchina Seminario n.1, 70056 Molfetta (BA) ; SEDE DISTACCATA: Banchina San Domenico s.n.c., 70056 Molfetta (BA)

Phone: Sede Comando (0803971076 - 0803973962) - Sede Distaccata (0803387471)

Fax: 0803971727

PEC: cp-molfetta@pec.mit.gov.it

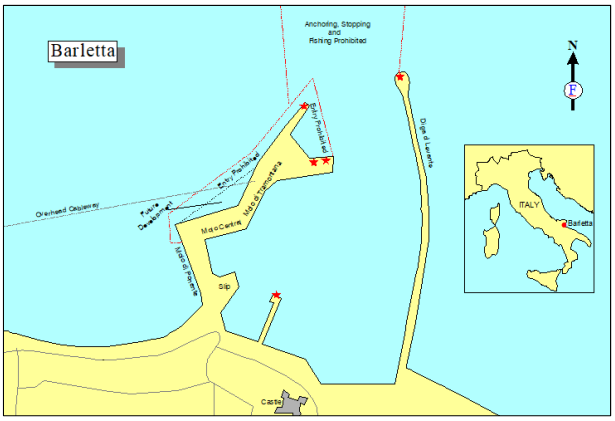
E-mail: cpmolfetta@mit.gov.it ; cp-molfetta@pec.mit.gov.it

BARLETTA PORT, ITALY

World Port Number :	PO1902	**UN LOCODE :**	ITBLT

PORT DESCRIPTION

Location: Barletta is situated 53km NW of Bari, on the Adriatic coast.



General overview: It is one of the principal commercial production centres in the wine trade and a large industrial base with modern port facilities for handling mainly bulk carriers and tankers of medium size together with Ro-Ro vessels. It is also a busy fishing harbour. The principal exports include wine, edible oils, salt, acids and cement. Imports are grain, coal, bulk chemicals, fertilizers and clay. It is sheltered from all winds by a breakwater, depth at the entrance 7.9m.

Traffic figures: Approx 330 vessels visit the port annually.

Load line zone: Summer.

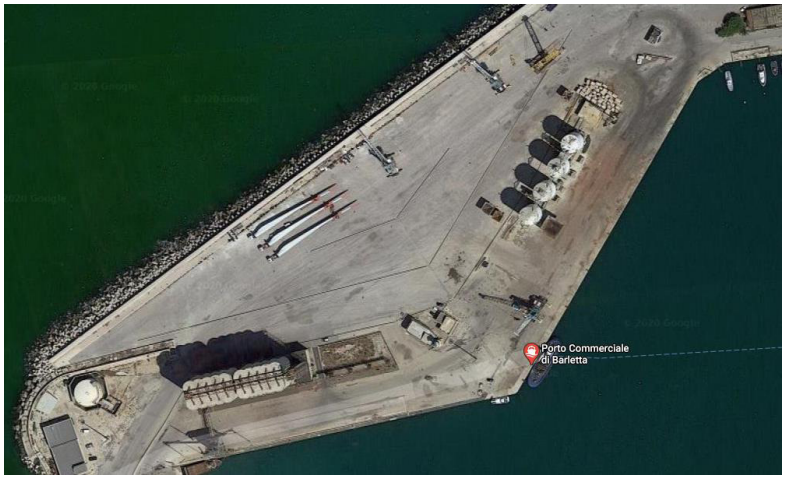
Max size:

LOA(m)	Max Draught (m)
150	6.30

BERTHS AND CARGO

Names/nos:
General cargo/Bulk berths: Berths No 4 to 10. Ships lie alongside these or the breakwater.
Tanker berth: Berth No 3. Discharge of gasoline via 1 x 6in hose, rate 500m^3/hr.
Ro-Ro berth: Berth No 6.

Storage: capacity 2500sqm

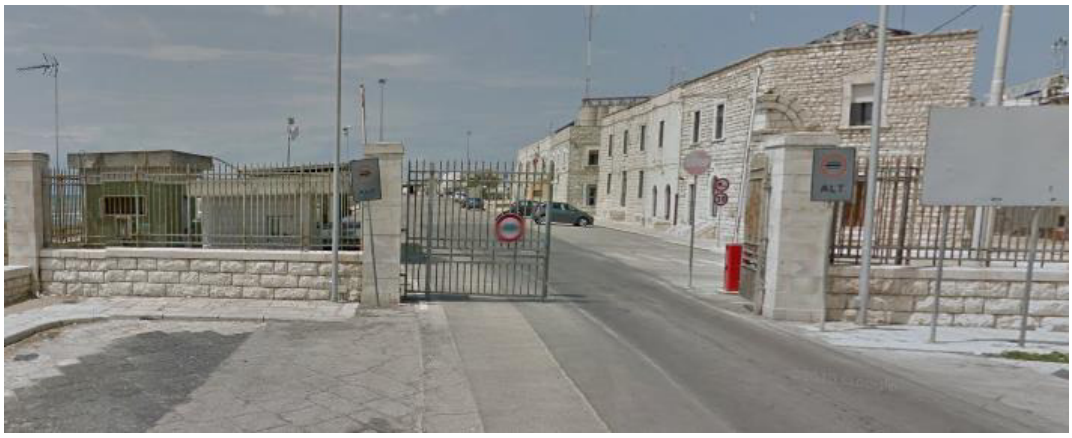


Ballast/slop reception: Available.

Pier	Length (m)	Notes
No 3	80	Tankers only
No 5	170	Max LOA 120m
No 6/7/8	190	-
No 9/10	210	-

Crane: crane max capacity at the storage area=2 x 100 tons (2 cranes available).

Access gate: not lenght or height limitations



Port Authority: Port System Authority of the Southern Adriatic Sea (Bari, Brindisi, Manfredonia, Barletta, Monopoli)

With the Ministerial Decree n. 128 of 5 April 2017, Prof. Avv. Ugo Patroni Griffi was appointed President of the Port System Authority of the Southern Adriatic Sea, which includes the ports of Bari, Brindisi, Manfredonia, Barletta and Monopoli.

Email: presidente@adspmam.it
Email certificated: protocollo@pec.adspmam.it
Phone: 0805788502
Fax: 0805245449

The Secretary General of the Authority of the Port System of the Southern Adriatic is instead Dr. Tito Vespasiani.

Email: segretariogenerale@adspmam.it
Email certificated: protocollo@pec.adspmam.it
Phone: 0805788576
Fax: 0805245449

Other Contacts:

Port Services:

Rimorchio – S. Cataldo S.p.A. sig. Domenico Del Rosso	+39 336 289501
Ormeggio – Barletta	Tel (+39) 0883 349382 – Fax (+39) 0883 349382
Ormeggiatori – Manfredonia	Tel (+39) 0884 533458 – Fax (+39) 0884 533458
Piloti Barletta	Tel (+39) 0883 484181 340 6073386

Port Companies

Barletta Terminal Cereali S.r.l.	Tel (+39) 0883 532691 – Fax (+39) 0883 348129 (+39) 0883 532151
Buzzi Unicem S.p.a.	Tel (+39) 0883 535752 – Fax (+39) 0883 348141
Compagnia Unica dei Lavoratori Portuali Barletta – Trani – Molfetta	Tel (+39) 0883 531124 – Fax (+39) 0883 336169
Impreport S.r.l.	Tel (+39) 0883 531124 – Fax (+39) 0883 336169
SERMAR S.A.S. di CASTIGLIEGO GAETANO e C.	Tel (+39) 0884 536836 – Fax (+39) 0884 584184

Public Administrations

Acquedotto Pugliese	Tel (+39) 0883 449411 – Fax (+39) 0883 488042 clienti@aqp.it
Agenzia delle Dogane – Sezione di Barletta	Tel (+39) 0883 531290 – Fax (+39) 0883 336354

Commissariato P.S. – Porto di Barletta	Tel (+39) 0883 341611 – Fax (+39) 0883 341611
Genio Civile Opere Marittime – Bari	Tel (+39) 080 5207211 – Fax (+39) 080 52446765
Guardia di Finanza – Compagnia di Barletta	Tel (+39) 0883 331757 – Fax (+39) 0883 531081
Ministero della Salute – U.S.M.A.F. Unità Territoriale di Manfredonia	Tel (+39) 0884 582191 – Fax (+39) 0884 538921 USMA.Foggia@sanita.it
Ufficio Circondariale di Barletta Guardia Costiera	Tel (+39) 0883 531020 – Fax (+39) 0883 533400 barletta@guardiacostiera.it

Access in port:

Through the PCS GAIA PASS service, it is possible to request access authorizations for the ports of Barletta.

If you are already registered to the service please access directly to the PCS GAIA https://gaia.adspmam.it.

If you are not yet registered to the service, you must first register via the following registration form. Through a single registration, interested parties can apply for authorisations for one or more vehicles/ people in the port of Barletta. After the registration phase you will receive confirmation via email and, after the verification by the competent office, an email confirming or denying the request. The confirmation email will specify the login credentials (email and password by default).

All the Societies that intend to exercise an activity in the ports of competence of the Authority of Harbour System of the Southern Adriatic Sea (Bari, Brindisi, Manfredonia, Barletta and Monopoli) must submit a specific application using the online procedure available at the following link: https://reaplus.adspmam.it/public/art68/

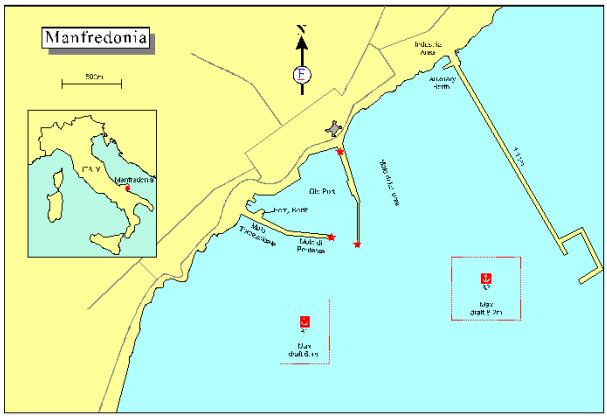
The procedure is fully computerised and provides for the use of digital signatures for the signing of documents.

Security: Inside the port is present a video monitoring system security.

MANFREDONIA PORT, ITALY

World Port Number :	PO1919	**UN LOCODE :**	ITMFR

PORT DESCRIPTION



Location: Manfredonia is situated on the E coast of Italy, in the Gulf of Manfredonia N of Bari.

General overview: This port consists of the Old Harbour, a quay within a breakwater and the New Harbour,
2km E, which is a jetty with a pier, protected by its own breakwater. The harbour is well equipped for handling
most types of vessels including tankers, general cargo, bulk carriers and ferries.
Principal exports include fertilisers, bauxite, vegetable oil, wine and general cargo.
Imports include grain, bulk chemicals, petroleum products and general goods.

Traffic figures: Approx 100 vessels use the port annually.

Load line zone: Summer.

Max size:
Vessels up to LOA 300m and draught of 9.5m may use Porto Industriale; vessels not exceeding draught of 6.0m may enter Porto Vecchio.

BERTHS AND CARGO

Names/nos: Old Harbour: Porto Vecchio, the original commercial harbour contains a number of berths with a total length of approx 1,300m with depths alongside of 2.0-7.5m. General cargo and caustic soda are handled together with passenger vessels and fishing boats. The deepest quay is Molo di Ponente with a length ofapprox 700m, max draught 6.0m.

Pier	Length (m)	Draught (m)	Notes
No 1	150	6.0	General cargo
No 2	150	6.0	General cargo
No 3	150	6.0	General cargo
No 4	80	5.0	Passengers

New Harbour (Porto Industriale): This is the new industrial harbour of Manfredonia.
The Industrial Port is located about 1.8 mg east-north-east of he entrance to the commercial port of Manfredonia. It contains a number of berths with a total length of 1,400m and permissible draughts of 9.5m. General cargo, bulk and dangerous cargoes are handled. It consists of an arm about 2 km long, which culminates in the port mirror formed by 5 docks: A1, A2, A3, A4, A5. The deepest quay is A5, on the W side of the outer angled mole with a length of 315m.

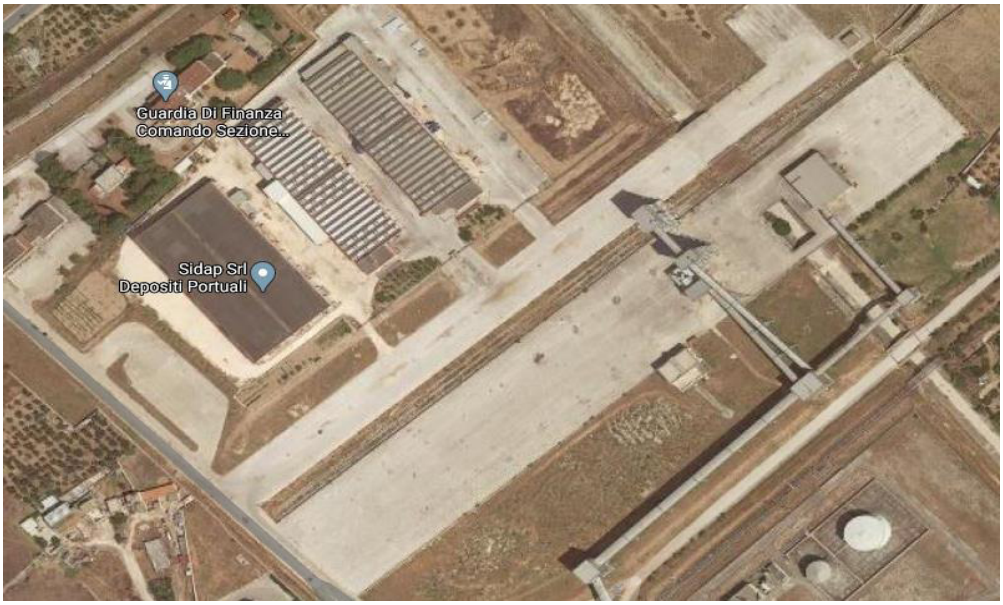
Pier	Length (m)	Draught (m)	Notes
A1	300	9.5	General cargo
A2	250	9.5	General cargo
A3	265	9.5	General cargo
A4	265	9.5	General cargo
A5	315	9.5	Chemical/Gas Oil

Auxiliary Berth: Situated on the SW side approx 0.3nm from the root, of the causeway to Porto Industriale;
used by vessels with a maximum draught of 6.5m, discharging toluene, fuels oils and caustic soda.

Cranes: There are 5 cranes available the harbour, with a max capacity from 25 to 40 ton. In pier A3 and A4 there are 2 mobile cranes of 25 tons each.

Ballast/slop reception: Not available.

Storage: Storage area has a surface of 2 ha. Storage area doesn't have mobile crane with the capacity required for the scope of this work, therefore external cranes need to be rent.



External Gate: Hmax=4,5 m.

Port Authority: Port System Authority of the Southern Adriatic Sea (Bari, Brindisi, Manfredonia, Barletta, Monopoli)

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Email: presidente@adspmam.it
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Email: segretariogenerale@adspmam.it
Email certificated: protocollo@pec.adspmam.it
Phone: 0805788576
Fax: 0805245449

Access in port:

Port Companies

Impresa Portuale art 16/84	Tel (+39) 0884 581930 – Fax (+39) 0884 583827
Impresa Portuale art 17/84	Tel (+39) 0884 581930 – Fax (+39) 0884 583827

Port Services

Corporazione Piloti del Porto di Manfredonia	Tel (+39) 0884-584870 – Fax (+39) 0884-584870

ECOLMARE GARGANO S.r.l.	Tel (+39) 0884 585175 – Fax (+39) 0884 585175 Mob (+39) 335 6466852/349 7892327/330 331610 email ecolmaregargano@libero.it – pec: ecolmaregargano@pec.it
Gruppo Ormeggiatori	Tel (+39) 0884 533458 – Fax (+39) 0884 533458

Security and Access in port:

In Manfredonia are present two harbour infrastructures:
-the commercial port;
and
-the industrial port.

In the commercial port of Manfredonia, in view of the particular activities that take place there, the Regulation concerning access and circulation will be regulated by the Harbour office and the Harbour Authority of Manfredonia having jurisdiction on the area.

All the industrial port is to consider "port facility" zone and therefore, at the beginning of the pier, where the gate and the security controls are present, are applied the provisions on the security matters referred to in this Ordinance and in the Port Security Plan.

The access to the port, must be forcibly restricted to all those engaged in employment or institutional activities; as well as to those who are expressly authorised for recognised purposes.

Therefore, will be managed by the competent Authorities (Harbour Authority for the commercial port and Harbour office of Manfredonia for the industrial port) appropriate permissions of access in order to estimate the existence of the aforesaid circumstances let alone the suitability of means.

The park of the vehicles in the harbour is allowed in the areas marked with special signs that will be placed, if not already present, by the Authority Port of Manfredonia. Vehicles parked in a parking ban will be subject to penalties and, in cases where such a stopover in any way compromises the safeguarding of port security or normal vehicular circulation, the same will be removed from the authorities at the expense of the owners.
During the night (from 22.00 to 06.00), only committed vehicles can park in port in embarkation and disembarkation operations and those of persons present for work purposes.

The vehicles in arrival in the harbour must stop and waiting to be started under edge, in the areas where they are not an obstacle for the port operations and traffic. Drivers must never leave the vehicle, always keeping close to it and, in any case, if products can be poured out of the vehicles (e.g. fertilizers, grains, gravel, sand, etc.) shall be required to cover the products with suitable tarpaulins to prevent dispersion in the polluting particles. It's forbidden to park the vehicles which do not have to carry out or which they have completion of trade and customs operations.
The access and the circulation in the harbour can be restricted and limited from the Marine Authority, in any time and in its sole discretion, where contingent security situations port impose it. Moreover, who accesses to the areas of the harbour can be subordinate, from Officers and Agents of Judicial and Public Security Police, operating for their own institutional purposes in port area, to inspections, with the modalities previewed from the enforced norms, to the person, the baggage, to the vehicle and the goods carried or, where there are contingent circumstances under control qualified personnel in accordance with the applicable rules and always for the purpose of carrying out its own specific functions.

Moreover, It is forbidden to fly over with any means the harbour areas comprised all the port commercial and industrial port, as well as filming, television, services photographs concerning or within the same areas, in the absence of the authorisation granted by Commander of the Port and of the authorization of the Harbour Authority of Manfredonia.

Without prejudice to controls carried out for entry and exit for customs purposes under the responsibility of the Authority Customs and the Guardia di Finanza, access to the commercial port, with motor vehicles, is allowed only to those in possession of appropriate permission of access in port released from the Harbour Authority of Manfredonia.
This card (port access permit) must be fully and well displayed visible on the windscreen and is valid only for the areas of the commercial port and for the year in which the same is state issued. Vehicles with an open access card to ports may also have free access to the port.

The authorization of access released from the Harbour Authority cannot be asserted which title for access to the industrial port of Manfredonia, where to access is necessary to be in possession of a permit issued by the Harbour Office of Manfredonia.
All the subjects that access to the "port facility" will be identified by the personnel assigned to checks, which are required to record these entries and subsequent exits in a register and to issue the appropriate "pass" to the same, upon delivery of an identification document, except for representatives of the Corps of Port Authorities - Coast Guard, Corps of Police, Fire Brigades and Public Administration officials responsible for maritime transport, for passengers, crew members and family members when departing with the unit.

On board the vehicle with which they enter authorized subjects may be present only other subjects also authorised. On the vehicles left standing within the designated areas on the industrial port of Manfredonia must the access permit issued by the Port Authority of Manfredonia.

Through the PCS GAIA PASS service, it is possible to request access authorizations for the ports of Manfredonia.

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Security: Inside the port is present a video monitoring system security.

Document number and Rev. TG01320_01_rev0
Issued on **22/06/2020**
Available language **English**

Executor: **Tabacco Remo / Giarratana Antonino**
Supervisor: **Giovanni Vitiello**

Client Enel Green Power: **Gori Stefano (Logistic Specialist)**

Customer: ENEL GREEN POWER SpA

TRANSPORT ROAD SURVEY REPORT

Site Visit Report

Project: "Road survey wind farm Puglia"
Rocchetta Sant'Antonio (Fg)

"Produzione di energia elettrica da fonte rinnovabile eolica"
Rocchetta Sant'Antonio (Fg)

History of this document:

N°	Doc. and Rev. no	Date:	Description of changes	Exec. / Prepared	Appr.
0	TG01320_01_rev0	22/06/2020	First Emission	Tabacco R.	
1					
2					

Classification: ☐ PUBLIC ☐ CONFIDENTIAL ☐ COMPANY ☐ RESTRICTED

0.0_Index

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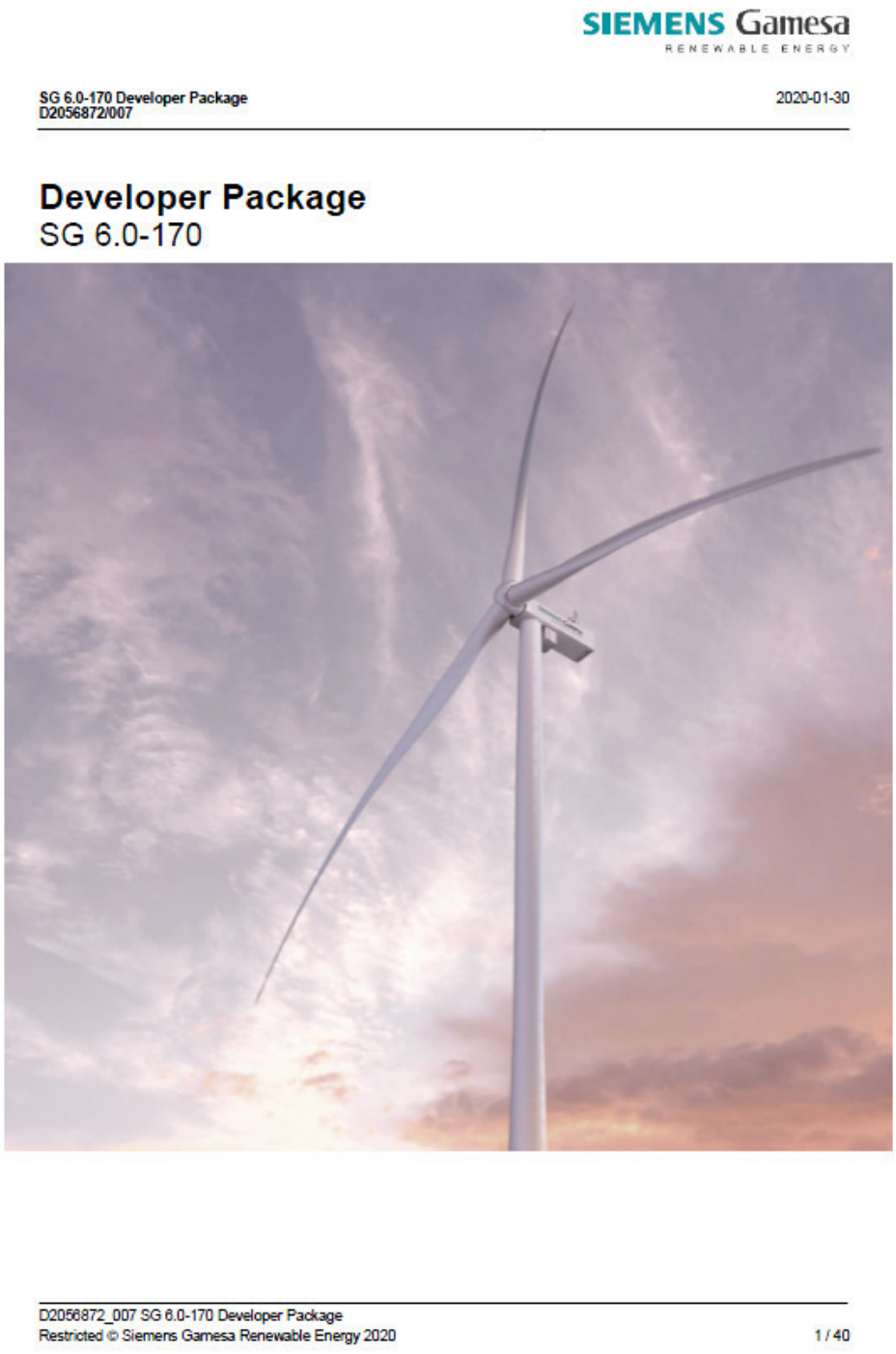
Only Internal Use	Not to be disclosed outside the Tuvia Italia SpA organization
	This document has been compiled, according to the directives received from the customer, with the documents: **- "SIEMENS GAMESA" D2165151-002 SGRE ON SG 6.0-170 Preliminary Generic - Site Roads and Hardstands requirements 2019-08-09** **- File RocchettaSAntonio__D180.kmz with location aero-motors**

3.0_Summary

In accordance with the customer's requests, this study concerns the transport of an aero-motor WTG mod. SG 6.0-170 with a 115m of tower complete with blade, nacelle and pole in its maximum configuration of 170 meters of diameter and the.

The numbers of documents refer are:

- SG 6.0-170 Developer Package D2056872/007 2020-01-30;
- Preliminary Generic - Site Roads and Hardstands requirements SG 6.0-170 D2165151/002 2019-08-09



Maximum configuration, dimension and weight of the component of the wind turbine for SG 6.0-170.
The weights and dimensions to be considered for SG 6.0 170:

115m tower

Element	W (kg)	L (m)	Ø Lower flange	Ø Upper Flange
Section 1	87491	14.835	4.700	4.700
Section 2	89063	20.340	4.700	4.440
Section 3	73619	21.170	4.440	4.430
Section 4	67234	26.665	4.430	3.480
Section 5	57481	29.940	3.480	3.500

Element	W (kg)	L (m)	Width (m)	Height (m)
Drive Train	77700	6.680	3.200	2.300

Hub

Element	W (kg)	L (m)	Width (m)	Height (m)
Hub	48765	3.910	4.720	4.100

Blades

Element	W (kg)	L (m)	Width (m)	Height (m)
Blade SG6.0-170	24600	83720	4.500	3.400

Transformer Unit

Element	W (kg)	L (m)	Width (m)	Height (m)
TU	14500	-	-	-

Generator

Element	W (kg)	L (m)	Width (m)	Height (m)
GEN	16500	-	-	-

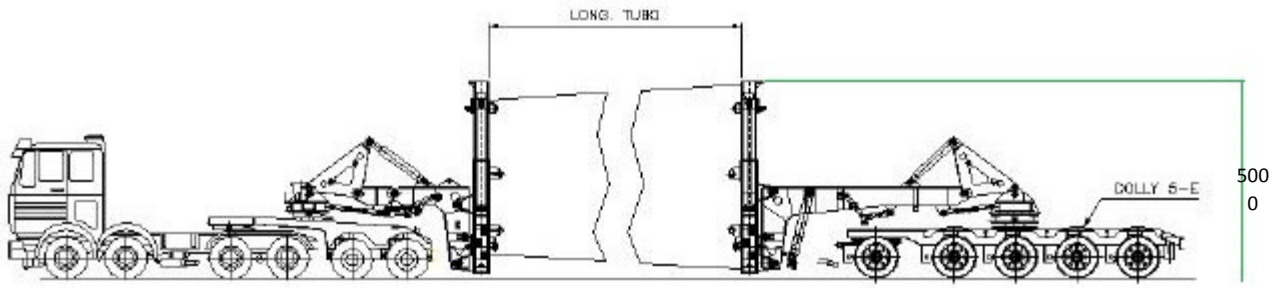
Note: Approximate component weights and dimensions. Not considered transport tools, unloading toolkits and assembly toolkits

The data highlighted in the yellow block, show the mistake in the brochure of Gamesa Siemens Sg 6.0 170.

<u>All dimensions are standard for tower of 170 meter high poles and are different from supplier to supplier.</u>

All vehicles will have the maximum dimensions suitable for transporting for the transport of wind turbines with a diameter of 170 m. Tower trunks, transport requires a maximum overall width of about 5 m.

Blade transport



Tower transport

All vehicles will have the maximum dimensions suitable for transporting the N149 (variable size, depend a final customer). The trips planned for the transport of the main components of the wind turbine are indicated in the following table, for each complete tower:

	Transport description and quantity of pieces							
	Virola of foundation	Tower	Nacele	Blade	Hub	Drive train	Anchor Cages	Transformer
Pieces	1	4÷6	1	3	1	1	4	3
N° of Transport	1	4÷6	1	3	1	1	1	1

The maximum weight will be with the transport of the nacelle and the drive train, which requires the use of a vehicle with dimensions, almost, in length of about 16 m (Standard transport, normal TIR, for the dimension), with a total mass of 76 tons.

On the basis of the dimensions of the greater bulk of the vehicles used for exceptional transport, a carriageway of a width equal to approximately 5 meters of access will be sufficient, and in relation to the weights they must have an adequate substrate to withstand the stresses of vertical loads, minimum 13 tons by axis. Exceptional transports can be carried out not only with exceptional vehicles, but also with normal vehicles that with the load exceed the size limits established for their category (art.10 C.d.S. paragraphs 2 and 3).

4.0_Final dimension for transport

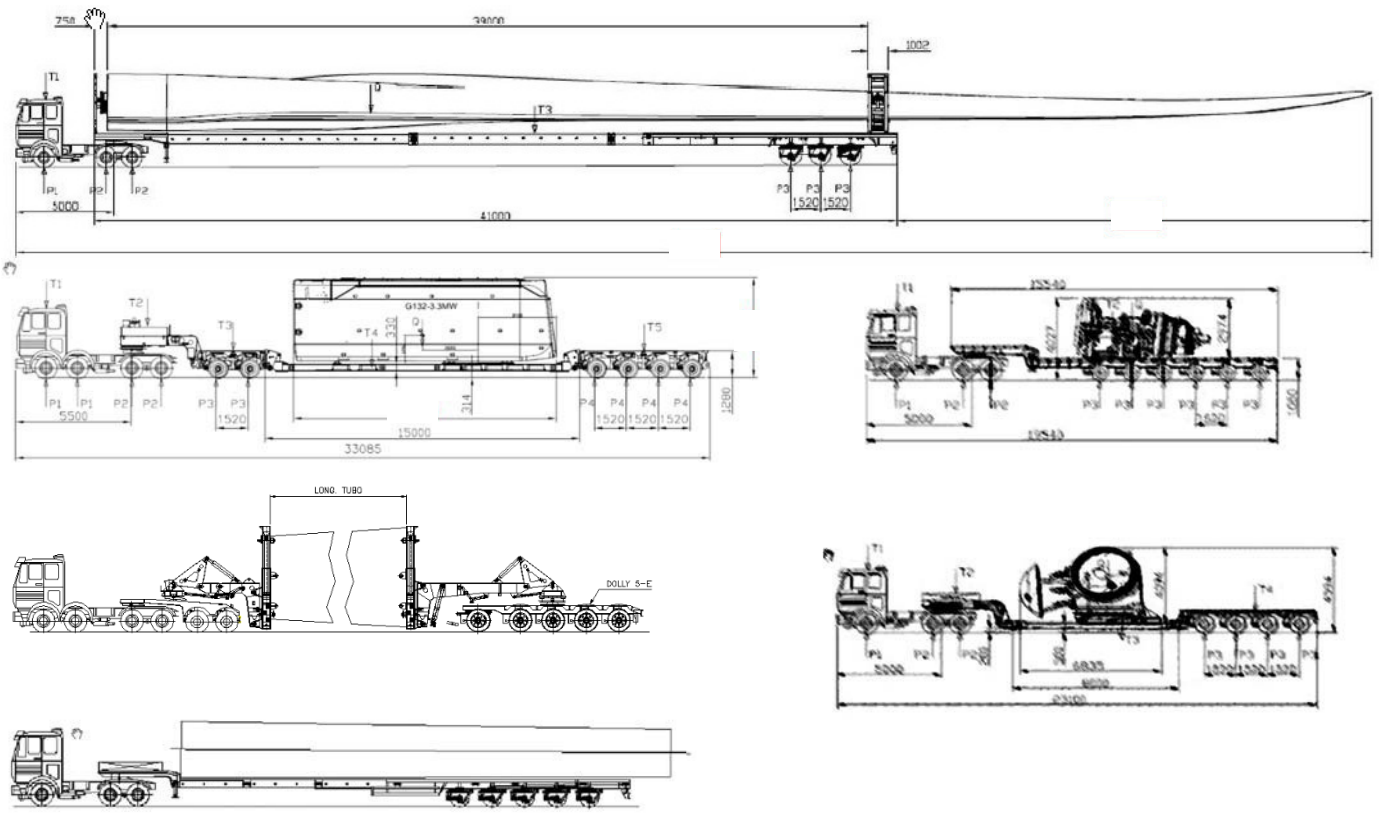
Below is the summary table of the dimensions of the individual pieces before transport:

	Widht (mt)	***Height (mt)***	***Lenght (mt)***	***Weight (Tons)***
Tower	4.70 (Section1)	4.70 (Section1)	29.94 (Section5)	89.063 (Section2)
Rotor hub	4.72	4.10	3.91	48.77
Nacelle	4.72	3.41	14.61	91.20
Drive train	3.20	2.30	6.68	77.70
Blade	4.50	3.40	83.30	24.60
Anchor cage	Standard Transport			Approx. 21.00
Transformet Unit	Standard Transport			Approx. 15.00
Generator	Standard Transport			Approx. 17.00

Below is the summary table of the dimensions of the individual pieces ready for transport:

	Widht (mt)	***Height (mt)***	***Lenght (mt)***	***Weight (Tons)***
Tower	4.70	5.00	Approx. 50.00	Approx. 105.00
Rotor hub	4.70	4.60	Approx. 30.00	Approx. 60.00
Nacelle	4.70	3.70	Approx. 30.00	Approx. 110.00
Drive train	3.20	2.60	Approx. 30.00	Approx. 100.00
Blade	4.50	3.70	Approx. 95.00	Approx. 50.00
Anchor cage	Standard Transport			Approx. 50.00
Transformet Unit	Standard Transport			Approx. 25.00
Generator	Standard Transport			Approx. 27.00

Example for transport:



4.1_General note/ Indication for transport

The transportation of blades must be done blade by blade. In a second phase, when the transport permits are issued, the final route must be checked again to check for any subsequent changes to this document.

Below is a series of general characteristics to be considered for the accesses to the wind farm.

Bypasses: The lack of bypass roads around some cities and towns is the biggest problem by far for carriage through these areas. While civil engineering works modifications can be used to find solutions for other problematic points, passage in many cases through urban areas and housing zones proves impossible.

Traffic Circles: In many cases, the radius is excessively small, as is the width, which complicates the clearance of transports. However, this problem is easier to resolve than the previous one, given that it would be sufficient to simply remove the signals. Both the inside and the outside of the traffic circle are usually crossed by the trailer, passing over the guardrail areas (see the following point). The passing over in small areas is more critical (depending on the height of the barrier and of the types of transports and carriage). Passing with steel plates may be a possibility, provided any gradient change is handled with care.

Guardrails and signals: For clearing the beams, normal guardrails should not pose problems, since they are passed over. For the guardrails having a double height, located in some ports, more caution is indeed required and, in some cases, the second guardrail beam will need to be removed (problem for heights above 80cm). For the signals, a male-female mechanical connection can be used for the signal support with a height of less than 60cm. The pilot car itself will remove and re-connect them after the truck has passed.

Bridges: Bridge strength is an essential factor because transport (nacelle as most critical element) and crane crossing can prove to be 12.5t/foe axes; thus all bridge strengths should be known. This should also be considered for roads with insufficient asphalt spread, since they could break. Providing to society for the transport the project data for each bridge is indispensable, since a simple visual inspection is not reliable. In case this information is unknown due to old bridges in rural areas lacking documentation, tests must be conducted to ensure resistance. Very critical point.

Roads: The condition of many rural roads is not the most appropriate for special transports. For mountain ports, the constant curves and reverse curves must be taken into account.

Measurements: Measuring was done with measuring tape and a GPS. Pictures with a digital camera and various onsite notes were taken. In order to obtain more precise measurements, detailed topography and computer simulations would need to be conducted, or a test run involving an empty carrier.

In light of this, small variations may be needed for measurements of the steps proposed in this report not expressly worded as having been analysed by detailed topography or through a transportation test run. Therefore, Tuvia Italia Spa is not responsible for the costs associated with these variations.

5.0_Requirements for the access roads

5.1_Weight of vehicles

- Max. load per axle approx. 12,5÷13 t (for roads exclusively for component transport)
- Max. load per axle approx. 16 t (for roads that are used for relocating cranes between two WT sites)
- Max. overall weight: approx. 180 t

5.2_Slope

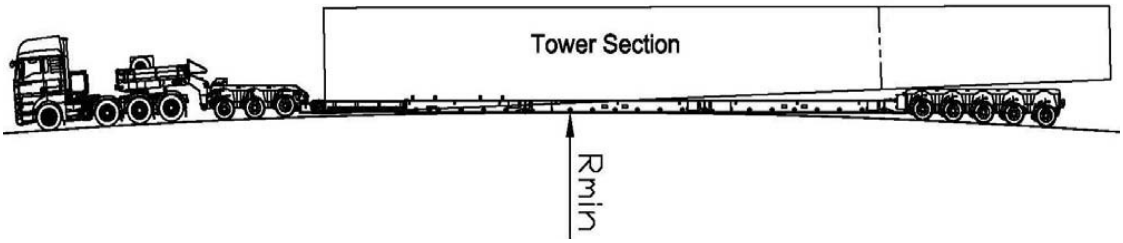
In compliance with the surface described in chapter 3.4, slopes of approx. 10 % (with unbound wearing course) or 12 % (bonded wearing course/asphalt) should not be exceeded under ideal road and weather conditions. In case of steeper slopes, Nordex must always be consulted.

At extra costs, additional tractor units and pushing vehicles as well as tractor units with a suitable hitch (register coupling) must be used so that steeper slopes can also be overcome under the provision of suitable surface conditions/bonded construction. As the length of the entire tractor unit becomes larger this must be considered in road construction planning, especially in terms of curve radii. Additional load securement, where applicable, for slopes in excess of 10 % must be coordinated with Nordex in advance.

The lateral downhill slope must not be greater than 2 %. Depending on season and weather the requirements for slopes may vary so that additional tractor units or vehicles for deceleration must be used.

5.3_Vertical radii

The aero engine manufacturer recommends these minimum radii



WT type	R_{min} [m]
SG 170	380

5.4_Clearance profile on a straight route

The clearance height on public roads generally is approx. 4.5 m due to bridges. On the access roads to the construction site a clearance height of 5 m to 6 m and a clearance width of at least 6 m must be ensured, depending on the project and location. A corresponding transport, reloading, and storage concept must be prepared, taking into account the local conditions and the feasibility of measures to be taken. In this case, the minimum requirement for the clearance profile (height) is 6 m.

For all hub heights		
H	Clearance height	Approx. 5.00 m to 6.00 m (depending on transport method)
W	Clearance width	6.00 m

6.0_Specifications Description route

Road Survey date: 09 June 2020

Rocchetta Sant'Antonio (Fg) wind Farm	
Location selected	Location: Rocchetta Sant'Antonio (Fg) Puglia
	Cities involved: Rocchetta Sant'Antonio (Fg) Puglia, Candela (Fg) Puglia.
	Area: Puglia, State: Italia
Coordinate GPS Start	41°38'30.81"N - 15°55'43.58"E (Manfredonia Port)
Coordinate GPS End	41°08'39.58"N - 15°28'37.78"E (Tower 1) 41°04'53.08"N – 15°27'56.16"E (Tower 17)
Altitude	From 21 m slm to 357 m slm (Tower 1), 737 m slm (Tower 17)
Closer cities	Foggia 38 Km, Melfi 21 Km, Potenza 60 km
Closest locations WF	Candela (34.5MW) Tozzi, Sud Rocchetta S. Antonio (49.9MW) Fortore Energia
Port of start	Manfredonia (FG) 91 km
Tipologia di WTG	SIEMENS GAMESA SG 6.0 170
Scope of work	Planning Stage - Transport Logistic - Feasibility Study

7.0_General route description

For the transport of the Hub, Blade, Nacelle, and Drive Train, Manfredonia (Fg) port has been considered as pick-up location.

It should be noted that the transport of the components constituting the wind towers will take place on a route of highway, provincial and municipal roads already existing while interventions will be necessary content of new viability in fact limited to:

- Adjustments to the existing municipal road system as shown in the graphic drawings accompanying this document;
- Possible enlargements in correspondence of junctions characterized by radii of curvature incompatible with the transit of exceptional means.

Access to the site by vehicles is feasible only through the roads already present. To reach the wind farm, the area of interest is served by State Roads by Provincial Roads and by roads of Municipal interest.

These roads have all been identified, studied and traveled to verify the route taken by the means of transport.

Important consideration must be made on the choice of the path to follow and / or the means to be used, being a criterion based on finding the best path with the lowest possible expense, the bureaucratic times for bureaucratic operations such as expropriation have also been considered or of passage authorization, in certain areas, or the procedure of authorization to issue concessions on protected areas and with landscape and / or hydrogeological constraints.

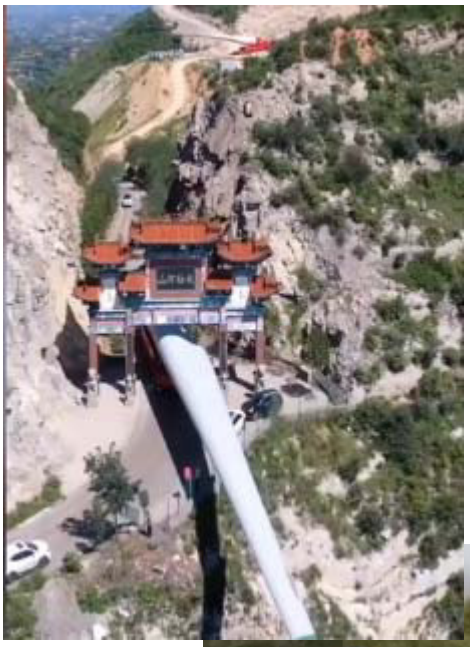
The whole study was conducted, considering the transport by truck for the blades (more extensive transport in length approx 95 m) and for the nacelle (more extended transport in 5 meters width). There are curves with insufficient bending radii. To minimize or even exclude adaptation interventions, new transport techniques have been taken into consideration that reduce vehicle maneuvering space to a minimum, the blade lifter.

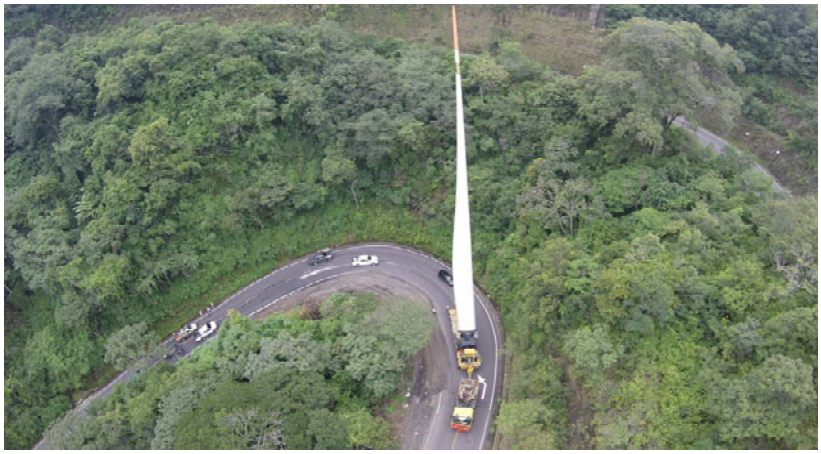
In fact, with respect to the technical traditions of transport, the use of means has been studied which allow to modify the load pattern during transport and consequently limit the radii of curvature, and therefore the roadway dimensions, the earth movements and the impact on the territory, they are reduced to a minimum.

The roads required to reach the wind farm have been verified and / or designed to allow the transport of all the aerogenerator components using the existing roads, without providing road works, such as widening of the roadway or temporary removal of some road signs vertical on the carriageway, temporary removal of guard rails, temporary lowering of side walls to the roadway, filling of gutters along the roadside, etc. etc.



Classic truck transport techniques





New truck transport techniques and possible variant

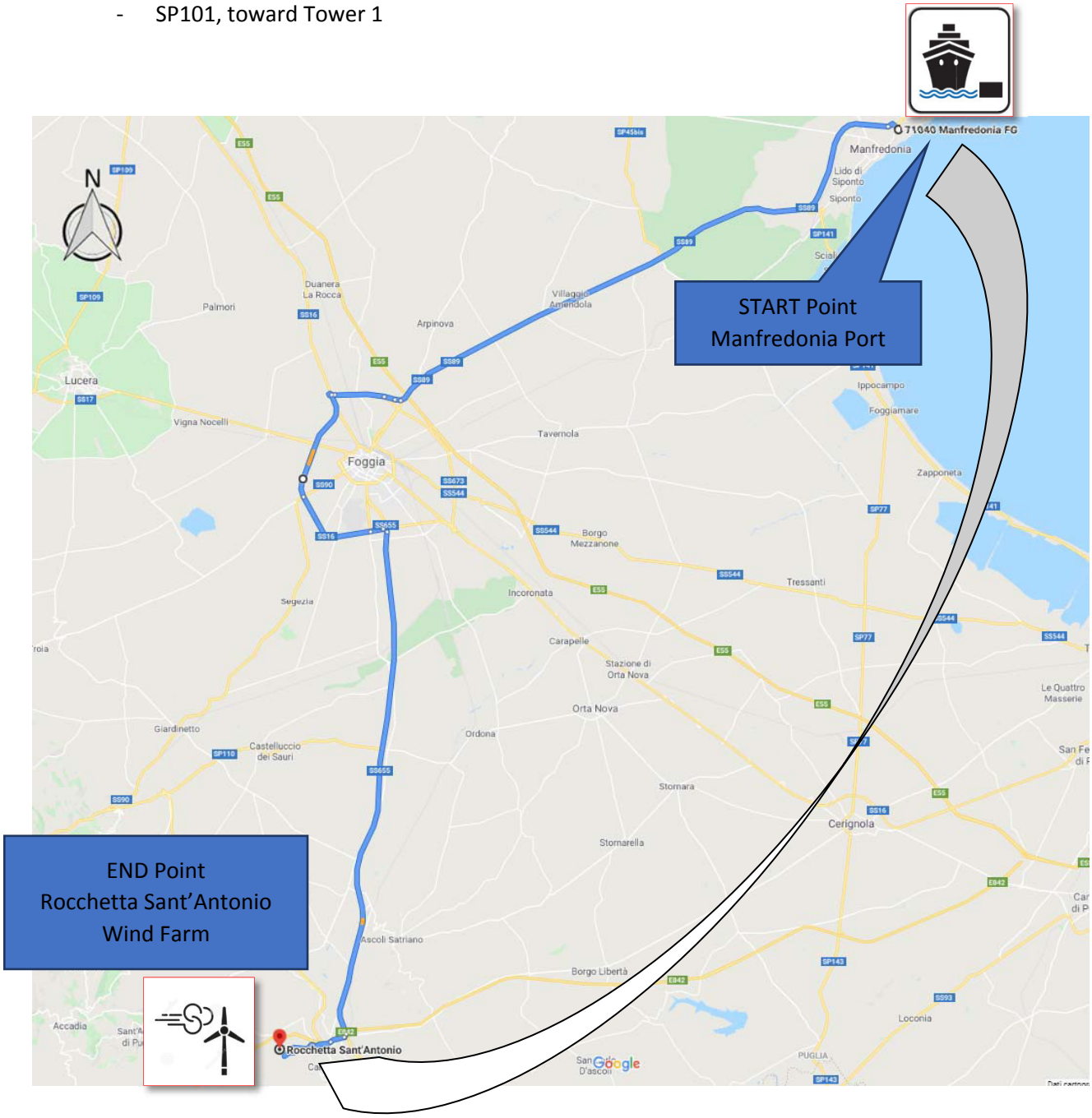
Blade Lifter is a special system used for the transport / movement of wind turbines. Mounted on a self-propelled or between modular axis lines, with this adapter it is possible to load wind turbines, raise them to an angle of about 90 °, oriented and rotated 360 ° around its axis. A third vertical rotation axis is even available on request, which allows an additional lateral rotation angle of 20 °. An option required for use in heavily urbanized areas. The vehicle is configured on an 8-axis SPMT and with a capacity of 500 t / m.

8.0_GRAPHIC PROCESSES AND STUDIES OF THE TRANSPORT PATH

Route 1:

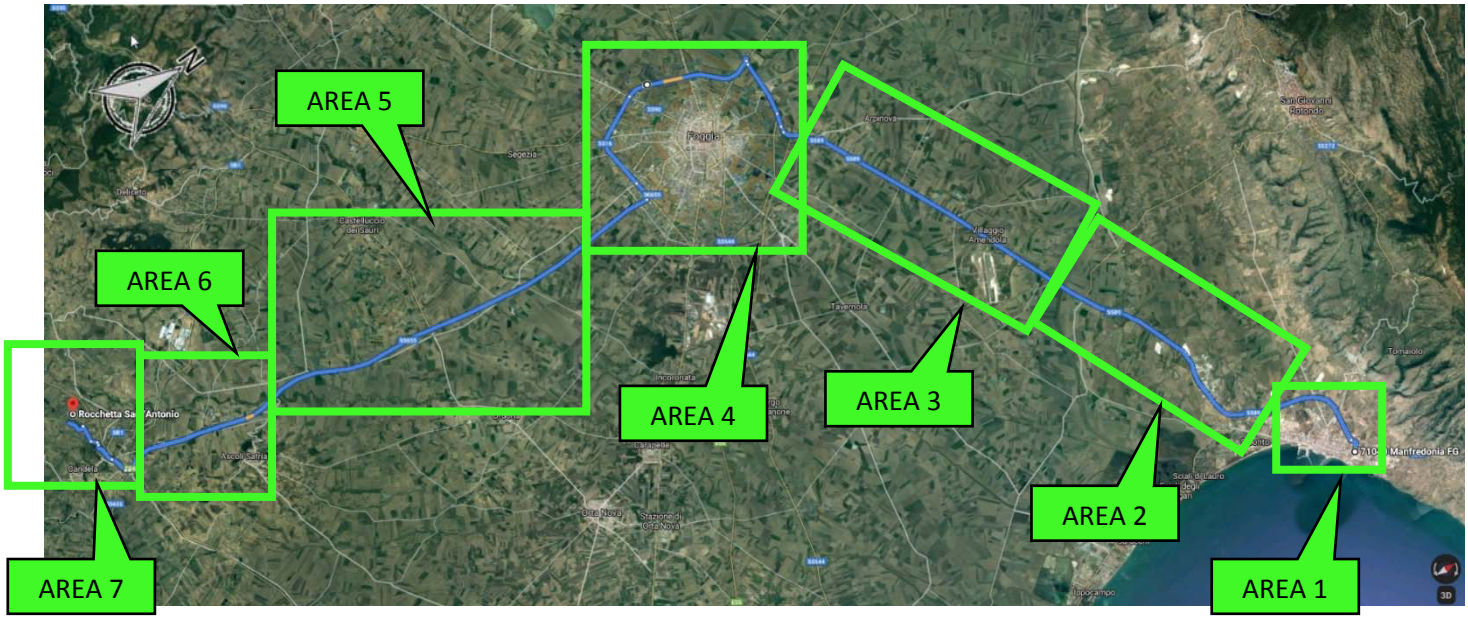
Manfredonia Port to Conza della Campania Wind farm (Conza della Campania Country)

- Manfredonia port (Fg)
- SS89 Garganica
- SS673 Circular ring Manfredonia
- SS16
- SS655
- SP95
- SP101, toward Tower 1



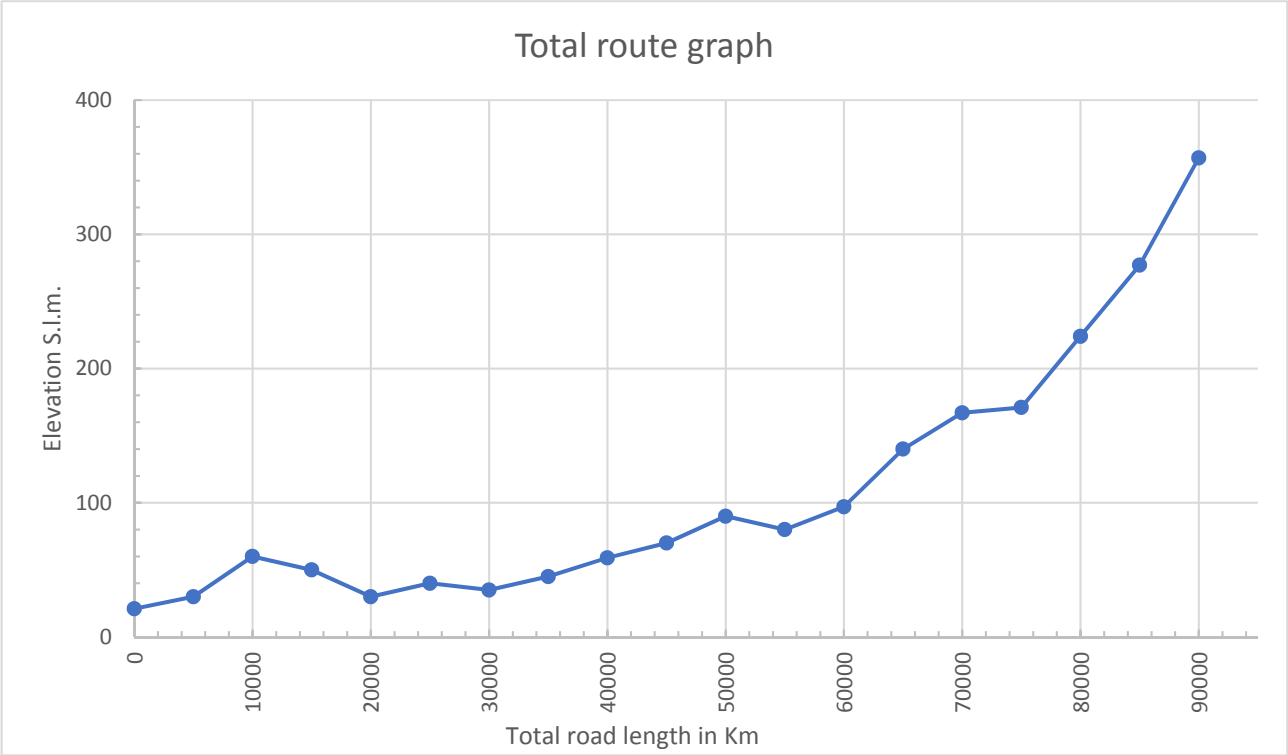
Recap route 1

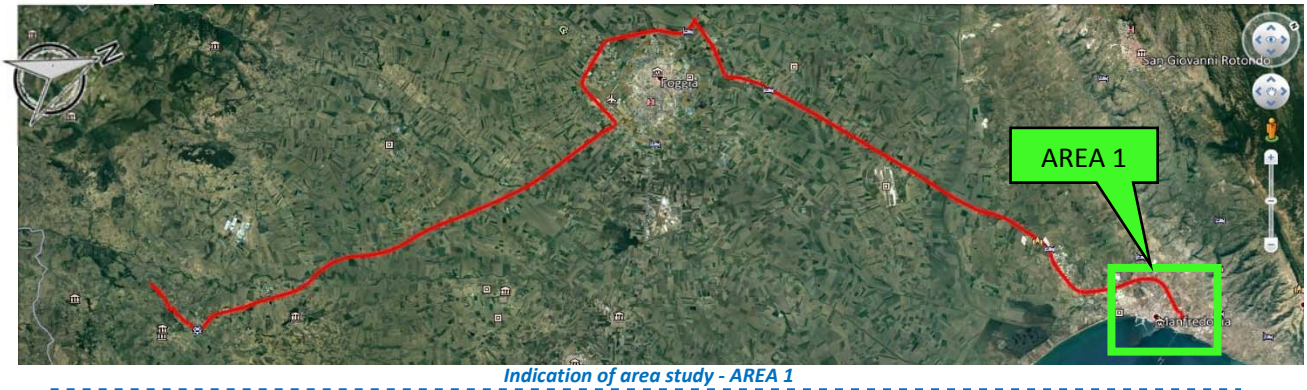
Manfredonia Port to Rocchetta Sant'Antonio Wind Farm (Rocchetta Sant'Antonio Country)



Total route	90.00	Km
Elevation of start	21.00	mt slm
Elevation of End Tower 1	355,00 ≈	mt slm
Elevation of End Tower 4	737,00 ≈	mt slm
City of START ruote	Manfredonia Port (Fg)	
Location of END ruote	Rocchetta Sant'Antonio (Fg)	

Route chart





Indication of area study - AREA 1

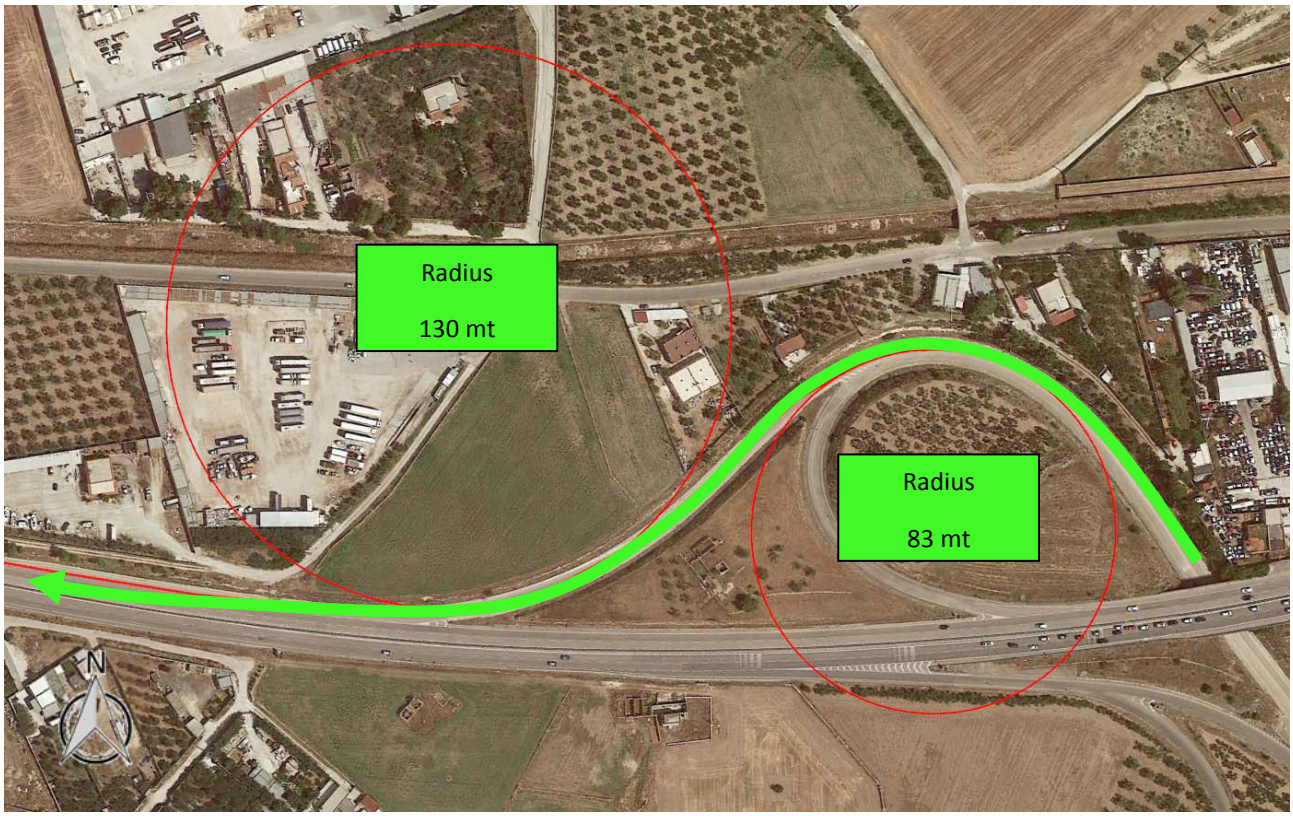
Indications for photographic references

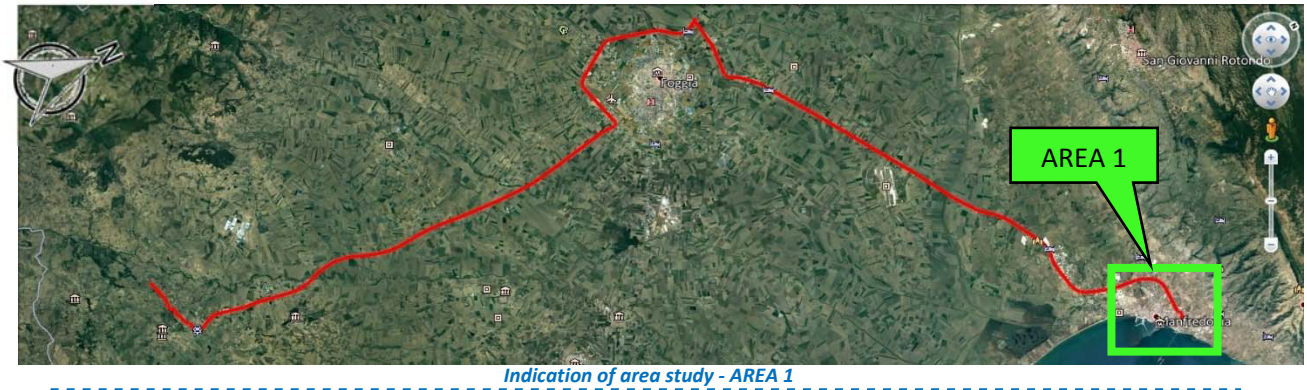
STUDY AREA 1, MAIN PROBLEMS AND SPECIAL FEATURES
Departure from the port of Manfredonia (Fg), at the exit we find five bridges with variable heights. The junction for the SS, has a trench section, along the route there are electric cables that cross the road and road signs. Road width never less than 7 mt. Bridge height greater than or equal to 5.00 m Cable crossing, present along the route. Bridge with unknown load. Lack of vegetation along the way. Road surface in good condition


1
5.15 mt
12/02/2020 09:59:07
2
11.10 mt
12/02/2020 09:59:44
3
6.20 mt
12/02/2020 10:00:15
4
6.00 mt
12/02/2020 10:00:51
5
6.70 mt
5.40 mt
12/02/2020 10:01:23
6
12/02/2020 10:02:48
7
5.40 mt
12/02/2020 10:03:46
8
5.30 mt
12/02/2020 10:05:25
9
5.40 mt
12/02/2020 10:06:47
10
6.00 mt
12/02/2020 10:07:29

FOCUS 1

Study for viability



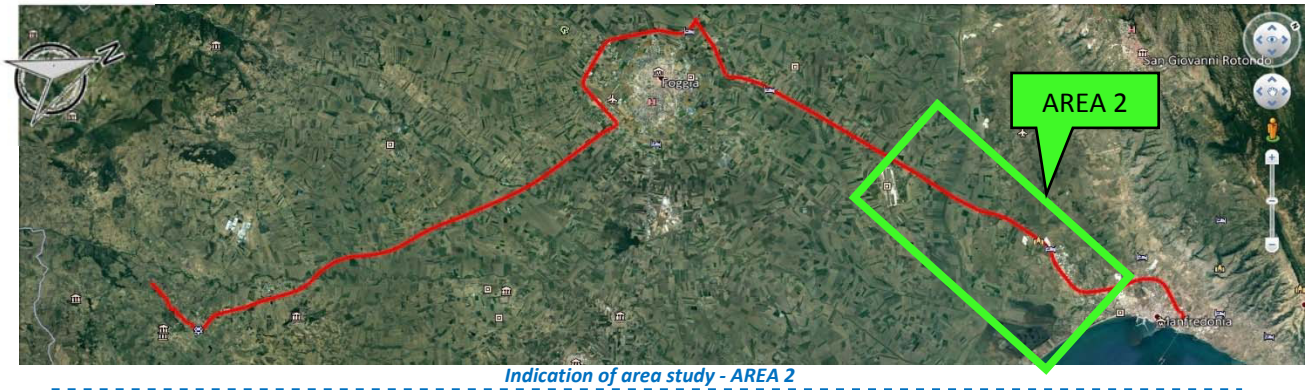


Indication of area study - AREA 1

Indications and analisis for points of interest and dimensional references

LEGENDA:

- *Cable Crossing (Medium and low tension)*
- *Bridge*
- *School*
- *Military Area* (ZONA MILITARE LIMITE INVALICABILE)
- *Traffic lights*
- *Temporary rest Area*
- *High traffic Area*
- *Distance traveled* (320 m)
- *Service Station*
- *Gallery*



Indication of area study - AREA 2

Indications for photographic references

STUDY AREA 2, MAIN PROBLEMS AND SPECIAL FEATURES
Along SS89 Garganica direction Foggia (Fg) Road width never less than 7 mt. Bridge height greater than or equal to 5.00 m Cable crossing, present along the route. Bridge with unknown load. Lack of vegetation along the way. Road surface in sufficient condition


13
5.20 mt
12/02/2020 10:11:44


14
5.20 mt
12/02/2020 10:12:55


15
5.70 mt
12/02/2020 10:15:10


16
6.00 mt
12/02/2020 10:15:46

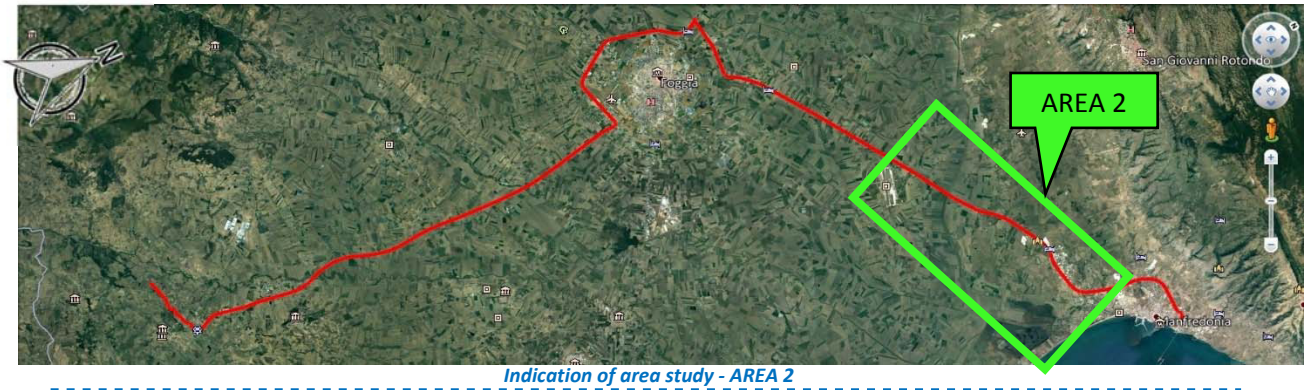

17
5.70 mt
12/02/2020 10:17:28


18
6.00 mt
12/02/2020 10:19:42


19
6.00 mt
12/02/2020 10:20:31

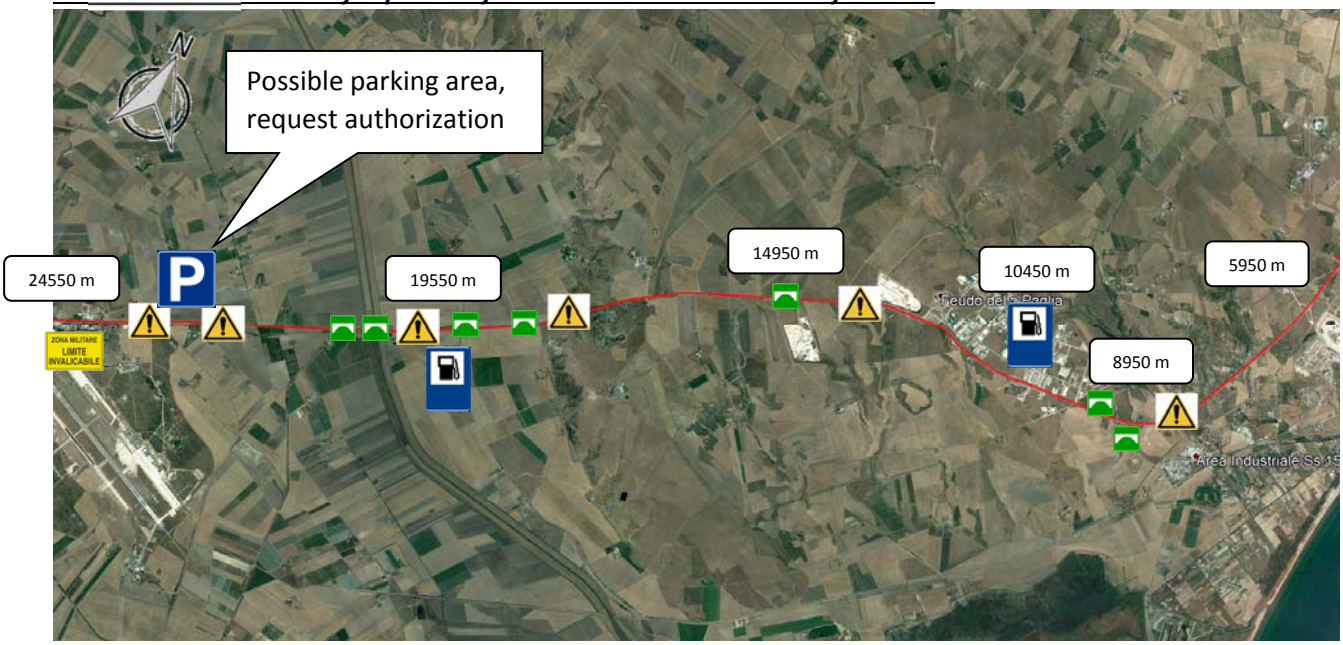

20
6.00 mt
12/02/2020 10:29:06


21
6.00 mt
12/02/2020 10:35:09



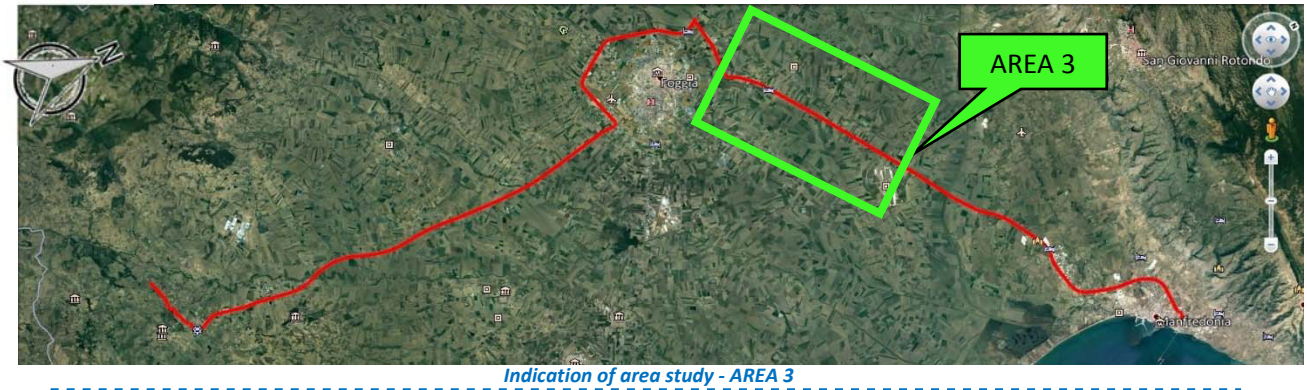
Indication of area study - AREA 2

Indications and analisis for points of interest and dimensional references



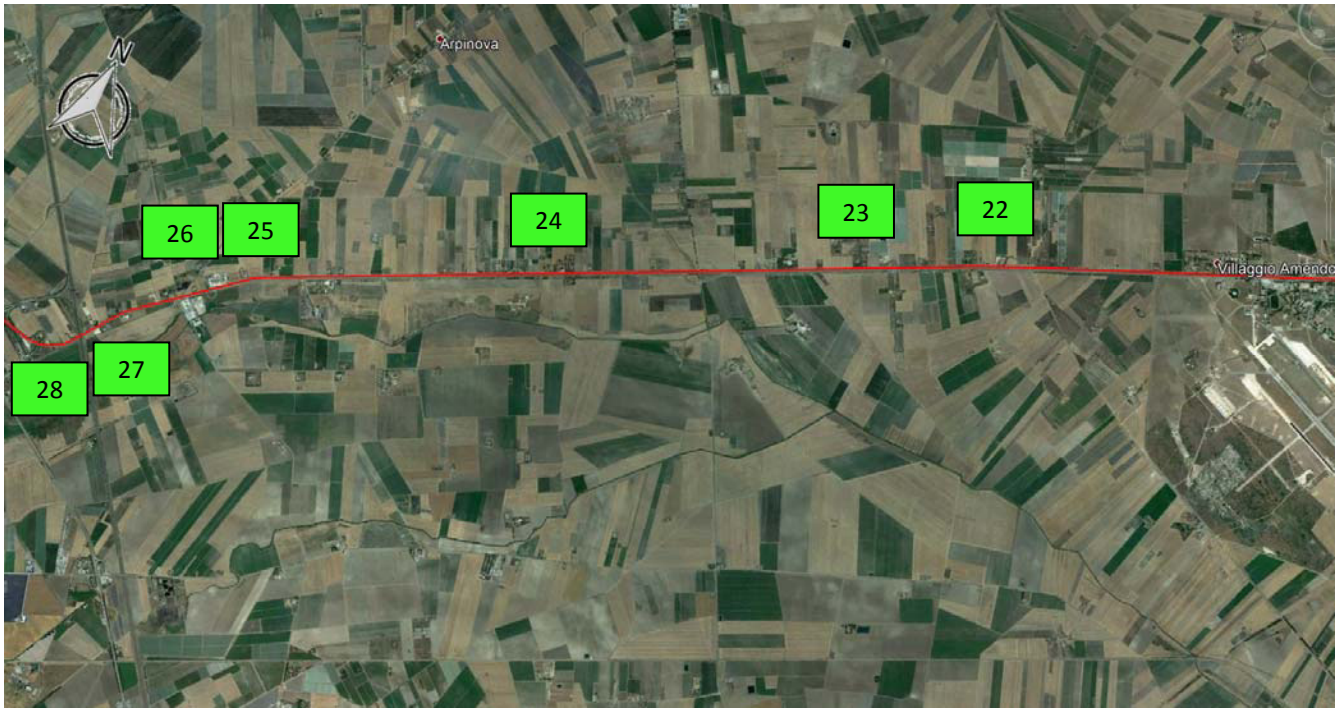
LEGENDA:

Cable Crossing (Medium and low tension)	Temporary rest Area
Bridge	High traffic Area
School	320 m Distance traveled
ZONA MILITARE LIMITE INVALICABILE Military Area	Service Station
Traffic lights	Gallery

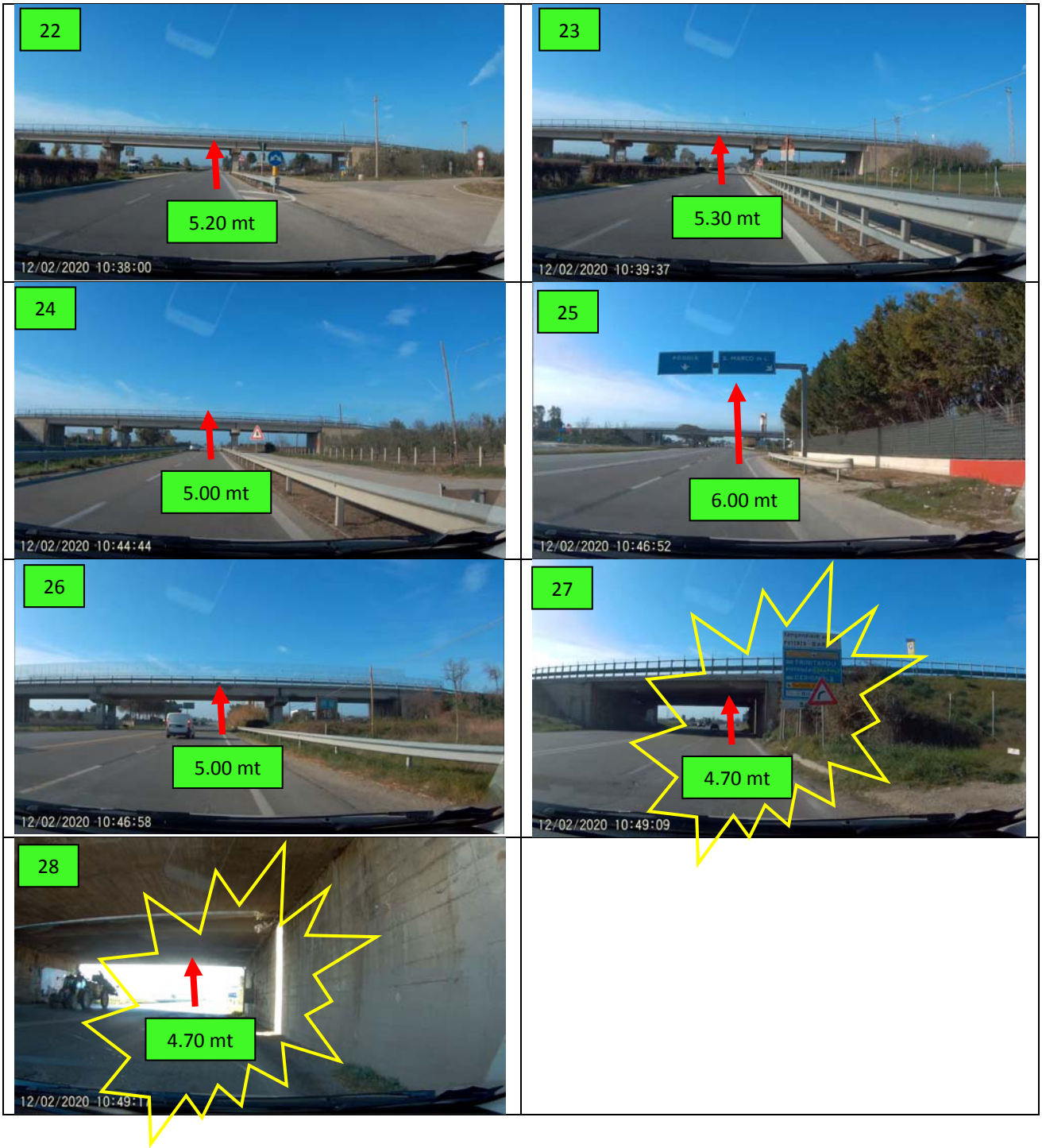


Indication of area study - AREA 3

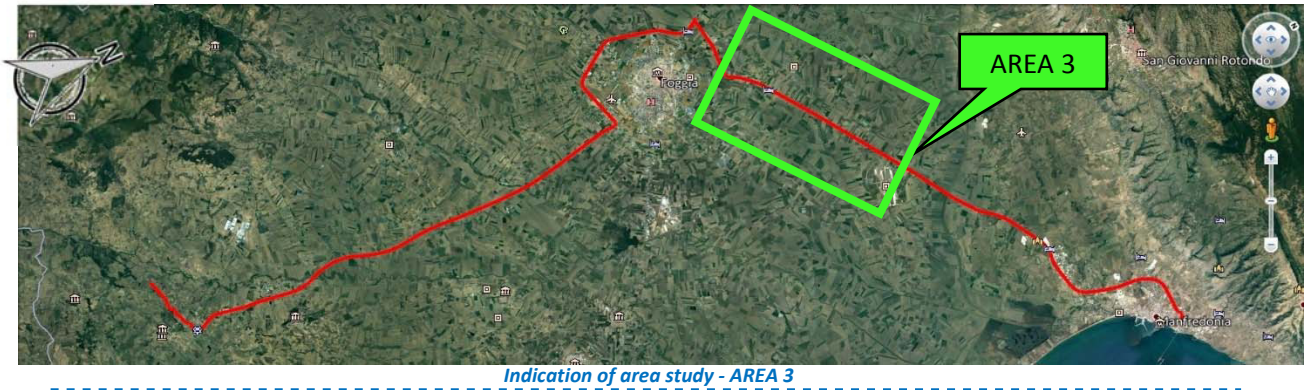
Indications for photographic references



STUDY AREA 3, MAIN PROBLEMS AND SPECIAL FEATURES
Along SS89 Garganica direction Foggia (Fg) Road width never less than 7 mt. **Bridge height, There are two bridges/underpasses with a thickness less than 5 meters (Image 27/28)** Cable crossing, present along the route. Bridge with unknown load. Lack of vegetation along the way. Road surface in sufficient condition



Comments for the image
For images 27 and 28, these are problems already known to Enel from other transports and clarified with the manufacturer / transport of the machine, with civil works for scarifying the road surface only at the underpass.

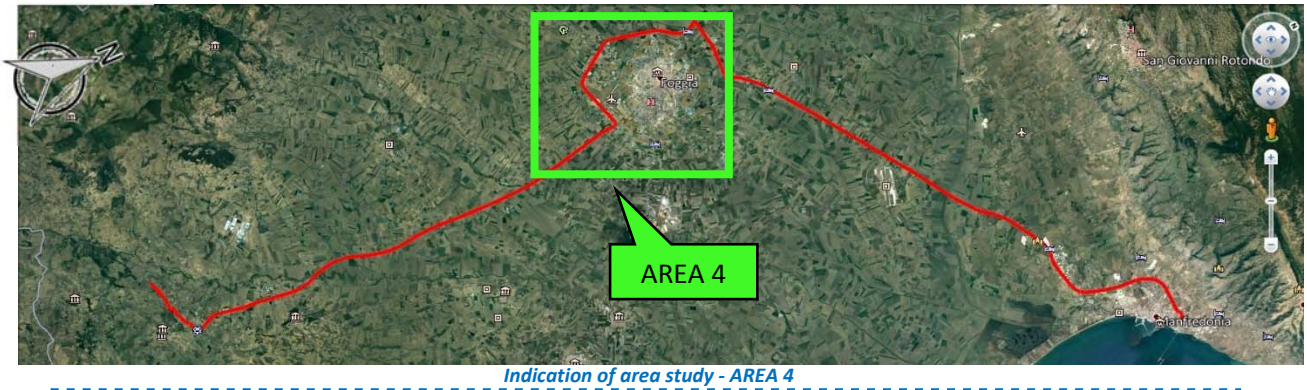


Indication of area study - AREA 3

Indications and analisis for points of interest and dimensional references

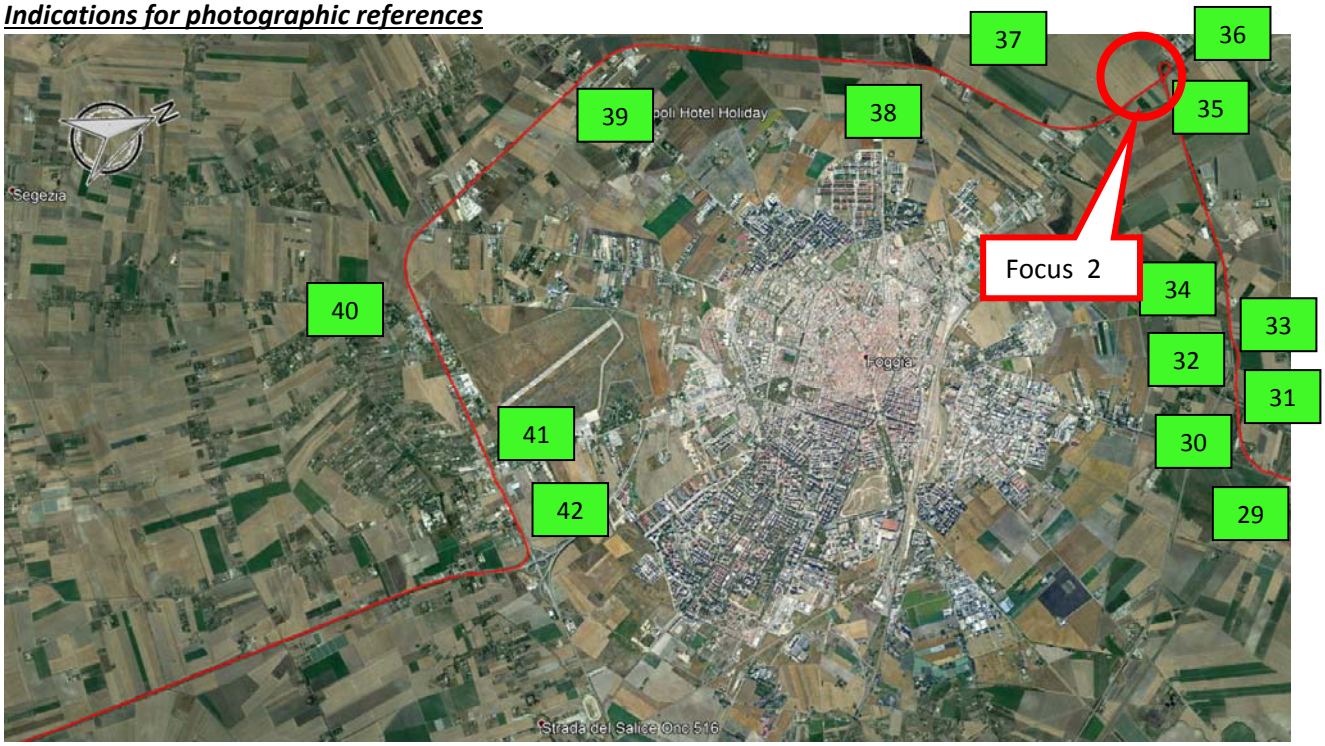
LEGENDA:

- *Cable Crossing (Medium and low tension)*
- *Bridge*
- *School*
- *Military Area* (ZONA MILITARE LIMITE INVALICABILE)
- *Traffic lights*
- *Temporary rest Area*
- *High traffic Area*
- *Distance traveled* (320 m)
- *Service Station*
- *Gallery*



Indication of area study - AREA 4

Indications for photographic references



STUDY AREA 4, MAIN PROBLEMS AND SPECIAL FEATURES
Along SS673, corner SS89 Garganica ring road of Foggia (Fg). Along SS16, corner SS655 direction Melfi (Pz) Road width never less than 7 mt Bridge height greater than or equal to 5.00 m Cable crossing, present along the route. Bridge with unknown load. Lack of vegetation along the way. Road surface in sufficient condition


29
6.00 mt
12/02/2020 10:49:59


30
5.50 mt
12/02/2020 10:50:13


31
6.00 mt
12/02/2020 10:51:02


32
6.00 mt
12/02/2020 10:51:08


33
5.30 mt
12/02/2020 10:51:19


34
12/02/2020 10:52:02


35
6.00 mt
12/02/2020 10:55:42

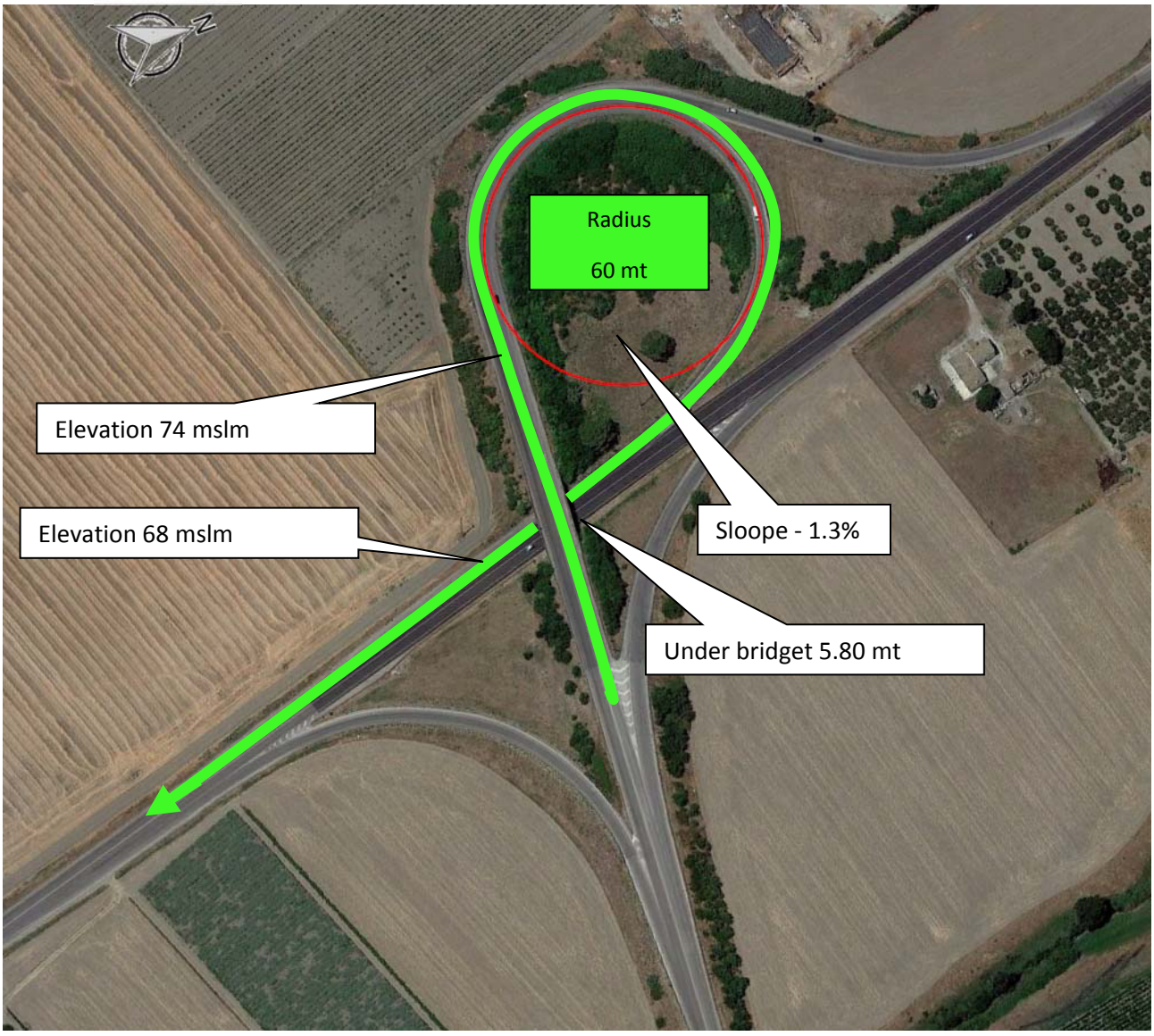

36
5.80 mt
12/02/2020 10:57:06


37
6.00 mt
12/02/2020 11:00:36


38
6.30 mt
12/02/2020 11:01:29

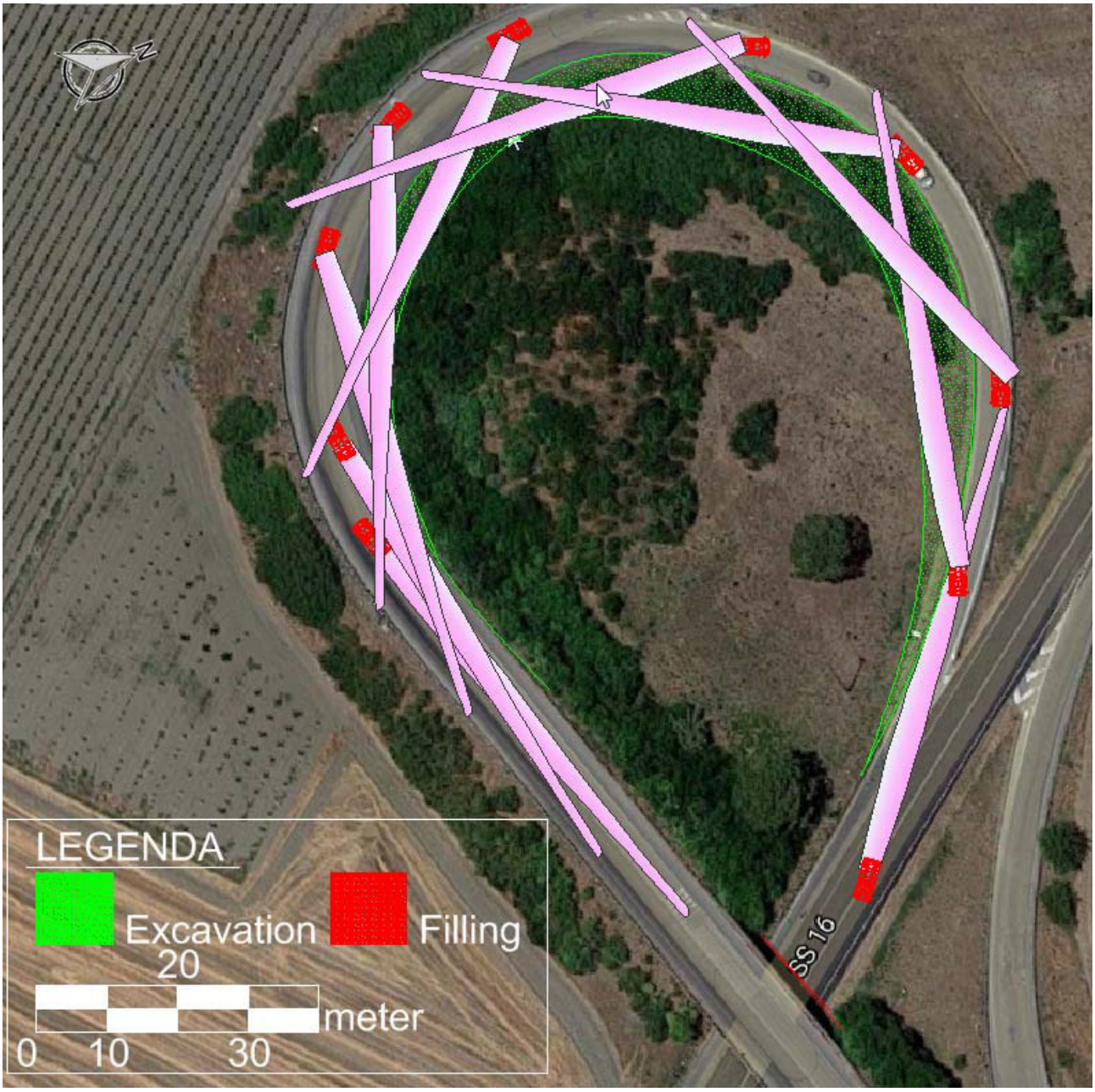

39
Traffic roundabout
12/02/2020 11:05:28
40
5.80 mt
12/02/2020 11:08:31
41
Traffic roundabout
12/02/2020 11:11:15
42
12/02/2020 11:12:14

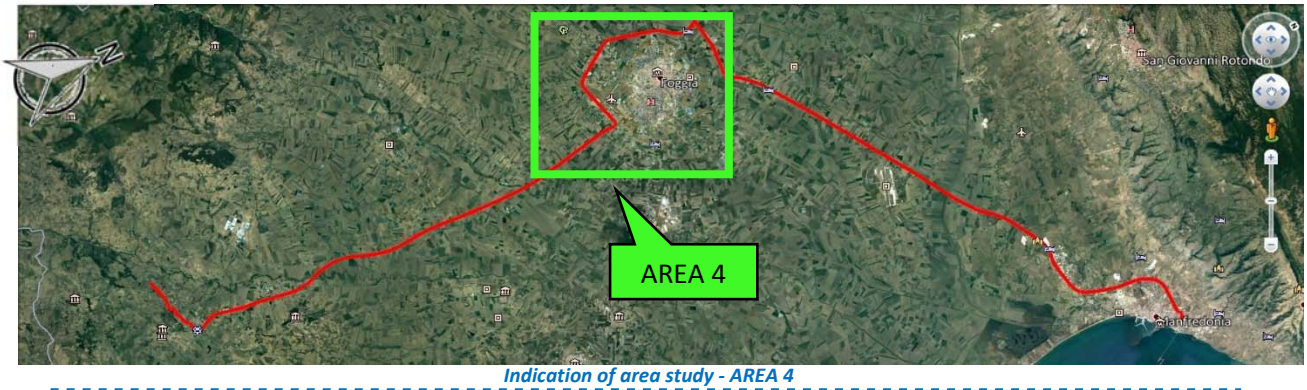
FOCUS 2


Radius
60 mt
Elevation 74 mslm
Elevation 68 mslm
Sloope - 1.3%
Under bridget 5.80 mt

FOCUS 2

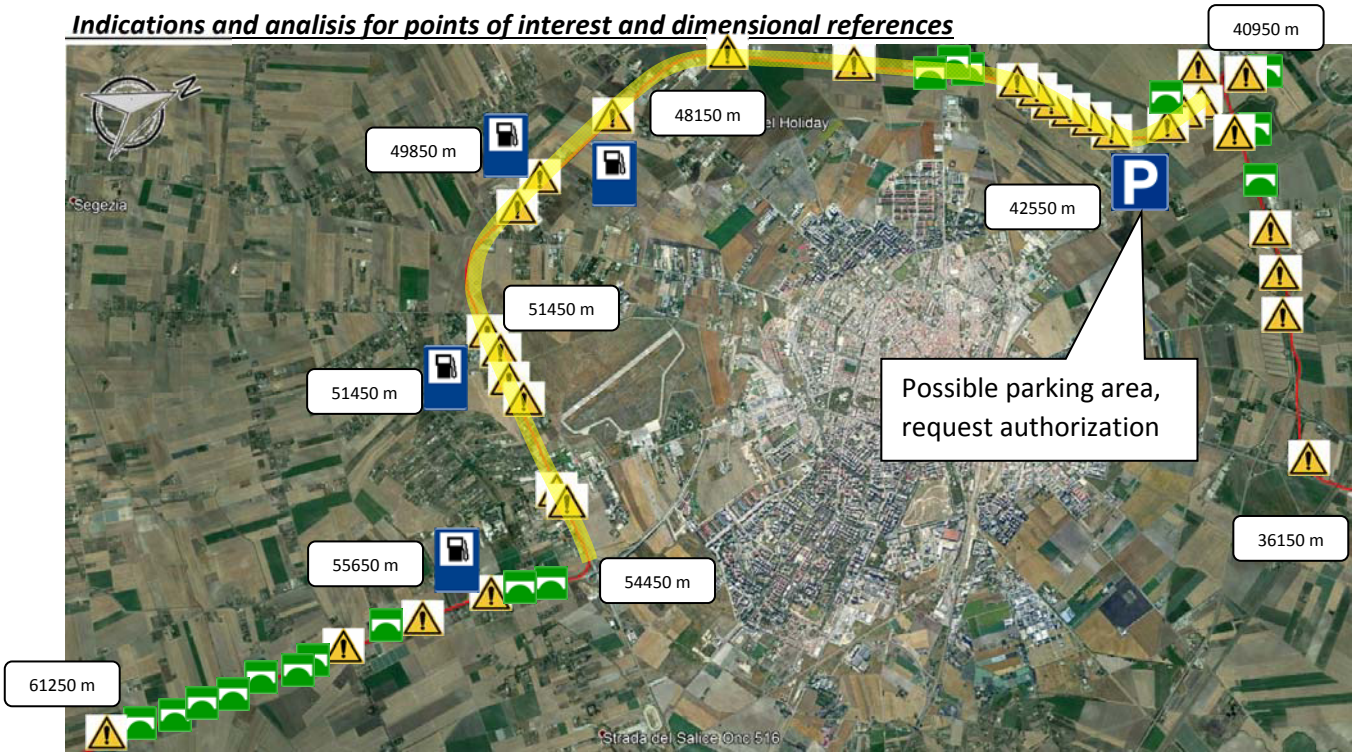
Study viability:





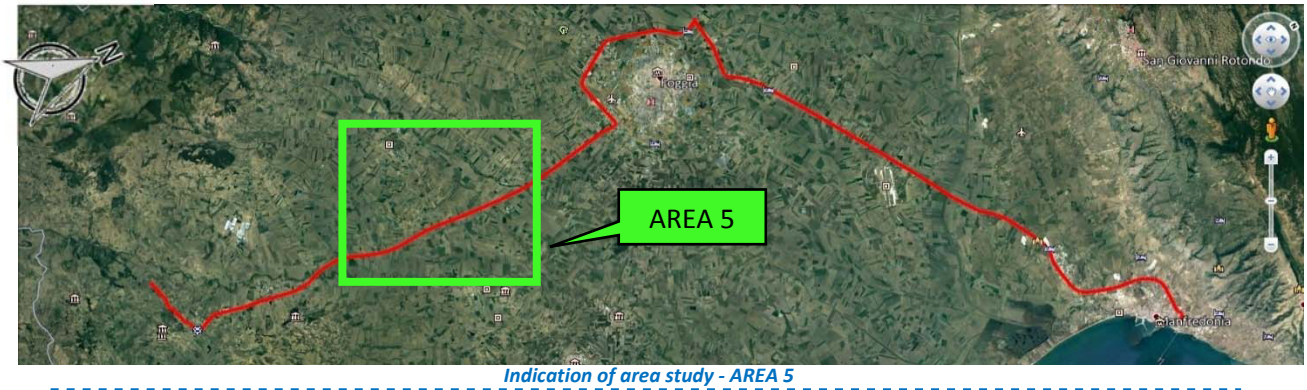
Indication of area study - AREA 4

Indications and analisis for points of interest and dimensional references



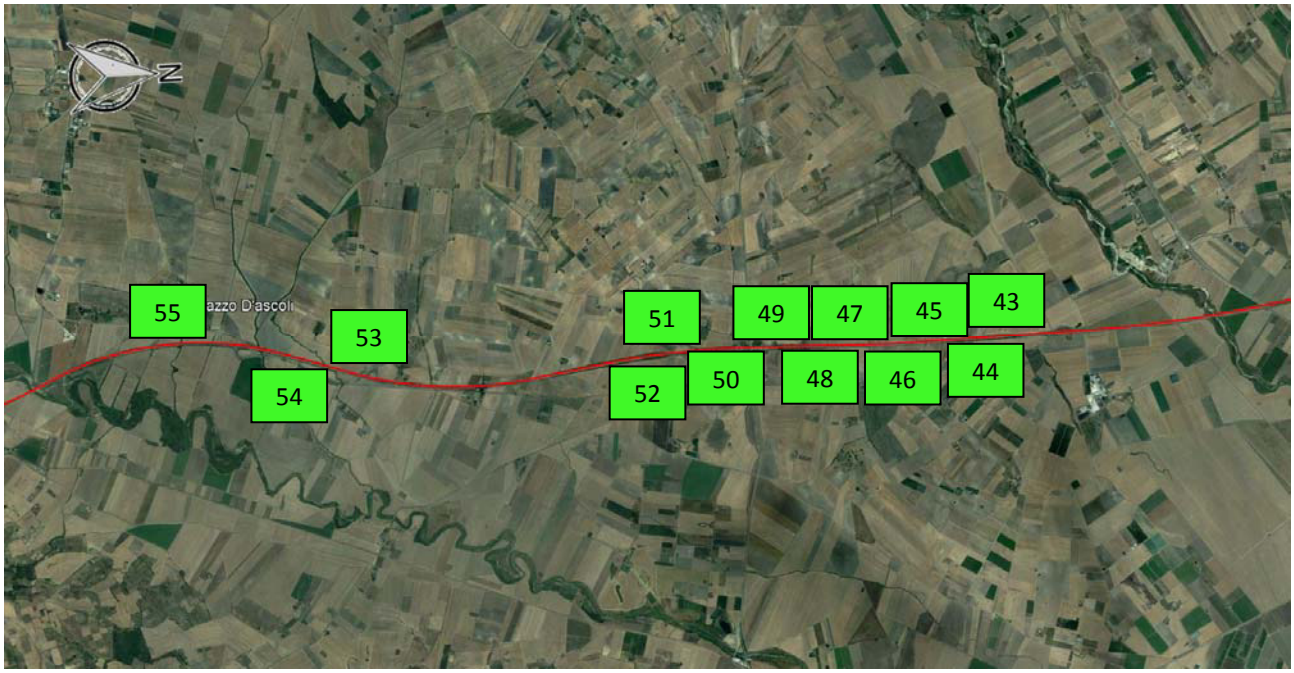
LEGENDA:

Cable Crossing (Medium and low tension)	*Temporary rest Area*
Bridge	*High traffic Area*
School	*Distance traveled* (320 m)
Military Area (ZONA MILITARE LIMITE INVALICABILE)	*Service Station*
Traffic lights	*Gallery*



Indication of area study - AREA 5

Indications for photographic references



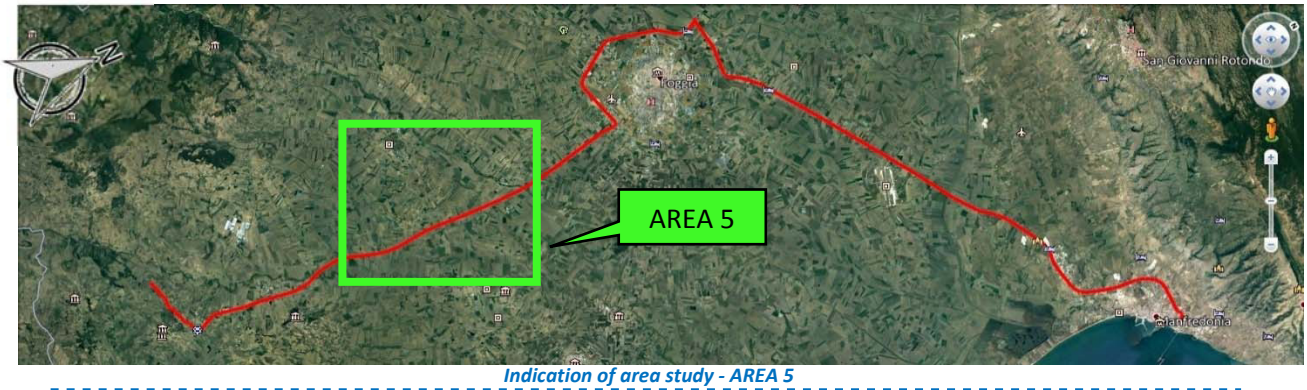
STUDY AREA 5, MAIN PROBLEMS AND SPECIAL FEATURES
Along SS16, corner SS655 direction Melfi (Pz) Road width never less than 7 mt Bridge height greater than or equal to 5.00 m Cable crossing, present along the route. Bridge with unknown load. Lack of vegetation along the way. Road surface in sufficient condition


43
6.00 mt
12/02/2020 11:20:17
44
5.90 mt
12/02/2020 11:21:50
45
5.80 mt
12/02/2020 11:22:40
46
5.80 mt
12/02/2020 11:23:47
47
5.60 mt
12/02/2020 11:24:43
48
6.50 mt
12/02/2020 11:25:37
49
6.00 mt
12/02/2020 11:25:34
50
6.20 mt
12/02/2020 11:26:38
51
5.90 mt
12/02/2020 11:27:54
52
5.80 mt
12/02/2020 11:28:38


53
5.90 mt
12/02/2020 11:31:27

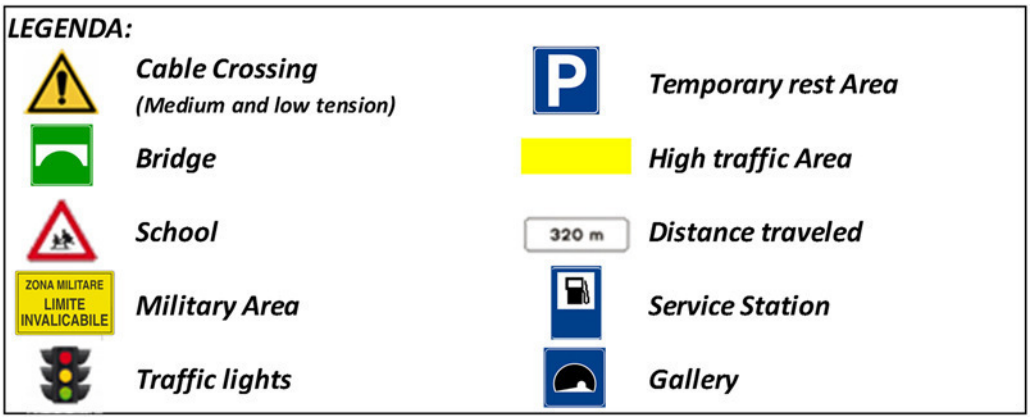

54
6.20 mt
12/02/2020 11:33:08

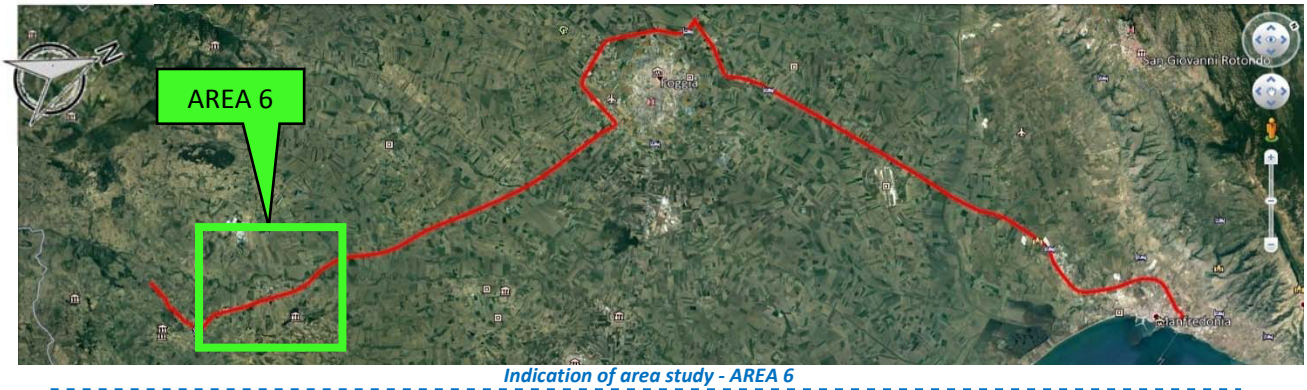

55
6.00 mt
12/02/2020 11:34:23



Indication of area study - AREA 5

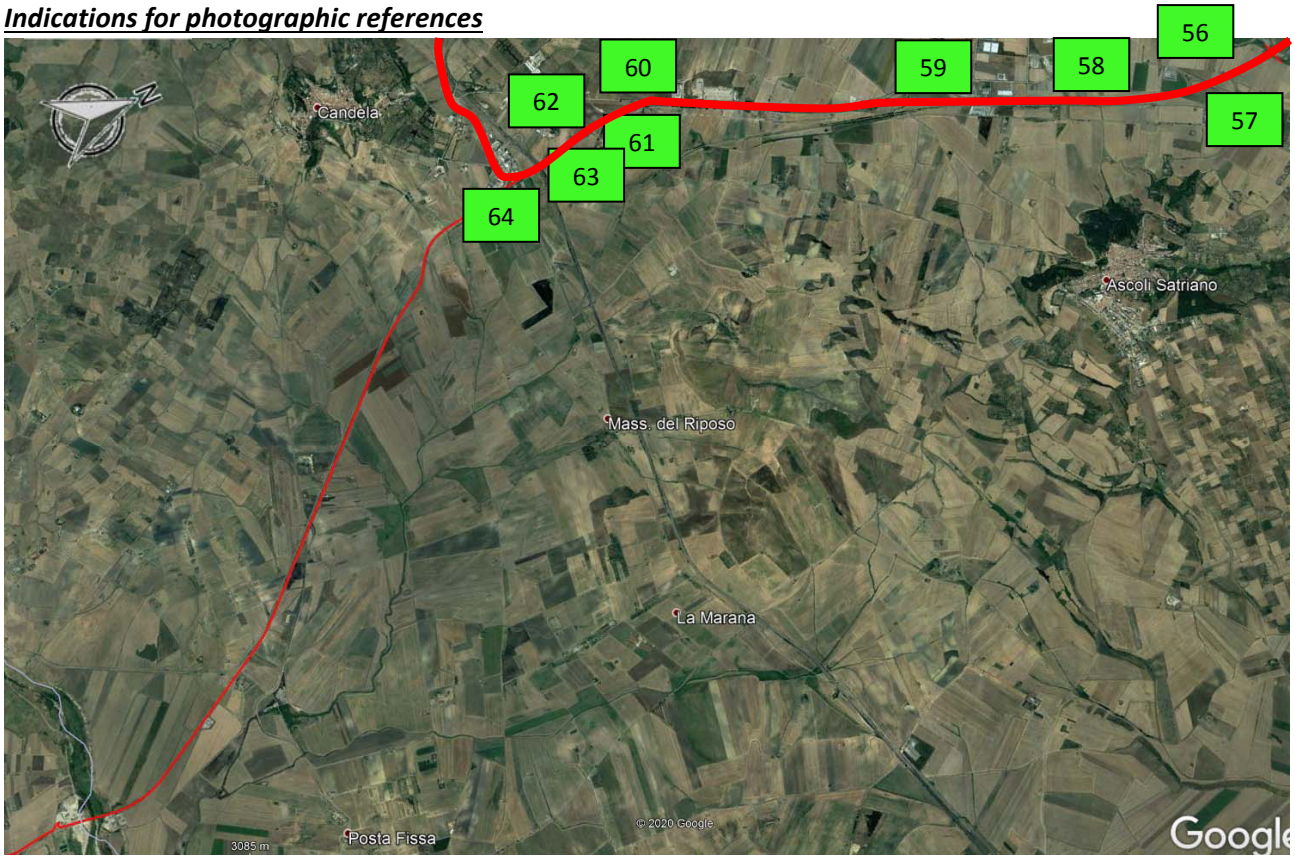
Indications and analisis for points of interest and dimensional references





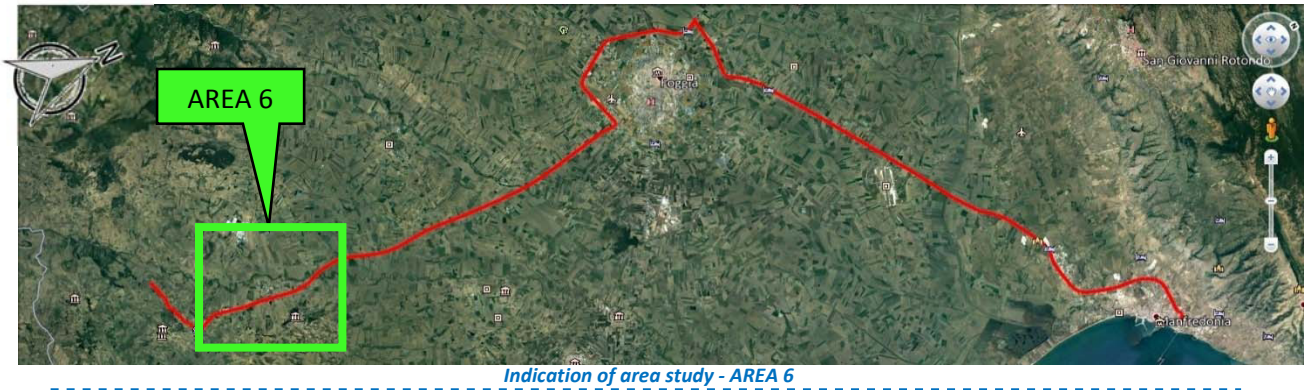
Indication of area study - AREA 6

Indications for photographic references



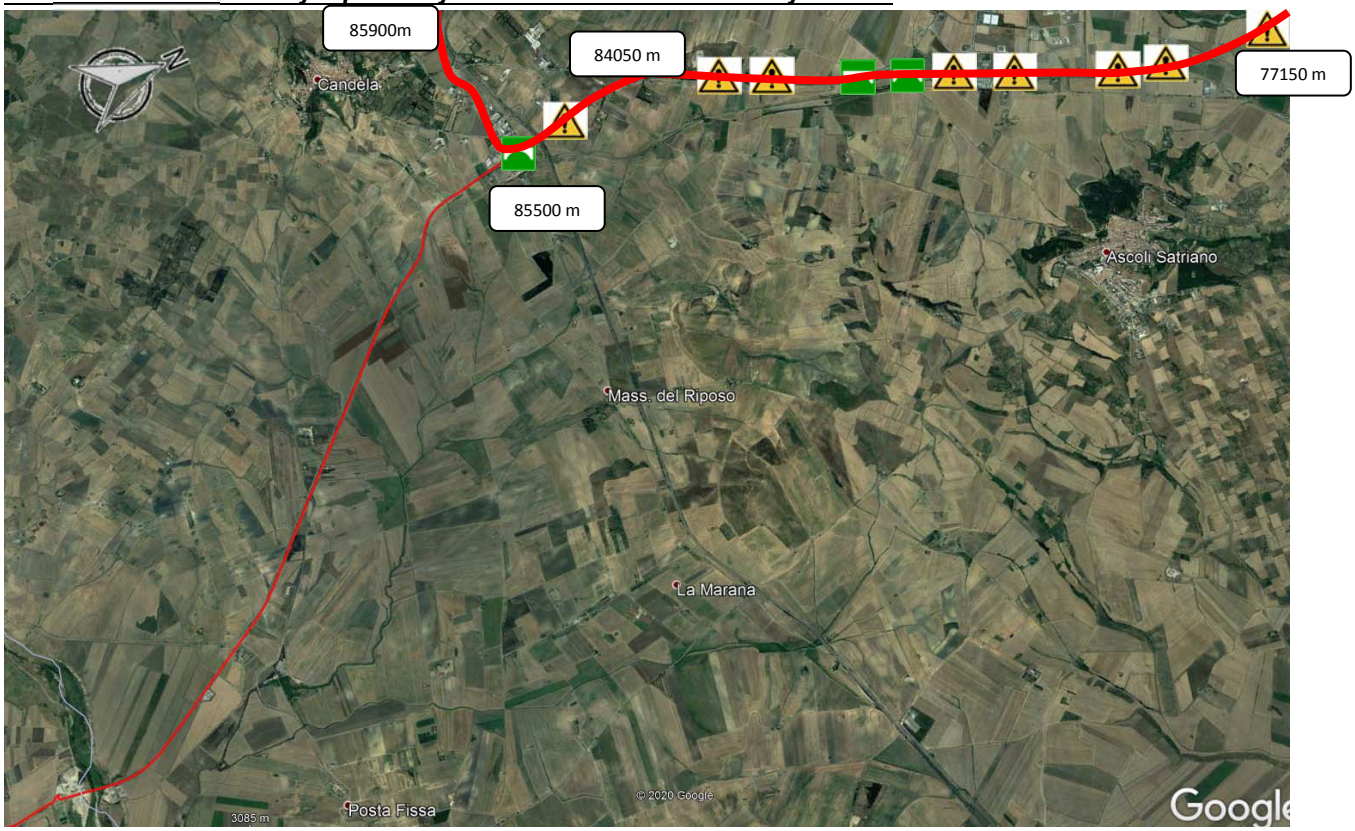
STUDY AREA 6, MAIN PROBLEMS AND SPECIAL FEATURES
Along SS16, corner SS655 direction Melfi (Pz), after SS401 dir. Road width never less than 7 mt Bridge height greater than or equal to 5.00 m Cable crossing, present along the route. Bridge with unknown load. Lack of vegetation along the way. Road surface in sufficient condition


56
6.00 mt
12/02/2020 11:36:46
57
6.00 mt
12/02/2020 11:37:01
58
5.60 mt
12/02/2020 11:39:05
59
6.00 mt
12/02/2020 11:41:04
60
5.80 mt
12/02/2020 11:43:48
61
6.10 mt
12/02/2020 11:44:34
62
5.50 mt
12/02/2020 11:45:26
63
6.20 mt
6.50 mt
12/02/2020 11:45:51
64
6.00 mt
12/02/2020 11:46:21



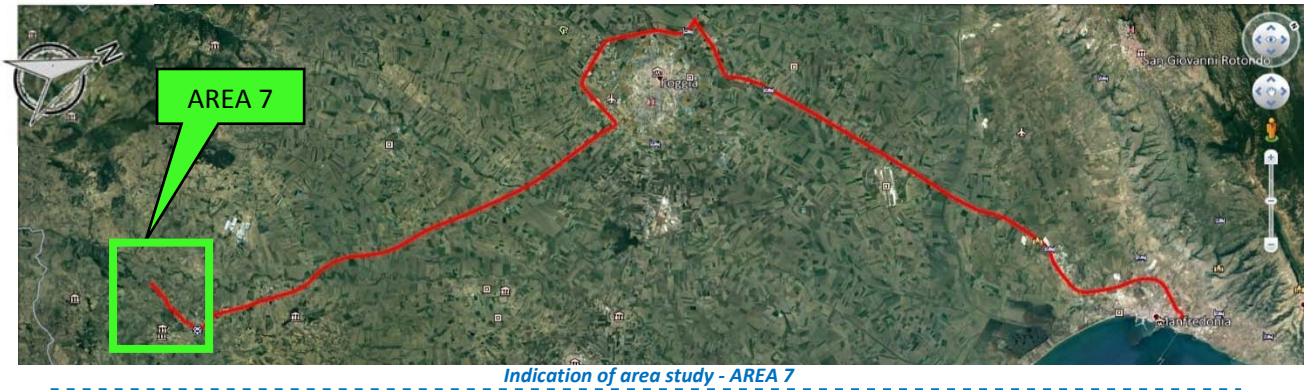
Indication of area study - AREA 6

Indications and analisis for points of interest and dimensional references



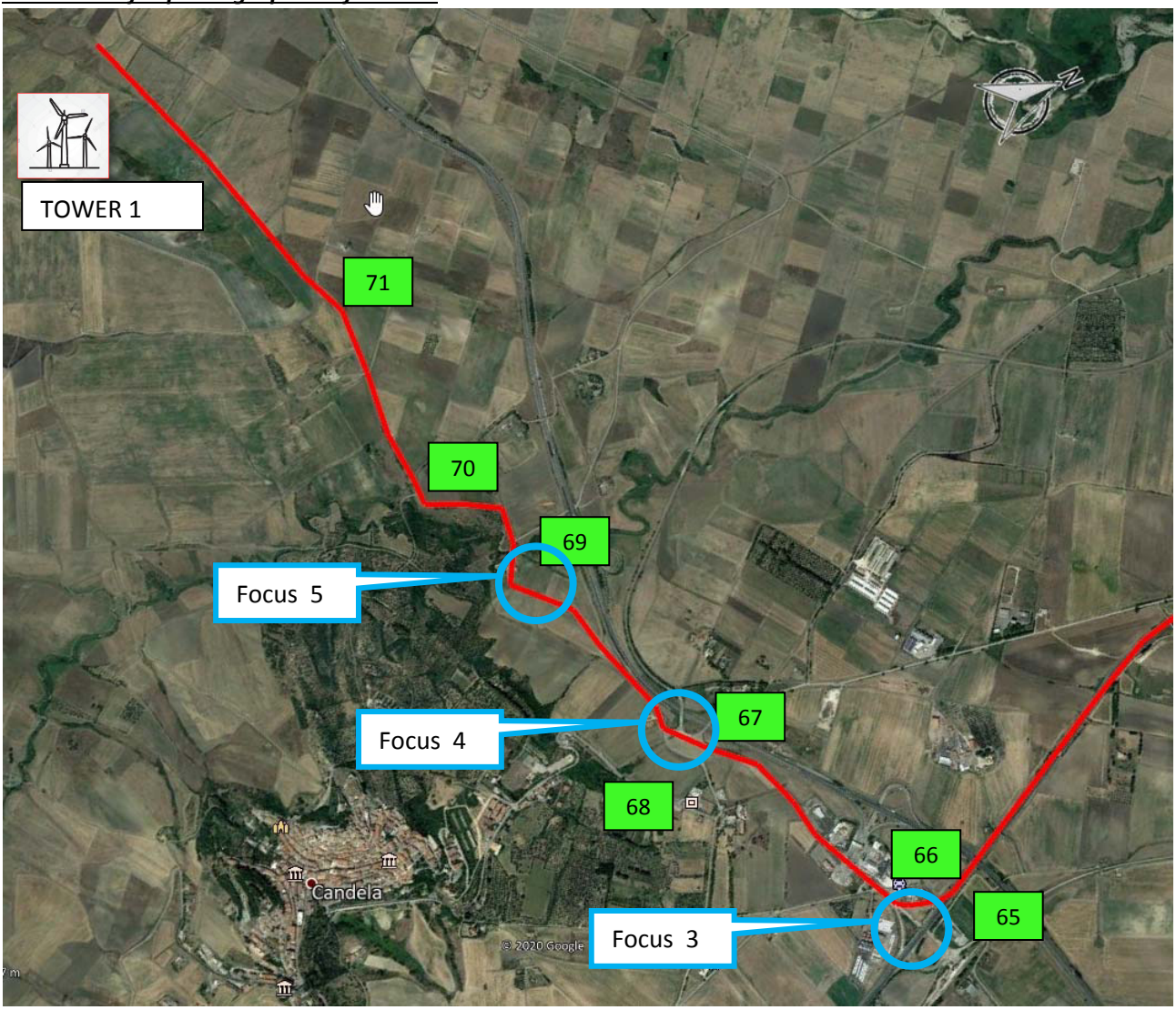
LEGENDA:

- ***Cable Crossing*** *(Medium and low tension)*
- ***Bridge***
- ***School***
- ***Military Area*** (ZONA MILITARE – LIMITE INVALICABILE)
- ***Traffic lights***
- ***Temporary rest Area*** (P)
- ***High traffic Area***
- ***Distance traveled*** (320 m)
- ***Service Station***
- ***Gallery***

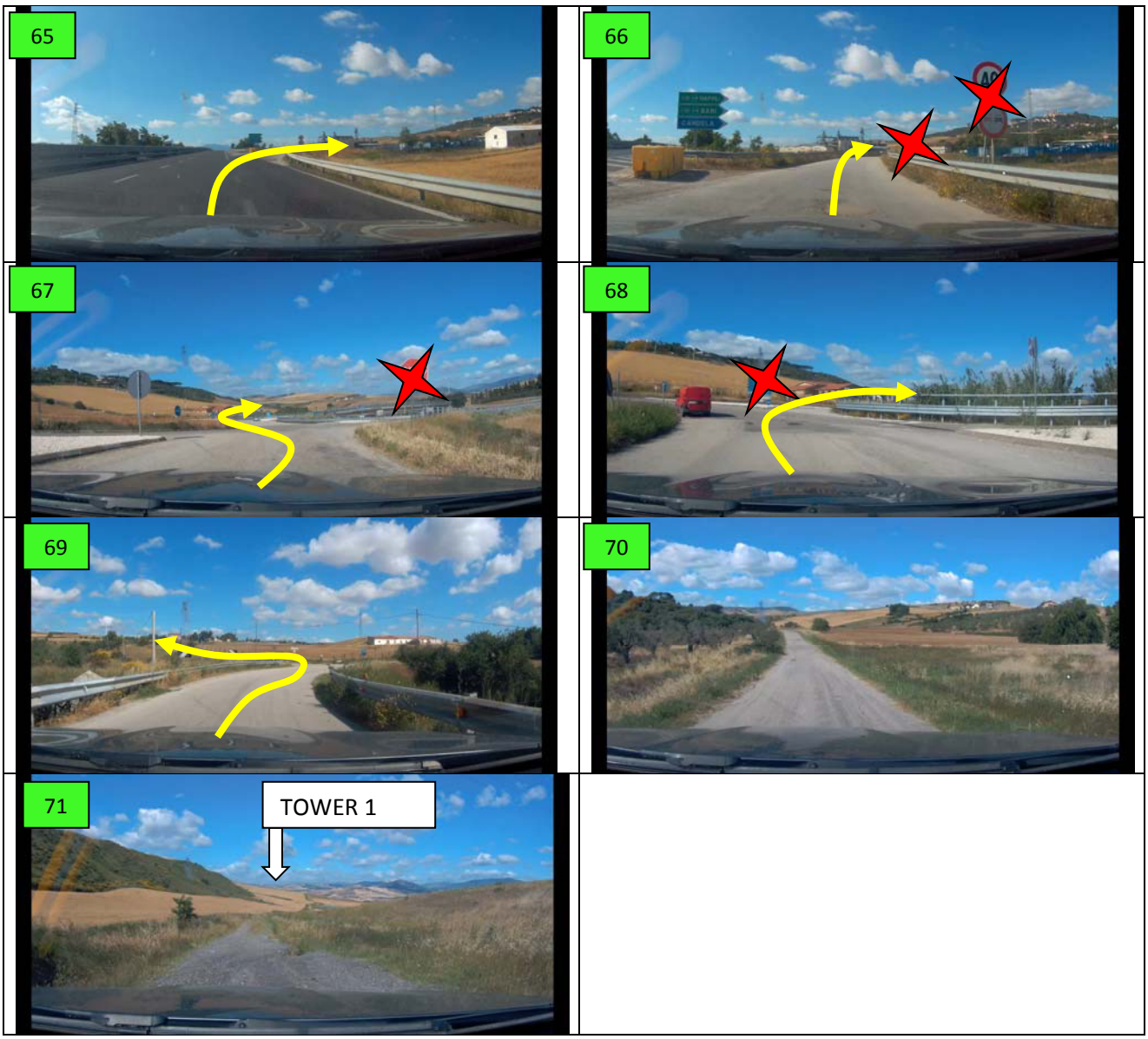


Indication of area study - AREA 7

Indications for photographic references

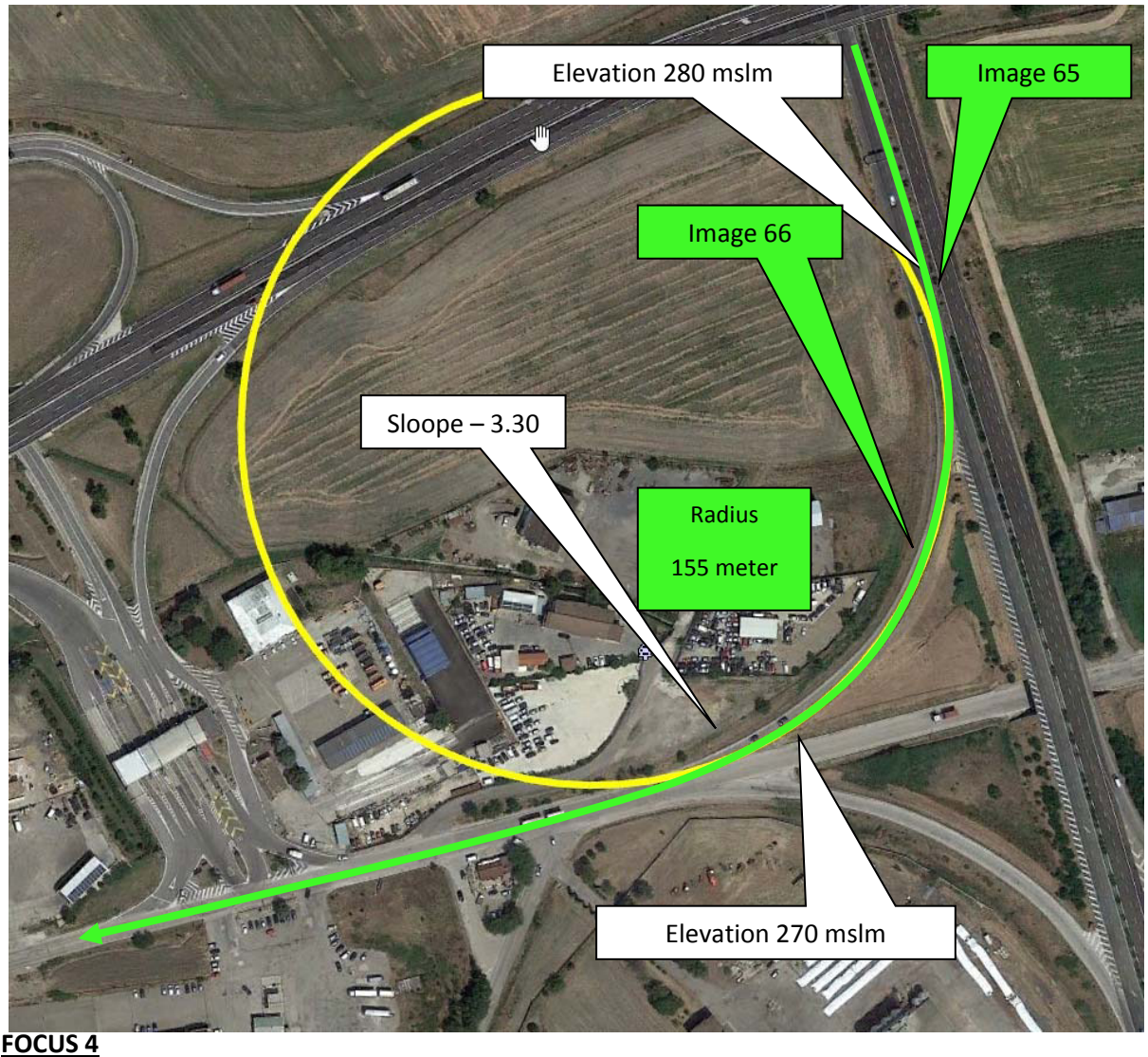


STUDY AREA 7, MAIN PROBLEMS AND SPECIAL FEATURES
Along SS401dir Road width never less than 6.5 mt Bridge height greater than or equal to 5.00 m Cable crossing, present along the route. Bridge with unknown load. Lack of vegetation along the way. Road surface in sufficient condition


65
66
67
68
69
70
71
TOWER 1

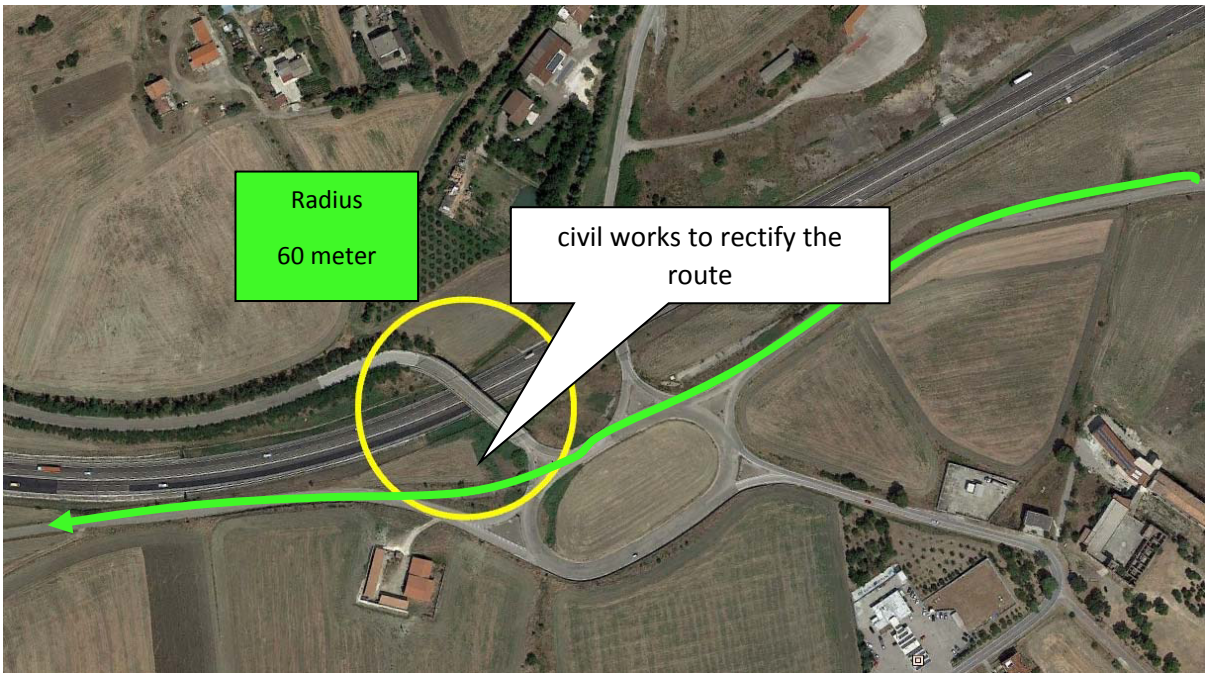
FOCUS 3

Study viability:



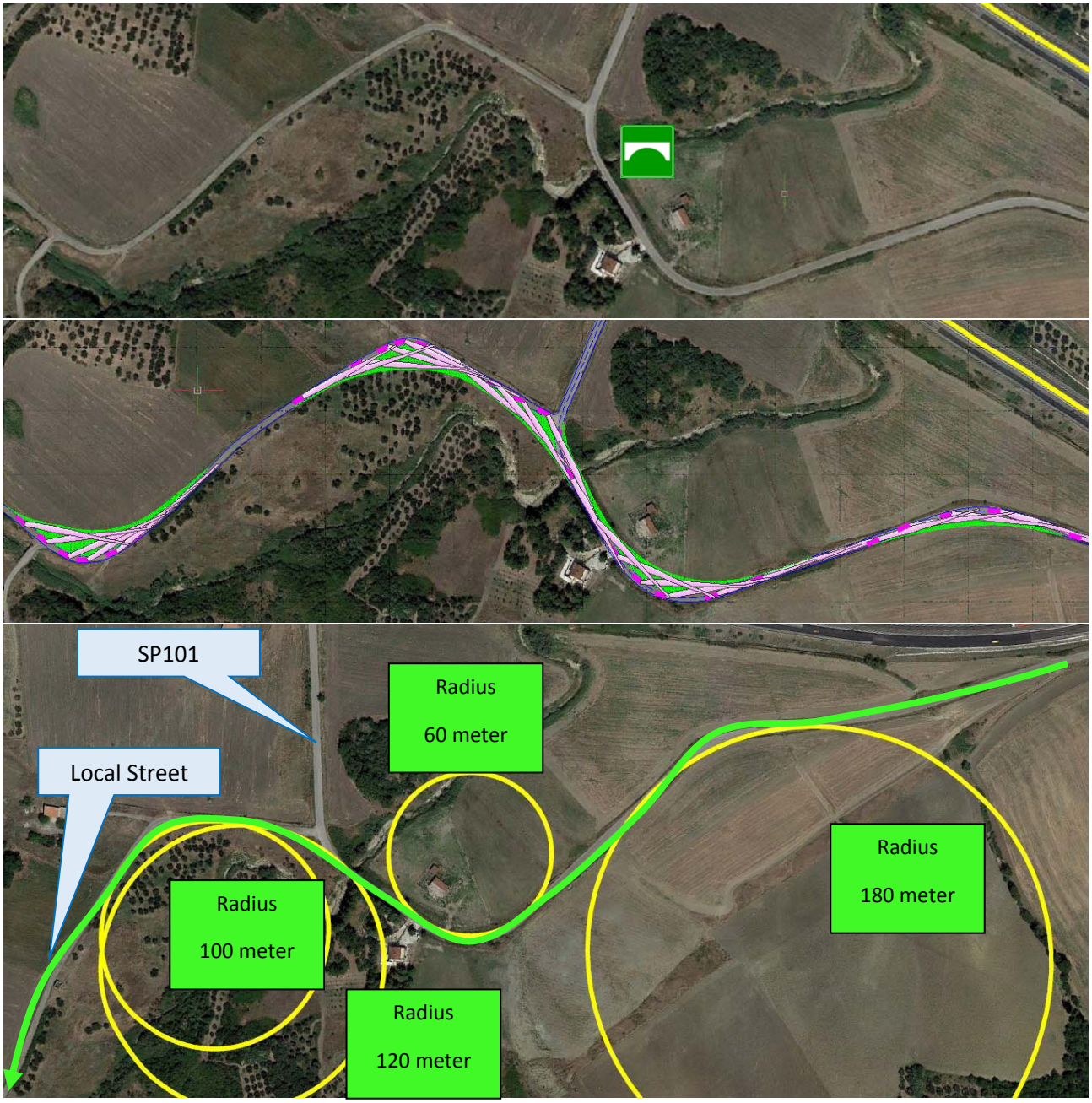
FOCUS 4

Study viability:

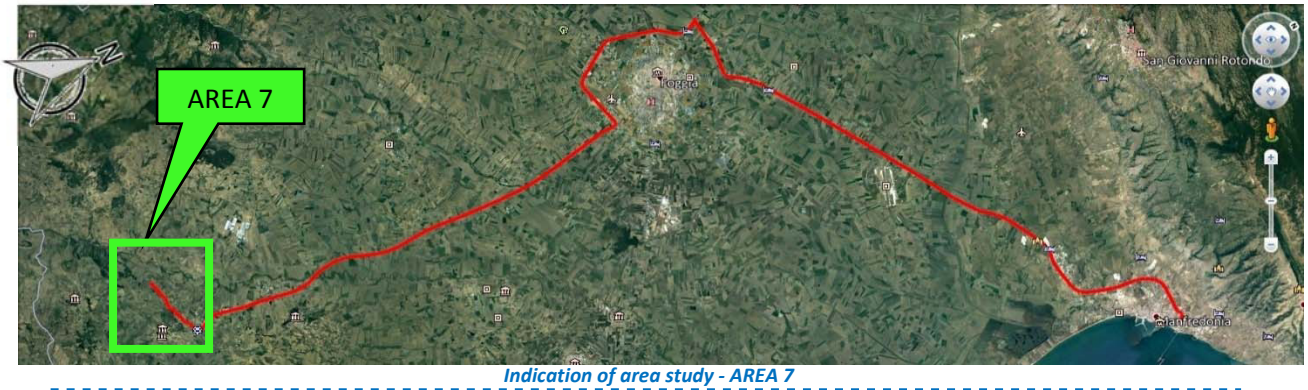


FOCUS 5

Study viability:

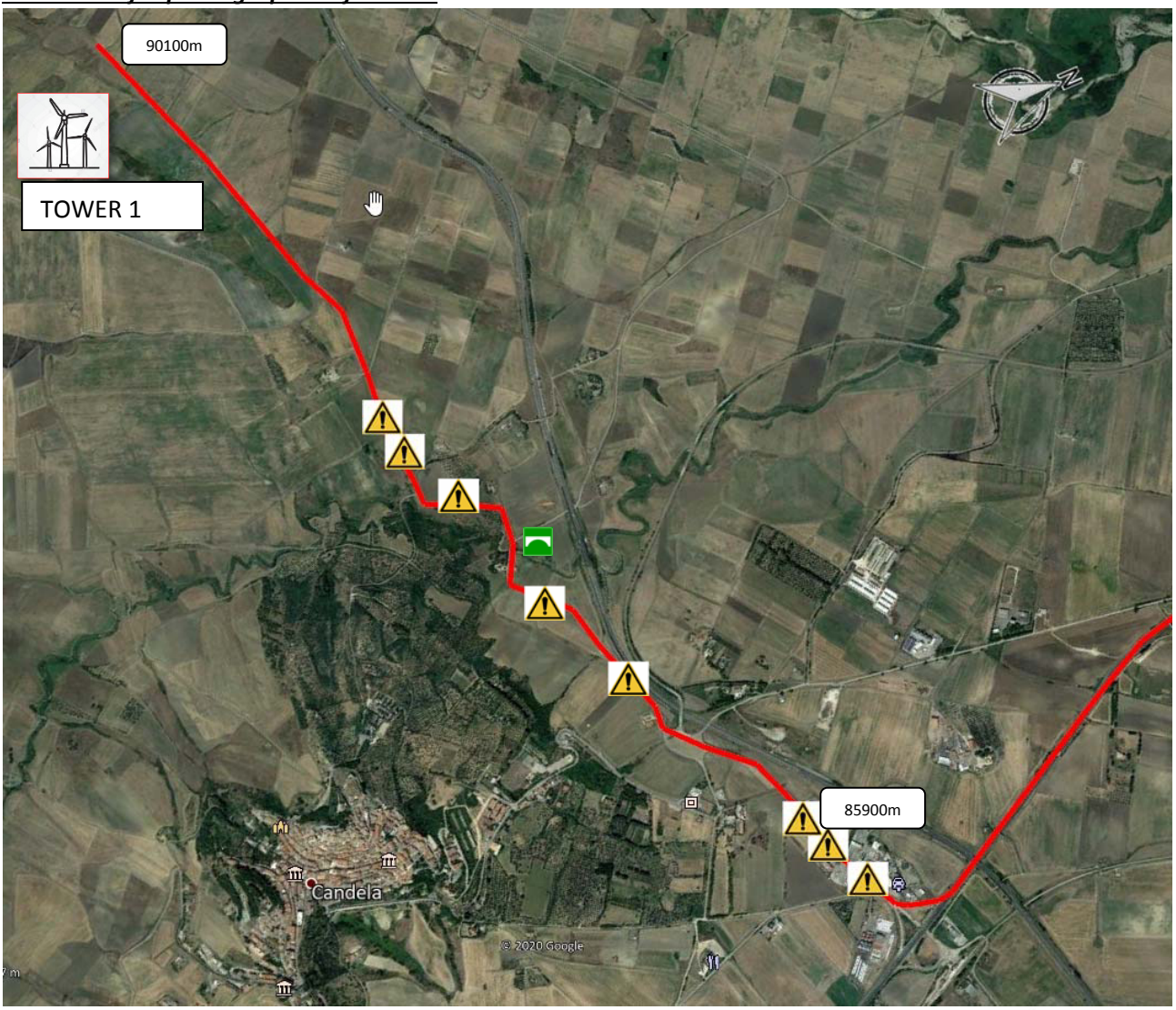


Comments for the focus
- With regard to study number 3, the radius of the exit ramp from the SS655 is large and easy to use, only it must be prepared with the removal of signs and gardrail, the road has a negative slope. - With regard to study number 4, after exiting the SS655, take the SP95 towards Candela, until the roundabout the road is linear, the road surface is not in perfect condition and the curves are wide. After the roundabout for the SP101, work will be needed to regularize the track and allow the convoy to pass, here too you need to remove the road signs. - With regard to the deepening number 5, along the SP101, we find a local/private road, which leads to wheat fields, where we find the NORD part of the wind farm, the road appears with road surface not in perfect condition, tight bending and important civil works to be carried out, in addition to the passage on an unknown loading bridge.



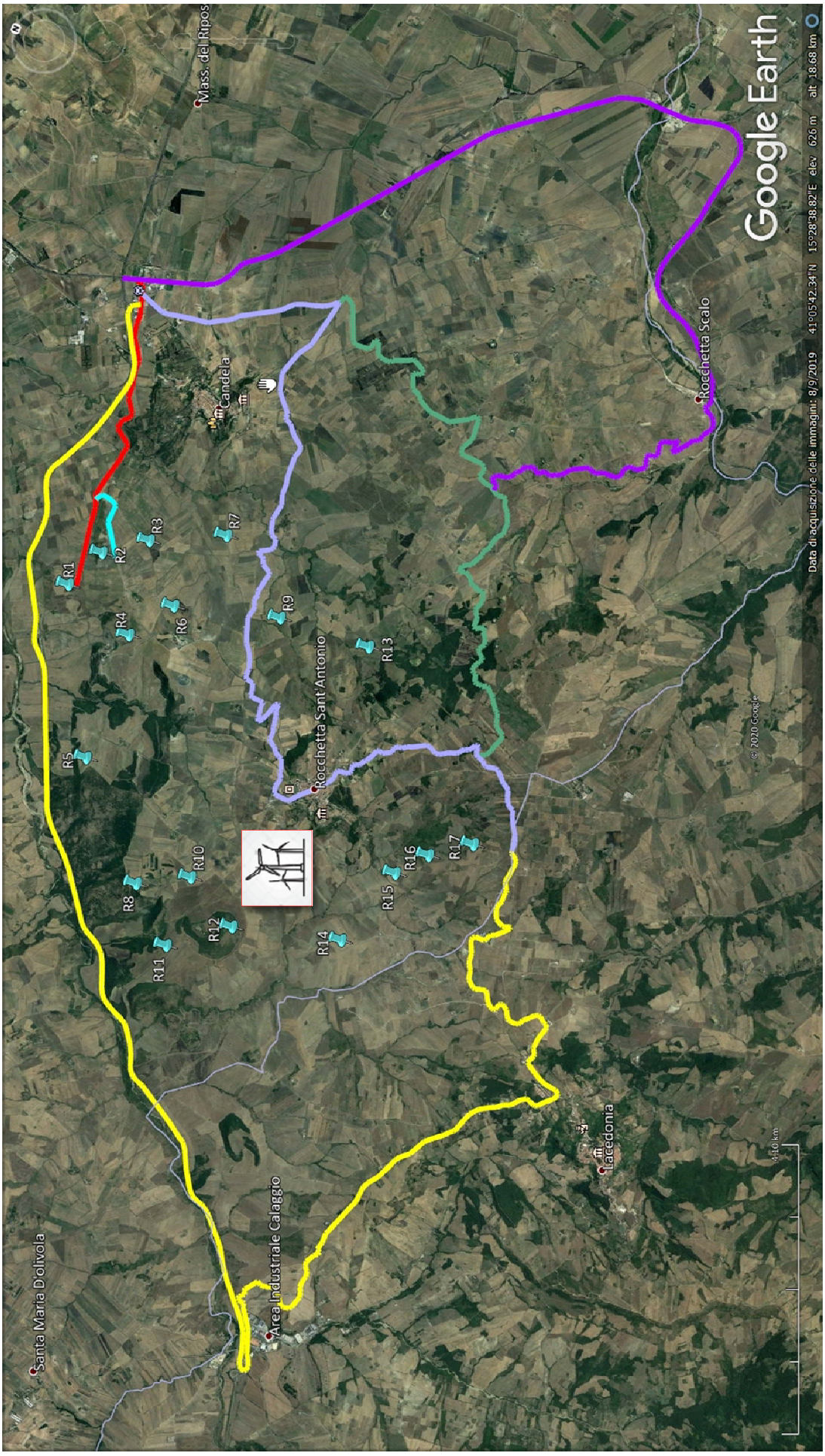
Indication of area study - AREA 7

Indications for photographic references



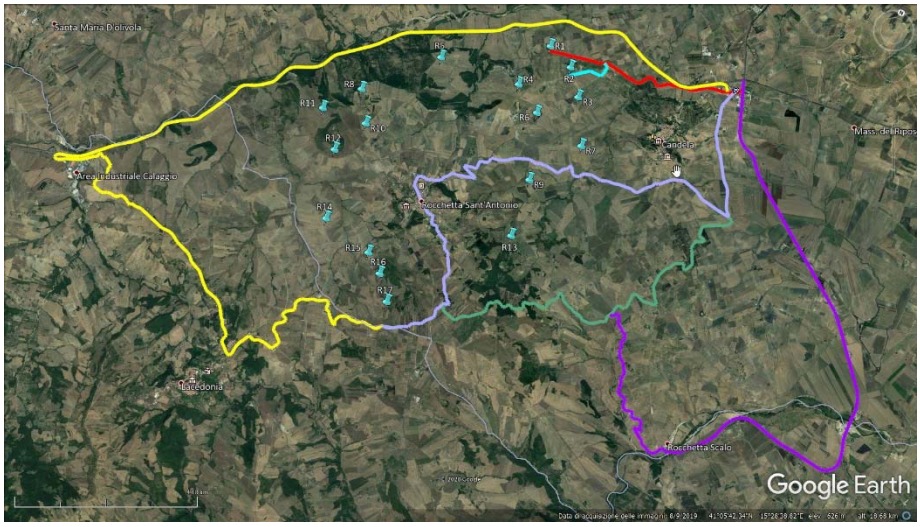
LEGENDA:

- ***Cable Crossing*** *(Medium and low tension)*
- ***Bridge***
- ***School***
- ***Military Area*** (ZONA MILITARE LIMITE INVALICABILE)
- ***Traffic lights***
- ***Temporary rest Area*** (P)
- ***High traffic Area***
- ***Distance traveled*** (320 m)
- ***Service Station***
- ***Gallery***


Route 1, (Tower 1)
Route 1, Alternative 1 (Tower 2,3,4...)
Route 2, (Tower 17,16,15 ...)
Route 2, Alternative 1 (Tower 17,16,15
Route 2, Alternative 2 (Tower 17,16,15
Route 3, (Tower 17,16,15 ...)
Google Earth
Mass. dei Ripos
Candela
Rocchetta Scalo
Rocchetta Sant'Antonio
Lacedonia
Area Industriale Calaggio
Santa Maria D'olivola
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17

9.0_Alternative routes

In addition to the path pursued by ENEL Green Power, which in the study of the facts provides for the passage inside the inhabited center of Rocchetta Sant'Antonio, it has a low feasibility, for objectives and objective criticalities along the way. From studies and inspections carried out, we have used the SP99 or SP98 or SS303 which arrives almost below tower 17, with a possible alternative that would allow you to get to about half of the wind farm. From WEST there is a possibility to use a Highway.



Alternative Routes recap

9.1_Conclusion alternative route

Conclusion for Route 1

The route 1 provides after the exit from the SS655 highway, take the road for Candela SP 95, arrived at the roundabout take the SP101 and then take a local road up to tower 1. This is the fastest and most direct route to tower 1, the road is narrow in the last stretch and crosses a small bridge, in general there are civil rectification works to allow the passage of the SG170 machine.

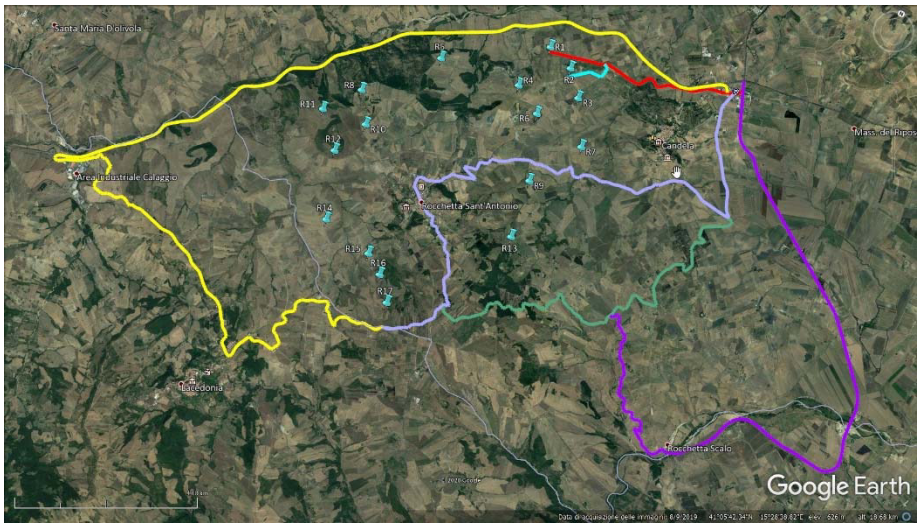
Conclusion for Route 1, Alternative 1

The Alternative 1 to route 1, involves using a crossroads of the local road to reach the other towers.

Conclusion for Route 2

The Route 2, to reach the southern part of the wind farm, plans to use the SP98 road, immediately after exiting the SS655.

Along the SP98 we find the intersection with the SP99 which leads exactly up to the village of Rocchetta Sant'Antonio, crossing it. At the end of the SP99, we find the intersection with the SS303, which leads to tower 17, the southernmost. The whole route is winding with many hairpin curves and tight radii of curvature, as well as many civil works of excavation and filling to allow the convoy to pass through the SG170 Alternative 1 to route 1, involves using a crossroads of the local road to reach the other towers.



Alternative Routes recap

Conclusion for Route 2, Alternative 1

The Alternative 1 to route 2, involves using a local road, which from SP97 reaches SS303, and then reconnects to SP99. The road is in poor condition, many hairpin bends and very narrow beams, the slope very high.

Conclusion for Route 2, Alternative 2

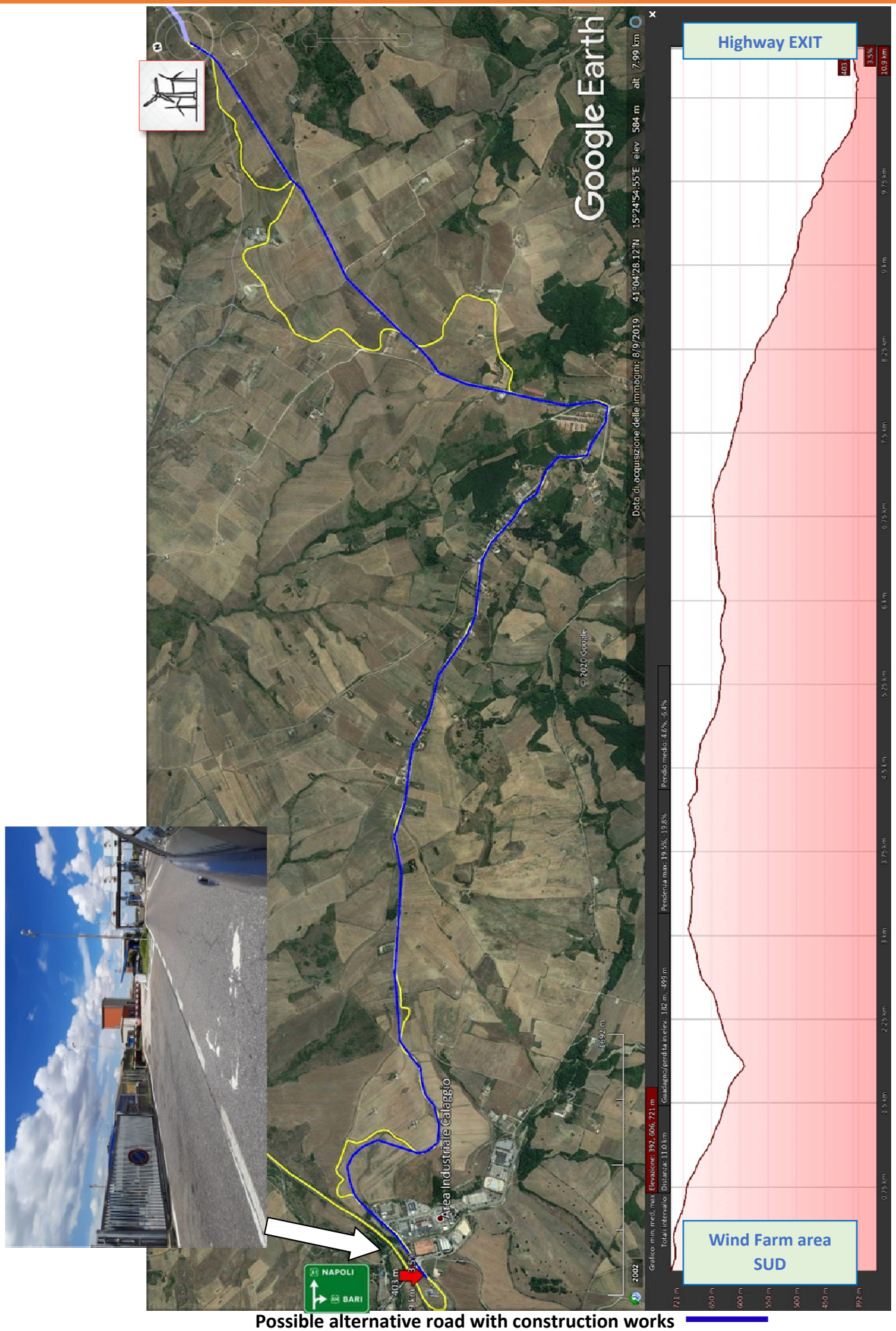
The alternative 2 to route 2, provides not to exit for the Candela junction but to continue until the intersection with the SS 401 and to use the junction for Rocchetta Scalo, from here with the SS303, to reach, from the SOUTH, the wind farm.

Conclusion for Route 3

The alternative route 3, plans to take after the exit from the SS655, the junction for the Due Mari, Napoli-Bari motorway, and to exit at Lacedonia, and then use the Contrada Serritelli road until the intersection with the SS303, which leads to the SOUTH part of the wind farm.

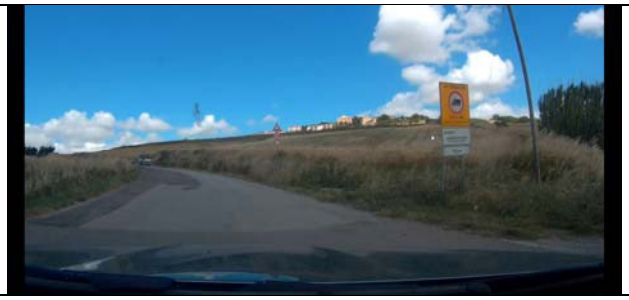
On this part of the route there are many local roads already adapted for the passage of the wind farm towers present in correspondence of the southern part of our park.

The entrance toll booths to the highway provide a transit air for special vehicles (verification is required), at the exit of Lacedonia, the road is very articulated and steep, only in the first part, subsequently before the town of Lacedonia and along the SS303, there is little civil intervention (to be verified with the 170 tower)alternative 2 to route 2, provides not to exit for the Candela junction but to continue until the intersection with the SS 401 and to use the junction for Rocchetta Scalo, from here with the SS303, to reach, from the SOUTH, the wind farm.



Possible alternative road with construction works

41°07'35.1"N 15°32'25.9"E, Corner Sp 97, to local street toward SP99



41°07'45.5"N 15°31'31.8"E, truck access ban 7,5 ton

41°06'29.7"N 15°27'30.4"E, city of Rocchetta Sant'Antonio

41°06'19.9"N 15°27'29.4"E, inside Rocchetta Sant'Antonio

41°05'09.9"N 15°28'39.3"E, corner Sp99 SS303

41°04'37.3"N 15°27'58.7"E, Tower 17

41°05'51.7"N 15°31'14.7"E, corner local street with SS303

41°04'29.0"N 15°32'44.2"E, under SS401

41°03'32.5"N 15°25'47.4"E, Nera lacedonia tower Highway

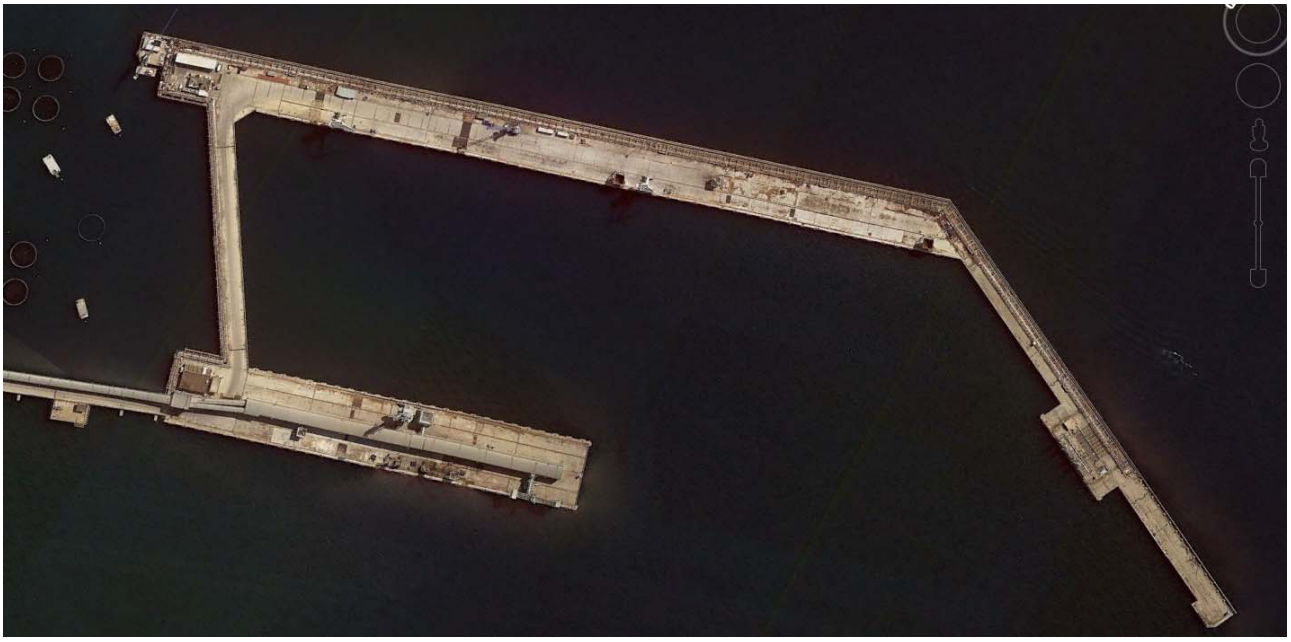
41°04'55.8"N 15°21'57.1"E, Highway exit

10.0_Point of start: Port of Manfredonia

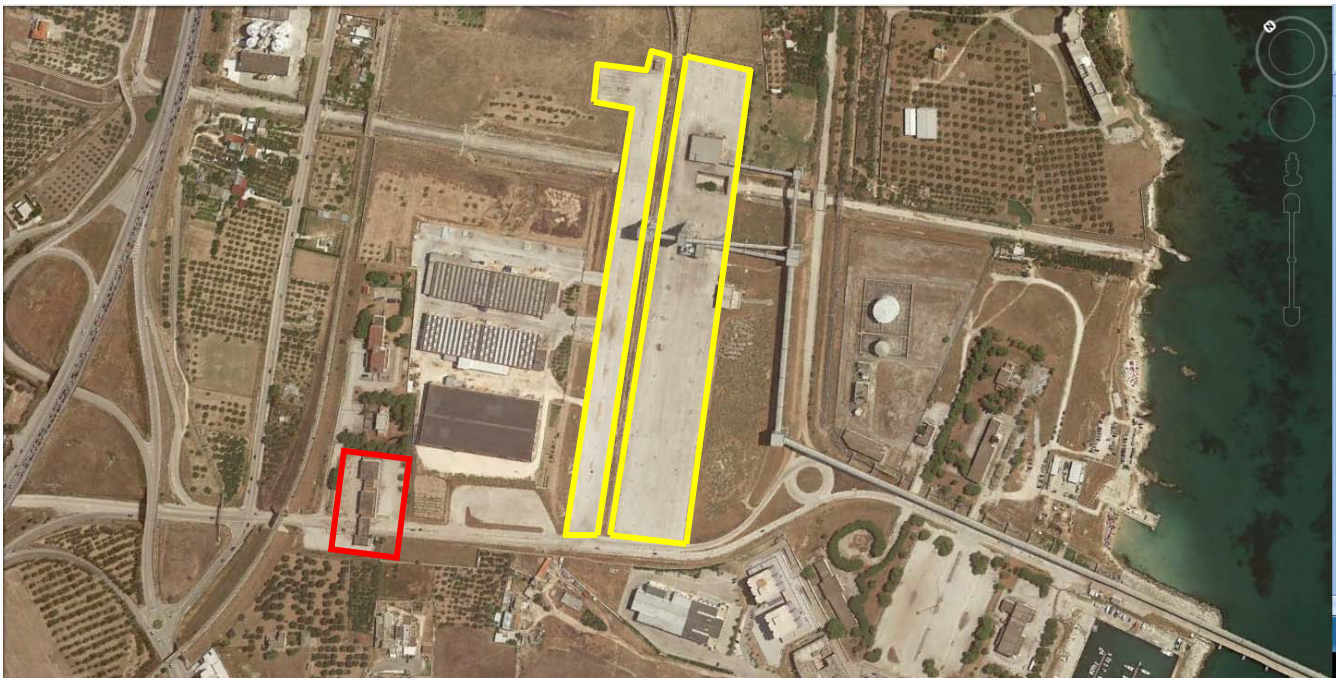
The industrial port of Manfredonia, also called "Porto Alti Fondali", is made up of an arm about 2 km long, which culminates in the port mirror formed by 5 docks: A1, A2, A3, A4, A5. The seabed is sandy and reaches a depth of -10m. Due to the particular physical characteristics and the seabed of the port of Manfredonia, units with a maximum draft of 9.50 meters are allowed to enter and exit the same port.

Truck maneuvers inside the port do not require any special precautions.

Top view of the industrial port of Manfredonia



Detail of the mooring quay of the industrial port of Manfredonia



Ground access area to the industrial port of Manfredonia.

The area highlighted in red in the image indicates the exit point from the port. The detail of this area will be examined further in this report. The yellow area indicates the zone chosen as the storage area. The total surface of the area is 49.460 m^2.

For the docking of the ship you must ask for authorization from the "Autorità di Sistema Portuale del Mare Adriatico Meridionale" which manages and coordinates the industrial port of Manfredonia and the authorization from the Capitaneria di Porto.

The loading and unloading of goods within the port, the storage and movement of goods in general on behalf of third parties is entrusted to **F. Muscatiello. s.c.a.r.l.**

To access the port of Manfredonia it is necessary to request a permit through the Pass service of the PCS GAIA https://gaia.adspmam.it.

This port has already been the site of unloading of "Vestas V150" wind turbine components in November 2019.

Unloading of Vestas V150 Blade at the industrial port of Manfredonia

Contacts

- **Autorità di Sistema Portuale del Mare Adriatico Meridionale -** phone +39 0884538547
- **F. Muscatiello. s.c.a.r.l. -** Viale Kennedy, 3 71043 Manfredonia (FG) phone: +39 0884 090494
  PEC: muscatiello.coop@arubapec.it

Capitaneria di Porto - Piazza Guglielmo Marconi, 27, 71043 Manfredonia (FG) phone: 0884 5

11.0_Index of Figures

ROCCHETTA SANT'ANTONIO, WIND FARM			
IMAGE	***COORDINATE***	***IMAGE***	***COORDINATE***
Image 01	41°38'29.1"N 15°55'47.2"E	Image 52	41°17'20.9"N 15°33'13.6"E
Image 02	41°38'30.9"N 15°55'44.6"E	Image 53	41°15'42.4"N 15°32'53.3"E
Image 03	41°38'32.2"N 15°55'42.7"E	Image 54	41°14'55.9"N 15°32'24.2"E
Image 04	41°38'33.9"N 15°55'41.0"E	Image 55	41°14'21.5"N 15°32'15.3"E
Image 05	41°38'36.4"N 15°55'37.6"E	Image 56	41°13'07.3"N 15°32'31.3"E
Image 06	41°38'40.1"N 15°55'28.1"E	Image 57	41°13'05.8"N 15°32'31.5"E
Image 07	41°38'35.5"N 15°55'02.5"E	Image 58	41°12'16.2"N 15°32'21.8"E
Image 08	41°38'39.7"N 15°54'10.7"E	Image 59	41°11'24.0"N 15°32'03.1"E
Image 09	41°38'35.4"N 15°53'31.6"E	Image 60	41°09'49.9"N 15°31'31.4"E
Image 10	41°38'32.2"N 15°53'25.6"E	Image 61	41°09'34.4"N 15°31'36.7"E
Image 11	41°38'21.6"N 15°53'13.3"E	Image 62	41°09'18.1"N 15°31'44.7"E
Image 12	41°37'41.9"N 15°52'53.4"E	Image 63	41°09'14.1"N 15°31'46.3"E
Image 13	41°37'14.9"N 15°52'46.2"E	Image 64	41°09'11.5"N 15°31'47.6"E
Image 14	41°36'52.3"N 15°52'36.0"E	Image 65	41°09'08.4"N 15°31'48.9"E
Image 15	41°36'08.0"N 15°52'07.7"E	Image 66	41°09'05.7"N 15°31'48.5"E
Image 16	41°36'03.4"N 15°52'01.2"E	Image 67	41°08'54.4"N 15°31'10.0"E
Image 17	41°35'54.6"N 15°51'35.4"E	Image 68	41°08'52.2"N 15°31'05.1"E
Image 18	41°35'50.2"N 15°50'34.7"E	Image 69	41°08'46.0"N 15°30'25.0"E
Image 19	41°35'49.7"N 15°50'26.0"E	Image 70	41°08'40.6"N 15°29'59.5"E
Image 20	41°34'22.5"N 15°45'32.3"E	Image 71	41°08'42.8"N 15°29'30.8"E
Image 21	41°33'06.4"N 15°42'01.3"E		
Image 22	41°32'31.3"N 15°40'18.4"E		
Image 23	41°32'11.3"N 15°39'26.5"E		
Image 24	41°30'53.2"N 15°36'09.0"E		
Image 25	41°30'25.3"N 15°35'06.9"E		
Image 26	41°30'23.0"N 15°35'03.4"E		
Image 27	41°29'52.4"N 15°34'25.4"E		
Image 28	41°29'52.4"N 15°34'25.4"E		
Image 29	41°29'45.1"N 15°34'17.5"E		
Image 30	41°29'43.0"N 15°34'10.9"E		
Image 31	41°29'43.5"N 15°33'58.6"E		
Image 32	41°29'44.1"N 15°33'54.8"E		
Image 33	41°29'45.1"N 15°33'48.1"E		
Image 34	41°29'46.6"N 15°33'37.9"E		
Image 35	41°29'52.5"N 15°31'20.8"E		
Image 36	41°29'52.5"N 15°31'09.0"E		
Image 37	41°28'30.7"N 15°30'34.8"E		
Image 38	41°28'26.6"N 15°30'32.7"E		
Image 39	41°26'34.8"N 15°29'56.3"E		
Image 40	41°25'15.9"N 15°31'19.4"E		
Image 41	41°25'26.6"N 15°32'44.3"E		
Image 42	41°25'31.8"N 15°33'23.7"E		
Image 43	41°20'05.3"N 15°33'41.8"E		
Image 44	41°19'53.1"N 15°33'39.8"E		
Image 45	41°19'32.9"N 15°33'36.4"E		
Image 46	41°19'09.9"N 15°33'32.1"E		
Image 47	41°18'51.1"N 15°33'27.6"E		
Image 48	41°18'34.8"N 15°33'23.6"E		
Image 49	41°18'34.4"N 15°33'23.5"E		
Image 50	41°18'20.7"N 15°33'20.2"E		
Image 51	41°17'31.8"N 15°33'13.7"E		

12.0_ Highlighted and Conclusion

12.1_ Highlighted

The present report concerns the feasibility study of the road route that starts from the port of Manfredonia (Fg), to the "Wind Farm Rocchetta Sant'Antonio (Fg)" site between Lacedonia (Fg) and Candela (Fg) municipalities.

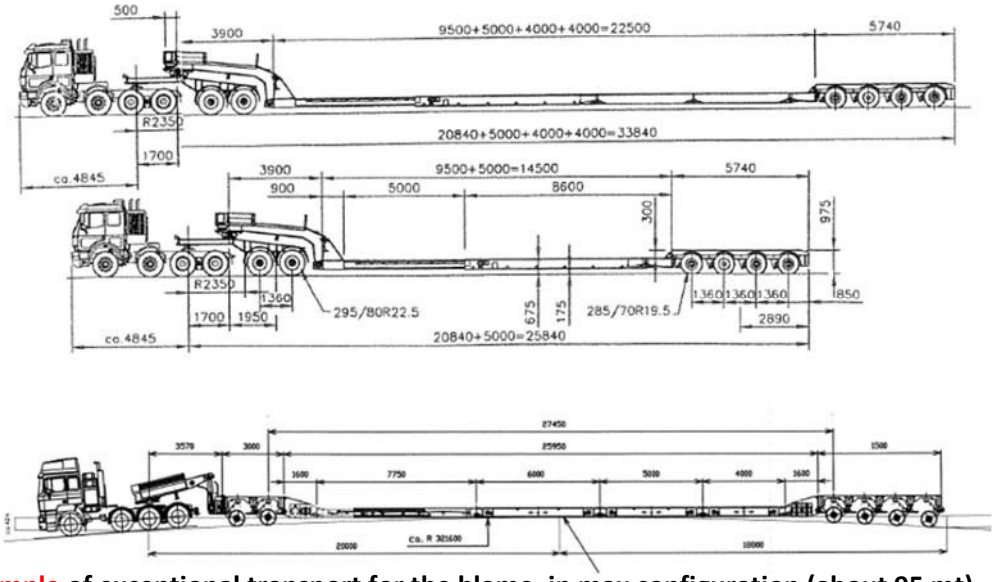
This study has been conducted according the Wind Farm Roads" GRE.EEC.R.73.IT.W.11110.00.041.00 Preliminary Road Survey, of 2014, and Annex 2 Technical Specification for Route Survey from which the proposed routes are extracted and analyzed.

The provinces interested in transport are: Foggia (Puglia).

This road feasibility study was conducted for the 170 m aero engine, trying to identify the quickest and most practical route, which included a minimum number of interventions.

The road and its characteristics both geometric and resistance are essentially studied according to the vehicles that will have to drive it.

The maximum length of the vehicles will be about 95 m, classified as exceptional transport, and and for a 110-ton transport (Nacelle).



Example of exceptional transport for the blame, in max configuration (about 95 mt).

The study involved exceptional transport of about 95 meters in length, with a height of about 4.50÷4.70 meters and a width of about 4.5 meters.

The location of the park it self limits its reachability, which is why this studys are on the possible routes, on the date of the inspection (10 June 2020).

All the routes analyzed provide for departure from the port of Manfredonia (Fg), this port is a hub for the Siemens Gamesa producer, as reported by Enel staff Green Power.

The route includes (Highway) the crossing of viaducts and highway underpasses, in these cases never less than 5 meters wide for the roadway and never less than 5 meters high for the underpasses. only in two cases was a height lower than the minimum, ***but by contacting ENEL on behalf of Nordex, the problem is known and can be overcome, with civil works, for the SG6.0 170, we consider the maximum size of 4.90÷5.00≈ (including transport devices).***

Throughout the way, we find little vegetation in the direction of travel, the same thing for the presence of crossings of high voltage electrical voltage lines, which are never below 6 meters high;

Our studies have concerned both the use of "Strada Statale", "Strada Provinciale" and local street , until to wind farm Rocchetta Sant'Antonio.

All the aeromotors, currently present on the site, are machines of the V90 type or similar more or less, which included much smaller transports than the present study, therefore the transport of a motor, in its maximum configuration, presents significant logistical problems, transport and civilians to adapt the roads to this type of transport.

The proposed roads, in the specifications indicated, at the date of the inspection, are not possible almost in total lenght of the route, because there are curves of narrow radius, with possible civil interventions, and underpass less 5 meter. Instead, the alternative routes proposed present alternatives similar with radii of curvature and similar civil works.

Along these 4 route, the road is with a constant slope. The proposed alternative routes, with the maximum transport configuration (170 m), based on this feasibility, the passage involves inconvenience in terms of costs and work to be carried out. All this report concerned the road route from Manfredonia port (Fg) to Rocchetta Sant'Antonio Areas Wind Farm.

In general, the jobs and directions to be performed are:

- All branches protruding on direct roads (6mt and 5.5mt high width) will have to be cut.
- Keep every difference in height flat on the road being examined, civil interventions and road sign removal.
- Each electrical and telephone cable must be at least 5 meters high
- This study has been prepared considering that the relevant authorities (Police, Urban Fire Brigade, Provincial Police) should be notified.
- Studies and feasibility activities presume the availability of the owners of the various land for the transit and/or construction of civil works on their properties.

This report follows the direct supervision of the route performed on 10 June 2020, so changes and/or changes in feasibility status will be assessed later.

This report may be changed according the final survey performed by the company that will perform the transport.

All practicability studies, indicated here, have been carried out, following the indications of the following documents:

- Siemens Gamesa, D2056872-R07 SGRE 6.0-170 Developer Package rev.07_20200130 General documentation Transport, access roads and crane requirements Wind turbine class.
- Siemens Gamesa, D2165151-002 SGRE ON SG 6.0-170 Preliminary Generic - Site Roads and Hardstands requirements
- Enel Green Power, Technical Specification for Route Survey, Annex 2
- Enel Green Power, EGP.EEC.S.38.XX.X.00000.00.094.01, GENERAL TECHNICAL SPECIFICATION for Trans port Feasibility Studies and Road Surveys EUROPE and NEW COUNTRIE.

In this specific case, the route, with its minimum requirements, was taken from the Siemens Gamesa specifications (page extracted from specific Siemens Gamesa):

Radius (m)	10°			20°			30°			40°			50°			60°		
	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai
5	5	4	2,5	6	6	5,5	6	7,5	8,5	6	9	11,5	7	10	15,5	7	10,5	19
10	5	4	2,5	6	6	5,5	6	7,5	8,5	6	8,5	11,5	7	9,5	15	7	10,5	18
15	5	4	2,5	6	5,5	5	6	7,5	8,5	6	8,5	11	7	9,5	14	7	10,5	17,5
20	5	4	2	6	5,5	5	6	7,5	8	6	8,5	11	7	9,5	14	7	10	16,5
25	5	4	2	6	5,5	5	6	7,5	8	6	8,5	10,5	7	9,5	13,5	7	10	16
30	5	4	2	5	5,5	5	6	7	7,5	6	8,5	10,5	7	9	13	7	10	15,5
35	5	4	2	5	5,5	5	6	7	7,5	6	8	10	6	9	12,5	7	9,5	14,5
40	5	4	2	5	5,5	5	6	7	7,5	6	8	9,5	6	9	12	7	9,5	14
45	5	4	2	5	5,5	5	6	7	7,5	6	8	9,5	6	8,5	11,5	7	9,5	13,5
50	5	4	2	5	5,5	4,5	6	7	7	6	8	9	6	8,5	11	6	9	12,5
55	5	4	2	5	5,5	4,5	6	7	7	6	8	9	6	8,5	10,5	6	9	11,5
60	5	4	2	5	5,5	4,5	6	6,5	6,5	6	7,5	8,5	6	8,5	10	6	9	11
65	5	4	2	5	5,5	4,5	6	6,5	6,5	6	7,5	8	6	8	9,5	6	8,5	10,5
70	5	4	2	5	5,5	4,5	6	6,5	6,5	6	7,5	8	6	8	9	6	8,5	9,5
75	5	4	2	5	5,5	4,5	6	6,5	6	6	7	7,5	6	7,5	8,5	6	8	9
80	5	4	2	5	5,5	4,5	5	6,5	6	5	7	7,5	6	7,5	8	6	7,5	8
85	5	4	2	5	5,5	4	5	6,5	6	5	7	7	6	7,5	7,5	6	7,5	7,5
90	5	4	2	5	5,5	4	5	6,5	5,5	5	7	6,5	6	7	7	6	7	7

Radius (m)	70°			80°			90°			100°			110°			120°		
	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai
5	8	11	23,5	11	11	28	15	11	34									
10	8	11	22	10	11	26,5	13	11	31,5	18	11	37,5						
15	8	10,5	21	9	11	25	12	11	29,5	16	11	35						
20	8	10,5	20	8	11	23,5	10	11	27,5	14	11	32	18	11	37,5			
25	7	10,5	19	8	11	22	9	11	25	12	11	29	15	11	33			
30	7	10,5	17,5	8	10,5	20,5	8	11	23	10	11	26	13	11	29	16	11	33
35	7	10	16,5	7	10,5	19	8	11	21	8	11	23,5	10	11	26	12	11	28
40	7	10	15,5	7	10,5	17,5	7	10,5	19	8	11	20,5	8	11	22	8	11	23
45	7	9,5	14,5	7	10	16	7	10,5	17	7	10,5	18	7	10,5	18,5	7	10,5	18,5
50	7	9,5	13,5	7	9,5	14,5	7	10	15,5	7	10	15,5	7	10	15,5	7	10	15,5
55	7	9,5	12,5	7	9,5	13,5	7	9,5	13,5	7	9,5	13,5	7	9,5	13,5	7	9,5	13,5
60	6	9	11,5	6	9	12	6	9	12	6	9	12	6	9	12	6	9	12
65	6	8,5	10,5	6	8,5	10,5	6	9	10,5	6	9	10,5	6	9	10,5	6	9	10,5
70	6	8,5	9,5	6	8,5	9,5	6	8,5	9,5	6	8,5	9,5	6	8,5	9,5	6	8,5	9,5
75	6	8	9	6	8	9	6	8	9	6	8	9	6	8	9	6	8	9
80	6	7,5	8,5	6	8	8,5	6	8	8,5	6	8	8,5	6	8	8,5	6	8	8,5
85	6	7,5	7,5	6	7,5	7,5	6	7,5	7,5	6	7,5	7,5	6	7,5	7,5	6	7,5	7,5
90	6	7	7	6	7	7	6	7	7	6	7	7	6	7	7	6	7	7

Radius (m)	130°			140°			150°			160°			170°			180°		
	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai	A	Sae	Sai
5																		
10																		
15																		
20																		
25																		
30																		
35	15	11	31	19	11	35												
40	9	11	24	11	11	25,5	12	11	26	14	11	27	16	11	29	18	11	31
45	7	10,5	18,5	7	10,5	18,5	8	10,5	18,5	8	10,5	18,5	8	10,5	18,5	8	10,5	18,5
50	7	10	15,5	7	10	15,5	7	10	15,5	7	10	15,5	7	10	15,5	7	10	15,5
55	7	9,5	13,5	7	9,5	13,5	7	9,5	13,5	7	9,5	13,5	7	9,5	13,5	7	9,5	13,5
60	6	9	12	6	9	12	6	9	12	6	9	12	6	9	12	6	9,5	12
65	6	9	10,5	6	9	10,5	6	9	10,5	6	9	10,5	6	9	10,5	6	9	10,5
70	6	8,5	9,5	6	8,5	9,5	6	8,5	9,5	6	8,5	9,5	6	8,5	9,5	6	8,5	10
75	6	8	9	6	8	9	6	8	9	6	8	9	6	8	9	6	8	9
80	6	8	8,5	6	8	8,5	6	8	8,5	6	8	8,5	6	8	8,5	6	8	8,5
85	6	7,5	7,5	6	7,5	7,5	6	7,5	7,5	6	7,5	7,5	6	7,5	7,5	6	7,5	7,5
90	6	7	7	6	7	7	6	7	7	6	7	7	6	7	7	6	7,5	7

12.2_Conclusions

The costs of the works to be carried out were not considered in this study.

This relationship was created considering (for the transport of all engine parts) the use of trucks, with the dimensions for the transport of the components of the Siemens SG6.0 170 wind turbine:

- Tower, T115 consists of 4 or 6 sections Ø max 4.70 m, between 57 to 89 tons
- Nacelle, Length 14.60 m Width 4.70 m Height 3.40 m, Weight 91.2 tons
- Drive train, length 6.60 m Width 3.20 m Height Approx. 2.30 m, Weight 77.7 tons
- Rotor Hub, Length 3.90 m Width 4.70 m Height 4.10 m, Weight Approx. 48.7 tons.
- Rotor Blade, Length 83.30 m Width 4.60 m Height 4.32 m, Weight 24.60 tons per blade.
- Transformer and medium-voltage switchgear.
- Anchor cages

Route 1 is the direct route to reach tower 1, civil works planned, feasibility with wheels.

Route 2 to reach the SOUTH area of the park, internal passage in the inhabited center, involves many civil works, limited feasibility on wheels; various alternatives have been studied to get to the park from the SOUTH, but none feasible, without civil intervention.

Route 3 involves the use of the motorway (to be verified) the passage from WEST to EAST, civil works are planned to pass through the motorway exit, feasibility with medium wheels.

All along the route it is possible to find areas for temporary parking.

To reduce and / or almost eliminate civil operations, the latest technologies can be used through the use of the blade lifter, only for the transport of the blade; instead, the transport of the tower, the nacelle and the hub remains on trucks, which for a maximum length of 40 meters and within the weight limits provided for by the current road regulations (to be verified with the competent bodies) which provide 13 tons per axle.

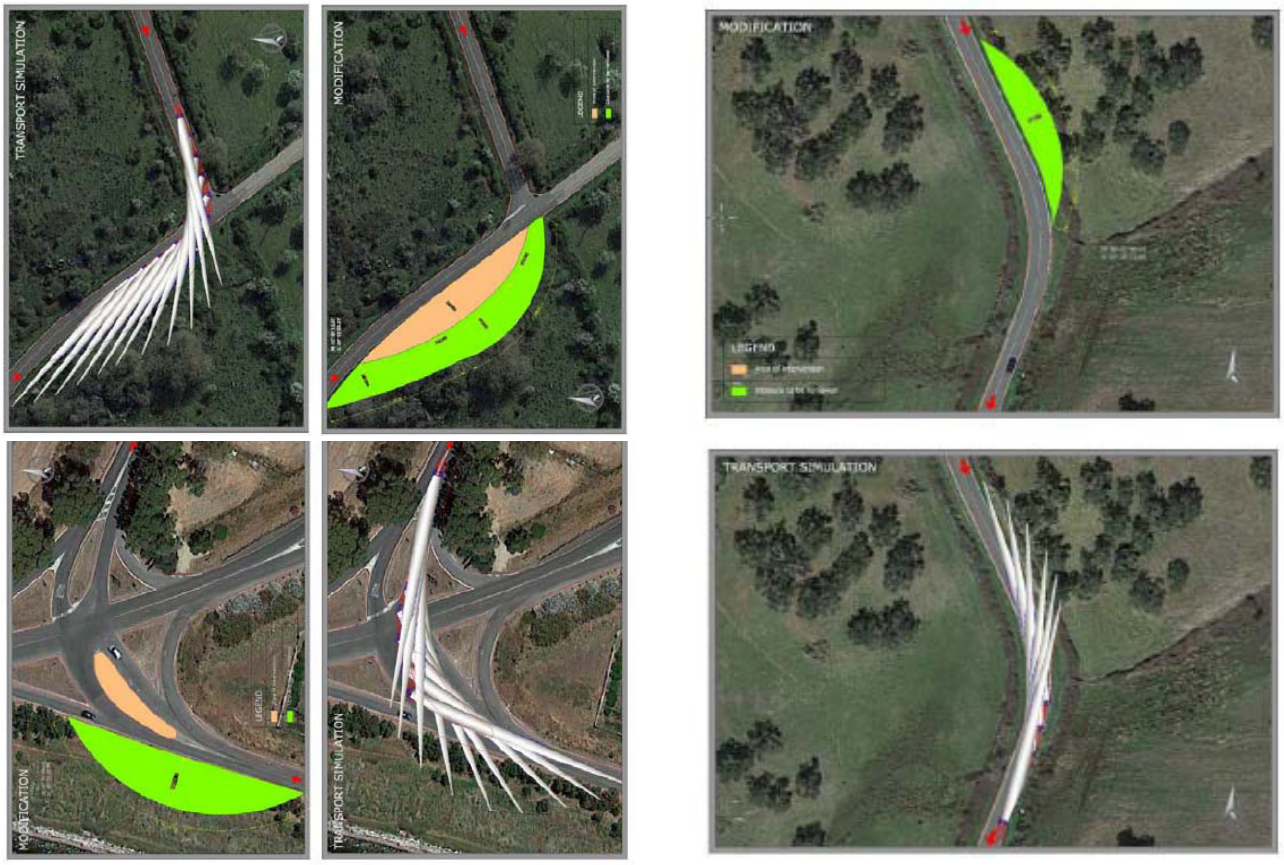
Therefore, to conclude, with the 170-meter wind blade, using only the truck, the interventions to be performed, to reach the Rocchetta Sant'Antonio wind farm, optionally using the alternative route number 1,2 or 3 they are not feasible without carrying out work.

Different speeches for the last stretch, present significant problems and considerable interventions, which could be solved with the use of a paddle lift, but considering also the passage of a mixed transport, the interventions are certainly reduced, but considerable..

SIEMENS Gamesa
RENEWABLE ENERGY

Developer Package
SG 6.0-170

Examples of study of curves with narrow radius and bulk of the truck



Examples of study of curves with the use of the blade lifter, even in built-up areas