Preliminary Route Identification Report

Second Malta – Italy electrical interconnector.

InterConnect Malta

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Table of Contents

1. Introduction....3
2. Onshore Malta side. 3
   a. Existing Interconnector - White Route Figure 1....4
   b. Option 1 – Red Route Figure 1 4
   c. Option 2 – Blue Route Figure 1 5
   d. Option 3 – Green Route Figure 1 6
   e. Option 4 – Orange Route Figure 1 7
   f. Option 5 – Pink Route Figure 1 8
3. Offshore Route 9
   a. Existing interconnector – Red Route Figure 2....11
   b. East Offshore Alternative – Orange Dotted Route Figure 2....11
   c. Proposed Offshore Route – Red Dotted Route Figure 2 12
   d. West Offshore Route – Green Dotted Route Figure 2 12
4. Onshore Route - Sicily 13
   a. Option 1 / Existing – Orange / Red Route Figure 3 15
   b. Option 2 – Yellow Route Figure 3....15
   c. Option 3 – Green Route Figure 3 16
   d. Option 4 – Blue Route Figure 3 16
   e. Option 5 – Pink Route Figure 3 17
5. Alternative Route Lengths....18

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1. Introduction

Malta has been electrically connected to Italy through the first Malta-Sicily interconnector since March 2015. This 230kV, 50Hz interconnector allows the exchange of a nominal 200MW between the sub-station at Ragusa, Sicily and the terminal station at Maghtab in Malta. The synchronous connection between the grids uses XLPE cable and has brought frequency stability and increased reliability to the Maltese electrical grid.

Malta is now planning to install a second electrical interconnector to Sicily. This is required in view of the expected increase in electrical demand due to local development and expected transport electrification as well as the substitution of old generating plant. The second interconnector shall also increase the security of electrical supply to the Maltese consumer and be another tool for Malta to meet its environmental commitments towards the European Green Deal as it allows the importation of electrical energy from large scale renewable sources plugged to the European grid.

The second interconnector is planned to connect the same two stations at Ragusa and Maghtab through another 50Hz link operating in parallel with the first one.

There are various route options as identified by the technical team for this second interconnector and the following is a preliminary report on the advantages and disadvantages of each of these identified routes.

2. Onshore Malta side.

Five alternative options have been identified between the Maghtab terminal station and offshore section, as shown in Figure 1.

It is to be noted that in the area of influence, Wasteserv have applied for a development permit for a waste to energy plant on their site – PA3012/20. This includes two HDPE pipes from the site towards the northeast within Qalet Marku for the intake and the discharge of the cooling water for this plant. This plant is planned for commissioning between 2023 and 2024. However, it is pertinent to note that Wasteserv project PA/3012/20 is still undergoing its permitting process and, at the time of writing of this document, the development permit has not been issued and the proposal is still pending. It is listed in this section for the comprehensive description of the proposed developments in the area.

Similar to the first interconnector, all shore approaches shall be of the trenchless type. This method allows no visual intrusion of the cable approach to the coastline and therefore shall not affect the touristic and landscape values of the coast. There are two methods for such approaches – Horizontal Directional Drilling (HDD) and Microtunnelling. As whichever method to be adopted shall be decided during the eventual design stage, this report will not deal with these options but shall list both under the generic “trenchless type” approach.

The presence of Posidonia Oceanica at Qalet Marku area shall impact all options discussed below. Therefore, careful coordination with the environmental competent authority is necessary to ensure the smooth workflow during the works.

The characteristics of each of the route options are as follows:

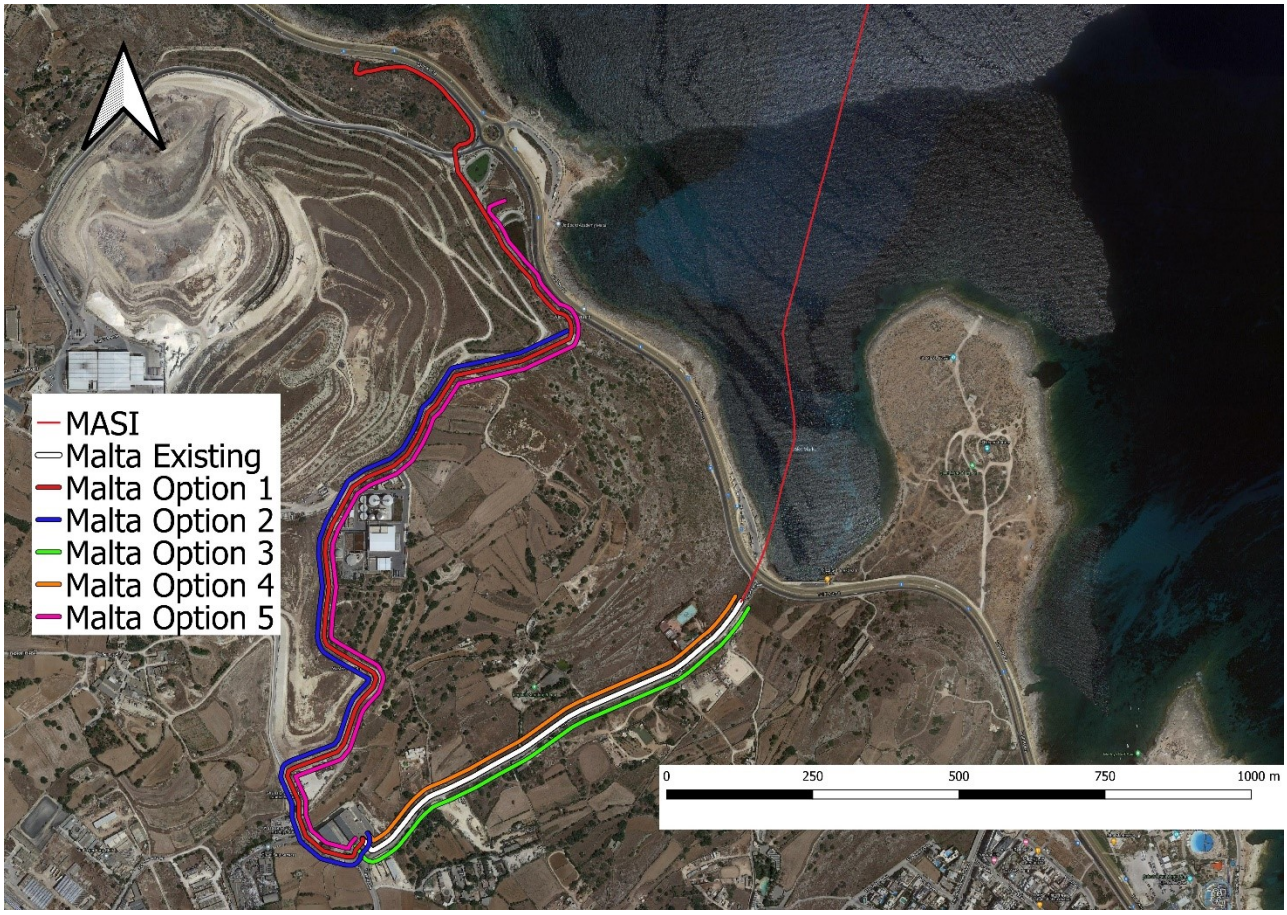

FIGURE 1: ALTERNATIVE ONSHORE ROUTES - MALTA

a. Existing Interconnector - White Route Figure 1

This is the route that is followed by the present (no.1) interconnector (IC1, MASI). The onshore cable from the Maghtab station towards the seashore at Qalet Marku passes through an underground culvert along the north-western side of Triq ir-Ramla and crosses Triq Tul il-Kosta through a trenchless approach up to approximately 200m from the coast. The offshore cable is laid on the seabed protected with cast-iron shells in posidonia meadows and then buried or protected by rock along the route to Sicily. The overall length of the onshore cable section is 800m.

b. Option 1 – Red Route Figure 1

This route exits from the Maghtab Terminal station at its southeast end, turns clockwise and follows the public road (no name) until Wasteserv's Maghtab facility south west entrance. It then passes through the ring road of the Wasteserv's facility on the eastern side and while still within Wasteserv's premises is directed towards the northwest parallel to Triq Tul il-Kosta. It then exists Wasteserv's north east's gate and still parallel to Triq tul il-Kosta for approximately 250m within the public land. A trenchless shore approach method is then used to cross Triq Tul il-Kosta and the shoreline for a distance of approximately 200m north

and west of the Natura 2000 site L-Ghadira s-Safra (Special Area of Conservation MT0000008 as per Government Notice G.N. 1373 of 2016). The route exits the shoreline in a northerly direction to the west of the present interconnector.

Advantages:

- Route is the most western approach (800m) from the existing interconnector thus being the most immune from any accident that may occur to the two interconnectors near the Malta shore approach.
- The major part of the onshore route is within Wasteserv's Maghtab facility and therefore there is no interference with the general public during the cable laying works.
- There is no offshore interference with the planned Wasteserv's thermal plant sea water cooling pipework.
- This option completely avoids Qalet Marku.
- As the exit from the shoreline is towards the north, the straight-line offshore cable pulling within the trenchless approach should be the easiest of the options. Adequate space is available for a transition joint from submarine to land cable.
- As a separate onshore route from the present interconnector, it avoids common mode faults (e.g. accidental damage) that can impact both interconnectors thus increasing security of supply.

Disadvantages:

- As the route lies within the south-eastern and north-eastern border of Wasteserv's area, it is the one that most interferes with any future development plans of the site – no construction shall be allowed on top of the cable route and cable trench/ culvert top cover have to be of the heavy duty type so as to allow laden trucks to pass over.
- Cable will have to cross the path of the cooling sea water inlet and outlet paths (possibly near the cooling water pump area) and therefore a planned and coordinated crossing within the Wasteserv's property has to be carefully planned.
- Any possible future repair to the cable will impact Wasteserv operations for the duration of such repairs. Therefore, alternate heavy vehicle operational routes for such cases will have to be agreed prior to the installation of the cable.
- Passes near a Natura 2000 site.
- Longest route.
- A transition joint would be necessary, thus adding extra works and a possible additional point of failure.

c. Option 2 – Blue Route Figure 1

This option follows the route through Wasteserv property in a similar fashion to option 1 but stops prior to turning northwest within the Wasteserv area and therefore leaves the northeastern boundary of the site unobstructed. The cable exits the Wasteserv site through a trenchless method in the vicinity of the planned site for the cooling sea water pump. Depending on the arrangement with Wasteserv, the crossing of the two pipes to the north shall either be on land as per option 1 or under the seabed. The cable exits the

shoreline in a north easterly direction and turns northwards with the route passing to the west of the present interconnector.

Advantages:

- The offshore route lies outside the Qalet Marku bay therefore presenting less problems for the cable laying ship to align itself with the trenchless approach tunnel.
- Presents less interference to Wasteserv's expansion plans in the area than option 1 although it runs all along the southeast border.
- The major part of the onshore route is within Wasteserv's Maghtab facility and therefore there is no interference with the general public during the cable laying works.
- Avoids interference with onshore Malta Natura 2000 sites.
- As a separate onshore route than the present interconnector, it avoids common mode faults (e.g. accidental damage) that can impact both interconnectors thus increasing security of supply.

Disadvantages:

- Route option presents the highest interference with the two proposed Wasteserv sea water cooling pipelines. Such an interaction will have to be carefully managed in order to avoid complications if the latter's permit is approved.
- Any possible future repair to the cable will impact Wasteserv operations for the duration of such repairs. Therefore, alternate heavy vehicle operational routes for such cases will have to be agreed prior to the installation of the cable.
- No construction shall be allowed on top of the cable route and cable trench/ culvert top cover have to be of the heavy-duty type so as to allow laden trucks to pass over. A road wide enough to allow a van to pass through will have to be allowed to ease access during cable repair/ testing procedures.
- Longer than the present interconnector.
- Passes close to the existing interconnector at the start of the offshore route which reduces the security of supply in this zone.
- A transition joint would be necessary, thus adding extra works and a possible additional point of failure.

d. Option 3 – Green Route Figure 1

The onshore route option follows the same onshore route of the present interconnector i.e. exiting the Maghtab terminal station at the south-east corner and proceeding through Triq ir-Ramla to Triq Tul il-Kosta exiting the seashore at the south western corner of Qalet Marku through a trenchless approach. In order to avoid any interference with the already operating interconnector, the cable will have to pass on the southern side of the Triq ir- Ramla with an underground crossing of the present interconnector being carried out (new cable will have to pass below the present interconnector) at the vicinity of the intersection with Triq Tul il-Kosta. Cable shall continue offshore to the west of the present interconnector.

Advantages:

- Passes through public roads (already disturbed ground)
- Onshore cable is a relatively straight line making this the shortest option of all considered.
- Offshore cable has the longest trenchless approach method. It is therefore considered to be the most protected route nearshore.
- Route shall be away from any Wasteserv site developments.
- Avoids onshore Natura 2000 sites in Malta
- Shortest distance.

Disadvantages:

- Inconvenience to residents and road users during works associated with the trenching or the construction of culverts for the onshore cable laying.
- Attention to be paid to possible underground services passing through Triq ir-Ramla
- Triq ir-Ramla has to be crossed at two points; one near the terminal station and the other near Triq Tul il-Kosta. Traffic Management is to be undertaken.
- Offshore cable is the nearest route to the present cable thus being subject to common mode faults nearshore.
- The long trenchless shore approach presents the most risks during construction.
- Cable crosses the two Wasteserv sea water cooling pipes offshore. Coordination has to be undertaken with Wasteserv to ensure that this interference is at minimum and to coordinate the final installation works.
- Uses same route as existing cable. No diversification would lead to issues in security of supply.

e. Option 4 – Orange Route Figure 1

This onshore route follows the same path as Option 3 with the exception that as the route passes to the east of the existing cable, it avoids completely any cable crossings onshore Malta as well as nearshore Malta.

Advantages:

- Passes through public roads (already disturbed ground)
- Onshore cable is a relatively straight line making this one of the shortest options of all considered.
- Route shall be away from any Wasteserv site developments.
- Avoids onshore Natura 2000 sites in Malta
- Only one road crossing at Triq ir-Ramla near Terminal Station

Disadvantages:

- Exits within Qalet Marku bay very near present interconnector. Therefore, offshore route most exposed to common mode faults with the existing cable nearshore Malta.
- Inconvenience to residents and road users during works associated with the trenching or the construction of culverts for the onshore cable laying.

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- Attention to be paid to possible underground services passing through Triq ir-Ramla
- Cable crosses the two Wasteserv sea water cooling pipes offshore. Coordination has to be undertaken with Wasteserv to ensure that this interference is at minimum and to coordinate the final installation works.

f. Option 5 – Pink Route Figure 1

This route passes through the Wasteserv Maghtab complex in a similar fashion to options 1 and 3. It exits the Wasteserv sites midway between the exit points of options 1 and 3. Thus it follows the southeast border of the site and exits part of the way on the northeast border passing below the present parking area which is being used as a temporary caravan camp site. Exit is carried out through a 450m trenchless approach from the Wasteserv complex, passing below the present interconnector offshore route and exiting from the sea floor to the east of the present interconnector. This cable exits outside of the Qalet Marku bay.

Advantages:

- The major part of the onshore route is within Wasteserv's Maghtab facility and therefore there is no interference with the general public during the cable laying works
- There is no offshore interference with the Wasteserv's thermal plant sea water cooling piping.
- This option completely avoids Qalet Marku
- As a separate onshore route than the present interconnector, it avoids common mode faults (e.g. accidental damage) that can impact both interconnectors onshore.
- Avoids onshore Natura 2000 site
- As cable emerges outside Qalet Marku Bay, there should be no issues for the pulling of cable into the trenchless approach tunnel.

Disadvantages:

- As the route lies within the south-eastern and north-eastern border of Wasteserv's area, it may interfere with any future development plans of the site – no construction shall be allowed on top of the cable route and cable trench/ culvert top cover have to be of the heavy-duty type so as to allow laden trucks to pass over. A road wide enough to allow a van to pass through will have to be allowed to ease access during cable repair/ testing procedures.
- Cable will have to cross the path of the cooling sea water inlet and outlet paths just offshore and therefore a planned and coordinated crossing within the Wasteserv's property has to be carefully planned.
- Any possible future repair to the cable will impact Wasteserv operations for the duration of such repairs. Therefore, alternate heavy vehicle operational routes for such cases will have to be agreed prior to the installation of the cable.
- Cable passes below the present offshore interconnector and thus careful planning is required during installation.
- Relatively long trenchless shore approach which may lead to technical challenges.

- A transition joint would be necessary, thus adding extra works and a possible additional point of failure.

3. Offshore Route

Three alternative offshore route options have been identified between Malta and Sicily and these are shown in Figure 2. Of these three options, one passes to the east of the present interconnector while the other two pass to the west.

The following main features have been considered when identifying the proposal:

Each route takes a different path from the existing interconnector one in order to avoid common mode issues that can lead to failure of both cable connections. This was affected to enhance security of supply.

Each route has been considered in terms of known restrictions being the Vega oil field in the Italian EEZ, possible areas for hydrocarbon studying, bunkering and trawling zones in the Malta zone. There may be other obstacles including possible wrecks, UXOs and other man-made hazards but as these are considered localised in areas they can easily be bypassed. Although it is known that the area within the Italian EEZ several licences have been granted and have been taken up for oil field exploration activities, as yet there is no public information available as to whether such areas have been designated for hydrocarbon extraction/studying purposes. Therefore, this report assumes that no other oil exploration zones have been granted in the interconnector path.

Regarding geological features, the EIA for the first interconnector stated that:

- From 0 – 11 km from Malta coast, there is the presence of rocks and rock subcrops with an escarpment which lies between 5 and 7.9 km from the shoreline
- From 11 to 65 km from the Malta coast, the seabed is smooth consisting of sandy clay and silty fine sand. Pockmarks are present but these are not large.
- From 65 km to Sicily landfall, seabed is made from sediments composed of silty clay and very fine silty sands. No rock outcrops or subcrops are found in this area

All the proposed routes are sited on the Malta- Sicily Plateau.

Along the offshore route, at present, there are 13 submarine communications cables that have to be crossed. At least another communication cable from France to Egypt passing through Malta is being planned to be laid within the short term.

Apart from the Melita TransGas Pipeline project, which is planned to connect Malta to Sicily, no other pipelines seem to be planned along the routes considered. The Argo – Cassiopea project which has recently been given the green light by the Italian authorities shall be installed from Gela towards the west and this is outside the area considered for the interconnectors

As both interconnector cables use alternating current technology, only slight changes in length are allowed as otherwise equal load sharing would be problematic and it would be possible where one cable would be fully loaded with the other cable still being partly loaded thus never reaching the theoretical potential of the link.

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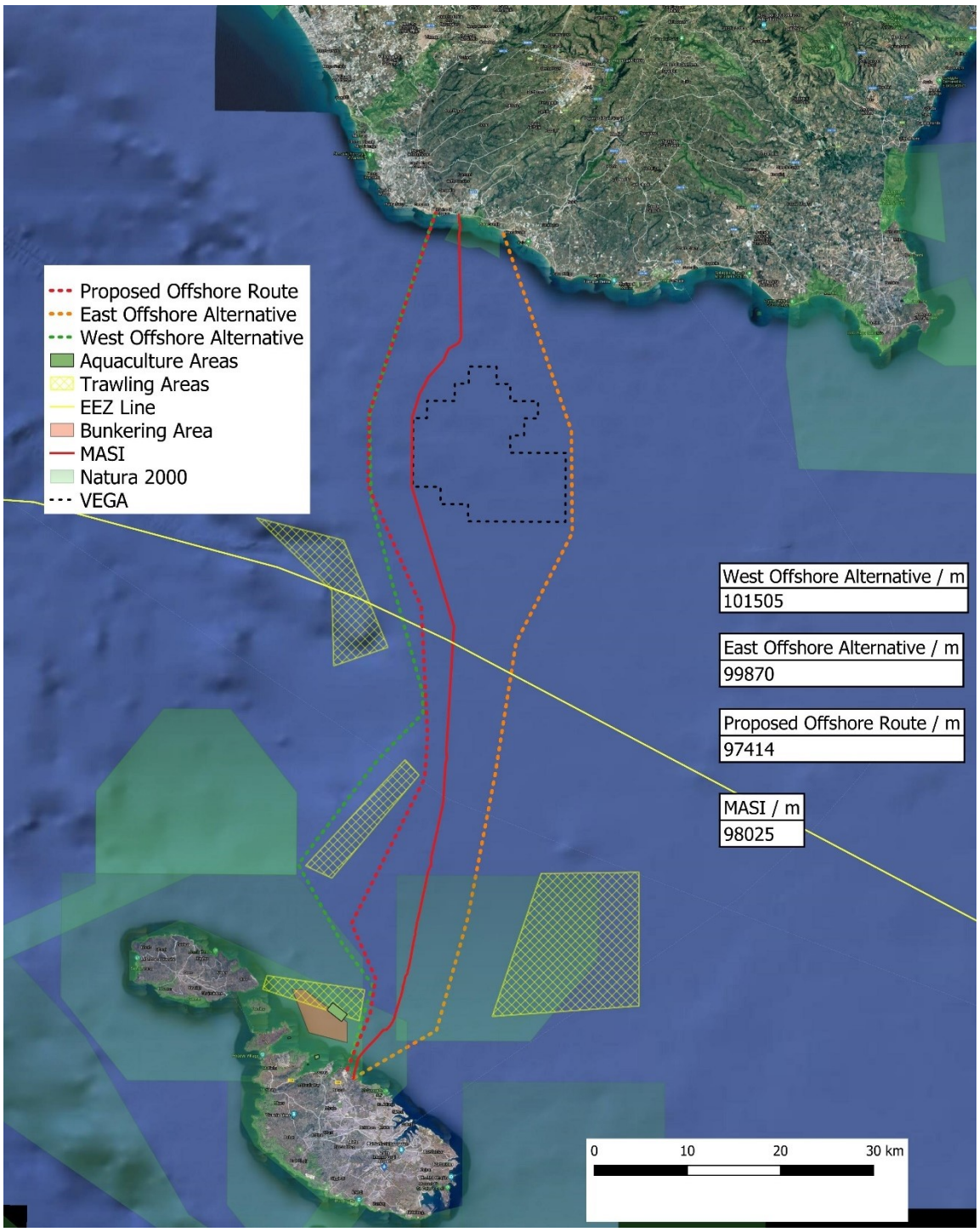

FIGURE 2: ALTERNATIVE OFFSHORE ROUTES

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a. Existing interconnector – Red Route Figure 2

This route starts from within Qalet Marku (see above) and then basically follows a northern route towards Sicily landing at Marina di Ragusa shoreline to the east of the town. Seashore approach in Sicily is through a trenchless HDD method due to the touristic potential of the area. The cable lies completely on the Malta – Sicily Plateau and is buried to a depth of 1.5m below the seabed in sandy stretches. Rock protection has been adopted to protect the cable in rocky areas and cast-iron shells where it is close to the respective shores. The offshore route is 98km long and skirts the Vega oilfield extraction concession area along its western perimeter.

b. East Offshore Alternative – Orange Dotted Route Figure 2

This proposed route lies to the east of the current interconnector. It exists the Sicily shoreline in the south-eastern direction from an area in between Playa Grande and Donnalucata to pass outside the eastern border of the Vega oilfield. South of this point, the route turns towards the south southwest passing west from a gas field in the Malta area and then continues to the proposed landing point at Qalet Marku to continue the land route towards Maghtab Terminal Station. This proposed route corridor generally lies between 5 to 17km to the east of IC1 and the estimated underwater length of this route corridor is 101.5km. This corridor would match with Sicilian onshore routes 1, 3 and 4.

It is important to note that the cable along this offshore route can also land at the existing landing point of the present interconnector in Sicily.

Advantages:

- Onshore route proposal 1 coupled to Malta onshore route option 4 does not cross the present interconnector anywhere.
- Due to the large east west distance from the present interconnector cable, provides best security of supply protection in case of offshore faults.
- Whole route lies on the Malta- Sicily Plateau making cable laying easier.
- Route avoids and is farthest away from all known trawling areas in the Maltese sector
- Route avoids all known potential hydrocarbon study field areas in the Maltese sector
- No landing point issues expected in Sicily as it uses the same shore landing point as existing interconnector

Disadvantages:

- Long route may become a problem to deviate route after/during marine route survey in search of suitable sandy seabed.
- In order to avoid crossings, the onshore route in Sicily is constrained to the follow the existing cable routing and hence provides the least security of supply.
- New landing point in Sicily may encounter permitting issues

c. Proposed Offshore Route – Red Dotted Route Figure 2

This route proposal passes to the west of the existing interconnector and is compatible with Maltese onshore route options 1, 2 and 3. This proposal is the shortest offshore route of the three routes, being also shorter than the present interconnector and avoids all known anthropogenic constraints. The proposed landfall in Sicily is on the west side of the Porto di Marina di Ragusa and is 2.54km to the west of the present landfall in Sicily. However, the existing landing point can still be used without the need for any offshore crossings.

Advantages:

- Shortest of all 3 proposals being also shorter than the present interconnector thus allowing for longer shore approach and onshore routes in Malta.
- Compatible with all three western shore approach options in Malta.
- Does not interfere with any of the trawling zones in the Maltese zone
- Avoids offshore crossing with existing interconnector.
- Can use both existing and new landing point in Sicily.

Disadvantages:

- New landing point in Sicily may encounter permitting issues as works to be carried out within touristic zone.

d. West Offshore Route – Green Dotted Route Figure 2

This route proposal passes to the west of the existing interconnector and is compatible with Maltese onshore route options 1, 2 and 3. This proposal is very similar to Proposal 2; however, it avoids potential hydrocarbon study fields. In fact, it takes a detour to the West of the adjacent trawling area. Its proximity to the end of the Malta-Sicily channel makes it a very risky corridor to choose for further studying. The proposed landfall in Sicily is on the west side of the Porto di Marina di Ragusa and is 2.54km to the west of the present landfall in Sicily. However, the existing landing point can still be used without the need of any offshore crossings.

Advantages:

- Compatible with all three western shore approach options in Malta.

- Does not interfere with any of the trawling zones in the Maltese zone
- Avoids offshore crossing with existing interconnector.
- Can use both existing and new landing point in Sicily.

Disadvantages:

- New landing point in Sicily may encounter permitting issues.
- The route is longer than the existing interconnector.
- The route passes on the edge of the Malta-Sicily plateau in an area which is characterised by a slope, and which can be of a relatively unstable nature.
- Long route may become a problem to deviate route after/during marine route survey in search of suitable sandy seabed.

4. Onshore Route - Sicily

The onshore route in Sicily is mainly dependent on whether the same landing point will be used or a different one is chosen.

In case a different landing point is to be used, this is to be to the West of the current interconnector landing point since there is an extensive Natura 2000 site to the East (Riserva Naturale Macchia Foresta del Fiume Irminio). Once onshore, the route is bound to follow either the SP25 to the Ragusa terminal or the route taken by the existing cable. The route is restricted to these two roads to maintain a similar length of cable since different cable lengths would create technical issues. (See figure 3).

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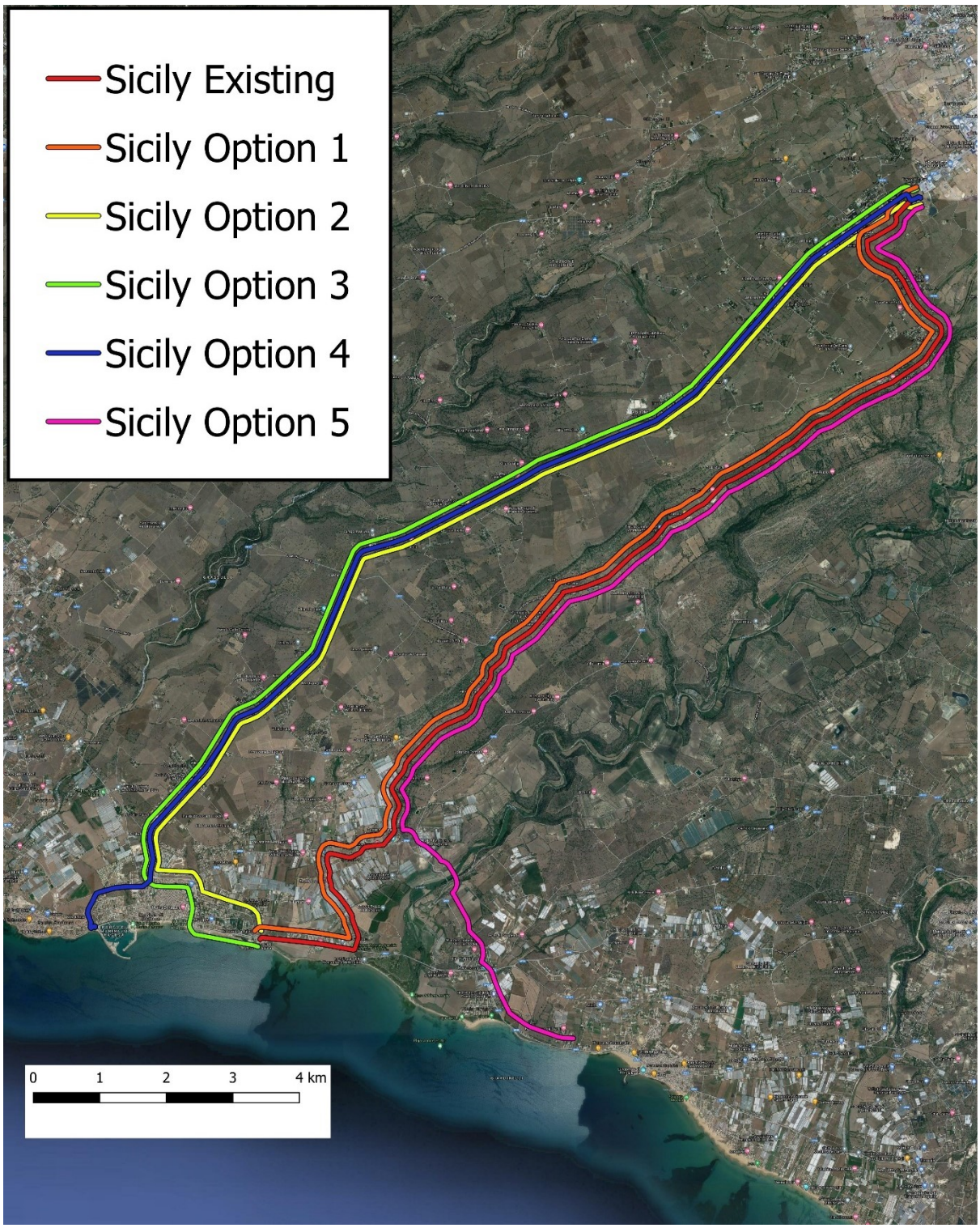

FIGURE 3: ALTERNATIVE ONSHORE ROUTES - SICILY

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a. Option 1 / Existing – Orange / Red Route Figure 3

This option lands at the same landing point of the existing interconnector and follows the same route onshore to the terminal station. It starts of by following SP63 until it continues along SR82. The cable is buried along this road until the junction with SP89 where it takes this route then. The route then follows the rural road SR63 until it joins with SP37 for only around 250m from where it then takes the route along the SP81. This route is followed until it gets close to the area where there is the Terna terminal station. However, the last part of the route follows Strada comunale Fallira-Fortugno with the final section passing underneath existing fields.

Advantages:

- Exact same length of the existing road
- Potentially offers the least planning restrictions from Italian authorities in view that route will be the same as already used
- Can verify whether we can use the same EIA and update it accordingly

Disadvantages:

- Least security of supply since it is the same exact route
- Landing zone was rehabilitated recently, and project would require this to be destroyed and re-constructed
- Crossing might be required at the landing zone
- Route contains a number of underpasses where the cable will be exposed

b. Option 2 – Yellow Route Figure 3

This option lands at the same landing point of the existing interconnector but immediately takes a different route once onshore. It follows Via Portovenere, Via Caboto and Via Ammiraglio Luigi Rizzo before it joins SP25 and follows it all the way to the Ragusa terminal station.

Advantages:

- Shorter onshore distance allows for a longer offshore route
- Most of the route follows only one road, SP25, which is multi-carriageway allowing easy traffic management
- Most of SP25 has an unused verge where the cable can be laid in. One may consider suggesting that the cable route is converted into a cycle lane between Ragusa and Marina di Ragusa.
- No underpasses detected from preliminary investigation

Disadvantages:

- A new route requires more permitting and clearances from Authorities
- The first section passes through a residential area

- Landing zone was rehabilitated recently, and project would require this to be destroyed and re-constructed
- Crossing might be required at landing site
- A new EIA is required

c. Option 3 – Green Route Figure 3

This option adopts the same landing point as the existing interconnector but immediately takes a different route once onshore. It follows Lungomare Andrea Doria, then Via Caboto and then Via Ammiraglio Luigi Rizzo before it joins SP25 and follows it all the way to the Ragusa terminal station.

Advantages:

- Shorter Sicilian onshore distance allows for a longer offshore route
- For most of the part follows only one road, SP25, which is multi-carriageway allowing easy traffic management
- Most of SP25 contains enough space to lay the cable away from underneath the paved road with the possibility to also include a cycle lane (for example)
- No underpasses detected from preliminary investigation

Disadvantages:

- A route requires more permitting and clearances from Authorities
- The first section passes through a residential and touristic area along the coast
- Landing zone was rehabilitated recently, and project would require this to be destroyed and re-constructed
- Crossing might be required at landing site
- A new EIA is required

d. Option 4 – Blue Route Figure 3

This option uses a different landing point just west of the Porto di Marina di Ragusa. Following landing, the route moves along Via F.Spata, then Via Cervia, Via Gaetano Schembri and finally it joins SP25 until the Ragusa terminal station.

Advantages:

- Gives the most security of supply from all the options considered
- Shortest onshore distance allows for a longer offshore route
- SP25 allows easy traffic management being a relatively wide road
- Most of SP25 contains enough space to lay the cable away from underneath the paved road with the possibility to also include a cycle lane (for example)
- No underpasses detected from preliminary investigation
- The landing zone is not rehabilitated yet and is a No Swimming zone

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Disadvantages:

- A new landing zone and route requires more permitting and clearances from Authorities

e. Option 5 – Pink Route Figure 3

This option uses a different landing point between Plaia Grande and Donnalucata. Following landing, the route moves along SP89 up to the point where it joins the same unmanned road mentioned for the existing interconnector. From then onwards, the same roads as the first interconnector are used.

Advantages:

- Gives more security of supply having a different landing point
- For most of the route it follows the existing cable presenting less challenges in view of permitting and clearances from Authorities
- Avoids crossings in case of an East offshore route

Disadvantages:

- Is the longest route
- Most of the route will be along the existing one reducing the security of supply
- Passes through some geographically challenging areas including a Natura 2000 valley (Fiume Irminio) and a corresponding crossing bridge
- Route contains a number of underpasses where the cable will be exposed

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5. Alternative Route Lengths

TABLE 1: MALTA ONSHORE ROUTE LENGTHS

Option	Onshore Length / km
Existing	0.8
1	2.1
2	1.3
3	0.8
4	0.85
5	1.6

TABLE 2: ITALY ONSHORE ROUTE LENGTHS

Option	Onshore Length / km
Existing	18.9
1	18.9
2	18.4
3	18.6
4	17.9
5	20.1

TABLE 3: OFFSHORE ROUTE LENGTHS

Proposal	Offshore Length / km
Existing	98.0
East Offshore Alternative	99.9
Proposed Offshore Route	97.4
West Offshore Alternative	101.5

The Applicant notes that the route alternatives provided are preliminary and the respective alignments are indicative and subject to potential improvement in step with the forthcoming assessments, studies and design. The offshore route will be surveyed along a 1.2km wide corridor which will serve as the area where the interconnector can be laid subject to design, bathymetry, cultural and environmental considerations. The area selected for the marine, geophysical and geotechnical surveys shall therefore provide a measure of flexibility vis-à-vis any other intermediary routes, hybrid/compromise alignments or other variations that may be necessary or desirable to address any emerging technical challenges, or environmental considerations, during the design and permitting stages.