ESIA Italy
Annex 5 Soil Management Plan
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1 SOIL MANAGEMENT PLAN

1.1 Background

Soils and rock excavated during the execution of the Italian section of the TAP Project will be managed in accordance with Art. 186 of D.lgs n. 152/2006 and its subsequent amendments, and in line with the Regulations concerning the management of soils and rocks resulting from excavation activities, earthworks and processing of inert material, as published in the «Official Bulletin» of Apulia’s Regional Government, n. 44, dated 28 March 2011.

The Proponent of the planned work is required to develop a project that will be approved by the authority in charge of the procedure.

In this specific case, since the Project is subject to the Italian Environmental Impact Assessment (EIA) procedure, all information will be assessed by the relevant authorities and incorporated into the final design.

This document describes how soils and rock excavated during the Project will be managed.

1.2 Description of Excavation Activities and Handled Materials

1.2.1 Overview

The gas pipeline will be installed during several stages of construction:

- Completion of onshore works, divided into sub-stages involving the excavation and covering of the underground pipeline and PRT construction; and

- Completion of offshore works, divided in sub-stages involving the execution of the landfall microtunnel, pre-dredging excavation and the laying of the pipeline on the seabed.

The construction sequence, as well as the excavation and intervention timeline, are outlined in this Section. A more detailed description of the Project activities for each stage is provided in Section 4 of the ESIA.

1.2.2 Completion of Onshore Works

During the onshore construction works, soil movements will result from:

- Excavation and backfilling related to pipe laying activities; and

- Earthworks related to PRT construction and worksite preparation.
### 1.2.2.1 Pipelaying Activities

Prior to any pipelaying activities, topsoil, which supports plant life and contains seed stock, will be removed from the working strip using suitable earth moving equipment and stockpiled in the form of a continuous ridge along one side of the construction corridor. The topsoil stockpile will be typically no higher than 2 m to prevent degradation of the soil and will be kept free from disturbance to reduce the possibility of physical damage and compaction.

The topsoil will be stored in such a way that it is not mixed with other trenched materials or driven over by vehicles. If the topsoil requires long-term storage, aeration and raking will be carried out regularly to avoid compaction.

The working strip will then be levelled using typical construction site machinery to eliminate irregularities, large stones, tree stumps and other features.

The onshore pipeline trench will generally be around 2.6 m deep. The trench will be approximately 1.4 m wide at the base and will be excavated to the requisite depth by an excavator or specialized trenching equipment (refer to Figure 1-1).

**Figure 1-1** Pipe Trench Excavation

![Pipe Trench Excavation](source: ERM SpA (October 2011))

The excavated subsoil will be placed separately from the topsoil pile to prevent mixing, as shown in Figure 1-2.

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The excavated subsoil will be placed separately from the topsoil pile to prevent mixing, as shown in Figure 1-2.
Once the trench is prepared, the already welded pipeline will be lowered into it by a team of side booms.

Immediately after the pipe section has been lowered into the trench, the backfill material will be placed over it. Backfill material in the direct vicinity of the pipe will be compacted in layers. A backhoe loader will be used to place the excavated material back into the trench to cover the pipe. After the initial layer of screened material (sand) is placed into the trench, the remaining excavated soil and rock mixture will be added to complete the backfill (refer to Figure 1-3).

In order to avoid any damage to the pipeline coating and the bottom of the trench, the padding material will consist of well graded, round material, such as sand.
1.2.2.2 Earthworks Related to the PRT and Worksite Preparation

The earthworks related to the PRT construction site and the temporary landfall worksite will consist of topsoil works, site levelling (excavation/backfill), drainage works, station piping works and excavation of foundations. The material that can be reused for backfill is approximately 60% of the total excavated material. The excess material (40%) will be removed and managed in accordance with Legislative Decree 152/06 and its subsequent amendments. Additional backfill material with predefined properties (e.g. sand) will also be required for laying drainage and piping.

1.2.3 Completion of Offshore Works

Soil movement during offshore activities will predominantly be associated with works related to the landfall.

A temporary worksite will be required specifically for the construction of the microtunnel landfall. 8,000 m$^3$ of soil will be removed during site clearance and stored in the same area for reuse during restoration activities.

The landfall will be implemented by means of a microtunnel. It will be installed using a Microtunnel Boring Machine (MTBM) in combination with the pipe jacking technique to directly install concrete jacking pipes that will form the underground microtunnel. The pipeline will be pulled through the tunnel.

The landfall microtunnel will also require the excavation of a launch shaft from where the MTBM will start. The estimated excavated material for the landfall is approximately 11,800 m$^3$ (1,300 m$^3$ for the launch shaft and 10,500 m$^3$ for the excavation of the microtunnel).

The MTBM will be recovered from the seabed just outside the microtunnel exit. For that reason, the recovery of the drilling head at the exit points requires dredging works.

Work on the pre-dredged trench shall be carried out by a backhoe dredger (see Figure 1-4) in order to prepare the laying of the pipeline, and to recover the MTBM in the proximity of the tunnel exit, seawards.
Figure 1-4 Typical Backhoe Dredger

Source: ERM (December 2011)

Trench work will be carried out from the microtunnel exit (approx. water depth range from 18 to 27 m), and will be approximately 110 m in length.

Approximately 15,500 m$^3$ of material will be removed during trenching. All material will be reused to flatten the exit point of the MTBM (at sea) by means of a fall pipe vessel.

Soil / marine sediment disturbance will also occur during the installation of the Fibre Optic Cable (FOC). This will be laid along a route parallel to the pipeline, at a distance of 50 m approx. The FOC, where necessary, will be buried 1m beneath the seabed to protect against trawl fishing, ships anchoring and other activities. 0.5 m$^3$/m of material is expected to be moved and backfilled, where the FOC is buried.

1.2.4 Schedule of Works

Table 1-1 provides a summary of the expected timescales for the construction works.

Table 1-1 Duration of Construction of Project Components

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Duration of Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction site and work sites</td>
<td>1 month</td>
</tr>
<tr>
<td>Landfall micro-tunnel</td>
<td>9 months</td>
</tr>
<tr>
<td>Pre-trench excavation</td>
<td>2 months</td>
</tr>
<tr>
<td>Pre-trench backfilling</td>
<td>1 month</td>
</tr>
<tr>
<td>Post-laying Gravel dumping</td>
<td>1 month</td>
</tr>
<tr>
<td>Pipeline Receiving Terminal</td>
<td>18 months</td>
</tr>
<tr>
<td>Landscaping/Reinstatement and Road Construction</td>
<td>6 - 12 months</td>
</tr>
<tr>
<td>Onshore pipeline and Block valve station</td>
<td>6 months</td>
</tr>
</tbody>
</table>
The whole Project will be constructed within approximately three years, although activities will be suspended during the summer season in order to avoid interfering with activities related to tourism.

Earthworks will commence with the excavation of the microtunnel, followed by the installation of the pipeline 10-12 months later.

1.3 Materials Handled during Construction Activities

1.3.1 Volumes of Materials

The completion of the planned Project activities will require the handling of inert material that will be:

- Produced during topsoil clearing and excavation activities to complete the onshore section (excavated soil) and the offshore section of the work (excavated soil and marine sediments); and
- Purchased / sourced for the purpose of laying drainage and piping at the PRT site.

The approximate volumes of materials to be handled are given in Table 1-2. The volumes are calculated based on an estimated thickness of topsoil layer of 30 cm and 40% of pipeline trench refill material consisting of sieved sandy material.

### Table 1-2 Volume of Materials Handled during Construction Activities

<table>
<thead>
<tr>
<th>Phase</th>
<th>Type of materials handled</th>
<th>Unit of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Resulting from soil and sediments movements</td>
<td>Volume</td>
</tr>
<tr>
<td>Onshore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipeline burial</td>
<td>Cleared / excavated soil</td>
<td>114,300 m³</td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>10,000 m³ (purchased)</td>
</tr>
<tr>
<td>Pipeline receiving terminal</td>
<td>Cleared / excavated soil</td>
<td>126,500 m³</td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>37,000 m³ (purchased)</td>
</tr>
<tr>
<td>Offshore</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microtunneling</td>
<td>Cleared / excavated soil</td>
<td>19,800 m³</td>
</tr>
<tr>
<td>Pre dredging</td>
<td>Marine sediments</td>
<td>15,500 m³</td>
</tr>
<tr>
<td>FOC installation</td>
<td>Marine sediments</td>
<td>0.5 m³/m</td>
</tr>
</tbody>
</table>

The majority of material produced during the installation of the gas pipeline will be reused to provide backfill the excavation. Further details are outlined in Section 1.3.2.
1.3.2 Origin / Destination and Use of Materials

The following types of materials will be handled during the construction activities:

- Cleared topsoil used for reinstatement (refer to Table 1-3);
- Excavated soils / marine sediments produced during excavation works (refer to Table 1-3);
- Sand for the purpose of laying the pipeline and backfilling the excavated section (refer to Table 1-4); and
- Grouting cement mortar for use inside the microtunnel (refer to Table 1-4).

### Table 1-3 Destination / Use of Materials Produced during Excavation

<table>
<thead>
<tr>
<th>Phase</th>
<th>Type of material</th>
<th>Volume</th>
<th>Location of disposal site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onshore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipeline burial</td>
<td>Cleared topsoil</td>
<td>64,000 m³</td>
<td>To be defined</td>
</tr>
<tr>
<td></td>
<td>Excavated soil</td>
<td>32,800 m³</td>
<td>To be defined</td>
</tr>
<tr>
<td>Pipeline receiving terminal</td>
<td>Cleared topsoil</td>
<td>7,600 m³</td>
<td>To be defined</td>
</tr>
<tr>
<td></td>
<td>Excavated soil</td>
<td>42,200 m³</td>
<td>To be defined</td>
</tr>
<tr>
<td>Offshore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landfall microtunnelling</td>
<td>Excavated soil</td>
<td>19,800 m³</td>
<td>To be defined</td>
</tr>
<tr>
<td>Microtunnel exit point</td>
<td>Marine sediments</td>
<td>4,500 m³</td>
<td>To be defined</td>
</tr>
<tr>
<td>FOC Installation</td>
<td>Marine sediments</td>
<td>0,5 m³ / m³</td>
<td>To be defined</td>
</tr>
</tbody>
</table>

Table 1-3 shows that more than 60% of onshore excavated soil and 100% of marine sediments will be reused for backfilling purposes, whereas the remaining portion of the material will be sent for disposal to appropriately licensed, local landfill sites.

The above data for the landfall microtunnel excavation soil are to be considered assuming that excavation materials are not contaminated and therefore suitable for reuse.

### Table 1-4 Origin of Purchased / Sourced Materials

<table>
<thead>
<tr>
<th>Phase</th>
<th>Type of material</th>
<th>Volume of purchased material</th>
<th>Location of purchase of quarry/site of quarry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onshore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pipeline burial</td>
<td>Sand</td>
<td>10,000 m³</td>
<td>To be defined</td>
</tr>
<tr>
<td>Pipeline receiving terminal</td>
<td>Sand</td>
<td>37,000 m³</td>
<td>To be defined</td>
</tr>
<tr>
<td>Offshore</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microtunnelling</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre dredging</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FOC installation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Purchased materials identified in Table 1-4 will be procured from local quarries.
1.4 Management of Handled Materials

Materials handled during the construction phase will be managed in compliance with the applicable legislative requirements. Hence, the purpose of this Section is to describe the type of management, handling and characterization to which these materials may be subject.

1.4.1 Soil

Soils resulting from excavation will be managed inside of the construction site in order to evaluate their qualitative and quantitative nature, to verify the possibility for re-use on the same area and, if applicable, to identify the appropriate disposal process.

A portion of the material produced during the completion of the work will be used (about 60%) for backfilling purposes, as part of the excavation closing process. A second portion, preliminarily estimated at about 40%, will be disposed of at a landfill site and, if necessary, will undergo appropriate treatment in compliance with waste management regulations prior to disposal.

Excavated materials will be stored at storage points that will be set up on a temporary basis along the route of the onshore pipeline. However, such materials may also be used directly for the purpose of closing the excavation or may be loaded on vehicles transporting soils directly to their final destination.

Figure 1-5 Intermediate Storage

Excavated soils and rocks to be sent for disposal will be managed in accordance with D.lgs n. 152/06 and its subsequent amendments and D.M. n.161/2012. The following information will be specifically reported and submitted to the competent authorities:

- CER codes identifying the nature of the materials that are sent for disposal;
- References to legislative requirements for outsourced approved disposal facilities where soil will be allocated; and
- References to companies specializing in completing transportation of soils from construction sites to disposal facilities.
Following weighing operations, all necessary documentation for disposal will be duly filled out and the Waste Loading / Unloading Register will be updated accordingly. Furthermore, a Waste Identification Form will be completed.

1.4.2 Marine Sediments

The marine sediments will be excavated during pre-dredging activities. All dredged marine sediments will be reused in the backfilling operation or positioned at the side of the excavation by the backhoe dredger. Therefore, no marine sediments will be disposed of, providing no contamination will be identified in the material.

1.4.3 Purchased / Sourced Materials

Gravel and sand will be procured to line the bottom of the trench and cover just above the pipe to avoid damage during the backfilling activities.

The required materials will be sourced from local suppliers or quarries.

1.4.4 Investigation and Characterisation of Excavated Materials

1.4.4.1 Investigation and Characterisation Performed

Soil along the pipeline route was sampled throughout July 2013 in order to investigate any potential historic contamination. Sampling and analysis of marine sediments was carried out in 2011 and at the beginning of 2013. The results of these surveys are reported in this Section. It is foreseen that an additional offshore campaign will be undertaken in autumn 2013 in order to ensure compliance with the requirements of Ministerial Decree 24 January 1996.

1.4.4.1.1 Onshore Pipeline Route

Soil samples were taken at the worksite near the landfall, along the onshore route and at the PRT construction site. A map of the sampling points is shown in Figure 1-6.

Sampling of soil was conducted by qualified individuals in compliance with the provisions of D.lgs 152/06 and its subsequent amendments and supplements. Chemical analysis of the soil was conducted by the accredited Theolab laboratory.
Samples were collected from the topsoil, then stored in sealed glass bottles, properly labelled and maintained in cool boxes until they were delivered to the laboratory. Each sample was geo-referenced with a GPS system.

The chemical analyses of soil and groundwater samples were carried out in Theolab laboratory, ACCREDIA registered and ERM qualified laboratory.

The samples were analysed for asbestos, metals, hydrocarbon compounds, polycyclic aromatic hydrocarbons and pesticides. None of the samples exceeded contamination threshold concentrations (CTC) for these substances as established by Legislative Decree 152/2006).

Detailed information on the sampling and analysis results are given in Annex 7 Baseline Data and Maps.
1.4.4.1.2 Offshore Pipeline Route

Marine sediments were sampled using a Van Veen type grab at the stations shown in Figure 1-7. Each sample was geo-referenced with a GPS system.

**Figure 1-7 Marine Sediment Sampling Stations**

Source: ERM (2013)

Shallow sediments within the survey corridor were characterized by medium to high backscatter. These were interpreted as rocky outcrops in the coastal area and sand in the offshore zone, confirmed by seabed samplings and laboratory tests.

Analysed parameters were nutrients, heavy metals and polycyclic aromatic hydrocarbons. Results fell in a normal range for coastal sediments, without any atypical values. The analysis also did not show any significant differences among the distribution of the different stations.

Detailed information on the marine sediment sampling is given in Annex 7 Baseline Data and Maps.
1.4.4.2 Surveys and Preventive Characterisation

In consideration of the planned excavation volumes and the already completed surveys, TAP AG intends to complete a detailed preventive characterization of soils and marine sediments before starting excavation activities.

Whenever possible, this will allow relocation of the excavated materials directly to their final destination, thus limiting accumulation activities involving loading and offloading in the technical area to only those materials that are destined for disposal at the landfill. As a matter of fact, materials that are not allocated for the landfill, can be used directly for backfilling.

1.4.4.2.1 Onshore Pipeline Route

The qualitative characteristics of any excavated materials will be investigated in compliance with D.lgs n. 152/06 and Art. 6 of the Regulations concerning management of soils and rock arising out of excavation activities, handling of soils and processing of inert material.

Preventive characterization of soil on site will be completed by tracing a square mesh of 500 m beyond each geo-lithological variation for the various excavation phases.

Several samples will be randomly collected from the first 0.2 m (topsoil) and from the subsequent 2.3 m (subsoil) of the soil bore-holes. The samples will be placed and homogenized in two previously-decontaminated containers to make two representative samples of the site.

Samples will be arranged and stored in compliance with D.lgs n. 152/06. The test protocol for preventive characterization will include parameters that have already been investigated as part of the latest exploration survey according to the applicable law requirements.

Characterization is required to be completed in advance of the excavation of parcels of land by at least 2 to 3 weeks, so that results from the chemical laboratory can be achieved in a timely manner and construction site works can be programmed accordingly.

With regard to traceability of excavated parcels of land, a construction site log will be maintained during sampling and the subsequent construction phases. This log will include the following information:

- Initials identifying the sampling point and the relevant parcel of land;
- Coordinates representing each sampling point and the relevant parcel of land;
- Timeframe of sampling;
- Timeframe of excavation for completion of the natural gas pipeline;
- Coordinates representative of each parcel of land after final reinstatement; and
- Reinstatement timeframe.
Coordinates will be determined by GPS. Timeframes for sampling will be communicated to the competent authorities in a timely manner.

1.5 Traffic Plan for Heavy Equipment

It is expected that no onshore traffic will be generated by the movement of marine sediment during the planned Project activities.

Approximately 89,000 m³ of soil will be transported to landfill for disposal during onshore construction activities relating to the pipeline (including microtunneling) and the PRT. Therefore, it is estimated that 6,100 truckloads will be required to dispose of this excess material. The truck movements will take place on open, public roads.

In addition, about 47,000 m³ of sand (or similar material) will be required as backfill for pipeline and pipe work resulting in an additional 3,200 truck movements.

Thus, the total traffic on public roads related to soil management is estimated to be 9,300 truck movements (empty truck journeys not counted). It is expected that Project related construction traffic will affect coastal roads SP 366 and/or SP1, depending on the location of the landfills and quarries to be used.

Other construction traffic movements relating to soil management activities will occur mainly on the working strip and within the PRT construction site.