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Appendix 5

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APPENDIX 5
FLORA AND HABITATS MANAGEMENT PLAN

Purpose of this document

The purpose of this Flora and Habitats Management Plan is to:

- Introduce the rationale and objectives for enhanced management measures for threatened and/or endemic flora and sensitive habitats within mapped DMUs along the Trans Adriatic Pipeline (TAP) corridor in Albania and Greece.
- Introduce the rationale and objectives of enhanced management measures for threatened or unique and sensitive habitats considered to be PBFs.
- Define the specific mitigation measures in place to satisfy these commitments.

The expected outcome of a successful Flora and Habitats Management Plan will be the minimisation of significant residual impacts on flora and habitats of conservation concern.

Baseline

Extensive surveys of flora and habitats have been carried out by TAP along the pipeline RoW and associated areas in all three host countries. Eight vascular plants and five habitat types trigger critical habitat. Figures are available in the Supplementary Ecological Assessment.

Flora

Mountain tea (*Sideritis raeseri* subsp. *raeseri*) is a perennial species endemic to the Balkans and found in rocky habitats and open grassland. It is well adapted to survive with little water and in shallow soils, and is tolerant of, but not confined to, serpentine soils. Surveys identified the presence of mountain tea in the project AOI in Albania, located in sub-alpine meadows between KP 72 and KP 97. The DMUs for this species are collectively estimated to be approximately 2,182 ha.

Yellow monkshood (*Aconitum lamarkii*) is a tall, clump-forming, perennial herb in the Ranunculaceae (buttercup) family native to southern Europe and occasionally found in cultivation. It produces spikes of pale yellow flowers in June and July (in Albania). The plant produces a harmful toxin in the leaves. Surveys identified the presence of yellow monkshood within beech forests from KP 70 to KP 90. The DMUs for this species are collectively estimated to be approximately 1,773 ha. The species is not known within the TAP AOI in Greece.

Deadly nightshade (*Atropa belladonna*) is a perennial herb in the Solanaceeae, perhaps best known for its deadly poisonous berries. Surveys identified the presence of deadly nightshade in beech forests within the TAP AOI in both Greece and Albania. The DMUs are collectively estimated to be approximately 1,933ha.

Albanian lily (*Lilium albanicum*) is a bulbous geophyte endemic to the Balkans that typically occurs in sub-alpine grasslands (over 1,500 masl). It is a native of serpentine soils. Surveys identified the presence of Albanian lily in sub-alpine meadows between KP 72 and KP 97 in Albania, within DMUs collectively estimated to be approximately 2,182 ha.

Dianthus formanekii is endemic to the Balkans and is 'range-restricted'. The species typically occurs in grasslands, but also occasionally in open *Juniperus* shrublands. Surveys identified the presence of *Dianthus formanekii* within the TAP AOI in Greece at approximately KP 544 - 545. The DMU for this species is estimated to be approximately 18.26 ha.

Dianthus tenuiflorous is endemic to the Balkans and is 'range-restricted'. In Greece, the species grows in open pine forest, deciduous shrub and roadsides between 50 and 1100 masl. Surveys identified the presence of *Dianthus tenuiflorus* within the TAP AOI in Greece at approximately KP 102. The DMU for this species is estimated to be approximately 1 ha.

Verbascum dingleri is endemic to Greece and is considered to be 'range-restricted'. The species typically occurs in open, rocky grasslands. Surveys identified the presence of *Verbascum dingleri* within the TAP AOI in Greece between KP 184 and KP 187. The DMU for this species is estimated to be approximately 107 ha.

Serpentine false-brome (*Festucopsis serpentini*) is endemic to Albania and its distribution is limited to areas of serpentine soils. The species typically occurs in sub-alpine grasslands (over 1,500 masl). Surveys identified the presence of *Festucopsis serpentini* within the TAP AOI in Albania between KP 72 and KP 97. The DMUs for this species are collectively estimated to be approximately 2,182 ha.

Habitats

Surveys identified three DMUs which support the EU Priority Habitat 3170* Mediterranean temporary ponds; one in Italy and two in Greece.

One DMU identified by surveys in Italy supports the EU Priority Habitat 7210* Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*. The DMU is approximately 26 ha.

Surveys identified a single DMU which supports the EU Priority Habitat 91E0* Alluvial Forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion Incanae*, *Salicion Albae*) in Greece, estimated to be approximately 1,326 ha.

Five DMUs were identified by surveys which support the EU Annex 1 Habitat 9540 Mediterranean pine forests with endemic Mesogean pines. Two are located in Albania and three in Greece. The DMUs of 9540 are estimated to be approximately 423 ha in Greece and 328 ha in Albania.

Surveys identified one DMU in Albania which supports the EU Annex 1 Habitat 9110 Luzulo-fagetum beech forest. The DMU of 9110 is estimated to be approximately 1773 ha.

Surveys identified 31 threatened or unique habitats considered PBFs within the project area.

- Annex 1 Habitat '1310 Salicornia and other annuals colonising mud and sand'.
- Annex 1 Habitat '1420 Mediterranean and thermo-Atlantic halophilous scrubs'.
- Annex 1 Habitat '2110 Embryonic shifting dunes'.
- Annex 1 Habitat '5110 Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes'.
- Annex 1 Habitat '5130 *Juniperus communis* formations on heaths or calcareous grasslands'.

- Greek scrub habitats: 5160 'South-eastern sub-Mediterranean deciduous thickets', 5340 'Garrigues of Eastern Mediterranean', and 5350 'Pseudomaquis'.
- Annex 1 Habitat '5210 Arborescent matorral with *Juniperus* spp'.
- Greek habitat '6290 Mediterranean subnitrophilous grassland'.
- Greek habitat '62A0 Eastern sub-Mediterranean dry grasslands (*Scorzonetailia villosae*)'
- Annex 1 Habitat '6420 Mediterranean tall humid herb grasslands of the Molinio-Holoschoenion'.
- Greek Habitat '6450 Greek hyper-Mediterranean humid grasslands'.
- Annex 1 Habitat '6520 Mountain hay meadows'.
- Greek habitat '72A0 Reed beds'.
- Annex 1 Habitat '8210 Calcareous rocky slopes with chasmophytic vegetation'.
- Annex 1 Habitat '8220 Siliceous rocky slopes with chasmophytic vegetation'.
- Annex 1 Habitat '9170 Galio-Carpinetum oak-hornbeam forests'.
- Annex 1 Habitat '91M0 Pannonian-Balkanic turkey oak-sessile oak forests'.
- Greek Habitat '924A thermophilous oak woods of Eastern Mediterranean and the Balkans'.
- Annex 1 Habitat '9250 *Quercus trojana* woods'.
- Greek Habitat '925A Mixed theromphilous forest with *Ostrya* and *Carpinus*' Carpinetum oak-hornbeam forests'.
- Annex 1 Habitat '91M0 Pannonian-Balkanic turkey oak-sessile oak forests'.
- Greek Habitat '924A thermophilous oak woods of Eastern Mediterranean and the Balkans'.
- Annex 1 Habitat '9250 *Quercus trojana* woods'.
- Greek Habitat '925A Mixed theromphilous forest with *Ostrya* and *Carpinus*'.
- Annex 1 Habitat '3280 Constantly flowing Mediterranean rivers with *Paspalo-Agridion* species and hanging curtains of *Salix* and *Populus'.*
- Greek habitat '32B0 Annual River Communities'.
- Annex 1 Habitat '92A0 *Salix alba* and *Populus alba* galleries'.
- Annex 1 Habitat '92C0 *Platanus orientalis* and *Liquidambar orientalis* woods'.
- Annex 1 Habitat '92D0 Southern riparian galleries and thickets'.
- Annex 1 Habitat '9340 *Quercus ilex* and *Quercus rotundifolia* forests'.

Mitigation and management measures

Level 3 site files will be produced for all REIR flora and habitat entries, as per section 8 of EMP.

Habitats

RoW working widths will be reduced in sensitive habitats. If technically feasible, the standard 38m working width will be reduced to:

- 18m in Annex 1 EU Priority habitat.
- 28m in Natural Habitats.

Where working widths are not technically feasible, the additional landtake procedure shall be initiated for TAP approval. The additional land-take request shall include a full justification for proposed increased working widths. Any deviation to working widths will be detailed within the Level 3 site files and subject to a residual impact assessment.

Reduced working widths are included within EPC contractor alignment sheets.

With the exception of the PPS, the TAP RoW will be restored to pre-construction condition. The biorestoration plan sets out the strategy to ensure successful biorestoration of the TAP RoW.

Vascular Plants

Seed harvest and translocation are the methods by which biorestoration of sensitive individual vascular plants and habitats will be undertaken along the pipeline route. Detailed guidelines on translocation of species for conservation can be found in IUCN/SSC (2013). These guidelines emphasise that translocations should be carried out only after options for avoidance and mitigation have been fully explored.

Actions in Tables 1, 2 and 3 are TAP's responsibility.

Species-specific action plans

Albanian lily and serpentine false-brome were both recorded between KP 75 and KP 78 in sub-alpine grassland (over 1,500 m above sea level) in areas of serpentine soils.

Table 1: action for Albanian lily and serpentine false brome.

Action	Timing	Rationale and evidence
Mapping of populations.	May (- June)	The populations along the route will need to be mapped carefully when in flower to prevent incorrect identification. The populations should be mapped as fully as possible, either recording individual plants or plant densities. Individual plants within the RoW will be mapped precisely for later translocation. Individuals off the RoW will be assessed for potential seed harvesting.
Preparation of nursery.	July	A plan will be created with detailed prescriptions for the long-term care of the plants while they are stored in the nursery area. The storage of plants in this area will need to be prepared. The area will be fenced to prevent entry of grazing animals.

Action	Timing	Rationale and evidence
		A small section of an active site compound is suggested, which will allow plants to be regularly attended.
Translocation of individuals	August	Translocations are best done when the plants are still visible but the main growing season has finished. This will also allow the collection of ripe seeds. Plants on or very close to the pipeline route will be dug up and put into appropriate pots for transport. These plants will then be stored in the prepared nursery area until construction is complete. Each plant must be labelled clearly with a unique ID that can be traced back to the source population.
Care of plants in nursery	Ongoing	A plan will be created with detailed prescriptions for the long-term care of the plants while they are stored in the nursery area. The plants must be maintained in the nursery during construction. This will require regular watering and fertilising as appropriate to conditions. They must be monitored at least weekly, but more frequently during very hot spells. The plants should only be re-planted once vegetation has re-established on the RoW. Suitable locations for the plants will need to be determined by an ecologist.

Yellow monkshood translocation will focus on collecting seeds and root stock.

Table 2: Action for *Aconitum lamarkii*

Action	Timing	Rationale and evidence
Mapping of populations.	June	The route sections within or adjacent to beech forests will be searched. Any populations along the route will need to be mapped carefully when in flower to prevent incorrect identification. The populations should be mapped as fully as possible, either recording individual plants, or plant densities. Individual plants within the RoW will be mapped precisely for later translocation. Individuals off the RoW will be assessed for potential seed harvesting.
Collection of seed and root stock.	August	The mature seeds on individuals will be collected and take to a designated seed nursery where they will be planted out directly. Individual plants with root stocks will be lifted from the ground and planted into pots. Each pot must be labelled clearly with a unique ID that can be traced back to the source population.
Care of plants in nursery.	Ongoing	A plan will be created with detailed prescriptions for the long-term care of the plants while they are stored in the nursery area. The plants must be maintained in the nursery during construction. This will require regular watering and fertilising

Action	Timing	Rationale and evidence
		as appropriate to conditions. They must be monitored at least weekly but more frequently during very hot spells. The plants should only be re-planted once vegetation has re-established on the RoW. Suitable locations for the plants will need to be determined by an ecologist.

Table 3: action for *Dianthus formanekii*, *D. tenuiflorus* and *Verbascum dingleri*

Action	Timing	Rationale and evidence
Mapping of populations.	June	Populations of the three key species (*Dianthus formanekii*, *D. tenuiflorus* and *Verbascum dingleri*) that potentially require seed harvest and translocation will be mapped and details recorded.
Collection of seed and root stock.	June	At this stage, the requirement for additional mitigation will be decided in accordance with GR0424. If additional intervention to protect the population is recommended, the following steps will be followed for each population: Detailed information will be collected following the Kew seed harvesting data collection protocol. A detailed translocation plan, including identification of the necessary permits and potential receptor sites, will be prepared.
Care of plants in nursery	Ongoing	A plan will be created with detailed prescriptions for the long-term care of the plants while they are stored in the nursery area. Populations will be returned when mature seeds are likely to be present. The seeds will be collected and put into dry storage (or another storage method used if appropriate). Where possible, the seeds will be sent to a plant nursery or botanical garden, where they can be grown into mature plants. Once seeds have been harvested, mature plants growing directly on the RoW will be excavated. These plants will then either be transferred to pots and taken to a nursery or moved to a suitable receptor site, depending on the results of the initial population assessment and the availability of suitable undisturbed habitat. Plants taken to a prepared nursery area (either at a site compound or off-site) will be cared for in the pots until they can be returned to the site. A small proportion of plants close to the RoW that might be impacted may also be translocated in this way. Once pipeline installation is complete and vegetation re-established, mature plants and possibly some seedlings will be returned to site and be protected by fencing until they become established.

Mountain tea should also be translocated on an opportunistic basis; the shoots and roots can be dug from the ground and planted into similar habitat adjacent to the RoW. The location of all individual plants that are translocated should be recorded. This should include an assessment of condition, and photographs, which will provide a baseline to monitor the plants in future.

Workers will be prohibited from collecting mountain tea.

No specific action is considered necessary for Deadly Nightshade. As the entire plant and its berries are extremely poisonous, any actions involving this species would clearly be more complex.

The primary threat to the species in Albania is from over-collection and over-harvesting. Against this background exploitation, project activities would have a negligible impact on the species population. It should also be noted that working widths will be reduced to 28m along the RoW and the creation of woodland edge habitat would increase the availability of this species' preferred habitat.

Deadly Nightshade is neither widely dispersed nor threatened in Greece, where surveys to date suggest that there are no known populations along the working width.

Coastal habitats (Albania)

Dune vegetation

True sand dunes with *Ammophila arenaria* (Marram grass) are not present in the footprint area of TAP and Marram is only very sparse on the dunes either side of the pipeline route. This is because the area is highly disturbed and Marram grass dunes are unable to develop. Instead, embryonic sand dunes form around the rhizomatous saltmarsh grass *Spartina maritima* (small cord grass) but do not progress to fixed dunes.

Careful management of sand-binding grasses, particularly *Ammophila arenaria*, is essential to the restoration of dunes in the face of dynamic coastal processes. However, the TAP footprint does not support natural dune vegetation stabilised by sand-binding grasses.

The absence of true sand dune vegetation means that coastal vegetation management, particularly regarding the use of *Ammophila arenaria,* does not need to be employed by TAP. The correct storage and restoration of topsoil is expected to be sufficient for the restoration of recorded species.

Sarcopoterium spinosum (Thorny burnet) has been identified in the Albanian coastal area. TAP will implement mitigation measures such as a reduced working width and propagation from cuttings.

Table 4: summary of key management controls for vascular plants.

Project activity	Potential impact	Proposed mitigation
Site / RoW preparation (including vegetation removal, topsoil stripping) within suitable vascular plant habitat .	Direct loss/ disturbance/ degradation/ fragmentation of habitat. Edge effects.	Work to be supervised by an on-site Ecological Field Monitor. Pre-construction survey to confirm extent of loss / disturbance to species.

Project activity	Potential impact	Proposed mitigation
		Post-construction monitoring to ensure species re-establish after pipeline construction. Implement measures outlined in the 'Species Action Plan for *Lilium Albanicum* and *Festucopsis serpentini'.* Implement measures outlined in the 'Species Action Plan for *Aconitum lamarcki* '. Implement measures outlined in the 'Species Action Plan for *Sarcopoterium spinosum*'. Implement measures outlined in the 'Species Action Plan for *Dianthus formanekii*, *D. tenuiflorus* and *Verbascum dingleri'.* Minimise vegetation clearance / working width. Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate.

Table 5: summary of key management controls for CH and PBF habitats.

Project activity	Potential impact	Proposed mitigation
Site / RoW preparation (including vegetation removal, topsoil stripping) within suitable vascular plant habitat.	Direct loss/ disturbance/ degradation/ fragmentation of habitat. Edge effects.	Reduced pipeline working width from 38m to 18m for priority European habitat and 28m for other natural habitats. Ancillary construction facilities to be sited on land of no ecological value. No construction materials will be taken from the surrounding environment unless approved by the competent authority. Collection of wild plant material by the workforce is strictly prohibited. Micro-siting of the route to be done, where possible, for best position available for biodiversity. Work to be supervised by an on-site Ecological Field Monitor.

Project activity	Potential impact	Proposed mitigation
		Pre-construction survey to confirm extent of loss / disturbance to species. Post-construction monitoring to ensure habitats re-establish after pipeline construction. Implement measures outlined in all relevant site files. Minimise vegetation clearance / working width. Contractor to develop procedures to avoid, monitor and control invasive species, as appropriate.