TÜRKİYE PETROLLERİ ANONİM ORTAKLIĞI

OTC OFFSHORE TECHNOLOGY CENTER

SAKARYA GAS FIELD DEVELOPMENT PROJECT – ENHANCEMENT OF SUBSEA PRODUCTION CAPACITY AND FLOATING PRODUCTION UNIT

Chapter 7.2 Onshore Biological Components Impact Assessment

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7.2 Onshore Biological Components

7.2.1 Flora

Based on the information collected for the definition of the baseline (see Chapter 6.2.1), the biological component *Flora* was assigned a **Medium** value of sensitivity for the following reasons:

- Limited Presence (1) of threatened species of flora;
- Limited Presence (1) of protected species; and
- Limited Presence of endemic or restricted-range species of flora.

Impacts potentially affecting this component are assessed here below for the construction phase and operation phase.

7.2.1.1 Construction phase

Impact factors

The impact factors from the Project activities potentially affecting flora during the construction phase are listed in the following table.

Table 7-1: Project actions and related impact factors potentially affecting flora during construction phase.

Project actions	Brief description	Impact factors
Site levelling and grading	Soil excavation for the pipeline	■ Emission of dust and particulate matter ■ Removal of soil
Material transportation	Removed soil and construction material will be transported out and, in the construction, area using trucks and heavy machinery. Building material will include crushed rocks and gravel.	■ Emission of dust and particulate matter ■ Possible introduction of alien species
General engineering / Construction works	Heavy machinery will be operating on the landfall area.	■ Emission of dust and particulate matter ■ Possible introduction of alien species

The impact factors identified above are described below and assessed in the matrix that follows.

- **Removal of soil**

The project footprint is entirely in a modified habitat. 20% of AoI is natural habitat and these areas will not be impacted by construction activities.

The removal of soil will be conducted during the Phase-2 pipeline construction. The area directly impacted by the landfall construction works corresponds to approximately 2 ha and is a modified habitat (EUNIS Code: J6.2). Campsites are areas that are already within the scope of operation, and no construction work will be carried out within this scope. Consequently, there will be no loss of natural habitat within the scope of the project construction.

No CH-triggering species or habitats will be impacted by the landfall construction works.

Endemic species and CH-triggering flora species have been identified in the B1.4 habitat in the eastern section of the Phase 2 pipeline footprint. In order to protect these populations, no construction activities will be carried out in this area.

The removal of soil will be carried on in the medium-short term, and the evident changes to the environment will be in accordance with the current legal regulations.

- **Emission of dust and particulate matter**

Emission of dust and particulate matter and its consequent fall to the ground has been proven to negatively impact flora. Dust emissions can impact vegetation directly by covering leaf surface and indirectly through impacts on soil composition and structure (Farmer, 1993). Dust can block stomata on the leaf surface, affect photosynthesis, respiration, transpiration, and may cause leaf injury symptoms. Possibly, resulting in a loss of productivity, and the consequent reduction in vegetation growth, vegetation cover and species loss.

The impact is expected to be stronger in the immediate vicinity of the construction site and vehicles, decline with the distance within the 100 m precautionary buffer. About 2 ha of natural and seminatural vegetation could be indirectly impacted by pollutant and dust emission during construction.

This impact is expected to be discontinuous during construction (depending on wind conditions and vehicle and machinery activity vehicle), localized and limited to the immediate surroundings of the project footprint. The intensity of the impact is expected to be low within the Project Area. The impact is considered reversible in the short term since a rain event, even if rare, could clean the leaf surface from dust and pollutant. The probability of occurrence of this impact is expected to be high.

- **Possible introduction of alien species**

Removal of soil could facilitate the introduction and proliferation of alien flora species. In particular, vehicles, machinery and materials utilized in other sites and entering the construction area may also carry seeds and bulbs non-native flora species.

Construction operations in the landfall carry the potential for such accidental introductions during the entire phase of works within each area but with an infrequent frequency and possibly negligible intensity.

Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Removal of soil
  - Limits of construction areas will be clearly marked or fenced in order to avoid impacts outside this area;

- No construction activities will be carried out in the eastern section of the Phase 2 pipeline footprint, given the presence of endemic and CH-triggering flora species within the B1.4 habitat;
- All vehicles will drive on designated routes unless otherwise authorized, and off-road driving will be strictly prohibited;
- Monitoring of flora species in B1.4 habitats in the landfall construction area to inform if further mitigation is needed.

- Emission of dust and particulate matter
  - Dust management control measures will be implemented as described in Chapter 7.2.1.2 – Air Quality.
- Possible introduction of alien species
  - Check of vehicles and machinery for evident foreign plant material, soil and seeds on their first entry on site.
  - Trucks coming from outside the Project area covered with visible amounts of dirt will be washed in a controlled site, where residues will be managed as waste;
  - If spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible negative residual impact** is expected on flora during the construction phase.

Table 7-2: Residual impact assessment matrix for flora during the construction phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Removal of soil	Duration:	Medium-short	Low	Short-mid-term	**Negligible**	Medium	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Project footprint					
	Intensity:	Low					
Emission of dust and particulate matter	Duration:	Medium	Medium-low	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Possible introduction of alien species	Duration:	Medium-short	Medium-low	Long term	**Low**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Overall assessment:		**Negligible**	Rationale:	Soil removal will affect a small part of the project area, comprising approximately 2 ha of modified habitat (EUNIS code: J6.2). Therefore, the project will not result in any loss of natural			

			habitat within the construction footprint. A negligible residual impact is expected with the mitigation measures.

Monitoring measures

The following monitoring measures shall be implemented to assess the true effects of the project on flora during the construction and verify the effectiveness of the mitigation measures.

a) The Phase-1 flora monitoring studies will continue as a component of Phase 2;

b) Monitoring of endemic and CH trigger flora species in B1.4 habitats in the landfall construction area to inform if further mitigation is needed, in the following two years, annually;

c) If detected, the presence and spreading of invasive flora within and around the construction site will be monitored every three months by experts, and, if necessary, an extirpation campaign will be put in place in order to avoid the spreading of the invasive species.

7.2.1.2 Operation phase

Impact factors

Impacts on flora generated by the operation phase of the Project are expected to be limited to the emission of dust and particulate matter. Impacts and mitigation measures are, therefore, applied as per the construction phase (Chapter 7.2.1.1).

Table 7-3: Project actions and related impact factors potentially affecting the flora during the operation phase.

Project actions	Brief description	Impact factors
Plan/Infrastructure onshore operation	Site activities and vehicle traffic within the Project's Area	■ Emission of dust and particulate matter

The impact factors identified above are described below and assessed in the matrix that follows.

- **Emission of dust and particulate matter**

As reported in the previous section emission of dust and particulate matter and its consequent fall to the ground has been proven to negatively impact flora.

The level of dust and particulate emissions from Phase 1 operations is not expected to increase in Phase 2 operations. Therefore, the impact is expected to be negligible.

Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Emission of dust and particulate matter
  - Dust management control measures will be implemented as described in Chapter 7.1.5 – Air Quality.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a **negligible residual impact** is expected on flora during the operation phase.

Table 7-4: Residual impact assessment matrix for the flora during the operation phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Emission of dust and particulate matter	Duration:	Short	Medium	Short-term	**Negligible**	Medium	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Overall assessment:		**Negligible**	Rationale:	During the operation phase no further direct impact on vegetation is expected and any negative effect from site activities will be promptly mitigated and monitored leading to an expected negligible residual impact.			

Monitoring measures

The following monitoring measures shall be implemented to assess the true effects of the project on flora during the operation and verify the effectiveness of the mitigation measures.

- The Phase-1 flora monitoring studies will continue as a component of Phase 2;
- Inadvertent impacts on natural habitats present around the project area will be monitored annually in order to assess eventual footprint creep outside designated areas, including signs of erosion or stagnant water accumulation, functioning of the water run-off management system, dust deposition on vegetation, presence of waste or hazardous substances spill.
- If detected, presence and spreading of invasive flora, including eucalyptus species within and around the construction site will be monitored once a year by experts, and, if necessary, extirpation campaign will be put in place in order to avoid the spreading of the invasive species.

7.2.2 Freshwater Fauna

Based on the information collected for the definition of the baseline (see Chapter 6.2.2), the biological components included in the *Freshwater Fauna* were assigned a **Medium** value of sensitivity for the following reasons:

- Absence of threatened amphibians and fish species;
- Limited number of threatened species of freshwater aquatic invertebrates (1);
- Limited presence of endemic amphibian (1) and fish species (3);
- Absence of endemic or restricted range species of freshwater aquatic invertebrates;
- Presence of protected amphibian species (8);
- Presence of introduced fish species (2); and
- Presence of areas, within the Project's AoI, deemed suitable for the spawning of the amphibian

Impacts potentially affecting this component are assessed here below for the construction phase and operation phase.

It is important to note that the ongoing operation impacts the Filyos River through various means, such as dust emissions, noise, wastewater discharge, and changes in its natural flow. However, based on the results of ongoing monitoring studies, the species in the river have negligible impacts from these impacts.

7.2.2.1 Construction phase

Impact factors

The impact factors from the Project activities potentially affecting freshwater fish during construction phase are listed in the following table.

Table 7-5: Project actions and related impact factors potentially affecting the freshwater fauna during construction phase.

Project actions	Brief description	Impact factors
Site levelling and grading	Soil excavation for the pipeline	■ Emission of dust and particulate matter ■ Emission of aerial noise and vibrations
Material transportation	Removed soil and construction material will be transported out and into the construction area using trucks and heavy machinery. Building material will include crushed rocks and gravel for both the landfall area.	■ Emission of dust and particulate matter ■ Emission of aerial noise and vibrations ■ Increase and modification of traffic onshore
General engineering / construction works	Heavy machinery will be operating on the landfall area. Water will be withdrawn from groundwater wells within the Project's footprint, used for construction-related activities, and then discharged back into the river.	■ Discharge of wastewater ■ Changes in flow/circulation in natural water bodies ■ Minor leakage of contaminants into water ■ Emission of dust and particulate matter ■ Emission of aerial noise and vibrations ■ Emission of light ■ Possible introduction of alien species ■ Increase and modification of traffic onshore

The impact factors identified above are described below and assessed in the matrix that follows.

- **Discharge of wastewater**

It is expected an intermittent discharge of treated wastewater for up to 700 m^3/day (considering a maximum capacity) from the existing domestic wastewater treatment plant (515 m^3/day) and backwash wastewater treatment plant (185 m^3/day) will continue to be discharged into the Filyos River in accordance with the relevant permits.

This factor will have a frequent impact during the construction phase although the intensity is considered to be low.

- **Changes in flow/circulation in natural water bodies**

Changes in water flow/circulation will be due mainly to discharges from wastewater treatment facilities into Filyos River.

The expected volumes and discharge outlets detailed in the previous point may produce an impact on the flow and circulation of freshwater in proximity to the discharge points.

The discharge in the faster-flowing section of the river is expected to have a negligible impact on flow/circulation of the receiving water body, on the contrary, the discharge of water in proximity of a stagnant water body could have a flash-flood effect on the habitat, resulting in fauna being washed away from the area, possibly causing loss of biodiversity in that area.

This factor would have a negligible intensity impact, and a short-term reversibility. The generated impacts will be infrequent over time.

- **Minor leakage of contaminants into water**

Leakages of contaminants into the water would be mainly expected to occur due to runoffs from areas in proximity of freshwater bodies that have experienced:

- oil and fuel leakage from vehicles and generators;
- accidental spill of any hazardous materials that are used during the construction;
- runoff from area where chemical, oil and fuel are temporarily stored (i.e. areas where paving and secondary containments are not present);
- pollution caused by temporary storage of hazardous materials and/or wastes;
- disposal of wastes, wastewater and liquid wastes;
- flooding of ponds (i.e., settling pond of concrete wastewater) or secondary containments caused by heavy precipitation;
- accidental spill of wastewater (e.g., domestic, hydrotest).

Chemical contamination of freshwater could have a variety of adverse effect on aquatic fauna, depending on the contaminant and its concentration. Oil and fuel, for example, could be lethal for many aquatic invertebrates linked to the water surface but also for amphibians and fish, while sewage water could promote eutrophication and even algal blooms with a consequent reduction of oxygen and even production of harmful toxins.

Despite the potential for even severe impacts this factor is predicted to be infrequent at best, and of a low intensity as there are no construction activities directly in freshwater habitats and therefore spills, leakages, and accidental discharges would have to originate from the project footprint or the connecting roads which are generally located at a certain distance from the nearby water bodies.

- **Emission of dust and particulate matter**

Dust and particulate depositing along the river sides and in the water could cause alterations in the biological and chemical characteristics of the water environment. Dust deposition can also produce negative effects on vegetation; in the case of freshwater environments, this could cause a loss of riparian vegetation and important

feeding and nesting habitats. Also, direct effects on fauna species could be through inhalation or ingestion of soil particles. Amphibians are also particularly susceptible to dust and air pollution due to their characteristic cutaneous respiration.

The impacts due to the dispersion of dust and particular matter, which is considered to be highly frequent and of low intensity, are possible around the Project footprint, involving a geographic extent defined as local (within 100 m buffer of the Phase-2 pipeline). The reversibility from this impact factor is considered to be short/mid-term.

- **Emission of aerial noise and vibrations**

The emission of noise and vibrations is expected to increase during construction phase compared to baseline levels due to construction activities such as vegetation clearance, soil excavation, surface levelling and grading, soil improvement activities, mobilization of vehicles, workers and equipment, temporary stockpiling of material, transport of materials and waste, construction of the facilities and paved areas.

Noise and vibration emission could cause indirect habitat degradation due to temporary avoidance of surrounding areas by fauna species. In freshwater habitats amphibians may prefer to move further away from the Project Area to avoid the increased noise from construction site activities.

Noise and vibrations can also have a negative effect on feeding behavior of freshwater fish (Popper and Hawkins, 2019; Pieniazek et al., 2020).

The emission of noise and vibration is expected to be of low intensity during construction activities and to have a high frequency and a local geographic extent (within 300 m buffer of the phase-2 pipeline). The impact is considered to be reversible in a short-term time.

- **Emission of light**

Aquatic ecosystems can be very sensitive to light and are often severely affected by artificial light at night. Exposure to artificial light at night can affect the productivity of freshwater ecosystems and interfere with predator-prey relationships. Some freshwater fish have been shown to avoid areas with artificial light (Kim and Mandrak, 2017) or even to increase risk-taking behaviors (Kurvers et al., 2018) increasing the chance of being predated.

Some amphibians (e.g., tree frogs), may also lessen their mating call in areas with intense artificial light, practically reducing the mating success and consequently negatively influencing local populations.

Light pollution is expected to be continuous during construction operations and of a low intensity.

- **Possible introduction of alien species**

The possibility of introduction of alien freshwater fauna species is limited to the import of water or moist soil into the Project Area and its discharge in or in proximity of water bodies within the Project footprint. Alien species tend to have an advantage in disturbed ecosystems, and if they penetrate into a habitat, they can potentially change its functionality and species composition, and compete with other species including endemic ones.

Such event is expected to be rare, and to be infrequent in its occurrence and of negligible intensity, its reversibility is classified as long-term.

- **Increase and modification of traffic onshore**

During construction, an increase in vehicular traffic is expected along all road network of the present Project Area, this could cause a higher risk of accidental collisions with wildlife. Roads are known to attract some fauna species for a variety of reasons (e.g., water, humidity, heat, presence of roadkill and preys), this can increase the impact on local populations of specific fauna groups and individual species.

Amphibians might be attracted by stagnant water that forms at roadside or within the construction area increasing the risk of collisions with traffic. During the construction phase, most fauna species may temporarily avoid construction areas and their immediate vicinities, and this behaviour is mainly due to the increase in human activity.

This impact factor is considered to have a local geographic extent classified, and a potential medium intensity with a frequency defined as “frequent”, since the events are evenly or randomly distributed over time. Since the biodiversity components can restore themselves in a short period after the end of this impact, depending on species’ biology, the reversibility of the vehicular traffic factor is classified as mid-term.

Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Discharge of wastewater
  - Discharges of water into the natural water habitats should follow the indications of Chapter 7.1.2 – Hydrology and Surface Water Quality.
  - Treated wastewater should be analyzed in accordance with national and international guidelines listed in Appendix B;
  - In case of any parameter exceeding its concentration limit the discharge output should be immediately closed until the issue is properly assessed and resolved.
- Changes in flow/circulation in natural water bodies
  - Discharges of water into the natural water habitats should follow the indications of Chapter 7.1.2 – Hydrology and Surface Water Quality.
  - In particular, the discharge from the pre-commissioning pipeline should be done at a reduced discharge flow to allow for the soil to absorb the majority of the water preventing any wash-off effect on the freshwater fauna in the area.
- Minor leakage of contaminants into water
  - Project-specific Pollution Prevention Plan and Waste Management Plan will be implemented to ensure that the amount of release and spills can be taken under control before reaching substantial amounts that may potentially affect the quality of soil and potentially that of the nearby water bodies.

- Detailed information on spills and leakages mitigation procedures are provided in Chapter 7.1.1 – Soil and Subsoil and Chapter 7.1.2 – Hydrology and Surface Water Quality Hydrology and Surface Water Quality.
- Particular care will be taken on spill containment procedures and materials, and spill/leakage response training of personnel in order to avoid any contamination reaching the freshwater habitats where containment and clean-up procedures would become significantly more complex.

- Emission of dust and particulate matter
  - Dust from material handling, such as conveyors, trucks processing equipment, including storage piles, will be minimized by using covers and/or control equipment (water suppression, bag house, or cyclone) and increasing the moisture content by water spraying.
  - Speed limit for all vehicles will be implemented so as not to generate dust emissions, and all trucks will be properly maintained and travel with covers when carrying material, at all times.
  - Any unpaved internal and access roads will be adequately compacted and periodically graded and maintained and sprayed with water on an as needed basis to minimize dust from vehicle movements. If water spraying is deemed insufficient, other means of surface treatment (e.g. hygroscopic media, such as calcium chloride, and soil natural–chemical binding agents) of unpaved internal and access roads, and exposed stockpiles using a sprinkler system or a ”water-mist cannon” will be implemented.
  - If the stockpiles are stored for a long period of time (more than 2 years), they shall be planted with appropriate methods in order to avoid erosion from wind and rain, and to protect the organic matter content.
- Emission of aerial noise and vibrations
  - Emissions of aerial noise and vibrations should follow the indications of Chapter 7.2.1.3 – Noise and Vibration.
  - Care will be taken to select machines and equipment with low noise emissions;
  - Night works will be avoided (from 8 pm to 6 am at least), as far as practicable, to reduce impacts to nocturnal freshwater fauna species;
  - Particularly noisy activities will be performed during the day and at regular times to promote the habituation of the local fauna to noise and avoid disturbances during critical hours for many species (dusk and dawn).

- Emission of light
  - Light emissions will be focused within the Project Area boundaries.
  - As far as practicable, no intense light has to be aimed directly towards the freshwater habitats within and in proximity of the Project Area.
  - Lights will be mounted as low as practicable.

- Downward-facing lights will be used to manage horizon glow. Louvered bollards, low height flat beam technology luminaires, poles and structure mounted fittings are acceptable.
- Shielded light fittings and directional lights will be used to manage light spill.
- Use of artificial light will be limited to what required to maintain a safe working environment during construction activities past sunset and before sunrise.
- Unnecessary lighting will not be used, including lights in unused areas, decorative lighting, or lighting that is brighter than needed for the task being carried out.
- Where practicable, timers and motion sensors will be used to turn off lights when not in use (e.g., sunset switch on, timer off for lighting used for walkways, car parks, and roads).

- Possible introduction of alien species
  - No freshwater or moist soil is to be discharged to the Project Area without a proper inspection from the Site Environmental Officer (environmental specialist/ecologist).
  - No freshwater procured outside of the Project Area will be discharged into Filyos River or any other nearby natural freshwater habitat.
  - If spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.
- Increase and modification of traffic onshore
  - Speed limits and animal crossing signs will be installed on the access road. If necessary, speed limit along the site access road will enforce installing speed bumps and noise stripes on straight sections;
  - Appropriate design elements aimed at modifying the behavior of animals (e.g., crossing structures, dry ledges, fencing, right-of way jump outs, etc.) could be installed on the road;
  - Avoid the accumulation of stagnant water and organic waste within the construction site and on the roads, that could attract wildlife, properly dispose of waste in a timely and secure manner including animal carcasses;
  - Awareness among employees and contractors working on site about the protected species/habitats potentially present in the area will be developed, in order to ensure constant monitoring and promote actions to be taken if wildlife is encountered;
  - If freshwater fauna species are encountered (amphibians), employees and contractors will wait until it moves on by itself or they will ask the assistance of the Environmental technician for its safe removal and relocation in a suitable environment;
  - Hunting and collection of any wild animal, including fish and invertebrates, by employees and contractors will be strictly prohibited within the Project area.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible residual negative impact** is expected on freshwater fish during the construction phase.

Table 7-6: Residual impact assessment matrix for the freshwater fauna during construction phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Discharge of wastewater	Duration:	Medium	Medium	Short-mid-term	**Low**	High	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Changes in flow/circulation in natural water bodies	Duration:	Medium	Medium	Short-term	**Negligible**	Medium-high	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Minor leakage of contaminants into water	Duration:	Medium	Medium	Short-mid-term	**Low**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Emission of dust and particulate matter	Duration:	Medium	Medium	Short-mid-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Emission of aerial noise and vibrations	Duration:	Medium	Medium	Short-term	**Negligible**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Emission of light	Duration:	Medium	Medium	Short-term	**Negligible**	Medium	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Low					
Possible introduction of alien species	Duration:	Medium-short	Medium	Long term	**Medium**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Increase and modification of traffic onshore	Duration:	Medium-short	Medium	Short-mid-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Low					

	Frequency:	Infrequent					

	Geo. Extent:	Local					
	Intensity:	Negligible					
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Overall assessment:		**Negligible**	Rationale:	During the construction phase some low to medium intensity impacts are expected on freshwater fauna. Mostly reversible in the short-term and with a medium to high efficiency of the reported mitigation measures. Consequently, there is an expected negligible residual impact on this component.			

Monitoring measures

The following monitoring measures shall be implemented to assess the true effects of the project on freshwater fauna during the construction and verify the effectiveness of the mitigation measures.

a) Discharge water quality should be monitored monthly with chemical analysis.

b) Inadvertent impacts on natural freshwater habitats present around the construction site will be monitored monthly in order to assess eventual footprint creep outside designated areas, including signs of habitat loss or stagnant water accumulation, functioning of the water run-off management system, dust deposition on vegetation, presence of waste or hazardous substances spill.

c) Accidents involving freshwater wildlife (amphibians) or the observation of live animal or carcasses along the access road or on the construction site will be recorded. Additional mitigation measures to discourage wildlife presence on site and to avoid roadkill will be taken if needed.

d) The monitoring program for aquatic ecosystems and their living organisms, especially endemic species, should be planned twice a year in May and October during construction activities. Monitoring of possible effects on the availability and population status of benthic macroinvertebrates, fish, and amphibian species should be carried out by a Hydrobiologist.

e) For freshwater ecosystems, the monitoring program should include water quality, flow and freshwater biodiversity.

7.2.2.2 Operation phase

Impact factors

The impact factors from the Project activities potentially affecting freshwater fish during operation phase are listed in the following table.

Table 7-7: Project actions and related impact factors potentially affecting the freshwater fauna during operation phase.

Project actions	Brief description	Impact factors
Plan/Infrastructure onshore operation	Several site activities during operational phase will require the use of water, wastewater generated from these activities	■ Discharge of wastewater ■ Emission of aerial noise and vibrations ■ Emission of light

Project actions	Brief description	Impact factors
	will be treated on site in dedicated treatment plants and discharged in Filyos River. Vehicle traffic within the Project's Area will continue to be intense.	▪ Increase and modification of traffic onshore

The impact factors identified above are described below and assessed in the matrix that follows.

- **Discharge of wastewater**

The discharge of treated wastewater into the river is expected to increase by up to 8.10 m³ per day, in addition to the existing amount. The treated wastewater will be discharged intermittently into the river in accordance with the relevant permits.

This factor would have a low intensity impact, and a short-term reversibility. The generated impacts will be continuous over time.

- **Emission of aerial noise and vibrations**

The emission of noise and vibrations is expected to decrease during operation phase compared to construction phase. However, in the Phase-2 operation stage, the noise and vibration levels from Phase-1 operations will not be affected and will remain the same.

However, in general, the effects of noise disturbance from human activity on wildlife are mostly perceived over short distances in a species- specific way (up to ~ 300 m, Reijnen et al., 1995; Canaday and Rivadeneyra, 2001). The emission of noise and vibrations is relevant during the operational phase, but in the long term it also can be defined more usual and "predictable" in time and space. In fact, animals exposed to prolonged or repeated human disturbance may eventually adapt both behaviorally and physiologically and become "habituated" (Petrinovich et Peeke, 1973). Additionally, the fact that the noise from the Project Area is not associated with an immediate risk suggests that the animals are able to habituate to the sound.

In general, once animals become habituated to noise, especially when it is steady and associated with clearly non-threatening activity, they suffer very little adverse response. During the operations phase the following effects are expected on local fauna:

- likely change in species composition in the study area, with less noise-tolerant species moving further away to avoid areas of high noise;
- selection for more noise tolerant individuals within the population of species closed to the project; and
- habituation of some species and individuals to the noise impacts.

During operation phase, the emission of noise and vibrations will be highly frequent and with a negligible intensity impact. So that, the geographic extent of this factor is defined as local and its reversibility is considered to occur in a short time.

- **Emission of light**

In the Phase-2 operation stage, the light emission levels from Phase-1 operations will not be impacted and will remain the same.

The impact on freshwater fauna present around the Project Area will be in line with what discussed for the construction phase (Chapter 7.2.2.1),

This factor would have a negligible intensity impact, and a short-term reversibility. The generated impacts will be continuous over time.

- **Increase and modification of traffic onshore**

An increase in vehicular traffic is expected during the operation phase compared to baseline conditions. The potential impact deriving from this impact factor are the same as described for the construction phase (Chapter 7.2.2.1).

This factor would have a negligible intensity impact on a local geographic extent and a short-term reversibility. The generated impacts will be frequent over time.

Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Discharge of wastewater
    - Treated wastewater should be analyzed in accordance with national and international guidelines listed in Appendix B;
    - In case of any parameter exceeding its concentration limit the discharge output should be immediately closed until the issue is properly assessed and resolved.
- Emission of aerial noise and vibrations
    - No specific mitigation measures for operation phase are proposed in addition to the that mentioned in the Chapter 7.2.2.1.
- Emission of light
    - No specific mitigation measures for operation phase are proposed in addition to the that mentioned in the Chapter 7.2.2.1.
- Increase and modification of traffic onshore
    - No specific mitigation measures for operation phase are proposed in addition to the that mentioned in the Chapter 7.2.2.1.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible residual negative impact** is expected on freshwater fish during the operation.

Table 7-8: Residual impact assessment matrix for the freshwater fauna during operation phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Discharge of wastewater	Duration:	Long	Medium	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Low					
Emission of aerial noise and vibrations	Duration:	Long	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Emission of light	Duration:	Long	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Negligible					
Increase and modification of traffic onshore	Duration:	Long	Medium	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Overall assessment:		**Negligible**	Rationale:	The impacts on freshwater fauna that will occur as part of Phase 2 operations are the ongoing impacts of current operations. As the level of these impacts on fauna is not expected to increase, it is expected that the impacts will be negligible with the necessary mitigation measures.			

Monitoring measures

The following monitoring measures shall be implemented to assess the true effects of the project on freshwater fauna during the operation and verify the effectiveness of the mitigation measures. This monitoring within the scope of Phase-1 operation will continue during the Phase-2 operation phase.

a) Discharge wastewater quality will be monitored quarterly by accredited laboratories.

b) The monitoring program for freshwater fauna, especially endemic species, should be planned twice a year (May and October) for at least two years during the operation phase. Monitoring of possible effects on the availability and population status of benthic macroinvertebrates, fish and amphibian species should be carried out by a Hydrobiologist.

c) Inadvertent impacts on natural freshwater habitats present around the operation site will be monitored monthly in order to assess eventual footprint creep outside designated areas, including signs of habitat loss or stagnant water accumulation, functioning of the water run-off management system, dust deposition on vegetation, presence of waste or hazardous substances spill.

d) Accidents involving freshwater wildlife (amphibians) or the observation of live animal or carcasses along the access road or on the construction site will be recorded. Additional mitigation measures to discourage wildlife presence on site and to avoid roadkill will be taken if needed.

7.2.3 Fauna

Based on the information collected for the definition of the baseline (see Chapter 6.2.2), the biological components included in the *Terrestrial and Avian Fauna* were assigned a **Medium** value of sensitivity for the following reasons:

- Absence of threatened terrestrial invertebrate, reptile and mammal species;
- Presence of protected reptile species (17);
- Limited Presence of endemic reptile species (2);
- Absence of endemic terrestrial invertebrate and mammal species;
- Presence of protected mammal species (24) including bat species, predators, scavengers, and European otter;

Impacts potentially affecting this component are assessed here below for the construction phase and operation phase.

It's worth mentioning that the ongoing operation impacts the fauna in various ways, including dust, noise, light emissions, and traffic. However, based on the results of ongoing monitoring studies, the fauna species in the area have adapted to these impacts.

7.2.3.1 Construction phase

Impact factors

The impact factors from the Project activities potentially affecting amphibians during construction phase are listed in the following table.

Table 7-9: Project actions and related impact factors potentially affecting the terrestrial fauna during construction phase.

Project actions	Brief description	Impact factors
Site levelling and grading	Soil excavation for the pipeline	■ Removal of soil ■ Emission of aerial noise and vibrations
Material transportation	Removed soil and construction material will be transported out and into the construction area using trucks and heavy machinery. Building material will include crushed rocks and gravel for both the landfall area.	■ Emission of aerial noise and vibrations ■ Possible introduction of alien species ■ Increase and modification of traffic onshore
General engineering/construction works	Heavy machinery will be operating on the landfall area installation.	■ Emission of aerial noise and vibrations ■ Emission of light ■ Increase and modification of traffic onshore ■ Minor leakage of contaminants into water ■ Possible introduction of alien species

The impact factors identified above are described below and assessed in the matrix that follows.

- **Removal of soil**

The Phase-2 onshore pipeline excavation will be carried out in a modified habitat. This activity could have an impact on the soil fauna (such as terrestrial invertebrates) and on the terrestrial species characterized by a hiding strategy to escape predators.

The removal of soil will be carried on in the medium-short term and the evident changes to the environment will be in accordance with the current legal regulations.

- **Emission of aerial noise and vibrations**

The emission of noise and vibrations is expected to increase during the construction phase compared to baseline levels due to construction activities such as soil excavation, surface levelling and grading, mobilization of vehicles, workers and equipment, temporary stockpiling of material, transport of materials and waste, construction of the facilities and paved areas.

Noise and vibration emission, related to the increase in human activities, could cause indirect habitat degradation due to temporary avoidance of surrounding areas by fauna species. In fact, in terrestrial habitats, animals may prefer to move further away from the Project Area to avoid the increased noise from construction site activities.

Noise has the greatest effect on wildlife that relies heavily on auditory signals for survival and especially on mammals. The effects of noise disturbance from human activity on wildlife are mostly perceived over short distances in a species- specific way.

Reptiles are highly sensitive to vibration (e.g., Shen, 1983), which low-frequency noise can be a source of information about approaching predators and prey. Disturbance from anthropogenic noise, for example, is known to be correlated with reduced densities of breeding birds (Reijnen et al., 1995; Canaday and Rivadeneyra, 2001). The effects of vibration on wildlife are poorly studied, however avoidance behavior around the source of vibration is likely to exist for birds. Birds are highly sensitive to vibration (e.g., Shen, 1983), which low-frequency noise can be a source of information about approaching predators and prey.

The emission of noise and vibration is expected to be of low intensity during construction activities, with a highly frequency and a geographic extent around the Project footprint (within 300 m buffer from phase 2 pipeline). The impact is considered to be reversible in a short-term time.

- **Emission of light**

Terrestrial ecosystems can be very sensitive to light and are often severely affected by artificial light at night. Light pollution can negatively affect the biological processes of many organisms and cause cascading effects on the entire ecosystem.

Among animals, the first to suffer from the problem of light pollution are those with nocturnal or crepuscular habits and those who use light sources to orient themselves. Exposure to artificial light at night can interfere with predator-prey relationships.

Invertebrates, and in particular insects, are the animals most affected: artificial light sources can attract them, deceive their sense of orientation and increase the risk of predation. Repeated collisions, stunning and

disorientation are stressful, often fatal, and make survivors easy prey. Light pollution mainly affects the singing and the times of reproductive behavior of birds, with consequences that have not yet been determined for the populations.

The emission of light during construction phases is expected to be of low intensity and duration, with a frequency defined as “continuous” and a geographic extent around the Project footprint. The impact is considered to be reversible in a short-term time.

- **Possible introduction of alien species**

Soil disturbance could facilitate within and around the Project site the spreading of invasive alien (non-native) species accidentally introduced by cars, trucks and other heavy machinery used during construction phases. These species tend to have an advantage in disturbed ecosystems, and if they penetrate into a habitat, they can potentially change its functionality and species composition, including priority biodiversity species.

The habitats around the construction site could experience a decrease in biodiversity, with a consequent trivialization (potential appearance of more dominant species) of the ecosystem in a small area close to the Project site. Local fauna that depends on those ecosystems could also be indirectly affected by the habitat degradation.

Although unlikely to occur and usually localized to areas of disturbed soil, this impact could have a potential long-term duration on habitats. Even if such event is expected to be rare, and to have a sporadic frequency and a negligible intensity, its reversibility is classified as long-term. In accordance with the vehicular traffic factor, the geographic extent of this impact factor is classified as local.

- **Minor leakage of contaminants into water**

Contamination of water bodies within and around the Project Area as described in Chapter 7.1.2 – Hydrology and Surface Water Quality can have a detrimental effect on birds that may use that habitat for feeding, drinking or resting.

Birds could be affected directly, for example by drinking, but also indirectly, for example by eating contaminated prey. Furthermore, the potential reduction of prey due to contamination in the frequented habitat could result in the displacement of birds from the area.

Despite the potential for even severe impacts this factor is predicted to be infrequent at best, and of a low intensity as there are no construction activities directly in freshwater habitats and therefore spills, leakages, and accidental discharges would have to originate from the OPF footprint or the connecting roads which are generally located at a certain distance from the nearby water bodies.

- **Increase and modification of traffic onshore**

During construction, an increase in vehicular traffic is expected along all road network of the present Project Area, this could cause a higher risk of accidental collisions with wildlife.

Traffic can have an important influence on the behavior and distribution, thus the use of the space, of local wildlife populations (St. Clair and Forrest, 2009). Some birds use roadside gravel to aid their digestion of seeds

or come to dust bathe on dirt roads, where they are vulnerable to vehicles as well as predators. Crows and other scavengers seek out roadkill and often become roadkill themselves.

This impact factor is considered to have a local geographic extent classified, and a potential low intensity with a frequency defined as “highly frequent”, since the high number of events are evenly or randomly distributed over time. Since the biodiversity components can restore themselves in a short period after the end of this impact, depending on species’ biology and ecology, the reversibility of the vehicular traffic factor is classified as mid-term.

Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Removal of soil
  - Specialist training shall be provided to plant operators and key personnel involved in activities which involve land clearance, materials handling and transport activities which may impact terrestrial fauna.

- Emission of aerial noise and vibrations
  - Care will be taken to select machines and equipment with low noise emissions;
  - Night works will be avoided (from 8 pm to 6 am at least), as far as practicable, to reduce impacts to nocturnal fauna species;
  - Particularly noisy activities will be performed during the day and at regular times to promote the habituation of the local fauna to noise and avoid disturbances during critical hours for many species (dusk and dawn).

- Emission of light
  - Light emissions will be focused within the Project Area boundaries;
  - Lights will be mounted as low as practicable;
  - Downward-facing lights will be used to manage horizon glow. Louvered bollards, low height flat beam technology luminaires, poles and structure mounted fittings are acceptable;
  - Shielded light fittings and directional lights will be used to manage light spill;
  - Use of artificial light will be limited to what required to maintain a safe working environment during construction activities past sunset and before sunrise;
  - Unnecessary lighting will not be used, including lights in unused areas, decorative lighting, or lighting that is brighter than needed for the task being carried out;
  - Where practicable, timers and motion sensors will be used to turn off lights when not in use (e.g., sunset switch on, timer off for lighting used for walkways, car parks, and roads).

- Minor leakage of contaminants into water

- Project-specific Pollution Prevention Plan and Waste Management Plan will be implemented to ensure that the amount of release and spills can be taken under control before reaching substantial amounts that may potentially affect the quality of soil and potentially that of the nearby water bodies.
- Detailed information on spills and leakages mitigation procedures are provided in Chapter 7.1.1 – Soil and Subsoil and Chapter 7.1.2 – Hydrology and Surface Water Quality;
- Particular care will be taken on spill containment procedures and materials, and spill/leakage response training of personnel in order to avoid that any contamination reaches the freshwater habitats where containment and clean-up procedures would also be significantly more complex.

- Possible introduction of alien species
  - Check of vehicles and machinery for evident foreign plant material, soil and seeds on their first entry on site;
  - Trucks coming from the outside the Project area covered with visible amounts of dirt will be washed in a controlled site, where residues will be managed as waste;
  - If spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.
- Increase and modification of traffic onshore
  - Wire fences should be used to prevent wildlife to enter the Project Area.
  - In locations within the Project Area where wire fencing is not a feasible option entry-exit of terrestrial fauna should be detected via camera-traps to be activated in the night hours during construction.
  - Speed limits and animal crossing signs will be installed on the access road. If necessary, speed limit along the site access road will enforce installing speed bumps and noise stripes on straight sections;
  - Appropriate design elements aimed at modifying the behavior of animals (e.g., crossing structures, dry ledges, fencing, right-of way jump outs and other one-way structures that allow animals to leave the right-of-way, noise barriers, olfactory repellents) could be installed on the road;
  - Avoid the accumulation of stagnant water and organic waste within the construction site and on the roads, that could attract wildlife, properly dispose of waste in a timely and secure manner including animal carcasses;
  - Feeding of wildlife or stray cats and dogs will be prohibited on-site and organic waste will be carefully managed and disposed of in order to avoid attraction of wildlife or stray cats and dogs;
  - Awareness among employees and contractors working on site about the protected species/habitats potentially present in the area will be developed, in order to ensure constant monitoring and promote actions to be taken if wildlife is encountered;
  - If fauna species are encountered, employees and contractors will wait until it moves on by itself or they will ask the assistance of the environmental Specialist/ecologist for its safe removal and relocation in a suitable environment;

- Hunting and collection of wild animals, by employee and contractors will be strictly prohibited within the Project area and the 300 m radius around it.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible residual negative impact** is expected on amphibians during the construction phase.

Table 7-10: Residual impact assessment matrix for the terrestrial fauna during construction phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Removal of soil	Duration:	Medium-short	Low	Long term	**Negligible**	Medium-high	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Project footprint					
	Intensity:	Low					
Emission of aerial noise and vibrations	Duration:	Medium	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Emission of light	Duration:	Medium	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Medium					
Minor leakage of contaminants into water	Duration:	Medium	Medium-high	Short-mid-term	**Low**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Possible introduction of alien species	Duration:	Medium-short	Medium	Long term	**Medium**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Increase and modification of traffic onshore	Duration:	Medium	Medium	Mid term	**Medium**	Medium-high	**Low**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Overall assessment:		**Negligible**	Rationale:	Impacts on terrestrial fauna during construction activities are expected to be of medium to negligible intensity, this is because most impacts are expected to induce the local fauna to move away from the Project's AoI, and despite the mid to long-term need to reverse some of these impacts a medium to high effectiveness of the proposed mitigation measures indicate a general negligible residual impact for terrestrial fauna.			

Monitoring measures

The following monitoring measures shall be implemented to assess the true effects of the project on terrestrial fauna during the construction and verify the effectiveness of the mitigation measures.

a) Accidents involving wildlife or the observation of live animal or carcasses along the access road or on the construction site will be recorded. Additional mitigation measures to discourage wildlife presence on site and to avoid roadkill will be taken if needed.

b) Cameratraps will serve also as monitoring of fauna within the Project Area, detection records will be analysed regularly and will be used to decide on the implementation of further mitigation measures.

c) Monitoring for bird species during construction phase should be carried out twice a year in breeding (May-June) and migration (October-November) months.

7.2.3.2 Operation phase

Impact factors

The impact factors from the Project activities potentially affecting terrestrial and avian fauna during operation phase are listed in the following table.

Table 7-11: Project actions and related impact factors potentially affecting the terrestrial and avian fauna during operation phase.

Project actions	Brief description	Impact factors
Plan/Infrastructure onshore operation	Site activities and vehicle traffic within the Project's Area	■ Emission of aerial noise and vibrations ■ Emission of light ■ Increase and modification of traffic onshore ■ Discharge of wastewater
FPU	Offshore production operations	■ Presence of new infrastructures offshore ■ Emission of aerial noise and vibrations ■ Emission of light ■ Emission of aerial heat

The impact factors identified above are described below and assessed in the matrix that follows.

Species that have already adapted to the noise, vibration, light and traffic levels from Phase-1 operations have been identified in the area. Since these levels are not expected to change, the impact on these species is anticipated to be negligible.

■ **Emission of aerial noise and vibrations**

The emission of noise and vibrations is expected to decrease during operation phase compared to construction phase, but it will be still above the baseline levels due to the expected activities from the OPF and the other associated facilities within the Project Area. Noise and vibrations emissions will occur frequently during operation phase as the OPF will be fully operative, However, in general, the effects of noise disturbance from human activity on wildlife are mostly perceived over short distances in a species- specific way (up to ~ 300 m,

Reijnen et al., 1995; Canaday and Rivadeneyra, 2001). The emission of noise and vibrations is relevant during the operational phase, but in the long term it also can be defined more usual and "predictable" in time and space. In fact, animals exposed to prolonged or repeated human disturbance may eventually adapt both behaviorally and physiologically and become "habituated" (Petrinovich et Peeke, 1973). Additionally, the fact that the noise from the Project Area is not associated with an immediate risk suggests that the animals are able to habituate to the sound.

In general, once animals become habituated to noise, especially when it is steady and associated with clearly non-threatening activity, they suffer very little adverse response. During the operations phase the following effects are expected on local fauna:

- likely change in species composition in the study area, with less noise-tolerant species moving further away to avoid areas of high noise;
- selection for more noise tolerant individuals within the population of species closed to the project; and
- habituation of some species and individuals to the noise impacts.

Aerial noise and vibrations emitted by FPU can raise stress levels in birds, negatively affecting their feeding, breeding, and migration behaviors. High-frequency sounds and vibrations may cause birds to avoid these areas, leading to significant energy loss as they are forced away from their natural habitats.

During operation phase, the emission of noise and vibrations will be highly frequent and with a low intensity impact. So that, the geographic extent of this factor is defined as local and its reversibility is considered to occur in a mid-term time.

- **Emission of light**

Artificial light emitted by FPU can attract birds, especially those that are active at night or migrating. Birds may be drawn towards these lights, which can result in energy depletion and, in some cases, collisions with structures.

Light emissions during operation phase will be probably increasing in number of sources as the FPU, OPF, roads, and all the associated facilities will be fully operational and will require proper illumination to maintain safe working conditions.

The impact on terrestrial and avian fauna present around the Project Area will be in line with what discussed for the construction phase (Chapter 7.2.3.1), generally inducing individual to move away from light sources. It can be also expected that a limited number of species, in particular invertebrates, could be attracted to lighted areas and due to their presence other predatory specie may frequent these areas too.

This factor would have a low intensity impact, and a short-term reversibility. The generated impacts will be continuous over time.

- **Increase and modification of traffic onshore**

A limited increase in vehicular traffic is expected during the operation phase compared to baseline conditions. The potential impact deriving from this impact factor are the same as described for the construction phase (Chapter 7.2.3.1).

In addition, a constant presence of people may generate organic and food waste that if not properly stored could attract wildlife within the Project Area and therefore increase the chance of wildlife-vehicles interactions.

This impact factor is considered to have a local geographic extent classified, and a potential low intensity with a frequency defined as “highly frequent”, since the high number of events are evenly or randomly distributed over time. Since the biodiversity components can restore themselves in a short period after the end of this impact, depending on species’ biology and ecology, the reversibility of the vehicular traffic factor is classified as mid-term.

- **Discharge of wastewater**

Produced water with monovalent salt will be discharged to the sea at a rate of up to 773 m³ per day, based on the maximum gas production and the water-to-gas ratio. Cooling water discharge will reach up to 312,000 m³ per day. Ship-based sewage, approximately 29.4 m³ per day, will be treated using a shipboard sewage treatment plant.

Considering that the Wastewater Treatment Plants will collect hazardous and non-hazardous compounds, as well as the drains from the paved areas, their effluents, even if compliant with the national and international regulations illustrated in Appendix B may still affect the river water quality and, consequently, impact directly (e.g., drinking) and indirectly (e.g., eating contaminated prey - biomagnification) the birds present in the area.

This factor will have a long duration and a continuous frequency during the operation phase although the intensity is considered to be medium.

- **Presence of new infrastructures offshore**

The introduction of new infrastructures can significantly alter marine ecosystems by creating artificial habitats that are attractive to marine life. These structures may also displace birds from their natural feeding and resting areas and lead to changes in the ecosystem (Ronconi et al., 2015).

For instance, studies have shown that these structures can enhance local prey abundance, leading to higher densities of seabird populations in their vicinity (Burke et al., 2005; Montevecchi, 2006).

New infrastructures can create new habitats for marine life, increasing foraging opportunities for seabirds. These structures may also displace birds from their natural feeding and resting areas and lead to changes in the ecosystem (Ronconi, R. A., et al.; 2015). Essentially, FPU presents an environment for birds that may use it for resting during migrations or while searching for food out at sea. While it may provide temporary shelter, the risks associated with the industrial environment remain high for these birds.

- **Emission of aerial heat**

Emission of aerial heat on offshore platforms poses a significant risk to seabirds. Birds attracted to the flames may suffer from burns or overheating, leading to fatal injuries. Implementing careful monitoring and control during flaring, along with physical barriers, can help prevent birds from approaching dangerous areas (Ronconi, R. A., et al.; 2015).

Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Emission of aerial noise and vibrations
  - No specific mitigation measures for operation phase are proposed in addition to the that mentioned in the Chapter 7.2.3.1.
- Emission of light
  - Attraction to lights may result in a collision with lit structures and incineration or partial incineration in flares. Best management practices can include turning off or shielding lights, especially on foggy nights (without compromising safety), avoiding flaring at night when possible or incorporating enclosed waste gas incineration systems instead of flares during FPU development.
- Increase and modification of traffic onshore
  - In addition to the mitigation measures mentioned in the Chapter 7.2.3.1, attention should also be given to properly store and dispose of organic and food waste on-site. During the operation phase cameratraps will be activated in the night hours for a 30-days period in each season.
- Discharge of wastewater
  - Treated wastewater should be analyzed in accordance with national and international guidelines listed in Chapter 2;
  - National and international guidelines listed in Appendix B will be followed to reduce impacts on seabirds;
  - In case of any parameter exceeding its concentration limit the discharge output should be immediately closed until the issue is properly assessed and resolved.
- Presence of new infrastructures offshore
  - Install bird spikes on handrails to deter birds from perching to FPU.
  - Install netting to block bird access from FPU.
  - Implement visual deterrents such as lasers, birds of prey decoys, and ‘inflatable flapping men’ decoys and/or use noise or vibration-emitting devices to directly deter birds and animals from high-risk areas.
- Emission of aerial heat
  - No additional mitigation measures for the emission of aerial heat impact are proposed in addition to those mentioned for the "Presence of new infrastructures offshore" impact, as the aim is to avoid the bird species around the platform.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible residual negative impact** is expected on terrestrial fauna species during the operation phase.

Table 7-12: Residual impact assessment matrix for terrestrial and avian fauna during operation phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Emission of aerial noise and vibrations	Duration:	Long	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Emission of light	Duration:	Long	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Negligible					
Increase and modification of traffic onshore	Duration:	Long	Medium	Mid term	**Medium**	High	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Discharge of wastewater	Duration:	Long	Medium-high	Short-term	**Low**	High	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Medium					
Presence of new infrastructures offshore	Duration:	Long	Medium	Short-mid-term	**Medium**	Medium-high	**Low**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Low					
Emission of aerial heat	Duration:	Medium-short	Medium	Mid term	**Medium**	Medium	**Low**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Very high					
Overall assessment:		**Low**	Rationale:	Impacts on terrestrial fauna during the operation phase will not be different levels from baseline conditions. The impact of FPU on seabirds will be monitored. All impacts have a low and negligible intensity and a mid to short-term reversibility, which, with the medium to high effectiveness of the proposed mitigation measures, produce a negligible-low residual impact on these components.			

Monitoring measures

The following monitoring measures shall be implemented to assess the true effects of the project on terrestrial fauna during the operation and verify the effectiveness of the mitigation measures.

a) Accidents involving wildlife or the observation of live animal or carcasses along the access road or on the construction site will be recorded. Additional mitigation measures to discourage wildlife presence on site and to avoid roadkill will be taken if needed.

d) Camera-traps will also serve as monitoring of fauna within the Project Area, detection records will be analysed regularly and will be used to decide on the implementation of further mitigation measures.

e) Monitoring for bird species during operation phase should be carried out twice a year in breeding (May-June) and migration (October-November) months for the duration of the operation phase.

f) Monitoring for migratory and seabirds on board the FPU during the first two years of operation to assess potential interferences.

7.2.4 Habitats

Based on the information collected for the definition of the baseline (see Chapter 6.2.8), the biological component *Habitats* was assigned a **Medium-high** value of sensitivity for the following reasons:

- Presence of threatened and/or protected habitats (Grey Dunes Habitat, B1.4).

The approach adopted for this component involves the inclusion of several impact factors form previously discussed components. The different habitats, including the threatened B1.4, are, in fact, susceptible to any impact on freshwater and terrestrial flora and fauna, including birds, that could alter their ecological equilibrium.

There will be no habitat loss in the B1.4 habitat during the Phase-2 construction and operation stages. The construction activities will be carried out in areas that are already modified.

Impacts potentially affecting this component are assessed here below for the construction phase and operation phase.

7.2.4.1 Construction phase

Impact factors

The impact factors from the Project activities potentially affecting habitats during the construction phase are listed in the following table.

Table 7-13: Project actions and related impact factors potentially affecting habitats during construction phase.

Project actions	Brief description	Impact factors
Site levelling and grading	Soil excavation for the pipeline	■ Emission of dust and particulate matter ■ Removal of soil
Material transportation	Removed soil and construction material will be transported in and out of the construction area using trucks and heavy machinery. Building material will include crushed rocks and gravel for the landfall area.	■ Emission of dust and particulate matter ■ Emission of aerial noise and vibrations ■ Possible introduction of alien species
General engineering / construction works	Heavy machinery will be operating on the landfall area.	■ Emission of light ■ Emission of aerial noise and vibrations

Project actions	Brief description	Impact factors
		■ Changes in flow/circulation in natural water bodies ■ Minor leakage of contaminants into water ■ Possible introduction of alien species

The impact factors identified above have been already described in detail in Chapters 7.2.1.1, 7.2.2.1, 7.2.3.1. For each factor the impacts were averaged across the different components affected and the selected value inserted in the matrix that follows.

Mitigation measures

The mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Removal of soil

  During the construction activities, the construction boundaries will be clearly defined, and no work will be carried out within the B1.4 habitat.

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.1.1, 7.2.2.1, 7.2.3.1.

- Emission of dust and particulate matter

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.1.1, 7.2.3.1.

- Emission of aerial noise and vibrations

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.2.1, 7.2.3.1.

- Emission of light

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.2.1, 7.2.3.1.

- Changes in flow/circulation in natural water bodies

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.2.1.

- Minor leakage of contaminants into water

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.2.1.

- Possible introduction of alien species

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.1.1, 7.2.2.1, 7.2.3.1.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible negative residual impact** is expected on habitats during the construction phase.

Table 7-14: Residual impact assessment matrix for habitats during construction phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Emission of dust and particulate matter	Duration:	Medium	Medium-low	Short-mid-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Emission of aerial noise and vibrations	Duration:	Medium	Medium	Short-mid-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Emission of light	Duration:	Medium	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Medium					
Changes in flow/circulation in natural water bodies	Duration:	Medium	Medium	Short-term	**Negligible**	Medium-high	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Minor leakage of contaminants into water	Duration:	Medium	Medium-high	Short-mid-term	**Low**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Possible introduction of alien species	Duration:	Medium-short	Medium	Long term	**Medium**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Removal of soil	Duration:	Medium-short	Low	Short-mid-term	**Negligible**	Medium	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Project footprint					
	Intensity:	Low					
Overall assessment:		**Negligible**	Rationale	The mitigation strategy for the impacted habitats reported in this section is expected to offer a medium to high recovery from the construction phase.			

Monitoring measures

No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.1.1, 7.2.2.1, 7.2.3.1.

7.2.4.2 Operation phase

Impact factors

The impact factors from the Project activities potentially affecting habitats during the operation phase are listed in the following table.

Table 7-15: Project actions and related impact factors potentially affecting habitats during the operation phase.

Project actions	Brief description	Impact factors
Plan/Infrastructure onshore operation	Site activities and vehicle traffic within the Project's Area. The operation phase will also require freshwater for several applications and processes, as a consequence wastewater will be produced, treated on-site and discharged mostly in Filyos River.	■ Discharge of wastewater ■ Emission of dust and particulate matter ■ Emission of aerial noise and vibrations ■ Emission of light ■ Increase and modification of traffic onshore

The impact factors identified above have been already described in detail in Chapters 7.2.1.2, 7.2.2.2, 7.2.3.2. For each factor the impacts were averaged across the different components affected and the selected value inserted in the matrix that follows.

Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Discharge of wastewater

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.2.2.

- Emission of dust and particulate matter

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapter 7.2.1.2.

- Emission of aerial noise and vibrations

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.2.2, 7.2.3.2.

- Emission of light

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.2.2, 7.2.3.2.

- Increase and modification of traffic onshore

  No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.2.2, 7.2.3.2.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible negative residual impact** is expected on habitats during the operation phase.

Table 7-16: Residual impact assessment matrix for habitats during operation phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Discharge of wastewater	Duration:	Long	Medium	Short-mid-term	**Medium**	Medium-high	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Emission of aerial noise and vibrations	Duration:	Long	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Emission of light	Duration:	Long	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Negligible					
Increase and modification of traffic onshore	Duration:	Long	Medium	Short-mid-term	**Low**	Medium-high	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Overall assessment:		**Negligible**	Rationale:	Operation phase activities will influence the aquatic and terrestrial habitats through discharge of wastewaters and various emissions. The impacts on habitats that will occur as part of Phase 2 operations are the ongoing impacts of current operations. As the level of these impacts on habitats is not expected to increase, it is expected that the impacts will be negligible with the necessary mitigation measures.			

Monitoring measures

No additional mitigation measures for construction phase are proposed in addition to those mentioned in the Chapters 7.2.1.2, 7.2.2.2, 7.2.3.2.

7.2.5 Legally Protected Areas and Internationally Protected Areas

Based on the information collected for the definition of the baseline (see Chapter 6.2.9), the biological component *Legally Protected Areas and Internationally Protected Areas* was assigned a **Medium** value of sensitivity for the following reasons:

- Absence of protected areas within the Project's AoI;
- Presence of Key Biodiversity Areas (KBAs) and one relevant area for bird biodiversity, Important Bird Area (IBA), according to national/local regulations.

Impacts potentially affecting this component are assessed here below for the construction phase and operation phase.

7.2.5.1 Construction phase

Impact factors

The impact factors from the Project activities potentially affecting legally protected areas and internationally protected areas during construction phase are listed in the following table.

Table 7-17: Project actions and related impact factors potentially affecting legally protected areas and internationally protected areas during construction phase.

Project actions	Brief description	Impact factors
Site levelling and grading	Soil excavation for the pipeline	■ Emission of dust and particulate matter ■ Emission of aerial noise and vibrations
Material transportation	Removed soil and construction material will be transported out and in the construction area using trucks and heavy machinery. Building material will include crushed rocks and gravel for landfall area.	■ Emission of dust and particulate matter ■ Emission of aerial noise and vibrations ■ Possible introduction of alien species
General engineering / construction works	Heavy machinery will be operating on the landfall area	■ Emission of dust and particulate matter ■ Emission of light ■ Emission of aerial noise and vibrations ■ Possible introduction of alien species

The impact factors identified above are described below and assessed in the matrix that follows.

- **Emission of dust and particulate matter**

Dust emission, as discussed in previous sections, can affect the health of vegetation within a 100 m from the Project Area boundaries, with adverse effects on the fauna using those habitats and consequently impacting the biodiversity within and in the vicinity of the Project Area.

The impacts due to the dispersion of dust and particular matter, which is considered to be highly frequent and of medium intensity, are possible around the Project footprint, involving a geographic extent defined as local (within 100 m buffer). The reversibility from this impact factor is considered to be short.

- **Emission of aerial noise and vibrations**

Emissions of noise and vibration would affect the general biodiversity (i.e., freshwater and terrestrial fauna and birds) of the KBA and IBA as per the details reported in Chapters 7.2.2.1, 7.2.3.1, and 7.2.2.2.1.

The impacts due to the emissions of aerial noise and vibrations are considered to be highly frequent and of medium intensity with a short-mid-term reversibility.

- **Emission of light**

Similarly to noise and vibration, light emissions will also affect the fauna within the Project's AoI and consequently the KBA and IBA. The details are again discussed in previous components at Chapters 7.2.2.1, 7.2.3.1, and 7.2.2.2.1.

The impacts due to light emissions are considered to be continuous and of medium intensity with a short-term reversibility.

- **Possible introduction of alien species**

The possible introduction of alien species (flora or fauna alike) could have a cascade effect on local biodiversity by changing the species compositions (invasive fauna and flora), the habitats morphology (invasive flora) and even some physical parameters (invasive microalgae) of the different habitats. A spill off effect from the Project's AoI to the KBAs could threaten the biodiversity value of these areas.

The impacts due to light emissions are considered to be continuous and of medium intensity with a short-term reversibility.

Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Emission of dust and particulate matter
  - Dust management control measures will be implemented as described in Chapter 7.2.1.2 – Air quality.
- Emission of aerial noise and vibrations
  - Care will be taken to select machines and equipment with low noise emissions;
  - Night works will be avoided (from 8 pm to 6 am at least), as far as practicable, to reduce impacts to nocturnal birds species;
  - Particularly noisy activities will be performed during the day and at regular times to promote the habituation of the local fauna to noise and avoid disturbances during critical hours for many species (dusk and dawn).
- Emission of light
  - Light emissions will be focused within the Project Area boundaries;
  - Keep glare to a minimum by ensuring that the main beam angle of all lights directed towards any potential observer is not more than 70°;

- Downward-facing lights will be used to manage horizon glow. Louvered bollards, low height flat beam technology luminaires, poles and structure mounted fittings are acceptable;
- Shielded light fittings and directional lights will be used to manage light spill;
- Use of artificial light will be limited to what required to maintain a safe working environment during construction activities past sunset and before sunrise;
- Unnecessary lighting will not be used, including lights in unused areas, decorative lighting, or lighting that is brighter than needed for the task being carried out;
- Where practicable, timers and motion sensors will be used to turn off lights when not in use (e.g., sunset switch on, timer off for lighting used for walkways, car parks, and roads).

g) Possible introduction of alien species

- Check of vehicles and machinery for evident foreign plant material, soil and seeds on their first entry on site:
- Trucks coming from the outside the Project area covered with visible amounts of dirt will be washed in a controlled site, where residues will be managed as waste;
- If spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible negative residual impact** is expected on legally protected areas and internationally protected areas during the construction phase.

Table 7-18: Residual impact assessment matrix for legally protected areas and internationally protected areas during construction phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Emission of dust and particulate matter	Duration:	Medium	Medium-low	Short-mid-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Emission of aerial noise and vibrations	Duration:	Medium	Medium	Short-mid-term	**Low**	Medium	**Low**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Emission of light	Duration:	Medium	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Continuous					

	Geo. Extent:	Project footprint					
	Intensity:	Medium					
Possible introduction of alien species	Duration:	Medium-short	Medium	Long term	**Medium**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Overall assessment:		**Negligible**	Rationale:	The impacts affecting the KBA and IBA status on biodiversity during construction activities will be mitigated and monitored as described in the previous components, in particular for birds, resulting in a negligible residual impact.			

Monitoring measures

The following monitoring measures shall be implemented to assess the true effects of the project on legally protected areas and internationally protected areas during the construction and verify the effectiveness of the mitigation measures.

- Inadvertent impacts on natural habitats present around the construction site will be monitored monthly in order to assess eventual footprint creep outside designated areas, including signs of erosion or stagnant water accumulation, functioning of the water run-off management system, dust deposition on vegetation, presence of waste or hazardous substances spill.
- Monitoring of birds and flora species and their recovery in the landfall construction area at completion of works and in the following one and two years.
- If detected, presence and spreading of invasive flora and fauna species within and around the construction site will be monitored every three months by experts, and, if necessary, extirpation campaign will be put in place in order to avoid the spreading of the invasive species.

7.2.5.2 Operation phase

Impact factors

The impact factors from the Project activities potentially affecting legally protected areas and internationally protected areas during operation phase are listed in the following table.

Table 7-19: Project actions and related impact factors potentially affecting legally protected areas and internationally protected areas during operation phase.

Project actions	Brief description	Impact factors
Plan/Infrastructure onshore operation	Site activities within the Project's Area	■ Emission of aerial noise and vibrations ■ Emission of light

The impact factors identified above are described below and assessed in the matrix that follows.

- **Emission of aerial noise and vibrations**

The impact due to aerial noise and vibrations emissions present around the Project Area will be in line with what discussed for the construction phase (Chapter 7.2.5.1).

The impacts due to the emissions of aerial noise and vibrations are considered to be highly frequent and of negligible intensity with a short-term reversibility.

- **Emission of light**

The impact due to light emissions present around the Project Area will be in line with what discussed for the construction phase (Chapter 7.2.5.1).

This factor would have a negligible intensity impact, and a short-term reversibility. The generated impacts will be continuous over time.

Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Emission of aerial noise and vibrations
  - No specific mitigation measures for operation phase are proposed in addition to the that mentioned in the Chapter 7.2.5.1.
- Emission of light
  - No specific mitigation measures for operation phase are proposed in addition to the that mentioned in the Chapter 7.2.5.1.

Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible negative residual impact** is expected on legally protected areas and internationally protected areas during the operation phase.

Table 7-20: Residual impact assessment matrix for legally protected areas and internationally protected areas during the operation phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Emission of aerial noise and vibrations	Duration:	Long	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Emission of light	Duration:	Long	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
	Intensity:	Negligible					
Overall assessment:		**Negligible**	Rationale:	The already relatively low impact on biodiversity during operation activities will be mitigated and monitored as described in the previous components, resulting in a negligible residual impact.			

Monitoring measures

The following monitoring measures shall be implemented to assess the true effects of the project on legally protected areas and internationally protected areas during the operation and verify the effectiveness of the mitigation measures.

Monitoring measures will follow those listed in Chapters 7.2.2.2, 7.2.3.2, and 7.2.2.3.2.

7.2.6 Critical and Natural Habitats

The only component triggering a Critical Habitat (CH) under Criteria 1 identified in the baseline (Chapter 6.2.8) is the endangered flora species *Centaurea kilaea* present in the landfall area of the Flora AoI.

Given that the species is included in the flora component and forms part of the coastal dune habitat (which is not subject to construction works) (Chapter 7.2.2.3), it can be concluded that the residual impact on this species will be negligible for both the construction and operational phases.

No construction or operation will be conducted in B1.4, *C. kilaea*'s habitat and there will be no population loss for this species. For this reason, **No Net Loss is assessed for the Critical habits triggered by *C. kilaea*.**