ENVIRONMENTAL IMPACT ASSESSMENT MATRIX OF THE CONSTRUCTION, USE AND MAINTENANCE OF THE AIRPORT AREA

ASSETS	Action	Environmental Component Exposed	Environmental aspect	Environmental impact	Impact Type	Extension	Intensity	Duration	Probability	Legal aspects	Unmitigated significance	original risk	Mitigation measures	Extension	Intensity	Duration	Probability	Legal aspects	significance with mitigation	mitigated risk	impact degree
Track construction: ground preparation	Anchorage of the ship for unloading tasks	Water	Vessel activities near the coast	Alteration of the coastal fauna	Straight	2	2	2	4	4	128	Medium	M5: to minimize the impact of the vessels, (a) the provisions of Annex IV and the Polar Code regarding discharges will be complied with, (b) the operation time will be reduced to the shortest possible, (c) the discharge will be carried out mainly to a summer campaign and (d) a main site and an alternative site for downloading will be established.	2	2	2	3	2	48	Low	Less than minimal or transient
	Arrival of people and cargo at the Base	Flora and fauna	Transport of Non-Native Species	Invasion of Species	Indirect	2	3	2	3	4	144	Medium	M1: The measures established in the Manual for the Prevention of Non-Native Species must be applied.	2	3	2	2	2	48	Low	Less than minimal or transient
	Elimination of packaging of transported cargo	Soil	Waste generation	environment pollution	Straight	2	2	2	3	2	48	Low	M2: the provisions of the Waste Management Plan and the Instructions for waste preparation of the bases must be completed.	1	2	2	3	2	24	Low	Less than minimal or transient
	Placement of poles for signalling	Soil	Introduction of anthropic elements	landscape modification	Straight	2	2	2	4	2	64	Low	M19: (a) avoid the formation of snow tails and foot ice, (b) affect the minimum necessary surface area, (c) not incorporate anthropic elements into surface water courses and (d) control that the accumulation of Water.	2	1	2	4	2	32	Low	Less than minimal or transient
	Vehicle operation and movement of people	Soil	Interaction of personnel and vehicles with the substrate	Substrate disturbance	Straight	2	3	2	4	2	96	Low	M3: (a) The activity will be carried out on the area already impacted by the base, (b) circulation through areas with vegetation must be avoided, (c) respect what is established as measures of approach to fauna, (d) respect maximum values of speed and (e) not cross the streams.	2	2	2	4	2	64	Low	Less than minimal or transient
	vehicle operation	Atmosphere	GEI emission	Atmospheric pollution	Straight	3	4	2	3	2	144	Medium	M4: Supervise the state of vehicles and machinery to avoid incomplete combustion and thus minimize CO2 emissions into the atmosphere.	3	3	2	2	2	72	Low	Less than minimal or transient
Track construction: compaction and initial levelling of the ground	Leveller Passes	Soil	land levelling	Substrate disturbance	Straight	2	3	2	4	2	96	Low	M20: You must (a) make the fewest passes of levellers necessary, (b) delimit the smoothing up to 10 meters outside the markers, (c) previously control the presence of fauna on the ground, (d) control the interruption of surface water currents and (e) control the presence of fossils on the ground.	2	2	2	4	2	64	Low	Less than minimal or transient
	Leveller Passes	Fauna	Noise Generation	Noise pollution	Straight	2	3	2	3	2	72	Low	M25: (a) the provisions of Resolution 2 (2004) - Guidelines for the operation of aircraft near concentrations of birds in Antarctica must be respected and (b) establish flight routes avoiding overflights over concentrations of birds.	2	2	4	2	2	64	Low	Less than minimal or transient
	Passes of the vibro-compactor	Soil	land levelling	Substrate disturbance	Straight	2	3	4	4	2	192	Medium	M20: You must (a) make the fewest passes of levellers necessary, (b) delimit the smoothing up to 10 meters outside the markers, (c) previously control the presence of fauna on the ground, (d) control the interruption of surface water currents and (e) control the presence of fossils on the ground.	2	2	4	4	2	128	Medium	Equal to minimum or transient
	Passes of the vibro-compactor	Fauna	Noise and vibration generation	harmful meddling	Straight	2	2	2	4	2	64	Low	M6: (a) Regular maintenance of all equipment to ensure its efficient operation, (b) the provisions of the wildlife approach manual will be respected, (c) vehicles will be used in a way that minimizes noise and (d) will control not to do activities that involve high levels of noise when there are nearby concentrations of fauna.	2	2	2	3	2	48	Low	Less than minimal or transient
	Use of machinery	Atmosphere	GEI emission	Atmospheric pollution	Straight	3	4	2	3	2	144	Medium	M4: Supervise the state of vehicles and machinery to avoid incomplete combustion and thus minimize CO2 emissions into the atmosphere.	3	3	2	2	2	72	Low	Less than minimal or transient
	Use of machinery	Soil	Loss of liquids (oils and fuels)	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	3	2	2	2	24	Low	Less than minimal or transient
	Obtaining filler material	Glacier	Extraction of aggregates from moraines	Modification of moray eels	Straight	2	4	4	4	2	256	High	M21: It must be (a) controlled that the extraction of aggregates does not generate an increase in accumulated water in the area, (b) extract aggregates only from the established area, (c) ensure that the extraction area has the necessary clast size to avoid make unnecessary extractions, (d) not remove material from the lower terrace and (e) extract material from the alluvial fans located at the foot of the moraine cord.	2	3	4	4	2	192	Medium	Equal to minimum or transient
	Transfer and distribution of gravel	Soil	use of roads	soil compaction	Straight	2	3	2	4	2	96	Low	M3: (a) The activity will be carried out on the area already impacted by the base, (b) circulation through areas with vegetation must be avoided, (c) respect what is established as measures of approach to fauna, (d) respect maximum values of speed and (e) not cross the streams.	2	2	2	4	2	64	Low	Less than minimal or transient

	Filling and lifting of zones	Soil	Substrate disturbance	Drain Modification	Straight	2	3	4	4	2	192	Medium	M22: (a) check the presence of water accumulation in summer, (b) check that the average thickness must correspond to the depth of the seasonal thawing to avoid the ablation effect, (c) it is advisable not to touch, remove, or alter the stone materials of the lower terrace, (e) fill only the runway trace and leave no accumulation of gravel outside it and (f) level the lowest ground first in order to prevent seawater from further entering the future runway area .	2	2	4	4	2	128	Medium	Equal to minimum or transient
	Generation of provisional channels	Soil	alteration of the substrate	Drain Modification	Straight	2	3	4	4	2	192	Medium	M23: It must (a) ensure that the run-off channels that are built do not increase erosion and drag sediments, (b) it must ensure that the new channels flow into existing watercourses, (c) the generation of meltwater in the area by removing accumulated snow whenever possible and (d) permanently ensuring a favourable slope towards the coast, to prevent water from melting snow or permafrost from remaining, without the possibility of its natural evacuation.	2	2	4	3	2	96	Low	Less than minimal or transient
Track construction: track lift	Leveller Passes	Soil	land levelling	Substrate disturbance	Straight	2	3	4	4	2	192	Medium	M20: You must (a) make the fewest passes of levellers necessary, (b) delimit the smoothing up to 10 meters outside the markers, (c) previously control the presence of fauna on the ground, (d) control the interruption of surface water currents and (e) control the presence of fossils on the ground.	2	2	4	4	2	128	Medium	Equal to minimum or transient
	Completion of runway lift	Soil	Presence of the runway lift	Drain Modification	Straight	2	3	4	4	4	384	High	M22: (a) check the presence of water accumulation in summer, (b) check that the average thickness must correspond to the depth of the seasonal thawing to avoid the ablation effect, (c) it is advisable not to touch, remove, or alter the stone materials of the lower terrace, (e) fill only the runway trace and leave no accumulation of gravel outside it and (f) level the lowest ground first in order to prevent seawater from further entering the future runway area .	2	2	4	4	2	128	Medium	Equal to minimum or transient
	Use of machinery	Atmosphere	GEI emission	Atmospheric pollution	Straight	3	4	2	3	2	144	Medium	M4: Supervise the state of vehicles and machinery to avoid incomplete combustion and thus minimize CO2 emissions into the atmosphere.	3	3	2	2	2	72	Low	Less than minimal or transient
	Use of machinery	Soil	Loss of liquids (oils and fuels)	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	2	2	2	4	32	Low	Less than minimal or transient
	Work of people and machinery	Soil	Waste generation	environment pollution	Straight	2	2	2	3	2	48	Low	M2: the provisions of the Waste Management Plan and the Instructions for waste preparation of the bases must be completed.	1	2	2	3	2	24	Low	Less than minimal or transient
	Installation of catering and lighting	Soil	Introduction of anthropic elements	landscape modification	Straight	2	2	4	4	2	128	Medium	M19: (a) avoid the formation of snow tails and foot ice, (b) affect the minimum necessary surface area, (c) not incorporate anthropic elements into surface water courses and (d) control that the accumulation of Water,	2	1	4	4	2	64	Low	Less than minimal or transient
Track construction: final adaptation of the track	Vehicle operation and movement of people	Soil	Interaction of personnel and vehicles with the substrate	Substrate disturbance	Straight	2	3	2	4	2	96	Low	M3: (a) The activity will be carried out on the area already impacted by the base, (b) circulation through areas with vegetation must be avoided, (c) respect what is established as measures of approach to fauna, (d) respect maximum values of speed and (e) not cross the streams.	2	2	2	4	2	64	Low	Less than minimal or transient
	Elimination of the packaging of the material to be installed	Soil	Waste generation	environment pollution	Straight	2	2	2	3	2	48	Low	M2: the provisions of the Waste Management Plan and the Instructions for waste preparation of the bases must be completed.	1	2	2	3	2	24	Low	Less than minimal or transient
	Levelling and Item Removal Review	Soil	land smoothing	alteration of the substrate	Straight	2	3	4	4	2	192	Medium	M20: You must (a) make the fewest passes of levellers necessary, (b) delimit the smoothing up to 10 meters outside the markers, (c) previously control the presence of fauna on the ground, (d) control the interruption of surface water currents and (e) control the presence of fossils on the ground.	2	2	4	4	2	128	Medium	Equal to minimum or transient
	Clearing of accumulated snow	Snow	Removal of accumulated snow	Drain Modification	Straight	2	3	4	4	2	192	Medium	M22: (a) check the presence of water accumulation in summer, (b) check that the average thickness must correspond to the depth of the seasonal thawing to avoid the ablation effect, (c) it is advisable not to touch, remove, or alter the stone materials of the lower terrace, (e) fill only the runway trace and leave no accumulation of gravel outside it and (f) level the lowest ground first in order to prevent seawater from further entering the future runway area .	2	2	4	3	2	96	Low	Less than minimal or transient
	Use of machinery	Fauna	Noise Generation	Noise pollution	Straight	2	4	4	3	2	192	Medium	M25: (a) the provisions of Resolution 2 (2004) - Guidelines for the operation of aircraft near concentrations of birds in Antarctica must be respected and (b) establish flight routes avoiding overflights over concentrations of birds.	2	3	4	2	2	96	Low	Less than minimal or transient
Runway operation: runway preparation and maintenance	Vehicle operation and movement of people	Soil	Interaction of personnel and vehicles with the substrate	Substrate disturbance	Straight	2	3	2	4	2	96	Low	M3: (a) The activity will be carried out on the area already impacted by the base, (b) circulation through areas with vegetation must be avoided, (c) respect what is established as measures of approach to fauna, (d) respect maximum values of speed and (e) not cross the streams.	2	2	2	4	2	64	Low	Less than minimal or transient
	Use of vehicles and machinery	Soil	Loss of liquids (oils and fuels)	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	2	2	2	2	16	Low	Less than minimal or transient

	Actions to minimize risks with fauna	Fauna	Displacement of fauna off the runway sector	harmful meddling	Straight	2	2	2	4	4	128	Medium	M24: (a) ensure that there is no garbage or food scraps scattered on the ground so as not to attract birds to the area, (b) previous tours of the runway prior to landings and take-offs to achieve the movement of birds and mammals off the runway , (c) report all incidents with fauna, (d) if it is necessary to carry out an unavoidable interaction with fauna, this must be done by specialized IAA personnel or with their advice and (e) not feed the fauna present in the Cape.	2	2	1	3	2	24	Low	Less than minimal or transient
Runway operation: landing and take-off of aircraft	Approach and take-off circuit flight	Fauna	Overflight over concentrations of fauna	harmful meddling	Straight	3	2	2	4	4	192	Medium	M25: (a) the provisions of Resolution 2 (2004) - Guidelines for the operation of aircraft near concentrations of birds in Antarctica must be respected and (b) establish flight routes avoiding overflights over concentrations of birds.	3	2	2	3	2	72	Low	Less than minimal or transient
	Approach and take-off circuit flight	Fauna	Overflight over protected areas	harmful meddling	Straight	3	2	2	4	4	192	Medium	M25: (a) the provisions of Resolution 2 (2004) - Guidelines for the operation of aircraft near concentrations of birds in Antarctica must be respected and (b) establish flight routes avoiding overflights over concentrations of birds.	3	2	2	3	2	72	Low	Less than minimal or transient
	Aircraft landing and take-off	Fauna	noise emission	harmful meddling	Straight	2	3	4	4	2	192	Medium	M6: (a) Regular maintenance of all equipment to ensure its efficient operation, (b) the provisions of the wildlife approach manual will be respected, (c) vehicles will be used in a way that minimizes noise and (d) will control not to do activities that involve high levels of noise when there are nearby concentrations of fauna.	2	2	4	3	2	96	Low	Less than minimal or transient
	Landing and take-off of aircraft	Atmosphere	GEI emission	Atmospheric pollution	Straight	3	4	4	3	2	288	High	M4: Supervise the state of vehicles and machinery to avoid incomplete combustion and thus minimize CO2 emissions into the atmosphere.	3	3	4	2	2	144	Medium	Equal to minimum or transient
	Movement and stay of aircraft at the airport	Soil	Loss of liquids (oils and fuels)	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	2	2	2	4	32	Low	Less than minimal or transient
	Arrival of people and cargo at the Base	Flora and fauna	Transport of Non-Native Species	Invasion of Species	Indirect	2	3	2	3	4	144	Medium	M1: The measures established in the Manual for the Prevention of Non-Native Species must be applied.	2	3	2	2	4	96	Low	Less than minimal or transient
	repair tasks	Soil	Loss of liquids (oils and fuels)	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	2	2	2	4	32	Low	Less than minimal or transient
	Aircraft landing and take-off	Soil and Fauna	plane crash	Harmful pollution and interference	Straight	3	3	2	2	2	72	Low	M26: The Base must have (a) an Accident Prevention Plan with the actions to be carried out in these cases and (b) a COMNAP format Contingency plan to minimize environmental impacts.	2	2	2	2	2	32	Low	Less than minimal or transient
Helicopter Operation: maintenance and inspections	maintenance tasks	Soil	Loss of liquids (oils and fuels)	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	2	2	2	4	32	Low	Less than minimal or transient
	Replacement of operating fluids	Soil	Hazardous Waste Generation	environment pollution	Straight	2	2	2	3	2	48	Low	M2: the provisions of the Waste Management Plan and the Instructions for waste preparation of the bases must be completed.	1	2	2	3	2	24	Low	Less than minimal or transient
	Disposal of packaging	Soil	Waste generation	environment pollution	Straight	2	2	2	3	2	48	Low	M2: the provisions of the Waste Management Plan and the Instructions for waste preparation of the bases must be completed.	1	2	2	3	2	24	Low	Less than minimal or transient
	Commissioning for tests	Atmosphere	Noise Generation	Noise pollution	Straight	2	4	4	3	2	192	Medium	M25: (a) the provisions of Resolution 2 (2004) - Guidelines for the operation of aircraft near concentrations of birds in Antarctica must be respected and (b) establish flight routes avoiding overflights over concentrations of birds.	2	3	4	2	2	96	Low	Less than minimal or transient
Helicopter Operation: take-off and landing	Take-off and landing procedure	Atmosphere	Noise Generation	Noise pollution	Straight	2	4	4	3	2	192	Medium	M6: (a) Regular maintenance of all equipment to ensure its efficient operation, (b) the provisions of the wildlife approach manual will be respected, (c) vehicles will be used in a way that minimizes noise and (d) will control not to do activities that involve high levels of noise when there are nearby concentrations of fauna.	2	3	4	2	2	96	Low	Less than minimal or transient
	Start up	Soil	Losses in fuel supply	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	2	2	2	4	32	Low	Less than minimal or transient
	Take-off and approach flight	Fauna	Overflight over concentrations of fauna	harmful meddling	Straight	3	2	2	4	4	192	Medium	M25: (a) the provisions of Resolution 2 (2004) - Guidelines for the operation of aircraft near concentrations of birds in Antarctica must be respected and (b) establish flight routes avoiding overflights over concentrations of birds.	3	2	2	3	2	72	Low	Less than minimal or transient
	Actions to minimize risks with fauna	Fauna	Displacement of fauna off the runway sector	harmful meddling	Straight	2	2	1	4	4	64	Low	M24: (a) ensure that there is no garbage or food scraps scattered on the ground so as not to attract birds to the area, (b) previous tours of the runway prior to landings and take-offs to achieve the movement of birds and mammals off the runway , (c) report all incidents with fauna, (d) if it is necessary to carry out an unavoidable interaction with fauna, this must be done by specialized IAA personnel or with their advice and (e) not feed the fauna present in the Cape.	2	2	1	3	2	24	Low	Less than minimal or transient
	Take-off and approach flight	Soil and Fauna	plane crash	Harmful pollution and interference	Straight	3	3	2	2	2	72	Low	M26: The Base must have (a) an Accident Prevention Plan with the actions to be carried out in these cases and (b) a COMNAP format Contingency plan to minimize environmental impacts.	2	2	2	2	2	32	Low	Less than minimal or transient

JP1 tankers: use and storage of JP1	Conditioning of Cisterns	Soil	Losses in the fuel drain	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	2	2	2	4	32	Low	Less than minimal or transient
	Conditioning of Cisterns	Soil and Water	Hazardous Waste Generation	environment pollution	Straight	2	2	2	3	2	48	Low	M2: the provisions of the Waste Management Plan and the Instructions for waste preparation of the bases must be completed.	1	2	2	3	2	24	Low	Less than minimal or transient
	Supply of JP1 to the Cisterns	Soil	Transfer losses	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	2	2	2	4	32	Low	Less than minimal or transient
	Fuel storage	Soil	Losses due to rupture of cisterns and/or pipes	soil contamination	Straight	1	3	2	3	4	72	Low	M10: (a) establish and take into account the contingency measures of the future Base Contingency Plan, (b) have the corresponding anti-spill material for the primary contingency of the spill, (c) conduct spill training for all personnel, (d) ensure the provision of anti-spill response equipment and (e) ensure compliance with the maintenance plan for vehicles, facilities and generators.	1	2	2	2	4	32	Low	Less than minimal or transient
	storage risk	Environment	Tanker fire	environment pollution	Straight	2	3	3	3	4	216	High	M26: The Base must have (a) an Accident Prevention Plan with the actions to be carried out in these cases and (b) a COMNAP format Contingency plan to minimize environmental impacts.	2	3	2	2	4	96	Low	Less than minimal or transient