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5 PROJECT DESCRIPTION

This chapter contains the project description for the modification and optimisation of the Mirador Mining Project facilities for phase II of the expansion of the mining and beneficiation of metallic minerals to 140,000 tonnes per day (140 ktpd), equivalent to 46.2 million tonnes per year (46.2 Mtpa). The content and structure of this chapter has been defined by reference to the "General Guidelines for the Preparation of Standard Terms of Reference for the Preparation of Environmental Impact Studies applicable to the Exploitation, Beneficiation, Smelting and Refining Phases of Category IV Mining Projects" of the Subsecretariat of Environmental Quality of the Ministry of Environment, Water and Ecological Transition (MAATE).

The modifications to the infrastructure, as well as the proposed new infrastructure, will allow for the continuity of mining activities in the operational sector of the mining phase. Table 5-1 shows the proposed modifications and optimisations, Table 5-2 details the distance of the infrastructure from socially sensitive elements.

Table 5-1 Infrastructures of the Exploitation phase of the Mirador Mining Project phase II

Item	Description	Coordinates (WGS84)		Surface	
		X	Y	ha	m2
1	*Tajo Mirador Norte*				
	Tajo Mina	783.223,894	9.606.625,98	154,949	1.549.490,04
	Shredding platform				
	Ore crushing platform	782.828,858	9.606.078,76	3,267	32.674,23
	Banda mena	783.141,812	9.605.869,04	0,661	6.613,12
	Tailings crushing platform	783.946,646	9.605.947,23	1,104	11.044,82
	Sterile band	784.688,144	9.606.451,16	5,26	52.600,95
	North Waste Dump				
	North Waste Dump	785.769,755	9.606.555,68	273,893	2.738.933,24
	Canal Northern Section	786.197,089	9.607.558,65	1,541	15.407,57
	Canal Southern Section	786.683,138	9.606.565,67	1,844	18.436,52
	Tagus Mirador Norte Acid Water Dam				
	Acid water dam	782.645,793	9.606.013,91	0,708	7.081,52
	Acid-water dam reservoir			1,116	11.161,24
	Acid water dam spillway			0,026	257,495
	Sedimentation pools	782.521,345	9.606.065,22	1,238	12.382,44
	Spillway pools sedimentation			0,024	237,495
5	*Acid water dam at Escombrera North*				
	Acid-water dam North dump	784.319,384	9.605.956,52	2,511	25.110,80

Item	Description	Coordinates (WGS84)		Surface	
		X	Y	ha	m2
	Escombrera Norte acid-water dam reservoir			4,286	42.864,48
	Spillway dam water acidic North dump			0,104	1.040,11
	Sedimentation pool A (dam)	784.713,528	9.605.861,34	0,377	3.771,69
	Swimming pool at sedimentation A (reservoir)			0,406	4.064,14
	Pool A Spillway			0,029	286,493
	Sedimentation pool B (weir)	784.645,97	9.605.935,18	0,512	5.120,90
	Swimming pool at sedimentation B (reservoir)			1,041	10.406,97
	Pool B Spillway			0,105	1.052,62
	Sedimentation pool C (dam)	785.310,421	9.605.500,99	0,434	4.340,98
	Swimming pool at sedimentation C (reservoir)			0,543	5.428,17
	Pool C Spillway			0,054	535,31
	Escombrera Sur Acid Water Dam 2				
	Dam from water dam acidic 2 of Escombrera Sur	784.368,097	9.605.361,48	4,7	46.995,19
	Escombrera Sur acid-water dam 2 reservoir			1,278	12.778,76
	Dam spillway			0,08	804,336
	Sedimentation pool	784.818,739	9.604.932,54	1,941	19.409,35
	Sedimentation pool channel			0,167	1.672,66
	Steel ball mill				
	Steel ball mill	780.034,968	9.604.776,18	16,461	164.613,97
	Recirculation pool			0,04	400,078
	Pumping room			0,008	76,499
	Tank tank from water tank recirculation tank			0,607	6.074,88
	Water tank for fire-fighting system			0,015	153,155
	Elevated tank for production			0,02	200,039
	Platforms Steel ball production workshop			1,975	19.752,29
	Workshop			0,198	1.980,03
	Platforms			9,469	94.686,05
	Warehouse platforms			0,85	8.497,63

Item	Description	Coordinates (WGS84)		Surface	
		X	Y	ha	m2
	Platforms spare parts warehouse			0,595	5.950,03
	Sleeping area			3,602	36.021,85
	Dining room			0,032	319,994
8	*Beneficiation Plant Phase II*				
	Beneficiation Plant Phase II	782.615,723	9.605.636,81	1,205	12.052,08
	Lines from processing processing lines	783.209,039	9.605.679,10	5,685	56.851,89
	Acid water treatment plant Mirador Norte				
	Acid water treatment plant			0,506	5.059,76
	Powder magazine				
	Polvorín Expansion	783.657,641	9.605.397,23	2,569	25.693,37
	Rubbish dumps				
	Waste dump 10	780.514,353	9.605.140,46	2,871	28.708,10
	Waste heap 11	780.774,521	9.605.394,36	11,018	110.178,57
	7- Extension	780.697,902	9.604.986,49	0,856	8.558,90
	7- Extension	780.852,170	9.605.129,95	0,408	4.078,52
	Dump 9	781.125,630	9.605.413,11	1,417	14.168,18
	Waste dump A	780.188,033	9.604.309,91	6,686	66.860,21
	Waste rock dump k1	783.331,389	9.606.532,88	2,844	28.435,32
	K2 tailings heap	783.894,017	9.606.157,04	5,432	54.321,17
	K3 tailings heap	783.880,047	9.606.567,97	1,52	15.198,66
	K4 tailings heap	782.191,402	9.606.764,77	0,991	9.912,35
	K5 tailings heap	782.581,035	9.606.794,04	3,001	30.006,46
	Waste rock dump k6	782.516,400	9.606.440,10	1,146	11.463,14
	Waste rock dump L1	784.585,210	9.606.040,30	0,418	4.178,85
	Landfill L2	784.634,037	9.606.218,80	1,402	14.017,43
	Waste rock dump L3	784.863,112	9.605.987,66	0,748	7.480,23
	L4 tailings heap	784.932,907	9.606.152,48	1,748	17.479,64
	L5 tailings heap	784.961,147	9.606.534,13	3,298	32.982,12
	Waste rock dump L6	785.006,764	9.606.742,51	1,769	17.694,77
	L7 tailings heap	785.057,487	9.606.845,29	2,193	21.929,11
	Z1 tailings heap	785.276,147	9.605.613,38	1,157	11.574,43
	Z2 tailings heap	786.149,445	9.605.181,02	0,397	3.967,45
	Z3 tailings heap	786.653,359	9.605.556,03	0,653	6.526,07
	Z4 tailings heap	786.731,738	9.605.780,24	0,629	6.291,65
	Z5 tailings heap	786.399,410	9.605.996,68	0,994	9.941,00
	Z6 tailings heap	786.476,716	9.606.247,4	0,908	9.082,09
	Z7 tailings heap	786.565,291	9.606.347,37	0,425	4.254,41

Item	Description	Coordinates (WGS84)		Surface	
		X	Y	ha	m2
	Z8 tailings heap	786.255,824	9.607.265,02	0,7	7.003,47
	Z9 tailings heap	786.064,415	9.607.659,41	1,314	13.143,77
	Z10 tailings heap	785.641,066	9.607.458,06	0,604	6.040,08
	Z11 tailings heap	786.625,227	9.606.852,05	0,808	8.077,66
	Z12 tailings heap	786.390,940	9.606.991,69	0,599	5.994,28
	Pathways				
	Track 21	784.038,250	9.605.876,45	5,156	51.563,64
	Track 22	782.580,485	9.606.418,77	2,035	20.350,25
	Track 23	783.327,003	9.606.661,69	3,628	36.275,50
	Track 25	784.220,640	9.606.518,81	3,457	34.573,96
	Track 26	784.736,545	9.606.574,92	4,641	46.414,20
	Track 27	786.426,882	9.605.434,77	2,016	20.160,90
	Access				
	Access	786.498,388	9.605.305,27	0,122	1.221,85
	Access Via 26	785.222,968	9.607.202,58	0,389	3.890,36
	Access 1 platform 875	782.512,478	9.606.156,06	1,047	10.466,30
	Access 2 platform 875	782.185,562	9.606.418,09	0,648	6.475,16
	Access Dike EN	784.613,128	9.605.890,03	0,325	3.250,83
	Industrial Platform 875				
	Industrial Platform 875	782.301,837	9.606.344,63	2,483	24.825,09
	Parking				
	Bridge car park #1	781.840,261	9.605.937,39	0,256	2.560,86
	Concentrate transport parking	781.339,101	9.605.589,07	1,344	13.444,63
	Waste collection				
	Expansion of waste collection	781.647,289	9.605.900,22	0,345	3.448,321
	Equipment yards				
	Equipment yard 1	784.170,198	9.605.549,14	3,299	3.,994,62
	Equipment yard 2	783.755,560	9.605.254,81	2,308	23.075,65
	Equipment yard 3	782.890,004	9.605.887,92	0,205	2.045,778
	Courtyard from parking and manoeuvres	782.174,282	9.606656,48	0,591	5.911,547
	Substation 34.5				
	Substation 34.5	784.295,664	9.606.123,86	0,239	2.393,43

Source: ECSA 2021

Table 5-2 Distance of socially sensitive elements from the Mirador Mining Project phase II

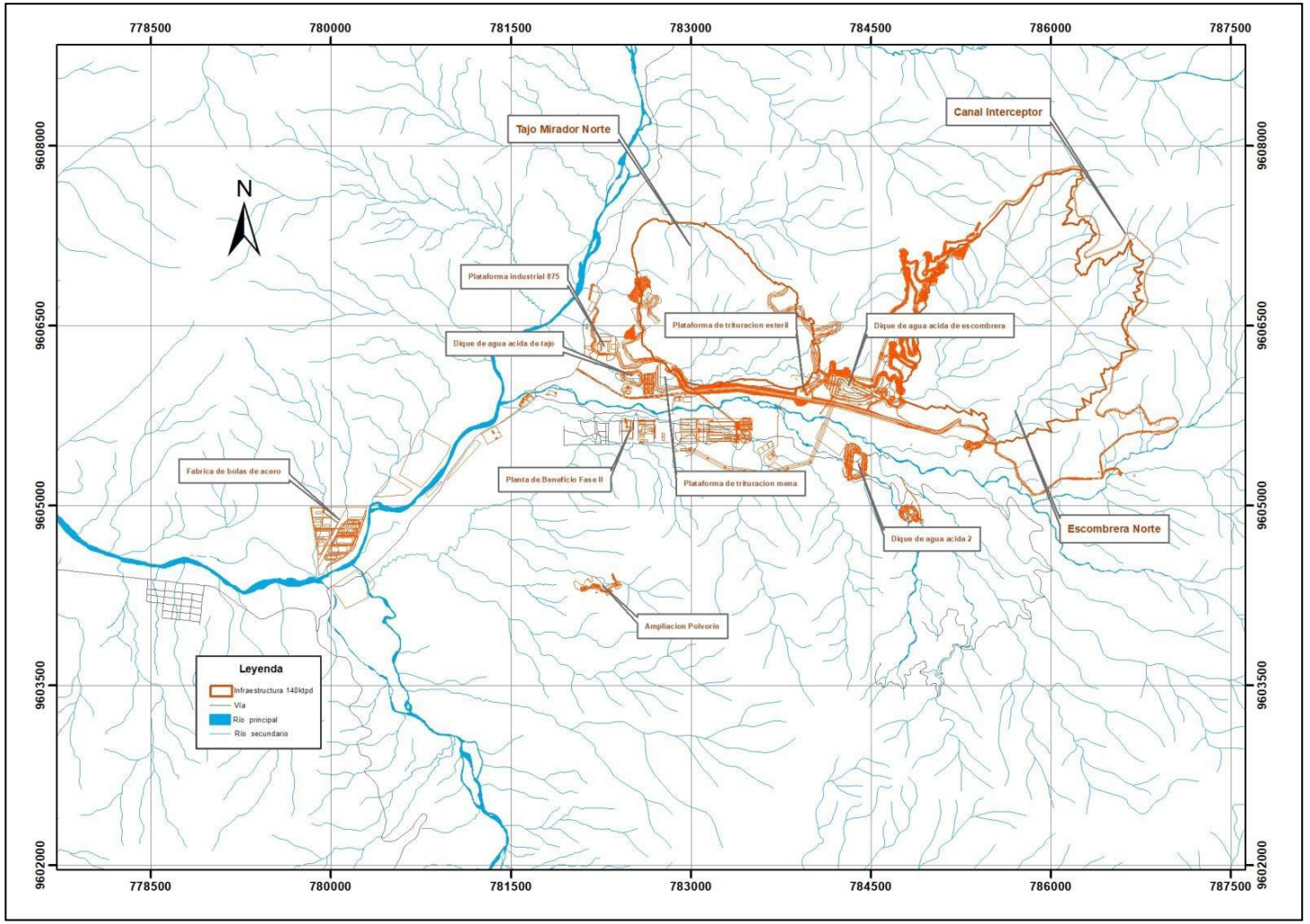
Type of infrastructure	Polvorín Expansion	Ball factory	Mineral processing lines	Acid water dam Northern tailings dam	Tagus acid water dam	Substation 34.5	Industrial Platform 875	North Waste Dump	Acid water treatment plant	Industrial platform for sterile shredding	Ore crushing platform	Tagus	Escombrera Sur Acid Water Dam 2
TUNDAYME CENTRE													
Political Tenure	3.606,07	1.497,05	4.796,23	5.939,63	4.284,48	5.966,14	4.213,46	7.501,80	4.192,23	5.580,21	4.572,63	5.160,40	5.850,99
Jaime Educational Unit Roldós Aguilera	3.592,02	1.480,34	4.779,68	5.923,13	4.267,21	5.949,46	4.195,89	7.485,15	4.175,02	5.563,60	4.555,46	5.142,96	5.835,25
CNH Los Brillantes	3.607,04	1.495,84	4.795,20	5.938,65	4.282,54	5.964,97	4.210,96	7.500,66	4.190,38	5.579,12	4.570,85	5.158,16	5.850,72
Catholic Church	3.425,74	1.343,78	4.637,47	5.779,82	4.140,67	5.809,16	4.080,17	7.344,14	4.046,65	5.422,14	4.425,74	5.021,71	5.682,10
Indoor Court	3.436,27	1.343,59	4.639,49	5.782,21	4.138,50	5.810,69	4.075,45	7.345,91	4.044,93	5.423,98	4.424,38	5.018,33	5.687,56
Livestock Fair	3.335,61	1.258,23	4.549,68	5.691,75	4.056,73	5.721,70	3.999,40	7.256,48	3.962,23	5.334,46	4.340,90	4.939,13	5.592,45
Sports field	3.281,09	1.230,32	4.513,35	5.654,38	4.030,61	5.686,31	3.979,72	7.220,35	3.935,04	5.298,39	4.312,67	4.915,74	5.548,22
Pentecostal Church IPUIE	3.551,53	1.529,60	4.808,75	5.948,88	4.329,91	5.982,22	4.278,47	7.515,66	4.234,22	5.593,89	4.611,66	5.215,08	5.835,69
Zamora Experimental Distance Education Unit (Unidad Educativa Experimental a Distancia Zamora) Chinchipe	3.297,86	1.343,96	4.589,74	5.726,42	4.135,84	5.764,20	4.100,92	7.295,06	4.037,65	5.374,66	4.412,00	5.026,83	5.598,69
GAD Parking	3.190,60	1.126,08	4.411,40	5.552,83	3.926,31	5.584,06	3.875,10	7.118,37	3.830,87	5.196,36	4.208,66	4.811,21	5.449,91
Tundayme Central Park	3.399,00	1.295,56	4.592,89	5.735,89	4.088,83	5.763,64	4.024,37	7.299,04	3.995,54	5.377,20	4.375,23	4.967,92	5.644,15
Tundayme Infocentre	3.434,07	1.319,62	4.618,54	5.761,89	4.109,24	5.788,61	4.041,34	7.324,22	4.016,55	5.402,58	4.396,68	4.986,63	5.673,72
UPC	3.998,35	1.856,22	5.153,58	6.297,83	4.616,74	6.319,41	4.527,30	7.855,38	4.527,74	5.935,67	4.909,76	5.482,07	6.224,68
CHURUWIA													
Community House	5.040,17	2.814,85	5.981,02	7.112,79	5.346,10	7.110,21	5.186,01	8.631,70	5.272,82	6.742,00	5.652,27	6.147,95	7.121,35
Stadium	5.066,12	2.847,13	6.047,45	7.182,90	5.425,38	7.183,96	5.274,19	8.709,24	5.349,75	6.812,91	5.730,46	6.237,37	7.178,30

Type of infrastructure	Polvorín Expansion	Ball factory	Mineral processing lines	Acid-water dam North dump	Tagus acid water dam	Substation 34.5	Industrial Platform 875	North Waste Dump	Acid water treatment plant	Industrial platform for sterile shredding	Ore crushing platform	Tagus	Escombrera Sur Acid Water Dam 2
Sports field	5.810,28	3.595,09	6.793,33	7.926,93	6.162,76	7.925,69	6.002,74	9.448,19	6.089,04	7.556,45	6.468,77	6.964,41	7.927,47
MACHINATZA HIGH													
Andrés Bello School	8.270,13	6.813,28	9.838,65	10.913,56	9.525,94	10.986,44	9.541,76	12.459,79	9.420,05	10.598,11	9.774,21	10.425,24	10.642,55
Church	8.224,47	6.767,96	9.792,85	10.867,82	9.480,22	10.940,67	9.496,17	12.414,12	9.374,31	10.552,33	9.728,45	10.379,51	10.596,99
THE VALLEY OF THE QUIMI													
Catholic Church	4.299,98	4.634,08	2.991,18	3.147,32	2.551,42	2.994,83	2.292,87	3.752,65	2.649,46	2.973,57	2.542,64	2.074,27	3.687,24
Indoor Court	4.207,62	4.558,49	2.899,58	3.068,11	2.458,60	2.916,82	2.201,18	3.700,77	2.556,79	2.889,54	2.449,77	1.984,72	3.604,49
Educational Unit Bilingual Juan José Urdiales	4.157,14	4.527,75	2.843,30	3.011,76	2.406,79	2.860,76	2.152,31	3.654,14	2.505,52	2.832,34	2.395,26	1.927,59	3.547,45
Community House	4.258,79	4.625,96	2.934,97	3.078,76	2.507,43	2.925,81	2.254,94	3.681,74	2.606,64	2.907,67	2.492,11	2.014,18	3.620,44
ETSA													
Court	4.219,06	2.002,36	5.232,52	6.372,62	4.635,86	6.380,08	4.506,66	7.910,98	4.555,39	6.004,41	4.937,79	5.470,11	6.349,35
Sanitary battery	4.199,77	1.983,78	5.216,40	6.356,73	4.621,25	6.364,56	4.493,19	7.895,71	4.540,53	5.988,64	4.922,99	5.456,55	6.332,22
Piped Water	4.092,78	1.869,50	5.079,91	6.218,75	4.476,72	6.224,47	4.344,04	7.754,22	4.397,20	5.849,97	4.779,36	5.307,70	6.202,53
THE QUIMI													
Unit Educativa Fray Jodoco Ricki	6.326,82	4.346,58	7.636,19	8.776,31	7.139,01	8.809,39	7.061,59	10.343,14	7.046,69	8.421,30	7.426,82	8.012,81	8.651,96
Centre Court	6.289,84	4.305,73	7.596,10	8.736,43	7.097,57	8.769,17	7.019,50	10.303,07	7.005,38	8.381,18	7.385,61	7.970,98	8.613,39
CHUCHUMBLETZA													
Indoor Court	9.369,17	7.299,37	9.685,51	10.646,94	8.906,55	10.577,04	8.607,73	11.900,18	8.883,89	10.294,94	9.192,35	9.409,19	10.882,89
Catholic Church	9.336,08	7.268,51	9.649,36	10.609,96	8.870,21	10.539,88	8.571,09	11.862,29	8.847,73	10.258,11	9.155,83	9.371,81	10.846,60
Educational Unit Hualpococ Duccicela	9.363,96	7.289,01	9.689,38	10.654,01	8.911,15	10.584,87	8.613,49	11.911,60	8.887,84	10.301,42	9.197,62	9.418,04	10.887,28
UPC	9.303,88	7.214,81	9.655,91	10.630,06	8.879,99	10.563,24	8.585,91	11.900,93	8.854,74	10.275,69	9.168,42	9.399,77	10.855,17
Community House	9.293,98	7.225,39	9.610,01	10.571,88	8.831,13	10.502,13	8.532,46	11.826,18	8.808,41	10.219,78	9.117,01	9.334,50	10.807,45

Type of infrastructure	Polvorín Expansion	Ball factory	Mineral processing lines	Acid-water dam North dump	Tagus acid water dam	Substation 34.5	Industrial Platform 875	North Waste Dump	Acid water treatment plant	Industrial platform for sterile shredding	Ore crushing platform	Tagus	Escombrera Sur Acid Water Dam 2
Health Centre	9.087,04	7.017,01	9.410,55	10.376,53	8.632,53	10.307,86	8.335,34	11.637,67	8.609,03	10.023,60	8.919,24	9.141,80	10.608,59
SAINT CARLOS NUMPAIN													
Sports field	7.871,04	5.759,61	8.302,39	9.312,49	7.537,65	9.255,90	7.259,27	10.640,74	7.504,82	8.951,54	7.833,06	8.111,32	9.504,19
Health Services, toilets	7.838,47	5.727,93	8.269,15	9.279,31	7.504,41	9.222,76	7.226,08	10.607,84	7.471,58	8.918,34	7.799,84	8.078,29	9.470,95
Community House	7.849,49	5.741,16	8.275,70	9.284,43	7.510,40	9.227,48	7.231,36	10.610,97	7.477,90	8.923,70	7.805,56	8.082,18	9.477,48
YANUA KIM													
Centre Court	5.805,10	3.653,14	6.934,50	8.077,78	6.357,90	8.091,27	6.233,97	9.625,12	6.275,29	7.711,92	6.658,07	7.197,22	8.025,44
RIOS													
Quimi River	1582,41561	241,96145					458,95711					1122,8333	
Wawayme	1486,00365		124,63600	272,27489	215,49301	419,01389	477,63348	1318,13819	146,78197	177,09607	258,99623	740,47575	176,82649

Source: ECSA 2021

Figure 5-1 Phase II Operation Infrastructure



Source: ECSA 2021

5.1 General Objective

The objective of this supplementary EIA is to describe and detail the modification, expansion and optimisation of existing infrastructure works and the construction of new works necessary for phase II of the Mirador Mining Project (expansion from 60 ktpd to 140 ktpd), complying with the document that is framed within the requirements demanded by the RAAM and the COA. The objectives are mentioned below:

- Carry out the regularisation of the works that have been extended, modified and of the new works and infrastructure for the 140ktpd metallic mineral exploitation and beneficiation phase, through the complementary EIA.
- To describe the expanded, modified and new infrastructures of the exploitation and beneficiation phase, in order to carry out the environmental assessment to characterise the baseline information of the areas comprising the new and modified exploitation and beneficiation work zones, in relation to the physical, biotic and social components.
- Carry out the environmental assessment of new and modified infrastructures.
- On the basis of the results obtained, draw up the environmental management plan for the proposed project.

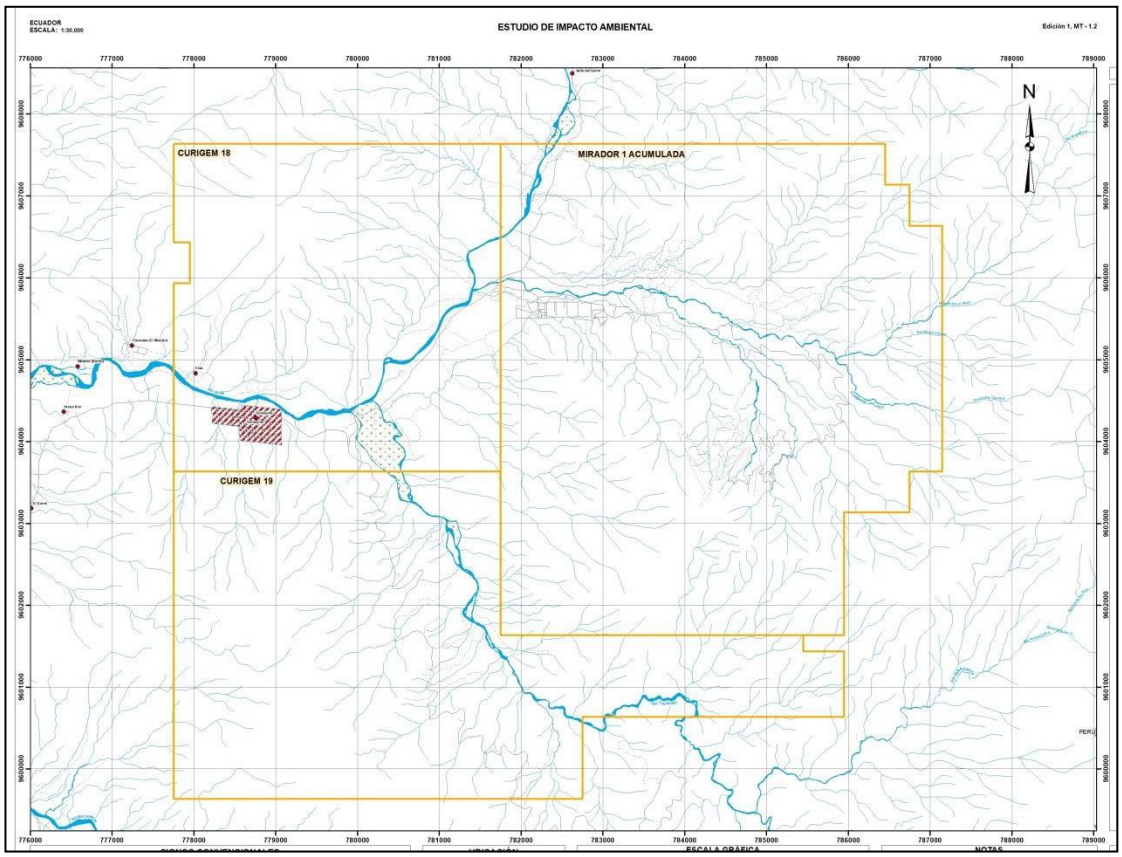
5.2 Location

The Mirador Mining Project (the project), whose promoter is the company ECSA, is located in the province of Zamora Chinchipe, canton El Pangui, parish Tundayme, approximately 545 km south of Quito and 167 km from Cuenca. Located in southeastern Ecuador, the project is a large copper deposit that forms part of the copper belt located in the Cordillera.

Figure 5-2 Access to the Mirador Mining Project

Source: ECSA 2010

Figure 5-3 Mining Concession Location



Source: ECSA, 2022

5.3 General background of the Mirador Mining Project Phase II

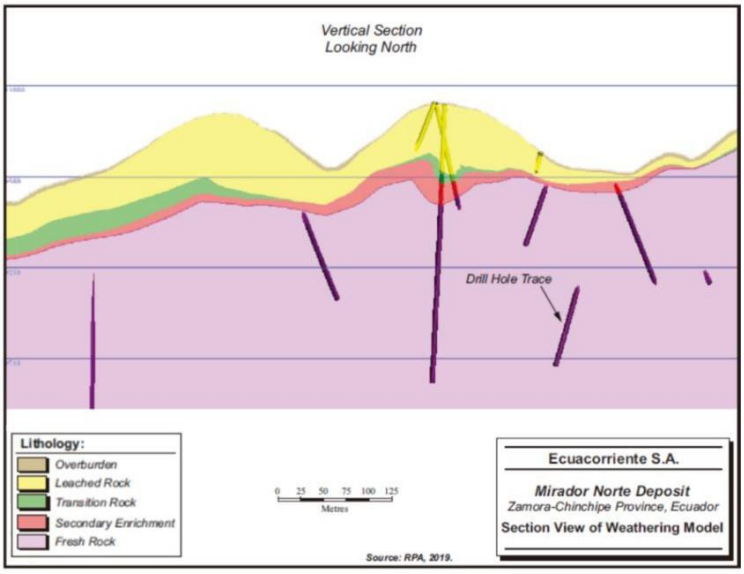
5.3.1 Geology

5.3.1.1 Geology of the Mining Area

No major geological faults are evident in the mining area, joints and fissures in the ore body are not developed and the stability of the ore rock is good. From top to bottom, the deposits are: topsoil cover layer, leach layer, transition layer, secondary enrichment layer and primary layer (Figure 5-4). The surrounding rock and topsoil covered by the upper part of the ore deposit are affected by rainwater leaching and weathering, so they have poor stability and the thickness of the surface humus soil and the weathering zone is generally 20 ～ 60m. The fully weathered materials are mainly mud, clay, sandy clay and sand. They are soft, broken and have poor stability.

Figure 5-4 Schematic diagram of the types of weathering zone in the reservoir

Source: ECSA, 2021



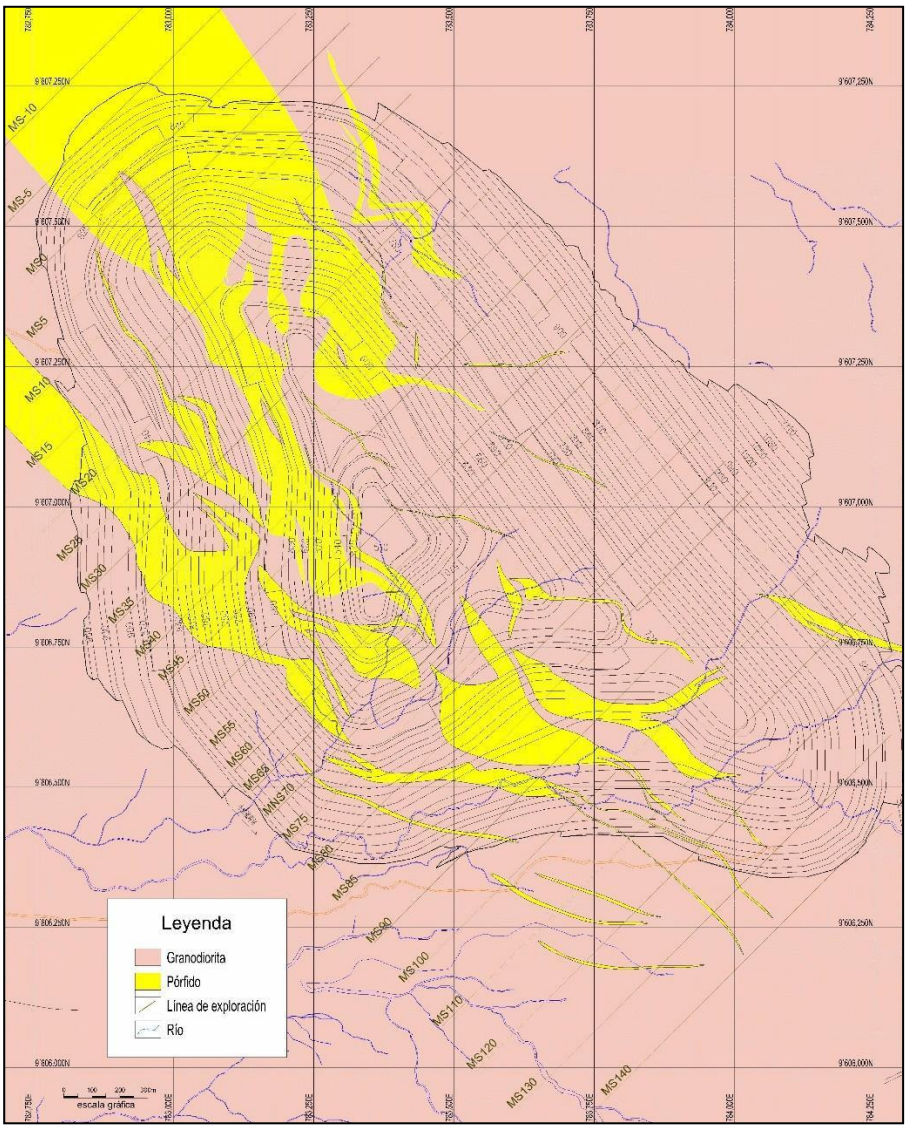
ECSA has conducted preliminary tests and investigations on the mechanical and geotechnical parameters of the mining area through geological drilling samples. According to the size of the rock blocks in the core, the crack spacing, the resistance to weathering and alteration, and the mechanical strength of the rock, the geomechanical properties of the rock are divided into three levels: very good, good and bad.

In the leaching zone, rocks with poor physical-mechanical properties are present, very good/good rocks are found in the transition zone and the secondary enrichment zone representing 30 ～ 40%, and poor rocks represent 60 ～ 70%. The leaching zone to the secondary enrichment zone is only distributed in the range of tens of metres near the surface. The statistics of the primary rock core show that very good rocks account for 71%, good rocks account for 15%, and poor rocks account for 13%.

5.3.1.2 Geological assessment of the mine

The general geological conditions in the mining area are good and, as depth increases, so does rock strength and grade. During the site investigation, the rock quality rating (RQD) of most of the rocks in the shallow part of the deposit (above 300m) is found to be low, with an average value of only 38%. The low RQD is largely due to gypsum / cross-linked anhydrite causing rock fragmentation. The depth of gypsum vein development generally does not exceed 300 m, the strength and integrity of the rocks below this layer is greatly improved.

Figure 5-5 Geological Topographic Map of the Mirador Norte deposit

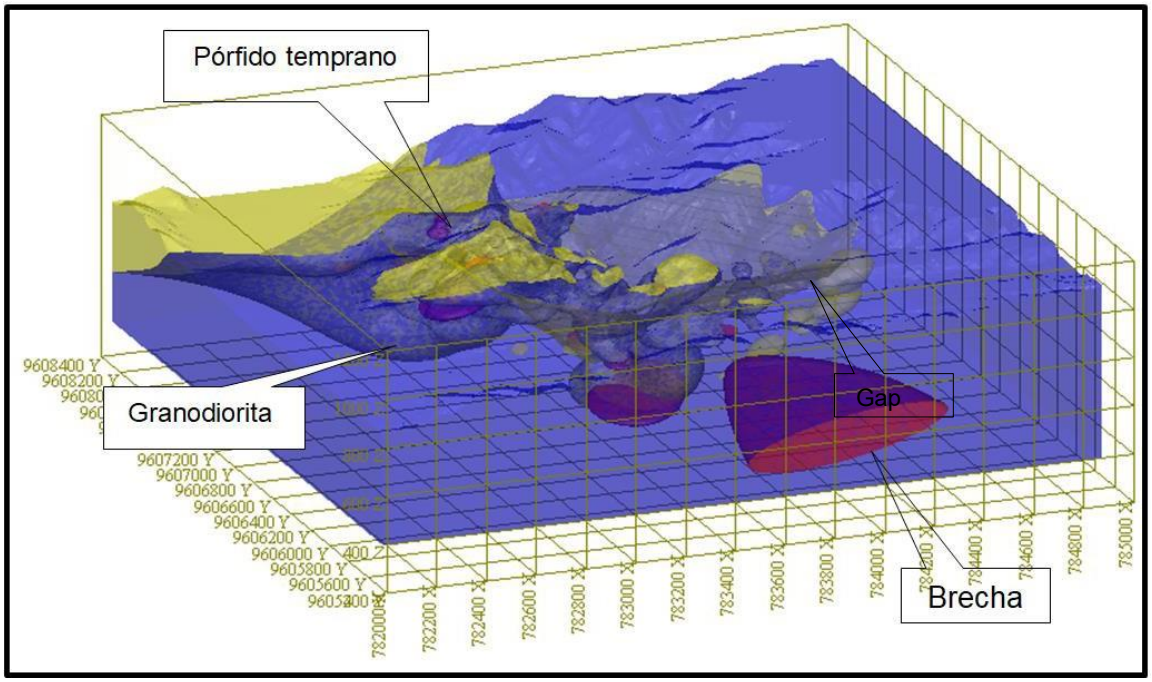


Source: ECSA, 2021

5.3.2 Lithology Distribution

In combination with the rock mass model characterised at the site, the main lithology involved in the Mirador Norte orebody consists of granodiorite, some early porphyry and a small amount of breccia. The distribution of the lithology is shown in Figure 5-6.

Figure 5-6 Rock mass distribution map of the Mirador Norte orebody



Source: ECSA, 2021

5.3.3 Structural Geology

The Mirador Norte deposit is located in the foothills of the Cordillera del Condor mountain range. The Late Jurassic porphyry copper deposits within a 40 km range are related to subvolcanic intrusions intruding equal-grained plutonic rocks. Equal-grained plutonic rocks constitute the Zamora bedrock widely distributed in the area, along the north-northeast extending some 200 km, located between 3° and 5° south latitude and at least 100 km wide.

The Zamora bedrock forms the surrounding rocks of the Mirador Mining Project. In the zone of mineralisation, the intrusive body is composed mainly of Zamora granites and granodiorites of equal granularity, and a small amount of light-coloured granite veins are distributed along the western and southwestern margins. In the centre of the bedrock, the Zamora granites are highly fragmented. This is a weathering process, resulting from the hydration of anhydrite into gypsum. With the expansion of volume, the gypsum in the newly formed veins dissolves, causing the rock to break up. Under the influence of weathering and leaching of anhydrite and gypsum, the interior of the bedrock is relatively good (Figure 5-5).

5.4 Reservations

Regarding the resource determination of the Mirador and Mirador Norte deposits, the mineable reserves (proven and probable) of Mirador are 509.2 Mt, with an average Cu grade of 0.53%, which represents a total Cu ore of 2,698.8 kt; on the other hand, the ore reserves of the Mirador Norte deposit are 291.2 Mt, with a grade of 0.53%, which represents a total Cu ore of 2,698.8 kt.

average Cu content of 0.46% corresponding to 1,345.4 kt of Cu ore; these volumes were considered for the design of the Mirador Phase II Mining Project.

In summary, the mineable reserves (proven and probable) of the two deposits of the Mirador Mining Project total 800.4 Mt, with an average Cu grade of 0.51% representing a total Cu ore of 4,044.2 kt. The results are summarised in the table below.

Table 5-3 Exploitable Reserves of the Mirador Mining Project

Name of the tank	Resource category	Amount of mineral	Cu Law	Au Law	Ag Law	Quantity of Cu	Amount of Au	Amount of Ag
Unit		(Mt)	(%)	(g/t)	(g/t)	(kt)	(kg)	(kg)
Viewpoint	Tested + Likely	509,2	0,53	0,170	1,41	2.698,8	86.564	717.972
Mirador Norte	Likely	291,2	0,46	0,084		1.345,4	24.461	
Total	Tested + Likely	800,4	0,51	0,139		4.044,2	111.025	

Source: ECSA, 2021 Prepared by: Gesambconsult Cía Ltda, 2021

5.5 Description of Works, Infrastructures and Activities

The Mirador Phase II expansion is based on increasing the current production scale from 60 ktpd (20 Mtpa) to 80 ktpd (26.2 Mtpa) and developing the Mirador North pit to 60 ktpd production. After the expansion, the total production scale of the Mirador Phase II Mining Project will be 140ktpd (46.2 Mtpa).

The total production scale of the mine is 140,000 t/d (46.2 million t/y), of which 80,000 t/d (26.4 million t/y) is from the southern open pit and 60,000 t/d (19.8 million t/y) from the northern open pit.

The total calculated mine life is 16.9a. According to the mining and stripping progress plan, the actual mine life of the south pit is approximately 20a and the actual mine life of the north pit is approximately 16a.

In the mine's first year of production (half year, phase II test production), 11.55 million tonnes of ore are extracted from the south pit, 8.10 million tonnes from the north pit and 19.65 million tonnes of ore from the two pits, reaching 85% of the design scale.

In the second year of production, 23.1 million tonnes of ore (70,000 t/d) are mined in the south pit, 19.80 million tonnes of ore (60,000 t/d) in the north pit and 42.9 million tonnes of ore from the two pits, reaching 93% of the design scale.

In the third year of production, it is the year of arrival of production. 26.4 million tonnes (80,000 t/d) of ore are extracted from the south pit and 19.80 million tonnes (80,000 t/d) of ore are extracted from the south pit.

(60,000 t/d) from the north pit, and a total of 46.20 million tonnes (140,000 t/d) of ore mined from the two pits.

In the 15th and 16th year of production, the north pit begins to reduce production until pit closure, with 14.85 million tonnes (45,000 t/d) and 110.817 million tonnes (45,000 t/d) of ore mined respectively, while the south pit extracts 26.4 million tonnes (80,000 t/d) of ore.

In the 17th year of production, the north pit is closed and the south pit begins a period of reduced production, with the scale of production reduced to 23.1 million t/a (70,000 t/d) until the end of production.

The stable production time of the mine is 12 years and the inactive or reduced production time is 9 years.

The overall mining and stripping progress plan for Phase II of the mine (i.e. the combination of the above-mentioned south and north open pit mining and stripping plan by year) is detailed in the table below:

Table 5-4 Overall mining and stripping progress plan for Phase II of the mine

Year	Total quantity of mineral rock	Amount of mineral	Amount of metal Cu	Cu Law	Amount of metal Au	Au Law	Amount of metal Ag	Ag Law	Amount of rock	Clearance and extraction ratio
	×10⁴ t	×10⁴ t	t		kg	g/t	kg	g/t	×10⁴ t	t/t
The first year (half year)	5.737,5	1.965,00	114.796,00	0,58	2.425,00	0,12	16.274,10	0,83	3.772,50	1,92
The second year	11.058,0	4.290,00	232.252,00	0,54	5.974,20	0,14	33.986,20	0,79	6.768,00	1,58
The third year	11.967,3	4.620,00	243.889,00	0,53	6.677,20	0,15	38.722,30	0,84	7.347,30	1,59
The fourth year	11.848,8	4.620,00	241.288,00	0,52	7.057,50	0,15	37.535,90	0,81	7.228,80	1,56
The fifth year	11.883,6	4.620,00	230.720,00	0,50	6.550,50	0,14	37.387,60	0,81	7.263,60	1,57
The sixth year	11.764,0	4.620,00	224.431,00	0,49	6.552,40	0,14	37.263,80	0,81	7.144,00	1,55
The seventh year	11.901,1	4.620,00	229.230,00	0,50	6.835,90	0,15	36.875,20	0,80	7.281,10	1,58
The eighth year	11.600,8	4.620,00	216.510,00	0,47	6.398,80	0,14	36.829,00	0,80	6.980,80	1,51
The ninth year	10.894,6	4.620,00	218.602,00	0,47	6.325,00	0,14	36.852,90	0,80	6.274,60	1,36
The tenth year	10.272,20	4.620,00	217.904,00	0,47	6.342,80	0,14	36.852,60	0,80	5.652,20	1,22
The eleventh year	9.554,40	4.620,00	218.398,00	0,47	6.234,20	0,14	36.482,70	0,79	4.934,40	1,07
The twelfth year	7.970,30	4.620,00	216.289,00	0,47	6.013,30	0,13	35.881,50	0,78	3.350,30	0,73
The tenth year	6.969,10	4.620,00	214.786,00	0,47	5.934,90	0,13	35.981,70	0,78	2.349,10	0,51
The fourteenth year	6.573,50	4.620,00	210.954,00	0,46	5.723,70	0,12	36.481,00	0,79	1.953,50	0,42
The fifteenth year	6.046,40	4.125,00	190.794,00	0,46	5.206,30	0,13	36.877,90	0,89	1.921,40	0,47
The sixteenth year	5.576,70	3.721,70	168.565,00	0,45	4.464,30	0,12	34.558,90	0,93	1.855,00	0,50
The seventeenth year	3.745,50	2.310,00	116.178,00	0,50	3.447,20	0,15	29.552,30	1,28	1.435,50	0,62
The eighteenth year	3.700,50	2.310,00	117.509,00	0,51	3.054,10	0,13	26.734,20	1,16	1.390,50	0,60
The 19th year	3.674,80	2.310,00	102.256,00	0,44	2.797,50	0,12	26.779,80	1,16	1.364,80	0,59
The 20th year	2.478,40	1.555,70	76.394,00	0,49	2.053,70	0,13	17.615,30	1,13	922,70	0,59
Total	165.217,50	78.027,40	3.801.746,00	0,49	106.068,50	0,14	665.524,90	0,85	87.190,10	1,12

Source: ECSA, 2022

To process the volume of ore expected to be produced in Phase II, it will be necessary to expand the capacity of the two existing lines at the beneficiation plant from 30 ktpd to 35 ktpd, in addition to installing two additional processing lines with the same grinding and flotation systems as the first two and with capacities of 35 ktpd. In the end, there will be 4 grinding and flotation lines installed where each line will have a production capacity of 35 ktpd (11.55 Mtpa).

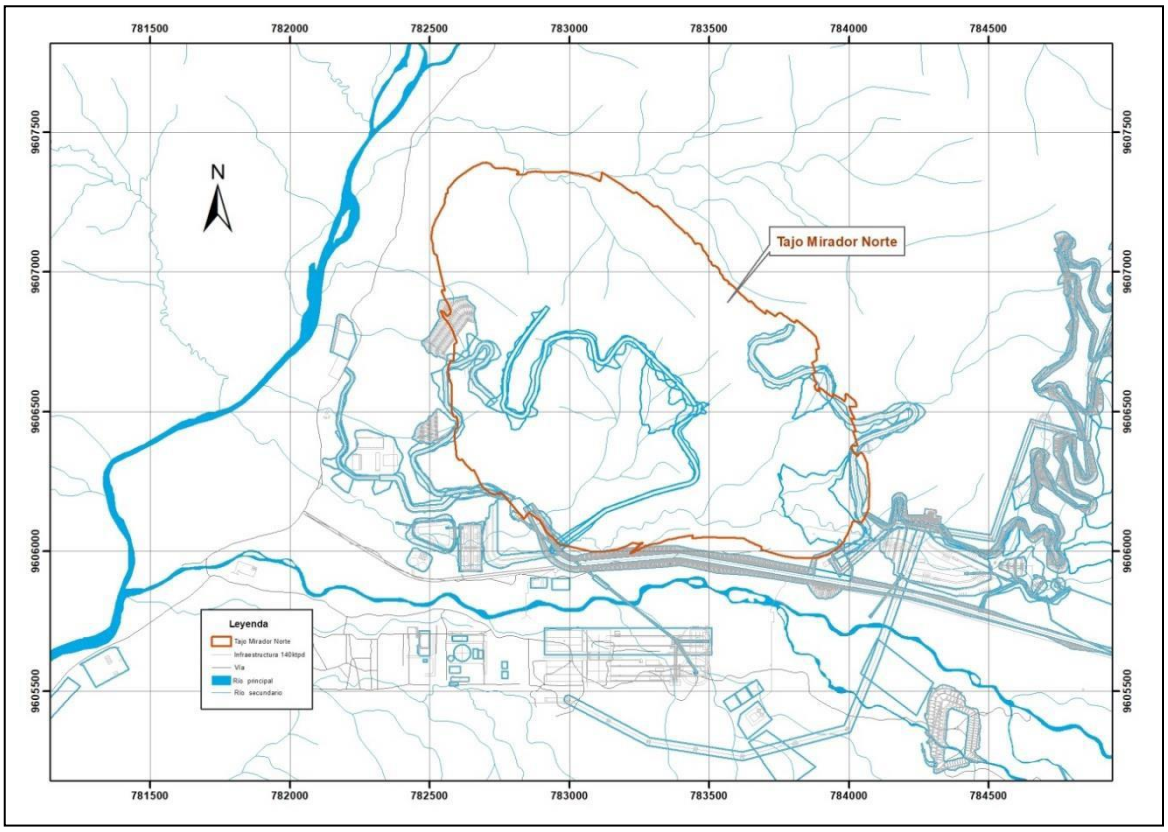
In the Curigem 18 mining area (Code 4768), it is intercepted by a socio-forest property belonging to Mr. Luis Amador Castro, which has Agreement No. MAE-PSB-II-2012-I-049, dated October 2012. In this regard, it should be mentioned that while the agreement is in force, ECSA will not carry out activities on this property.

5.5.1 Main infrastructures

5.5.1.1 Tajo Mirador Norte

The area of the planned Mirador Norte pit is 139.85 ha and is located on the right bank of the lower Wawayme river basin, in the foothills of the Cordillera del Cóndor. It is bounded to the north by the Quimi Valley, to the east by the northern dump, to the south by the Wawayme River and to the west by the Quimi River.

Figure 5-7 Implantation Tajo Mirador Norte



Source: ECSA, 2022

GEOVIA Whittle software was used for the design and delineation of the Mirador Norte pit. The main design parameters of the Mirador Norte pit are shown in Table 5-5 and the implementation in the following figure.

Table 5-5 Mirador Norte pit design parameters

Item	Unit	Parameter
Pit surface dimension	m	1.860×1.220 ～ 660
Pit bottom dimension	m	121×70 ～50
Height of workbenches	m	15 m (30 m end bench)
Bank slope angle	°	70 (between 540 and 600 m above sea level)
	°	
	°	50 (eroded layer close to the surface of the 30 ～ 60 m)
Width of the safety platform	m	8 ～15
Width of the cleaning platform	m	12 ～ 25
Haulage track width	m	20 (single lane between 540 and 600 masl)
	m	32 (two lanes)
Track slope		8 ～10
Maximum pit elevation	msnm	1.133
Pit bottom elevation	msnm	
Elevation of pit perimeter track	msnm	870
Maximum slope height	m	593
Slope height under the perimeter track	m	330
Final slope angle	°	< 42

Source: ECSA, 2022

Figure 5-8 Schematic of operating banks of the Mirador Norte Pit

Source: ECSA, 2022

Table 5-6 Ore volume within the Mirador Norte pit

Item	Unit	Quantity	Observation
Total amount of rock in the pit	kt	560.516,00	
	Mm3	224,263	
Amount of mineral	kt	291.167,00	
	Mm3	113,706	
Amount of rock sterile	kt	269.349,00	
	Mm3	110,557	
Average coefficient of unveiling	t/t	0,93	Ore specific gravity 2.56 t/m3
	m3/m3	0,97	Specific gravity of rock 2.44 t/m3
Amount of mineral	t	1.345.423,00	Cu
	kg	24.547,8	Au
Average law		0,462	Cu
	g/t	0,084	Au

Source: ECSA, 2022

The orebody is irregular dumbbell-shaped, with its northwest and southeast ends thick and the central part thin. This deposit is large in volume and low in grade, covered by shallow weathered saprolite, so the recommended mining system is open pit using the drill and blast method.

The exploitation will be carried out in descending benches, according to the physical-mechanical characteristics of the rocks, with a final slope angle of less than 42°, this angle may vary depending on the progressive results of the rock mechanics that are obtained during the exploitation of the deposit.

An interceptor channel will be constructed on the platform at 900 m above sea level in the north pit to intercept and divert runoff water from the pit slope and water draining from the pit. The intercepted water will be conveyed to the pit sedimentation system and advanced to the acid water dam.

The channel will have a trapezoidal section with a depth of 1 m, a lower width of 1 m and an upper width of 2 m along its entire length. The thickness of the walls will be 0.4 m and will be made of C30 concrete.

5.5.1.1.1 Mirador north pit drainage system

Runoff water above 900 m above sea level will be drained by gravity, while for lower elevations two water drainage systems will be designed with mobile and fixed pumping stations.

- **Mobile pumping station**

Determination of drainage capacity

The mobile pumping station may be located on the operating banks (h= 15 m) and will have a pump with the capacity to lift water up to 45 m, i.e. the height of three banks.

- ✓ The normal volume of water will be 15,021.7 m^3 /d;
- ✓ The maximum volume of water in the rainy season will be 29,214.37 m^3 /d;

Selection of drainage equipment

- ✓ Required drainage capacity:

Normal water volume:

Qnormal = 15,021.7 ÷ 20 = 751.09 m3/h.

- ✓ Pending:

H = KH = 1,1 × 45 = 49,5 m.

- ✓ Drainage pipes:

Each YQ725-53/2-160/WD-DS pump is equipped with 1 drain pipe.

- ✓ Calculation of the pipe diameter:

$$d\pi \sqrt{\frac{4nQ}{3600\,v}} \quad \sqrt{\frac{41\,725}{3600\;3.14\;2.5}} \quad 0.3203\text{m}$$

In the formula:

dp= Required diameter of the drainage pipe, m;

n= Number of pumps supplying water to the drainage pipe; Q= Flow

rate of the water pump, m^3 /h;

v= Water flow velocity in the drainage pipe m/s;

According to the calculation, the outer diameter of the drainage pipe is selected as ø377 mm.

- ✓ Pipe wall thickness calculation

$$0.5d\left(\sqrt{\frac{X\ 0.4Pd}{X\ 1.3Pd}}-1\right)+a_f \qquad 0.5\ 0.377\left(\sqrt{\frac{80\ 0.4\ 0.58}{80\ 1.3\ 0.58}}-1\right)+2\ 3.18$$

In the formula:

δ= Drainage pipe wall thickness, mm; δx= Allowable

pressure, Mpa;

Pd= Pressure at the lowest point of the pipe, Mpa; af=

Additional pipe wall thickness mm;

According to the calculation, the pipe adopted is seamless steel pipe of φ377 × 7 mm. The drainage flow rate is 1.95 m/s.

- **Fixed pumping station**

Determination of drainage capacity

In the design, 1 fixed pumping station every 90 m is provided.

- ✓ The normal volume of water is 15,021.7 m3/d;
- ✓ The maximum volume of water in the rainy season is 29,214.37 m3/d;

Selection of drainage equipment

- ✓ Required drainage capacity:

Normal water volume:

Qnormal = (15,021.7 ÷ 20) = 751.09 m^3 /h.

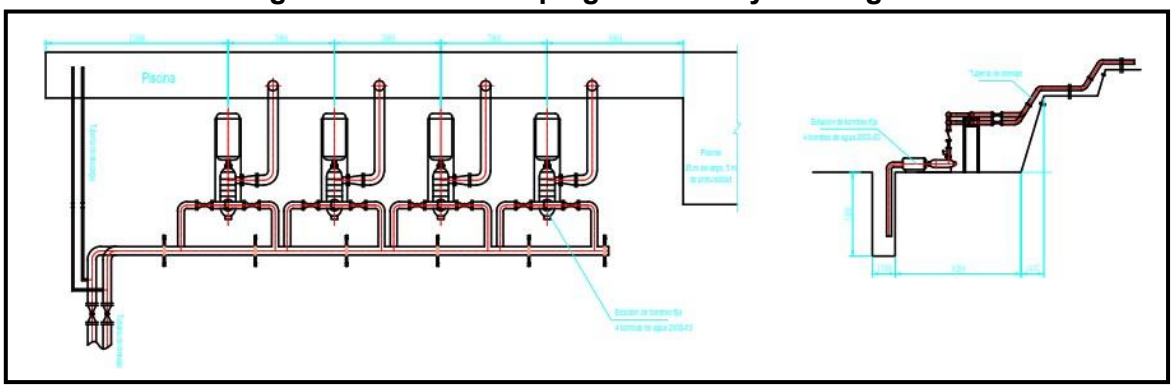
- ✓ Slope:

H=KH=1,1×90=99m.

The first water drainage system located in the southern part of the Mirador Norte pit will consist of three mobile pumping stations and one fixed station; At 540 m above sea level, a mobile pumping station will be installed, equipped with two YQ725-53/2-160/WD-DS pumps with a flow rate of 725 m^3 /h, a drop of 20 m～53 m and a motor power of 160 kW, a fixed pumping station equipped with four double suction centrifugal pumps type 200S-63 with a flow rate of 290 m^3 /h, a head of 95 m and a motor power of 132 kW will be installed at 630 m above sea level, and at 720 and 810 m above sea level a fixed pumping station equipped with four double suction centrifugal pumps type 200S-63 with a flow rate of 290 m /h and a motor power of 132 kW will be installed.

masl, two mobile pumping stations will be installed, each equipped with four pumps with the same characteristics as the previous ones.

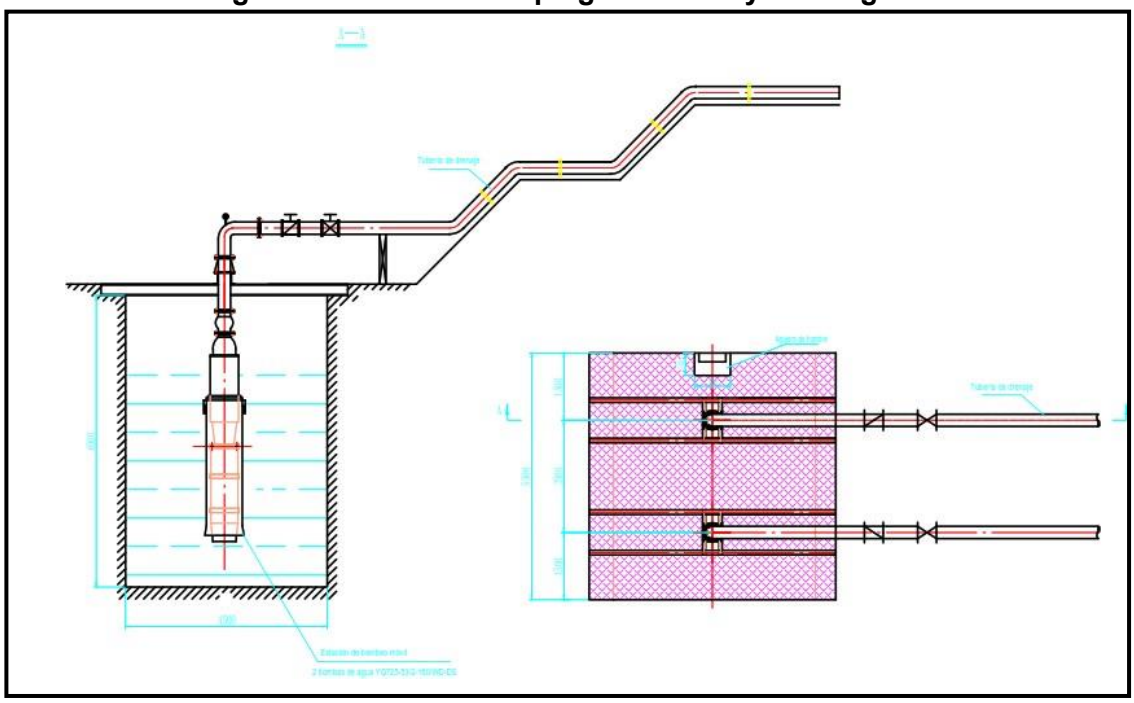
Figure 5-9 Fixed Pumping Station Layout Diagram



Source: ECSA, 2021

The second water drainage system, located in the north-western part of the Mirador Norte pit, will consist of two mobile pumping stations: at 720 masl the first station will be installed, equipped with two water pumps of type YQ725-53/2- 160/WD-DS with a flow rate of 725 m^3 /h, a drop of 20 m ～ 53 m and a motor power of 160 Kw and at 810 masl the second station will be installed equipped with four double suction centrifugal pumps of type 200S-63 with a flow rate of 290 m^3 /h, advances a height of 95 m and a motor power of 132 Kw.

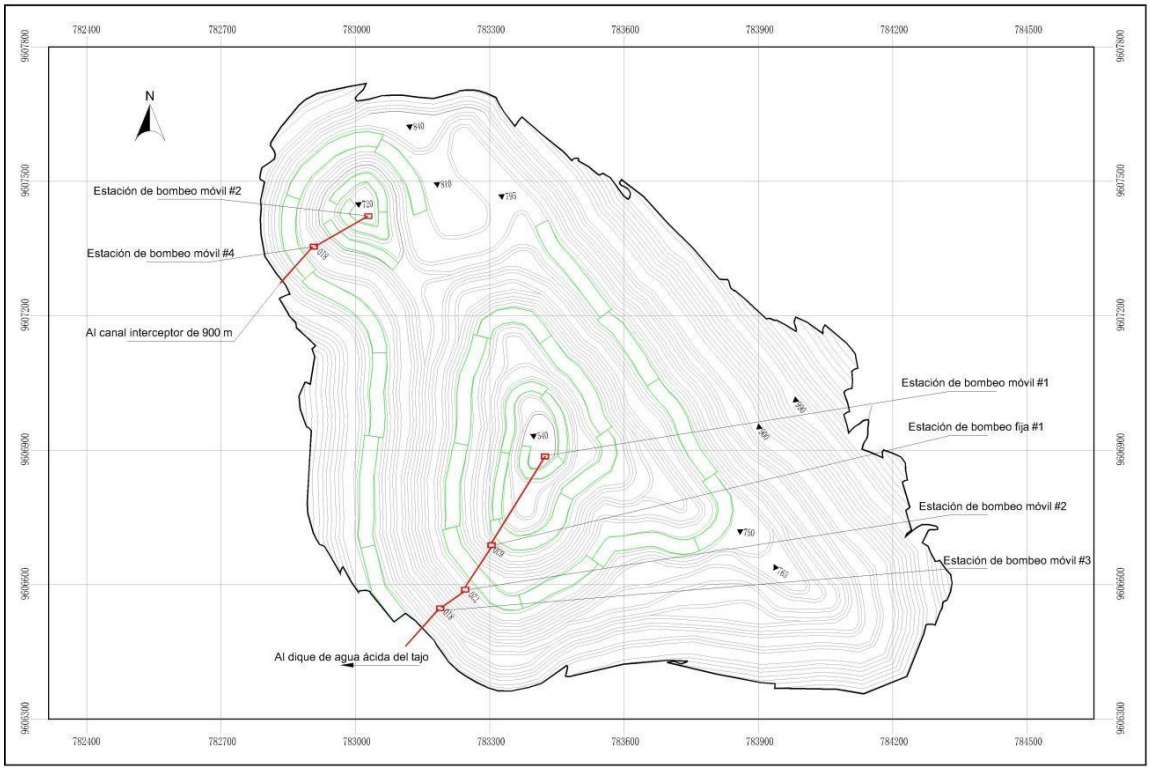
Figure 5-10 Mobile Pumping Station Layout Diagram



Source: ECSA, 2021

According to the hydrogeological assessment, the normal drainage volume of the pit will be 15,021.7 m^3 /d; in a heavy rainfall with a return period of 20 years, the maximum drainage will be 29,214.37 m^3 /d. When mining operations occur below elevation 765 masl, the normal drainage volume to be pumped from the first system of the Mirador Norte pit will be 10,790.38 m^3 /d and in the case of a heavy rainfall with a return period of 20 years the volume will be 21,869.46 m^3 /d. The normal drainage volume to be pumped by the second system will be 4,231.32 m^3 /d and in the case of an intense rainfall with a return period of 20 years the volume will be 7,344.91 m^3 /d.

Figure 5-11 Mirador north pit drainage system design



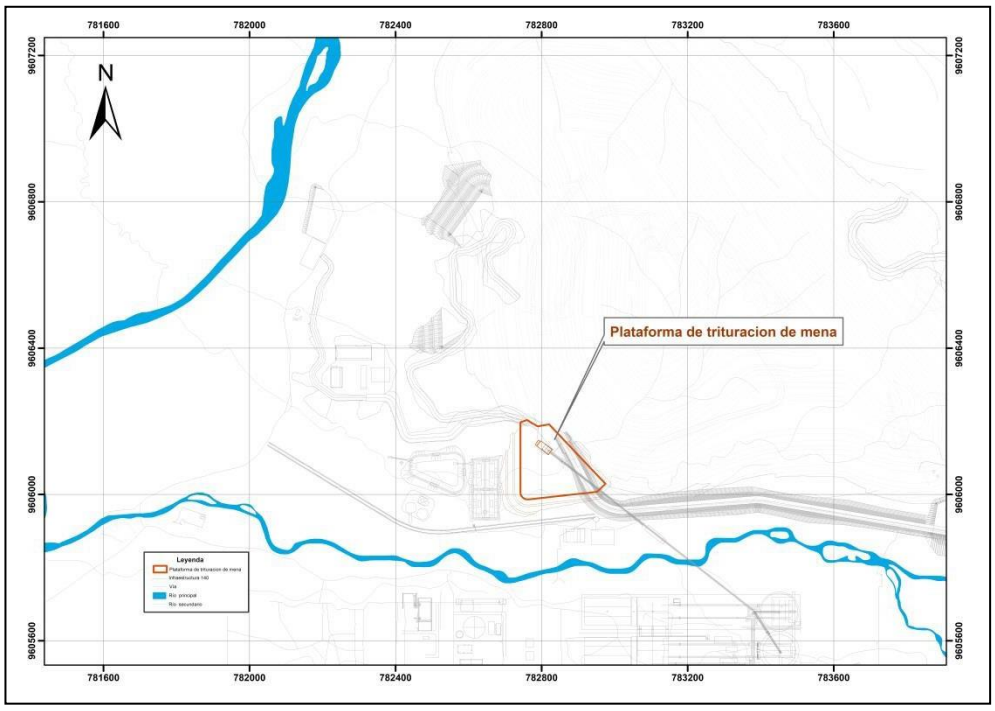
Source: ECSA, 2021

5.5.1.2 Shredding Platforms

5.5.1.2.1 Ore crushing platform

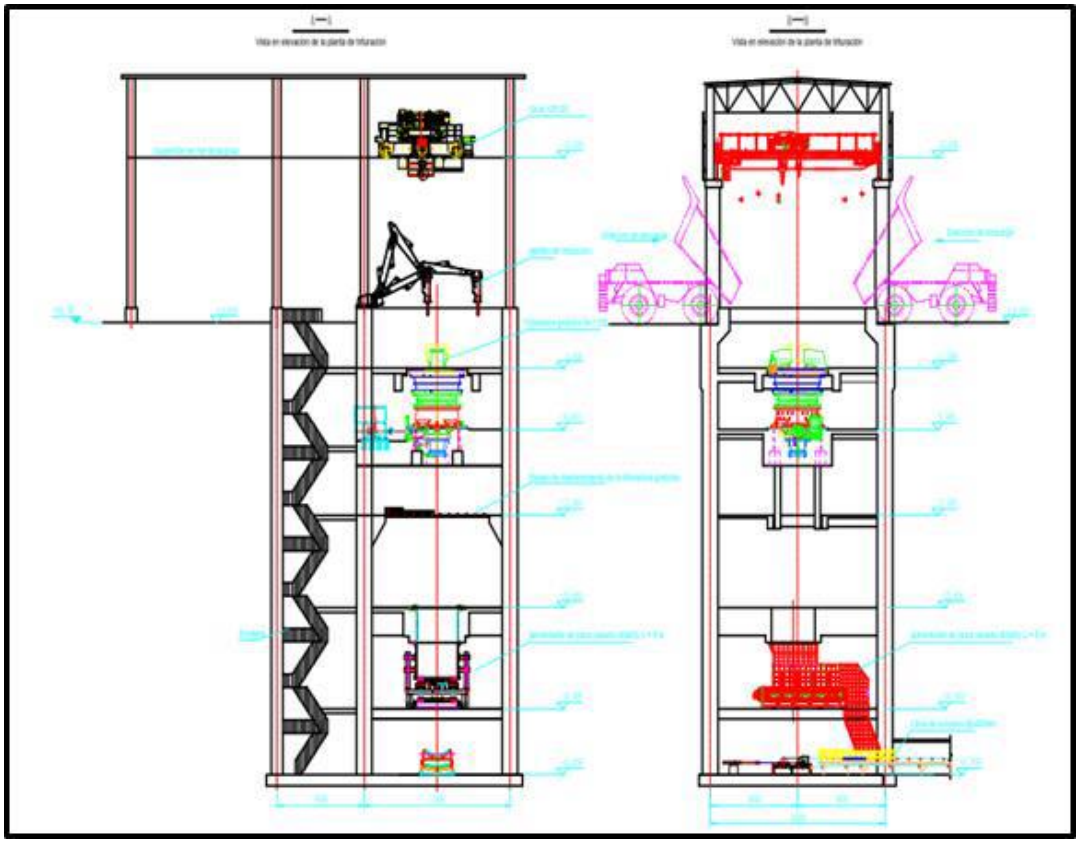
In the phase II project, a new primary ore crushing plant will be installed on a platform to be built at an altitude of 890 metres above sea level. The construction characteristics of the plant will be the same as the existing one, the foundations and the entire underground structure will be made of reinforced concrete and the superstructure of the industrial shed will be built with steel profiles.

Figure 5-12 Ore Crushing Platform Implementation



Source: ECSA, 2022

Figure 5-13 Primary crushing plant layout



Source: ECSA, 2021

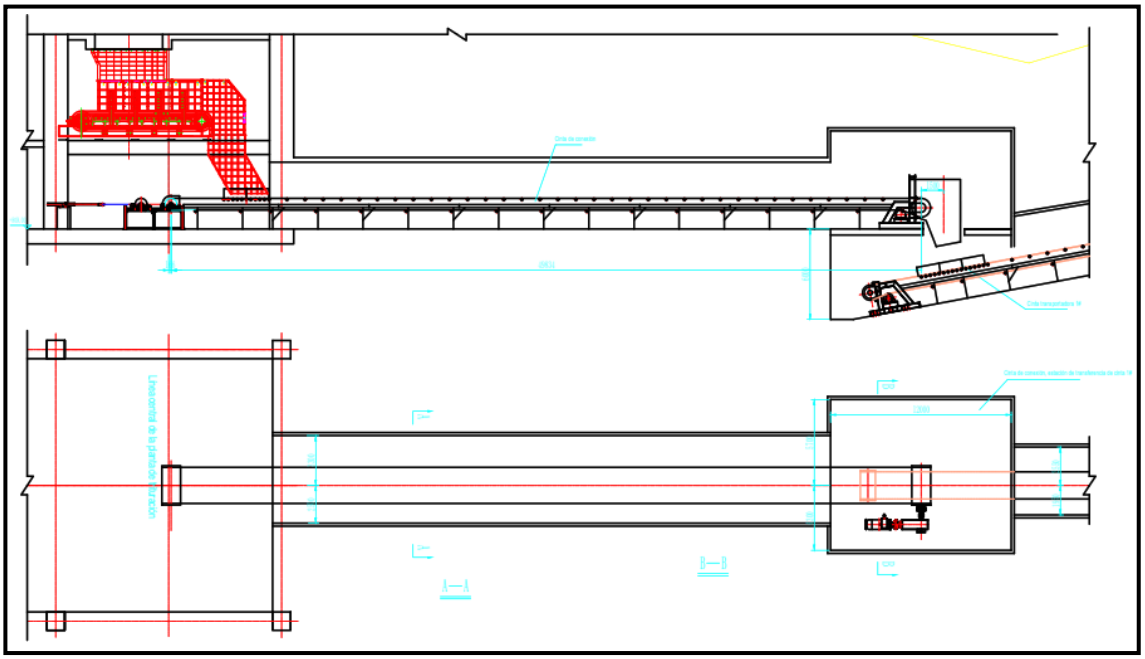
A primary crushing plant will be installed on a platform located at an altitude of 890 metres above sea level outside the Mirador Norte pit with 1 gyratory crusher model MK II 60 - 110 E with a production capacity of 5,800 tonnes per hour.

The crushed material will be transported to the stockpile located in the beneficiation plant by means of a conveyor belt divided into three sections with a total length of 792.46 metres.

- ***Connecting conveyor belt***

The horizontal length of the belt shall be 49.83 m with an angle of inclination of 0°, the belt width shall be 1.80 m, the speed shall be 2.0 m/s and the corresponding motor power shall be 90 kW.

Figure 5-14 Connecting conveyor belt

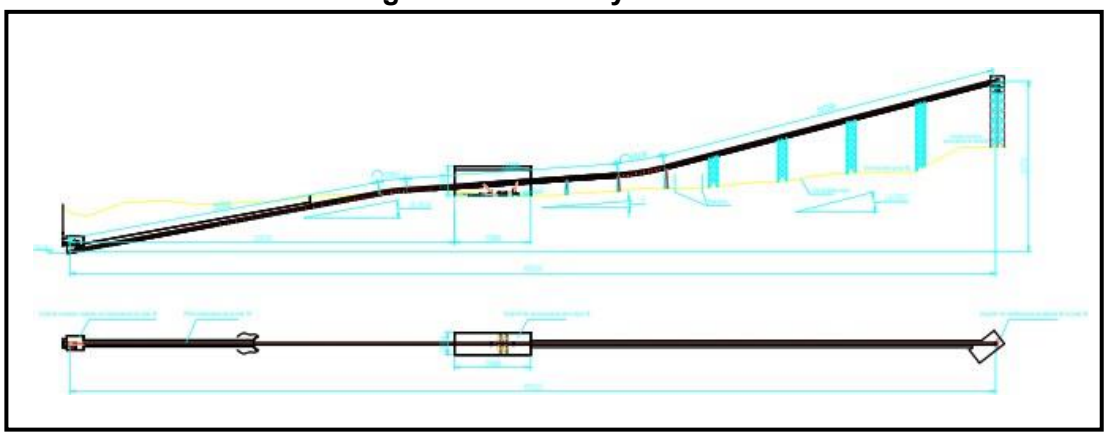


Source: ECSA, 2022

- ***Conveyor belt # 1***

The horizontal length of the belt will be 670,19 m, with a difference in elevation of 122,7 m, giving an angle of inclination of 10,25 °, the width of the belt will be 1,40 m, the belt speed will be 4 m/s and the corresponding engine power will be 3 × 560 kW.

Figure 5-15 Conveyor belt #1

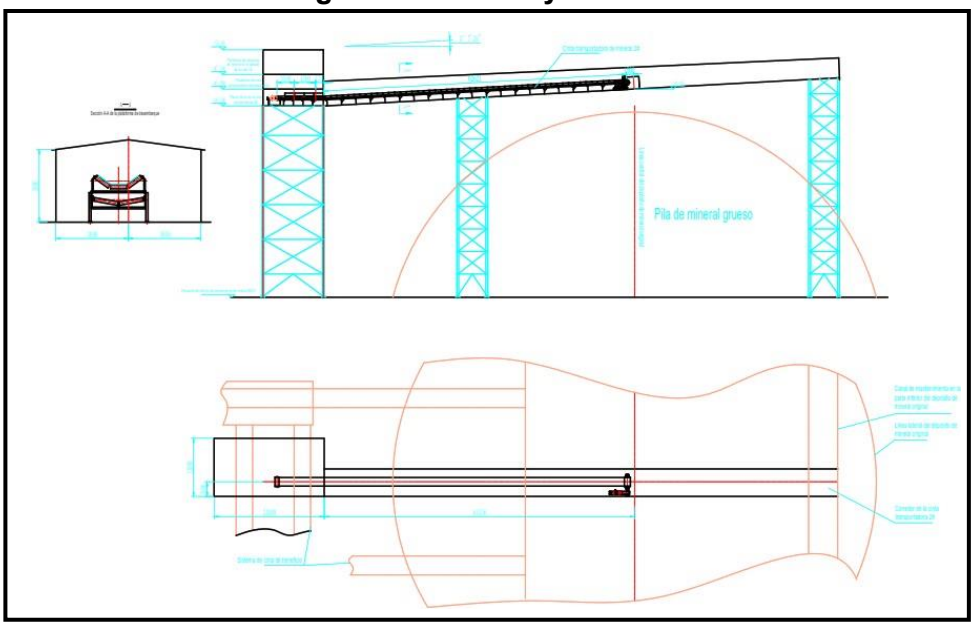


Source: ECSA, 2022

- ***Conveyor belt # 2***

The horizontal length of the belt shall be 72,4 m, with an angle of inclination of 0°, the width of the belt shall be 1,80 m, the speed shall be 4 m/s and the corresponding engine power shall be 200 kW.

Figure 5-16 Conveyor belt #2



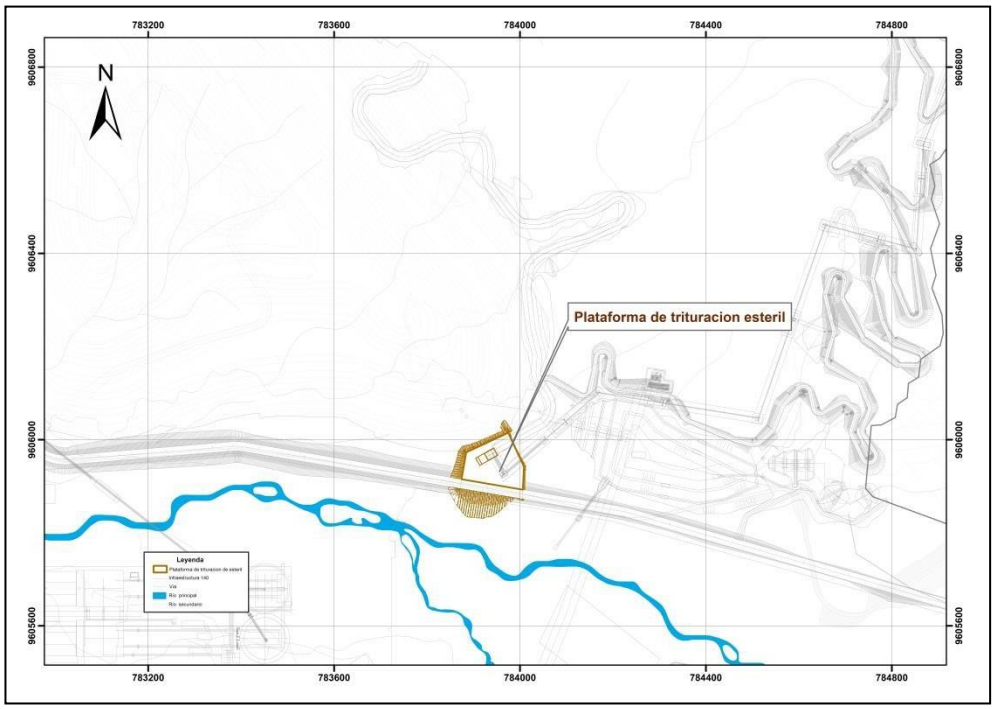
Source: ECSA, 2022

5.5.1.2.2 Tailings crushing platform

A second primary crushing plant will be installed for the crushing of waste rock, located southeast of the north pit on a platform at an altitude of 992 metres above sea level, which will have a Superior MK II 60-110 E gyratory crusher with a production capacity of 5,800 tonnes per hour. For the transport of waste rock from the Mirador Norte pit, there will be a system of conveyor belts divided into nine sections, with a capacity of 5,800 tonnes per hour.

total horizontal belt length of approximately 2,552 m and a width of 1.8 m. The rocks will be transported to the northern dump.

Figure 5-17 Implementation Tailings crushing platform



Source: ECSA, 2022

Table 5-7 Waste rock transport equipment parameters in the Mirador Norte Pit

No.	Team name	Equipment parameters					
		Width of the tape (mm)	Speed belt speed (m/s)	Length horizontal (m)	Height of elevation (m)	Angle of inclination (°)	Matching engine
1	Band of rock connection	2.400		50	0	0	200 kW
	Rock band # 1	1.800		272,6	65,63	13,54	2×900 kW
	Rock band # 2	1.800		350,75	68,48	11,05	2×1.000 kW
	Rock band # 3	1.800		442,11	92,87	11,87	3×900 kW
5	Rock band 4 # Rock band 4 # Rock band 4 # Rock band 4 # Rock band 4 # Rock band 4	1.800		205,26	50,89	13,93	2×800 kW
	Rock band # 5	1.800		229,93	57,03	13,94	2×800 kW
	Rock band # 6	1.800		220,22	55,2	14,08	2×800 kW
8	Rock band # 7	1.800		221,07	56,22	14,28	2×800 kW
	Rock band # 8	1.800		284,73	51,81	10,32	2×800 kW
	Rock band # 9	1.800		124,04	25,23	11,5	800 kW
	Rock band north-south # 1	1.200	3,15	863,73	110	7,26	2×500 kW

	Rock band north-south # 2	1.200	3,15	1.353,65	35	1,48	630 kW

Source: ECSA 2022

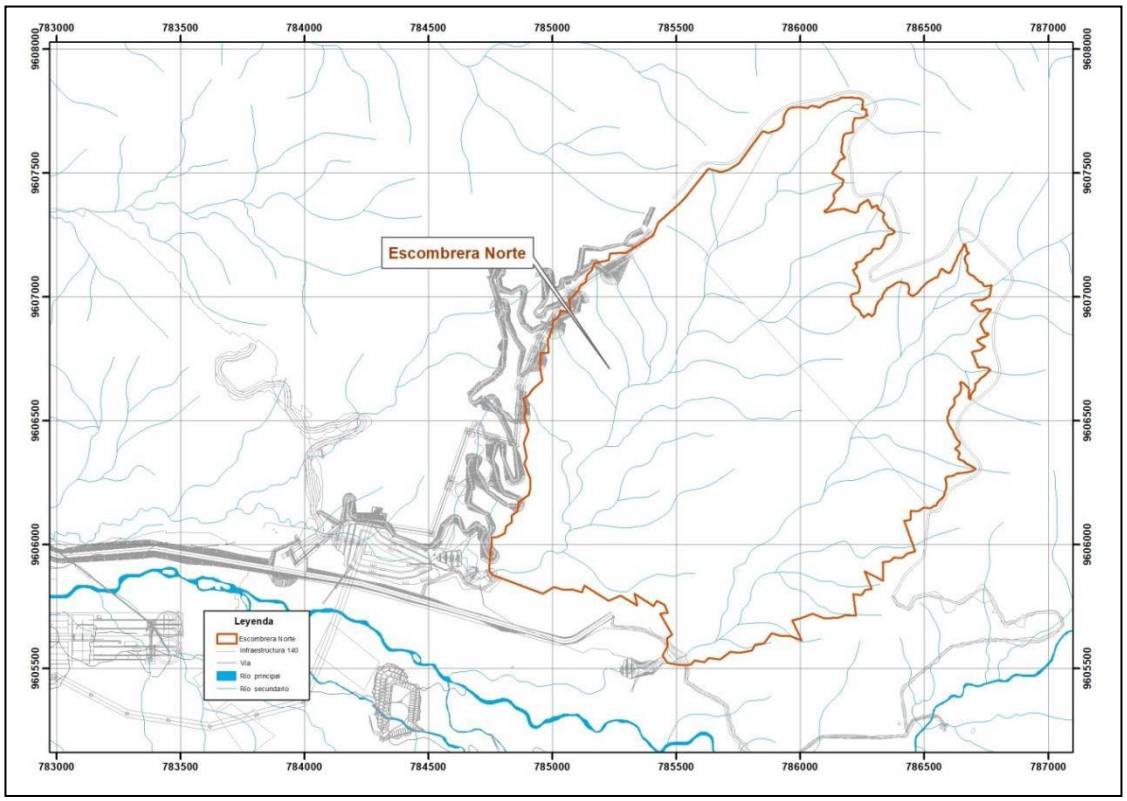
The crushed waste rock from the north pit will mainly be transported to the north dump for disposal. However, from 2026 onwards between 8,000 and 9,000 kt of rock will be transported annually, via two conveyor belts (north-south rock belt 1 and 2) to the Tundayme tailings dam for tailings dam construction.

5.5.1.3 North Waste Dump

The north heap is located approximately 800m east of the Mirador Norte pit and 700m north of the south heap, in the northeast of the Wawayme River valley. The north dump will be used to unload waste rock and low grade ores extracted from the Mirador Norte pit.

The total area of the north dump and its ancillary works will be approximately 394 ha, including the dump, the rockfill wall, the interceptor channel, the conveyor belt, the sedimentation pool, the acid water dam, etc., of which the dump will occupy approximately 274 ha, from 1,050 masl to 1,490 masl, and a total capacity of 215 million m³. A total of approximately 269.35 million tonnes of waste rock and low grade ores will be extracted in the Mirador Norte pit, around 111.14 million m³. With a sponging coefficient of 1.35, the heap will require a volume of 150.04 million m³. Table 5-8 shows the calculation of the capacity of the north heap.

Figure 5-18 North dump



Source: ECSA, 2022

Table 5-8 Calculation of the capacity of the north dump

Middle section of discharge (height)	Volume (Mm^3)	Cumulative volume (Mm^3)
1.050 ~ 1.100 m asl	1,273	1,273
1,100 ~ 1,150 m asl	6,361	7,634
1,150 ~ 1,200 m asl	13,562	21,196
1,200 ~ 1,250 m asl	22,757	43,953
1,250 ~ 1,300 m asl	30,386	74,339
1,300 ~ 1,350 m asl	35,369	109,708
1,350 ~ 1,400 m asl	40,784	150,492
1.400 ~ 1.430 m asl	26,007	176,499
Total	176,499	

Source: ECSA, 2022

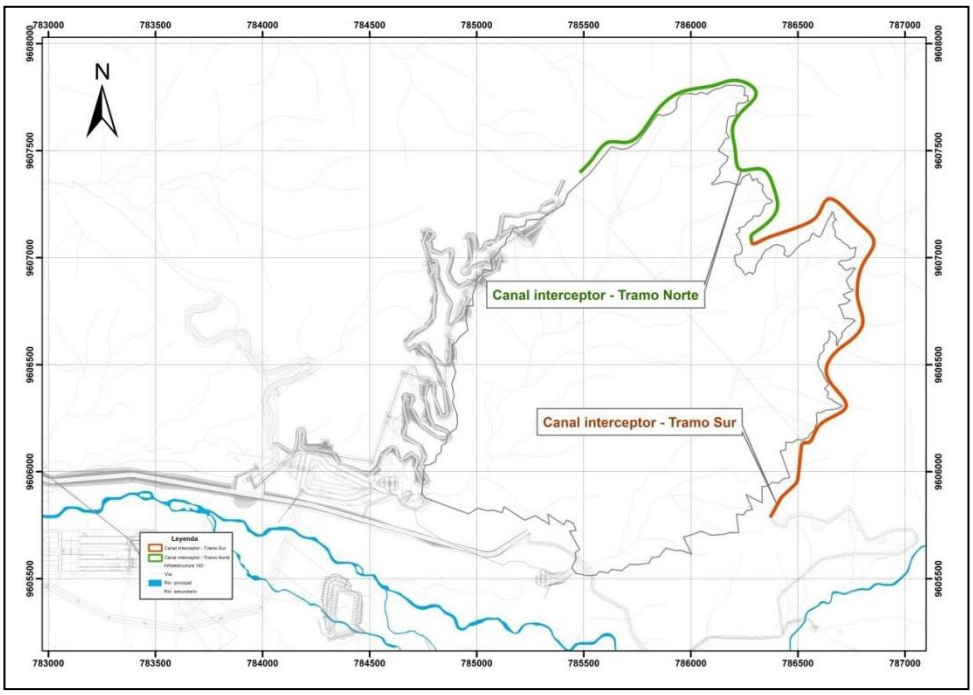
Nine platforms will be formed every 50 m in height at elevations 1,100, 1,150, 1,200, 1,250, 1,300, 1,350, 1,400, 1,450 and 1,490 m above sea level. These platforms will have a 50 m wide safety strip, between each main platform there will be 25 m wide safety berms every 15 m and 20 m in height respectively. The slope between the safety berms will be 1: 1.5 (approximately 33.69°), the slope of each platform will be 1: 2.5 (approximately 21.8°) and the external slope of the dump will be 1: 3.21 (approximately 17.3°).

5.5.1.3.1 North dump interceptor canal

The interceptor channel of the North dump will have an approximate length of 4.24 km, it will start at 1,530 m above sea level and will end at 1,405 m above sea level, its slope varies between 0.35% and 15% depending on the topography of the terrain, this channel will collect all the runoff water that is contributed from the upper basin of the dump. Its construction will be carried out using the cut and fill method, in addition to the construction of dumps, which will be located according to the topography of the site and the safety conditions for its operation.

The channel will be trapezoidal in shape with an upper width of 2 m, a lower width of 1 m and a height of 1 m. The walls will be made of C30 concrete and will be 0.4 m thick. The excavated material will be deposited in dumps along the length of the channel and once the construction phase has been completed, these dumps will be rehabilitated and revegetated.

Figure 5-19 North dump interceptor channel

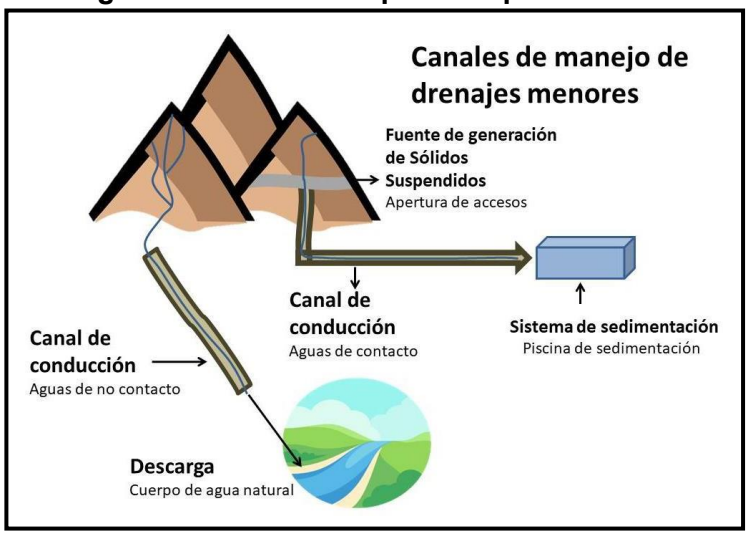


Source: ECSA, 2022

5.5.1.3.2 Minor drainage management channels

Due to the topography of the Project area, water bodies flow from the northeast to the southwest. The minor drainage management channels are intended to divert contact and non-contact water from the mine pit, north dump, ball mill, acid water dams and other minor infrastructure. The following figure shows the operation of the minor drainage management channels.

Figure 5-20 North dump interceptor channel



Source: ECSA, 2019

Temporary canals are considered to be those located in areas to be intervened, such as the mine pit and the north dump; permanent canals are all those located on roads and slopes, and will remain operational throughout the life of the Project.

5.5.1.4 Acid water dams Mirador Norte

According to the information provided by the "Hydrological Study of Mirador Mine" (Sichuan Qingyuan Engineering Consulting Co., Ltd., January 2014) see Annex C3. Mirador Mine Hydrological Study, the monthly distribution of precipitation in different representative years (maximum precipitation, average precipitation and dry years) in the mine area can be seen in the following table:

Table 5-9 Monthly rainfall distribution in representative years in the Mirador Project area

Guarantee fee	Jan	Feb	Sea	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
5%			240	448		373	246	194	227	159			2.729,1
50%		146	215	286	263	145	178	264	230	182	159	200	2.405,5
95%			198	248	317	360	199	145	111		71.4	136	2.166,6

Source: Sichuan Qingyuan Engineering Consulting Co., Ltd., 2014.

Acid water generation is calculated according to precipitation and monthly distribution in a 20-year wet year (5% guarantee rate), evaporation is not considered. The following data was considered for the calculation:

- The average annual rainfall is 2,729.1 mm (365 d) once every 20 years, and the maximum monthly rainfall is 448.4 mm (30 d);
- Mine pit water intake volume: average water intake volume is 15,021.7 m3/d, maximum water intake volume is 29,214.37 m3/d;
- Catchment area:
  - Mirador Norte mine pit (uncovered): 1,693 km2
  - Mirador Norte mine pit (in operation - perimeter road at 900 masl): 0.552 km2.
  - Northern dump: 3.164 km2
- The hydrological study estimates the surface runoff factor to be 0.8.

According to the hydrological study and calculations made using the formula:

$$\text{Volume of acidic water generation (annual)} = \frac{\text{Annual } \bar{P} \times F \times c}{365 \text{ days}}$$

$$\text{Volume of acidic water generation (monthly)} = \frac{P \text{ monthly} \times F \times c}{30 \text{ days}}$$

Where:

annual $\bar{P}$=average annual precipitation

P monthly=maximum monthly precipitation

F=catchment area

c=runoff coefficient

The volume of acidic water from runoff in the Mirador Norte pit and the northern dump are detailed in the following table:

Table 5-10 Volume of acidic water generation

Item	Unit	Tajo Mirador Norte		North dump
		Mirador Norte mine pit (uncovering)	Mirador Norte mine pit (in operation - perimeter road elevation 900 masl)	
Catchment area	km2	1.693	0,552	3.164
Runoff coefficient		0,8	0,8	0,8
Daily acid water generation calculated from precipitation annual average	Ten thousand m3	1,01	0,33	1,89
Daily acid water generation calculated from precipitation monthly maximum	Ten thousand m3	2,02	0,66	3,78

Source: ECSA, 2022

The normal flow is calculated with the average rainfall over the years, and the maximum flow with the maximum daily rainfall. According to the latest specification requirements, the allowable flooding period for the lower workings of the open stope is 7 days, one day's storm is discharged for seven days (including the accumulation of the rain storm on day 1 and the normal water inflow in the following 6 days) standard consideration. The water inflow volume of the Mirador Norte mine is the sum of the atmospheric precipitation and the outcrop water inflow volume. The predicted results of the total water inflow to the pit are shown in the table below:

Table 5-11 Total inflow of water to the Mirador Norte Pit

Open pit	Normal water flow (m³/d)		Maximum water flow rate (m³/d)		Observation
North Tagus	Atmospheric precipitation	2.004,15	Atmospheric precipitation	3.399,90	The allowable flooding period is 7 days.
	Upwelling water	2.227,17	Runoff water	3.945,01	
	Subtotal	4.231,32	Subtotal	7.344,91	
	Atmospheric precipitation	7.131,45	Atmospheric precipitation	12.097,86	The allowable

South Tagus	Upwelling water	3.658,93	Runoff water	9.771,60	flooding period is 7 days.

Open pit	Normal water flow (m³/d)		Maximum water flow rate (m³/d)		Observation
	Subtotal	10.790,38	Subtotal	21.869,46	
Total	Atmospheric precipitation	9.135,60	Atmospheric precipitation	15.497,76	Sum
	Upwelling water	5.886,10	Runoff water	13.716,61	
	Total	15.021,70	Total	29.214,37	

Source: ECSA, 2022

According to the table, the average volume of acidic water in the initial stage (uncovering) is 1.01+1.89=29,000 m3/d, and the maximum volume of acidic water is 2.02+3.78=58.000 m3/d; After mining and open pit formation, considering the pit outcrop water, the average volume of acid water in the middle and late stages is 0.33+1.89+1.5 (normal water flow)=37,200 m3/d, and the maximum volume of acid water is 0.66+3.78+2.92 (maximum water flow)=73,600 m3/d.

The acid water dams at the Mirador mining project will be built according to the needs of the project, which will be adjusted to the physical characteristics of the terrain, the geological and hydrological conditions and the existing accessibility, these works will be built in sites that are within the limits of the project site, however, if additional dams are required to those described in this study, they will be built maintaining the same construction, environmental and safety standards, according to the initially proposed dams.

5.5.1.4.1 Tagus Mirador Norte acid water dams

The Mirador Norte pit acid water dam will have a sedimentation system, which will be located at 858 metres above sea level, downstream of the crushing plant platform.

This sedimentation system will consist of four pools connected in series, which will reduce the suspended solids in the acidic water, prolonging the time of use of the acidic water dam and preventing damage to the impermeable membrane of the dam during cleaning activities.

The sedimentation system will be 155 m long, 65 m wide and 5 m deep, with a total storage capacity of 30,400 m^3 and a surface area of approximately 1.46 ha.

The construction of the sedimentation system will require, on two of its four sides, the excavation of the mountain slope, while the other two will consist of a rock and compacted earth dam 199 m long and 5 m high, the crest of which will be located at 858 m above sea level. The crest width will be 5 m and the slopes of the upstream and downstream slopes will be 1:1.5 and 1:1.75 respectively. The construction volume of the dam will be approximately 15,000 m^3 .

The internal slopes and the bottom of the sedimentation pools will be waterproofed by placing a 1.5 mm thick HDPE geomembrane to prevent seepage; in addition, a 300 mm layer of coarse sand and 500 g/m^2 geotextile will be placed under the lining of the bottom of the pools. In addition, a French underdrain system will be installed.

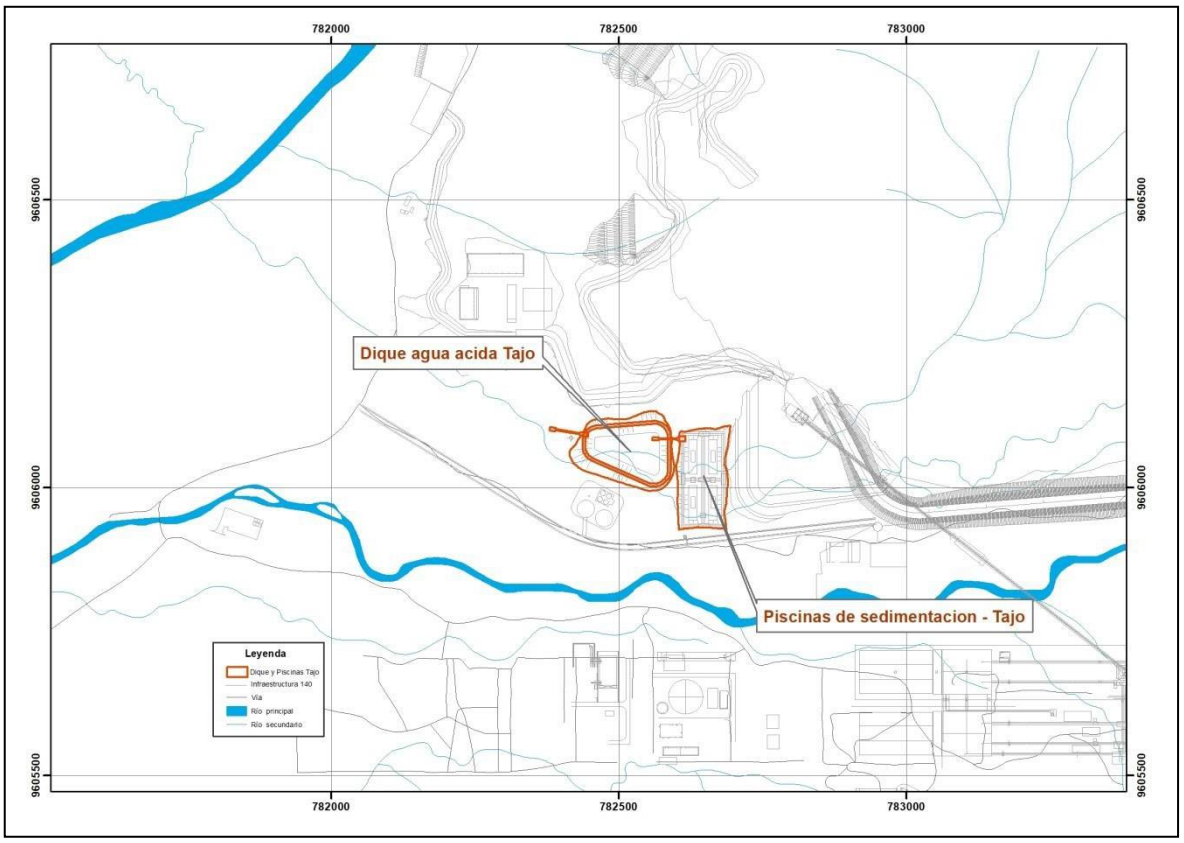
The water will discharge into the acid water dam through a spillway with a discharge height of 856.5 metres above sea level.

The acid-water dam will require excavation of the hillside and construction of dikes on three sides and will occupy an area of approximately 1.9 ha. The maximum flood elevation of the pit's acid-water dam will be 855 m above sea level. The pool will be approximately 140 m long, 75 m wide and 10 m deep. The total theoretical storage capacity will be 82,000 m^3 , but applying the safety factor, the real capacity will be 66,000 m^3 , which will allow the storage of the acidic water produced between
3.3 and 6.5 days. The inside of the pool will be waterproofed with 1.5 mm thick HDPE geomembrane, 500 g/m² geotextile^2 and a 300 mm thick layer of coarse sand.

The acidic water from this dam will flow by gravity to the acidic water treatment plant through two HDPE pipes DN 800 × 22, where it will be treated prior to discharge in compliance with the maximum permitted limits for waste water discharge according to national environmental legislation. In addition, there will be a pumping station to allow the acidic water to be pumped to the north dump pool, if necessary, so that the volume of water in the two pools can be adjusted to each other.

The daily acid water production will be between 8,900 ～ 13,100 m^3 , a range calculated using the average annual precipitation and the maximum monthly precipitation respectively.

Figure 5-21 Implementation of the Mirador Norte Tagus Acid Water Dam

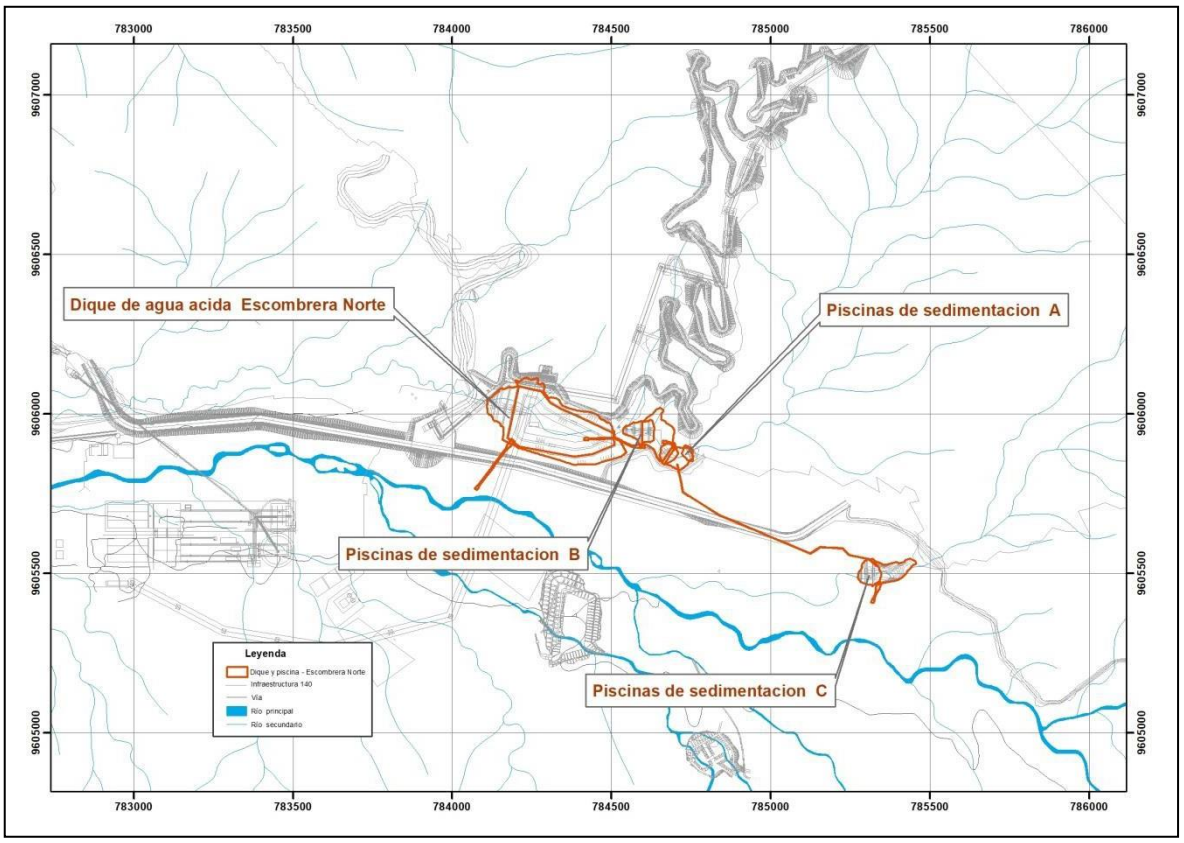


Source: ECSA, 2022

5.5.1.4.2 Acid water dam at Escombrera North

There are two channels that collect the acidic water produced in the north dump, in which sedimentation ponds will be installed prior to entering the North Dump acidic water dam (Figure 5-22). Sedimentation ponds A and B, connected in series, will be constructed in the main channel, and sedimentation pool C will be constructed in the secondary channel. The purpose of the sedimentation ponds is to reduce the suspended solids in the acidic water in order to prolong the service life of the acidic water dam and to avoid damage to the impermeable membrane due to cleaning.

Figure 5-22 Implementation of the North Dump acid water dyke



Source: ECSA, 2022

The internal slopes and the bottom of the sedimentation pools will be waterproofed by placing a 1.5 mm thick HDPE geomembrane to prevent seepage; in addition, a 300 mm layer of coarse sand and 500 g/m^2 geotextile will be placed under the lining of the bottom of the pools. In addition, a French underdrain system will be installed.

- **Sedimentation pool A**

The total theoretical storage capacity will be 18,000 m^3 , but applying the safety factor, the real capacity will be 10,900 m^3 . Its dimensions will be 70 m long, 60 m wide and 12 m deep, with a total area of 0.58 ha.

The containment dam will consist of a rock and compacted earth dam 63 m long and 14 m high, the crest of which will be located at an elevation of 1,052 m above sea level. The crest width will be 5 m and the slope of the upstream and downstream slopes will be 1:2, the construction volume of the dam will be approximately 17,000 m^3 .

Sedimentation pool A discharges to sedimentation pool B through a spillway located at an altitude of 1,050 m above sea level.

- **Sedimentation pool B**

The total theoretical storage capacity will be 82,400 m^3 , but applying the safety factor, the real capacity will be 63,000 m^3 . Its dimensions will be 90 m long, 80 m wide and 15 m deep, with a total area of 1.32 ha.

The containment dam will consist of a rock and compacted earth dam 84 m long and 22 m high, the crest of which will be located at an altitude of 1,050 m above sea level. The crest width will be 5 m and the slope of the upstream and downstream slopes will be 1:2, the construction volume of the dam will be approximately 57,000 m^3 .

Below 1,030.0 m above sea level, a drainage prism will be constructed at the base of the dam, with an upstream slope gradient of 1:2.0. A gravel transition layer and a 500 g/m2 geotextile layer will be placed on the inner slope of the pool, and a breakwater wall will be placed on the downstream slope.

The sedimentation pool B discharges to the acid water dam of the tailings dump through a spillway located at an altitude of 1,048 metres above sea level.

- **Sedimentation pool C**

The total storage capacity will be 31,400 m^3 , its dimensions will be 100 m long, 60 m wide and 10 m deep, with a total area of 0.99 ha.

The containment dam will consist of a rock and compacted earth dam 83 m long and 15 m high, whose crest will be located at an altitude of 1,136 m above sea level. The crest width will be 5 m and the slope of the upstream and downstream slopes will be 1:2, the construction volume of the dam will be approximately 39,000 m^3 .

Below 1,120 m above sea level, a drainage prism will be constructed at the base of the dam, with an upstream slope gradient of 1:2.0. A gravel transition layer and a 500 g/m2 geotextile layer will be placed on the inner slope of the pool, and a breakwater wall will be placed on the downstream slope.

Sedimentation pool C discharges towards sedimentation pool A, through a DN 600 HDPE pipe. In addition, it will have a spillway located at an altitude of 1,134 m above sea level to discharge in the event of flooding.

Acidic water seeping through the dump will flow by gravity to sedimentation ponds A, B and C before entering the dump's acidic water dam, and will then be conveyed to the pit's acidic water dam through HDPE pipe DN 800 × 22, and then enter the treatment plant where it will be treated prior to discharge in compliance with the maximum permitted limits according to the national environmental legislation in force.

The main facilities of the acid-water barrage include the barrage, the spillway for flood discharges and the anti-filtration facilities, covering an area of approximately 5.6 ha.

The interior of the pool will be waterproofed with 1.5 mm thick HDPE geomembrane, 500 g/m^2 geotextile[2] and a 300 mm thick layer of coarse sand.

The maximum flood level of the acid-water embankment of the north heap shall be 1,020 metres above sea level. The pool will be approximately 310 m long, 140 m wide and 20 m deep. The total theoretical storage capacity will be 507,300 m^3 , but applying the safety factor, the real capacity will be 425,100 m^3 . This will allow the acidic water produced to be stored for between 5.8 days and 11.4 days.

The water catchment area of the northern dump is 3.164 km^2 and considering the average annual rainfall, the daily acid water production would be 16,600 m^3 . If calculated using the maximum monthly rainfall, the daily acid water production would be 24,500 m^3 . When considering the water flow from the northern pit, the total daily acid water production will be between 34,500 m^3 and 42,400 m^3 .

5.5.1.5 Acidic water dam 2 of the South Dump

The acid water dam 2 of the South Dump is located towards the right margin of the East sedimentation pool, covers an area of 6.06 hectares, has a storage capacity of 180000 m^3 and the real capacity is 152000 m^3 capable of storing the acid water produced by an average rainfall of 5.1 days, or 3 days of maximum rainfall, it is located on a maximum elevation of 1030 m above sea level.

Its main function is to temporarily store the acid water generated in the Mirador pit and in the south dump (currently in operation), this is a complementary work to the dyke that is operating. The main facilities of the acid water dam 2# include the main dam, the secondary dam and the drainage and interception facilities, anti-filtration also for safety control, prior to this facility there will be a sedimentation system to prevent the entry of sediments into the dam.

- **Main containment dyke**

The height of the dam crest is 1,030 m above sea level, it has a maximum designed height of 15 m, the width of the dam crest is 5 m and the length of the dam is 307.40 m. The upstream slope ratio is 1:2, and the downstream slope ratio is 1:2 (the slope ratio in the access road section is 1:1.75).

The main containment dike is designed as an impermeable dike, constructed of compacted material and its inner wall will be covered with an impermeable layer of 1.5 mm thick HDPE geomembrane to prevent seepage.
An underground anti-seepage wall is constructed on the upstream slope; 2m wide berms are established at 1022m and 1013m respectively. The drainage prisms are placed below the 1013m downstream slope of the main retaining wall, the drainage prisms are made of rock. The outer slope after construction is revegetated, dry masonry stone is used to protect the slope at the site of the drainage prism. An interceptor channel is constructed in the dam abutment to prevent the body of the dam from being washed out.

- **Secondary dyke**

This weir is located south of the spillway, the crest height of the weir is 1030m, the maximum height is 5m, the width of the crest is 5m, the length is 52.90m. The upstream slope ratio is 1:2, the downstream slope ratio is 1:2. The upstream surface of the dam body will be covered with an impermeable layer of 1.5mm thick HDPE geomembrane to prevent seepage. The outer slope is revegetated after construction.

- **Check dam**

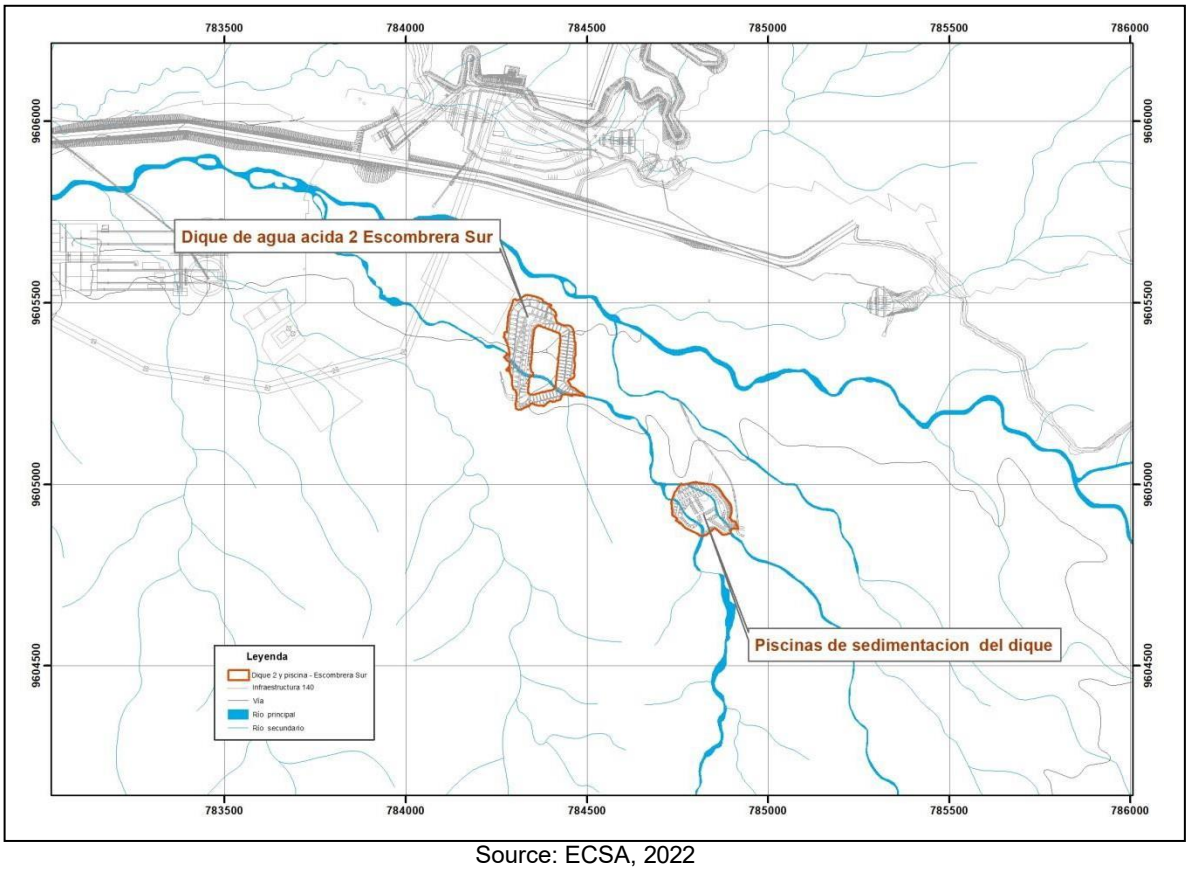
The crest elevation of the dam is 1105m, the lowest natural surface elevation in the axis is 1086m, the maximum designed height of the dam is 19m with the crest width of 5m, the dam length is 127.21m, the upstream slope ratio is 1:2, and the downstream slope ratio is 1:2. The check dam is impermeable, the upstream wall of the dam is made of anti-infiltration concrete. The downstream slope of the dam has a berm at 1095m. The drainage prism is located below the 1095m elevation of the downstream slope, the drainage prism is constructed of stone. The downstream slope of the check dam will be revegetated.

- **Flood drainage facilities**

The open spillway is used as a flood discharge structure. The catchment area of the reservoir withstands the possible effects of 100-year return period floods. The water body is at an elevation of 1028.50 m above sea level, the flood level would reach 1029.50 m.

The spillway is arranged on the left bank, and a spillway with a wide top without sills is adopted at the inlet. The elevation of the inlet is 1128.50m and the width of the spillway is 15m; the steep groove section of the spillway is 4m wide and approximately 60m long. The spillway is made of reinforced concrete. An open channel is constructed at the end to connect to the sedimentation pool.

Figure 5-23 Implementation of Escombrera Sur acid water dam 2



Source: ECSA, 2022

- **Sedimentation system**

The sedimentation system of the acid water dam 2 will consist of three pools (East, South and West), built downstream of the outlet of the spillway of the acid water dam #1 (current dam in operation). The location of the acid water dam #1 has the final submerged elevation of 1105 m, the total storage capacity is 32,700 m³ (among which, East Pool has 14,800 m³, South Pool 5,000 m³, West Pool 12,900 m³), with a storage capacity of 23,000 m³, the main function is to collect, temporarily store and preliminarily clarify the acid water coming from the mine pit and the waste dump.

5.5.1.6 Steel Ball Mill

The constructive scope of the project includes the production of 18,000 t/y of rolled steel balls of Φ 50 ～ 80 mm; and 12,000 t/y of forged steel balls of Φ120 ～ 150 mm, bringing the total number of steel balls produced to 30,000 t/y.

Table 5-12 Product specifications and production capacity

Product name	Specifications	Unit	Quantity	Total
Balls rolled from alloy high hardness multi-component	Φ50 ～ Φ80	t/a	18.000	30.000 t/a
Balls forged from alloy multicomponent for grinding semi-autogenous	Φ120 ～ Φ150	t/a	12.000	

Source: ECSA, 2022

The steel ball mill will be located on the right bank of the Quimi River, southwest of the Mirador Mining Project emulsion plant, at the following UTM coordinates X= 780.100, Y=9.604.700 (WGS84 - 17S), Parroquia Tundayme, Cantón Pangui, Zamora Chinchipe province.

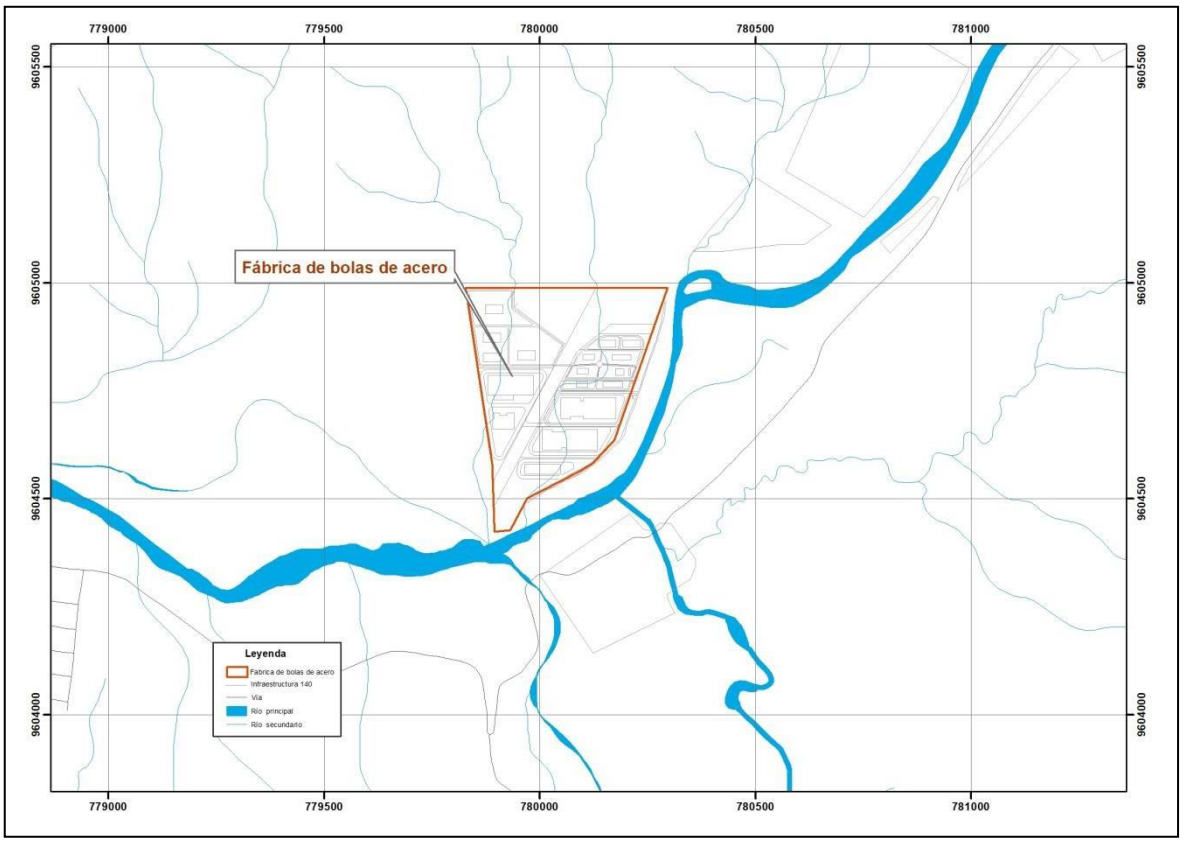
The steel ball mill will consist of the following infrastructure.

Table 5-13 Steel ball mill infrastructure.

No.	Name of building or structure	Type from structure	Size of plan Length (m) × Width (m)	Height from construction (m)	Area of construction (m^2)
1	Steel ball production workshop	Steel structure	83,3 × 48,7 (the widest place)	14,2	3.838,6
	Circulation pool	Structure of concrete	20×6	Depth of 4.5	120
	Pump room	Structure of steel	15×5,1		76,5
	Tank tank for production	Structure of concrete	Diameter of 11 m	Depth of 3.5	95
5	Elevated water tank fire protection	Structure of concrete	Diameter of 9 m	Depth of 3.5	63,5
	Raw material yard and steel shed	Structure of steel	36,9 x 54,9	12,8	2.025,8
	Dormitory building 1	Steel structure	27,1 x 13,1 (the widest place)	3,3	313
8	Dormitory building 2	Steel structure	45,1 x 13,1 (the widest place)	3,3	521,5
	Dining room	Structure of steel	20 x 16	3,6	320
	On-call room	Structure of steel	4,5 x 4	3,6	

Source: ECSA, 2021

Figure 5-24 Steel ball mill implementation



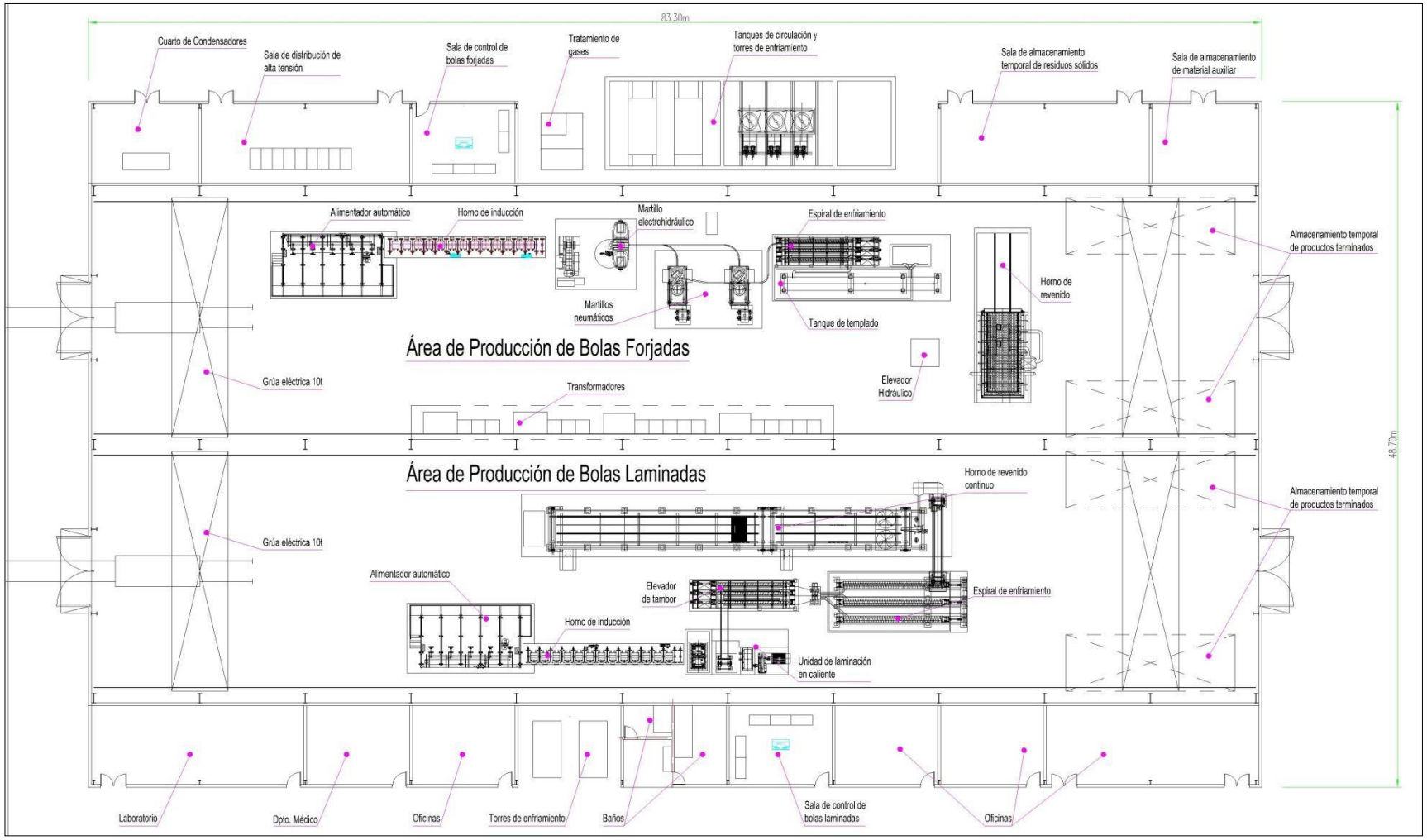
Source: ECSA, 2022

5.5.1.6.1 Steel ball production workshop

The steel ball production shop will be 83.3 m long, 48.7 m wide at the widest point, and 14.2 m high, with two bays, which will be respectively the forged ball production area and the rolled ball production area. Two double girder electric cranes will be installed. The northern secondary span will be 53.2 m long, 5.8 m wide and 5 m high, with a high-voltage distribution room, a forged ball control room, a temporary solid waste storage room and an auxiliary material storage room. The southern secondary span will be 75.8 m long, 5.8 m wide and 5 m high, which are respectively offices, toilets, ball mill control room and others.

The entire shed will be a single-storey steel structure with a total area of 3,838.6 m^2 . The wall below 1.2 m of the main span will be made of brick, and the wall above 1.2 m will be made of 0.6 mm thick aluminium-zinc profiled steel sheets, the maintenance structure of the secondary span will have brick wall. Plastic or coloured aluminium doors shall be adopted. The base of exhaust gas treatment system equipment, cooling tower and other equipment outside the shed shall be constructed of flat steel, steel doors and fireproof doors; windows shall be made of steel.

Figure 5-25 Steel ball production workshop



Source: ECSA, 2021

5.5.1.6.2 Circulation pool

The circulation pool is a semi-subterranean pool which will have an area of 20 m x 6 m and a depth of 4.5 m.

Circulation pools shall have a self-sealing reinforced cast-in-place concrete structure. To improve waterproofing the concrete shall be mixed with UEA water-repellent admixture.

5.5.1.6.3 Pumping room

The pump room will have a plan size of 15 x 5.1 m, a height of 4.2 m and a construction area of 76.5 m2.

The pump room shall be constructed of a single-storey steel structure, its steel columns and beams shall have I-shaped sections. The roof and wall purlins of the house shall be of C-shaped steel or channel steel. Vertical and horizontal steel profile supports shall be installed between the columns and the roof according to the relative codes. Light steel wall and roof shall be used.

5.5.1.6.4 Elevated tank for production

The project's production water will be taken from nearby sources. An elevated tank of 300 m^3 of concrete will be built for the storage of production water.

5.5.1.6.5 Elevated fire water tank

The elevated fire water tank (200 m^3) will be constructed of concrete. The collected water will be fed into the tank to supply the fire water to the plant area.

The fire water supply pipe network shall be laid in a circular form along the road. The diameter of the main pipe shall be DN150 mm. The pipe shall be made of ductile iron and shall be buried in the ground with a depth of 0,8
m. Surface hydrants shall be installed at no more than 120 m.

5.5.1.6.6 Raw material yard and steel shed

The raw material yard and steel shed will be 54.9m long and 36.9m wide, with an overhead crane Q = 20t and S = 34.5m. The entire shed is a single-storey steel structure, with a total area of 2,025.8 m^2 . The wall below 1.2m will be made of brick and above 1.2m will be made of 0.6mm thick aluminium-zinc profiled steel sheets. Steel doors and fireproof doors shall be used; windows shall be steel or coloured aluminium.

5.5.1.6.7 Bedrooms, Dining Room and Wardroom

A dormitory area will be built, which will include a laundry and dining room, a conference room and a construction area of approximately 320 m^2 , the guardhouse will have a size of 4 m x 4.5 m, a height of 3.6 m and a construction area of 18 m^2 .

The structure of the dormitories, dining room and caretaker's quarters will be of steel sections built on a single storey with light steel walls and roof.

5.5.1.7 Beneficiation Plant Phase II

The Mirador Mining Project's beneficiation plant is located in the lower basin of the Wawayme River, 3.45 km in a straight line from the Tundayme tailings dam and 2 km from the Quimi tailings dam.

The beneficiation plant currently has a production capacity of 20 million tonnes per year and is made up of two parallel series, each with the capacity to process 10 Mtpa. This plant is regularised within the Environmental Impact Study of the beneficiation phase, approved by resolution No. 223 of 13 July 2016, which began operations in July 2019. It has two production lines, each with a designed production capacity of 10 Mtpa. The main production system consists of a SABC grinding system (including a SAG mill, a ball mill and a pebble crusher), a thickener system and a filter press system to dewater the concentrate.

The SABC process is used for the crushing and grinding system, consisting of "primary crushing + SAG mill + ball mill + pebble crushing". For the separation system, the "coarse grinding, coarse flotation and tailings discharge plus re-grinding and re-separation of coarse concentrates" process is used.

For the concentrate dewatering system, the two-stage "thickening + filtration" process is used. Figure 5-29 shows the process flow diagram of the beneficiation process designed for phase I of the beneficiation plant.

Phase II of the Mirador Mining Project will proceed with the increase of the processing volume in the two lines that are already operating and that process 30 ktpd each, the real processing capacity of each line is 40 ktpd, therefore, for the increase of 5 ktpd there is no need for new facilities or the increase in the already installed ones.

To meet the 140 ktpd production, two additional lines will be installed, which will be located on the platform of the existing beneficiation plant, these two lines are integrated and form a single mineral processing system at the Mirador Mining Project, which use the same secondary facilities and services already installed.

The new capacity of this beneficiation plant in this design will be 80 ktpd, with a total capacity of 140 ktpd. Phase I of the beneficiation plant will require an additional 10 ktpd capacity and the capacity after expansion will be 70 ktpd (to process ore from the Mirador pit); while the capacity of Phase II of the beneficiation plant will be 70 ktpd (processing 10 ktpd of ore from the south pit and 60 ktpd of ore from the Mirador Norte pit).

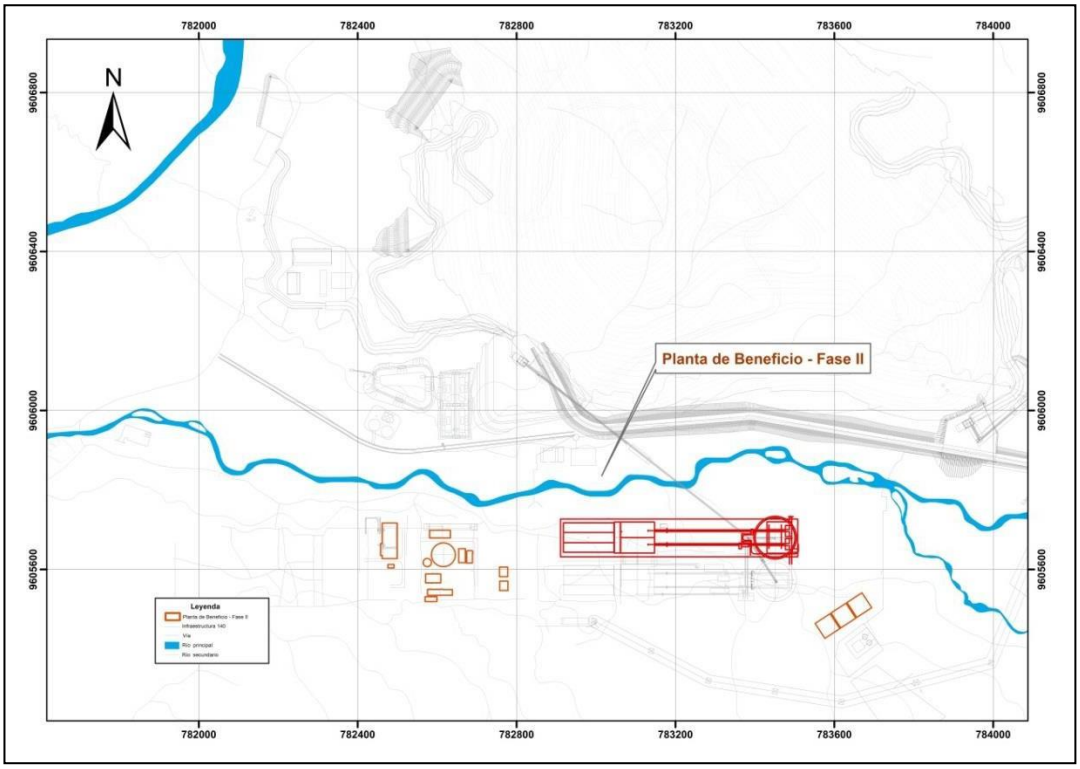
The total mine life is 17.2 years. Based on the progress of mining and uncovering, the estimated life of the Mirador pit is approximately 21 years and that of the Mirador Norte pit will be 16 years.

During the construction of phase I of the mine, the future works of the beneficiation plant were planned, i.e. it was planned to share a set of public facilities, considering the development of the mining area in the initial and later stages. Next to the existing beneficiation plant, space was reserved in the northern part of the platform for expansion in phase II, where two additional series will be installed. The beneficiation plant installed for phase I and phase II, including ancillary and complementary works, will occupy the approximately 50 ha platform that was licensed in the beneficiation phase for a production of 60 ktpd.

The beneficiation plant is distributed along the slope, where the coarse ore stockpiles, milling plant, flotation and concentrate filtration plant are arranged from east to west. The lime slurry preparation shop and reagent preparation room are located east of the platform at a higher elevation allowing gravity flow of lime slurry and reagent to the storage tanks respectively.

The coarse ore stockpile is connected to the milling area of the beneficiation plant by a conveyor belt, while to the west is the tailings deposit, tracks and pipelines for the transport of tailings and concentrates.

Figure 5-26 Beneficiation Plant Implementation



Source: ECSA, 2022

5.5.1.7.1 Ore feed mode and working system

For open-cast mining, there is one coarse ore crushing plant in the Mirador pit and one in the Mirador Norte pit, the coarse crushed products (with

a granularity ≤300 mm) are transported to the stockpile of the beneficiation plant by conveyor belt.

According to the mining and ore feed, all ores fed to the phase I beneficiation plant site are ores from the Mirador pit, as shown in table 5-15. The ores fed to the Phase II workings of the beneficiation plant are ores from the Mirador Norte pit and part of ores from the Mirador pit, as shown in Table 5-16.

Table 5-14 Annual beneficiation quantity and average ore grade of the phase I site of the beneficiation plant

South Tagus (×104t/a)	Amount of mineral	Cu (%)	Au(g/t)	Ag(g/t)
	2.310	0,514	0,167	1,36

Source: ECSA, 2021

Table 5-15 Annual beneficiation quantity, type, average grade and percentage of ores from Phase II beneficiation plant site

Year	Mirador Norte pit (×104 t/a)				South Tagus (×104t/a)		Total (Mirador and Mirador Norte pits) Quantity and law			
	Oxide ore/mixed ore		Primary mineral							
	Amount of mineral	Percentage (%)	Amount of mineral	Percentage (%)	Amount of mineral	Ratio (%)	Amount of mineral	Cu (%)	Au (g/t)	Ag (g/t)
1	612,9		197,1				810	0,594	0,068	
	918,4	46	1.061,6				1.980	0,516	0,079	
	544,6		1.435,4		330		2.310	0,465	0,104	0,20
	440,0		1.540,0		330		2.310			
5	374,4		1.605,6	70	330		2.310			
	95,1		1.884,9	82	330		2.310			
	84,8		1.895,2	82	330		2.310			
8	96,6		1.883,4	82	330		2.310			
9 ～14			1.980	86	330		2.310	0,436	0,090	0,21
			1.485	82	330		1.815			
			1.081,7		330		1.411.7			

Source: ECSA, 2021

Table 5-16 Physical properties of raw ore from the Mirador pit

Ore density (t/m^3)	Loose factor	Ore hardness coefficient	Feed granularity (mm)	Observation
2,65	1,5	6～12	0～300	Products gy ratory crusher

Source: ECSA, 2021

Table 5-17 Physical properties of raw ore from the Mirador Norte pit

Ore density (t/m^3)	Loose factor	Ore hardness coefficient	Feed granularity (mm)	Observation
2,56	1,5	6～12	0～300	Products gy ratory crusher

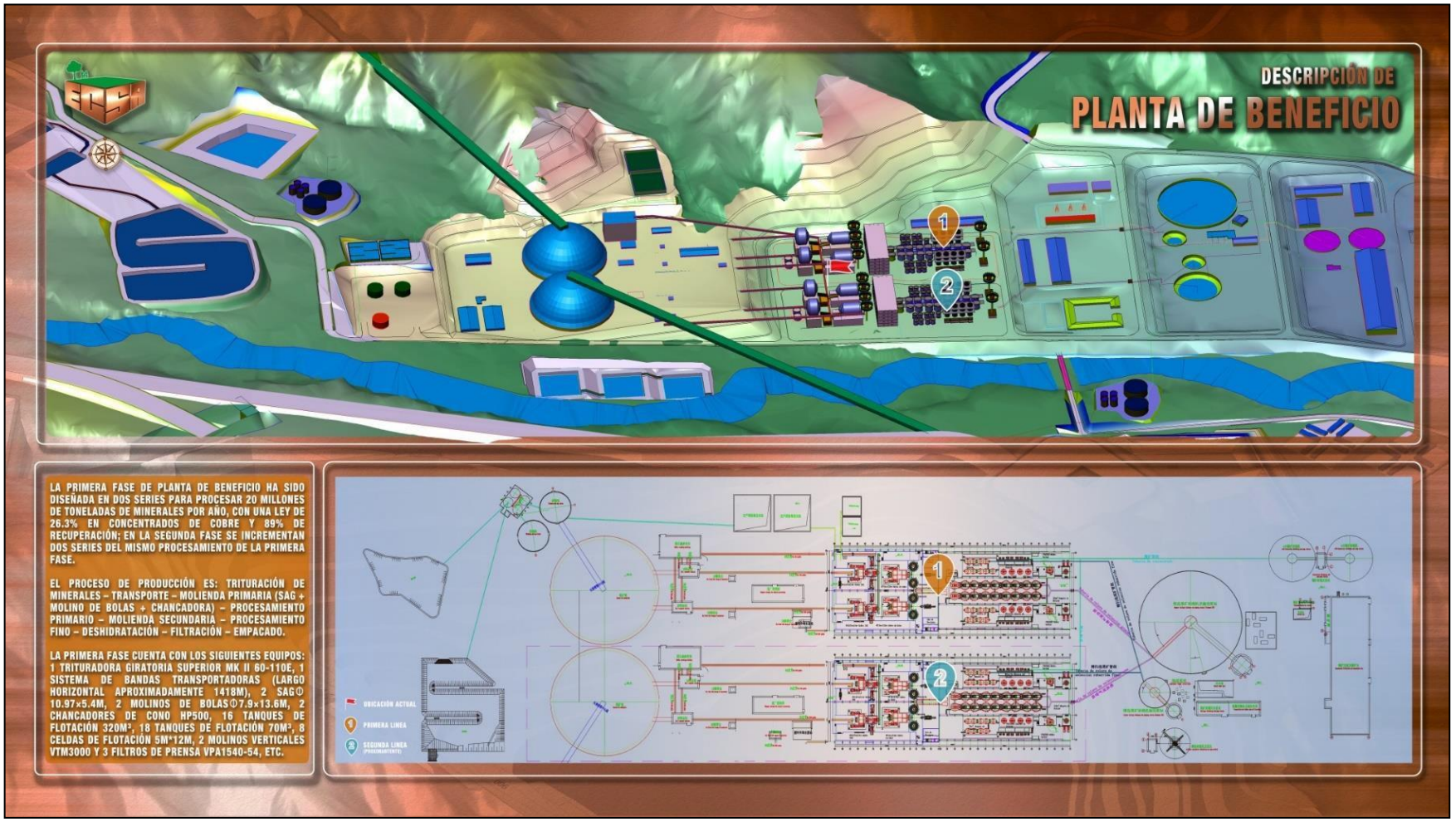
Source: ECSA, 2021

For its part, each process line will be composed of:

- Grinding area: it will consist of a SAG mill, a ball mill and a pebble mill for each processing line; this area will be common to both lines and will include industrial sheds with a metal structure, electrical installations, water circuits and safety installations and a control room with all the services.
- Flotation and regrinding area: it will consist of three flotation circuits: the first one for coarse ore will be composed of 11 cells, a nest of hydrocyclones and a vertical mill; a second vertical flotation circuit will have seven flotation columns and, finally, the third flotation circuit will have four cells. In addition, a vertical mill will be installed for the regrinding of coarse ore. This area will be made up of metal structure sheds.
- Tailings Thickening Area: It will consist of a thickener tank, which is located outdoors.
- Thickening and Filtration Area: It will be made up of the thickener and the filter presses; the construction and assembly of this equipment will be carried out under a metal structure shed, this area has the basic services.
- Concentrate Storage and Loading Area: This will consist of a control room and electrical control area. The concentrate will be stored in a rectangular concrete tank, from where the concentrate is loaded onto the trucks that take it to the port.

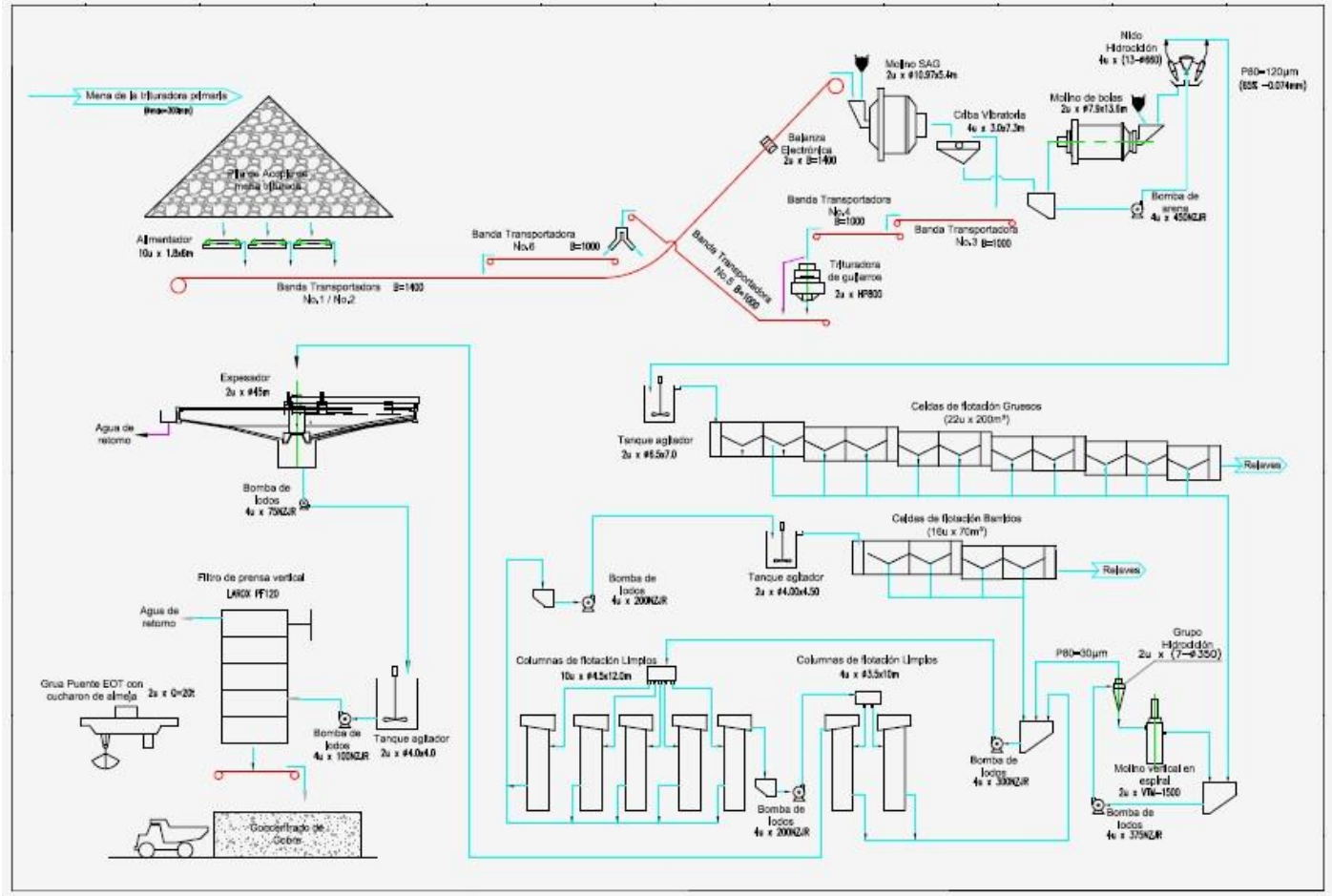
In addition, the beneficiation plant will have unique areas that serve the process: the lime slurry storage and preparation area, chemical reagent storage and preparation areas, fuel storage area, two process water tanks, return water tanks, warehouses and maintenance workshops, a laboratory and offices. The following is a detailed description of each of the facilities and the operation of the Beneficiation Plant.

Figure 5-27 Schematic of the Beneficiation Plant



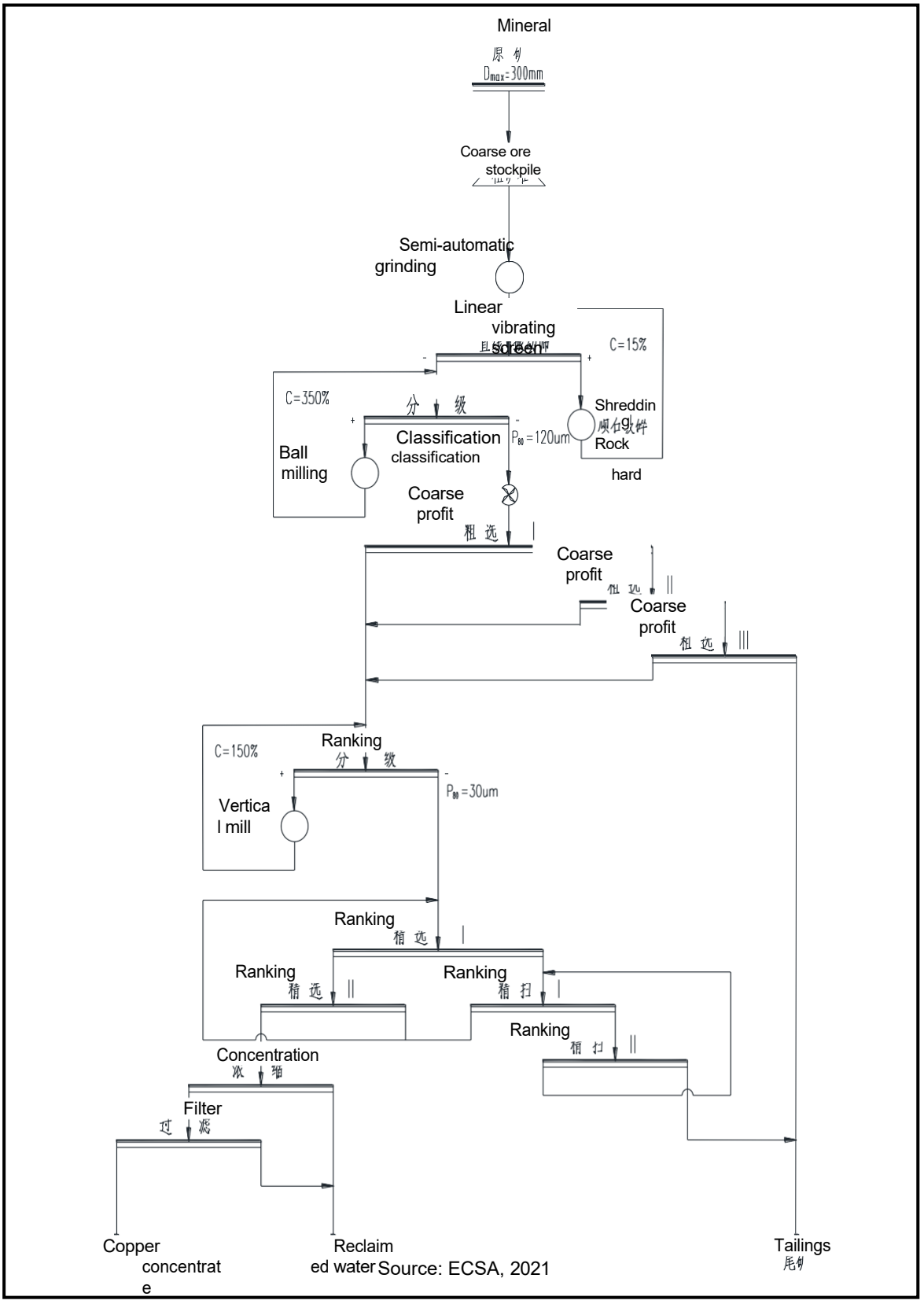
Source: ECSA, 2021

Figure 5-28 Beneficiation Plant Flow Diagram



Source: ECSA, 2021

Figure 5-29 Flow chart of the design beneficiation process



Source: ECSA, 2021

5.5.1.7.2 Description of the production process for Phase II

Ore crushed in the Mirador Norte pit will be transported to the coarse ore stockpile in the beneficiation plant via a conveyor belt for stockpiling.

A 2,000×9,000 heavy plate feeder will be provided under the stockpile, which will supply ore to the Φ10.97×5.40 m SAG mill in the main plant via the conveyor belt.

The ores discharged from the SAG mill will be classified by a linear vibrating screen LH3073, the products that do not pass through the screen will be conveyed to the HP500 cone crusher in the hard rock crushing shop for crushing, then the products obtained from the crusher will be conveyed by belt conveyor back to the SAG mill.

Products from cone crusher #1 will be supplied to stage I of the beneficiation plant, while those from cone crusher #2 will be supplied to stage II of the beneficiation plant. Uncrushed hard rock may be transported to stage I or II of the beneficiation plant as appropriate. The products passing through the linear vibrating screen enter the slurry tank and are conveyed to the FX660-GX-N×18 hydrocyclone nest via the slurry pump, and the sediment from the cyclone is conveyed to the Φ7.9 m × 13.6 m overflow ball mill, and the overflow from the cyclone (P80=120 μm) flows by gravity to the Φ7.500×7,500 before coarse flotation for pulp processing prior to flotation.

The slurry in the mixing tank will flow by gravity to 16 320 m flotation cells^3 for three coarse cleanings, and the tailings will flow by gravity to the tailings pumping station. The concentrates produced after the three coarse cleanings will be pumped to the FX-250-GX-B×15 cyclone for classification.

The sediment from the cyclone will be supplied to the VTM-3000-WB vertical mill for regrinding, while the cyclone overflow will enter the concentration process.

The coarse concentration process will consist of a two-concentration, two-sweep process. Eight Φ5.0×12 flotation columns will be used for concentration, and 18 flotation cells of 70 m^3 will be used for sweep-cleaning. Concentrates from the sweep and tailings from concentration II will in turn return to the concentration process, and the sweep tailings will flow by gravity to the tailings pumping station.

Concentrate II concentrates will be pumped to the Φ45 m high efficiency thickener for thickening, the underflow from the thickener will be pumped to the filter press VPA1540-54, and the water content of the filtrate concentrate will be approximately 9%. The filtrate concentrate will be transported via conveyor belt for storage to the concentrate silo, which will be enlarged for this phase. It will be loaded onto trucks with a 20 t grab crane and then weighed. The containers or big-bags will be transported by truck to the outside.

For the water supply to the plant, water storage tanks made of reinforced concrete will be built, these tanks will be located towards the top of the processing plant.

Prior to the entry of the production water from the East pool, the Wawayme River intake and pumping from pool B, there will be a treatment plant that regulates the process water parameters.

The tailings generated will be disposed of in the Tundayme tailings deposit, which is currently in operation. As an increase in the tailings deposit capacity is required, ECSA is in the process of studying and analysing alternatives. As soon as the best option for tailings management is defined, we will proceed with the regularisation of the beneficiation for a production of 140 ktpd considering: tailings deposit, auxiliary and complementary works.

The design beneficiation process flow and rates are shown in the accompanying drawings, figure 5-29.

The processing capacity of the beneficiation plant will be 140 ktpd and 46.2 Mtpa. The annual continuous working system will be adopted, 330 d/a, 2 shifts/d, 12 h/shift. The following table shows the working system of each workshop or operation, the annual operating rate and the processing capacity of the equipment.

Table 5-18 Annual equipment operating rate and workshop production capacity

Operation	Working system			Operating rate per annum (%)	Processing capacity (t/h)	Observation
	Days of operation of the equipment / year	Daily number of shifts of work	Hours of operation / shift			
Grinding and separation	330			90,41	5.833,33	Including shredding of hard rock
Thickening and filtration of concentrates	330			90,41	~102,00	Maximum quantity during the useful life

Source: ECSA, 2021

5.5.1.7.3 Description of the main equipment selected

- ✓ Ore feeder: In the present design, 12 2000×9000 heavy plate feeders of the same specification as the Phase I feeders are selected for Phase II of the beneficiation plant, 6 in operation and 6 in reserve, at the bottom of the coarse ore stockpile.
- ✓ Pebble crusher: 2 HP500 multi-cylinder conical crushers will be used for phase I of the beneficiation plant. According to the actual production and calculation results, the existing equipment can meet the expansion demands of phase II, therefore, no addition of this type of equipment is required.
- ✓ Coarse grinding equipment: Consists of 2 SAG mills of Φ10,97 × 5,4 m and 2 ball mills of Φ7,9 × 13,6 m for Stage I, all mills are dual drive mills. In each series, one SAG mill corresponds to one ball mill. According to the review and calculation, 2 SAG mills of Φ10,97 × 5,4 m and 2 overflow ball mills of Φ7,9 × 13,6 m are also used in the present design corresponding to phase II.

The SAG mill is selected according to a design DWI of 7.58 kWh/t, and the coarse grinding ball mill is selected according to a standard ball mill work index of 15.7 kWh/t.

Table 5-19 SAG mill

No.	Specification	Quantity	Power (KW / unit)
1	Φ10,97×5,40 m		2×6250

Source: ECSA, 2021 Prepared by: Gesambconsult Cía Ltda, 2021

Table 5-20 Ball mill

No.	Design stage	Specification	Quantity	Power (KW / unit)
1	Design / construction plans	Φ7,9m×13,6 m		2×7800

Source: ECSA, 2021 Prepared by: Gesambconsult Cía Ltda, 2021

- ✓ Coarse concentrate regrinding equipment: The granularity of the concentrate regrind products in the present design is P80=30 μm, equal to that of the phase.
  I. In this design, 2 vertical mills VTM-3000-WB are also selected.
- ✓ Flotation system: Currently, 16 flotation cells of 320 m3 are used for coarse flotation, 18 flotation cells of 70 m3 for clean, and 8 flotation columns of 5.0×12 for concentration. The design for phase II corresponds to the same design as phase I.

Table 5-21 Coarse and Sweep Flotation System

No.	Specification	Number of cells	Volume (m^3 /cell)
1	KYF-200		200

Source: ECSA, 2021 Prepared by: Gesambconsult Cía Ltda, 2021

Table 5-22 Clean and sweep flotation system

No.	Specification	Number of cells	Volume (m^3 /cell)
1	KYF-70		70

Source: ECSA, 2021 Prepared by: Gesambconsult Cía Ltda, 2021

Table 5-23 Flotation column for concentration

No.	Operation	Specification	Quantity	Volume (m^3 /unit)
1	Concentration I	Φ4,5×12,0 m		191
	Concentration II	Φ3,5×12,0 m		115

Source: ECSA, 2021 Prepared by: Gesambconsult Cía Ltda, 2021

- ✓ Concentrate thickener equipment: The selection of concentrate thickener equipment is based on the operation of equipment for the current Phase I production. Based on current production, the two Φ45 m high-efficiency thickeners currently in use can meet the demands of Phase II expansion, therefore, the addition of this type of equipment is not required.

Table 5-24 Copper concentrate thickener

No.	Specification	Quantity	Nominal capacity (t/m² h)		Observation
			Designed	Weight	
	Φ 45m		0,7	0,66	A factor of 1.3 is considered

Source: ECSA, 2021 Prepared by: Gesambconsult Cía Ltda, 2021

- ✓ Concentrate filtration equipment: In this design, the two VPA1540-54 filter presses from Phase I are planned to be used for this project, and equipment of the same specification will be added as required.
- ✓ Thickeners and tailings transport: The coarse flotation tailings slurry and concentration tailings slurry discharged from the beneficiation plant are thickened by Φ100m and Φ30m thickeners, respectively, the underflow concentration reaches 55-60% and 50-55%, which are transported to the tailings pond by Φ820 rubber-lined steel pipe, using a pumping system.

5.5.1.7.4 Dosing, preparation and storage of reagents

The reagent dosing work system for beneficiation corresponds to the flotation work system, which is 330 d/a, 2 shifts/d, 12 h/shift. A separate reagent dosing system is provided for both phase I and phase II of the beneficiation plant.

No.2 oil is added as a foaming agent and PAC stock solution as a collector, 10% butyl xanthate is prepared and added. A reagent dosing room is built in the flotation workshop. Pulse dosing machine is used for quantitative dosing at each reagent dosing point according to the fluctuation of mineral processing capacity and ore properties.

The lime slurry is dosed by pumping and circulation, the dosing branches and valves form a closed-loop control by the pH meter, in order to carry out the quantitative dosing of reagents at each dosing point.

- Storage and preparation of Butyl Xanthate, Poly Aluminium Chloride (PAC) and No. 2 oil

The beneficiation plant has a separate dosing room for the storage of beneficiation reagents: butyl xanthate, PAC and No. 2 oil.

There is also a separate reagent preparation room for the preparation of butyl xanthate. Butyl xanthate is diluted to a concentration of 10% through the reagent mixing tank.

In the present design, the existing reagent preparation system for the preparation of butyl xanthate is used.

- Preparation and storage of lime milk

Phase I of the beneficiation plant has a separate lime slurry preparation workshop, with a design processing capacity of 20 t/h. Quicklime with a granularity ≤120 mm is prepared in a 10% emulsion and then agitated for storage. The lime slurry preparation shop is close to the east of the coarse ore stockpile. The ball mill is used for one-stage grinding, and the spiral classifier and cyclone are arranged for two-stage classification to produce the graded lime slurry. The main equipment includes the Φ2.7×3.6 m grid ball mill, the 2FG-20 double spiral classifier and the 5-Φ250 cyclone group.

The prepared lime slurry flows by gravity to the two Φ9.0×9.5 m mixing tanks in front of the grinding plant for storage.

In the present design, it is planned to use the existing lime slurry preparation system. Two new mixing tanks of Φ9.0×9.5 m are added in front of the grinding plant, feeding lime slurry to phase II of the beneficiation plant.

The working system of the lime slurry preparation plant is as follows: 330 d/a, 2 shifts/d, 12 h/shift.

5.5.1.7.5 Complementary infrastructures of the Beneficiation Plant Phase II

- **Centralised control room:** A centralised control room is already built in the existing multifunctional plant. The centralised control room monitors in real time the technological parameters of the production process, configures the necessary automatic adjustment circuits for important parameters of the production process, and sets parameter alarms or interlock control for working conditions that may cause equipment failures or personal accidents. The operating conditions of the coarse ore stockpile, conveyor belt and main equipment of the milling and flotation plants and process parameters are sent to the centralised control room, which performs automatic adjustment and control of process parameters and process flow according to production and requirements, so that centralised operation, control and management of the entire beneficiation plant by the computer are realised.

- **Technical inspection station:** The main purpose of this station is the sampling and processing of various samples, inspection and supervision of the quantity and quality of the selected raw ore and concentrate to be exported from the beneficiation plant, frequent inspection and supervision of the

dosage, equipment operating parameters and other technical conditions.

The selection of sampling and measuring equipment will be based on the principles of energy saving, new model, fast and accurate. The raw ore is measured online using a belt scale. In addition, granularity analyser, concentration meter, flow meter, pH meter and other instruments are arranged in the processes to measure the production products online. Automatic sampling machines are arranged at each sampling point respectively.

- **Test (chemical) laboratory and sample processing station:** The Phase I site of the beneficiation plant already has a (chemical) test laboratory and sample processing station that can meet the requirements of the present design.

- **Stockpile capacity and storage time:** To ensure the continuous and stable production of the beneficiation plant, and to maximise the capacities of the equipment, the ore storage facilities at the Phase II site include the coarse ore stockpile, the concentrate silo, etc.

  The concentrate silo is mainly used for the storage of products from the beneficiation plant. The products are loaded with a grab crane, and the mode of transport of phase II products is by container (tipper) truck transport.

Table 5-25 Ore storage facilities

Installation	Bulk density	Effective volume (m^3)	Geometric volume (m^3)	Effective storage capacity (t)	Geometric storage capacity (t)	Effective storage time (d)	Observation
Phase I coarse ore stockpile	2,65/1,5	35.000	79.500	60.000	140.000	0,86	
Phase II coarse ore stockpile	2,56/1,5	41.000	79.500	70.000	136.000	1	The calculation is based on the discharge of a single point
Phase I concentrate silo							Design of Phase I
Phase II concentrate silo			18.480	30.000		25	New in Phase II

Source: ECSA, 2021

- **Steel ball supply facilities:** Steel ball silos #1 and #2 were built for Phase I of the beneficiation plant, supplying steel balls to the SAG mills, while steel ball silo #3 supplies steel balls to the ball mill.

  In this design, it is planned to build two new steel ball silos, which will supply steel balls to the new SAG mill. In addition, it is planned to modify steel ball silo #3 and conveyor belts #7 and #8 for the supply of steel balls to the new ball mills.

  Steel balls are regularly supplied in normal production. In addition, they can be supplied in real time according to the detection of the instrument.

- **Blower and air compressor:** For Phase I, the air compressor station and blower room were constructed to supply high and low pressure air to the beneficiation plant. In the present design, it is planned to install equipment of the same specification in the area reserved in the air compressor station and blower room. Two 700 m^3 /min blowers and three air compressors will be added. The blower will be used for air injection into the flotation tanks.

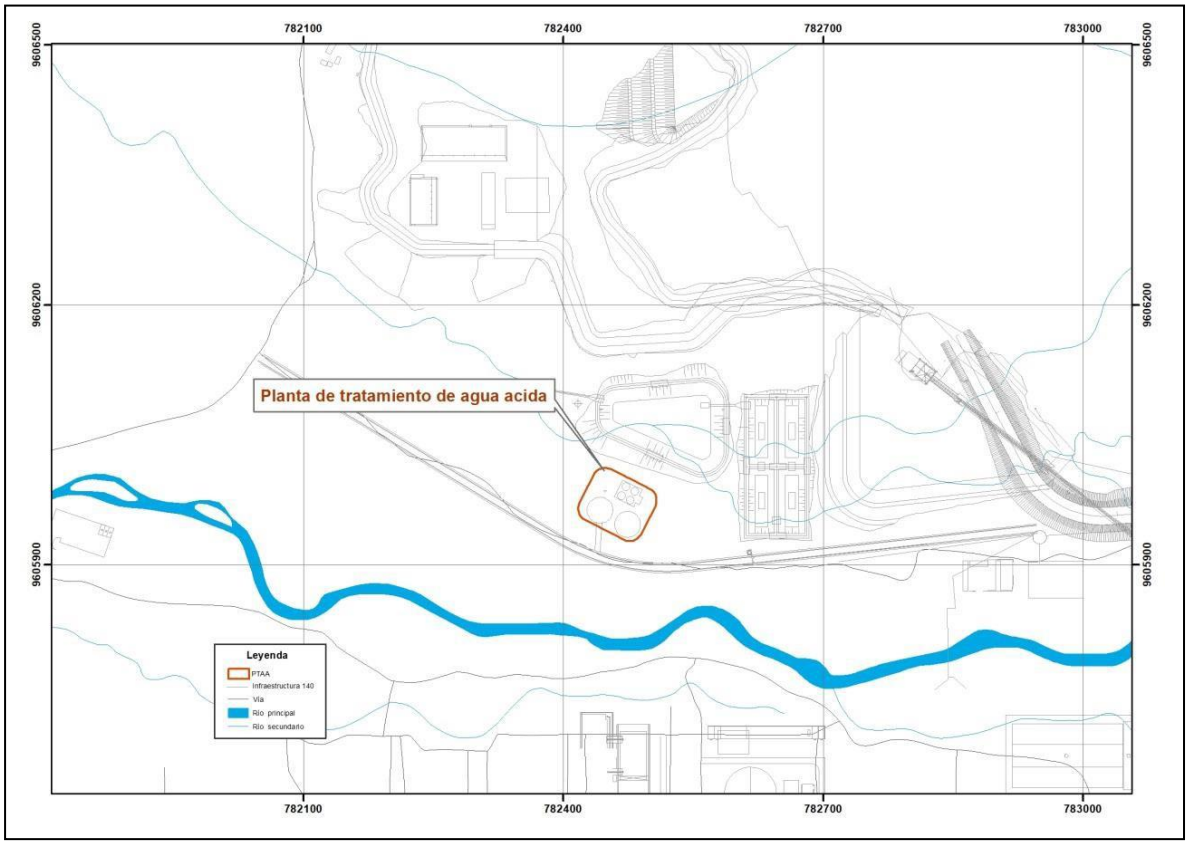
5.5.2 Ancillary infrastructure

5.5.2.1 Acid water treatment plant Mirador Norte

The source of acidic water (pH 2 ～ 3) will be runoff water from the Mirador Norte pit and Escombrera Norte and water gushing from the north pit, which will have to be pumped. It is estimated that when mine production reaches advanced stages, the maximum acid water production will reach 46,700 m^3 per day.

Two acid water collection ponds will be constructed downstream of the north pit and one downstream of the north dump, plus a new acid water treatment plant, which will be installed at a site close to the pit's acid water dam, depending on the operational requirements of the project. Water from the two ponds will flow by gravity to the acid water treatment plant for neutralisation.

Figure 5-30 Mirador Norte Acid Water Treatment Plant



Source: ECSA, 2022

The acid water treatment plant will use the HDS (High Density Sludge) process where the acid water will be neutralised with lime slurry and polyacrylamide (PAM) flocculant to regulate its pH and precipitate heavy metals. Two series will be installed, each with a treatment capacity of 20,000 m^3 /d (800 m^3 /h), equipped with a thickener tank (ø30 m, h = 4 m), two neutralisation tanks (ø9 m, h = 9.50 m) and a lime slurry preparation system.

The acidic water will enter the neutralisation tank with the lime slurry where the pH will be adjusted to 8.5. The hydraulic retention time will be 60 min, the treated water will flow by gravity to the thickener where PAM is added with a concentration of 4%; the supernatant from the thickener will be kept within the pH range of 6 ~ 9 and discharged directly to nearby natural water bodies in compliance with current environmental regulations. The sludge will be returned to the neutralisation tank.

If the effluent treated by the acid water treatment plant does not comply with the limits set out in the environmental regulations, it will be pumped back to the acid water dam for treatment until it reaches the discharge standard.

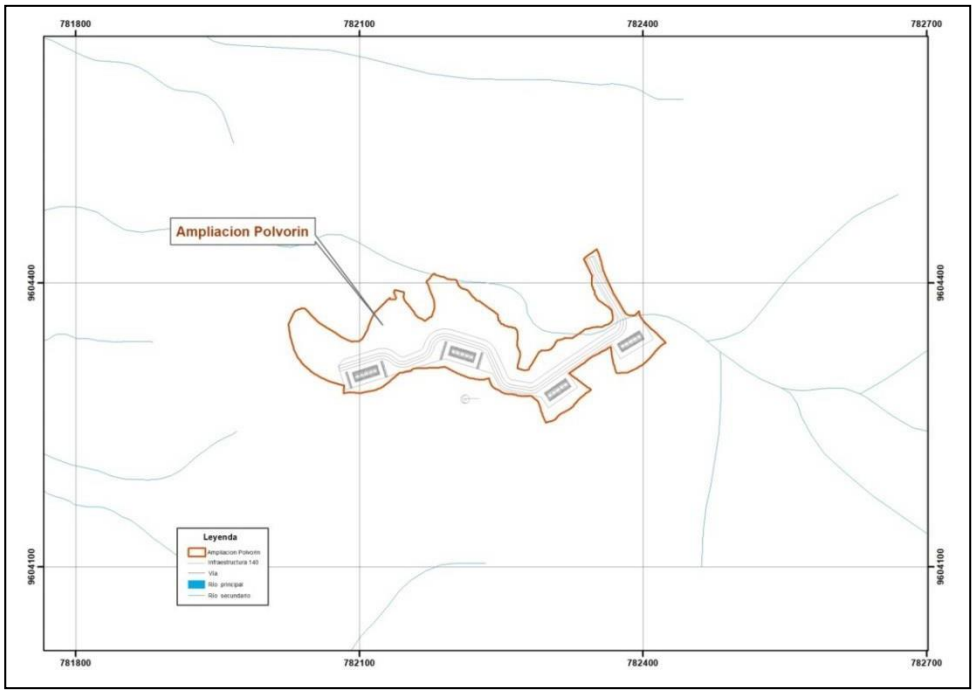
The acidic water from the North Landfill pool will flow by gravity to the treatment plant through HDPE DN 800 pipes, with an approximate length of 1.8 km.

5.5.2.2 Powder magazine

The existing powder magazine has a capacity of 100 t and is located at a distance of 1,170 m northwest of the Mirador pit. In this design, it is proposed to expand the existing powder magazine by adding four explosives cubicles with a capacity of 50 t each, after the expansion, the total capacity of the powder magazine will be 300 t, which will be able to meet the company's production demand for 6 months.

The new powder magazine area will be located at an elevation of 945 m above sea level, a 500 m long section of road (subgrade width 6 m, pavement width 4 m, gravel surface) will be built, connecting the powder magazine of phase I with its extension, and the constructed road will be 500 m long, breakwater walls will be built around the area of the extension of the powder magazine for protection.

Figure 5-31 Magazine extension



Source: ECSA, 2022

Table 5-26 Quantity of explosives in the magazine

No.	Name	Storage plan
I	Phase I powder magazine (100 t)	
1	Warehouse # 1	Ammonium explosives 50 t
	Warehouse # 2	150,000 detonators
	Warehouse # 3	Detonating bombs 50 t
	Warehouse # 4	Ammonium explosives 50 t, ropes 900,000 m detonators
II	Phase II Powder Magazine (200 t)	
1	Cellar #5	Ammonium explosives 50 t
	Warehouse	Ammonium explosives 50 t

	# 6	
	Warehouse # 7	Ammonium explosives 50 t
	Warehouse # 8	Ammonium explosives 50 t

Source: ECSA, 2021

5.5.2.3 Contractors' Camp Phase II

Phase II of the Mirador Mining Project contemplates the use of an existing camp, which was licensed in the "Study for the Rehabilitation and Improvement of the Accesses to the Bridge over the Zamora River. Sections Chuchumbletza-Puente Zamora and Puente Zamora- Tundayme (Mirador Camp)", which is located at the intersection of the Zamora River and the Quimi River, 9 km west of the project area (Annex C2. Environmental License 045 Via Chuchumbletza-Mirador).

5.5.2.4 Temporary Camps

In order to provide workers with adequate accommodation and food, and to facilitate the coordination and efficiency of the work to be carried out, the construction of temporary camps has been planned, which are located close to the different work fronts. Their facilities include: dormitories, bathrooms, showers, kitchen, dining room, among others. The energy of the temporary camps will be provided by generators, which have a power of 100 kW to 150 kW.

Solid waste generated in the temporary camps will be transported to the project's temporary storage area and then sent to the qualified waste manager. Liquid waste, black and grey water, will be treated using septic tanks. These pits are located in each of the camps. The pits will be maintained and evacuated by vacuum suction.

5.5.2.5 Rubbish dumps

The construction of dumps will be planned for the organised and planned reception of materials generated during the construction phase of the different works and infrastructures.

Within the Mirador Norte pit, three temporary spoil heaps # K1, # K2, # K3 will be constructed for the operations of uncovering and opening of the cutting trench. These will be made up of 15 m high benches, a slope gradient of 1:1.5 and a width of the safety platforms of 5 m.

The construction of infrastructure and maintenance of the waste rock conveyor belt will require the construction of seven waste rock dumps # L1 ～ # L7, consisting of benches of varying height depending on ground conditions and maintaining a slope gradient of 1:1.5.

The construction of the interceptor channel of the dump and its maintenance road will require the construction and operation of ten dumps # Z1 ～ # Z10, all of which will consist of banks of varying height depending on ground conditions and maintaining a slope gradient of 1:1.5.

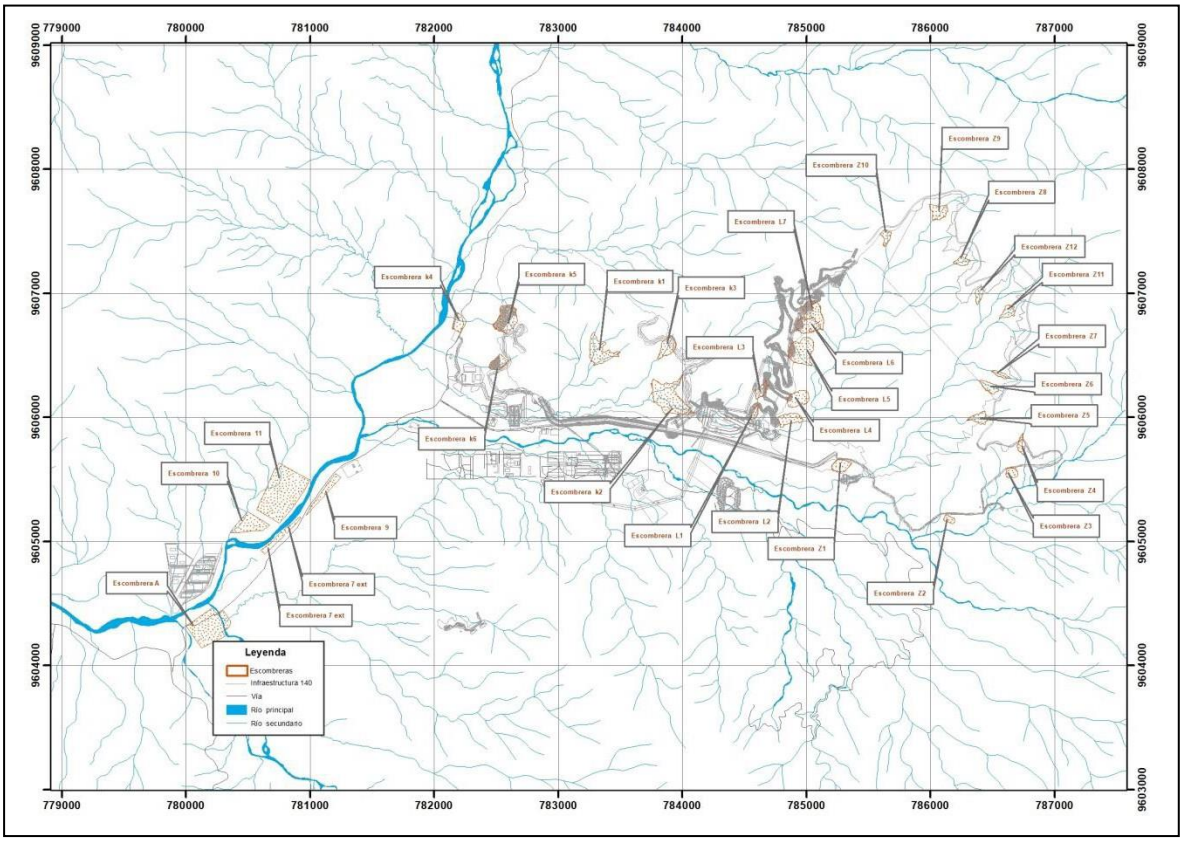
The following table details the elevation at which each dump is located, as well as its location and surface coordinates.

Table 5-27 Trenches

No.	Name	Elevation (m)	X	Y	Area (ha)
1	Trenches # K1		783.331,389	9.606.532,88	2.844
	Trenches # K2	980	783.894,017	9.606.157,04	5.432
	Trenches # K3	1.05	783.880,047	9.606.567,97	1.52
	Trenches # K4	825	782191.402	9.606.764,77	0.991
5	Trenches # K5	965	782.581,035	9.606.794,04	3.001
	Trenches #K6		782.516,400	9.606.440,10	1.146
	Trenches #L1	1.055	784.585,210	9.606.040,30	0.418
8	Trenches #L2	1.09	784.634,037	9.606.218,80	1.402
	Trenches #L3	1.105	784.863,112	9.605.987,66	0.748
	Trenches # L4	1.15	784.932,907	9.606.152,48	1.748
	Escombreras # L5	1.234	784.961,147	9.606.534,13	3.298
	Trenches # L6	1.291	785.006,764	9.606.742,51	1.769
	Trenches # L7	1.327	785.057,487	9.606.845,29	2.193
	Trenches # Z1	1.153	785.276,147	9.605.613,38	1.157
	Trenches # Z2	1.235	786.149,445	9.605.181,02	0.397
	Trenches # Z3	1.313	786.653,359	9.605.556,03	0.653
	Trenches # Z4	1.395	786.731,738	9.605.780,24	0.629
	Trenches # Z5	1.443	786.399,410	9.605.996,68	0.994
	Trenches # Z6	1.45	786.476,716	9.606.247,40	0.908
	Trenches # Z7	1.455	786.565,291	9.606.347,37	0.425
21	Trenches # Z8	1.454	786.255,824	9.607.265,02	0.7
	Trenches # Z9	1.45	786.064,415	9.607.659,41	1.314
	Trenches# Z10	1.442	785.641,066	9.607.458,06	0.604
	Escombreras# Z11	1.46	786.625,227	9.606.852,05	0.808
25	Trenches# Z12		786.390,940	9.606.991,69	0.599

Source: ECSA, 2021

Figure 5-32 Debris heap implementation



Source: ECSA, 2022

On the right bank of the Quimi River to the north of the emulsion plant, two waste dumps will be built for the construction phase of phase II. These dumps will be equipped with perimeter channels, access and signage.

However, in the event that additional dumps are required during construction, additional temporary dumps will be provided, which will be built to the same standards as the initial dumps.

In order to prepare the site defined as a dump, the first step is the clearing, then the layer of organic soil up to 50 cm thick is removed, the surface is compacted and then channels are built to carry clean water, retaining walls are built at the base of the dumps to prevent the deposited materials from sliding.

5.5.2.6 Pathways

Haulage tracks will be constructed from the pit to the primary ore crushing plant and from there to the north heap to form a complete haulage system between the mining and stoping work face and the ore and waste rock discharge point.

The road structure for lanes 21, 22, 23 and 25 is detailed as follows: The width of the ballast shall be 20.0 m, the width of the sand and gravel wearing course shall be 18.0 m with a thickness of 3 cm, the crushed gravel base course shall be 25 cm and the

surface of mixed crushed stone will be 40 cm, the road ditches will have a rectangular cross section, B x H = 0.6 m x 0.5 m, lined with concrete; the flow capacity will be 0.5 m^3 /s (0.5% gradient) at 1.09 m^3 /s (2.4% gradient).

- **Track # 21**

The main waste rock transport road runs from 890 metres above sea level to the waste dump at 1,150 metres above sea level and will be approximately 2.9 km long.

- **Track # 22**

A new main road will be built from 890 m above sea level to 1,020 m above sea level on the west side of the north pit, with a width of 15 m and an approximate length of 1.5 km.

- **Track # 23**

This is an existing road built for the exploration phase for Mirador Norte, with an approximate width of 5 m and a length of 2.5 km. In this design, the track width is extended to 15m.

- **Track # 25**

A new road will be constructed from the primary tailings crushing plant at 990 m above sea level to 1,110 m above sea level on the east side of the north pit, with a width of 20 m and a length of approximately 1.8 km.

- **Track # 26**

Connecting track for the construction of infrastructure and maintenance of the waste rock belt, connecting the primary tailings crusher and the dump pad at the north dump.

The width of the ballast shall be 6 m, the width of the wearing course shall be 4.5 m, the thickness of the gravel base layer shall be 30 cm, the thickness of the surface course shall be 0.3 m, and the sand and gravel wearing course shall be 0.3 m.

- **Track # 27**

Access and maintenance road for the north dump interceptor channel, connecting the end of road # 21, from elevation 1,150 m above sea level, to the north end of the interceptor channel, with an approximate length of 7.6 km, the ballast width will be 6 m, the width of the sand and gravel wearing course will be 4.5 m, the thickness of the gravel base course will be 0.4 m and the thickness of the surface course will be 0.3 m.

5.5.2.7 Access

The necessary internal roads and accesses will be built to connect the different facilities. The opening and construction of accesses is essential for the entry of machinery, equipment and personnel responsible for clearing, earthmoving and construction of the various infrastructures. If necessary, and in accordance with the progress of the work, additional accesses to those described in this description will be built.

- **Internal access to the mill**

Track section of approximately 170 m in length to be built at the beneficiation plant, next to the crushed ore stockpile: the width of the ballast will be 6 m, the width of the wearing course will be 4 m, the thickness of the gravel base course will be 0.3 m and the thickness of the C30 concrete (concrete strength 300 kg/cm²) will be 0.3 m.

- **Powder magazine access**

Approximately 450 m long access connecting the powder magazine built in phase I and the powder magazine to be built for phase II.

The width of the ballast shall be 6 m, the width of the wearing course shall be 5 m, the thickness of the gravel base layer shall be 0.3 m, the thickness of the surface layer shall be 0.3 m, and the sand and gravel wearing course shall be 0.3 m.

- **Access to the dump**

For the construction and operation of the northern dump, six accesses will be formed, whose construction and operation will be progressive as the filling of the dump progresses and which will allow movement between the platforms.

The first five accesses will have a length of 685 m, the width of the ballast will be 25 m and the width of the wearing course will be 22 m, the thickness of the gravel base course will be 0.4 m, and the thickness of the surface course 0.3 m. The last access will have a length of 1,000 m, these accesses will have a rectangular ditch of C25 concrete, with a depth of 1 m, a width of 0.6 m, and a wall thickness of 0.2 m.

- **Maintenance access Interceptor channel of the North waste dump**

The access for the construction and maintenance of the north dump interceptor channel will have the following parameters: the width of the ballast will be 6 m, the width of the wearing course will be 4.5 m, the thickness of the gravel base layer will be 0.4 m, the thickness of the surface layer will be 0.3 m and the sand and gravel wearing layer will be 0.03 m.

5.5.2.8 Sedimentation systems

In addition to the sedimentation systems described above and according to the progress of the planned activities, sedimentation systems will be built in areas where it is considered necessary as a measure to mitigate and control impacts on water resources.

5.5.2.9 Industrial Platform 875

The North Pit industrial platform will be located at an elevation of 875 m above sea level, northwest of the sedimentation pool and the Mirador Norte pit acid water collection dam, and will occupy an area of approximately 4.1 ha.

Within this industrial platform is the materials warehouse, to the north is the lorry and tipper maintenance workshop and to the west is the machinery maintenance workshop.

A 540 m long access road will be built, the width of the subgrade will be 12 m, the width of the pavement will be 10 m, the excavation volume will be 57,000 m^3 and the filling volume will be 18,000 m3.

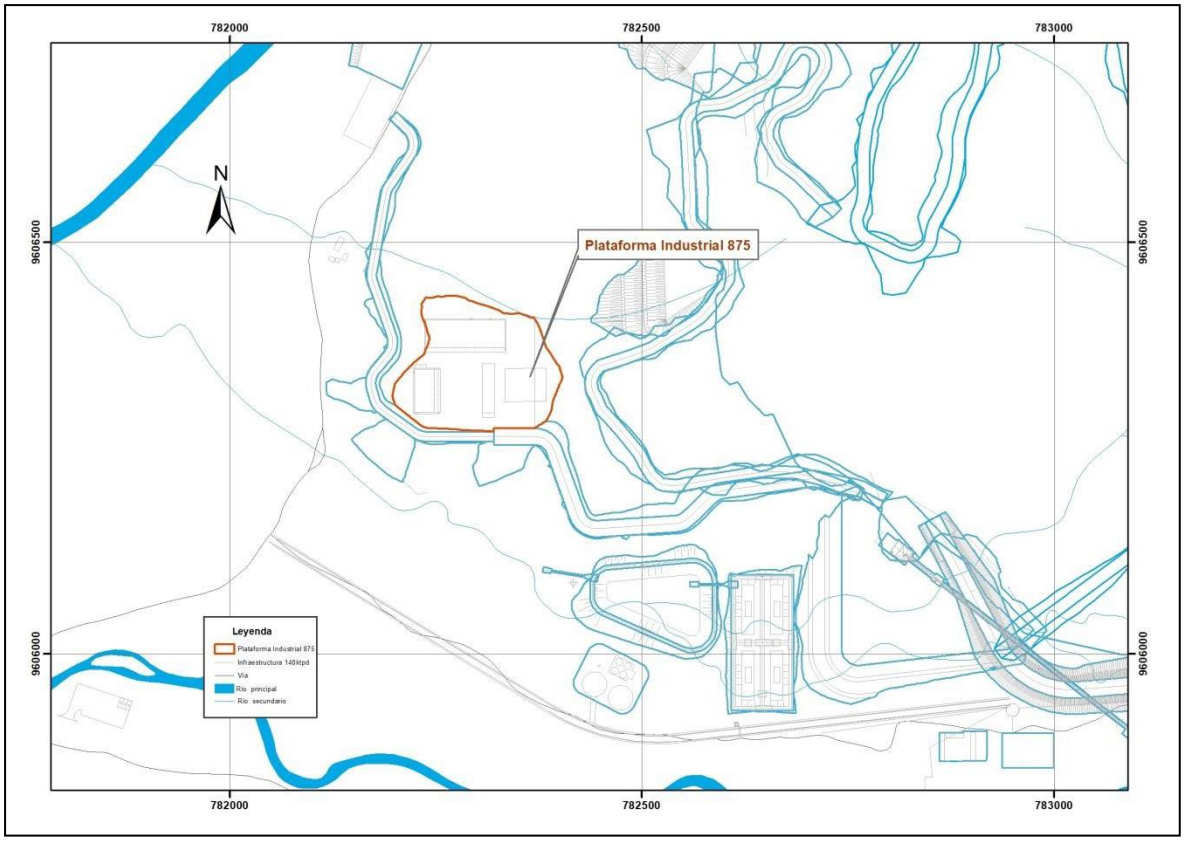
The road structure will have: a 3 cm sand and gravel layer, a 25 cm gravel base layer and a 40 cm gravel surface layer.

A 565 m long road will be built, the width of the subgrade will be 20 m, the width of the pavement will be 18 m, the excavation volume will be 145,000 m3 and the backfill volume will be 5,000 m3.

The track structure will be the same as the access road to the industrial platform. Interceptor channels will be built along the edge of this platform.

This road will connect the industrial platform with the coarse ore crushing plant and the Mirador Norte pit interceptor channel.

Figure 5-33 Industrial Platform 875



Source: ECSA, 2022

The petrol station at the Mirador Norte pit, located on the eastern side of the industrial platform, will allow vehicles driving in the pit or on the industrial platform to refuel.

An interceptor channel will be constructed on the periphery of the gas station in the Mirador Norte pit, which will be connected to the channel bordering the industrial platform, and the water collected in these channels will flow into the platform's sedimentation pool. A canal and API system will be constructed in the gas station area to collect water within the site.

5.5.2.10 Workshops

Workshops will be installed at the required work fronts, which will be used for the repair, preparation and construction of parts, as well as for the maintenance of machinery. They will have as part of their facilities: temporary fuel storage areas, material storage sites, rod and steel cutting machinery, compressors, generators, warehouses, offices, machinery washing areas, waste storage areas and toilets.

Solid waste generated in the workshops will be transported to the mine's temporary stockpile and then sent to the qualified waste manager. Liquid waste, black and grey waste water, will be treated in septic tanks. The pits will be maintained and evacuated by vacuum suction.

5.5.2.11 Wineries

Warehouses for the storage of general supplies will be installed or built at the different work fronts where they are required. These must comply with the necessary requirements, considering that there are products that require specific conditions for their storage.

5.5.2.12 Parking

5.5.2.12.1 Bridge car park # 1

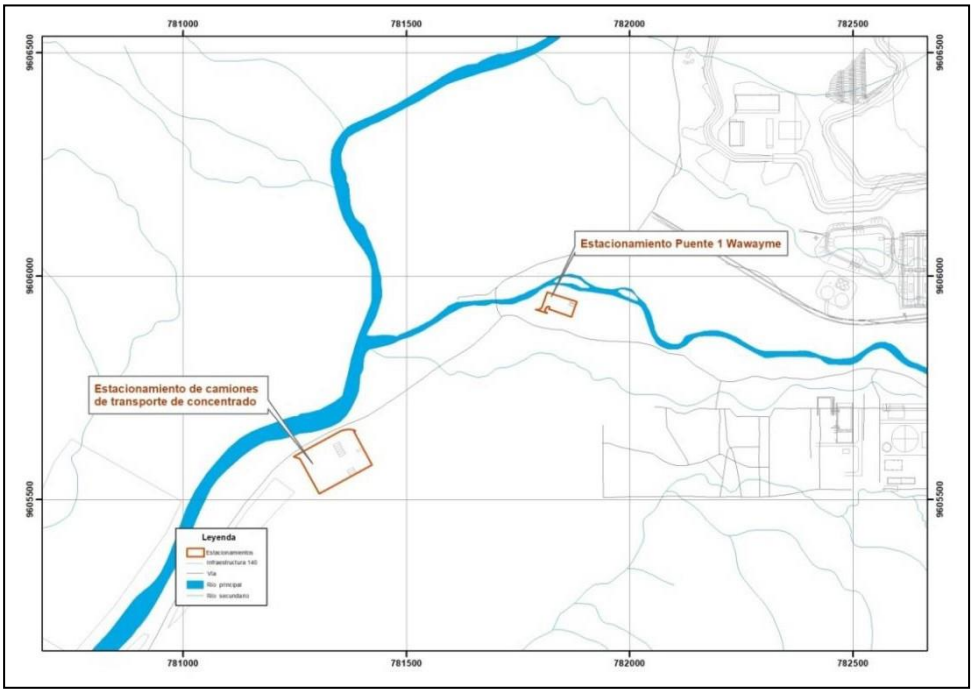
A parking area will be constructed and will be located next to the Wawayme River Bridge #1, adjacent to the road. The area will occupy 0.26 ha and will have the capacity to receive 14 large vehicles and 18 small vehicles.

5.5.2.12.2 Parking for concentrate transport vehicles

A car park with capacity for 68 concentrate transport vehicles will be built, located next to the truck weighbridge. The construction of the platform will occupy 1.35 ha and will require levelling and soil compaction, drainage facilities, base and sub-base shaping and asphalt concrete paving.

In future, the copper concentrate will be transported in tipping containers. The container size will be: 20 ft × 8 ft × 6.56 ft, giving a capacity of 18.8 m³, with a maximum load of 30 tonnes. These containers will be transported with Ecuador's S3 semi-trailers, with a maximum total load of 48 t, the total length of the vehicle will be 15 m and the maximum width of 2.992 m at the head end.

Figure 5-34 Parking facilities implementation



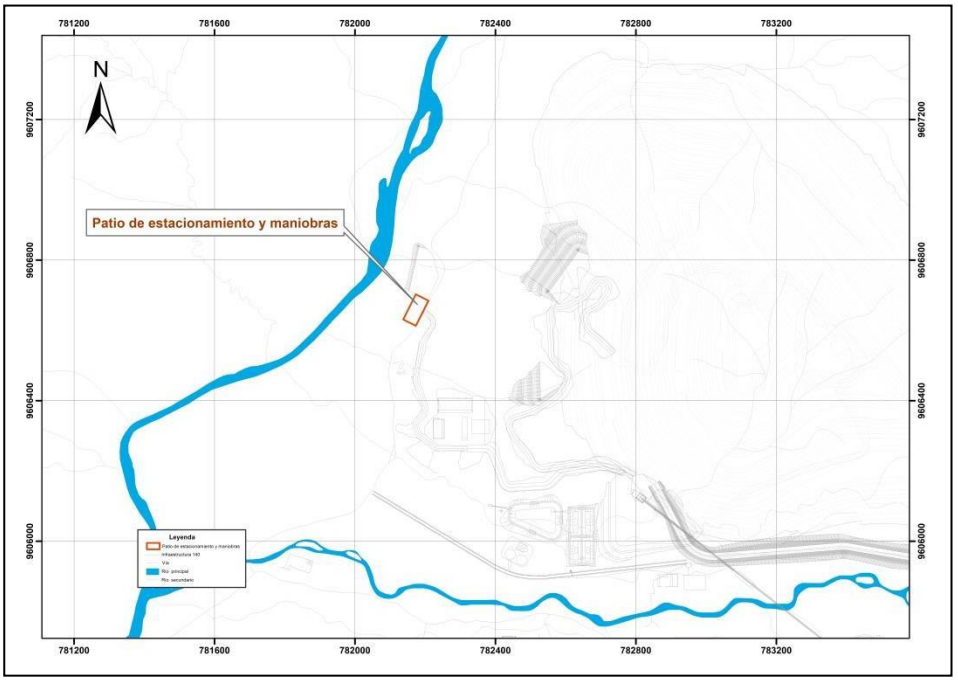
Source: ECSA, 2022

5.5.2.13 Courty ards

5.5.2.13.1 Parking and manoeuvring yard

The parking and manoeuvring yard will be formed next to the K4 dump, this area will be filled with compacted material and covers an area of 0.32 hectares, on this site will be located machinery used for the construction and operation of the north pit.

Figure 5-35 Parking and manoeuvring yard layout



Source: ECSA, 2022

5.5.2.13.2 Temporary material storage yard N° 1

It has a surface area of 33,000 m^2 , the main works include levelling, filling and compacting the land, placing a ballast layer and drainage.

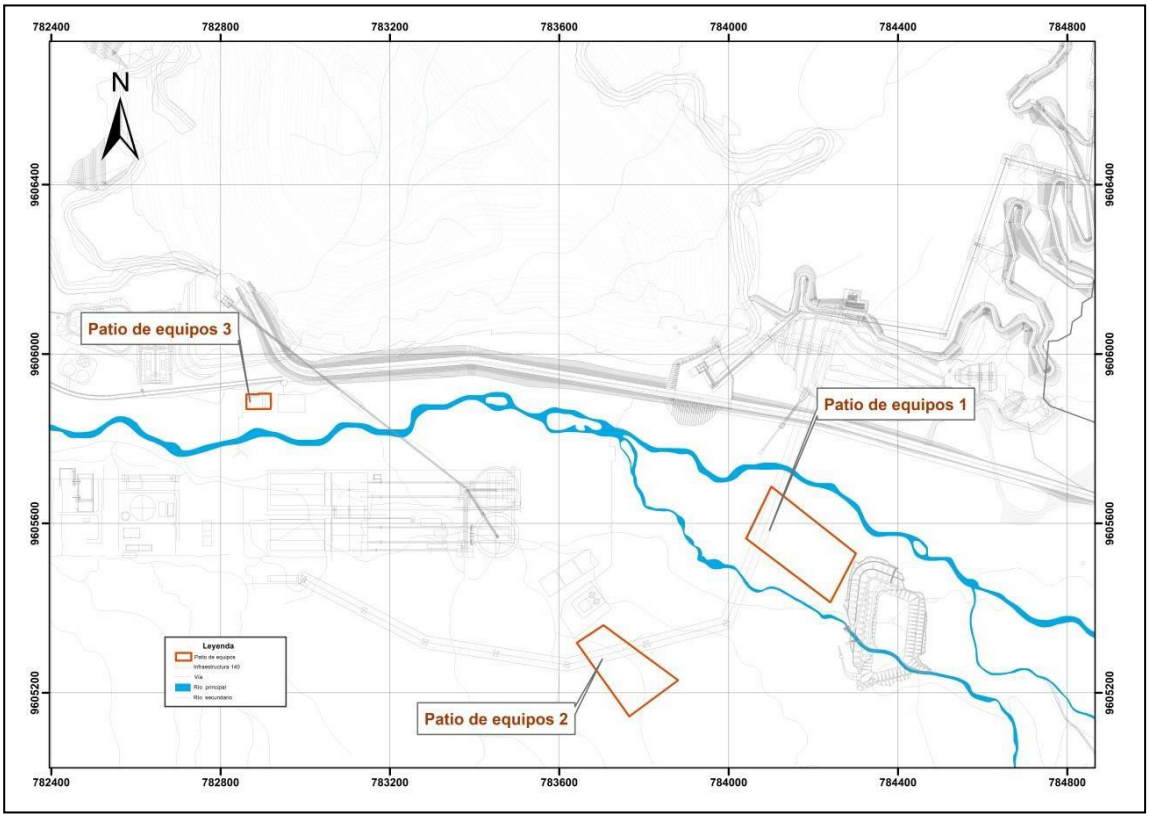
5.5.2.13.3 Temporary material storage yard N° 2.

It has a surface area of 24,000 m^2 , the main works include levelling, backfilling and compacting of the land, placement of ballast layer and drainage.

5.5.2.13.4 Temporary material storage yard N° 3

This yard measures 60m×30m, it is used to store equipment, spare parts, metal materials, hardware tools, electrical instruments, etc., the maintenance structure adopts steel purlins and coloured profiled steel plates, cement floor and metal cover.

Figure 5-36 Implementation of courtyards N° 1, 2 and 3



Source: ECSA, 2022

5.5.2.14 Expansion of waste collection

For Phase II of the exploitation phase of the Mirador Mining Project, the expansion of the ECSA tailings storage facility currently in operation is required.

The extension of the waste collection has the following characteristics:

- Length 34 m
- Width 15 m.

- Ceiling height 4.5 m
- Differentiated into two blocks:
  - Block 1: 9 non-hazardous waste cells
  - Block 2: 9 cells for hazardous waste.
- It has a concrete floor and perimeter gutters.
- A grease trap
- The enclosure is made of half a concrete wall and the upper half is made of mesh.
- It has fire extinguishers, signage and labelling.

5.6 Use of resources

5.6.1 Water supply

The project's water supply system requires domestic and production water, the circulating cooling water system, and the fire water supply system.

The water consumption of the administration staff and production workers will be 50 L/person-shift, the production water consumption is determined according to the process requirements. The total water consumption of the construction project will be 13,572 m^3 /d, of which: 96 m^3 /d is new water and 13,476 m^3 /d is recycled water. The source of the water supplied will be connected to the production water supply network of the Mirador Mining Project.

For domestic water consumption, the current authorised flow for the Mirador project will be used; however, the necessary steps will be taken to change the collection points that currently correspond to wells MN64 and MN15, which are groundwater wells, to the spillway of the interceptor channel of the north dump, This catchment will be adapted in this spillway and the water will be piped to a water purification plant that occupies an area of 0.26 hectares, through pipelines that will be built and installed according to the topography of the terrain, located next to the current contractors' camp and from here to the supply tanks of camps and offices through pipes.

The water catchment for industrial use will be located in the lower basin of the Wawayme River, this catchment will be built in concrete, from which water conduction pipes will be installed to the elevated water storage tanks that supply the processing plant. In Annex A4. Permits the approval of the former SENAGUA is attached.

Table 5-28 Approved catchment points

Date of approval	Catchment Points	X	Y	Flow rate L/s	Time years	Description
14/6/2018	Groundwater	783115	9606342	5,2	20	009-DHS-2016-E Human Consumption
9/7/2013	Wawayme River	781885	9606310	243	Concession period	5419-009-C Exploitation
9/7/2013	Runoff water and percolations			317	Concession period	5419-009-C Benefit

Date of approval	Catchment Points	X	Y	Flow rate L/s	Time years	Description
9/7/2013	Wawayme River			3,70	Indefinite	5419-009-C Human Consumption
Total, flow rate				**568,90**		

Source: ECSA, 2021 Prepared by: Gesambconsult Cía Ltda, 2021

5.6.1.1 Water supply for the steel ball mill

The water supply system of the ball mill project is divided into the non-potable domestic water and production water supply system, the recirculating cooling water system, and the fire-fighting water supply system.

For the non-potable domestic and production water system, the water comes from the production water supply network of the Mirador mine, which is piped underground using 150mm diameter PVC-coated steel pipes. This water is used to supply the cold water pool of the cooling water system and the fire-fighting water pool for the process.

The recirculating cooling water system pumps the liquid from the cold water pool to the tempering pool and other water use sites; the hot water flows by gravity through the ditch to the settling pool. The hot water pump then pumps the hot water to the open cooling tower, and the cooled water flows into the cold water pool, completing the water recirculation process.

Water for the fire fighting system comes from the fire fighting water pool and is distributed through a network of 150mm diameter ductile iron pipes, buried in the ground, with external hydrants with a distance between them of less than 120m.

The total water consumption of the ball mill project is 13,572 m3/d, of which: 96 m3/d is new water and the majority, i.e. 13,476 m3/d is recirculated water.

5.6.2 Energy supply and distribution

5.6.2.1 230 kV step-down substation

The Mirador Mining Project currently operates with a 230 kV reducer substation that was licensed in the "Project for the Construction, Operation-Maintenance and Retirement of the 230 kV Transmission Line Bomboiza-S/E Mirador Substation of 17.59 km; connection between Santa Cruz and Mirador substations of 15.896 km and construction, operation and decommissioning of Mirador substation" (Annex C1. Environmental License 002-15_DE2015-007 Transmission Line), which has two 230/36/14.5 kV, 80 MVA transformers. Phase II will require the repowering of the two original transformers and the addition of one more transformer of 100 MVA each. The capacity of the equipment is selected according to the future needs of the project. The loading rate of the three transformers will be approximately 62.1%. In case of failure of one of the transformers, the other two transformers can carry the full load with a load rate of approximately 93.1%.

Table 5-29 Aggregate phase II output line circuit of each voltage level of the 230 kV substation

Voltage level	Incoming and outgoing circuit name	Number of incoming and outgoing line circuits protrusions	Description
34.5kV	Tagus substation 34.5/14.5 kV Mirador Norte	2 circuits	SZ10-20000kVA, 20MVA
	Substation 34,5/14,5 kV from tailstock	2 circuits	SZ10-20000kVA, 20MVA
	Starting line	1 circuit	Reserve
13.8kV	Semi-automatic Stage II Mill	4 circuits	4×6,250kW
	Stage II ball mill	4 circuits	4×7,800kW
	Station from distribution from phase II grinding and flotation	2 circuits	21.396kW
	Tailings pumping station	2 circuits	8,311 kW
	Transformer used	1 circuit	Transformer 1×1.250kVA
	Capacitor compensation	1 circuit	15,000 kVAR

Source: ECSA, 2021

5.6.2.2 34.5 kV substation

5.6.2.2.1 Power supply for Mirador Norte pit

From the 230 kV full step-down substation, the 2 circuits of the 34.5 kV power supply lines are routed to the substation near the Mirador Norte pit, the distance is approximately 2 km. The substation is equipped with two 34.5/14.5 kV transformers (20000 kVA).

The power supply lines for the two pit loops will be arranged around the pit by means of overhead lines with a length of about 5.5 km. The pit loop line will supply power to the 13.8/6 kV mobile substation and the 13.8/0.48 kV box substation for pit drainage. The load will be approximately 14,080 kVA.

5.6.2.2.2 Power supply for Beneficiation Plant

The power distribution station for the grinding and flotation area will be located in the centre of this area.

From the main 230 kV step-down substation, the two-circuit 13.8 kV power line will be laid to supply the power.

In the grinding and flotation area, with the exception of the ball mill and the semi-autogenous mill (SAG), which are fed directly from the 230 kV main gear substation, the other high voltage motors and transformers will be fed from the distribution station installed in this area.

5.6.2.2.3 Power supply for the steel ball mill

The new air compressor and fan will be fed from the existing distribution station in the area.

This is the power supply and distribution design for the annual production of 30,000 tonnes of steel balls (including the design of power supply and distribution, power, lightning protection, lighting and other electrical designs for the steel ball production workshop and offices) and the power supply design for the camp.

The total annual electricity consumption of the construction project will be 18 million kWh. The 13.8 kV electricity supply will come from the 230/13.8 kV substation in the mine area, which has sufficient capacity to meet the electricity needs of the steel ball mill, a distribution line will be constructed from the substation to the mill.

5.6.2.2.4 Tailings transport power supply

The power distribution substation for the tailings transport pumping station is located adjacent to the tailings transport pumping station and is arranged on one level. Two circuits of 13.8 kV lines will be branched from the 230 kV full step-down substation for the power supply.

5.6.3 Equipment and machinery

The equipment and machinery for the mining activities of the mining and beneficiation project to expand the Mirador copper mine in Ecuador to 46.2 million t/a is presented below.

Table 5-30 Main mining equipment in mines

No.	Team name	Unit	Quantity		
			South Tagus	North Tagus	Total
1	310 mm roller bore	Unit	5		
	Roller bore 250 mm	Unit			
	140 mm down the hole drilling rig	Unit			5
	76 mm down the hole drilling rig	Unit	1	1	
	Hydraulic rock crusher	Unit			
	25 m3 electric shovel	Unit			
5	Hydraulic excavator 4 m3	Unit			
	10 m³ front loader	Unit			
	Dump truck with 220 t capacity (electric wheels)	Unit			50
8	50 t dump truck	Unit			
	430 kW bulldozer (tracked)	Unit			
	370 kW bulldozer (wheeled)	Unit			
	15 t loader	Unit			
	198 kW motor grader	Unit			
	20 t roller	Unit			
	50 t spray truck	Unit			
	5 t material truck	Unit			
	Production Command Vehicle	Unit			
	30 t tanker truck	Unit			

Source: ECSA, 2021

5.6.4 Fuels, chemicals and explosives

The project uses fuel for machinery, lime to neutralise the acidic water from the south and north pits and explosives for the start-up of the open-cast mine. As described below.

Table 5-31 Annual consumption of main materials - Exploitation Phase II

No.	Name of the material	Unit	Quantity			Observation
			South Tagus	North Tagus	Total	
1	Explosives of emulsion	t	17.955	10.665,8	28.620,8	0.63kg/m³
	Explosives of products	t	410	220		Procurement external
	Detonating bomb	t	26,5	17,3	43,8	Detonator
	Detonation tube	Firing	60.000	45.000	105.000	
5	Detonating cord	Ten thousand m				
	Roller drill bit	Part	2.255	1.340	3.595	0.3 pcs/ten thousand tonnes of rock and ore
	Roller drill drill pipe	Pcs	150		239	0,02 Pcs/ten thousand tonnes of rock and mineral
8	Down the hole drill bit	Part	1.127	670	1.797	1.5 pcs/ten thousand tonnes of rock and ore
	Drill pipe of the drilling rig drilling at the bottom	Pcs				0,004 Pcs/unit-shift
	Electric shovel tooth 25m3	Part	957	545	1.502	0,25 Pcs/unit-shift
	Truck tyre of 220t	Set	71		110	35000km/set
	Diesel	t	35.559	1.663	55.222	
	Engine oil	t	5.196	2.574	7.770	
	Yellow dry oil	t	8	5		
	Turbine oil	t				
	Washing oil	t	8	5		
	Cleaning material	t				

Source: ECSA, 2021

5.6.4.1 Fuel Supply

Fuel storage areas must have: cover, gutters to prevent rainwater infiltration, grease traps, perimeter drainage system and bins with a capacity equivalent to 110% of the volume of the stored product. The area must comply with the provisions of the Ecuadorian Technical Standard NTE 2266:2010 covering "Transport, Storage and Handling of Hazardous

Chemicals" or whatever replaces or replaces this standard.

Fuel supplies are supplied by a tanker, which transports the fuel from the permanent fuel storage area approved in the "Update of the Environmental Impact Assessment and Environmental Management Plan for the Metallic Minerals Beneficiation Phase, Expansion from 30 kt per day to
60 kt per day of the Mirador Mining Project Mirador 1 (cumulative) concession (code 500807), as well as of the mining concessions Curigem 18 (code 4768), Curigem 19 (code 4769)"; approved by Resolution No. 223 of 13 July 2016, in compliance with the Procedure for loading and unloading of fuel and LPG.

5.6.5 Labour

The contracting of labour is carried out in accordance with Article 75 of the Mining Law, which states that: *"The holders of mining rights are obliged to employ Ecuadorian personnel in a proportion of no less than 80% for the development of their mining operations. In the remaining percentage, preference will be given to Ecuadorian specialised technical personnel; if there are none, foreign personnel will be hired, who must comply with current Ecuadorian legislation".*

The Organic Law for the Integral Planning of the Special Territorial District of the Amazon will also be considered in Art. 41, which refers to the right to preferential employment, mentioning that: *"All natural and legal persons, public, private, mixed and community enterprises, with national or foreign capital, which carry out their activities in the jurisdiction of the Special Amazon Territorial District, shall hire at least 70% of its residents for the execution of activities within the District, with the exception of those for which the required qualified labour force does not exist in the District".*

For the exception mentioned in Art. 41 of the Organic Law for the Integral Planning of the Special Amazonian Territorial Circumscription, the provisions of its regulations will be considered, *"Art. 28. All natural and legal persons, consortiums, public and private companies, joint ventures, community companies, with national or foreign capital that carry out their activities in the jurisdiction of the Special Amazonian Territorial District, shall qualify the labour required, for which the percentage established in the Organic Law for the Integral Planning of the Special Amazonian Territorial District and the secondary regulations that regulate this provision shall be complied with".*

5.6.5.1 Mine personnel

The approximate personnel required to carry out the activities of the Mirador Mining Project is detailed in the following table, which will work in 2 shifts of 12 hours.

Table 5-32 Personnel Required for the Mirador Project

Staff	Total	Observation
Exploitation	467	Technicians, operators, drivers, crushing, and labour personnel etc.
Benefit		Technicians, operators, drivers, crushing, and labour personnel etc.
Auxiliary	201	maintenance
Administrative and service employees		Cleaning and maintenance
Management	8	Office

Staff	Total	Observation
Administration		Office
Public relations		Office and field
Human Resources		Office
Safety and environmental protection		Office and field
Production operations	50	Mine and Office
Purchasing and sales		Camp
Finance		office
Self-generation plant	30	Office
Total	1.199	

Source: ECSA, 2021

5.6.5.2 Steel ball mill personnel

The approximate personnel required to carry out the activities of the steel ball mill is detailed in the following table, which will work 300 days a year and 2 daily shifts of 8 hours.

Table 5-33 Personnel Required at the Steel Ball Mill

No.	Job title		Number of persons
1	Administrator	Manager	1
		Translator	1
		Finance staff	
		Staff commercial, staff technical, safety and environmental manager	
	Ball forging group	Forge worker in charge	
		Worker in charge of heat treatment	
		Worker in charge of transport and addition of materials	
	Ball rolling mill group	Worker in charge of production	
		Worker in charge of transport and addition of materials	
	Group of auxiliary workers	Maintenance technician	
		Worker in charge of tempering and shipping	
		Worker in charge of the laboratory test	1
	Health care personnel	Doctor	1
		Nurse	1
		Total	**35**

Source: ECSA, 2021

5.7 Sequential description of the different phases of the project

5.7.1 Construction phase

5.7.1.1 Construction of Escombrera Sur

The construction sequence of the northern dump is planned as follows:

- Before unloading, the bottom of the dump will be cleaned to remove humus and roots of vegetation, and the topsoil is piled separately for later covering. For sections with original local topography

higher than 24°, the floor surface is treated in steps and the slope of the steps is treated as an inverted slope.

- A permeable stone dam will be constructed off the toe of the slope downstream of the dump to prevent possible damage to the bottom of the dump by dumped rolling rock. The stone dam has a height of 10m, a top width of 5m, an outer slope of 1:2, an inner slope of 1:1.5, an approximate length of 50m and a rockfill volume of approximately 40,000 m3.
- Unloading sequence below 1200 masl elevation: In this initial sequence the rocks are transported with the vehicles to unload downwards from the intermediate 1150 masl platform; once this elevation is completed, work is carried out on the safety platform and the final slope of each intermediate section below 1150 masl.
- Unloading sequence from elevation 1150 masl - 1200 masl: From 1150 masl the intermediate platforms are unloaded and shaped from the bottom upwards and then completed by unloading the upper platforms from the top; and finally the safety platform and the final slope of each intermediate section are worked on.
- Unloading sequence above 1200msnm elevation: For this rock part, the combined vehicle + conveyor + vehicle transport mode is adopted. The unloading sequence between the lower platforms is from bottom to top, and the unloading sequence on the upper platforms is from top to bottom. Finally, the safety platform and the final slope in the small middle sections are repaired.

This filling sequence is shown in detail in table 5-34:

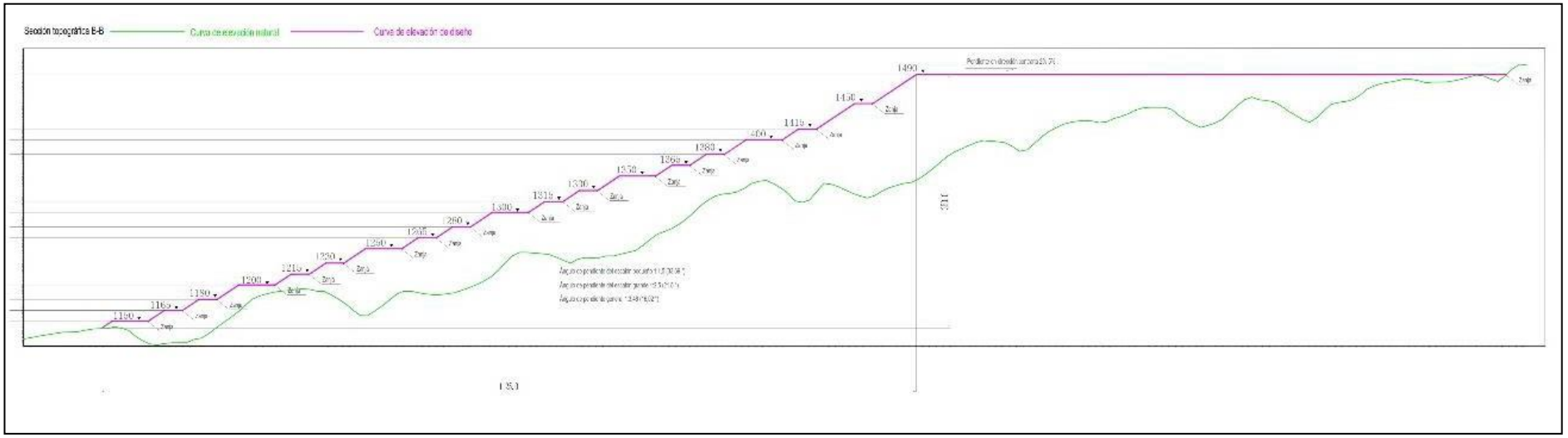
Table 5-34 Filling plan for the north waste dump

Year	Amount of rock	Amount of rock discharged on each platform in the heap						
		msnm	msnm	msnm	msnm	msnm	msnm	msnm
		1.050 ~ 1.100	1.100 ~ 1.150	1.150 ~ 1.200	1.200 ~ 1.250	1.250 ~ 1.300	1.300 ~ 1.350	1.350 ~ 1.430
	Kt	Kt	Kt	Kt	Kt	Kt	Kt	Kt
Year 0 Uncovering	25.699	2.301	11.497	11.901				
Year 1	16.322			10.783	5.539			
Year 2	24.874				24.874			
Year 3	24.718				10.718	14.000		
Year 4	23.533					23.533		
Year 5	23.881					17.431	6.450	
Year 6	22.685						22.685	
Year 7	24.056						24.056	
Year 8	21.053						10.692	10.361
Year 9	18.246							18.246
Year 10	17.922							17.922

Year	Amount of rock	Amount of rock discharged on each platform in the heap						
		msnm	msnm	msnm	msnm	msnm	msnm	msnm
		1.050 ~ 1.100	1.100 ~ 1.150	1.150 ~ 1.200	1.200 ~ 1.250	1.250 ~ 1.300	1.300 ~ 1.350	1.350 ~ 1.430
	Kt	Kt	Kt	Kt	Kt	Kt	Kt	Kt
Year 11	15.144							15.144
Year 12	7.103							7.103
Year 13	1.851							1.851
Year 14	1.085							1.085
Year 15	697							697
Year 16								
Total	269.349							

Source: ECSA, 2021

Figure 5-37 North Dump Platforms



Source: ECSA, 2021

5.7.1.2 Construction of the steel ball mill

5.7.1.2.1 Floor construction

The depth of the foundations shall be determined by the site conditions and the shape of the superstructure.

- ✓ General shed floor: concrete floor
- ✓ For the floor treatment a 2 mm HDPE geomembrane (permeability coefficient ≤ 10 ～ 12 cm/s) and a layer of 400 g/m long woven geotextile shall be laid.
- ✓ Electrical distribution room, control room, etc..: Concrete floor
- ✓ Pile floor: Reinforced concrete floor
- ✓ Bedrooms and dining rooms: Non-slip tiled floor

5.7.1.2.2 Wall structure

- ✓ Exterior wall: Acrylic paint, profiled steel sheet or light steel sandwich panel
- ✓ Inner wall: Latex painted surface, profiled steel sheet or light steel sandwich panel
- ✓ Roof: profiled steel sheet or light steel sandwich panel

5.7.1.2.3 Columns and beams

- ✓ Welded H-profile or rolled H-profile steel is used for the structure in the building.
- ✓ In reinforced concrete buildings, reinforced concrete columns of rectangular cross-section shall be used.
- ✓ Steel columns will be used for the workshop.
- ✓ The crane girder shall be a steel H-profile.

5.7.1.2.4 Type of doors and windows

- ✓ In the shed, flat steel doors, steel plastic doors and fire doors will be used, while in the bedrooms and dining room, flat wooden doors, steel burglar-resistant doors, steel plastic doors and fire doors will be used; windows will be made of steel plastic or coloured aluminium.
- ✓ All exterior windows will be made of plastic steel or coloured aluminium. Single-glazed windows will be used in the shed, while double-glazed windows will be used in the bedrooms and dining room.
- ✓ Ventilation skylights shall be built into the roof of the shed.

5.7.1.2.5 Anti-corrosion protection

- ✓ Surface of steel structures and exterior steel components shall be protected by special fluorine-containing polyvinyl chloride anti-corrosion paint.

5.7.1.2.6 Types of building materials

- ✓ Concrete: The strength grades will be as follows, C15 clinker, C30 shed base slab and C30 frame superstructure.
- ✓ Reinforcing steel: When the diameter is less than or equal to 10 mm, HPB300 shall be used and the others shall be HRB400. For steel sections and plates, Q235B or Q355B shall be used. The minimum yield strength of all steel components, anchor bolts and ordinary bolts shall comply with the requirements of the relevant regulations and specifications. When steel is transported to site, the relevant quality certificate shall be attached.

5.7.2 Operation and maintenance phase

5.7.2.1 Ore extraction process

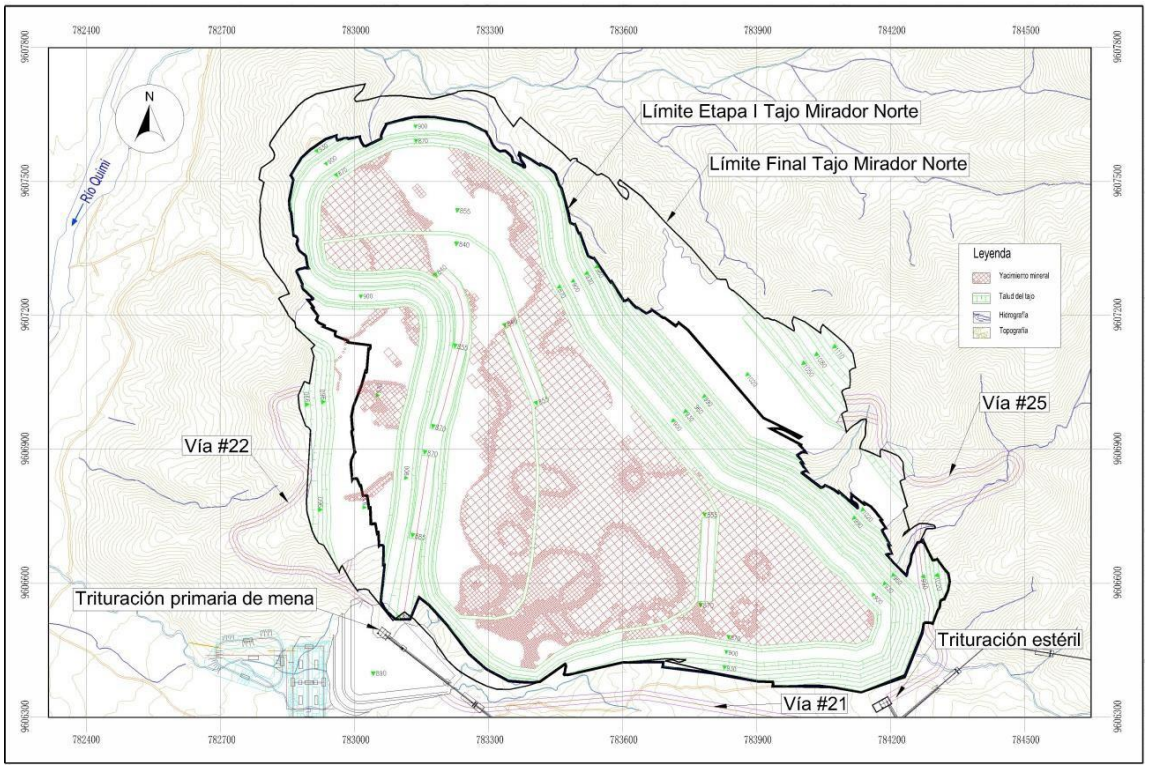
Approximately 71% of the waste rock in the Mirador Norte pit is distributed above the 870m elevation; and the ore is mainly concentrated below the 870m elevation. To optimise ore extraction, uncover the deposit, reduce the amount of infrastructure works and investment, it is determined to extract the deposit in stages. That is, a time limit is defined for the first stage of mining, after a few years of mining the time limit is expanded for the second stage and then expanded to the final limit. The bottom of the first stage limit will reach an elevation of 675 metres above sea level, and the maximum mining elevation will be 1,065 metres above sea level. The amount of mineralised rock within the stage boundary is shown in the table below.

Table 5-35 Quantity of mineralised rock by stage

Name	Total amount of rock in the pit	Amount of mineral	Quantity of waste rock	Cu Law	Au Law	coefficient means of uncoveri ng
	kt	kt	kt		g/t	t/t
Stage I	299.629,00	169.551,00	130.078,00	0,495	0,092	0,77
Stage II	260.887,00	121.616,00	139.271,00	0,417	0,074	1,15
Limit final	560.516,00	291.167,00	269.349,00	0,462	0,084	0,93

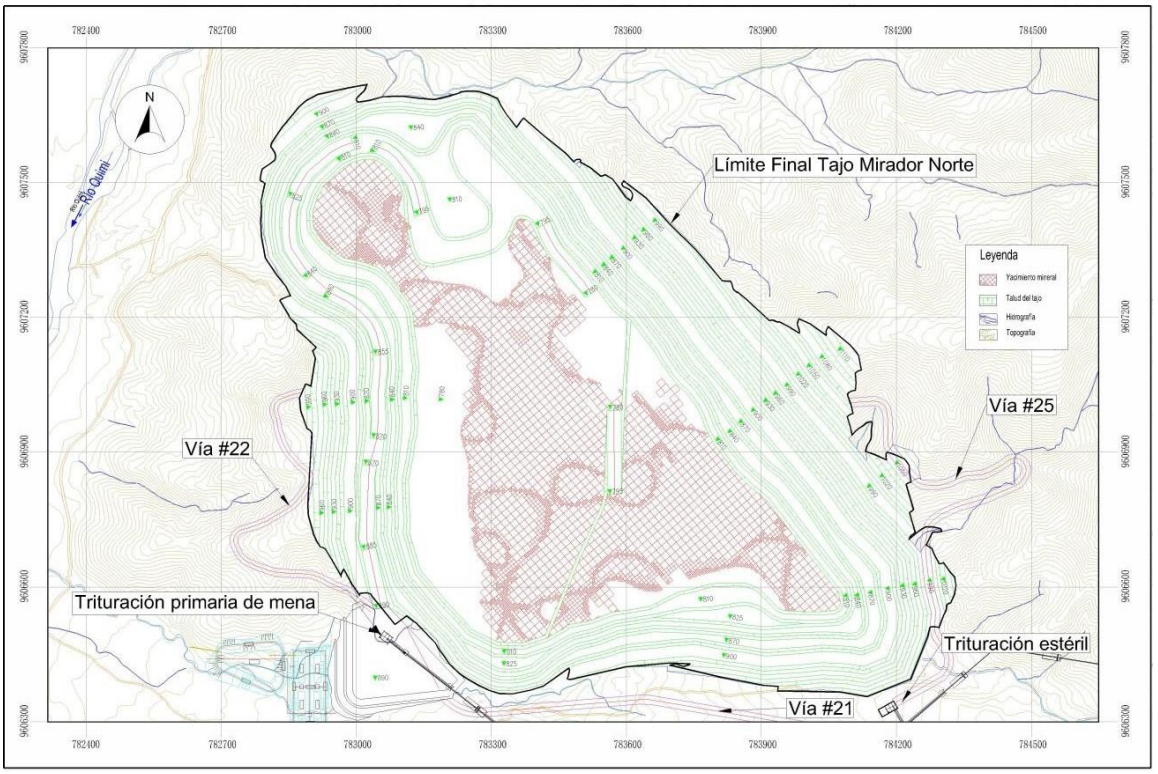
Source: ECSA, 2021

Figure 5-38 Final stage I exploitation plan of the Mirador Norte Pit



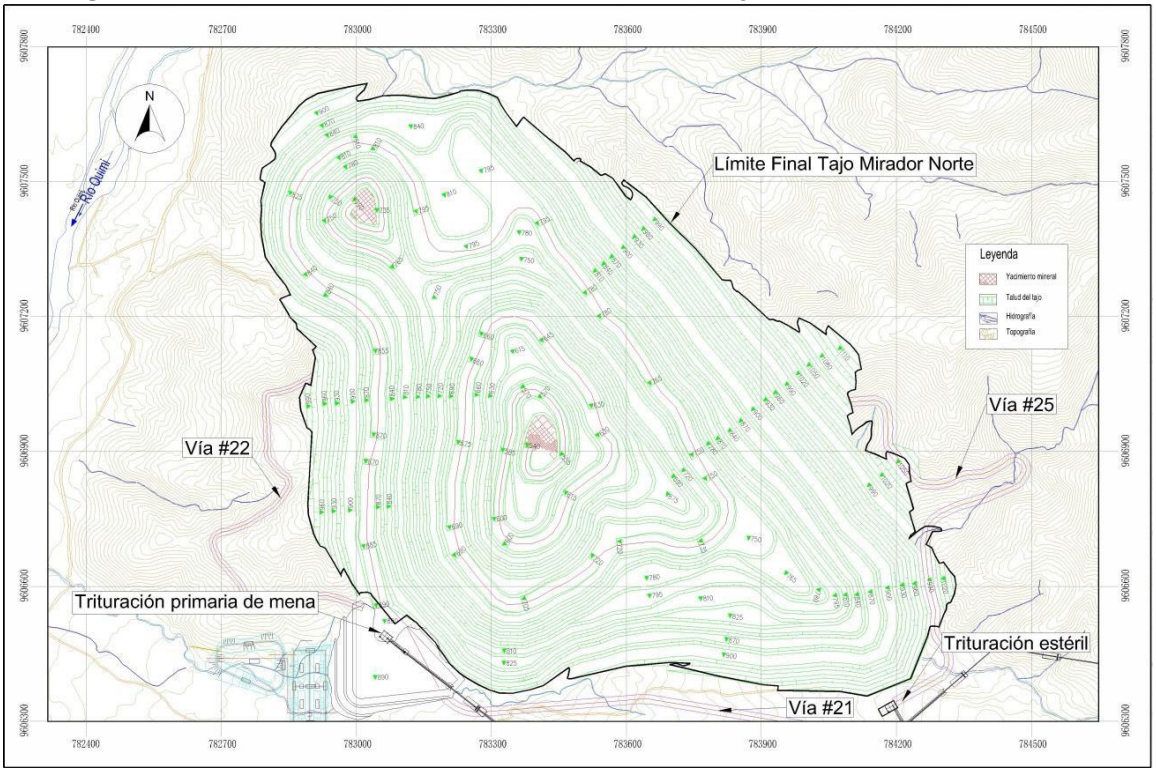
Source: ECSA, 2021

Figure 5-39 Final Stage II exploitation plan of the Mirador Norte Pit



Source: ECSA, 2021

Figure 5-40 Exploitation plan at the final boundary of the Mirador Norte Pit



Source: ECSA, 2021

The design adopts the traditional 15 m high descending bench mining technology. In the initial production stage and during the development period of Phase II mining, combined operations by steeply descending benches for mine stripping and gently descending benches for ore extraction will be used. The minimum width of the working platform will be 50 m.

The designed loss rate of the north pit extraction as well as the ore dilution rate will be 3.0%.

Table 5-36 details the activities to be carried out in the ore mining phase.

Table 5-36 Activities in the exploitation phase

Item	Description
Clearing	Clearing of shrubs and bushes
Uncovering	Cleaning of soil and rock cover without mineral
Ore extraction	Ore mining with drilling and blasting
Charge	Loading of tailings and ore
Transport	Transport of tailings and ore

Source: ECSA, 2021

5.7.2.1.1 Clearing

This consists of extracting and removing all trees, stumps, plants, undergrowth, fallen timber, debris, etc. from the areas designated for mining activities, the existing timber will be used in mining activities, the other materials will be transported to the waste dumps.

The plants and vegetation determined during the rescue of flora and fauna will be recovered and taken to the nursery area of the Mirador Mining Project, these plants will be used in the rehabilitation of the areas intervened by the mining activities.

5.7.2.1.2 Uncovering

The thickness of the topsoil overlying the ore deposit varies between 10 ～ 60 m, near the top it is relatively thick while on the slopes it is thinner.

The amount of waste rock to be removed annually will be approximately 24.88 million tonnes, for which 4 drill rigs (ø310 mm) will be used. For loading operations, 4 electric excavators with a bucket capacity of 25 m^3 will be used and the waste rock will be transported to the north dump by mining trucks.

The main parameters at the uncovering operation work fronts shall be as follows:

- Bench height 15 m
- Workbench inclination angle 65 ～ 70°.
- Minimum working platform width 50 m
- Minimum working line length 200 m
- The slope angle of the uncovering slope is <30°.

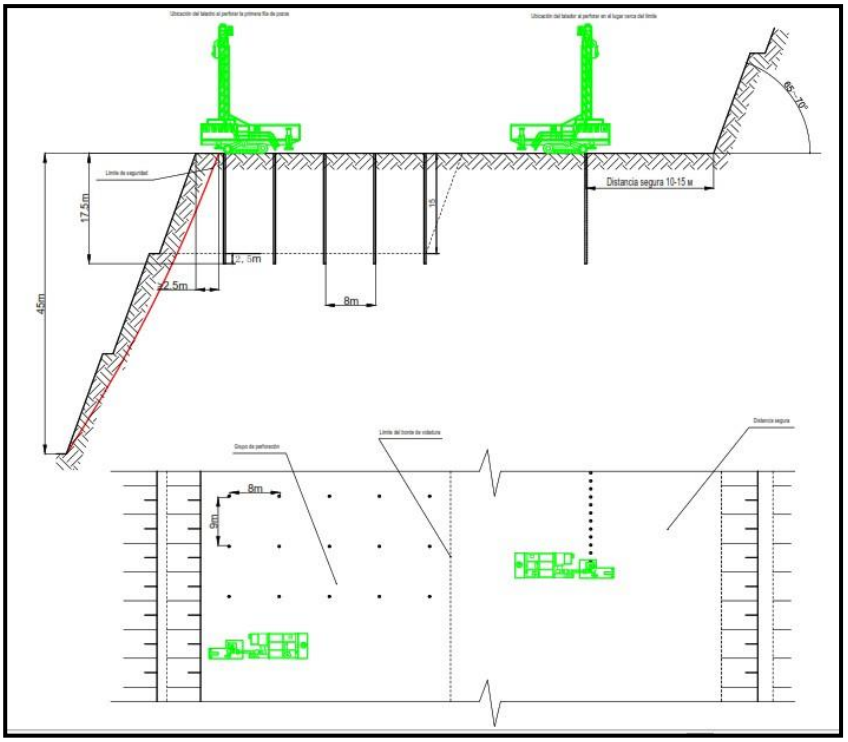
A portion of ore and rock in the Mirador Norte pit is uncovered to form a working face where the main equipment can operate normally to meet the requirements of the mine plan.

5.7.2.1.3 Drilling and Blasting

Drilling in the Mirador Norte pit will be carried out using 4 drill rigs (ø310 mm) for ore and waste rock uncovering, 2 diesel-powered drill rigs (ø150 mm) and 1 drill rig (ø76 mm) for auxiliary operations such as preparation of work faces, work on difficult access faces and pit slopes.

The drilling grid shall be 9 m x 8 m and adopt a rectangular or five-point layout. For bench blasting, vertical shafts with a depth of 17.5 m shall be used with a safety distance of 10～15 m to the back slope.

Figure 5-41 Drilling Operation Schematic Diagram



Source: ECSA, 2021

Table 5-37 Calculation of the number of drilling rigs

No.	Item	Unit	Drilling in mena	Drilling in sterile
1	Drilling diameter	mm	310	310
	Annual working days	d/a	270	270
	Daily number of working shifts	Shift/d		
	Unit-shift efficiency	m/unit-shift		
5	Unit-day efficiency	m/unit-day	330	330
	Unit-year efficiency	m/unit-year	89.100	89.100
	Bench height	m		
	Hole spacing	m		
	Row spacing	m	8	8
	Extra depth	m	2,5	2,5
	Borehole inclination angle	Grade	90	90
	Single hole length	m	17,5	17,5
	Blasting volume per linear metre	m3/m	61,71	61,71
	Residual porosity			
	Drilling efficiency per unit year	m3/unit-year	5.498.743	5.498.743
	Maximum annual load	m3	7.734.375	10.194.182
	Calculated units	Unit	1,47	1,93
	Total	Unit		

Source: ECSA, 2021

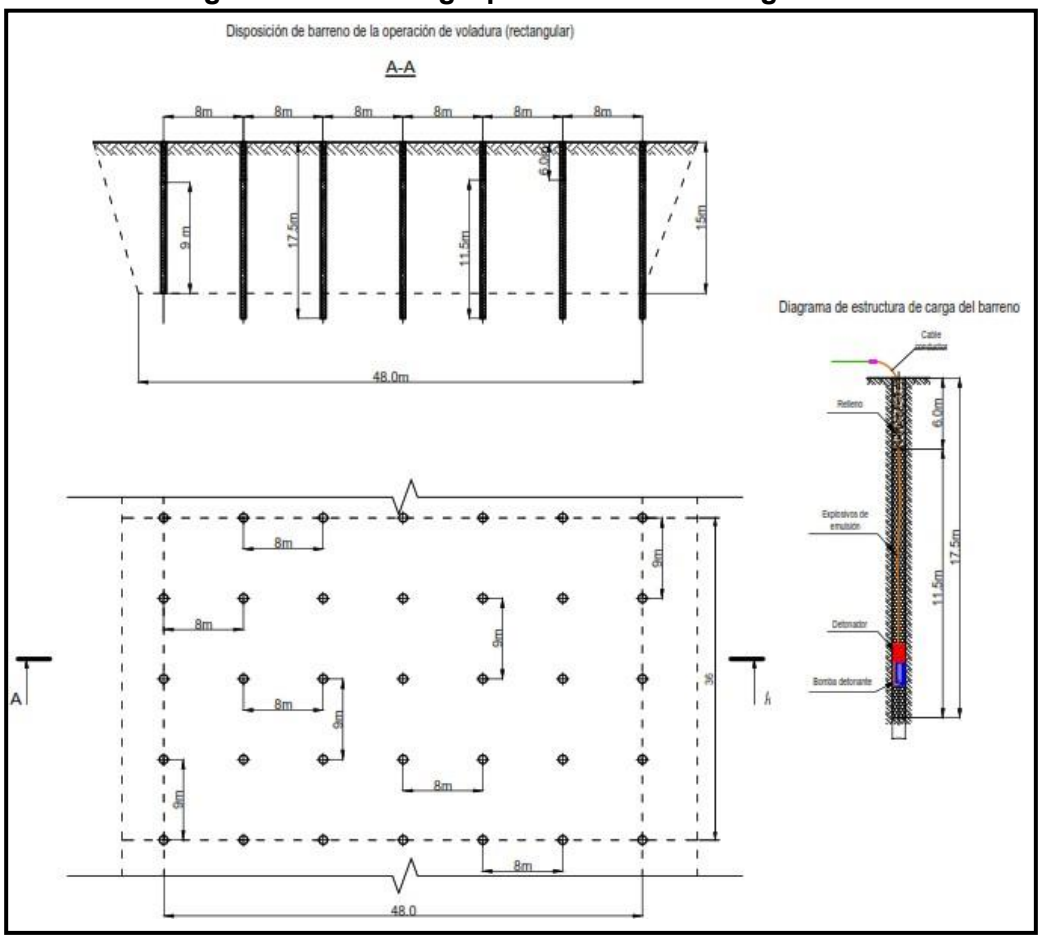
In blasting, emulsion explosives, finished explosives, detonating cord, non-electric detonators and 15 t mixed loading vehicle on site with a loading efficiency of 240 kg/min will be used. According to calculations, 4 loading vehicles will be required.

Table 5-38 Annual consumption of explosive substances in the Mirador Norte pit

No.	Name of the material	Unit	Quantity	Observation
1	Emulsion explosives	t	10.665,8	0.63 kg/m³ 0.63 kg/m³ 0.63 kg/m³ 0.63 kg/m³ 0.63 kg/m³
	Explosives	t	220	External procurement
	Detonator	t	17,3	
	Fulminants	Firing	45.000	
5	Detonating cord	km	130	

Source: ECSA, 2021

Figure 5-42 Blasting Operation Hole Arrangement



Source: ECSA, 2021

5.7.2.1.4 Charge

For ore and waste rock loading, a 25 m³ electric shovel will be used as the main equipment, in addition to 2 front end loaders with a bucket capacity of 10 m³ to assist in the mining and stoping operations. The maximum annual mining and stoping production at

the Mirador Norte pit will be 19.98 million tonnes of ore and 24.88 million tonnes of waste rock and the annual efficiency of the electric shovel will be approximately 13 million tonnes.

5.7.2.1.5 Transport

For the transport of ore and waste rock from the Mirador Norte pit, a combined haulage method of mining trucks and conveyor belts will be adopted.

The ore crushing plant will be installed on a pad at an elevation of 890 metres above sea level near the north pit access and the conveyor belt system will be installed from the crushing plant to the beneficiation plant. The waste rock crushing plant will be installed on a pad above 990 metres above sea level on the southeast side of the pit, from where it will be transported by a conveyor belt system to a transfer site where the waste rock will be trucked to disposal.

It is planned to use 17 220 t mine trucks as the main haulage vehicles, in addition to 10 50 t dump trucks for start-up and face development activities, as well as for mining and uncovering operations in difficult to access areas.

The combination of conveyor (belt conveyor and trucks) for waste rock disposal will be employed due to the steep areas, reduced working length and width in the waste rock dump area.

5.7.2.2 Beneficiation Plant Maintenance Facilities Phase II

Each area of the plant is equipped with the corresponding crane, the necessary maintenance site and maintenance workshop to facilitate the maintenance and repair of equipment and ensure normal production.

The coarse ore stockpile is equipped with electric hoist, chain hoist, etc. for maintenance of the heavy plate feeder.

The bridge crane in the milling plant is used for maintenance and lifting of equipment. In addition, the plant is equipped with maintenance facilities such as manipulator, slow mill drive device and bolt punching for mill liner replacement and main bearing bushing maintenance.

In addition to the maintenance facilities and small stations in each main workshop, the electromechanical repair shop of the existing beneficiation plant can also be used for maintenance and repair of equipment.

Table 5-39 Main cranes for each plant

No.	Installation location	Team name	Lifting capacity (t)	Quantity		Observation
				Originals	New	
1	Workshop at crushing pe bble crushing	Crane from electric bridge crane		1		Original
	Plant mi lling plant	Crane from electric bridge crane	75			A grinding planty

No.	Installation location	Team name	Lifting capacity (t)	Quantity		Observation
				Originals	New	
		Crane from electric bridge crane	20/5			existing flotation and a new one
	Plant flotation plant	Crane from electric bridge crane	75/20			
		Crane from electric bridge crane	20/5	1	1	
	Plant from filtration of concentrates	Crane from electric bridge crane				A new plant storage and loading of concentrates
		Bridge grab crane		1		
5	Workshop for the preparation of milk of lime	Crane from electric bridge crane		1		Original

Source: ECSA, 2021

5.7.3 Closure and Abandonment Phase

The activities of the closure and abandonment phase include those necessary to proceed to progressive closure after the construction phase, final closure after project operation activities and post-closure. The activities and sub-activities of this phase are listed below:

Table 5-40 Project Closure and Abandonment Phase Activities

Phase	Activity	Subactivity
Stage from Closure and Abandonment	Cleaning and decommissioning	- Dismantling of infrastructure - Management of inert and biodegradable materials
	Site recovery	- Mine pit reclamation - Reconformation and revegetation of areas
	Monitoring and decommissioning	- Continuous treatment of dump drainage water

Prepared by: Gesambconsult Cía. Ltda., 2022

The sub-activities listed in the table apply to the phases of progressive, definitive and post-closure, however, they were summarised as follows:

- Cleaning and dismantling:
  - Dismantling of infrastructure: At the end of the construction phase activities, the progressive closure will proceed with the dismantling of temporary camps, latrines and other infrastructure that is no longer required for the operation of the project. During the decommissioning phase, dismantling of substations, pumping stations, ball mills, distribution lines, permanent camps and management of access and roads that are no longer required for post-closure activities or are to be donated for use by local communities will be carried out.

  - Management of inert and biodegradable materials: materials such as steel, iron, concrete, plastic and wood will be disposed of with authorised waste managers; biodegradable materials such as wood can be left on site for rapid degradation after being chopped up. Recyclable materials will be managed with the community or with a manager. This activity will be implemented during progressive and final closure.
- Site recovery:
  - Reclamation of the mine pit: Once mining activities have been completed and the stability of the slopes in the mine pit has been verified, the mine pit will be filled with water.
  - Reconformation and revegetation of areas: For waste dumps, a layer of impermeable soil or a soil cover is placed on the final surface in order to prevent or reduce water infiltration, and then revegetation with local species is carried out. In the areas that have been cleared, the land will be reconformed and then revegetated. Additionally, the areas that have already been revegetated will be monitored to determine their effectiveness or to carry out the necessary corrective actions.
- Monitoring and decommissioning:
  - Continuous treatment of dump drainage water: Continuous monitoring of dump drainage water will be carried out to determine the best treatment considering existing practices at the time of closure.

Once the useful life of the deposit has ended (extraction of all its reserves) or the mining concession holder decides to relinquish the mining concession and initiates the process of reversion to the State, the implementation of the Closure and Abandonment Plan will begin, which must be complied with for the closure of mining activities, this plan will incorporate remediation actions of the alterations produced in the exploitation fronts on the different environmental components. However, during the useful life, partial closures of those infrastructures and areas that cease to be used or cease to operate will be carried out.

Exploitation activities in the concession areas may be used for a period of 31 years, as indicated in the concession title, subject to compliance with the obligations set out in the Mining Law and its applicable regulations in force; however, any anti-technical and irrational work will be grounds for termination and closure will take place, The Mining Holder will proceed to closure, with total predisposition and commitment to carry out a closure plan, which will allow the affected area to be reconditioned and rehabilitated, establishing environmental mitigation activities at the end of the mining activity, which implies the removal of machinery, the dismantling of installations and the environmental rehabilitation process.

Closure and abandonment activities must be carried out in phases and prior to the respective studies and analyses, in such a way that the activities to be carried out for abandonment can be determined, taking into account the social and economic factors involved in the work.

In the abandonment plan, the dismantling of all infrastructures (campsites, sports fields, etc.) will be contemplated. In addition, fixed structures and foundations will be removed and recyclable materials will be used.

reused or sold to third parties. All waste shall be disposed of in authorised waste disposal sites. The site shall be cleaned of all waste and shall be free of structures and slopes that pose a risk to third parties.

Activities will focus on the restitution or rehabilitation of the area, consisting of reforestation and remediation if required to return the land to its original state.