

Independent EPC Cost Estimate for Gold Mining Project Investment in Indonesia -Approach and Methodology

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16 May 2023





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- Scope of Services
- Approach & Methodology
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ABOUT US



SMEC – Company Overview

Who we are

SMEC is a global engineering, management and development consultancy with a 70-year history of delivering advanced solutions on a global scale across infrastructure, urban development and management services industries.



We are specialists in providing design leadership, consulting and advisory expertise across the roads and highways, rail and metro, aviation, **hydropower** and **renewable energy** sectors.



Collaborating closely with our parent and sister companies, we have the flexibility to operate in global markets either individually or in partnership to add value.





16,000+

Offices

Countries

Employees



Where we operate



	Australia, New		South & Central		UN
	Zealand & Pacific		Asia	•	London
	Islands	•	Afghanistan		
٠	<u>Australia</u>	•	Bangladesh		
•	New Zealand	•	Georgia		
•	Fiji	•	India		
•	Papua New	•	Kazakhstan		
	Guinea	•	Nepal		
•	Solomon Islands	•	Pakistan		
		•	Sri Lanka		
	Africa	•	Tajikistan		
•	Ethiopia	•	UAE		
٠	Kenya				
٠	Tanzania		Southeast Asia		
٠	South Africa	•	Singapore		
•	Namibia	•	Brunei		
		•	<u>Indonesia</u>		
	North America	•	Malaysia		
٠	Canada	•	Philippines		
•	US (Seattle)	•	Myanmar		
•	North Asia	•	Vietnam		
•	China				

South & Control

South America

Austrolic

Maria

Chile

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We're Specialists In Delivering Infrastructure Projects



< Snowy Mountain Hydroelectric Scheme Australia

Known for the reliable delivery of complex projects, technical excellence and specialist engineering solutions, SMEC is a **trusted partner on transport, energy & infrastructure projects** around the world.

SMEC has extensive experience in Feasibility Study, Owner's Engineer and Detail Design roles for energy & infrastructure projects.

Our core market:

• Power & Energy

Social Development

- Mining & Resources
- Water & Environment
- Roads and Highways
- o Rail, Metro & TOD



INFRASTRUCTURE SERVICES

Aviation

Tunnels



Civil Infrastructure

Oil & Gas, LNG

Rail & metro

highways



PROJECT BACKGROUND



Project Background



Overview

• SMEC were engaged by Client in February 2021 to undertake **the services**.

Independent Cost Estimating and Scheduling Services for a Gold Project Development

- Project Location: South Sulawesi, Indonesia.
- The services were officially kicked-off on the 1st week of March 2021.

Fig. 1 - Simple Process Flow Diagram of Gold Process Plant



South Sulawesi, Indonesia



Fig 2 – Project Location



SCOPE OF SERVICES

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Scope of Services

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The EPC Scope of the total project to be estimated and scheduled:

- □ Site wide stormwater drainage;
- Earthworks;
 - LV Site Access Roads;
 - ROM, Process, Mine Facility Pad;
 - Non-Processing Infrastructure (NPI) Facility Pad;
 - Primary HV Road & ROM;
- Processing Plant;
- NPI (include Bulk Diesel Storage, raw water supply, CSR facility, balance of HV/MV electrical and communications);
- □ Tailing Storage Facilities Civils, Pipeline and Deposition;
- Dermanent Mine Facilities;
- □ Construction Fuel;
- □ Temporary Facilities for EPC;
- Temporary Works Main Access Road and Site Access Roads.





The cost estimate has been requested to meet AACE Class 2 with a target accuracy of: -5% to -15% on the low side and;

+5% to +20% on the high side.



APPROACH & METHODOLOGY



Site Visit

3-days site visit performed by SMEC team consist of the Project Director, Project Manager and Project Engineer.

Objective: To understand the project site and its accessibility.

The site visit agenda is as follows:

- Providing visualization of the site to the project team with regard to:
 - $\circ~$ topography & geotechnical condition;
 - social-communities and the environmental situation surrounding the project area.
- Conducting assessment of the nearest port and local assessment of the proposed logistics survey via existing road and bridges which will be passed by project freight (including heavy equipment) to be utilised from port to the project site.



Project Activities

SMEC listed the Work Breakdown Structure (WBS) and modified version used for the estimate (i.e. up to Level 7).

The Level 1 summary provided is as below:

- WBS 100 Open Pit Mining;
- WBS 200 Not Used;
- WBS 300 Processing Plant;
- WBS 400 Tailings Storage Facility;
- WBS 500 Infrastructure;
- WBS 600 Site Support Facilities;
- WBS 700 Temporary Facilities;
- WBS 800 Owners Costs (Not used by SMEC);
- WBS 000 Project Management & Overheads;
- WBS 900 Escalation and Contingency;

SMEC then adopted the same WBS structure (**albeit further developed to level 7**) for consistency with estimation and schedule alignment.





Estimate Overview

SMEC has undertaken the EPC cost estimate in accordance with the requirements of:

AACE (American Association of Cost Engineering) International Recommended Practice
No. 18R-97, Cost Estimate Classification System – As Applied in Engineering,
Procurement, and Construction for the Process Industries, TCM
Framework: 7.3 – Cost Estimating and Budgeting).

It will be Class 2 Estimate agreed with Client.





Estimate Overview - AACE Estimate Classification

	Primary Characteristics	Secondary Characteristics									
ESTIMATE CLASSES	Level of Project Management Definition Expressed as % of complete definition	END USAGE Typical purpose of estimate	METHODOLOGY Typical estimating method	EXPECTED ACCURACY RANGE Typical Variation low and high ranges (a)	PREPARATION EFFORT Typical degree of effort relative to least cost index of 1(b)						
Class 5	0% to 2%	Conceptual Screening	Capacity Factored, Parametric Models, Judgment or Analogy	L: -20% to -50% H: +30% to +100%	1						
Class 4	1% to 15%	Study of Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: 20% to 50%	2 to 4						
Class 3	10% to 40%	Budget Authorization, or Control	Semi-Detailed Unit Costs with Assembly Level Line Items	L: -10% to -20% H: +10% to +30%	3 to 10						
Class 2	30% to 70%	Control or Bid/Tender	Detailed Unit Cost with Forced Detailed Take-Off	L: -5% to -15% H: +5% to 20%	4 to 20						
Class 1	50% to 100%	Check Estimate or Bid/Tender	Detailed Unit Cost with Detailed Take-Off	L: -3% to -10% H: +3% to +15%	5 to 100						

AACE Estimate Classification



Basis of Estimate

The basis of EPC Cost Estimate calculations is stated as follows:

- a. The scope and EPC execution approach are based on Project Execution Plan and Scope Statement;
- b. Client supplied engineering quantities have been spot checked for accuracy, but in quantum relied upon as listed in MTO. Engineered quantities are treated as containing no quantity growth allowances;
- c. Client supplied pricing has been reviewed by SMEC but basically relied upon as listed in
 Other Relied Upon Information.

This includes proposal for tagged engineered equipment, concrete batching plant, accommodation/catering and mobile crushing plant (establishment excluded - by others);



- d. Foreign exchange rates are based on Client provided assumptions being:
 - US\$ 1.00 : IDR 14,500
 - US\$ 1.00 : AUD 1.42
 - US\$ 1.00 : EUR 0.85
 - US\$ 1.00 : SGD 1.36
- e. Diesel fuel rate of IDR 8,311.63 per litre delivered to the site (Client supplied);
- f. Power based on Client supplied PLN Premium Gold published Tariff I-4 rate of IDR 996.74 per kWhr + IDR 105 per kWh for gold service level premium (i.e. power cost IDR 1,101.74 per kWhr);
- g. Salary and wages rates for domestic personnel includes Income Tax (PPh);
- h. Construction site workforce is based on 20% local hire BIBO and 80% FIFO external to Sulawesi Island







- i. Transport and logistics costs have been estimated by a local provider with international freight experience from affiliate ANTRACK. This includes management and customs clearance/agent fees for international importation, but not customs duty on imported goods;
- j. Structural steel, platework and pipework are assumed sourced from Surabaya area, with remaining electrical and any other bulk materials sourced from Jakarta area;
- k. ROM mining bulk earthworks rates (i.e. drill blast, load, haul, dump), mine overhaul rates and mobilisation/demobilisation fleet costs have been provided by a mining contractor company;
- I. TSF (Tailing Storage Facility) Estimate site waste rock mining haulage and rehandling (including mobile crushing) are costed by the Mining Contractor and excluded. TSF estimate includes all necessary civil construction costs to build the TSF (decant and starter embankment) with the mining delivered rock;



- m. Bulk earthworks rates are based upon 2 x 8 hours double shift developed from internal database;
- n. **Civil rates are based upon current market prices**, and SMEC internal cost database similar to related construction works in the project location;
- o. Structural rates are based upon current market prices, typical price quotations and SMEC internal cost databases;
- p. **Mechanical rates are based upon current market prices**, typical price quotations and SMEC internal cost databases;
- q. **Pipework rates are based upon current market prices**, typical price quotations and SMEC internal cost databases;
- r. **Electrical rates are based upon current market prices**, typical price quotations and SMEC internal cost databases;







- S. Wage costs are based on mining sector salary wages in South Sulawesi and working hours regulation from Indonesian government
- t. The rates of tagged equipment's are based upon TBE and/or CBE supplied by Client.
- u. Temporary facilities rates are based upon estimated workforce manpower quantity, temporary lodge and office rental rates;
- v. **Project management and Detail Engineering Design (DED) service is based on local rates,** including senior expatriate management. DED of processing plant is based on DRA Global proposal quotation price as nominated by Client;







- w. Construction and plant equipment mobilisation and rental rates are based on current market prices, typical price quotations and SMEC internal cost databases;
- x. EPC contractor overhead assumes direct cost percentage mark-up of 0.3% insurance, 0.35% bonds and 6% for overhead. The EPC Contractor margin is costed at a 12% mark-up applied to the whole estimate (excluding escalation and contingency);
- **y.** Contingency is selected based on probabilistic methods from Base Estimate to the P50 cost;
- z. The estimate base date is Q2 2021 on basis of costs adopted;
- aa. All costs are expressed in US\$ as nominated base project currency;





Project Schedule



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			IN	IDEPENI	DENT C	OST ES	TIMATE AN	D SCHEDULING SERVICES
ityID	Activity Name	Original	Start	Finish				Morth-
		719	05-10-21	28-Jun-23				10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
230 AWAN WAS GOLD FI	ROBECT-COMPLETO00321	719	05-14-21	23-Jun-23	9	:		
MLS1000	EP C Contractor Awarded	0	05-Jul-21*		0	EPCC	ontractor Awarded 05	421
MLS1010	Project Start	0	05-Jul-21		143	Project	Start, , 06-Jul-21	
MLS1020	MS Board FID	0		05-Jul-21	719	MS Bo	ard FID, 05-Jul-21,	
MLS1030	PLN Contract Award	0	40.64.04	06-Jul-21	719	PLN 0	ontradt Award, 05-Jul-21 of Mootine, 10, 14/01	
MLS1040 MLS1050	Start Magazine Pad (Temporary)	0	02-Autr-21		691	- NUN	 Start Macazine Pad (1) 	mpravi,
MLS1060	Explosive suplier award	0		(2-Aug-21	691		Explosive suplier ewar	(02-40-21)
MLS1070	Pad explosive available	0		23-Aug-21	66.9		Pad e splo	edatije, 23-Adg-21,
MLS1080	Start Batching Plant Pad	0	31-Aug-21		661		Start Batchir	Plain Pad, 39 Aug 21
MLS1090	Temp. Main Access Road Completed	0	2E 0 / 24	14-Sep-21	647		• temp.	an Access Pola Completed, 14-Sep 21, Access Access Access Pola Complete Access Pola Pola Complete Access Pola Pola Pola Pola Pola Pola Pola Pola
MLS1100	Start Pad Process Plant	0	09-Nov-21		592			Start Part Process Part. (0.9 Nov21
MLS1120	Batching Plant Completion	0		30-Nov-21	670			Batching Plant Cooppetion, 30-Nov-27,
MLS1130	Batch Plant available	0		30-Nov-21	670			Eatch Plant available, 30-Ndpv21,
MLS1140	Tem p. Facility 01 (Process Plant) Completed	0		06-Dec-21	66.4			◆ Temp Facility of (Process Pant) Ofmpleted,D6-Dec-2].
MLS1150	Temp. Facility 02 (for TSF) Completed	0		07-Dec-21	563			
MLS1160 MI S1170	Mobile Crusher - first crusheed andr	0		13-D80-21	66.7			Wohe many many page game compared pro-decize Mohe many and many page data and and and and and and and and and an
MLS1180	First explosive	0	16-Dec-21	10-00-21	555			♦ Frst explosive, 160s-21
MLS1190	Start SB Haul Road to Process Plant	0	30-Dec-21		641			♦ Start SB; Haul Rodat to Process Plant, 30-Dec-21
MLS1200	Start Awak Mas Haul Road to Process Plant	0	30-Dec-21		64.0			♦ Start Awjak Mas Haul Roadto Process Plant, 30-Deo-21
MLS1210	Temp. Facility 03 (for Permanent Camp) completed	0		08-Jan-22	53.6			◆ Temp, Facility 03 (for Pernlament Camp) completed, 03-lan-22,
MLS1220	Start Pad Camp Permanent	0	05-Jan-22		634			Start Had Camp Permanent, do-Jah 22
ML81230 ML91240	avait Sub saduri Pati Avait Max Hallion Braritio Process Plant Completion	0	06-080-22	(9. Jan.22	53.0			A di que da du razi, ve varezz Australia da la construcción de la construcción d
MLS1250	Soil Lab Completion	0		11-Jan-22	52.8			◆ Soil Lab Completion, 11i-Jan-22,
MLS1260	Pad Camp Permanent Completion	0		14-Jan-22	625			♦ Pag Camp Remanent/Comptetion, 14-Jan-22,
MLS1270	Start Detonator Pad	0	16-Jan-22		524			Start Detonjaor Pad, 1/6-Jan-22
MLS1280	MS HV Switch yard padCompleted	0		02-Mar-22	478			MS HV/Swith yard pad/completed, 02-Mar-22.
MLS1290	Start MIA Pad	0	15-Mar-22	00 Mar 00	466			Stay IMA Pay, 15-May -22 Say IMA Pay, 15-May -22 May -10 Mark May -22 Mark -22
MLS1300	First Raw water draw	0		20-10ar-22 (B-Anr-22	404			for the much of the second secon
ML\$1320	Raw Water Intake - Construction completed	0		27 - Apr - 22	422			 Raw Water Intake Ouristruction completed, 27-Apr-22,
MLS1330	Raw Water Intake Completed	0		27-Apr-22	422			
MLS1340	DED Completed	0		29-Apr-22	420			◆ DED Completed, 19-Apr-23
MLS1350	EP C Engineering Completed	0	_	29-Apr-22	420			◆ EPC Errgineering 20m pitelet, 29-Apr-22,
ML81360 ML91370	Verbrator padi Completed	0		04-May-22 04-May-22	415			Deurspin pad complexed, v-rady-zz, Warszing Part (Zminkting) (M.Mar.2)
MLS1380	Start Starter Enbankment TSF (Land Clearing)	0	19-May-22	on multer	401			Start Starte Embarkment 15F d. and Oberino), 19May-22
MLS1390	Pad Process Plant Completed	0		08-Jun-22	385			Pad Process Rait Completed, co-uip-22,
MLS1400	Permanent Camp Area 1	0		10-Jun-22	378			
MLS1410	Grid Power Energisation	0		18-Jun-22	371			
MLS1420 MLS1420	Permaneni Camp Area 2 Detector Building Completed	0		23-Jun-22 06-10-22	365		·	term area (camp pred2 (25-10-12)) beneficient and pred2 (25-10-12) beneficient area (camp pred2 (25-10-12))
MLS1440	1st Foundation Works at Process Plant Area	0	23-Jul-22	~~ 01F22	33.6			 Ist Foundation Works at Process Plant Area, 23-84-22
ML81450	Permanent Camp Area 3	0		30-Jul-22	32.8			
MLS1460	Magazine Building Completed	0		05-Sep-22	291			♦ Magazine Building Com patient, 0.6-Sep 22,
MLS1470	First Delivery of SB Waste Material to TSF Site	0	15-Sep-22		282			◆ First Deliveryof SB Wastle Material to TSF Stile., 15-Sap-22
MLS1480 MLS1480	MiA Pacity Compression Mile Danaked at the	0		20-Sep-22	276			MiAHPad Completion (20-sep-22) Mite Research 2 for 0 A/r (-1/2-2)
MLS1500	Start C0 Construction Verification	0	16-0d-2?	WHOLE2	262			◆ Sati Construction instribution, 16-06-22
MLS1510	Start C1/C2 Commissioning	0	18-0cl-22		24.9			◆ Sent C1/C2; Commissioning,, 1 ≨-Oct-22
ML81520	Start Erection and Installation Mills Equipment at Process Plant Area (SAG Mil)	0	21-0ct-22		245			🔶 İşat Eredipi and Iniştalation Mile Equipment at Pápcese Plajt Area (SAG Mil), 21-03-2
MLS1530	Start Substation Works	0	01-Nov-22		235			Start Substation Monks, 01 Mov-22
MLS1540	Foundation Completed at Process Plant Area	0		04-Jan-23	170			 Foundeion Completed al/Process Raft Area (04-Jan-22)
Remaining Level of Effor	t		Revi	sion		Checked	Approved	Project ID : 230 Report Date
Actual Work	V Summary							CONSTRUCTION SCHEDULE Data Date : 05-Jul-21 16-May-21
Remaining Work								baseme : 230: Datail Schedule Page 1 ar 1 ar 1
Critical Remaining Work								LEVEL 4 Task Filter : All Activities

Fig 3 – EPC Project Schedule

Project Schedule



Activity ID	Activity Name	Ong	nal Start	Finsh	Total Float							lonth	-					-	
10.00000		Due	1011	01 10 1 00		3 1	2	3	5 6 7	8 9 10	11 12	13 14	15	16 1	/ 18	19 20	21 22	23	24 25 9
ML \$1550	MS 150 KV Switchyard Construction - Completion	0	20.5 1 00	U1-Feb-23	142										1 1	• MS 10	TRV Switchyard	Construction C	anpieron UI-Peo-
MLS1560	Commissioning started with full power and ar service	0	00 F-t- 20		142		1 1						1 1		1 1	- Coeina	aloning spaneo	Minuipowera	id air service, , ua-r
WES1070	Verious - COG - stat	0	09-Feb-23	10.14-022	130		+				-++	·····				• var	Jus - 000 - stan	L, USPED-23	
ML S1580	Stater Embandment Competion	0	_	10-May-23	40													• Starter	Inderwhen Con
ML 51090	Erection and installation Mills Equipment at Process Plant Area (Completed U	_	11-May-23	43		1			1 1	1 1		1		1 1	1 1		Create	Tano instalation in
MLSIBUU	Construction Completed		70 k = 20	11-May-23	43		1			1 1			1		1 1	1 1		Gollar	Cuor Competer 1
MLSIDIU MLSIDIU	Sian C3 Ore Commissioning	0	03-JUN-23	-	21		1						1 1		1 1	1 1		1	Stat Go Geod O
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230.E DETAILED ENG	NEERING DESIGN		9 00-00-21	20-194-22	-20						20mpile		1		1 1	1 1			
230.E.1 OPEN PIT MINING			12-34-21	23-Aug-21	669	V.	T V	S-Aug-Z					1 1		1 1	1 1	, 1	1	
230 E 18 Magazine Area		4	12-34-21	23-7403-21	669		V	(S-AUg-Z)			20						·		
23UE.3 PROCESS PLANT		- 21	5 05-04-21	20-447-22	200	l l	1 1	1		1 1	20-00-22		1		1 1	1 1			
200 E 31 Earth Works & Fac	Nity Wide Process Plant	21	12.14.21	01-04-21	405	2	: :	• 01	.0-sb1	1 1	20-0p-22		1		1 1	1 1		1	
230 E 32 Primary Crushing	& Conveying	14	0 05-Aup 21	16-Feb-72	245		~			T 16-Feb-22	1 1		1		1 1	1 1		1 1	
230.E.3.3 Coarse Ore Storag	e and Reclaim	15	0 19-Aug-21	16-Mar-22	225		V=			▼ 16 Mar 2	2		1			1 1	(I		
230.E.3.4 Grinding, Classifi	cation and Gravity Separation	17	9 05-Aug-21	12-Apr-22	213		V		1 1 1	V :	12-Apr-22		1	1	1 1	1 1	1	1 1	1 1
230.E.35 Leaching and A da	orption	15	5 02-Sep-21	05-Apr-22	222		1		1 1 1 1	▼ 06	-Apr-22		1		1 1	1 1		1	
230.E.3.6 Gold Recovery		15	7 12-Aug-21	18-Mar-22	230		~	1		▼ 18-Mar-	2		1	1	1 1	1 1		1	1 1
230 E 39 Tailings Doubled	a & Custide Dattruction	15	7 UD-AUG-21	01.Mar.22	205			, :		V 11-68-22			1 1		1			1	
230 E 39 Plant Air and Water	rServices	13	2 02.500-21	04-Mar-22	210		+			V 04-Mat 22						+			
230.E.5 INFRASTRUCTUR	E	1.49	23-0-21	25-04-21	606		<u> </u>		▼ 25-0d-2	1			1						
230.E.5.1 Substation		6	23-34-21	25-Sep-21	636			7.5.	iep-21	1 1			1		1 1	1 1		1	1 1
230.E52 Dom estic Waste A	rea& Landfill	2	31-34-21	29-Aug-21	663		V V	29-Aug-21					1	1				1	
230.E.5.3 Main Drainage and	d Sedim ent P ond	7.	07-Aug-21	25-0d-21	606		7		■7 25-00-2									1	
230.E.4 TAILING STORAG	E FACILITY (TSF)	2	23-34-21	16-Sep-21	645	V		■V 16-Sec	21										
230.E.4.1 General		3	23-34-21	23-Aug 21	182			3-Aug-21					1	1	1 1	1 1		1 1	1 1
230.E42 Earthworks & Civi	1	24	23-Aug-21	16-Sep-21	182		V=	16 -Sep	21				1		1 1	1 1			
230.E.4.3 Mechanical & Pipi	ng	1	13-Aug-21	30-Aug-21	662			30-Aug/21		1 1	1 1		1 1		1 1	1 1		1 1	1 1
230.E.6 SITE SUPPORT FA	ACILITIES	4	05-30-21	24-Sep-24	321			V 124-3						·····			, 		
200.E.6.1 Earthworks		3.	05-301-21	10-Sep-21	331	1	1 1	- 10-Sep-0					1		1 1			1 1	
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230 P PROCUREMENT		33	1 05-Jul-21	10-0d-22	184	-		-			+ + +			T 10-0d-22					
230 P3 PROCESS PLANT		20	2 12.44.21	01.0422	199			·····						V D4-00-22			·		
230 P30 Bulk Material		g	02-Aut-21	16-Dep-21	396		V		▼ 16 Dec-21				1		1 1	1 1		1	1 1
230.P.3.1 Bulk Processing P	lant Material	18	5 30-Dec-21	14-Sep-22	202		1		V				▼ 14	Sep-22	1 1			1 1	
230.P32 LongLeadItem Ar	es 320	27	8 12-34-21	03-Aug-22	232	V	+ + +				+ + -	03	Auto 22		1 1	1 1		1	1 1
230.P.3.3 Long Lead Item Ar	en 330	23	1 12-Jul-21	30-May-22	279	V					SD-May	22							
230.P.3.4 LongLeadItem Ar	ea 340	32	2 12-JUF-21	04-0d-22	188	V	1				1		-	▼ 04-0d-22	1 1	1 1		1	
230.P35 LongLeaditem Ar	es 350	21	0 12-30-21	29-Apr-22	300	V-	1 1	1	1 1 1 1	1 1	23-Apr-32	- 15 U.M	1 1	1	1 1	1 1		1 1	1 1
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230.P.3.10 LongLead Item -	Mechanical Equipment Packages	30	0 12-24-21	02-Sep-22	210	V-	+						-7 02-Sec	22	1 1			1 1	
230.P4 TAILING STORAGE	E FACILITY	18	1 17-Sep-21	27-May-22	280		1	▼ :		- 1 - 1		2	1		1 1	1 1		1	1 1
230.P.4.1 Heavy Equipment		16	2 17-Sep-21	02-May-22	4		1	~			-7 02-Maj 22							1	
230.P.4.2 Geofabric		11	9 24-Sep-21	CB-Mar-22	337		.÷	V.		US-Mar-22							,		
230.PA3 Civil Material 220.PA4 Mechanical Disistence		4	24-Sep-21	18-NOV21	416		1	ip.	V 10-11 0V-21		27			1	1 1	1 1	. 1		
230 P45 Electrical action	entation Material	12	6 31-Dec-21	77-Mai-22	290		1	-	-	01-1	77.Ma	2	1		1			1	
230.P6 SITE SUPPORT FA	CILITIES	- 20	1 19.44-21	10-0:4-22	194		-				- Hug			V 10-0ct-22				1	
230.P.6.1 Earthworks		14	8 19-34-21	(9-Feb-22	367	V	-			V 09-Feb 22					1				
230.P52 Civil /Structure /F	inishing	13	8 16-Aug-21	23-Feb-22	347		-			23 Feb 22		1		1		1	1	1	
230.P/63 Mechanical /Pipin		25	0 02-Aug-21	15-11-22	245		V	-				▼ 15 Jul-22			1 1			1 1	
230.P6.4 Electrical /Instrum	entation	31	1 02-Aug-21	10-0d-22	184		-			1 1				■▼ 10-0ct-22		1 1			
230.P.7 TEMPORARY FAC	LTIES	4	05-34-21	31-Aug21	447	1	-	31-Aug 21					1		1				
230.P.7.1 Vendor Civil Work		4	05-JUF-21	31-Aug-21	384			31-Aug21						·····					
230,P72 Vendor Bulk Mater 220,P73 Mender Comm	18	4	05-30-21	31-RUGZI	419	1	1	31-Aug21											
230 PTA Vendor Camp 230 PTA Vendor Patchion P	lant	4	05.14.21	31.402	400			31. Aug 21					1		1			1	1 1
230.P75 Vendor Crushing P	Plant	4	05-14-21	31-Aup 21	447			31-Aug21					1					1	
230 C CONSTRUCTION	V	70	7 12-34-21	19-Jun 23	5	V-							-	_					
230.C 1 OPEN PIT MANING		- 40	3 19.16.2	21.Ech.72	122		-+										PLEeh 2		
			and the second	1211-00-02		1		1					-						
Remaining end of Eff	nt 🌢 🌢 Milestrone	Date	Revis	ian		Checked	Ap	proved					Project I	n · 220			· · · · ·	D	oport Data
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Actual Work	V Summary						-		CONSTRI	ICTION S	CHEDU	F	Data Dal	ie : us-Ju	-21				10-Way-21
Remaining Work					-		+		CONSTRU	CHOIR 3	CHEDOL	-	Daseline		Detail C-L	ماريام			18:50
Ctifical Remaining Mor	*						+			LEVEL A			Layout	10 : 230 :	Detail Scho	some		1 1	age 2 of 3
Chiecai Nei haihing Wo										LEVEL 4			Task Filt	er: All Ac	tivities				

Fig 3 – EPC Project Schedule

Project Schedule



chity/D Activity Name	Original Start	Finsh	ctal Float					Month			_
	Duration		4 1	2 3	4 5 6 7	8 9	10 11	12 13	14 15 16 17 19	19 20 21 22	23 24
230.C.1.0 General	14 19-Ju	1-21 01-Aug-21	137	▼=▼ 01-Aug 21							
230.C.12 Mine Site Preparation and Roads	299 30-D	ec-21 14-0ct-22	252		V				▼ 14 Dct-22		
230.C.1.7 Mine Infrastructure Are a (MIA)	363 24-Fe	eb-22 21-Feb-23	122							▼ 21-Feb-23	
230.C.18 Bulk Explosives (Temporary and Permanent)	400 02-AL	n-21 Ob-Sep-22	291					*****	V U5-Sep-22		
230C-3 PROCESS PLANT	365 0400	act III-May20				1 1		May 22			113109-23
200.C.30 General 230.C.31 Eacility Wide Process Plant	229 04-00 106 25.0r	121 20-MBy-22	181					0-mdy-22		PLDes 2	
230.C.32 Primary Crushing & Conveying	224 04-Ju	n-22 13-Jan-23	161		TII			V		▼ 13-Jan-23	
230.C.33 Coarse Ore Storage and Reclaim	123 30-AL	p-22 30-Dec-22	175							▼ 30-Dec-22	
230.C.34 Grinding, Classification and Gravity Separation	342 04-Ju	n-22 11-May-23	43			T		P		a al antitutte a statement	11-May-23
230.C.35 Leaching and A dsorption	147 11-00	#22 06-Mar-23	109			1 1			▼	▼ 06-Mar-23	
230.C.36 Gold Recovery	134 24-00	#22 05-Mar-23	109							▼ 06-Mar-23	
230.C.37 Reagents	8/ 31-00	#22 25-Jan-23	149			1 1				V (S-Jan-45	
230.C.38 Tailings Devatering & Cyanide Distruction 290.C.39 Flant Air and Mater Services	72 29 40	04-22 24-3an-23 22 09 Ech 22	125							▼ 29+Jan-25	
230 C.4 TAILING STORAGE FACILITIES	412 03-4	a-22 19-1 n-23	5				7			0010020	▼ 19
230.C.40 General	14 03-M	av-22 16-May-22	5				7-7 16	Mar-22			
230.C.41 Facility Wide	368 17-M	ay-22 10-May-23	45				V				10-May-23
230.C.42 Tailings Pipeline - Decant for Starter Em bankment	277 15-Se	p-22 19-Jun-23	5						▼		▼ 19-
230.C.4.3 Tailings Deposition	27 10-Mi	ay-23 05-Jun-23	18			1 1					▼ 106-Juh
230.C.44 Tallings Decant	24 22-AL	19-22 14-Sep-22	5						▼ 14 Sep-22		
20.C.45 fallings Services	33 15-M	ay-23 17-3un-23								DI Ed. 27	
230.C.51 General	170 12 10	121 01-Feb-23		1 1 1		0.21				01-1-80-23	
230.C 5510 Main Access Road Belopato Ranteballa	420 17-10	121 20-0-60-21	287		28-D e	ו•			▼ 09-Sep-22		
230.C.5520 Substation and Site Distribution	392 06-la	n-22 01-Feb-23	142		V					01-Feb-23	
230.C.5.540 Dom estic-Industrial Waste A rea & Landfill	163 06-Ja	n-22 17-Jun-22	371								
230.C.5.570 Main Drainage and Sediment Mgt	393 07-Se	ep-21 04-0ct-22	262	▼		+ +			▼ 04-06-22		
230.C.6 SITE SUPPORT FACILITIES	367 06-Se	ip-21 08-Sep-22	298	V		1			▼ 08-Sep-22		
230.C.6.1 Site Roads	220 06-Se	ep-21 14-Apr-22	435	V			₩ 14 Apr-22				
230.C.62 Main Office Fadilities	180 22-Ja	n-22 21-Jul-22	337					▼ 2	1-Jul-22		
230.C.63 Communication System	189 11+e	45-22 19-Aug-22	308			V I			19-Aug-22		
200.0.64 Camp & Admin 200.0.65 Resultities	102 10 0	80-21 US-Sep-22	200			-		M Mai 20	V 05-3EP-22		
200 C 56 C SR Security Office & Gate	122 19.0	n=22 24-may-22	429				7 D. Ang. 22	27 W09-22			
230.C.7 TEMPORARY FACILITIES	183 314	ip-21 11-Jan-22	528	V	▼ 1	-Jan-22					
230.C.70 Temp, Access Road	14 31-A	ip 21 14-Sep-21	546	V=V 14 Se	p-21						
230.C.7.1 Temp. Facil. for Process Plant	69 31-Au	g-21 08-Nov-21	592	V +	▼ 08-Nov-21						
230.C.72 Temp. Facil. for TSF	80 18-Se	p-21 07-Dec-21	563		▼ 07-D to-21						
230.C.7.3 Temp. Facil, for Permanent Camp	52 13-Ni	ov-21 03-Jan-22	536		▼ 7 03-J	an 22					
230.C.74 Temporary Plant	133 31-AL	13-21 11-Jan-22	528			an-22					_
230.COM COMMISSIONING AND TEST RUN	400 ZU-Mi	ar-22 25-301-23	<u> </u>			1 1 -					
230.COM.3 Process Plant	297 10-Se	ap-22 23-Jun-23	0			1 1				1 1 1 1	
230.COM 31 CO to C1 - Individual Cheklist and Commisioning	258 10-Se	ap-22 2b-May-23	29						V i i i i i i i i i i i i i i i i i i i		25-May-23
230.COM.32 C2-C om misioning using full load electr waterrain service into system	131 22-Ja 112 10 Fe	n-23 U2-Jun-23	0								02-50-2
230.COM 33-4 Commissioning Ore Load and Ramp Up (C3 & C4)	14 (P.In	n-23 16.Jun-23	0	1 1 1							16.
230.COM.35 Performance Test (C5)	7 16-Ju	n-23 23-Jun-23	0								W 2
230.COM.2 Non Process Plant Infra (NPI)	383 20-44	ar-22 16-Feb-23	127			V=				▼ 16 Feb-23	
230.COM 2.1 CO to C1 - Individual Cheklist and Commisioning	319 20-Mi	ar-22 02-Feb-23	127	1 1 1						🗘 02-Fep-23	1 1
230.COM 22 C3 - Load and Ramp Up (C3 & C4)	14 02-Fe	16-Feb-23	127			1 1				▼ 16-Feb-23	
Remaining Level of Effort 🔶 🔶 Miestone	Date	Revision	Checke	d Approved	-				Project ID : 230	3	Report
Actual Work V Summary					CONCTO	UCTION	COURT		Data Date : 05-Jul-21		16-Ma
Actual Work Summary					CONSTR	UCTION	SCHEI	DULE	Data Date : 05-Jul-21 Baseline :		16-Ma 1
Actual Work Summary Remaining Work					CONSTR	UCTION	SCHE	DULE	Data Date : 05-Jul-21 Baseline : Layout No : 230 : Detail S	Schedule	16-Ma 1 Page 3

Fig 3 – EPC Project Schedule







Estimate Exclusion

The following exclusions are not included in the EPC cost estimate:

- a. **Owners costs** such land acquisition, project approvals, project financing costs and owners insurances.
- b. Owners Management cost;
- c. Mining pre-production costs associated with the open pit mining;
- d. **Mining technical services** such as grade control, mine survey, mine management and mine geotechnical;
- e. Temporary mining facilities costs;
- f. Mining capital development costs including bulk TSF mine rock supply for the TSF;
- g. Operational Costs including start-up operations and maintenance



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Estimate Exclusion (Cont.)

- h. Spare parts;
- i. Taxes of WHT and VAT;
- j. Taxes of GST for overseas supply from Australia;
- k. **Importation customs duty**; Any imported equipment and materials assumed to be on Client's project importation Master-list;
- I. Royalties;
- m. Any performance bonus scheme;
- n. Working capital;
- O. Sustaining capital;
- p. Pandemic impacts or changes to political policy interrupting project implementation.









Cost Estimate Recapitulation



WBS	Description	Total (US \$)	% From Total EPC Cost
А	DIRECT COST		
100	OPEN PIT MINING	14,075,909	9.09%
300	PROCESS PLANT	42,542,390	27.48%
400	TAILINGS STORAGE FACILITIES (TSF)	7,648,726	4.94%
500	INFRASTRUCTURE	7,374,963	4.76%
600	SITE SUPPORT FACILITIES	19,491,129	12.59%
	Total Direct Cost	91,133,117	58.86%
В	Total Direct Cost	91,133,117	58.86%
<mark>В</mark> 700	Total Direct Cost INDIRECT COST TEMPORARY FACILITIES	91,133,117 3,590,539	58.86% 2.32%
B 700 000	Total Direct Cost INDIRECT COST TEMPORARY FACILITIES EPC PROJECT MANAGEMENT / SUB-CONSULTANTS	91,133,117 3,590,539 38,449,368	58.86% 2.32% 24.83%
B 700 000 Wide	Total Direct Cost INDIRECT COST TEMPORARY FACILITIES EPC PROJECT MANAGEMENT / SUB-CONSULTANTS EPC MARGIN	91,133,117 3,590,539 38,449,368 21,307,684	58.86% 2.32% 24.83% 10.32%
B 700 000 Wide 900	Total Direct CostINDIRECT COSTTEMPORARY FACILITIESEPC PROJECT MANAGEMENT / SUB-CONSULTANTSEPC MARGINESCALATION & CONTINGENCY	91,133,117 3 ,590,539 3 8,449,368 21,307,684 5 ,674,492	58.86% 2.32% 24.83% 10.32% 3.67%
B 700 000 Wide 900	Total Direct Cost INDIRECT COST TEMPORARY FACILITIES EPC PROJECT MANAGEMENT / SUB-CONSULTANTS EPC MARGIN ESCALATION & CONTINGENCY Total Indirect Cost	91,133,117 3,590,539 38,449,368 21,307,684 5,674,492 63,695,162	58.86% 2.32% 24.83% 10.32% 3.67% 41,14%

The most of the cost is in WBS Area 300 - Process Plant: US \$ 42,542,390 (27.48% of the total EPC cost).

The local to overseas content of the overall estimate is reported as:

- Local Indonesian cost content US\$ 125,549,022;
- Imported overseas cost content US\$ 29,279,257

Cost Estimate Contingency and Risk Analysis



- **Cost Risk Analysis (CRA)** has been performed by SMEC (Adelaide) experts using probabilistic assessment techniques on the base estimate provided by SMEC team in Jakarta.
- The CRA was undertaken using Palisade @Risk 8.1 software.
- Generally, SMEC adopted the general processes and methodologies given in the following documents.
 - Guidance Note 3A Probabilistic Contingency Estimate, Australian Government Department of Infrastructure Regional Development and Cities, November 2018; and
 - Contingency Guideline 2nd Edition, Risk Engineering Society, February 2019.



There are a number of techniques for modelling of risks and methods used:

Line item ranging

- Uncertainty in quantity is ranged using a three-point estimate (low most likely high);
- Uncertainty in rate is ranged using a three-point estimate that generally only describes the uncertainty in plant/labour productivities or anticipated subcontract uncertainty.

<u>Risk Drivers</u>

• Identification of risk drivers that effect many cost elements with a many-to-many relationship between risks and costs. These risk drivers are designed to address areas other than productivities in the rate uncertainty;

Correlation of like effects

 Correlation is a statistic used to describe the degree to which two variables are related. Given the large number of estimate items whose uncertainty is related the use of correlation is important in the analysis of this project.

Cost Estimate Contingency and Risk Analysis



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Probabilistic Analysis Output



Further explanation

- Inherent is base only
- Total is sum of Inherent & Contingent

Fig 4 - Probabilistic Analysis Output

Cost Estimate Contingency and Risk Analysis



The following areas were not incorporated into the risk model

- **Consideration of a generalised scope growth** (including functionality or standard change).
- Allowance for escalation.
- Consideration of other client risks not specific to the EPC Contractor scope of work such as those risks on the Client's Corporate Risk Registers

Probabilistic modelling undertaken in @Risk presents a subdivision within the cost model described as:

- Inherent Risk reflecting the contingency (risk) in the quantities and rates of the estimate as presented.
- **Contingent Risk** reflecting the contingency (risk) in other general risk drivers (including the SRA impacts).

The results of the @Risk analysis are stated below:

• To achieve a P50 (50% equal chance of overrunning and underrunning the estimate within its accuracy range) the delta amount of US\$ 5.674M. This is industry practice and SMEC has reported this amount as Contingency to the Base Estimate.

Conclusions



- a. Subject to the limitations and assumptions listed in the Basis of Estimate and Basis of Schedule, SMEC states that the requirements laid out in AACE International Practice No. 18R-97, Cost Estimation Classification System for a Class 2 estimate are met.
- **b.** The EPC cost estimate is US\$ 154,828,279 with consist of total direct cost is US\$ 91,133,117 and indirect cost is US\$ 63,695,162;
- c. Cost Risk Analysis performed based on the information of cost variables (price/rate, quantity, productivity/schedule) and found P50 risk and contingency is US\$ 5,674,492 (3.67% of total base estimate EPC cost) while P90 is US\$ 7,822,737 (5.06% of total base estimate of EPC cost). SMEC adopted P50 US\$ 5,674,492.



Thank You

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Through specialist expertise, we're challenging boundaries to deliver advance infrastructure solutions.

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