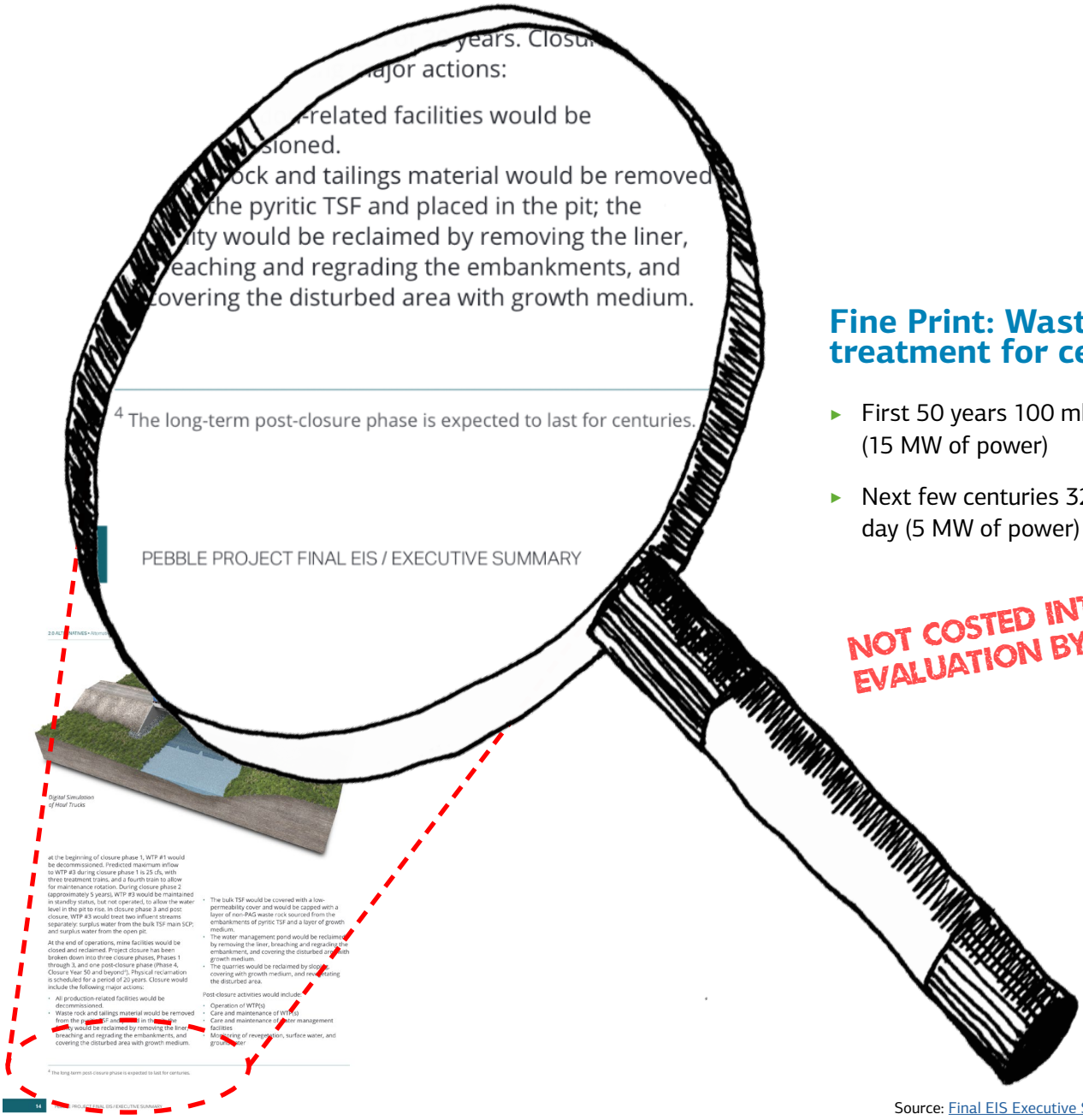
September 9, 2020

Terms of Service

By viewing this material you agree to the following Terms of Service. You agree that use of J Capital Research USA LLC's research is at your own risk. In no event will you hold J CapitalResearch USA LLC or any affiliated party liable for any direct or indirect trading losses caused by any information on this site. You further agree to do your own research and due diligence before making any investment decision with respect to securities covered herein. You represent to J Capital Research USA LLC that you have sufficient investment sophistication to critically assess the information, analysis and opinion on this site. You further agree that you will not communicate the contents of this report to any other person unless that person has agreed to be bound by these same terms of service. If you download or receive the contents of this report as an agent for any other person, you are binding your principal to these same Terms of Service. You should assume that as of the publication date ofour reports and research, J Capital Research USA LLC may benefit from short positions a client has in all stocks (and/or options, swaps, and other derivatives related to the stock) and bonds covered herein, and therefore stands to realize significant gains in the event that the price of either declines. This is not an offer to sell or a solicitation of an offer to buy any security, nor shall J Capital Research offer, sell or buy any security to or from any person through this site or reports on this site. If you are in the United Kingdom, you confirm that you are accessing research and materials as or on behalf of: (a) an investment professional falling within Article 19 of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "FPO"); or (b) high net worth entity falling within Article 49 of the FPO. Our research and reports express our opinions, which we have based upon generallyavailable information, field research, inferences and deductions through our due diligence and analytical process. To the best of our ability and belief, all information contained herein is accurate and reliable, and has been obtained from public sources we believe to be accurate and reliable, and who are not insiders or connected persons of the stock covered herein or who may otherwise owe any fiduciary duty or duty of confidentiality to the issuer. However, such information is presented "as is," without warranty of any kind, whether express or implied. J Capital Research USA LLC makes no representation, express or implied, as to the accuracy, timeliness, or completeness of any such information or with regard to the results to be obtained from its use. Further, any report on this site contains a very large measure of analysis and opinion. All expressions of opinion are subject to change without notice, and J Capital Research USA LLC does not undertake to update or supplement any reports or any ofthe information, analysis and opinion contained in them. You agree that the information on this website is copyrighted, and you therefore agree not to distribute this information (whether the downloaded file, copies / images / reproductions, or the link to these files) in any manner other than by providing the following link: https://www.jcapitalresearch.com/. If you have obtained the research of J Capital Research USA LLC in any manner other than by downloading from that link, you may not read such research without going to that link and agreeing to the Terms of Service. You further agree that any dispute arising from your use of this report and / or the J Capital Research USA LLC website or viewing the material hereon shall be governed by the laws of the State of New York, without regard to any conflict of law provisions. You knowingly and independently agree to submit to the personal and exclusive jurisdiction of the superior courts located within the State of New York and waive your right to any other jurisdiction or applicable law. The failure of J Capital Research USA LLC to exercise or enforce any right or provision of these Terms of Service shall not constitute a waiver of this right or provision. If any provision of these Terms of Service is found by a court of competent jurisdiction to be invalid, the parties nevertheless agree that the court should endeavor to give effect to the parties' intentions as reflected in the provision and rule that the other provisions of these Terms of Service remain in full force and effect, in particular as to this governing law and jurisdiction provision. You agree that regardless of any statute or law to the contrary, any claim or cause of action arising out of or related to use of this website or the material herein must be filed within one (1) year after such claim or cause of action arose or be forever barred.

Pretend and Extend

The No-Return Deposit



Fine Print: Wastewater treatment for centuries

- First 50 years 100 mln liters/day (15 MW of power)
- Next few centuries 32 mln liters/day (5 MW of power)

NOT COSTED INTO ANY EVALUATION BY NAK

Source: Final EIS Executive Summary page 14

September 9, 2020

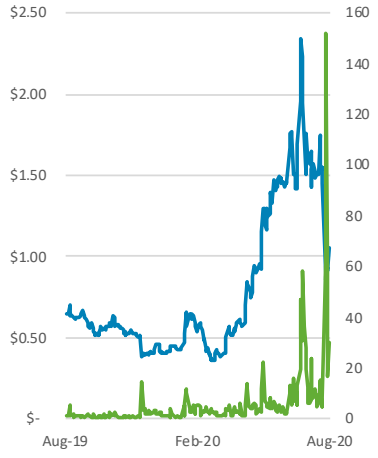
Tim Murray
tim@jcapitalresearch.com

+1 860 391 6094

Northern Dynasty (NAK US)

Share Price in USD	**$0.97**
Market Cap in USD (mln)	483.8
Av volume (shares)	15,410,593

Northern Dynasty (NAK US) last share price in USD (blue, left) and volume (green, right, mln shares)



Source: S&P Capital IQ September 9, 2020

We believe Northern Dynasty (NAK US, NDM TO) has crafted a money-losing mining plan to achieve government approvals. Since management is bonused on lobbying success instead of for producing minerals, NAK has no reason to care that the new plan is irrational: we think it will lose money, leave investors with a stranded asset, and be canceled anyway if Joe Biden is elected.

So why has NAK twisted itself into this knot? The CEO of Pebble Partners, the operating entity for NAK's low-concentration gold and copper deposit, will receive $4.4 mln of the promised $12.5 mln bonus for winning a green light just to start the permitting process.[1]

We believe that the deposit cannot be mined profitably and that mining majors Anglo American (AAL L) and Rio Tinto (RIO US) know that. AAL withdrew from its partnership in the mine in 2013 after spending $500 mln.[2] Rio gifted its 19.1% stake in NAK to two Alaskan charities. One of those, the Bristol Bay Native Corporation, benefitting people in the impacted Bristol Bay area, promptly sold off the shares.[3] The local people clearly don't believe in the mine. What's more, NAK has claimed poverty to dodge a feasibility study, which would demonstrate economic viability. Pebble CEO Tom Collier said they did not have the money to pay for one despite the fact they have spent $1 bln and such a study would cost $80 mln at most.[4]

1 https://www.sec.gov/Archives/edgar/data/1164771/000106299318002329/exhibit99-3.htm

2 See AAL's press release on its withdrawal, which states they had better economic opportunities: https://www.angloamerican.com/media/press-releases/2013/2013-09-16

3 https://www.alaskajournal.com/business-and-finance/2014-04-11/rio-tinto-gifts-stake-northern-dynasty-state-charities and https://www.kdlg.org/post/bbnc-educational-foundation-outlines-priorities-stock-sale-funds#stream/0

4 https://www.pbs.org/wgbh/frontline/article/alaska-pebble-mine-bristol-bay/ and Mike Heatwole, Vice President, Pebble comments: https://www.alaskasnewssource.com/content/news/Pebble-investment-company-reports-continued-losses-hopes-for-approval-565899731.html?fbclid=IwAR13AVlq6cPEmmNq95ezcJqDhzqG9zPRk1KENukcNv63f2k4jmMoOerIGAs

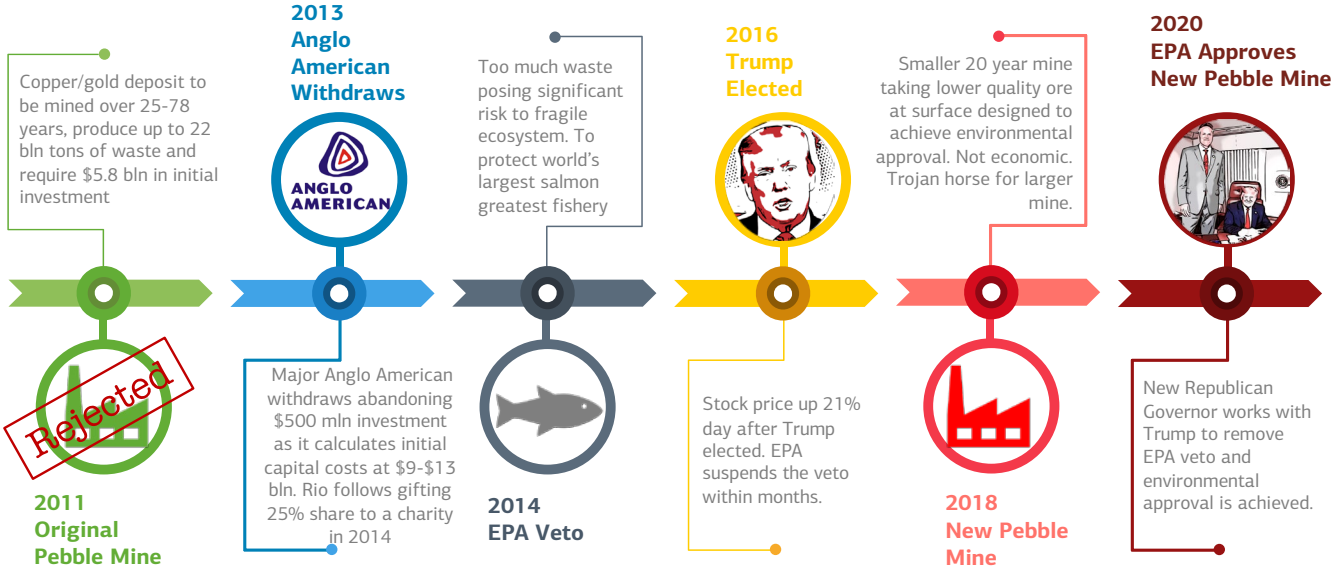
The NAK proposition is on its face absurd: the company squeezes an NPV of $1 bln out of the new, 20-year plan that management claims requires $4.7 bln in initial capital. That's a terrible return compared with peers. We have identified two critical omissions from NAK's economic analysis which, when factored in, sink the project:

1. Initial capital costs are understated by as much as 50%. Management admitted three years ago that costs to develop the mine, in one planning scenario, could be a staggering $13 bln, 2.8x the company's current estimate. And yet NAK has not changed its cost estimates.
2. Post-closure wastewater treatment is required for centuries and will cost billions. A former RIO executive estimated the post-closure costs at $4.5 bln.

The new mine plan has half the minerals of the original 25-year plan. To compensate for this decline, NAK increased the price of the minerals in its model by 20% but left operating costs unchanged from the 2011 level. NAK dialed up the positives but left out the negatives.

After spending close to $1 bln in to develop the Pebble deposit, NAK still cannot say if the deposit is economically viable and has failed to produce a feasibility study. We believe it is because they know it will demonstrate the mine is not economically viable.

Chart 1. Pebble Project Timeline



Source: J Capital

We have reviewed thousands of pages of documents produced for the mine plan, the environmental impact statement (EIS) and legal proceedings and consulted mining engineers, geologists, legal experts, and environmental scientists to conclude that the Pebble gold/copper deposit is unlikely ever to be mined. Management is playing political games that benefit themselves, not investors.

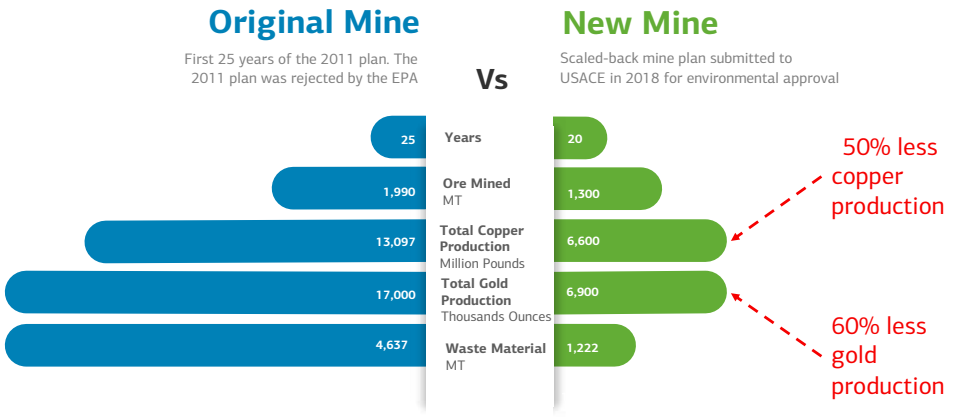
Gaslighting investors

NAK management, after years of struggle, had the final Environmental Impact Statement released by the U.S. Army Core of Engineers3 (USACE) and hopes to get a federal mining permit for the 20-year mine. To get around the lack of economic viability for the 20-year plan, management is openly saying that, once the plan is under way, they will push forward with another 58 years.[5] Management claims they will not need any additional environmental approval to extend the life of the mine. That is untrue: the permit is for 20 years. Any mine extension will produce exponentially higher amounts of waste creating, we believe, an impossible hurdle for both approval and economic viability.

Source: J Capital

5 See NAK Webcast Presentation at 53:00, John Tumazos Very Independent Research 2020 Annual Conference (Aug. 11, 2020), available at https://zoom.us/webinar/register/WN_2fKTGX2IQ8eYr9-OfRO1hQ

Chart 3. New mine produces half the minerals of original mine



Source: J Capital see Appendix 2

No economic viability

NAK is trying to placate both investors and environmental officials. To do that, management is claiming that the new, 20-year mine plan will require more or less the same initial infrastructure and investment as the old plan and still turn a profit.[6] NAK's official estimate of initial capital costs is $4.7 bln.

Management has submitted this $4.7 bln number even though they admit that one "planning scenario" had the costs at $13 bln instead. NAK has never disclosed that "planning scenario," which was commissioned by one-time investor AAL to assess the viability of a project in which they had a 50% interest..

NAK doesn't even stand by its own estimate. In 2012, the CEO of Pebble Partners, the operating entity for the project, said that costs might be nearly double that number--$7-$8 bln.[7]

---

6 When we use the term "old mine plan" or "original mine" we refer to the mining plan first submitted to the USACE in 2017 for the Environmental Impact Statement and most recently updated in June 2020. When we use the term "old mine plan" we refer to the mining plan in the Preliminary Economic Assessment in 2011 which had a 25, 45 and 78 year plan. For reference, we compare 25-year portion of the preliminary assessment with the new mine plan.

7 https://www.pbs.org/wgbh/frontline/film/alaska-gold/transcript/ note the CEO made this statement in 2012 after the 2011 PEA was published. NAK affirmed this estimate of $7-$8b in its defence of a class action lawsuit accusing the company of securities fraud see Defendant's Memorandum of Points and Authorities in Support of Motion to Dismiss in case Case No. 2:17-cv-01241-PSG-SS in Central District Court of California dated February, 27 2018.

The $4.7 bln figure is absurd. The number fails to include a key cost that, when factored in, sinks even the unrealistically cheap 20-year plan: the natural gas pipeline will have to be lengthened from 86 to 164 miles, and that increase will cost at least an additional $0.4 bln.[8] This and other missing costs and associated overhead and contingency come to another $1 billion. Those missing costs conservatively put the 20-year plan's capital costs at $5.7 bln. That sinks the positive NPV of $1 bln that NAK claims for the project.

And NAK's strawman NPV fails to include reclamation and closure costs, which include wastewater treatment for centuries. Those costs we estimate at $1.8 bln. [9]

The "$7-8 bln" admission shows that management knows it is low balling. Kerrisdale Capital published a negative report about Pebble called "Cu at Zero" in February 2017 and stated that they had spoken with staff at former NAK partner AAL, who said that they had estimated the initial capital cost of the mine at between $11- $13 bln in 2012 when preparing a feasibility study that was never published.[10] In responding, NAK admitted there was such an analysis:

> "In fact, Pebble Partnership staff, led by secondees from Anglo American, recognized the flaws with this work and continued studying development alternatives. Further, a review of a preliminary draft US$13 billion mine planning scenario by an independent engineering firm commissioned by Northern Dynasty identified issues with that study and identified savings that reduced the preliminary capital estimate by US$4 billion."[11]

In other words, NAK responded to Kerrisdale by saying costs would be $9 bln, or about double what they had claimed in 2011. Seven years and about another $0.5 bln later, there is still no update to the capital required to build the mine.

---

8 We have used the current pipeline project average cost per inch of $260,000 to estimate the construction cost at $511 mln (260,000 x 12 x 164) see below in this section for full description.

9 See section below "Wastewater Treatment Forever: Costs Destroy Value of Mine"

10 https://www.kerrisdalecap.com/investments/northern-dynasty-minerals-ltd-nak/

11 https://www.sec.gov/Archives/edgar/data/1164771/000106299317001035/exhibit99-1.htm

It is unusual for a development of this scale not to have a proper feasibility study at this stage. A feasibility study demonstrates in detail whether a mine plan for a deposit is economically viable. We have reviewed 870 copper-development projects, of which 59% had either a feasibility or prefeasibility study.[12] Why hasn't NAK done one? Tom Collier, CEO of the operating entity, Pebble Partners, told Frontline that the company did not have the money to pay for one.[13] A feasibility study costs between 0.5% and 1.5%[14] of the capital costs of a mine, which for NAK would be approximately $20 - $80 mln. We believe the current cost would be in the lower range, as most of the project has working drawings, making costing fairly straightforward. NAK has spent $1 bln on developing the mine to date. NAK recently completed a capital raise of $35.3 mln on July 15, 2020 and did not include a feasibility study in the use of funds.[15] NAK could easily afford to complete a feasibility study but chooses not to: we think management knows the outcome will demonstrate that the mine will not make money.

Mining majors AAL and RIO may have known of the negative return to be expected if there is an attempt to mine this deposit, which lies in a fragile wetland upstream of a key salmon fishery in Bristol Bay, Alaska. It had to be painful for them to walk away from sunk costs of $0.5 billion.

Only 5% of the deposit is proven to be economically viable (see Appendix 1).[16] The new mine plan will mine 1,300 mln tons, or 12% of the deposit, mainly the portion of the deposit that is not proven to be economically viable.[17]

---

12 We reviewed 870 copper development studies over the past 40 years sourced from S&P Global of which 411 were unique properties.

13 https://www.pbs.org/wgbh/frontline/article/alaska-pebble-mine-bristol-bay/

14 See page 73 of https://www.stantec.com/content/dam/stantec/files/PDFAssets/2014/Hard%20Rock%20Miner's%20Handbook%20Edition%205_3.pdf

15 https://www.sec.gov/Archives/edgar/data/1164771/000106299320002723/formf10.htm

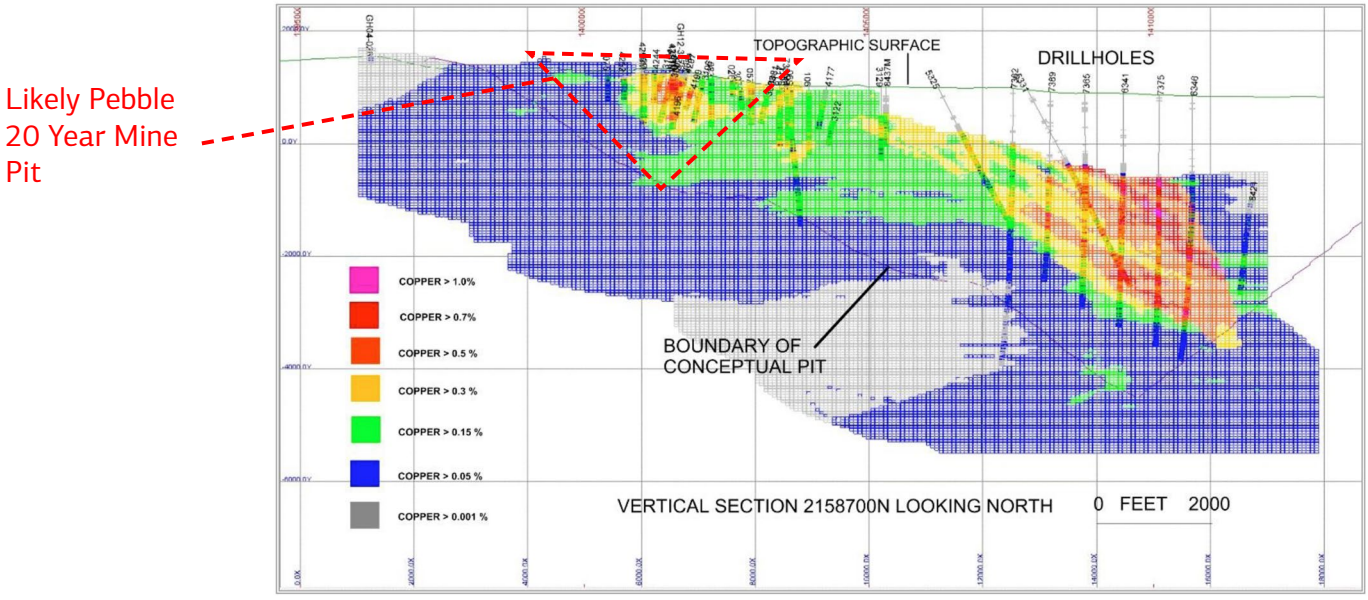
16 See response to RFI 070 at https://www.pebbleprojecteis.com/documents/eis where the company states it had spent $851 million up to 9/5/2018 and we estimate the company has spent approximately $100 mln since that date making total spent on development to date of $951 million.

17 The mine cut-off grade for copper is 0.29% and gold is 0.27% g/t lower than the economically viable "measured mineral resource" and a strip ratio of 0.11:1 indicates it is the portion of the deposit right on the surface. The mine will be low grade ore near the surface that is part of the inferred mineral resource which by definition has unknown economic viability. https://www.pebbleprojecteis.com/documents/finaleis

The blue and green areas in the cross section below indicate contained copper of less than 0.15% and 0.05% respectively—economically a no-go. NAK makes it very clear in all its reports filled with the SEC that it has no known body of economic viable mineralization.[18]

Chart 4. Cross section of Pebble deposit showing new mine area

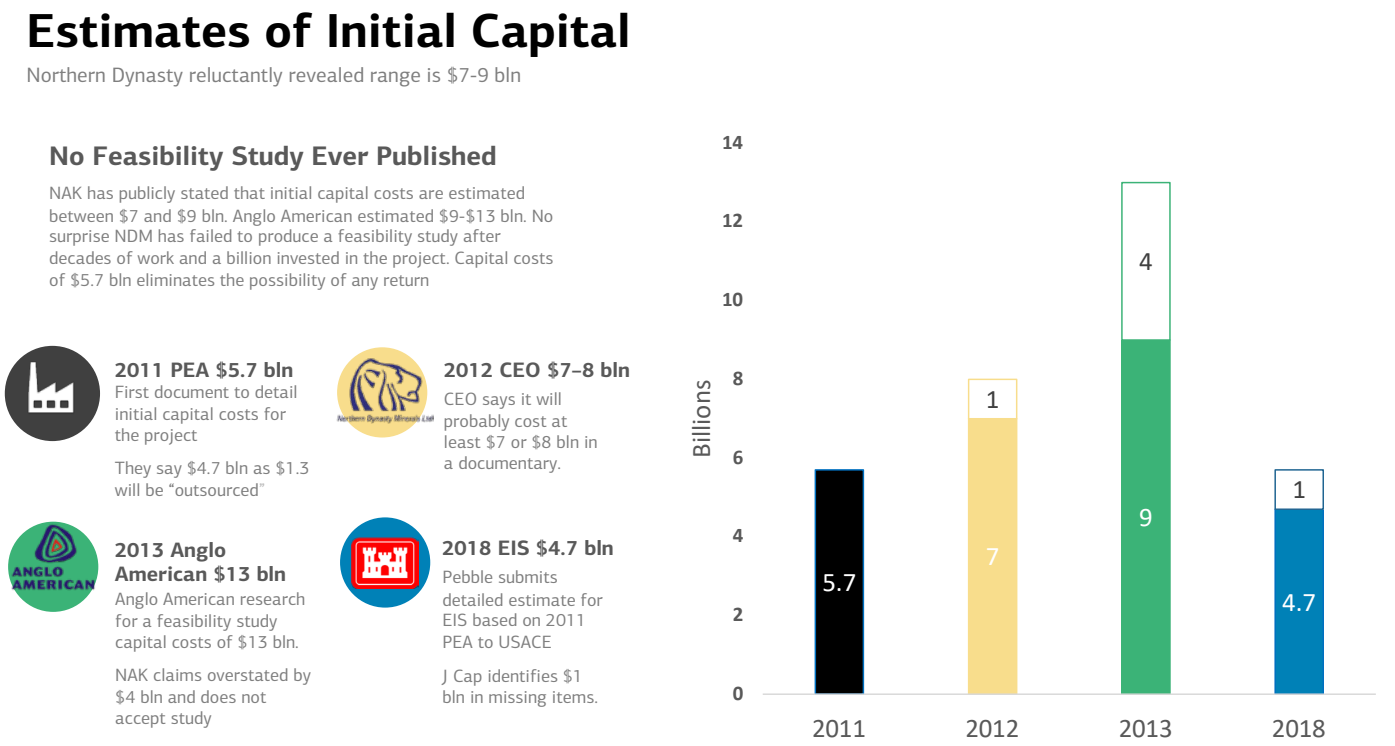
Figure 14.11-1 Pebble Deposit Vertical Section 2158700N Block and Composite Copper Grades; Section Line Location Shown in Figure 7.3.1



Source: Technical Report on Pebble 2018

18 See for instance 6K filled on August 18, 2020.

Chart 5. Project killer: spiraling capital costs



Source: J Capital

In 2019, as part of the environmental impact statement process, Richard Borden, a former senior manager at Rio Tinto, made a series of submissions to the USACE that are highly critical of the Pebble mine plan's economic viability.[19] The Borden analysis, carried out for mine opponent the Natural Resources Defense Council, came up with significantly higher capital (an extra $1.3 bln) and post-closure costs ($4.5 bln) than the company had forecast.[20] In response, Pebble's Tom Collier was irate: "He's wrong, and he didn't look at a single piece of real information," Collier said. "The man made up assumptions and looked at data from years ago. Update the metals to realistic metals prices, and what you find is that it adds 7 billion dollars. He made negative assumptions across the board." Collier said the mine under consideration is "night and day" from the 2011 scenario.[21]

---

19 The key Borden document summarizing his submissions to the USACE is Pebble Mine Draft Environmental Impact Statement Summary Comments

20 Borden's Post Closure Reclamation and Wastewater Costs Analysis and Pebble Mine Project Economics

21 https://www.pbs.org/wgbh/frontline/article/alaska-pebble-mine-bristol-bay/

> Yet Pebble itself in 2018 relied on its 2011 scenario to argue that the mine is economically viable. The USACE asked Pebble for modeling on the economic viability of the proposed mine. In response, Pebble provided analysis based entirely on the 2011 scenario.[22]

Chart 6. NAK new mine capital costs and NPV

Initial Capital Costs of New Mine

Calculated from Initial Capital Costs of Old Mine in 2011

Table 1 - Project Capital ($millions)					
Area	**Adjustment**	**Small (50k) Project**	**Proposed (180k) Project**	**2011 PEA (220k) Project**	**Big (320k) Project**
Mining	6/10 rule	177	382	**431**	539
Process	6/10 rule	435	938	**1,058**	1,325
Moly Seperation	Not in Proposed Project	0	0	**84**	0
Secondary Gold Plant	Not in Proposed Project	0	0	**161**	0
Other Infrastructure	Fixed	422	422	**422**	422
Tailings	Fixed	294	294	**294**	294
Concentrate & Fuel (Diesel) Pipelines	Not in Proposed Project (Required for Big Project)	0	0	**98**	98
Access Road	Fixed	162	162	**162**	162
Port Infrastructure	Fixed	155	155	**155**	155
Port Process	Not in Proposed Project (Required for Big Project)	0	0	**87**	109
Power Generation	50% scaled (powerplant), 50% fixed pipeline	377	504	**534**	601
Total Direct		**2,021**	**2,856**	**3,484**	**3,705**
Indirect Costs	40% of Directs	809	1,143	**1,407**	1,482
Contingency	18% of Total	509	720	**866**	934
Total Capital		**3,339**	**4,719**	**5,757**	**6,120**

Gold and copper prices increased 20% over 2011 model while costs not changed to deliver NPV of $1bln

Table 4 Financial Metrics			
Metric	**Small (50k) Project**	**Proposed (180k) Project**	**Big (320k) Project**
Mine Life	71	20	11
Cashflow	115,839	7,714,243	8,186,378
NPV(7%)	(2,301,785)	1,028,388	2,257,666
IRR	0%	10%	13%

Source: Pebble response to RFI 059 made by the USAEC

22 RFI 059 and the updated model for the capital costs and NPV

Table 1. Initial Capital Costs and Missing Costs ($ millions except where noted)

Item	Original Plan (PEA 2011)	New Mine (2018)	New Mine J Capital Est
Processing capacity tons/day	220k	180k	180k
Processing	1,057	938	938
Secondary Gold Plant	161	-	
Port Processing	87	-	
Other Infrastructure	422	422	422
Tailings	294	294	294
Access Road	162	162	162
Port Infrastructure	155	155	155
Power Generation	534	504	504
Mining	431	382	382
Additional mining costs			49
Molybdenum Separation	84	-	
Adding back Moly Sep			84
Pipelines	98	98	98
Additional Pipeline Cost			414
Total Direct	3,484	2,954	3,501
Indirect Costs	1,407	1,182	1,182
*Additional Indirect costs @ 40% direct costs (49+84+414)*0.4*			219
Contingency	866	720	720
*Additional Contingency Costs @ 18% of total costs (49+84+414+219)*0.18*			162
Total	5,757	4,719	5,783
Total Additional Costs			1,064

Source: Preliminary Economic Assessment 2011, NAK Response to Request for Information 059

The gaping holes in the NAK 20-year plan:

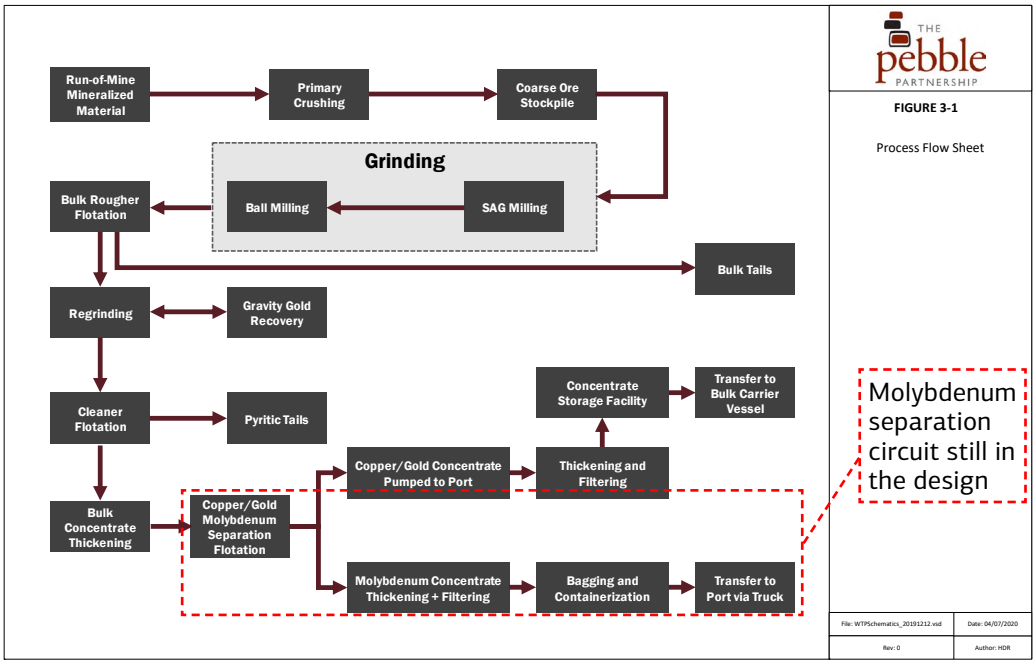
- Pipeline additional costs: $414 mln. NAK's pipeline estimate remains at $98 mln though the pipeline was extended from 86 miles to 164 miles. We have used the current pipeline project average cost per inch of $260,000 to estimate the construction cost at $511 mln (260,000 x 12 x 164).[23] We consider this method conservative, as there are actually three pipes over half the length: natural gas, concentrate, and wastewater. By conservative estimate, the pipeline's extension adds $414 mln.

- Mining costs: $49 mln. The new mine has similar specifications to the old. We therefore have added back all of the reduced mining costs.

- Molybdenum separation plant: $84 mln. This was removed from the cost estimate of Pebble, but the process is still in the mine plan, so we added it back.

- Indirect and contingency cost increase: $420 mln. Additional contingency and indirect costs that flow from the above.

Chart 7: Molybdenum separation plant still in the design



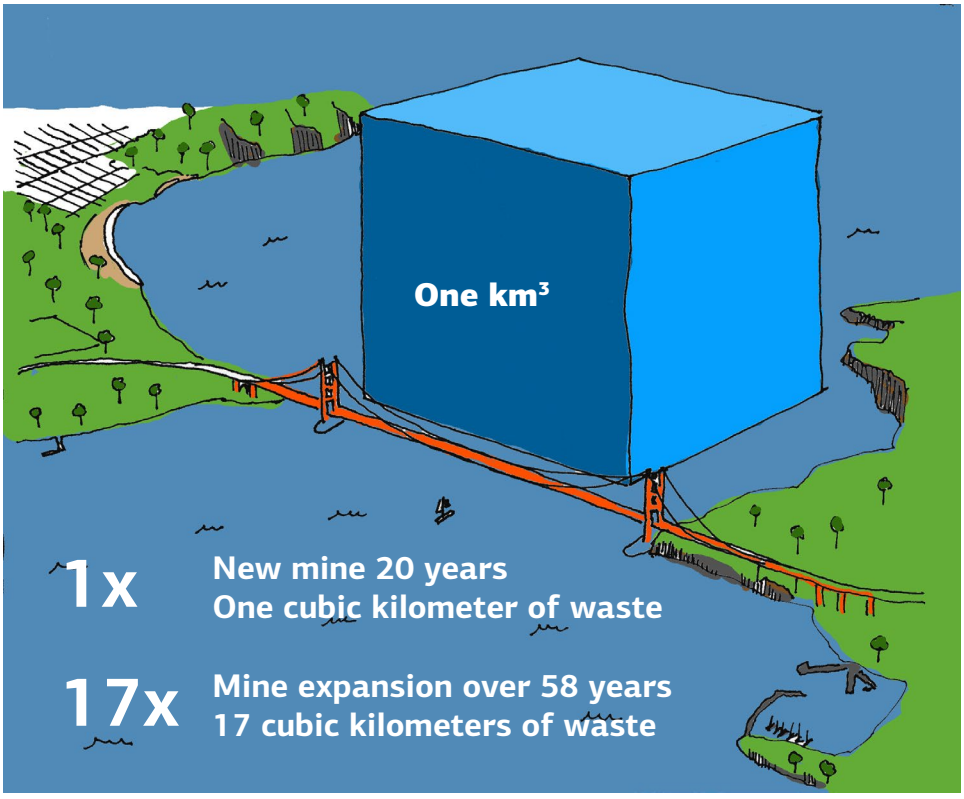
Source: Pebble Project Description May 2020

23 The Interstate Natural Gas Association of America https://www.ingaa.org/File.aspx?id=34658

Why the mine will never be extended

Expanding the mine past year 20 would require an exponential increase in waste.[24] NAK's own permit application indicates that, following the 20-year mine, the next 58 years would generate 22.3 bln tons of waste, approximately 22x the waste by weight of the 20-year mine. Cyanide would most likely be used in processing in the expansion. There is no question this level of waste will devastate the wetlands, pollute the waterways and decimate fish stocks.

One cubic kilometer of waste



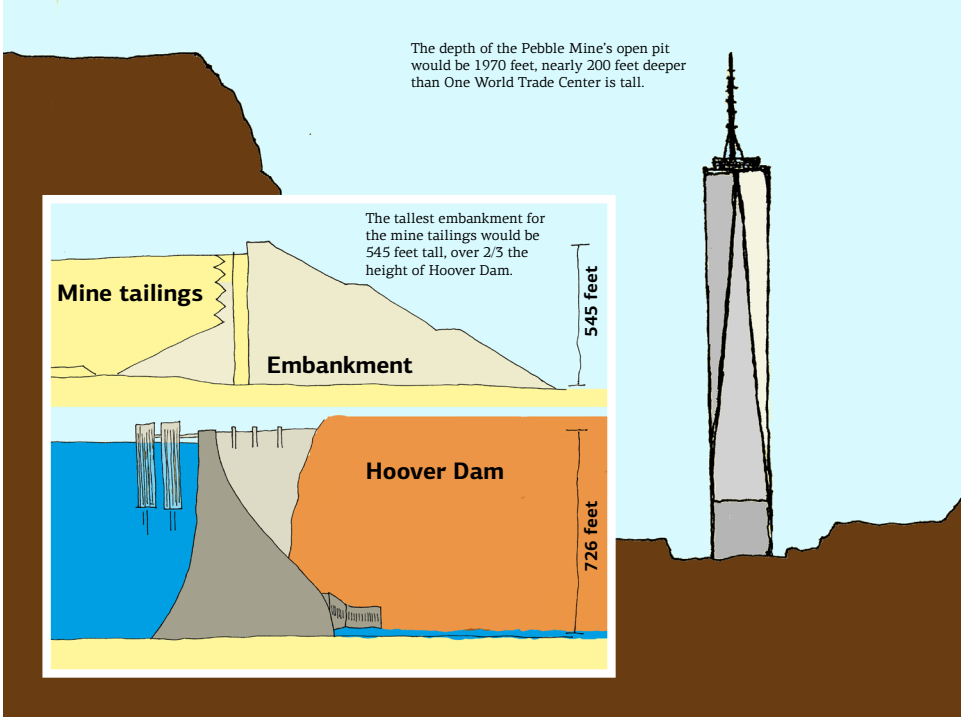
Visualisation of waste produced by Pebble compared to the Golden Gate Bridge

We do not believe such an expansion will ever be permitted. The environmental impact statement for the 20-year plan only squeaked by with the support of Republican politicians. A mine extension of just 25 years would produce at least eight times more waste and 11 times more toxic waste than in the first 20 years. We believe it could be even higher: the first 20 years plan a strip ratio of 0.11:1, and so the strip ratio of any extension is

24 See Pebble response to RFI 062 referenced above the waste for the next 58 years would be 22.3 bln tons which is approximately 22x the waste of the 20-year mine, Cyanide would most likely be used in processing in the expansion. See also https://inletkeeper.org/2019/03/05/pebble-lies-lobbyists/

likely to be higher than the 2.1:1 of the 45-year mine plan in 2011. Otherwise, you could not extract the promised minerals. The higher the strip ratio, the more waste.

Mine size and waste storage



Mine depth and embankment scale comparison

Table 2. Waste Rock and Toxic Waste Rock Produced by Proposed Pebble Mine

	New Mine 20 Year (2018)	Original Mine 25 Year (2011)	Original Mine 45 Year (2011)	Original Mine 78 Year (2011)
Mine Life Years	20	25	45	78
Strip Ratio	0.11	1.5	2.1	2.6
Total Processed Ore	1,300	1,990	3,767	6,528
1. Waste Rock	143	2,985	7,911	16,973
2. Tailings	1,079	1,652	3,127	5,418
Total Waste 1+2	**1,222**	**4,637**	**11,037**	**22,391**
a) Acid Generating Waste Rock (20% of Waste)	29	597	1582	3395
b) Pyritic Tailings (12% of tailings)	129	198	375	650
Total Toxic Waste a+b	**158**	**795**	**1,957**	**4,045**

Source: Preliminary Economic Assessment 2011, Technical Report 2018, Pebble Project Description. 12% of Pyritic tailings is from Technical Report 2018 and applied to 2011 data, 20% acid generating waste rock from PEA 2011 and applied to 2018 data.

Chart 8. Comparison Waste Produced in First 20 Years vs Next 25 Years

Source: Preliminary Economic Assessment 2011, Technical Report 2018, Pebble Project Description. Next 25 years is total waste from 45 year mine less waste from 20 year mine.

Wastewater Treatment Forever

NAK did not include any mine-closure costs in its NPV analysis in the 2011 PEA or in estimates submitted to the USAEC. We estimate the reclamation and water treatment costs at the time of closure will be $1.78 bln. That creates a drag on NPV of $0.46 bln. When the mine is closed, structures will be demolished, hundreds of millions of tons of waste will be moved back into the pit, and wastewater will have to be treated for centuries. The power plant, gas pipeline, roads and camps will remain open indefinitely to treat the wastewater.

Chart 9. Water treatment for centuries

Operations					
Month	Total Release from WTPs (cfs)				
	1st Percentile	10th Percentile	50th Percentile	90th Percentile	99th Percentile
Jan	3	10	23	37	45
Feb	3	4	23	36	47
Mar	3	3	16	31	48
Apr	3	4	11	29	42
May	7	16	28	37	51
Jun	18	29	37	45	53
Jul	8	27	40	48	53
Aug	12	28	39	48	53
Sep	20	29	40	48	53
Oct	13	26	36	48	53
Nov	6	25	32	40	53
Dec	5	16	27	38	50
Annual Average	8	18	29	41	50

Post closure water treatment rates

We used the base case average water treatment costs post-closure in the EIS to calculate the costs of treatment.

- Phase 1 (15 years) 57 cubic feet per second (cfs)
- Phase 3 (30 years) 35 cfs
- Phase 4 (centuries) 13 cfs

Closure Phase 1					
Month	Total Release from WTPs (cfs)				
	1st Percentile	10th Percentile	50th Percentile	90th Percentile	99th Percentile
Jan	6	40	50	57	65
Feb	6	18	49	53	64
Mar	5	8	49	50	65
Apr	4	6	49	52	65
May	35	55	62	65	67
Jun	52	61	66	67	68
Jul	38	54	65	67	67
Aug	46	56	65	67	67
Sep	55	57	65	67	67
Oct	21	52	62	66	67
Nov	20	50	54	64	67
Dec	7	50	50	63	67
Annual Average	25	42	57	62	66

Closure Phase 2					
Month	Total Release from WTPs (cfs)				
	1st Percentile	10th Percentile	50th Percentile	90th Percentile	99th Percentile
Jan	0	0	0	0	0
Feb	0	0	0	0	0
Mar	0	0	0	0	0
Apr	0	0	0	0	0
May	0	0	0	0	0
Jun	0	0	0	0	0
Jul	0	0	0	0	0
Aug	0	0	0	0	0
Sep	0	0	0	0	0
Oct	0	0	0	0	0
Nov	0	0	0	0	0
Dec	0	0	0	0	0
Annual Average	0	0	0	0	0

Closure Phase 3					
Month	Total Release from WTPs (cfs)				
	1st Percentile	10th Percentile	50th Percentile	90th Percentile	99th Percentile
Jan	3	4	31	44	52
Feb	3	3	31	34	46
Mar	3	4	9	31	52
Apr	2	2	10	33	43
May	14	38	43	44	52
Jun	35	44	44	45	52
Jul	12	39	44	50	52
Aug	23	41	44	52	52
Sep	35	43	44	52	52
Oct	5	35	44	52	52
Nov	3	26	40	51	52
Dec	3	4	31	46	52
Annual Average	12	24	35	45	51

Closure Phase 4					
Month	Total Release from WTPs (cfs)				
	1st Percentile	10th Percentile	50th Percentile	90th Percentile	99th Percentile
Jan	2	2	5	19	24
Feb	2	2	5	10	19
Mar	2	2	5	5	23
Apr	1	1	5	10	18
May	8	15	18	19	23
Jun	10	18	18	20	24
Jul	0	14	18	23	29
Aug	8	17	18	23	33
Sep	11	19	18	21	27
Oct	1	13	19	20	26
Nov	2	5	17	19	25
Dec	2	2	5	19	24
Annual Average	4	9	13	17	25

Source: Final EIS Surface Water Hydrology Appendix K4.16 see Table K4.16-19 and EPA REFERENCE GUIDE to Treatment Technologies for Mining-Influenced Water 2014

Table 3. Closure Costs: Reclamation and Wastewater Treatment

	Material Moved MT	Cost/T	Cost
Material Movement			
Pyrite tailings to pit	129	1.5	194
Drainage through pyrite TSF and WMP	60	1.5	90
PAG to Pit	29	1.5	44
Bulk TSF recontouring	25	1.5	38
Cover bulk TSF	10	1.5	15
Topsoil placement	4.5	1.5	7
Material Movement Cost			**386**
Other Reclamation Costs			
Infrastructure demolition			20
Modification/Construction WTP			30
Access road and gas pipeline maintenance			40
Environmental monitoring			60
Other Costs			**150**
Water Treatment Costs			
Direct Water treatment costs discounted to mine closure date			$854
Total Direct Costs			$1,391
Indirect costs at 28%			$389
Total Closure and Reclamation Costs			**$1,780**

Source: Borden submission on reclamation and wastewater treatment, 2018 Technical report, 2011 PEA, Pebble Reclamation and Closure plan and Final EIS Surface Water Hydrology Appendix K4.16 see Table K4.16-19

When the "forgotten" closure and reclamation costs are added to the NPV calculation, the project has a negative NPV of $0.46 bln.

Table 4. Conceptual NPV for New Mine

	NPV (billion)
Estimated NPV of the New Mine (Pebble estimate)	$1.00
Additional Initial Capital Cost of Pipeline	-$1
Refined perpetual water treatment costs	-$0.46
Conceptual NPV of the New Mine Plan	**-$0.46**

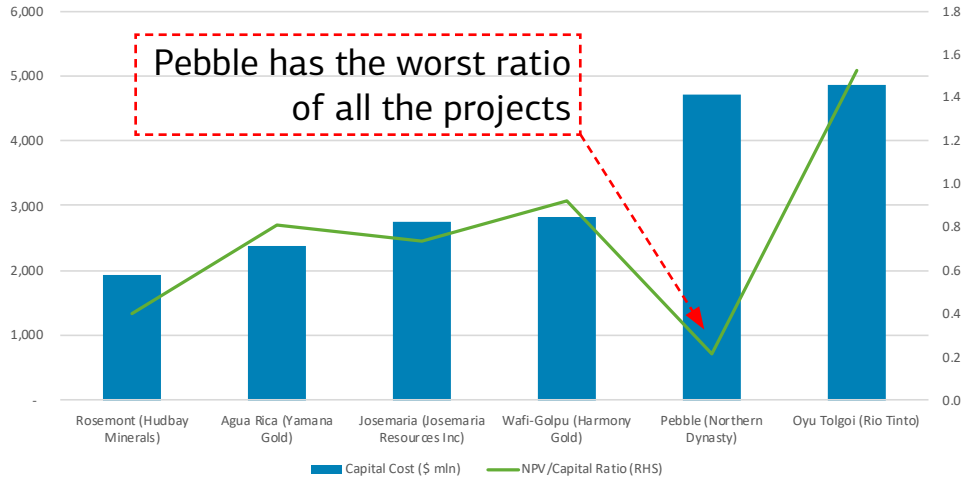
Source: J Capital and RFI 059

Comparable Mine Projects: Better Value Elsewhere

Other copper projects under development provide better returns and require less capital. We reviewed large-scale copper projects (expected to produce more than 100,000 metric tonnes of copper per year) currently being developed to compare with Pebble.[25] We included RIO's Oyu Tolgoi to reference a recent project that has been completed. Each one of these projects has a full feasibility study or prefeasibility study, which means they are economically minable. As a rule of thumb, we can see projects have an NPV-to-capital ratio of around 1. For each $1 of capital you will get $1 NPV. We have used Pebble's own capital costs and NPV and the ratio is only 0.2, or for every $1 of capital invested you will get $0.20 of NPV.

Four of the largest copper mining companies in the world AAL, RIO, Mitsubishi Corporation (8058 JP) and First Quantum Minerals (FM TO) have

Chart 10. Capital Costs and NPV/Capital Ratio



Source: S&P Global Market Intelligence

25 Each project's NPV was calculated with a discount rate of 7% of greater. NAK's NPV was calculated with a discount rate of 7%.

invested in Northern Dynasty over the years and all of them chose to walk away. There are many better options than NAK's Pebble deposit.

Trump met Dunleavy on Air Force One at a military base in Alaska on his way to Japan. The next day the EPA lifted restrictions on the Pebble mine.[27] Source: Sheilah Craighead, White House June 26, 2019

Political Jeopardy

"It is no place for a mine." Joe Biden Aug 9, 2020[26]

We believe even if this new mine plan is approved, the project faces near certain cancellation on environmental grounds. Joe Biden could not have been more explicit in his view of the mine when he said a few weeks ago:

> "Bristol Bay has been foundational to the way of life of Alaska Natives for countless generations, provides incredible joy for recreational anglers from across the country, and is an economic powerhouse that supplies half of the world's wild sockeye salmon. It is no place for a mine. The Obama-Biden Administration reached that conclusion when we ran a rigorous, science-based process in 2014, and it is still true today. The only reason we are still debating whether Pebble Mine should move forward is because hours after

26 https://medium.com/@JoeBiden/statement-by-vice-president-joe-biden-on-bristol-bay-1a83d60a2986

27 https://edition.cnn.com/2019/08/09/us/epa-alaska-pebble-mine-salmon-invs/index.html and https://www.epa.gov/newsreleases/epa-withdraws-outdated-preemptive-proposed-determination-restrict-use-pebble-deposit

> former EPA Administrator Scott Pruitt met with a mining executive behind closed doors, the Trump Administration reversed our thoughtful decision. Now, Alaskan culture, traditions, and jobs are on the line. As President, I will do what President Trump has failed to do: listen to the scientists and experts to protect Bristol Bay — and all it offers to Alaska, our country, and the world."[28]

Last week, investors got a taste of what is likely to happen if Democrats win the White House in November: the stock fell by nearly 45% in a single day when Politico reported that the Trump Administration would block the project, and Donald Trump Jr. expressed his opposition. That turned out not to be true: Politico took a regulatory request for information on environmental mitigation for a plan to block the mine.[29] Shares bounced back.

Both federal and state governments clearly have the power to veto a Pebble mine regardless of any approved permits.[30] Currently, both are Republican governments that strongly support Pebble, but one election could change that.

---

28 https://medium.com/@JoeBiden/statement-by-vice-president-joe-biden-on-bristol-bay-1a83d60a2986

29 https://www.northerndynastyminerals.com/site/assets/files/4855/2020-08-24-nr2-ndm.pdf

30 https://ballotpedia.org/Alaska_Bristol_Bay_Mining_Ban,_Ballot_Measure_4_(2014) and http://www.akleg.gov/basis/statutes.asp#38.05.142

Appendix I. Pebble Deposit

Pebble Deposit (Copper Cu, Gold Au): Only 5% Proven Economically Feasible

Canadian Institute of Mining Terms	Description	Pebble Grade	Pebble DepositMT	Proven Economically Feasible
Inferred Mineral Resource	Est from limited samples cannot be used in Pre-Feasibility or Feasibility studies	0.25% Cu, 0.25% g/T Au	4,460	
Indicated Mineral Resource	Can be used in pre-feasibility	0.41% Cu, 0.34% g/T Au	5,912	
Measured Mineral Resources	Est confidence for feasibility and economic viability	0.3% Cu, 0.35% g/T Au	527	5%
Total Inferred, Indicated and Measured Resource			10,899	
Probable Mineral Reserves	Economically mineable		nil	
Proven Mineral Reserve	Economically mineable with higher confidence		nil	

Source: Technical Study 2018, Pebble Project Description 2018,

Appendix II. Original vs New Mine Plan Minerals Produced 50% Less

	New Mine	Old Mine	New/Old
Ore Mined MT	1,300	1,990	65%
Copper Grade	0.29%	0.38%	76%
Copper Recovery Rate	87.6%	86.6%	101%
Copper Total Production (pounds, 000)	6,601	13,097	50%
Gold Grade	0.27 grams/ton	0.34 grams/ton	79%
Gold Recovery Rate	55.80%	71.50%	78%
Gold Production oz	6,908,695	17,064,468	40%
Molybdenum Production M lb	316	616	51%

Source: Project Plan 2020, Technical Plan 2018

Disclaimer