TECHNICAL MEMORANDUM

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PROJECT No. 09-1221-3019/5000

TO Mr. Ian Hanks
Dundee Precious Krumovgrad B.V

DOC. No. 001

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CONCEPTUAL SITE WATER BALANCE MODEL FOR DUNDEE PRECIOUS KRUMOVGRAD, BULGARIA

Dundee Precious Krumovgrad B.V. (Dundee) is presently developing a gold mining project in the vicinity of the town of Krumovgrad, Bulgaria. Dundee has requested Golder Associates Ltd. (Golder) to develop a site wide water balance model to assist with planning for the proposed gold mining project. This technical memorandum presents the conceptual water balance framework, assumptions and input parameters used in the site water balance model. The objectives of the site wide water balance model are the following:

- Evaluate the Raw and Process Water Reservoir design under average conditions.
- Estimate any water shortages that require external freshwater makeup.
- Estimate water discharges from the Raw and Process Water Reservoir to the environment.

1.0 CONCEPTUAL WATER BALANCE FRAMEWORK

The following presents the conceptual water balance framework developed for the site wide water balance model. In order to model a range of conditions the model assumes that the Krumovgrad Mine has a nine year mine life with a constant mine production rate of 850,000 tonnes per year (tpy).

1.1 Water Balance Assumptions

The following presents an overview of the assumptions made in the site wide water balance development:

- Precipitation distributions for all types of years are distributed based on the average year distribution.
- Precipitation on the integrated mine waste area will infiltrate through the waste and contribute to collection sumps as seepage inflows.
- The collection sumps are assumed to be operated in an empty condition.
- The collection sumps and the Raw and Process Water Reservoir are empty at the start of the simulation.

- The collection sumps and the Raw and Process Water Reservoir were modeled assuming no seepage losses from the model.
- Seepage and Runoff from the IMWF and Ade Tepe pit is assumed to have adequate water quality for use as process water at the Processing Mill after being pumped through the Raw and Process Water Reservoir.
- The Raw and Process Water Reservoir is modeled as a fully lined impoundment with only evaporation and makeup water extraction for the process plant. Any water excess to the process requirements is assumed to be a surplus that can be treated for discharge.
- Mine operation requires a combination of freshwater and recycled water from the following sources:
  - Process water requirements are satisfied entirely from the Raw and Process Water Reservoir; and
  - Freshwater makeup will be pumped to The Raw and Process Water Reservoir when water levels reach the equivalent of three months of mill process requirements.
- The water released from the consolidation of deposited tailings is based on an annual production rate of 850,000 tons per year and a tailings solids contents of 56%.
- Runoff from the plant site area is assumed to report to the South Collection Sump.

1.2 Water Balance Features

The water balance features have been grouped into three main categories:

- Water collection facilities and sources (Raw and Process Water Reservoir, Ade Tepe Open Pit, and External Freshwater makeup);
- Integrated Mine Waste Management Facility; and
- Process Plant.

Figure 1 shows the conceptual water balance flow diagram and Table 1 describes the individual flow components.

Table -1: List of Water Balance Flow Components

Area	Flow Number	Description
Flows associated with ore processing and tailings production (PR)	PR1	Process Water from Raw and Process Water Reservoir to Process Plant
	PR2	Tailings from Process to North Catchment IMWF
	PR3	Tailings from Process to South Catchment IMWF
Pumped Flows (P)	P1	Water from North Collection Sump to Raw and Process Water Reservoir
	P2	Water from South Collection Sump to Raw and Process Water Reservoir
	P3	Water from Ade Tepe Pit Sump to Raw and Process Water Reservoir
	P4	Water from External Fresh Water Sources to Raw and Process Water Reservoir
	P5	Water from External Fresh Water Sources to Raw and Process Plant
Direct Precipitation (DP)	DP1	Direct Precipitation on North Catchment IMWF
	DP2	Direct Precipitation on North Collection Sump
	DP3	Direct Precipitation on South Catchment IMWF
	DP4	Direct Precipitation on South Collection Sump
	DP5	Direct Precipitation on Ade Tepe Pit Sump
	DP6	Direct Precipitation on Raw and Process Water Reservoir
	DP7	Direct Precipitation on Plant Site Area
Runoff (RO)	RO1	Runoff from North Catchment IMWF to North Collection Sump
	RO2	Runoff from South Catchment IMWF to South Collection Sump
	RO3	Runoff from Ade Tepe Pit Catchment to Pit Sump
	RO4	Runoff from Plant Site Area to South Collection Sump
Evaporation (E)	E1	Evaporation from North Collection Sump Surface
	E2	Evaporation from South Collection Sump Surface
	E3	Evaporation from AdeTepe Pit Sump Surface
	E4	Evaporation from Raw and Process Water Reservoir Surface
Seepage (S)	S1	Seepage from North Catchment IMWF to North Collection Sump
	S2	Seepage from South Catchment IMWF to South Collection Sump
	S3	Seepage from Groundwater to AdeTepe Pit Sump
Tailings Water Release	T1	Tailings Release from North Catchment IMWF to North Collection Sump
	T2	Tailings Release from South Catchment IMWF to South Collection Sump
Discharge (M)	M1	Discharge

2.0 WATER BALANCE MODEL

The water balance model was developed based on the conceptual water balance framework described above and in the flow diagram presented in Figure 1. The following section provides a brief description of the input parameters and assumptions that were used in the modeling exercise.

2.1 Input Parameters and Assumptions

The water balance model was developed using the GoldSim simulation environment; a graphical, object oriented software platform. The model will simulate the water management processes at the mine from start of operations through to the end of mine life. The mine construction, closure and post closure states will not be included at this time.

2.1.1 Simulation Parameters

The model will be run with daily time steps for a nine year mine operating period. Table 2 presents the general modeling parameters and assumptions.

Table -2: Water Balance Model Input Parameters and Assumptions – General Table

Variable/Parameter	Value	Comment/Assumptions
Simulation Duration	Year 0 to Year 9	Selected from start to end of mine processing operations.
Number of Timesteps	3288	Based on daily time-steps. Results, however, will be shown on a monthly basis and summarized on an annual basis.

2.1.2 Climate Parameters

The climate at the project site is typical of a Continental-Mediterranean climate with mild winters and hot summers. The monthly average temperatures vary between +1.3 °C in January to +23.7 °C in July (Ausenco, 2005). The average daily maximum between December and February is between +6 °C to 8.6 °C, however, during cold periods the temperatures can fall to -13 °C. During summer warm periods, the temperatures can exceed 36 °C.

Local daily rainfall data was recorded at the Krumovgrad meteorological station over a 30-year period between 1974 and 2003 (Golder, 2009). The water balance model will be developed using average climate conditions, as outlined in Table 3 below which presents the average monthly rainfall, lake evaporation, and runoff coefficients (Golder, 2009).

Lake evaporation was estimated from the pan evaporation data presented in Golder (2009) using a coefficient of 0.8 (Ausenco, 2005).

Table 3: Monthly Average Precipitation, Lake Evaporation and Runoff Coefficients

Month	Precipitation (mm)	Lake Evaporation (mm)	Natural Ground Runoff Coefficient
January	63.4	26	0.89
February	69.9	30	1.01
March	65.9	42	0.84
April	63.4	62	0.62
May	59.1	81	0.38
June	46.4	103	0.24
July	38.4	140	0.13
August	24.1	132	0.08
September	41.6	95	0.12
October	51.1	60	0.14
November	83.3	40	0.30
December	96.9	29	0.64
Total	**703.5**	**841**	*N/A*
Average	*N/A*	*N/A*	**0.45**

Table 4 presents the precipitation frequency analysis results for the annual wet and dry years (Golder, 2009).

Table -4: Annual Precipitation

Return Period	Annual Precipitation (mm)	
	Wet Years	Dry Years
1:2 years	687.9	
1:5 years	829.6	570.7
1:10 years	914.0	519.6
1:25 years	1012.8	474.1
1:50 years	1081.8	450.2
1:100 years	1147.5	432.8

Table 5 presents the estimated 24-hour rainfall events for different return periods (Golder, 2009). These values are considered to be conservative (Golder, 2009).

Table -5: Frequency Analysis Summary for the 24-hour Rainfall Event

Return Period (years)	24-Hour Rainfall Event (mm)
2	56.6
5	73.0
10	84.6
20	96.4
50	112.6
100	125.6

Table 6 presents the water balance model input parameters and assumptions for climate and runoff generation in the model.

Table -6: Water Balance Model Input Parameters and Assumptions - Climate/Runoff Generation

Variable/Parameter	Value	Source	Comment/Assumptions
Daily Precipitation	Lookup Table	Golder, 2009	Deterministic daily precipitation is based on an average monthly precipitation distribution and yearly total precipitations (see Table 3).
R_c Undisturbed Area	Lookup Table	Golder, 2009	Monthly runoff coefficients applied to the natural ground and undisturbed areas. Accounts for losses due to evaporation, storage, infiltration, etc (see Table 3).
Rc Integrated Mine Waste Facility	0.6 to 0.8		Assumed: The ratio of precipitation infiltrating through the IMWF that contributes to IMWF seepage is assumed to vary seasonally between 0.6 (May to October) and 0.8 (November to April) to account for losses due to evaporation, storage, infiltration, etc.
R_c Water surface	1.0		Assumed: Average annual runoff coefficient applied to the pond surface (Direct precipitation).
R_c Pits	0.9		Assumed: Average annual runoff coefficient applied to the open pit areas. Accounts for losses due to evaporation, storage, infiltration, etc.
R_c Plant Site	0.8		Assumed: Average annual runoff coefficient applied to the plant site areas. Accounts for losses due to evaporation, storage, infiltration, etc.

Runoff in the water balance model is estimated according to catchment types. The following catchment types have been assumed:

- Undisturbed areas – represent areas of undisturbed natural growth;
- Waste areas – represent areas where tailings and waste rock have been placed, or the areas that have been prepared for placement;
- Water surface areas – represent water surface areas;
- Pit areas – represent the open pit footprint areas (Ade Tepe pit); and
- Plant Site area- represents a combination of gravel surfaces and infrastructure.

The catchment areas are summarized in Table 7 by catchment type contributing runoff at each water balance feature.

Table - -7: Catchment Areas per Catchment Type for Site Water Balance Features

Area	Undisturbed Area	Waste area	Pond Surface	Pits	Plant Site Area
Ade Tepe Pit	0.0	0.0	334 m^2	81,668 m^2 to 157,905$m^{2(a)}$	0.0
Reclaim Pond	0.0	0.0	Varies with water level	0.0	0.0
North Collection Sump's Watershed	Varies with Mine Life (20.6 ha to 3.7 ha)	Varies with Mine Life (0 to 16.9 ha)	334 m^2	0.0	0.0
South Collection Sump's Watershed	Varies with Mine Life (34.8 ha to 6.4 ha)	Varies with Mine Life (0 to 28.4 ha)	334 m^2	0.0	0.0
Plant Site Area	0.0	0.0	0.0	0.0	1.45 ha

(a) Pit Areas by Year are shown in Figure 2.

2.1.3 Water Collection Faculties and Sources

The water supply facilities consist of the Ade Tepe Pit, Raw and Process Water Reservoir, and External Freshwater supply. The Ade Tepe Pit collects seepage and runoff from the surrounding area and pumps the water to the Raw and Process Reservoir. The Raw and Process Water Reservoir is designed to collect runoff and process water from the site and either provide the process plant water requirements or discharge the water. The External Freshwater Supplies consist of possible groundwater wells, and the Krumvista River. If the water level drops in the Raw and Process Reservoir the freshwater pump will activate until the pond volume reaches a volume equal to a three month water supply for the process plant. Additionally, the external freshwater sources will provide the fresh and potable water requirements of 7.2 m3/hr. Table 8 presents the water balance input parameters and modeling assumptions for the Ade Tepe Pit, the Raw and Process Water Reservoir, and External Water Sources.

Table -8: Water Balance Model Input Parameters and Assumptions – Ade Tepe Pit and Reclaim

Variable/Parameter	Value	Source	Comment/Assumptions
Pit Seepage	18,000 m^3/yr	Ausenco, 2005	Seepage assumed to be constant throughout the year and starts at the beginning of mine life.
Pit Sump Pump Capacity	30 m^3/hr		Ade Tepe sump pump capacities assumed to pump four weeks of the maximum monthly runoff volume from the average annual year plus groundwater over a three week period
Mine Pit Sump Capacity	2000 m^3		Collection sump is assumed to have a storage capacity of 2000 m^3, with a depth of 6 m, and a rectangular shape with a water surface area of 334 m^2.
Raw and Process Water Reservoir Storage-Elevation Curves	Lookup	Golder 2010	Storage-Elevation-Curves based on Option 2 Water Pond Location
Water Volume to start pumping freshwater	91,081m^3	Email communication from Dundee	Assumed to be the minimum volume for storage capacity required for 3 months of process plant operation
Freshwater pump to Raw and Process Water Reservoir	42.2 m^3/day		Assumed to be the minimum required size to meet all process plants demands

2.1.4 Integrated Mine Waste Facility

The Integrated Mine Waste Facility comprises the North and South Catchments that will store both Tailings and Waste Rock from mining operations. Additionally, two collection sumps will collect surface runoff, seepage, and Tailings Water Release from the IMWF area. Water collected in the collection ponds is pumped to the Raw and Process Water Reservoir where it is either treated and discharged to the environment or recycled back to the process plant. Table 9 presents the water balance input parameters and modeling assumptions for the IMWF.

Table -9: Water Balance Model Input Parameters and Assumptions – Tailings Management Facility

Variable/Parameter	Value	Source	Comment/Assumptions
North/South South Sump Pump Capacity	Varies		The North and South sump pump capacities are equal to the MWF underdrain design flow, sized to pass the peak flow from the 24-hour, 100-year precipitation event. This is Depended on the Tailings percentage solids
North/South Sump Capacity	2000 m^3		Each collection sump (North and South) is assumed to have a storage capacity of 2000 m^3, with a depth of 6 m, and a rectangular shape with a water surface area of 334 m^2
Tailings Release to Collection Ponds	Lookup Table		The water released from the consolidation of deposited tailings is based on an annual production rate of 850,000 tons per year assuming tailings water content 56%. Ratio of water released from North and South Catchments based on ratio of volumes of Waste Deposited in each Catchment
Maximum Tailings and Waste Rock Volume North	4104200 m^3		Total North Tailings Volume. Assumed to grow from 0 to full size throughout mine life
Maximum Tailings and Waste Rock Volume South	9577500 m^3		Total South Tailings Volume. Assumed to grow from 0 to full size throughout mine life
Total Tailings Water Release to Collection Ponds	414,000 m^3/year		The estimated annual volume of water released from consolidation of the deposited tailings for a tailings solids content of 56%

2.1.5 Processing Plant

The process plant water requirements are satisfied from the Raw and Process Water Reservoir. The tailings output is directed to the Integrated Mine Waste Facility. Table 10 presents the water balance input parameters and modeling assumptions for the IMWF.

Table -10: Water Balance Model Input Parameters and Assumptions – Processing Mill

Variable/Parameter	Value	Source	Comment/Assumptions
Production Rate	850,000 tpy	Ausenco, 2005	Production rate
Tailings % Solids (by Weight)	56%	Golder, 2010	The Tailings output is directed to IMWF
Total Process Water Requirements	68 m^3/hr	Email communication from Dundee	Water required from the Raw and Process Reservoir to meet the Process Plants Requirements
Process Freshwater Requirements	7.2 m^3/hr	Email communication from Dundee	Freshwater required from External Freshwater Sources to meet the Process Plants Requirements
Water in Ore	68,000 m^3/year	Ausenco, 2005	Water in ore feed to the Processing Mill at a production rate of 850,000 tpy

3.0 WATER BALANCE RESULTS

A total of six water balance scenarios where modeled and are described in Table 11 below. The scenarios were chosen to provide a range of required external freshwater flows and discharges to the environment.

Table -11: Water Balance Scenarios Modeled

Scenario	Tailing Solids Content	Precipitation Year
Scenario 1	56%	Mean annual year
Scenario 2	56%	100-year wet year
Scenario 3	56%	100-year dry year

The water balance is positive on an annual basis for Scenario 1 and Scenario 2 after the Raw and Process Water Reservoir is filled. However, there is a shortage of water throughout Scenario 3. The maximum freshwater requirement occurs at the beginning of operations while the maximum discharge to the environment occurs at the end of operations due to the increasing watershed of the Ade Tepe pit, and the volume and area of waste in the IMWF. Table 12 below estimates a maximum discharges to the environment of 465,008 m^3/year and maximum freshwater intake of 184,781 m^3/year in scenario 1 and scenario 3 respectively.

Table -12: Freshwater Makeup and Discharge the Environment for 56% Tailings Solids Content (m^3/year)

Year Scenario	Flow	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Scenario 1 Average	Total Freshwater Requirements [(a)]	113,885	63,072	63,072	63,072	63,245	63,072	63,072	63,072	63,245
	Discharge to Environment (M1)	0	57,436	134,993	152,985	165,821	176,581	190,879	200,818	203,853
Scenario 2 Wet	Total Freshwater Requirements[(a)]	99,706	63,072	63,072	63,072	63,245	63,072	63,072	63,072	63,245
	Discharge to Environment (M1)	111,823	323,342	352,408	381,859	403,318	419,380	443,362	460,450	465,809
Scenario 3 Dry	Total Freshwater Requirements[(a)]	184,781	67,123	63,072	63,072	63,245	63,072	63,072	63,072	63,245
	Discharge to Environment (M1)	0	0	0	0	0	818	30,322	39,370	45,291

(a) Minimum Freshwater Requirements for the Process Plant and Potable water are 63,072 m^3 per year (7.2 m^3/hr)

Table 13 shows the model results of the full water balance flow diagram results for Scenario 1 the average precipitation year. Table 13 also shows that range of possible flows over the mine life for three annual climatic scenarios modeled. Additionally, Figure 3 shows the results of all of the flows outlined below except the direct precipitation and runoff. Figure 4, shows the Inflows, Overflows, and Volumes of the North and South Collection Sumps and Ade Tepe Pit. Figure 5 outlines in Inflows and outflows of the Retention Pond. And Figure 6 and Figure 7 shows the retention ponds volume accumulation and overflow over time. Figure 8 shows all water losses that are permanently lost from the system.

Table -13: Water Balance Results-Scenario 1 (m^3/year)

Area	Flow Number	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Min 100 yr-dry (L/s)[(a)]	Max 100 yr-Wet (L/s)[(b)]	Avg. (L/s)[(c)]
Flows associated with ore processing and tailings production (PR)	PR1	597,312	595,680	595,680	595,680	597,312	595,680	595,680	595,680	597,312	1	18.9	18.9
Pumped Flows (P)	P1	173,426	186,308	185,673	158,262	140,922	170,885	194,832	200,801	202,236	3.4	8.4	5.7
	P2	455,843	449,034	458,188	494,118	522,334	498,554	483,126	485,675	488,495	12.5	19.8	15.3
	P3	68,383	84,231	93,578	103,180	106,842	109,947	115,833	117,352	117,728	1.5	5.7	3.2
	P4	50,640	0	0	0	0	0	0	0	0	0.0	1.2	0.2
	P5	63,245	63,072	63,072	63,072	63,245	63,072	63,072	63,072	63,245	2.0	2.0	2.0
Direct Precipitation (DP)	DP1	145,065	144,591	144,591	144,591	145,065	144,591	144,591	144,591	145,065	2.8	7.5	4.6
	DP2	235	234	234	234	235	234	234	234	235	0.0	0.0	0.0
	DP3	245,062	244,263	244,263	244,263	245,062	244,263	244,263	244,263	245,062	4.8	12.7	7.7
	DP4	235	234	234	234	235	234	234	234	235	0.0	0.0	0.0
	DP5	352	351	351	351	352	351	351	351	352	0.0	0.0	0.0
	DP6	21,458	35,535	37,369	37,869	38,302	38,388	38,558	38,678	38,845	0.4	2.0	1.1
	DP7	10,211	10,178	10,178	10,178	10,211	10,178	10,178	10,178	10,211	0.2	0.5	0.3
Runoff (RO)	RO1	71,317	63,272	55,705	48,138	40,831	32,982	25,415	17,848	13,349	0.3	3.7	1.3
	RO2	120,504	106,981	94,264	81,548	69,273	56,079	43,363	30,646	23,090	0.5	6.2	2.2
	RO3	50,415	66,313	75,661	85,263	88,875	92,030	97,915	99,435	99,760	1.0	5.2	2.7
	RO4	8,169	8,142	8,142	8,142	8,169	8,142	8,142	8,142	8,169	0.2	0.4	0.3

Area	Flow Number	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Min 100 yr-dry (L/s)(a)	Max 100 yr-Wet (L/s)(b)	Avg. (L/s)(c)
Evaporation (E)	E1	281	281	281	281	281	281	281	281	281	0.0	0.0	0.0
	E2	281	281	281	281	281	281	281	281	281	0.0	0.0	0.0
	E3	422	421	421	421	422	421	421	421	422	0.0	0.0	0.0
	E4	27,464	42,967	44,135	44,764	45,268	45,513	45,789	46,008	46,144	0.7	1.5	1.4
Seepage (S)	S1	5,433	16,177	26,923	37,668	48,598	59,188	69,933	80,678	86,332	0.1	4.5	1.5
	S2	9,129	27,186	45,243	63,300	81,668	99,464	117,521	135,578	145,078	0.2	7.5	2.5
	S3	18,037	17,988	17,988	17,988	18,037	17,988	17,988	17,988	18,037	0.6	0.6	0.6
Tailings Water Release (T)	T1	96,724	106,905	103,092	72,503	51,540	78,761	99,530	102,320	102,601	1.6	3.4	2.9
	T2	318,088	306,772	310,585	341,175	363,271	334,916	314,147	311,356	312,209	9.7	11.5	10.3
Environmental Discharge (M)	M1	0	57,436	134,993	152,985	165,821	176,581	190,879	200,818	203,853	0.0	14.8	4.5
Tailings Pore Water(d)		254,418	253,722	253,722	253,722	254,418	253,722	253,722	253,722	254,418	8.0	8.0	8.1

(a) Minimum Flow throughout mine life using the 100 yr-Dry Annual Climatic input for each year.

(b) Maximum Flow throughout mine life using the 100 yr-Wet Annual Climatic inputs for each year.

(c) Average Flow throughout mine life using the 100 yr-Wet Annual Climatic inputs for each year.

(d) Water lost permanently to tailings pore space.

Currently the model assumes a passive approach to managing water discharge from the Raw and Process Water Reservoir. As water reaches the reservoir capacity, it is automatically discharged. The current GoldSim model is programmed to handle storm events although none have run at this time. To address the passive management of discharge to the environment a range maximum capacities Raw and Processes Water Reservoir was modeled (100,000m^3 and 204,000m^3). The sensitivity analysis was conducted in an Average year with a tailing water content of 56%. The difference between water release is shown in Figure 7 and Figure 8.

4.0 CLOSURE

We trust that the information contained in this document meets your requirements at this time. Should you have any questions relating to the above, please do not hesitate to contact the undersigned.

GOLDER ASSOCIATES LTD.

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MLP/dss

Attachments: Figures 1 to 8

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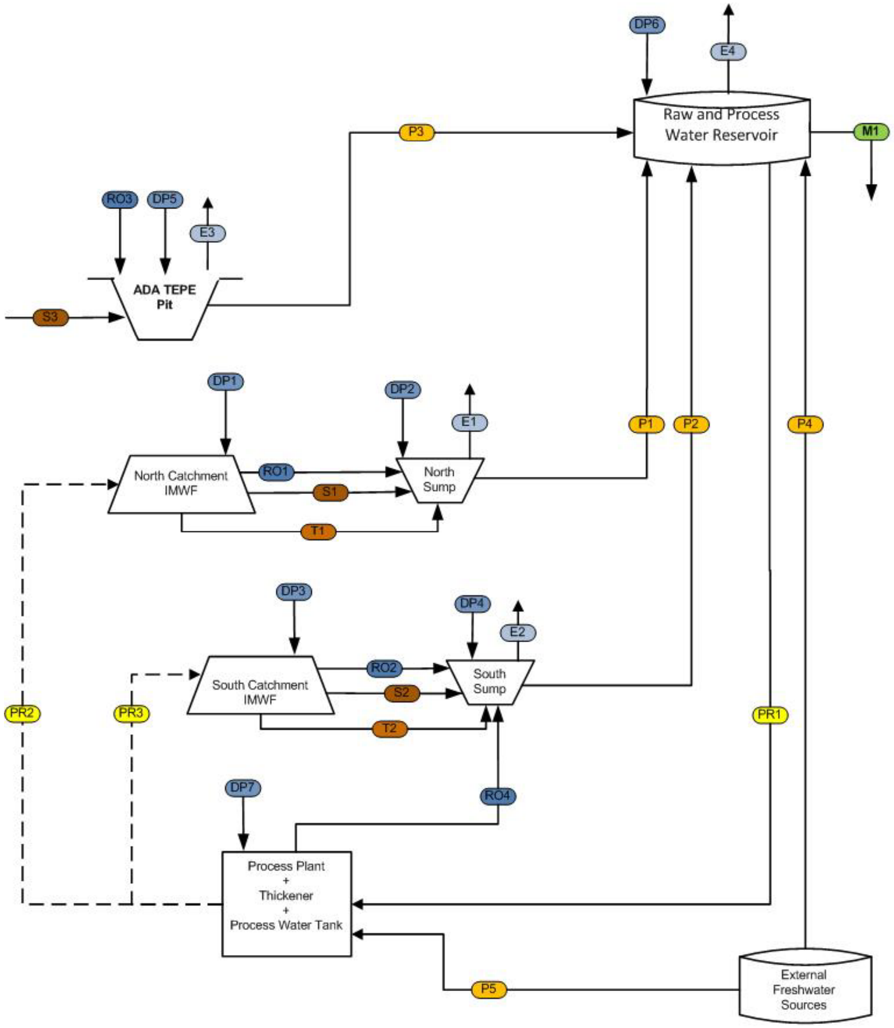


Table 1: List of Water Balance Flow Components

Area	Flow Number	Description	Min 100 yr-dry (L/s)[a]	Max 100yr-Wet (L/s)[b]	Avg. (L/s)[c]
Flows associated with ore processing and tailings production (PR)	PR1	Process Water from Raw and Process Water Reservoir to Process Plant	18.9	18.9	18.9
	PR2	Tailings from Process to North Catchment IMWF	NA	NA	NA
	PR3	Tailings from Process to South Catchment IMWF	NA	NA	NA
Pumped Flows (P)	P1	Water from North Collection Sump to Raw and Process Water Reservoir	3.4	8.4	5.7
	P2	Water from South Collection Sump to Raw and Process Water Reservoir	12.5	19.8	15.3
	P3	Water from Ade Tepe Pit Sump to Raw and Process Water Reservoir	1.5	5.7	3.2
	P4	Water from External Fresh Water Sources to Raw and Process Water Reservoir	0.0	1.2	0.2
	P5	Freshwater to Process Plant	2.0	2.0	2.0
Direct Precipitation (DP)	DP1	Direct Precipitation on North Catchment IMWF	2.8	7.5	4.6
	DP2	Direct Precipitation on North Collection Sump	0.0	0.0	0.0
	DP3	Direct Precipitation on South Catchment IMWF	4.8	12.7	7.7
	DP4	Direct Precipitation on South Collection Sump	0.0	0.0	0.0
	DP5	Direct Precipitation on Ade Tepe Pit Sump	0.0	0.0	0.0
	DP6	Direct Precipitation on Raw and Process Water Reservoir	0.4	2.0	1.1
	DP7	Direct Precipitation on Plant Site Area	0.2	0.5	0.3
Runoff (RO)	RO1	Runoff from North Catchment IMWF to North Collection Sump	0.3	3.7	1.3
	RO2	Runoff from South Catchment IMWF to South Collection Sump	0.5	6.2	2.2
	RO3	Runoff from Ade Tepe Pit Catchment to Pit Sump	1.0	5.2	2.7
	RO4	Runoff from Plant Site Area to South Collection Sump	0.2	0.4	0.3
Evaporation (E)	E1	Evaporation from North Collection Sump Surface	0.0	0.0	0.0
	E2	Evaporation from South Collection Sump Surface	0.0	0.0	0.0
	E3	Evaporation from AdeTepe Pit Sump Surface	0.0	0.0	0.0
	E4	Evaporation from Raw and Process Water Reservoir Surface	0.7	1.5	1.4
Seepage (S)	S1	Seepage from North Catchment IMWF to North Collection Sump	0.1	4.5	1.5
	S2	Seepage from South Catchment IMWF to South Collection Sump	0.2	7.5	2.5
	S3	Seepage from Groundwater to AdeTepe Pit Sump	0.6	0.6	0.6
Tailings Water Release(T)	T1	Tailings Release from North Catchment IMWF to North Collection Sump	1.6	3.4	2.9
	T2	Tailings Release from South Catchment IMWF to South Collection Sump	9.7	11.5	10.3
Environmental Discharge (M)	M1	Discharge	0.0	14.8	4.5

LEGEND:

- Flow Component
- Flows not Directly Modeled
- P# Flow Number

NOTES:

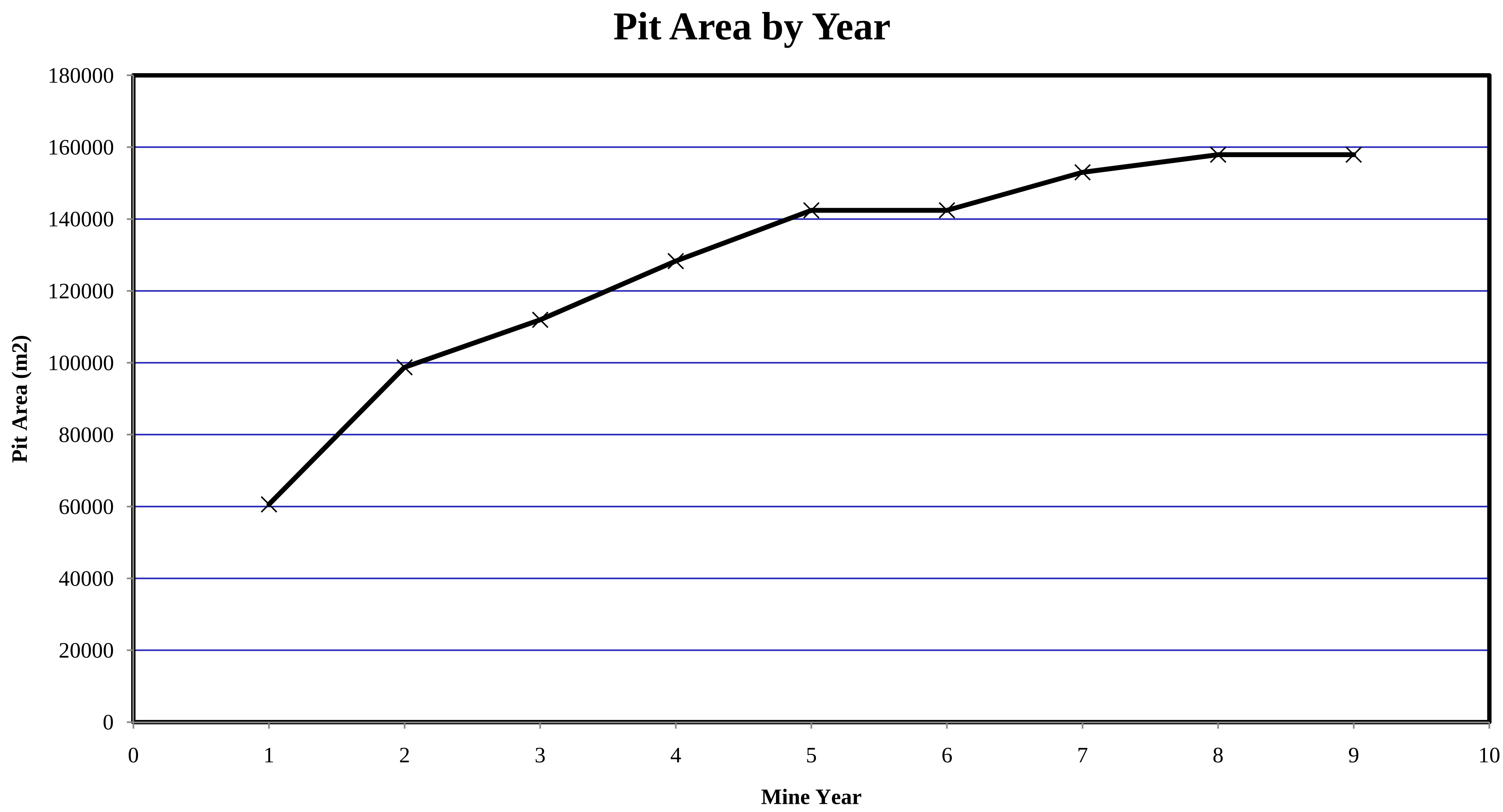
- Water Balance Flow Components are Described in Table 1.0

DRAFT

PROJECT	DUNDEE PRECIOUS (KRUMOVGRAD) BV KRUMOVGRAD GOLD PROJECT BULGARIA
TITLE	WATER BALANCE FLOW DIAGRAM

Golder Associates

PROJECT No. 09-1221-3019			PHASE No. 5000	
DESIGN	MLP	8APR10	SCALE NTS	REV.1
CADD			FIGURE 1	
CHECK				
REVIEW				



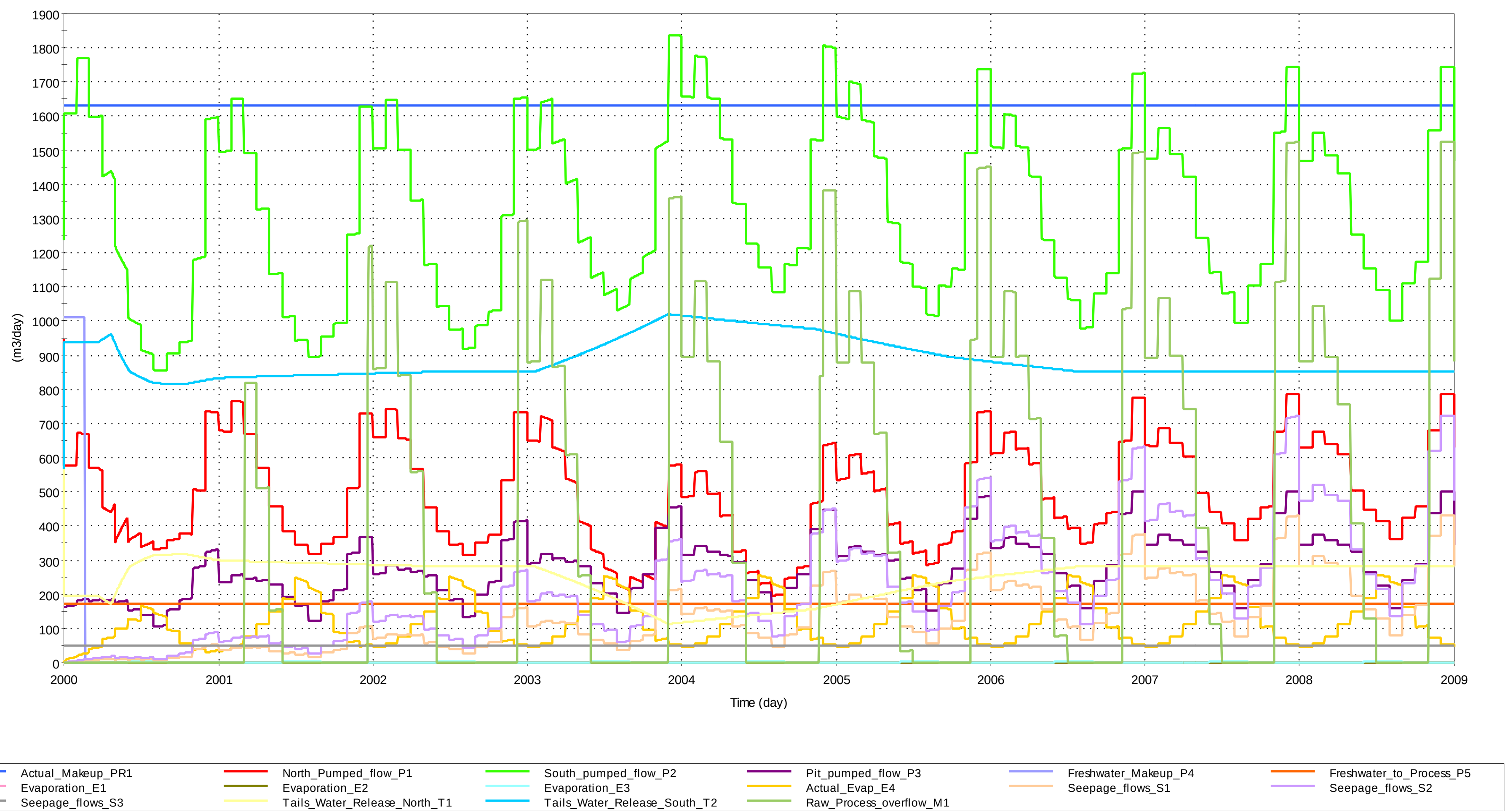
DRAFT

PROJECT	DUNDEE PRECIOUS (KRUMOVGRAD) BV KRUMOVGRAD GOLD PROJECT BULGARIA
TITLE	**Pit Catchment Area by Year**

Golder Associates

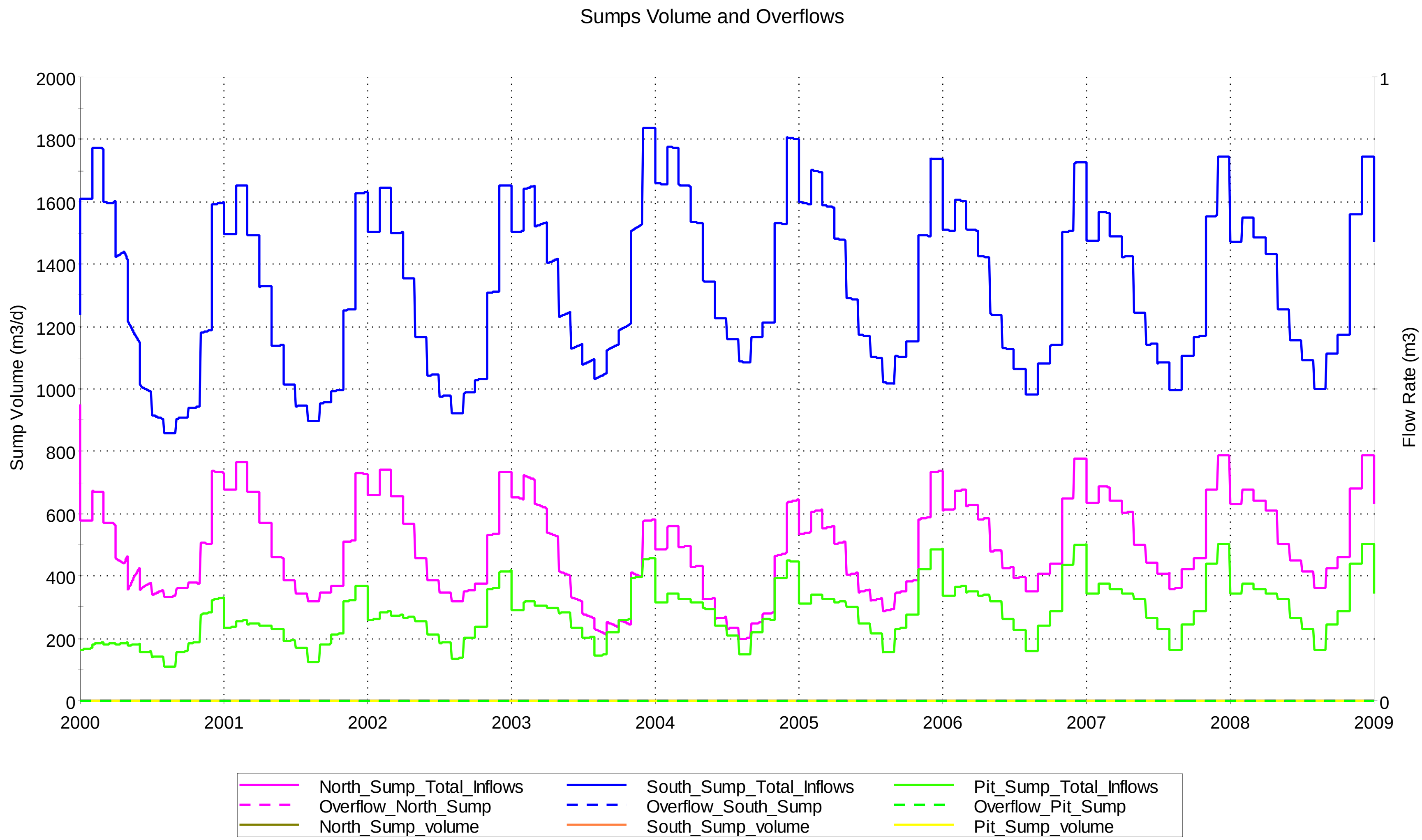
PROJECT No. 00-1428-5008			PHASE No. 5000	
DESIGN	MLP	9APR10	SCALE NTS	REV.
CADD	---	---	**FIGURE 2**	
CHECK				
REVIEW				

Flow Results



DRAFT

PROJECT	DUNDEE PRECIOUS (KRUMOVGRAD) BV KRUMOVGRAD GOLD PROJECT BULGARIA				
TITLE	**Water Balance Results** **Average Year** **Tailings Solid Content 56%**				
Golder Associates	PROJECT No.	00-1428-5008		PHASE No. 5000	
	DESIGN	MLP	9APR10	SCALE NTS	REV.
	CADD	---	---	**FIGURE 3**	
	CHECK				
	REVIEW				

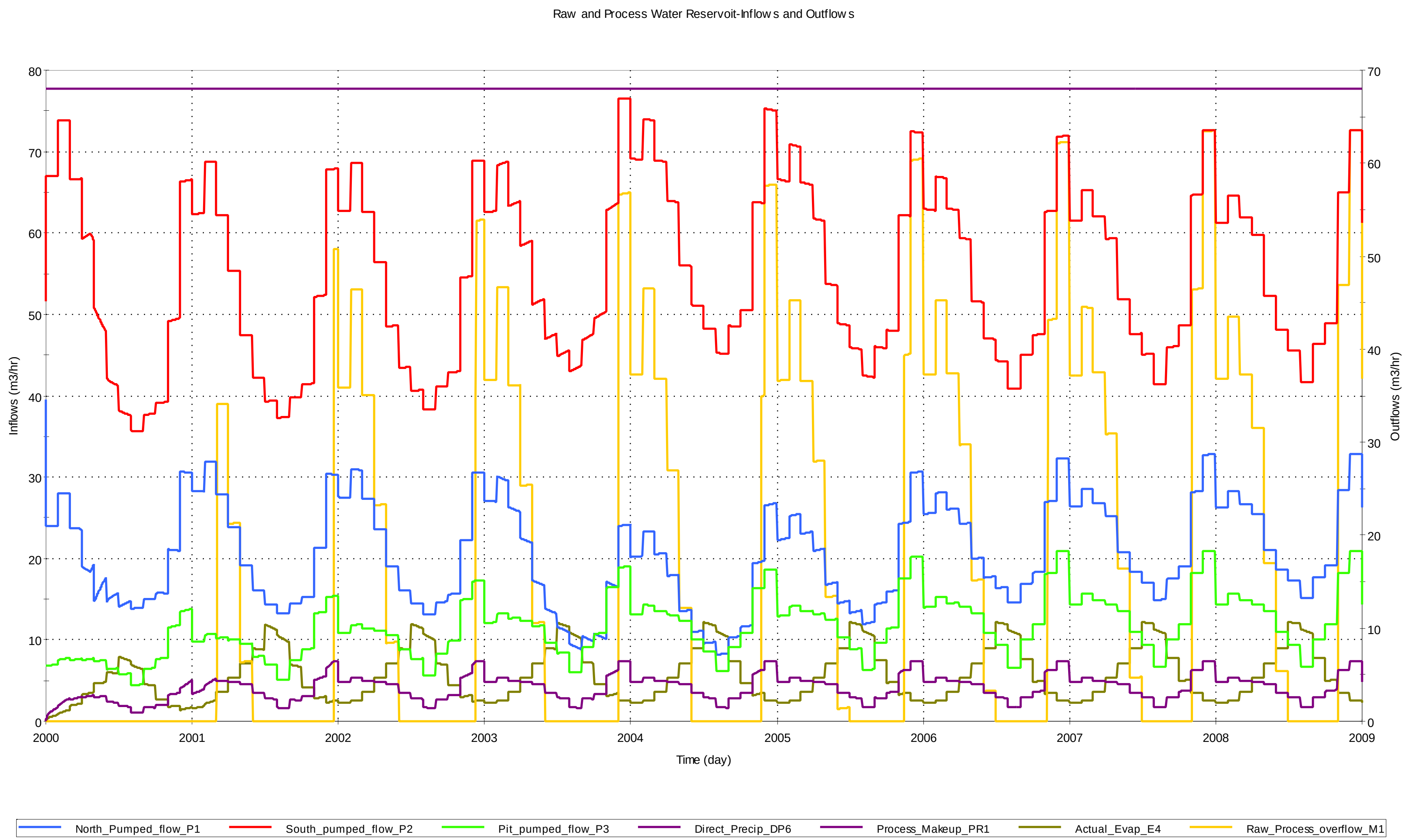


DRAFT

PROJECT	DUNDEE PRECIOUS (KRUMOVGRAD) BV KRUMOVGRAD GOLD PROJECT BULGARIA
TITLE	**Sumps Volumes and Overflows** **Average Year** **Tailings Solid Content 56%**

Golder Associates

PROJECT No.	00-1428-5008		PHASE No.	5000
DESIGN	MLP	9APR10	SCALE NTS	REV.
CADD	---	---	**FIGURE 4**	
CHECK				
REVIEW				

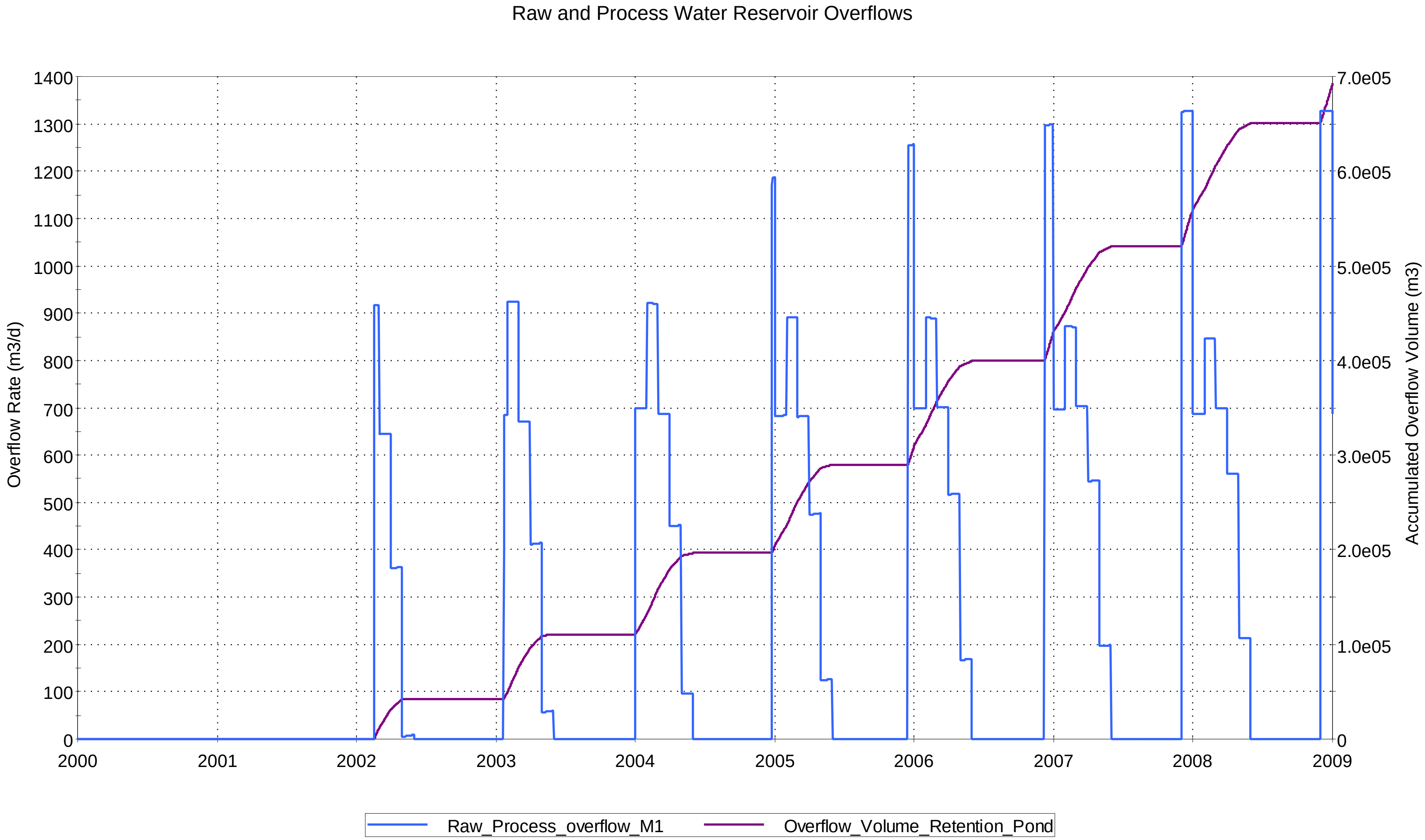


DRAFT

PROJECT	DUNDEE PRECIOUS (KRUMOVGRAD) BV KRUMOVGRAD GOLD PROJECT BULGARIA
TITLE	**Raw and Process Water Reservoir Inflows and Outflows-Average Year Tailings Solid Content 56%**

Golder Associates

PROJECT No.	00-1428-5008		PHASE No.	5000
DESIGN	MLP	9APR10	SCALE NTS	REV.
CADD	---	---	**FIGURE 5**	
CHECK				
REVIEW				

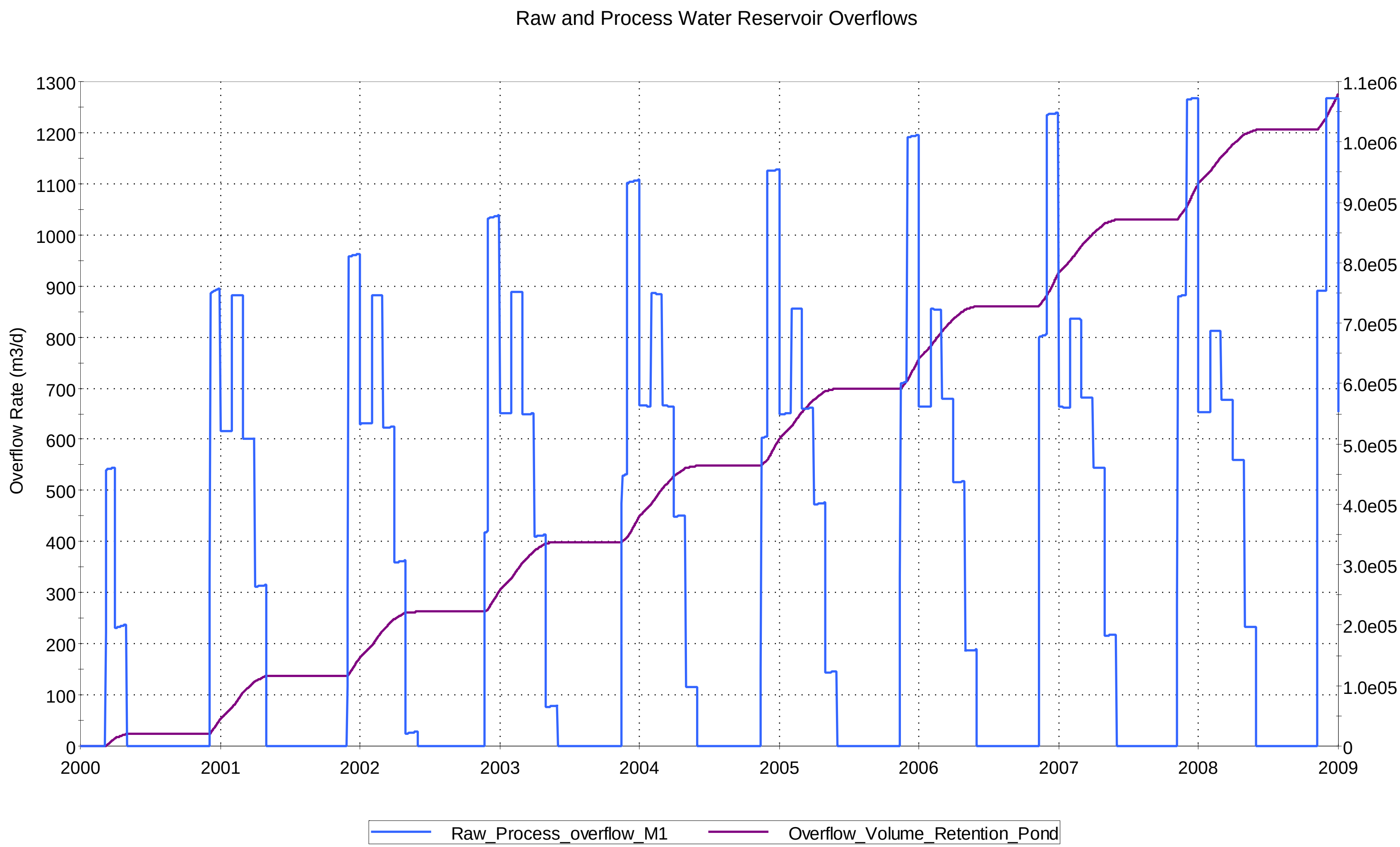


DRAFT

PROJECT	DUNDEE PRECIOUS (KRUMOVGRAD) BV KRUMOVGRAD GOLD PROJECT BULGARIA
TITLE	**Raw and Process Water Capacity Sensitivity Analysis - Average Year Tailings Solid Content 56%- 200,000m³ Capacity**

Golder Associates

PROJECT No.	00-1428-5008		PHASE No.	5000
DESIGN	MLP	9APR10	SCALE NTS	REV.
CADD	---	---		
CHECK			**FIGURE 6**	
REVIEW				

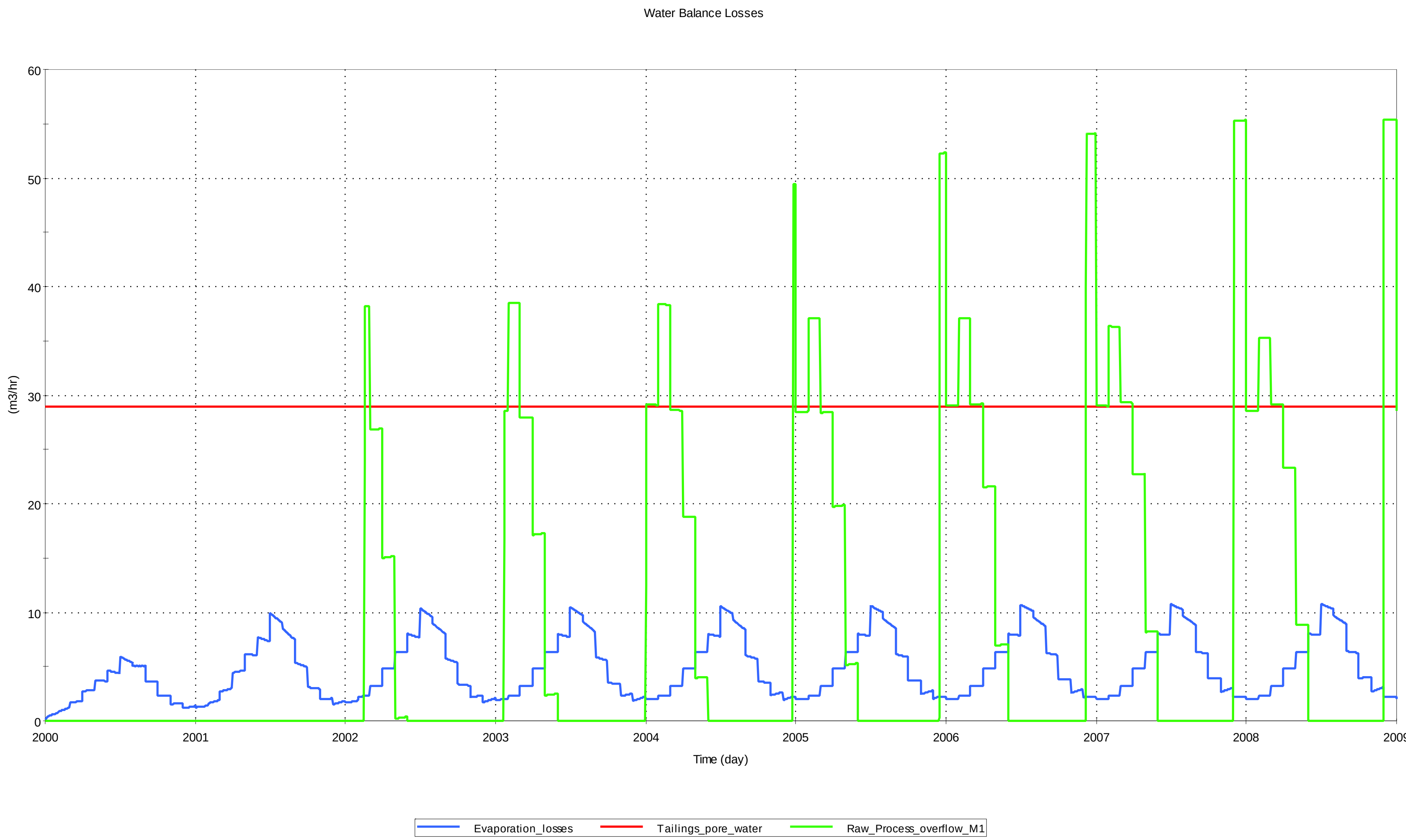


DRAFT

PROJECT	DUNDEE PRECIOUS (KRUMOVGRAD) BV KRUMOVGRAD GOLD PROJECT BULGARIA
TITLE	**Raw and Process Water Capacity Sensitivity Analysis - Average Year** **Tailings Solid Content 56%- 100,000m³ Capacity**

Golder Associates

PROJECT No.	00-1428-5008		PHASE No.	5000
DESIGN	MLP	9APR10	SCALE NTS	REV.
CADD	---	---		
CHECK			**FIGURE 7**	
REVIEW				



DRAFT

PROJECT	DUNDEE PRECIOUS (KRUMOVGRAD) BV KRUMOVGRAD GOLD PROJECT BULGARIA
TITLE	**Water Balance Losses** **Average Year** **Tailings Solid Content 56%**

Golder Associates

PROJECT No.	00-1428-5008		PHASE No.	5000
DESIGN	MLP	9APR10	SCALE NTS	REV.
CADD	---	---	**FIGURE 8**	
CHECK				
REVIEW				