Galaxy Lithium – Mine Wide Water Balance

In support of the Feasibility Study for the James Bay Project

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Sign-off Sheet

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

Galaxy Lithium (Canada) Inc. (Galaxy) is currently developing the James Bay Lithium Project (the Project) in Northern Québec. Stantec Experts-conseils (Stantec) was retained to complete a mine wide water balance in support of the feasibility study for the Project. This report presents the methods, model inputs and results of the mine wide water balance modelling. The OPSF pond has been sized as part of a different study (Stantec, 2019b).

2.0 PROJECT OVERVIEW

2.1 LOCATION

The James Bay Lithium Project is located in the administrative region of Nord-du-Québec, within the Eeyou Istchee James Bay Regional Government territory. The Project is located approximately 10 km south of the Eastmain river, and 100 km east of James Bay. The site is accessible using the James Bay Road (km 381).

2.2 PROJECT DESCRIPTION

The project (mining life span of 17 years, with the year prior to production referred to as year 1) involves mining of ore from a (multi-bottomed) open pit. The ore will be stockpiled then fed via a front-end loader to a three-stage crushing circuit, including: a primary jaw crusher, dry multi-deck sizing screen, secondary and tertiary crushers. The concentrator can process 2 Mtpa of ore, producing 0.3 Mtpa of 6% Lithium Oxide concentrate ore. The concentrated ore will be transported offsite for secondary concentration.

This project will have two waste streams: waste rock from the open pit, and the tailings from the coarse separation (concentration). The tailings from the process will be dried and stored along with waste rock in the WRTSF.

Drawing 1 presents the general site layout.

2.3 SITE TOPOGRAPHY

The study area is located within the Eastmain river watershed covering a surface of approximately 46,000 km^2. WSP Canada Inc. (WSP) identified five watercourses known as CE1 to CE5 in their Environmental Impact Assessment (2018a). CE1 and CE2 (north) flow west toward Miskimatao River and CE3 to CE5 (south) flow east.

The site is currently vacant and undeveloped. The northeastern portion of the site is covered with dense forest, while the southwestern portion is generally clear of trees. In addition, there are numerous swamp areas within the northeastern portion of the site.

2.4 CLIMATE

Daily data for La Grande Riviere (station 7093715) was obtained from Environment Climate Change Canada (ECCC) to prepare climate normal, wet and dry-year simulation scenarios. Climate monthly temperature data was also required for a Thornthwaite analysis that was done for the runoff study and was available for the La Grande Riviere weather station.

The input precipitation for the normal-year scenario was the monthly average of the entire data set, in lieu of the climate normal information published by ECCC for the year 1981-2010. The year 1993 was a particularly poor year with respect to data availability, and is included in the 1981-2010 timeframe. The available data set from October 1976 to November 2012 was used to develop the normal-year scenario data, with 1993 and also 1979 (another poor year) filtered out of the set.

The precipitation inputs for the 25-year wet and dry scenarios were determined with the Gumbel distribution using the method of moments estimator. The data set was input into the software HYFRAN which considers multiple distributions. The Gumbel distribution was the best fit for the data based on the statistics and graphical fit.

Table 1 presents the monthly precipitation data for the three scenarios.

2.5 MINE WATER MANAGEMENT

Mine-contact water will be primarily managed through the main site water management pond (WMP). The WMP will be the receiver for water from the open pit, waste rock and tailings storage facility (WRTSF), process plant area, roads, and surrounding catchments. While plant raw water demand will preferentially be sourced from the run-of-mine (ROM) pad runoff, most of the demand will be sourced from the WMP. Excess water in the WMP will be discharged to the environment (stream CE2). Galaxy Lithium has indicated that no treatment of excess water will be required prior to discharge.

A polishing pond will also be constructed for the Overburden and Peat Storage Facility (OPSF), and this water will be managed separately to the other site infrastructure. Excess water in the OPSF Sedimentation Pond will be discharged to the environment (stream CE3).

Table 1: Monthly Total Precipitation for the Normal and 25-Year Wet/Dry Scenarios

Month	Normal (mm) *	25-year Wet (mm) **	25-year Dry (mm) **	Evaporation (mm) ***
January	33	41	25	0
February	24	30	19	0
March	32	40	24	0
April	34	42	26	0
May	40	49	30	25
June	65	81	50	58
July	79	97	60	76
August	91	113	70	71
September	111	137	85	42
October	89	110	68	8
November	72	89	55	0
December	46	57	35	0
Winter (Nov - Apr)	241	299	184	0
Annual	**716**	**885**	**547**	**280**

Notes:

* Published values by ECCC for the years 1981-2010

** Based on a Gumbel distribution (method of moments) regression of daily precipitation data for the years 1976 to 2010 (1979 and 1993 were filtered out due to data gaps).

*** Average monthly evaporation rate for open water surfaces, which is based on the Mean Annual Lake Evaporation map published by Natural Resources Canada.

3.0 METHODS AND DEVELOPMENT OF MODEL INPUTS

The aim of the mine wide water balance was to estimate flows in and around the facilities to confirm adequate supply for the plant and to estimate discharge rates under climate normal conditions scenario as well as under 25-year wet and dry scenarios (discussed in Section 2.4).

The mine wide water balance was prepared in Microsoft Excel®. The model was run with a monthly timestep for the 17-year mine life and the pre-production year 1. Figure 1 presents the conceptual model for the flow of water across site.

Model inputs and results are described in the following subsections.

3.1 MINE WIDE WATER BALANCE INPUTS

Model inputs were prepared based on information provided by WSP, Primero Group Pty Ltd. (Primero) and Mining Plus Pty Ltd. (Mining Plus), as well as the WRTSF and OPSF designs prepared by Stantec. The water balance only considered mine contact water, as non-contact water will be intercepted and diverted around the site where possible.

Model inputs included:

- Contact Water Runoff
- Process Plant Raw Water Requirements
- Open Pit Dewatering and Runoff
- Mine Waste Rock and Tailings Moisture Content
- WMP Water Management
- Overburden and peat storage facility (OPSF)

These model inputs are described in the following subsections.

3.1.1 Contact Water Runoff

Runoff from all contact water catchments (with the exception of the ROM pad) will be collected and directed to the WMP. Watershed areas were estimated from Light Detection and Ranging (LiDAR) survey flown in 2018.

Figure 2 presents the watersheds for contact water that will be relatively constant for the life of mine. The footprints of the WRTSF and Open Pit are anticipated to expand during the mine life, and are anticipated to reach their ultimate footprints by Year 7 and Year 14, respectively.

A monthly model for evaporation, runoff and infiltration for each catchment was prepared based on the Thornthwaite equation (Thornthwaite and Mather 1957; McCabe and Wolock 1999) using the United States Geological Survey graphical user interface. Inputs were provided by Environment Canada (Years 1976-2012) and included monthly precipitation, average monthly temperature, soil moisture storage capacity, snow/rainfall temperature thresholds and runoff factors/melting rates.

Thornthwaite analyses typically consider different land uses, and the overall runoff characteristics are then determined from the fraction of each in the catchment. Analyses were carried out for three land uses, with the difference represented in the input soil moisture capacity (Table 2). The catchment areas and the fraction of the land uses in each are shown in Table 3.

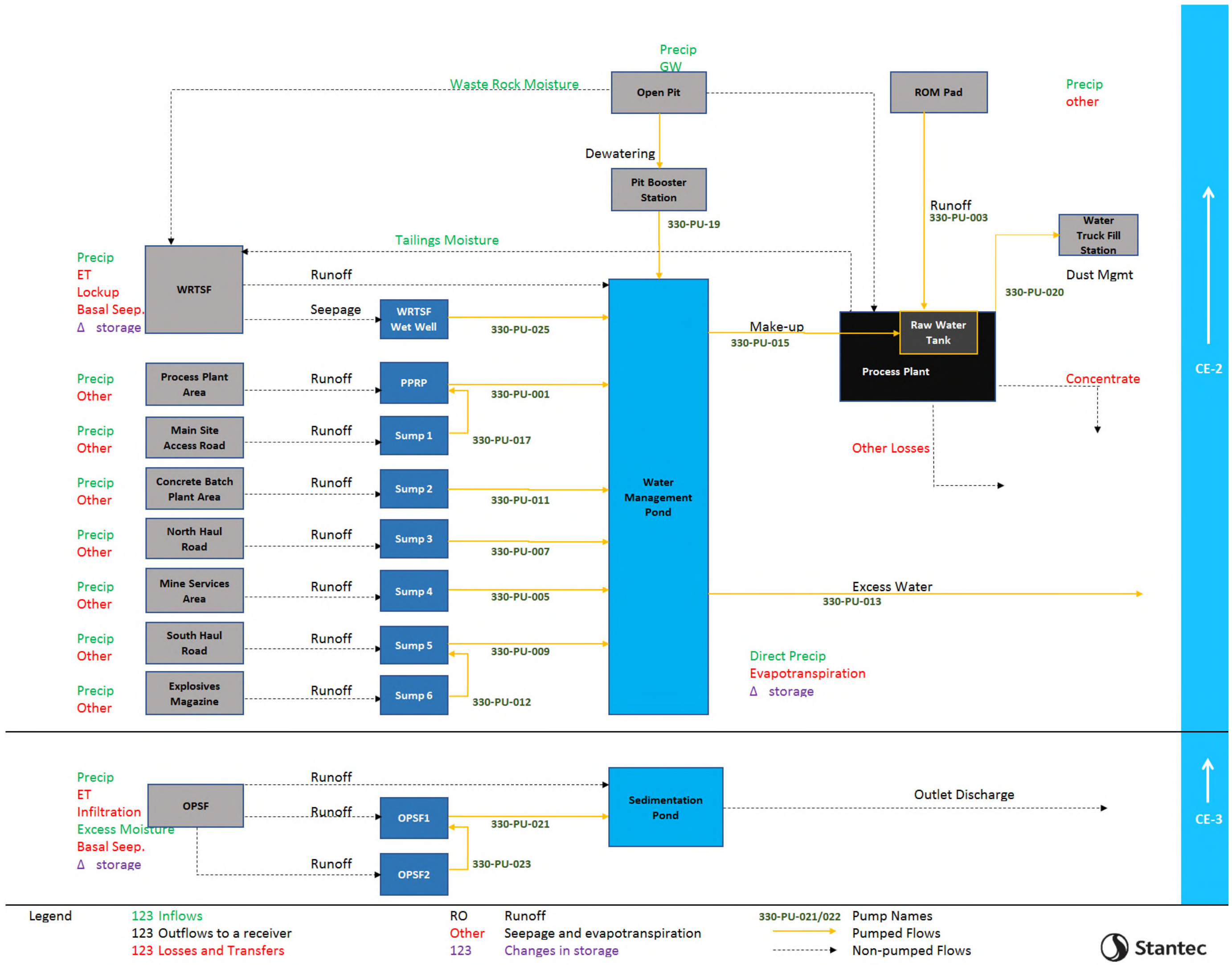

Figure 1: Conceptual Model for the Flow of Water Across the Site

Table 2: Thornthwaite Analysis Land Use Inputs

Land Use	Soil Moisture Capacity	Comments
WRTSF Surface	50 mm	Typical soil moisture for coarse materials
Natural Ground	350 mm	Ground that is relatively undisturbed. Soil moisture obtained from MOE (2003) for a mature forest with fine soils
Prepared Ground	200 mm	Ground that has been disturbed by mining operations, obtained from a review of Ontario MOE (2003). Soil moisture values were typically between 150 mm to 250 mm for fine soils on cleared (not mature forest) land

Table 3: Watershed Land Use

Watershed		Sub Watersheds		
Facility	**Area (ha)**	**Collecting area**	**% of total**	**(m^2)**
Plant / PPRP	12.9	Prepared Ground	0.60	77,400
		Plant site	0.40	51,600
Main Site Access Road / P1	1.4	Prepared ground	1.0	14,000
Concrete Batch Plant / P2	0.7	Prepared ground	1.0	7,000
North Haul / P3	6.5	Prepared ground	1.0	65,000
MSA / P4	3.6	Prepared Ground	0.60	21,600
		Plant Site	0.4	14,400
South Hall Road / P5	17.2	Prepared ground	1.0	128,000
Explosives Magazine / P6	1.4	Prepared ground	1.0	14,000
ROM Pad	7.5	WRTSF Surface	0.6	42,767
		Prepared ground	0.4	32,097

The input snow/rainfall temperature thresholds are the temperature for the precipitation to be completely in the form of rain (a negative temperature) and snow (a positive temperature). A review of the La Grande Riviere data set indicates that the lowest temperature at which the precipitation was all rain was -2.4°C on the October 17, 1980, and the maximum temperature at which the precipitation was all snow was 3.0°C on November 12, 2010.

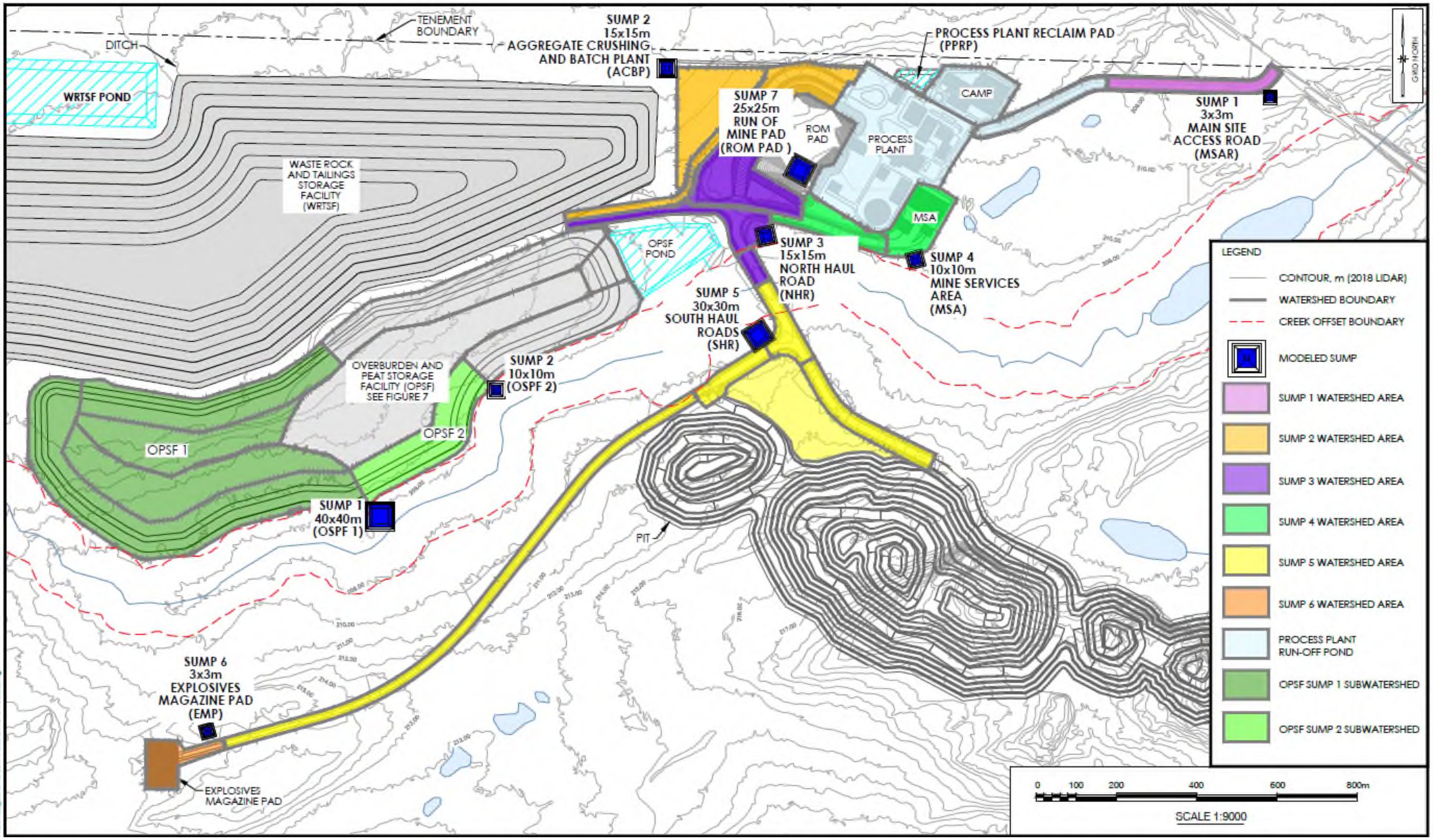

Figure 2: Contact Water Catchment Delineation

The runoff factor and melting rate affect the runoff and snow melt that are generated within the same month of the precipitation or melt event. The remainder is carried over into the next month, and therefore these factors essentially represent a time delay for precipitation events to impact downstream receivers. A value of 75% was input for the runoff factor and 90% for the maximum melt rate to ensure that there was no snow pack remaining in June, as advised by Primero.

The Thornthwaite analysis generates runoff for each rain and snow event, and subsequent melt of the snow pack. The majority of the runoff occurs in May from snow melt. Runoff coefficients (RoCs) have been estimated through a direct division of the precipitation and estimated runoff for each month, resulting in RoCs that are greater than 1 for the month of May (Table 4), i.e. there is more runoff than precipitation in that month due to melting of accumulated snowpack. RoCs are typically considered to be less than 1 for rain events when considered separately to snow melt, however a RoC greater than 1 is mathematically reasonable in this study as snow and rain has been considered together.

Table 4: Runoff Coefficients for Each Catchment

	WRTSF (Ultimate)	PP	Sump 1	Sump 2	Sump 3	Sump 4	Sump 5	Sump 6	ROM PAD
January	0.03	0.42	0.03	0.03	0.03	0.42	0.03	0.03	0.03
February	0.01	0.41	0.01	0.01	0.01	0.41	0.01	0.01	0.01
March	0.00	0.40	0.00	0.00	0.00	0.40	0.00	0.00	0.00
April	0.11	0.46	0.10	0.10	0.10	0.46	0.10	0.10	0.10
May	2.53	1.84	2.40	2.40	2.40	1.84	2.40	2.40	2.47
June	0.79	0.86	0.77	0.77	0.77	0.86	0.77	0.77	0.78
July	0.22	0.53	0.21	0.21	0.21	0.53	0.21	0.21	0.22
August	0.22	0.53	0.22	0.22	0.22	0.53	0.22	0.22	0.22
September	0.47	0.66	0.44	0.44	0.44	0.66	0.44	0.44	0.46
October	0.64	0.77	0.62	0.62	0.62	0.77	0.62	0.62	0.63
November	0.22	0.52	0.21	0.21	0.21	0.52	0.21	0.21	0.21
December	0.09	0.45	0.09	0.09	0.09	0.45	0.09	0.09	0.09
Annual Avg	**0.44**	**0.66**	**0.43**	**0.43**	**0.43**	**0.66**	**0.43**	**0.43**	**0.44**

The Thornthwaite analysis also considers evapotranspiration and surface infiltration, which was only included in the model for the WRTSF and OPSF. The infiltration captured is only from the crest surface immediately into the material, and there will be seepage further into the pile from the moisture within the material at placement. The runoff coefficient was all that was required for the other catchments, as evapotranspiration and runoff were both assumed to leave the water balance and not impact downstream nodes. Table 5 presents the monthly evapotranspiration and surface infiltration inputs for the WRTSF as developed from the Thornthwaite analysis.

The evapotranspiration is higher than the evaporation rate presented by WSP (2018a) of 280 mm annually. The WSP figure was based on lake evaporation and therefore didn't include transpiration. While there is not likely to be significant transpiration on the waste rock surface, it is reasonable to apply the higher figure for the WRTSF as the surface typically generates more heat than surrounding land due to the higher thermal conductivity of the waste rock material compared with typical soils (Pham, 2013).

The negative annual surface infiltration indicates that there will be a net exfiltration of stored moisture from the WRTSF surface. The exfiltration is extremely small compared to precipitation at approximately 0.2%. This does not indicate that there will be no seepage through the facility, as there will be a source of moisture from the material at placement, and downward seepage in the months that are positive for infiltration.

Table 5: Evapotranspiration and Infiltration Inputs

	WRTSF		OPSF	
Month	**Evapotranspiration (mm)**	**Surface Infiltration (mm)**	**Evapotranspiration (mm)**	**Surface Infiltration (mm)**
January	2.0	28.10	2.3	28.15
February	2.7	21.50	3.3	21.53
March	6.0	29.35	7.8	29.35
April	14.9	15.95	19.0	15.84
May	48.0	-139.14	48.0	-140.98
June	76.5	-55.58	76.9	-54.12
July	88.2	-15.87	90.5	-15.50
August	67.6	0.93	69.1	1.00
September	36.2	9.87	36.2	9.04
October	18.0	13.50	18.0	14.00
November	7.4	52.96	7.4	53.30
December	2.9	36.78	3.2	37.01
Sum	**370.4**	**-1.7**	**381.5**	**-1.4**

3.1.2 Process Plant Raw Water Requirements

Primero has developed a mass balance for water within the process plant. Primero has determined that the process plant will be a net consumer of water at a rate of 19.1 m^3/hr and Stantec has allowed for an additional demand of 250 m^3/day (20.8 m^3/hr) for dust control. A sensitivity check was carried out to confirm that a plant demand 30 m^3/hr could also be serviced.

3.1.3 Open Pit Dewatering and Runoff

Development of the open pit will be below the water table, and groundwater inflow will need to be pumped out for continual access to the ore. Groundwater and direct precipitation will be collected in a sump and pumped to the WMP for storage.

Groundwater inflows and direct precipitation to the pit were provided by Mining Plus (Table 6, provided by email July 3, 2019), based on normal precipitative conditions. The provided annual totals were averaged for the May-October season as assumed by WSP and Mining Plus. The monthly inputs for groundwater inflow and direct precipitation were proportionally modified for the 25-year wet and dry scenarios based on the relative annual precipitation total to that of the normal precipitation.

Table 6: Groundwater Inflow to the Open Pit

Year	Groundwater Inflow to the Pit (m^3/year)	Direct Precipitation to the Pit (m^3/year)
1	69,600	62,500
2	18,000	61,800
3	39,200	83,900
4	81,200	199,600
5	124,300	334,200
6	128,700	334,200
7	155,400	395,500
8	206,100	514,100
9	252,200	606,000
10	263,500	606,000
11	267,200	606,000
12	274,200	606,000
13	281,200	606,000
14	242,900	521,000
15	246,100	521,000
16	258,200	521,000
17	266,500	521,000
18	277,000	521,000

3.1.4 Mine Waste Rock and Tailings Moisture Content

Tailings and waste rock will be delivered to the WRTSF throughout the LOM. However, the moisture content of these waste streams in the long term may differ from that which they are delivered to the WRTSF. Excess moisture within the tailings and waste rock at placement will drain by gravity through the pile according to the soil moisture retention characteristics of the materials and will report as either basal seepage or as seepage collected by the WRTSF underdrain. The seepage of water through the WRTSF has been considered similarly to this author's study for a similar site that was presented at the Mine Water Solutions conference in 2018 (Steinepreis 2018).

Table 7 summarizes the expected annual production of ore and waste rock as provided by Mining Plus (2019). Primero has indicated that approximately 15% of the ore feed will be shipped as concentrate, and the remainder will be tailings.

Table 7: Production Rates

Mine Year	Ore Production (t)	Tailings Production (t)[1]	Waste Rock Production (t)
-1	54,000	45,900	267,000
1	1,946,000	1,654,100	4,996,000
2	2,000,000	1,700,000	5,048,000
3	2,000,000	1,700,000	5,116,000
4	2,000,000	1,700,000	7,658,000
5	2,000,000	1,700,000	11,142,000
6	2,000,000	1,700,000	11,402,000
7	2,000,000	1,700,000	11,121,000
8	2,000,000	1,700,000	11,097,000
9	2,000,000	1,700,000	11,095,000
10	2,000,000	1,700,000	9,339,000
11	2,000,000	1,700,000	8,214,000
12	2,000,000	1,700,000	5,428,000
13	2,000,000	1,700,000	5,425,000
14	2,000,000	1,700,000	5,378,000
15	2,000,000	1,700,000	3,500,000
16	2,000,000	1,700,000	2,819,000
17	1,386,000	1,178,100	2,225,000
SUM	33,386,000	**28,378,100**	**121,270,000**

[1]: Tailings tonnages were assumed to be 85% of the ore production (Primero)

3.1.4.1 Moisture Content Upon Delivery to the WRTSF

The moisture content of the filtered tailings upon placement at the WRTSF (after drying) was estimated by Primero to be 12.9% (mass water/solids). Similar soils have been found to have Optimum Moisture Content near to this level. In order for the tailings to achieve long term strength parameters, it is critical that the tailings be sufficiently dried to allow the tailings to be adequately compacted in the WRTSF. Compaction testing should be carried out for a synthetic or pilot plant tailings sample to estimate the optimum water content of the tailings.

In addition, Primero has advised that the moisture content of the Waste Rock upon delivery to the WRTSF will be 5.3% (mass water/solids) respectively as advised by Primero.

3.1.4.2 Long Term Moisture Content

The anticipated particle size distribution (PSD) of the tailings and waste rock have been provided to Stantec by Primero and Mining Plus, respectively. The soil moisture characteristic curve (SMCC) for the tailings has been estimated from the PSD using SEEP/W, part of the Geostudio suite of software (Figure 3). In the short term, there will be excess moisture in the material that will drain through the base of the pile or seep out the front face. In the long term the materials will come to an equilibrium (steady state) with the infiltration into the pile.

A literature study has been performed to estimate the residual moisture content of waste rock material. Milczarek et al. (2009) measured the curves for waste material with different gravel (>4.75mm diameter) contents and compared the results to different fitting algorithms. The waste rock is anticipated to be in excess of 80% gravel according to the provided PSD, so the SMCC for that material with the Van Genuchten fitting was used (Figure 4).

The tailings and waste rock materials will be placed separately within the WRTSF. Transient seepage analyses were carried out separately for the tailings and waste rock to estimate the equilibrium water content of each material. A 9 m column of tailings and waste rock was simulated in SEEP/W for 2 years based on the development schedule of the WRTSF, with the placement water content (after conversion to a volumetric water content) was applied as an initial pressure head condition per the SMCC curves. The base of the model was assumed to be free draining due to the convergence challenges that arise when multiple materials are modelled in transient analyses with saturated/unsaturated material properties. The boundary condition for the top of the column was annual exfiltration estimated from the Thornthwaite analysis (Section 3.1.3).

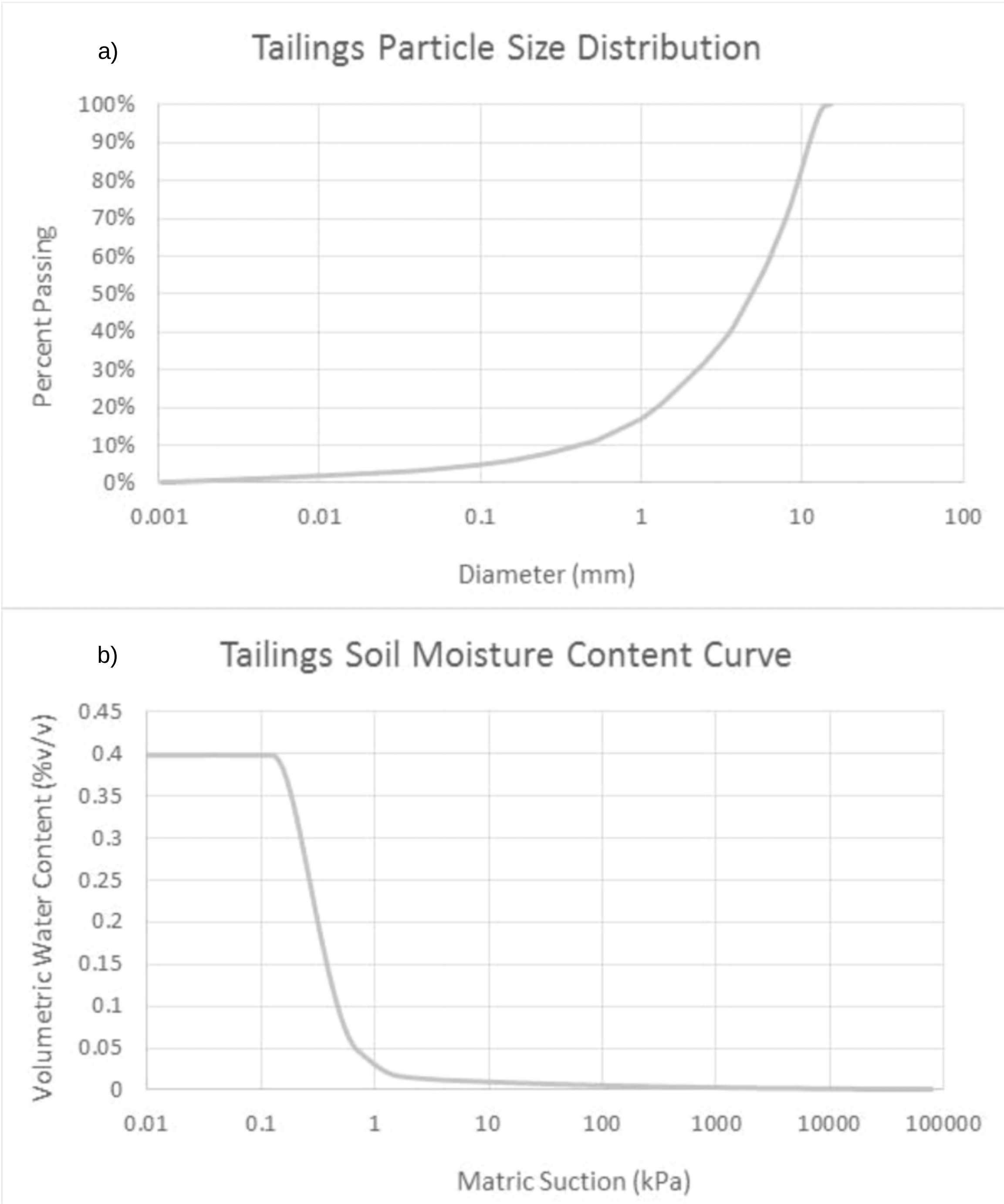

Figure 3: Particle Size Distribution and Soil Moisture Characteristic Curve for the Tailings

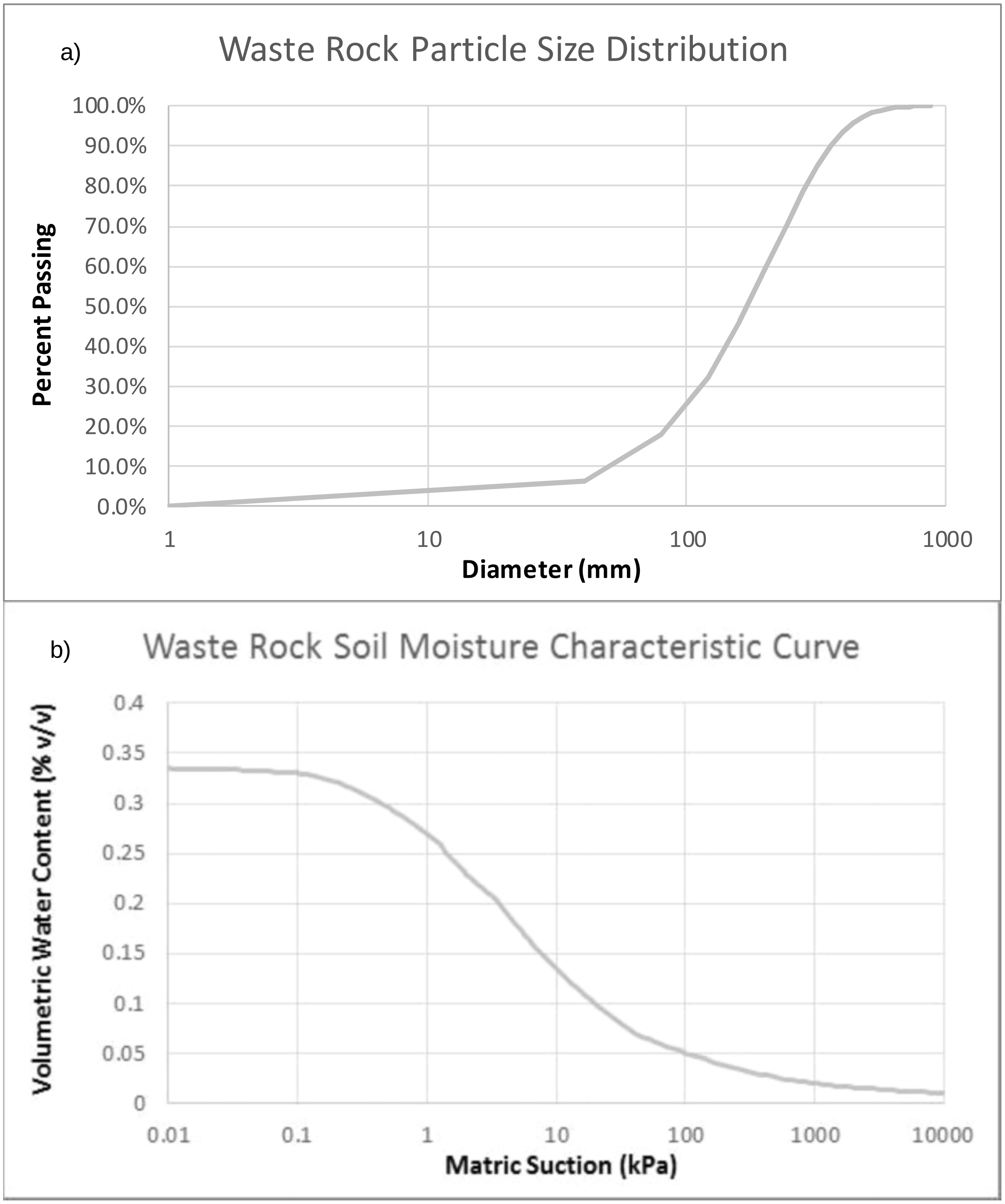

Figure 4: Particle Size Distribution and Soil Moisture Content Curve for the Waste Rock from Milczarek et al., 2006)

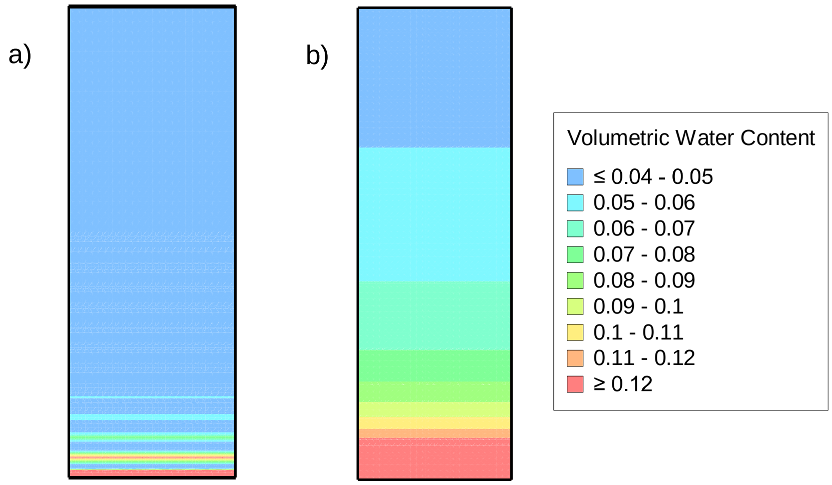

Figure 5: Drainage of the a) Tailings and b) Waste Rock after 3 Years

The drainage of the tailings to an equilibrium water content of 4% v/v (2.4 % w/w assuming a bulk density of 1.68 t/m^3) is relatively complete at the end of the 2-year analysis period. However, the drainage of the waste rock to 5% v/v (2.2% w/w assuming a bulk density of 2.05 t/m^3) is only partially complete at the end of the analysis period, with the 5% contour approximately 1/3 of the way down the column at the end of the analysis.

An input for 'final' water content as well as placement is required for the water balance to estimate the volume of water that will contribute to the water balance. As a reasonable assumption for the final water content during the timeframe of operations, it has been assumed that complete drainage to equilibrium occurs for the tailings, however the final water content for the waste rock is half the difference between the placement water content and the equilibrium water content.

The seepage flow was calculated as a simple subtraction of the final water content from the placement water content, multiplied by the production figures. The seepage water will either leave the water balance through basal seepage or will exfiltrate at the toe of the facility and enter the WRTSF by surface drainage. Basal seepage has been estimated by Darcy's law:

$$Q = kIA$$

Where: Q = flow (m^3/month)

k: hydraulic conductivity (m/month)

i: hydraulic gradient (-)

A: footprint area (m^2)

The hydraulic conductivity of the basal material has been assumed to be 1 x 10^{-9} m/s (2.61 x 10^{-3} m/ month) based on the geometric mean of the overburden from field hydraulic conductivity testing (WSP 2018b). A typical hydraulic gradient of 1 has been assumed. The basal area has been estimated from the progressive development modelling of the WRTSF and OPSF. The excess seepage was assumed to exfiltrate from the face of the WRTSF and drain to the Pond.

3.1.5 Water Management Pond Design Criteria

Table 8 presents the applicable Regulatory design criteria and other pertinent design information provided to Stantec.

Table 8: WMP Design Criteria

Description	Criteria Source	Symbol	Criterion / Assumption	
Water Management				
Contact water management protocol		Divert runoff to Water Management Pond		
WMP Environmental Design Flood (EDF; retained)	D019, 2.9.3.1		1:1,000-year 24-h rain, plus 1:100-year snow melt over 30 days	
WMP Inflow Design Flood (IDF; safely discharged)	D019, 2.9.3.1		Probable Maximum Flood (PMF)	
WMP Process Water Availability (at all times)	Primero		30	m^3/hr
WMP Winter Ice Thickness	2018 EIA		2	m

Notes

This section of D019 relates to structures that retain water, which the WRTSF embankments do not. These criteria have, however been used for design of the WRTSF and WMP, as they are commonly used within the industry.

Acronyms

2018 EIA – 2018 Environmental Impact Assessment

WMP – Water Management Pond

Surface water management for the WRTSF area shall be managed as two streams: contact water ditches and non-contact (clean) water that should be diverted from contact water wherever feasible. For the WRTSF, there are clean water diversion ditches to the west and east of the facility. The majority of contact water is that which runs off from the working footprint of the WRTSF and is will be conveyed to the WMP at the northwest of the facility.

The WMP is a key component of the overall water management system for the site, providing storage for contact water storage from the site, and dewatering from the open pit. The WMP will also provide raw water for the Process Plant, and excess water will be discharged (pumped) to the stream CE-2.

The water management strategy for the WRTSF includes trenched drains around the perimeter to capture seepage and runoff and direct it to the WMP (GXY-JBL-WRT-DR-001-01, included in Appendix B). The WMP will be used to manage all the contact water from the WRTSF and other catchments on site. The WMP has been situated on the north side of the WRTSF to take advantage of the natural topography sloping in this direction. An emergency spillway will be constructed that discharges to the CE2 watercourse to the north.

The WRTSF will be partially situated over clay and partially over a peated area that will be excavated and replaced with coarse material to form a shear key (GXY-JBL-WRT-DR-008-01, Appendix B). Seepage will be intercepted in a toe drain across the clay footprint and an underdrain within the shear key.

Diversion channels will be used upstream of the seepage collection ditches to divert incoming non-contact water to the creek prior to mine contact (i.e. non-contact water), reducing the catchment for the ponds.

Per the requirements of Directive 019 sur l'industrie minière (Directive 019) from the Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (MDDELCC), the WMP have been sized to contain the freshet runoff for the 1:100-year total winter snow, and the 24-hr 1:1,000-year rainfall event drained from the WRTSF and the surrounding catchments. The following criteria were used to size the ponds:

- 24-hr 1:1,000-year storm event for the environmental design flood (EDF) to be stored between the maximum operating water level (MOWL) and the spillway invert, as required by Directive 019. This precipitation event has been estimated to be 101.6 mm based on the Environment and Climate Change Canada (ECCC) climatic records for La Grande Riviere and noted by WSP (2018a). It is understood that the intensity-duration-frequency curve for La Grande Riviere was updated in February 2019, after the WSP study, however the 101.6 mm value has been retained for this study as a conservative measure.
- A 1:100-year return spring freshet of 338 mm as estimated by WSP (2018a), to calculate the volume to be stored beneath MOWL under thawed (summer-fall) conditions.
- Catchment area for the WMP – 203 ha for the WRTSF, 21 ha for the pond footprint and 138 ha for the pit and the other catchments for the other catchments.
- Runoff Coefficient – 44% for the catchments associated with the WRTSF and surrounding areas. This value was determined through a runoff study for the water balance (Section 3.1.3).

The aim of the WMP design was to satisfy the following requirements:

- The earliest spring thaw was estimated to be 19 March of each year, and the latest was assumed to be the 10 May, based on the 10-day moving of average daily temperature from Environment Canada data records (mean daily temperature data from 1977-2012). Based on this:
  - Adequate storage capacity should be maintained in the pond after the 19th March each year to accommodate the spring melt.
  - It has been assumed that adequate storage should be maintained in the WMP to supply the process plant up until the 10th of May each year. A 30% contingency has been added to this volume.

  - It has been assumed that winter water stored in the WMP to supply the process plant will be discharged to the environment if unused prior to the spring freshet.

- The WMP can accommodate the design snow melt event (1:100-year spring freshet runoff) below the maximum operating water level (MOWL).
- The WMP can store the Environmental Design Flood (EDF) above the MOWL without discharge.

Precipitation on the WRTSF catchment and the WMP was considered, and evaporation on the latter. It was assumed that there will not be a supernatant pond on the WRTSF due to the deposition strategy of the materials (truck dumped). Typically, the design of a TSF includes perimeter embankments and subaerial deposition of tailings slurry that form a pond at the low point of the beach. The design of the WRTSF is different as the coarse nature of the tailings and waste rock allows trucked transport and deposition, and the crest topography is not likely to grade inwards.

3.1.6 Overburden and Peat Storage Facility Seepage

The OPSF will be comprised of peat, clay/silt and granular material. Seepage through the facility was calculated from input placement and final moisture contents. The placement moisture content was estimated based on the average moisture content for each of the materials from laboratory testing presented in the Geotechnical Factual Report (Stantec, 2019a). The final moisture content was assumed to be 50% of the placement moisture content for the peat as a reasonable assumption, and typical example SWCC curves for fine and granular material in the SEEP/W software were reviewed for the input final moisture contents (Table 9).

Table 9: Input Placement and Final Moisture Contents for the Overburden and Peat Materials

Material	Placement Water Content (% mass water / mass solids)	Final Moisture Content (% mass water / mass solids)
Peat	696 %	398 %
Clay / Silt	35 %	15 %
Granular	13 %	6 %

The volume of material to be placed in each year was obtained from the site wide soil balance (Stantec, 2019c).

3.2 WATER BALANCE RESULTS

3.2.1 Year -1

The main activity during the pre-production year is construction, which will produce significant volumes of overburden for storage in the OPSF. The discharge of seepage from the facility is estimated to be 2,711 m^3/day assuming the materials drain within the same year. Figure 6 presents the process flow diagram for the pre-production year -1.

Figure 7 and Figure 8 present the stored volume and water level in the WMP and the volume discharged to CE-2 in each mine year. Assuming the process plant is to start operating on 1 January 2022, then approximately 93,000 m^3 of free (i.e. unfrozen) storage will be required to supply the process plant until the spring freshet, and according to the stage storage curve of the WMP an additional 340,000 m^3 will be required for the assumed 2 m of ice above this working volume (total volume 432,000 m^3). It is recommended that the WMP be constructed during the winter of 2020-2021 and completion is no later than 1 May 2021. The 25-year dry water balance indicates that approximately half of this volume can be sourced from the direct inputs to the WMP from the period of May through November 2021, assuming the contact water catchments surrounding the process plant and pit (Figure 2) are collecting and discharging to the WMP and the contact water ditches around the WRTSF footprint are in place (GXY-JBL-WRT-DR-009-01, Appendix B). The remainder will need to be sourced from the OPSF. Average discharge from the OPSF during Year -1 is 78,805 m^3/month under the 25-year dry scenario assuming that peat/overburden stripping occurs consistently throughout the year, and therefore the required make up volume can be sourced from the OPSF pond.

The availability of water at the commencement of operations will need to be carefully considered as project planning continues, as it will be challenging to supply sufficient water to the process plant if completion is later than 1 May, 2021 for commencement the following year. The above assessment to source the water assumed that drainage ditch infrastructure was in place and that peat/overburden was being placed during construction of the WMP and after completion to capture the drainage of interstitial moisture. The capacity of the OPSF pond is small at approximately 46,000 m^3, and there is little scope to store water in the pond for later pumping to the WMP.

3.2.2 Life of Mine Years 1-17

The water balance indicates that the site will have a positive water balance (more water that can be used or is needed), and discharge to the environment will be required throughout the mine life. The water level within the WMP has been managed on a month-month basis to reduce peak discharge flows. The water level in February to April was maintained low in anticipation of the May influx.

Table 10 presents the maximum water levels in the WMP for each month of the year under the normal climactic conditions scenario. The discharge to CE-2 is a maximum of approximately 8,850 m^3/day during year 9 (Figure 8). The average discharge for Life-of-Mine (production years 1 to 17) is 4,087 m^3/day for normal conditions, 5,079 m^3/day for the 25-year wet conditions and 3,104 m^3/day for the 25-year dry conditions. These flows are significant compared with the WSP (2018a) average estimated flows in CE-2 of a minimum of 4,752 m^3/day in March to 25,229 m^3/day in May. An assimilative capacity study should be carried out to assess the impact of the added flow to the system.

The largest discharges to CE-3 are during the preproduction year at 2,711 m^3/day under normal conditions. Average discharge to CE-3 from the OPSF for the Life-Of-Mine is 525 m^3/day for normal conditions, 634 m^3/day for the 25-year wet conditions and 420 m^3/day for the 25-year dry conditions. These discharge volumes are significantly less than the volume estimated for the pre-production year 1 of 28,026 m^3/day under normal conditions. WSP (2018a) average estimated flows in CE-3 range from 5,443 m^3/day in March to 28,685 m^3/day in May.

Figure 9 to Figure 11 present the process flow diagram for the average LOM under the climactic conditions considered. The largest flows are associated with the WRTSF runoff and pit dewatering. Process flow diagrams for select years and precipitative conditions are attached within Appendix A. Due to the excess of water in the system, the main difference between the normal conditions and 25-year wet and dry is the discharge volume. There is sufficient water for typical plant operation of 19.1 m^3/hr and the assumed peak production rate of 30 m^3/hr under each climate scenario.

Table 10: Maximum Water Levels in the WMP for each Month of the Year, Normal Climactic Conditions

Month	Max OWL (m asl)	Min OWL (m asl)	Max Storage (m^3)	Min Storage (m^3)
January	199.70	195.82	1,053,739	315,996
February	196.26	195.82	392,985	315,996
March	196.26	195.82	392,985	315,996
April	196.26	195.82	392,985	315,996
May	199.70	195.82	1,053,739	315,996
June	199.70	195.00	1,053,739	177,065
July	199.70	195.00	1,053,739	177,065
August	199.70	195.00	1,053,739	177,065
September	199.70	195.00	1,053,739	177,065
October	199.70	195.00	1,053,739	177,065
November	199.70	195.82	1,053,739	315,996
December	199.70	195.82	1,053,739	315,996

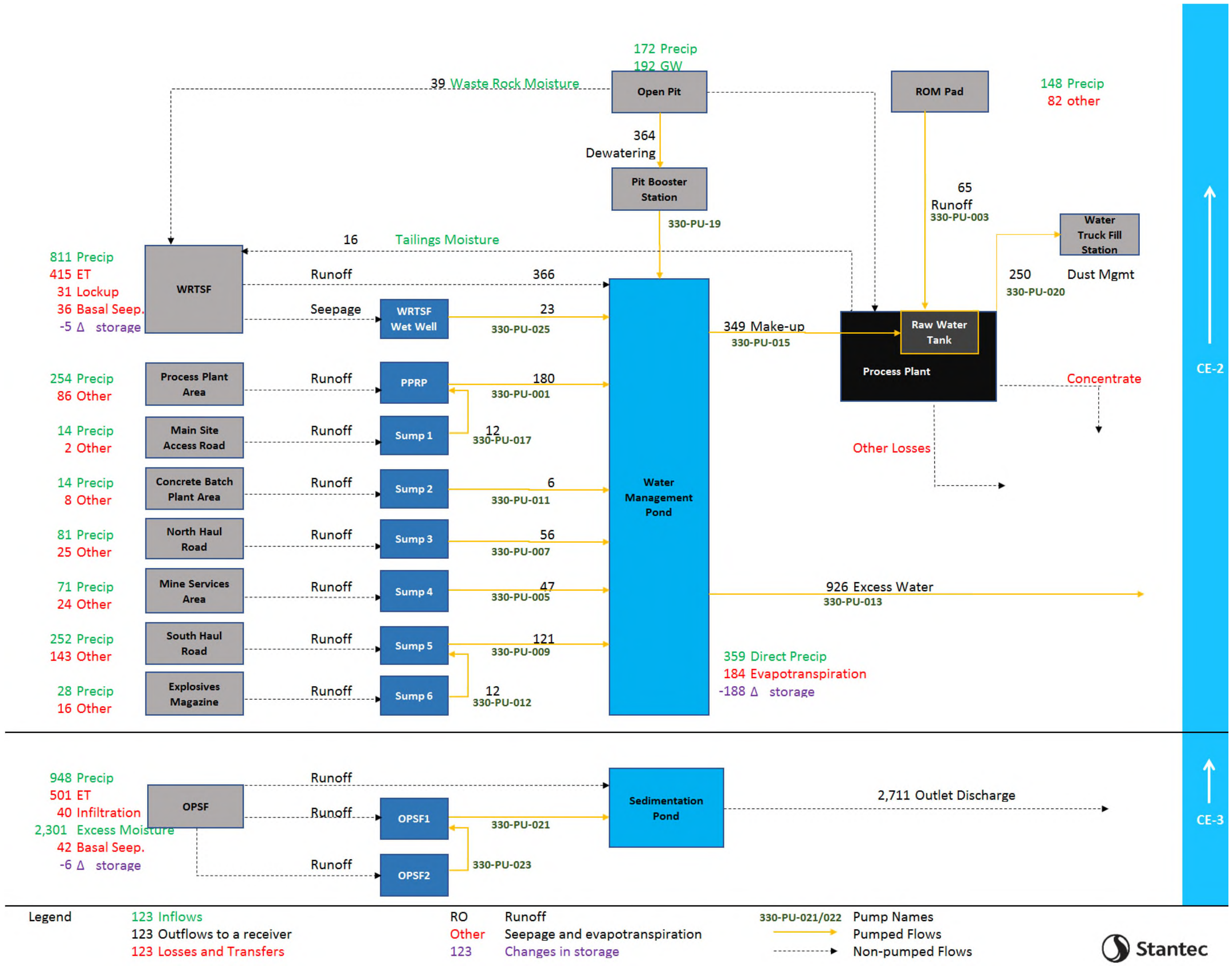

Figure 6: Process Flow Diagram for Pre-Production Year -1 – Normal Climactic Conditions – Average Flows (m³/day)

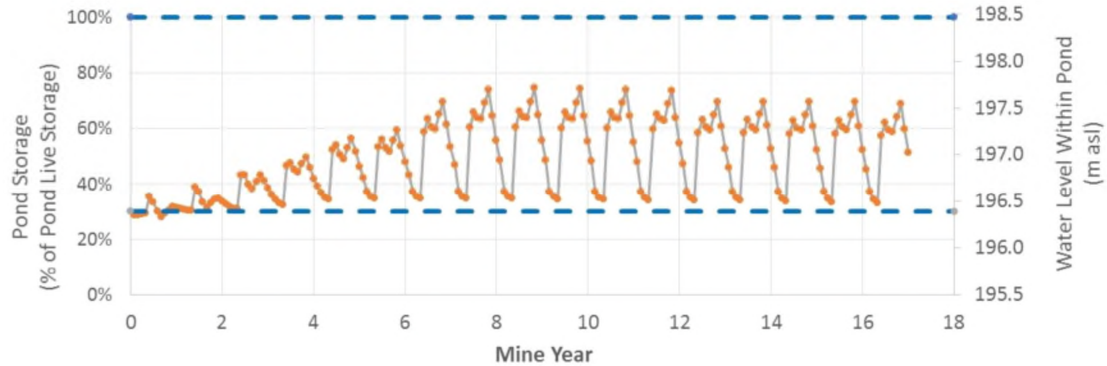

Figure 7: Water Level in the WMP

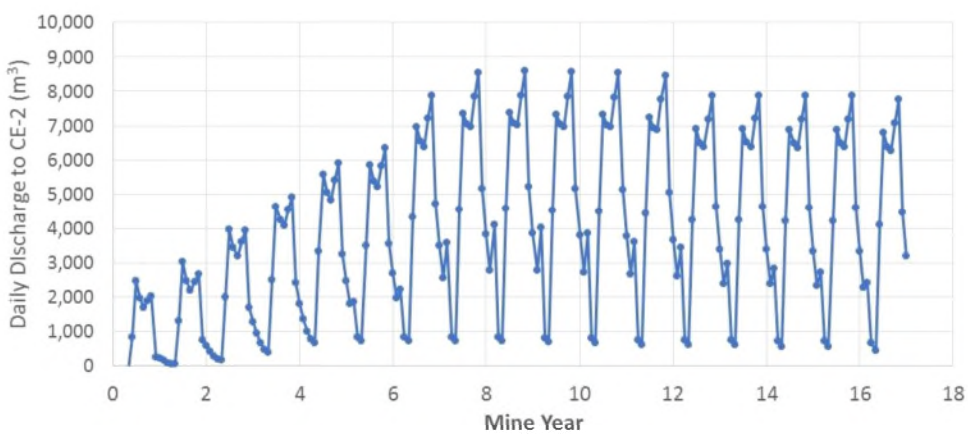

Figure 8: Discharge to CE-2

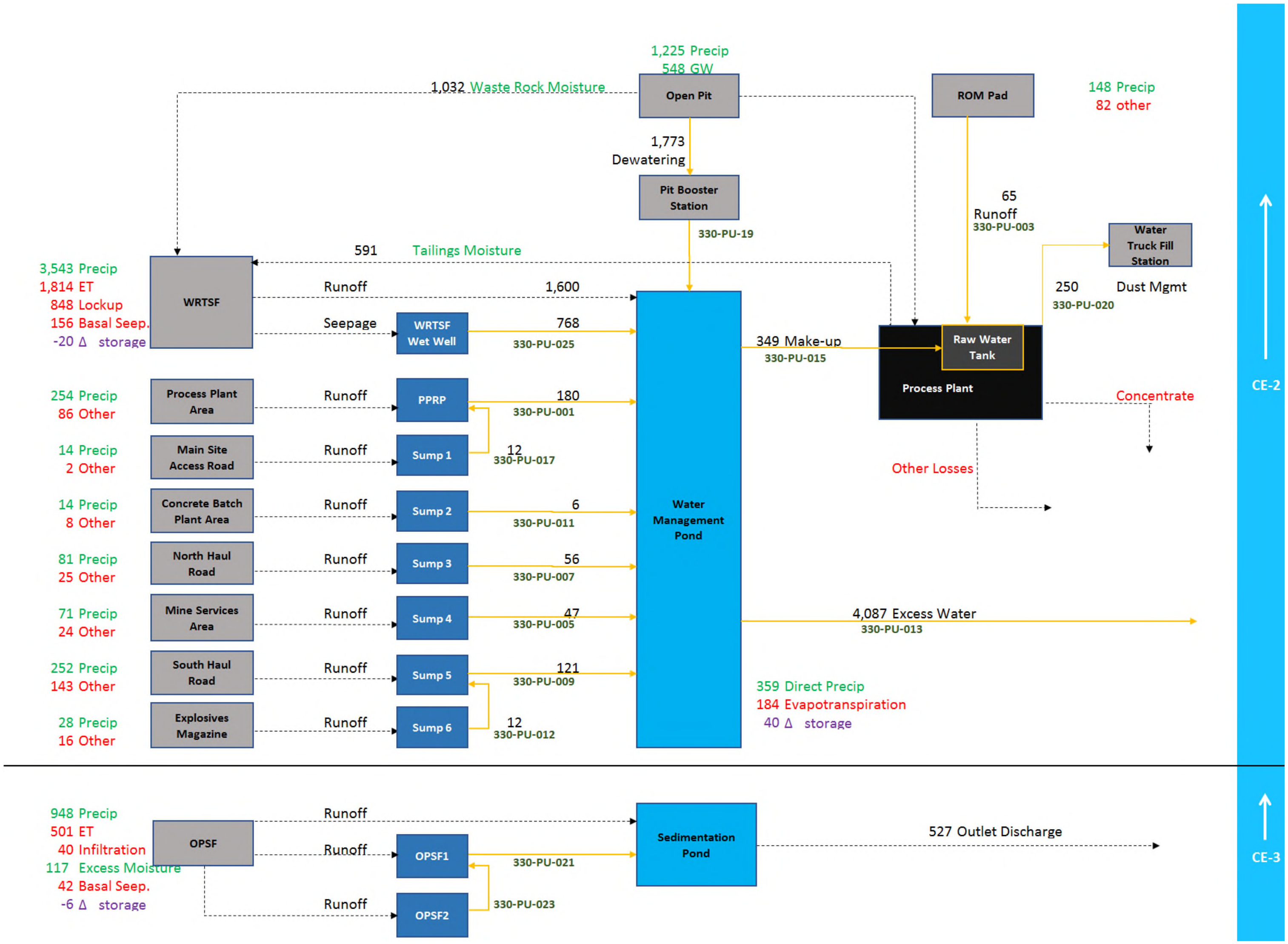

Figure 9: Process Flow Diagram for Life of Mine –Normal Climactic Conditions – Average Flows (m³/day)

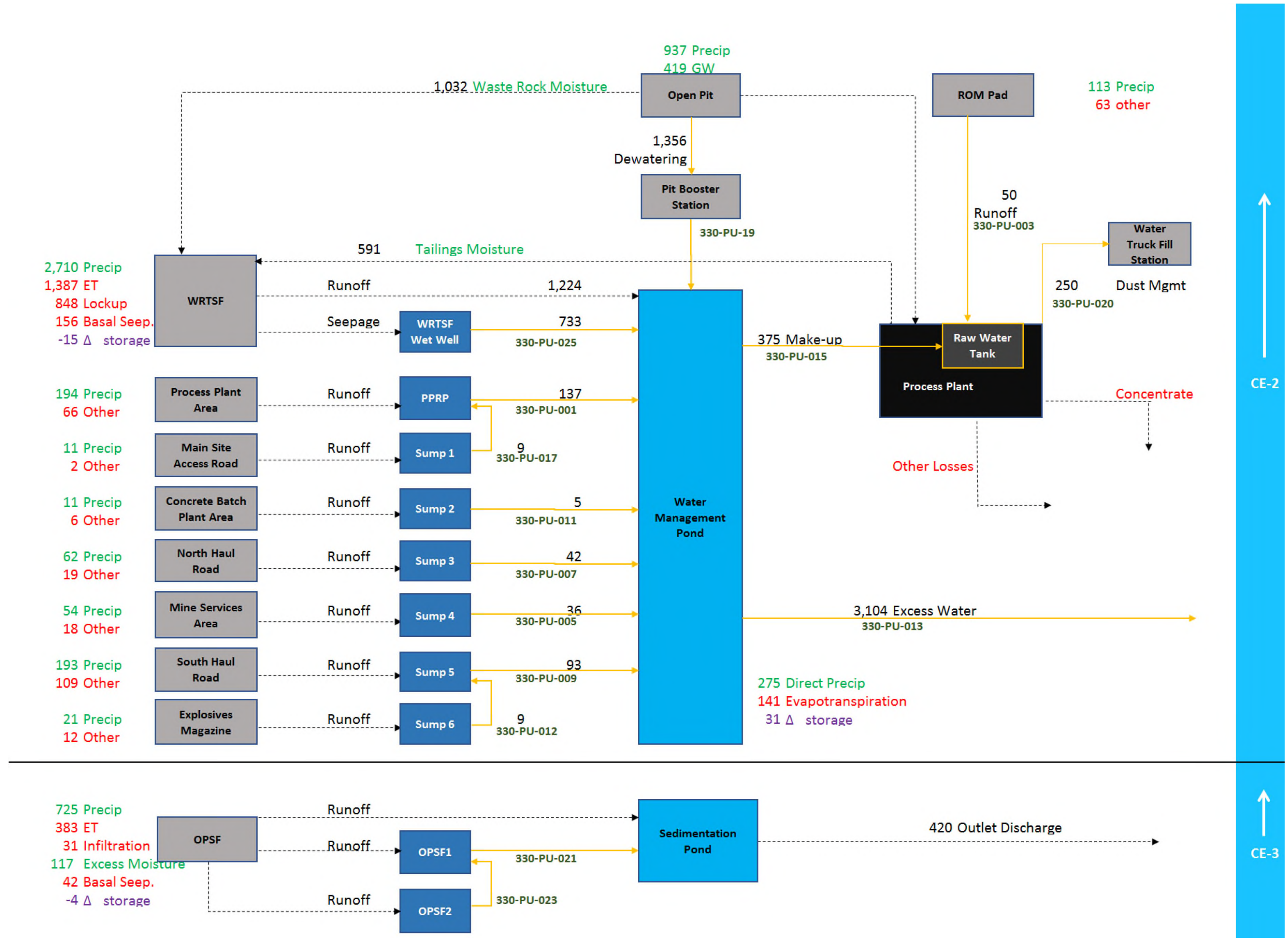

Figure 10: Process Flow Diagram for Life of Mine – 25-Year Dry Climactic Conditions – Average Flows (m^3/day)

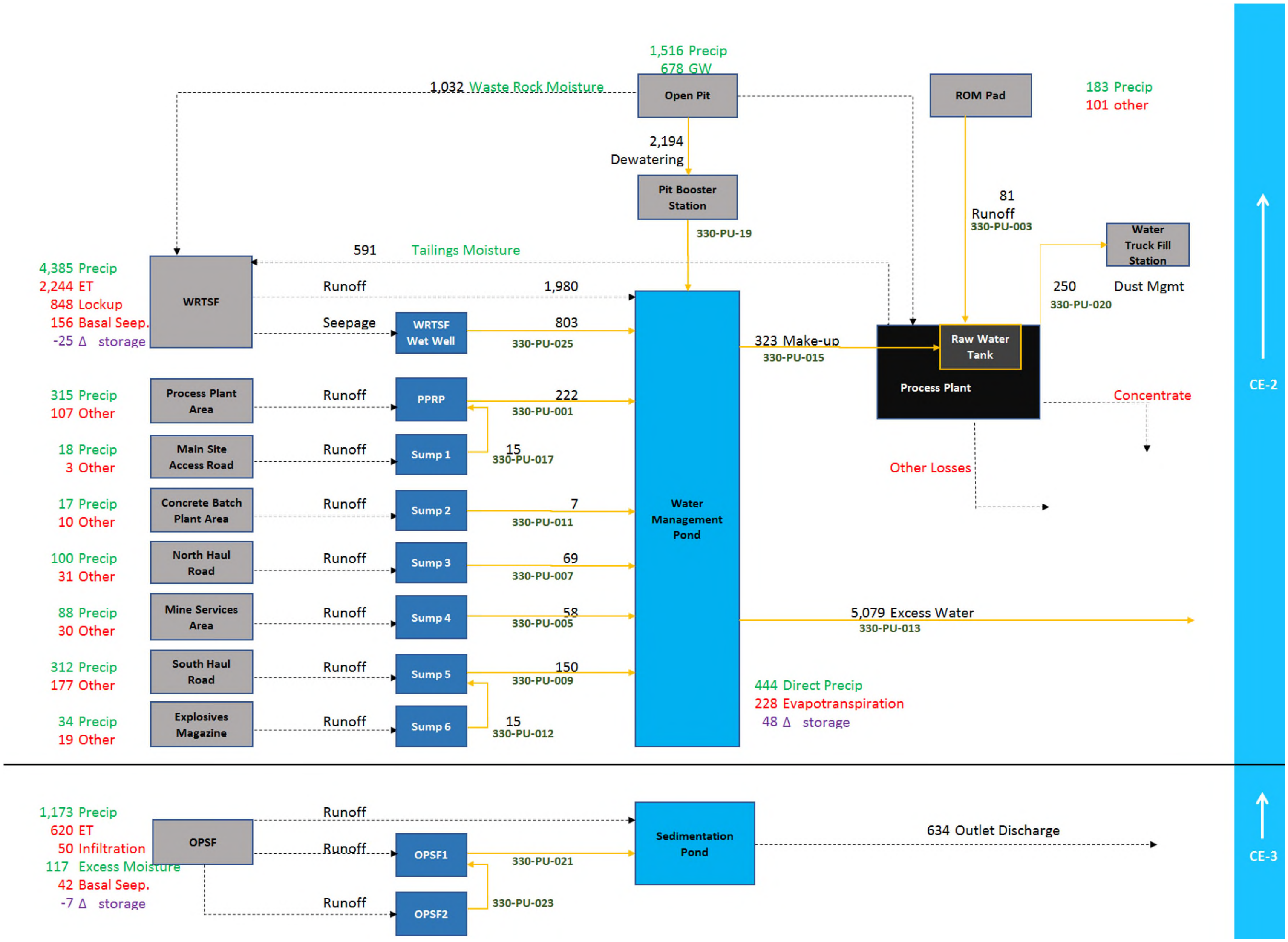

Figure 11: Process Flow Diagram for Life of Mine – 25-Year Wet Climactic Condition – Average Flows (m^3/day)

4.0 CONCLUSIONS AND LIMITATIONS

A mine wide water balance was prepared in support of the feasibility study for the James Bay Lithium Project. The water balance estimated discharge rates to the environment and was used to confirm sufficient availability for plant demand. A positive water balance was indicated for each mine year and the average discharge for Life-of-Mine is 4,087 m^3/day under normal climactic conditions. The water level in the WMP was managed for each time step to reduce peak discharges.

The water balance indicates that the plant demand can on average be satisfied from catchment runoff and pit dewatering.

The water balance for this Feasibility Study includes other important assumptions for key inputs that will be dynamic during operations, including the following:

- Water quality has not been simulated, including the assimilative capacity of CE-2 and CE-3.
- There will be no supernatant pond on the WRTSF.
- No inefficiencies such as pumping losses or leaks have been included.
- Infiltration beneath the WRTSF or surrounding catchments is lost from the system, i.e. not connected to downstream nodes including the open pit. Groundwater inflow into the pit has been considered separately.

5.0 REFERENCES

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Stantec Consulting, 2019b. Overburden and Peat Stockpile Facility Preliminary Engineering. August 2, 2019.

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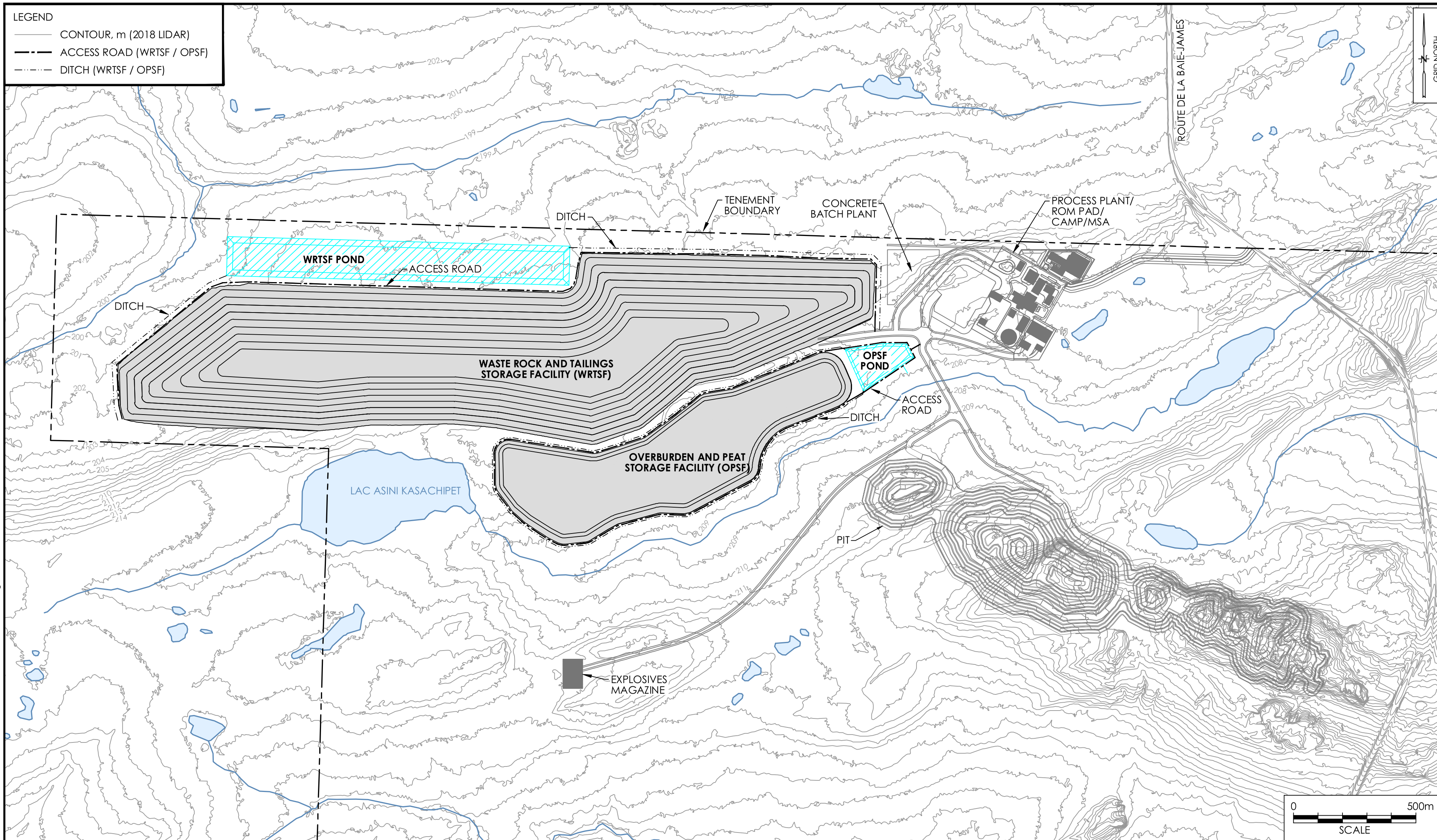

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:
LIDAR: 2018, WSP
CANVEC DATA: NATURAL RESOURCES CANADA

PRELIMINARY NOT FOR CONSTRUCTION

GENERAL ARRANGEMENT - MINE FACILITIES
SITE WIDE WATER BALANCE
JAMES BAY, QUEBEC

Client: GALAXY LITHIUM (CANADA) INC.

Job No.:	121622255
Scale:	1 : 15 000
Date:	2019 07 26
Dwn. By:	JL
App'd By:	MS
Dwg. No.:	1

Stantec

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APPENDIX A
Process Flow Diagrams for Select Years / Scenarios

Galaxy Lithium

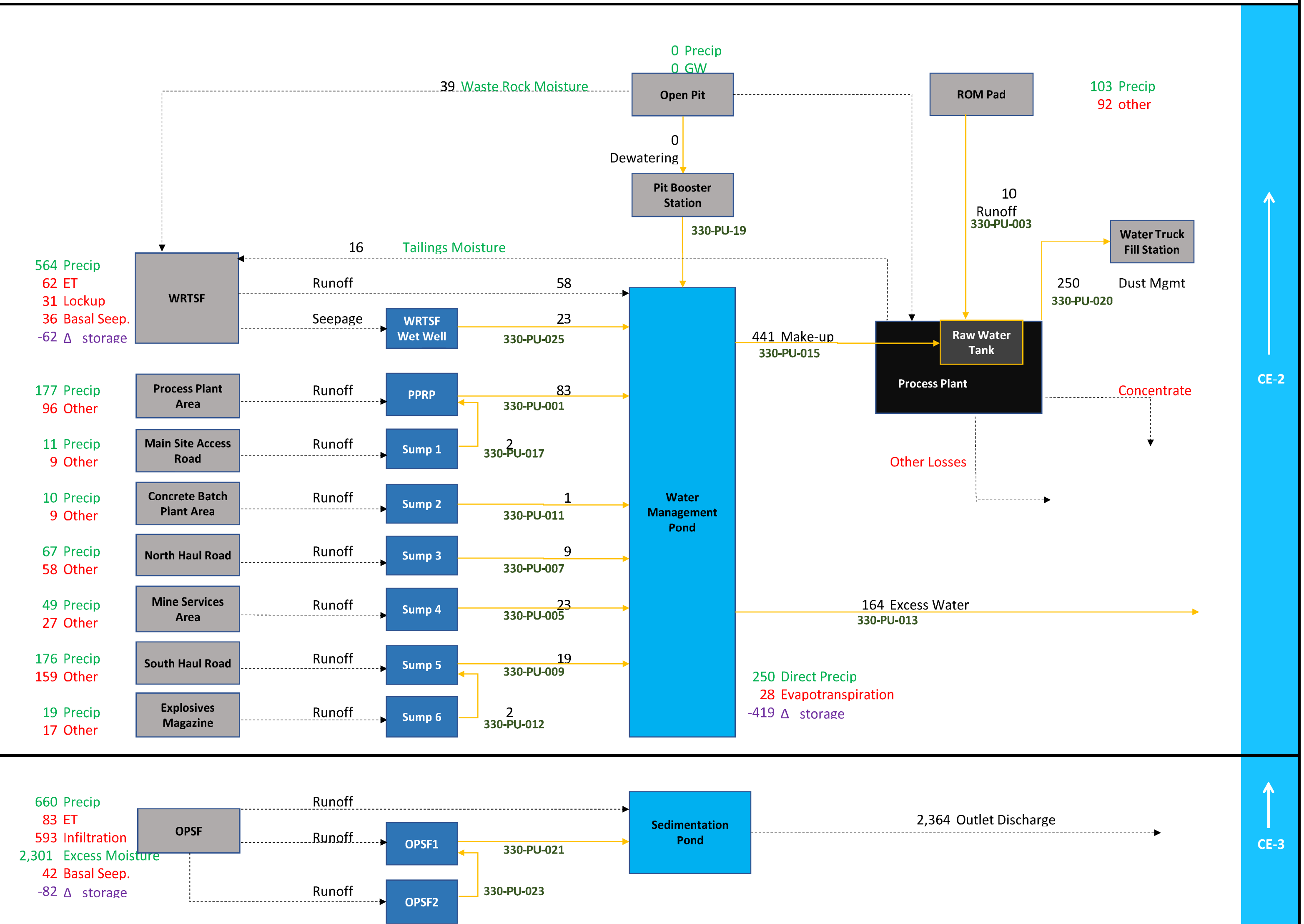
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m³/day

Year	**-1**
Functional Season	**Winter (Nov-April)**
Climate conditions	**Normal**



Legend

123 Inflows		RO	Runoff	330-PU-021/022	Pump Names
123 Outflows to a receiver		Other	Seepage and evapotranspiration		Pumped Flows
123 Losses and Transfers		123	Changes in storage		Non-pumped Flows

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Galaxy Lithium

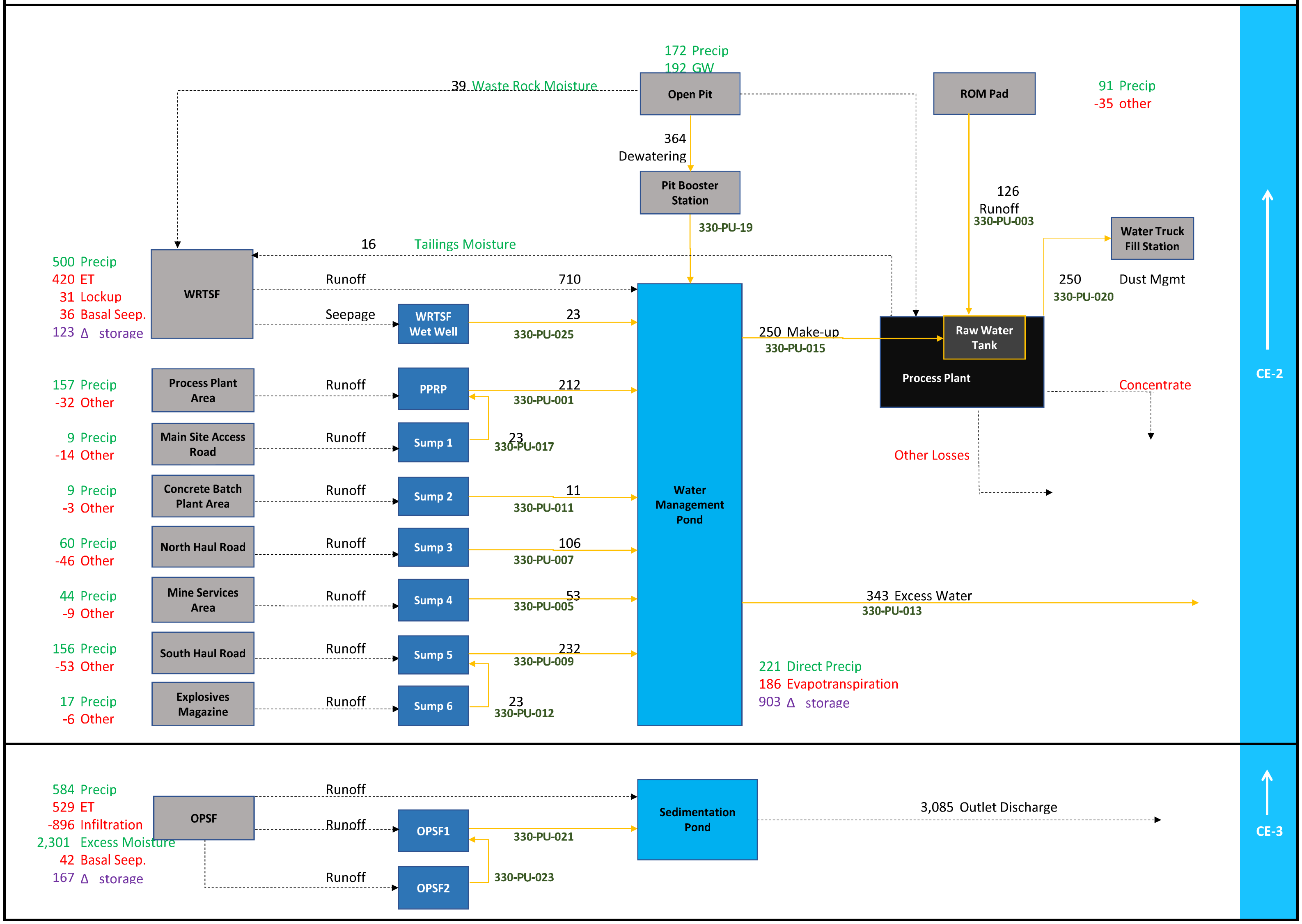
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	**-1**
Functional Season	**Spring**
Climate conditions	**Normal**



Legend

123 Inflows	RO	Runoff	330-PU-021/022 Pump Names
123 Outflows to a receiver	Other	Seepage and evapotranspiration	Pumped Flows
123 Losses and Transfers	123	Changes in storage	Non-pumped Flows

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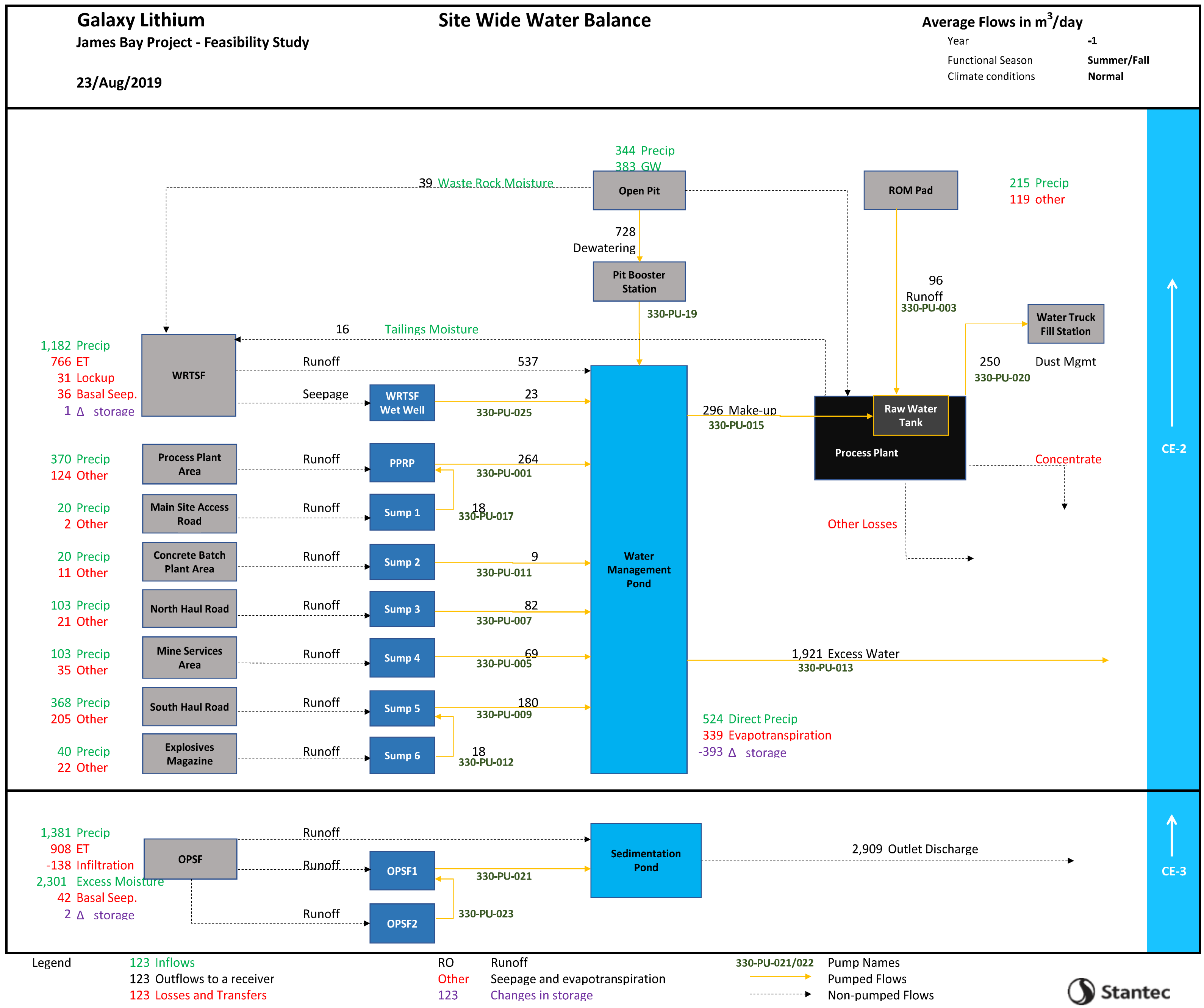

Galaxy Lithium
James Bay Project - Feasibility Study
23/Aug/2019
Site Wide Water Balance
Average Flows in m3/day
Year -1
Functional Season Summer/Fall
Climate conditions Normal
344 Precip
383 GW
Open Pit
39 Waste Rock Moisture
728 Dewatering
Pit Booster Station
330-PU-19
ROM Pad
215 Precip
119 other
96 Runoff
330-PU-003
Water Truck Fill Station
250 Dust Mgmt
330-PU-020
Raw Water Tank
Process Plant
296 Make-up
330-PU-015
Concentrate
Other Losses
16 Tailings Moisture
1,182 Precip
766 ET
31 Lockup
36 Basal Seep.
1 Δ storage
WRTSF
Runoff 537
Seepage
WRTSF Wet Well
23
330-PU-025
370 Precip
124 Other
Process Plant Area
Runoff
PPRP
264
330-PU-001
20 Precip
2 Other
Main Site Access Road
Sump 1
18
330-PU-017
20 Precip
11 Other
Concrete Batch Plant Area
Sump 2
9
330-PU-011
103 Precip
21 Other
North Haul Road
Sump 3
82
330-PU-007
103 Precip
35 Other
Mine Services Area
Sump 4
69
330-PU-005
368 Precip
205 Other
South Haul Road
Sump 5
180
330-PU-009
40 Precip
22 Other
Explosives Magazine
Sump 6
18
330-PU-012
Water Management Pond
1,921 Excess Water
330-PU-013
524 Direct Precip
339 Evapotranspiration
-393 Δ storage
CE-2
1,381 Precip
908 ET
-138 Infiltration
2,301 Excess Moisture
42 Basal Seep.
2 Δ storage
OPSF
Runoff
OPSF1
330-PU-021
OPSF2
330-PU-023
Sedimentation Pond
2,909 Outlet Discharge
CE-3
Legend
123 Inflows
123 Outflows to a receiver
123 Losses and Transfers
RO Runoff
Other Seepage and evapotranspiration
123 Changes in storage
330-PU-021/022 Pump Names
Pumped Flows
Non-pumped Flows
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Galaxy Lithium

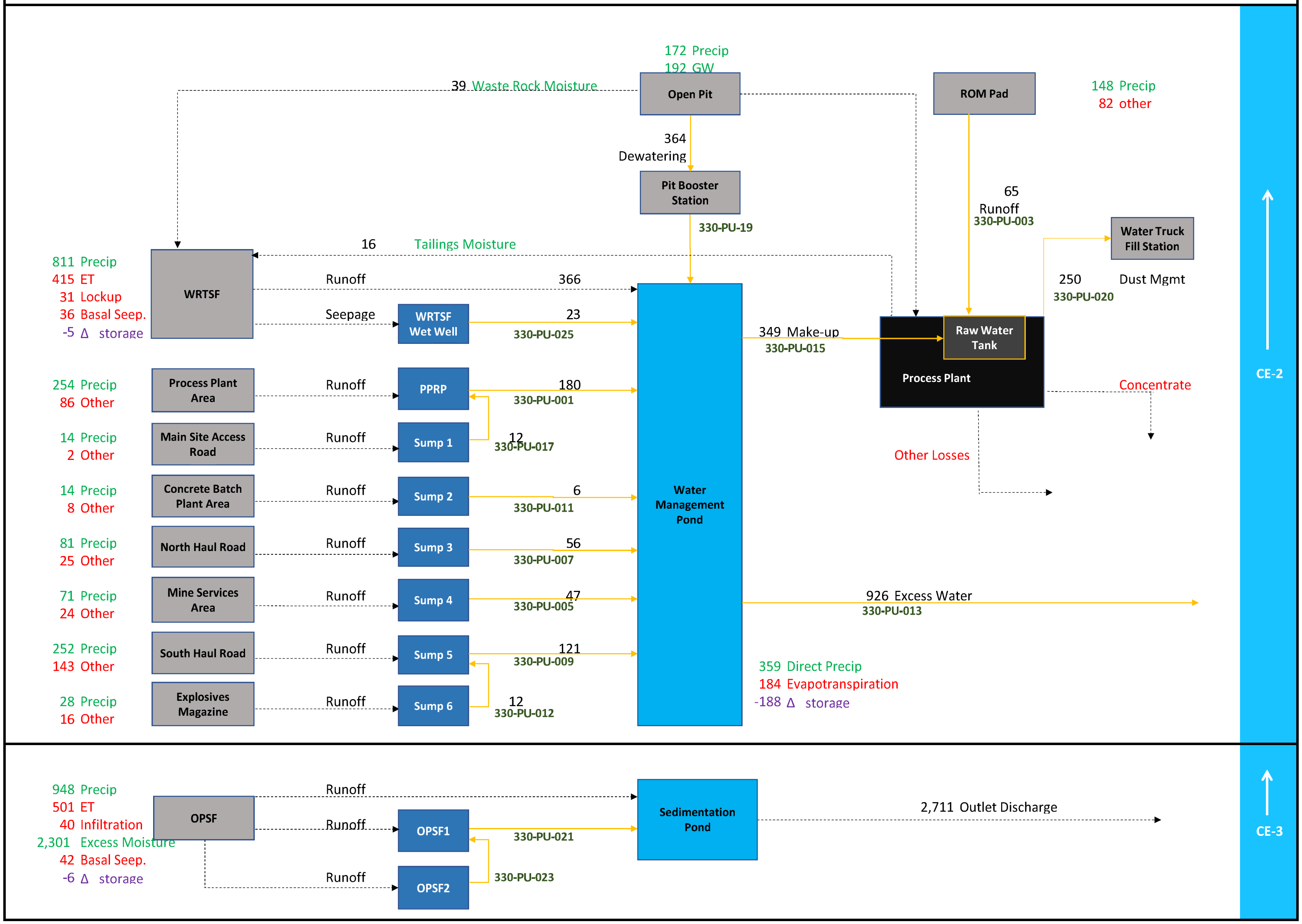
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	-1
Functional Season	*
Climate conditions	Normal



Legend

123 Inflows
123 Outflows to a receiver
123 Losses and Transfers

RO Runoff
Other Seepage and evapotranspiration
123 Changes in storage

330-PU-021/022 Pump Names
Pumped Flows
Non-pumped Flows

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Galaxy Lithium

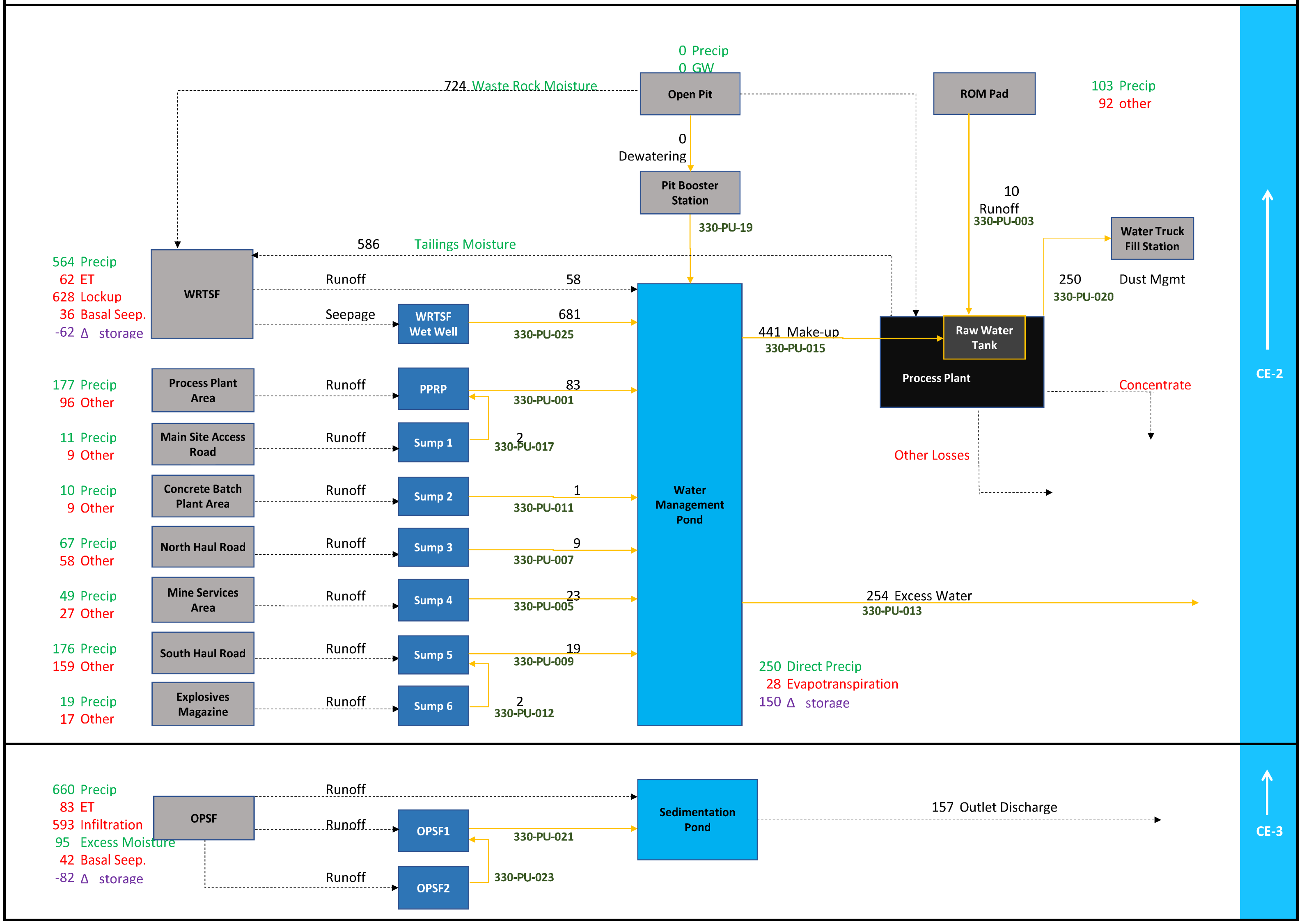
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	**1**
Functional Season	**Winter (Nov-April)**
Climate conditions	**Normal**



Legend	123 Inflows	RO	Runoff	330-PU-021/022	Pump Names
	123 Outflows to a receiver	Other	Seepage and evapotranspiration		Pumped Flows
	123 Losses and Transfers	123	Changes in storage		Non-pumped Flows

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Galaxy Lithium

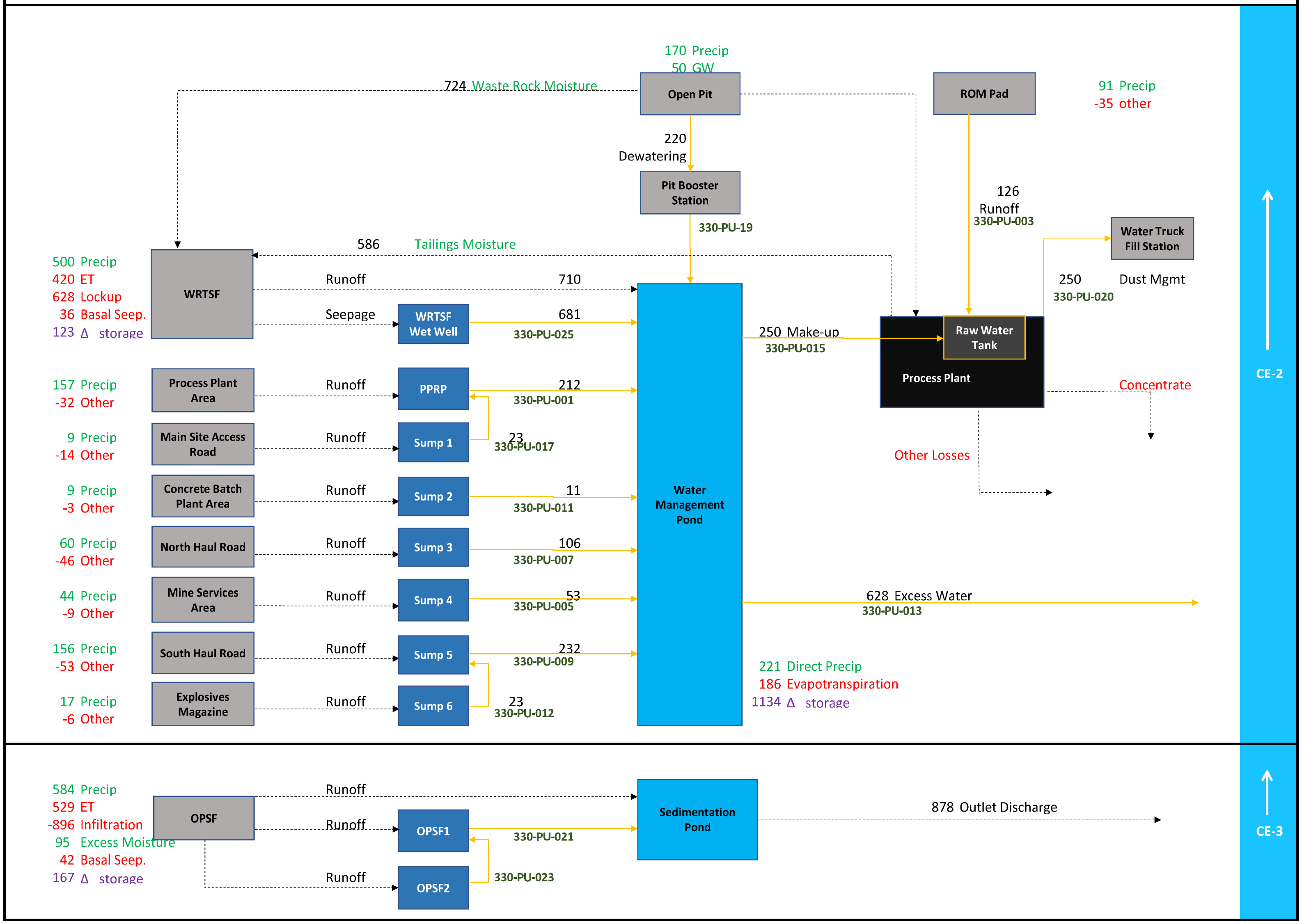
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	**1**
Functional Season	**Spring**
Climate conditions	**Normal**



Legend

123 Inflows	RO	Runoff	330-PU-021/022	Pump Names
123 Outflows to a receiver	Other	Seepage and evapotranspiration		Pumped Flows
123 Losses and Transfers	123	Changes in storage		Non-pumped Flows

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Galaxy Lithium

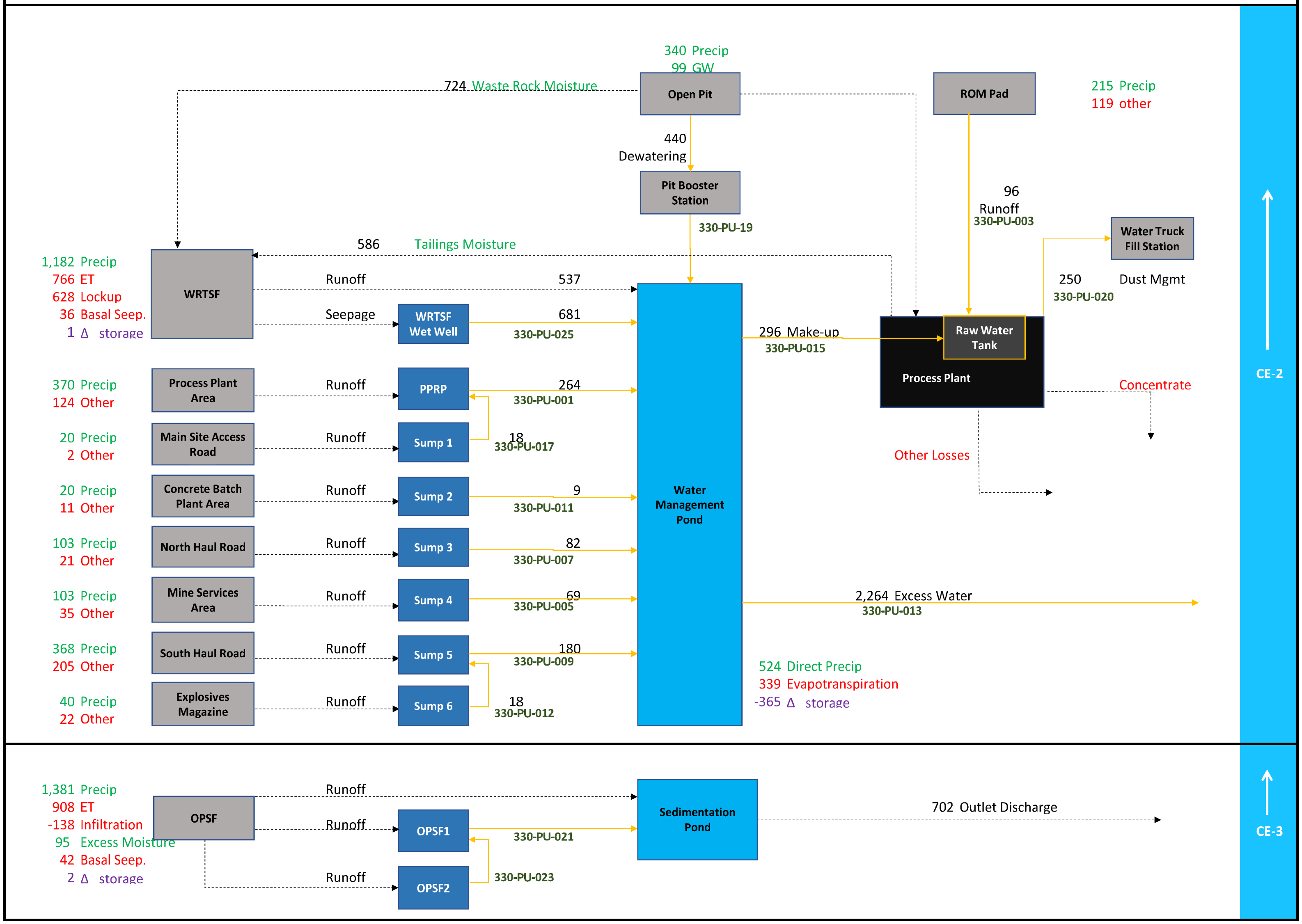
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	**1**
Functional Season	**Summer/Fall**
Climate conditions	**Normal**



Legend					
123 Inflows		RO	Runoff	330-PU-021/022	Pump Names
123 Outflows to a receiver		Other	Seepage and evapotranspiration		Pumped Flows
123 Losses and Transfers		123	Changes in storage		Non-pumped Flows

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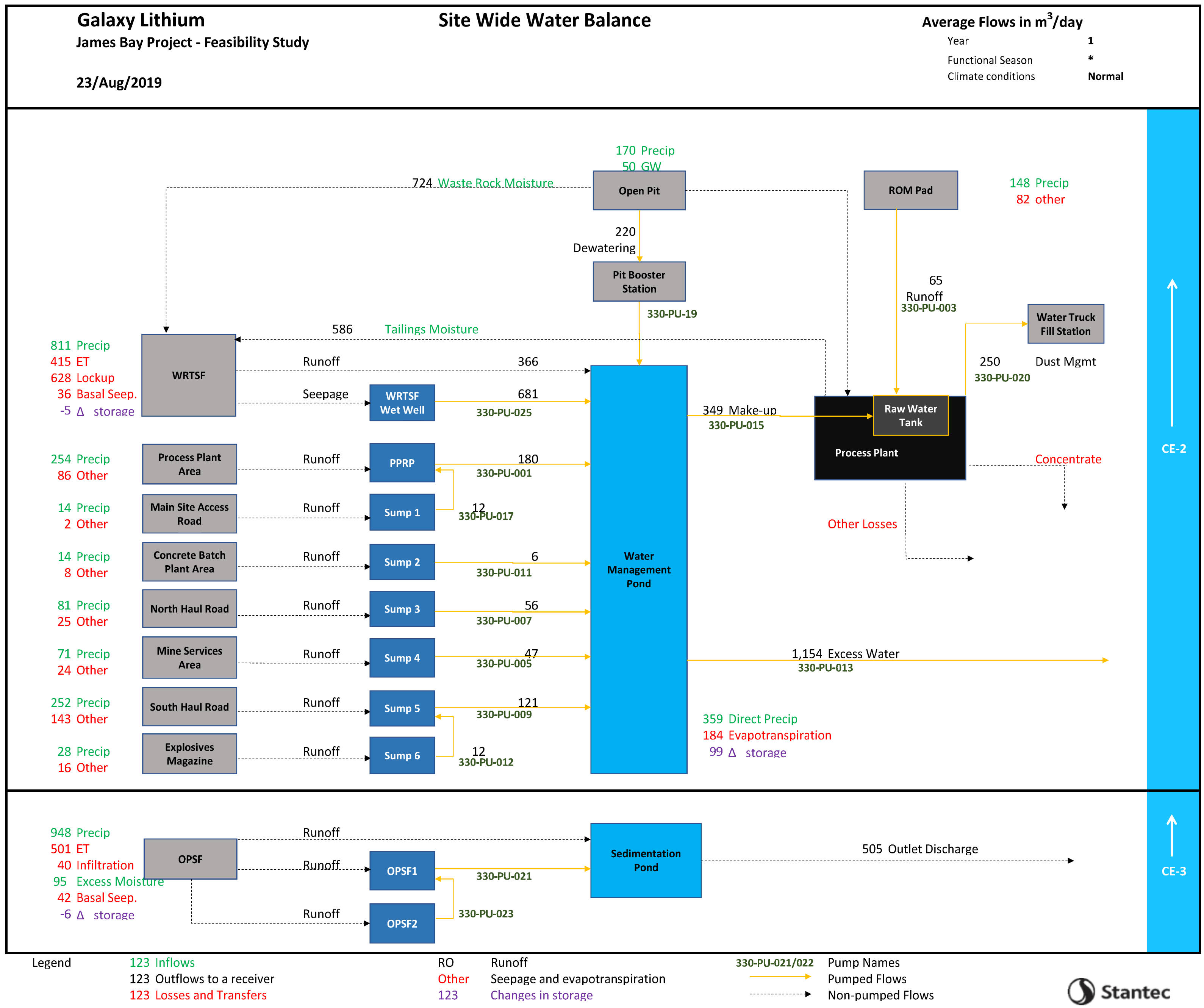

Galaxy Lithium
James Bay Project - Feasibility Study
23/Aug/2019
Site Wide Water Balance
Average Flows in m3/day
Year 1
Functional Season *
Climate conditions Normal
170 Precip
50 GW
Open Pit
724 Waste Rock Moisture
220 Dewatering
Pit Booster Station
330-PU-19
ROM Pad
148 Precip
82 other
65 Runoff
330-PU-003
Water Truck Fill Station
250 Dust Mgmt
330-PU-020
586 Tailings Moisture
811 Precip
415 ET
628 Lockup
36 Basal Seep.
-5 Δ storage
WRTSF
Runoff 366
Seepage
WRTSF Wet Well
681
330-PU-025
349 Make-up
330-PU-015
Raw Water Tank
Process Plant
Concentrate
Other Losses
254 Precip
86 Other
Process Plant Area
Runoff
PPRP
180
330-PU-001
14 Precip
2 Other
Main Site Access Road
Runoff
Sump 1
12
330-PU-017
14 Precip
8 Other
Concrete Batch Plant Area
Runoff
Sump 2
6
330-PU-011
81 Precip
25 Other
North Haul Road
Runoff
Sump 3
56
330-PU-007
71 Precip
24 Other
Mine Services Area
Runoff
Sump 4
47
330-PU-005
1,154 Excess Water
330-PU-013
252 Precip
143 Other
South Haul Road
Runoff
Sump 5
121
330-PU-009
28 Precip
16 Other
Explosives Magazine
Runoff
Sump 6
12
330-PU-012
Water Management Pond
359 Direct Precip
184 Evapotranspiration
99 Δ storage
CE-2
948 Precip
501 ET
40 Infiltration
95 Excess Moisture
42 Basal Seep.
-6 Δ storage
OPSF
Runoff
Runoff
OPSF1
330-PU-021
Runoff
OPSF2
330-PU-023
Sedimentation Pond
505 Outlet Discharge
CE-3
Legend
123 Inflows
123 Outflows to a receiver
123 Losses and Transfers
RO Runoff
Other Seepage and evapotranspiration
123 Changes in storage
330-PU-021/022 Pump Names
Pumped Flows
Non-pumped Flows
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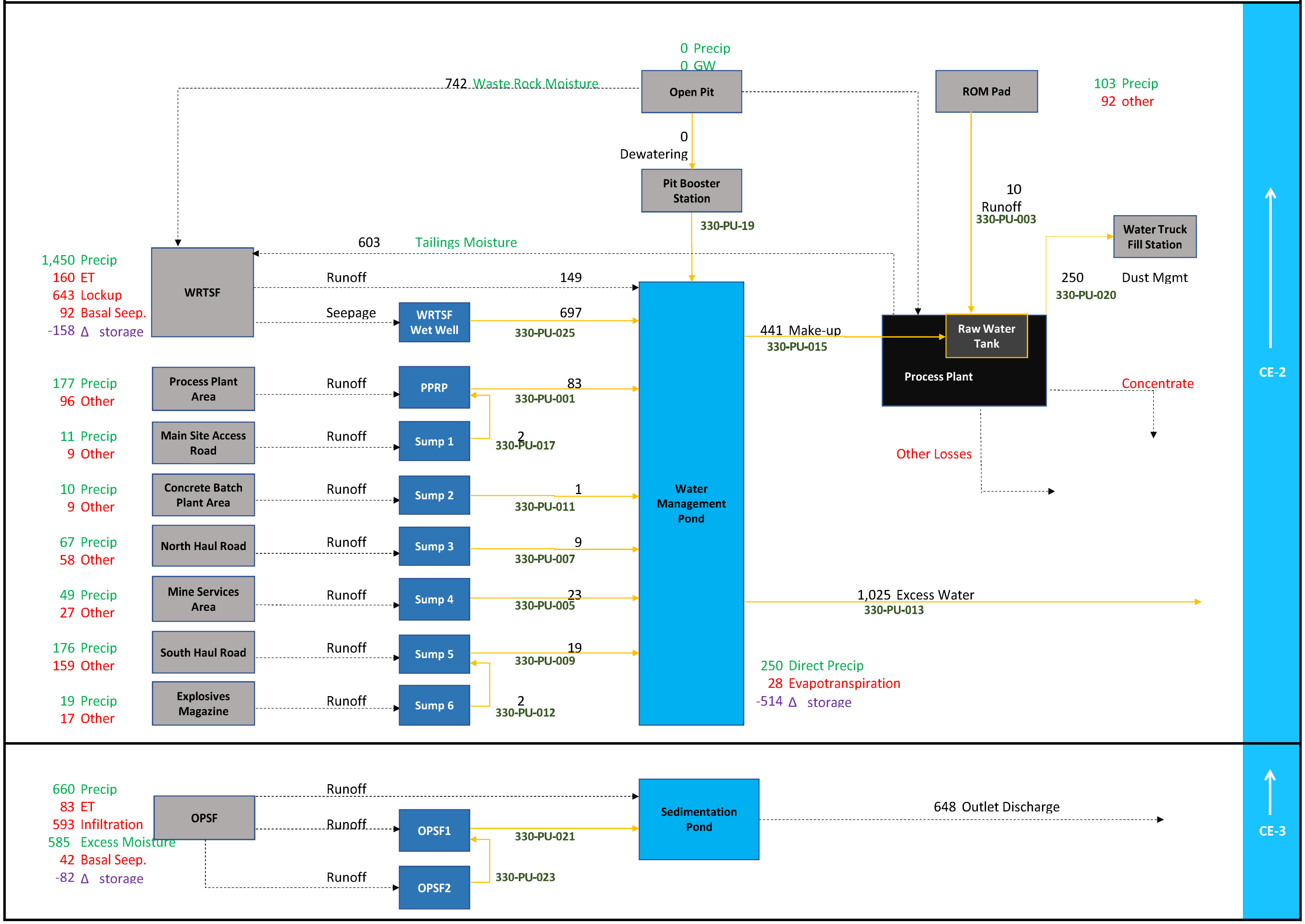
Galaxy Lithium
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	3
Functional Season	Winter (Nov-April)
Climate conditions	Normal



Legend					
123 Inflows		RO	Runoff	330-PU-021/022	Pump Names
123 Outflows to a receiver		Other	Seepage and evapotranspiration		Pumped Flows
123 Losses and Transfers		123	Changes in storage		Non-pumped Flows

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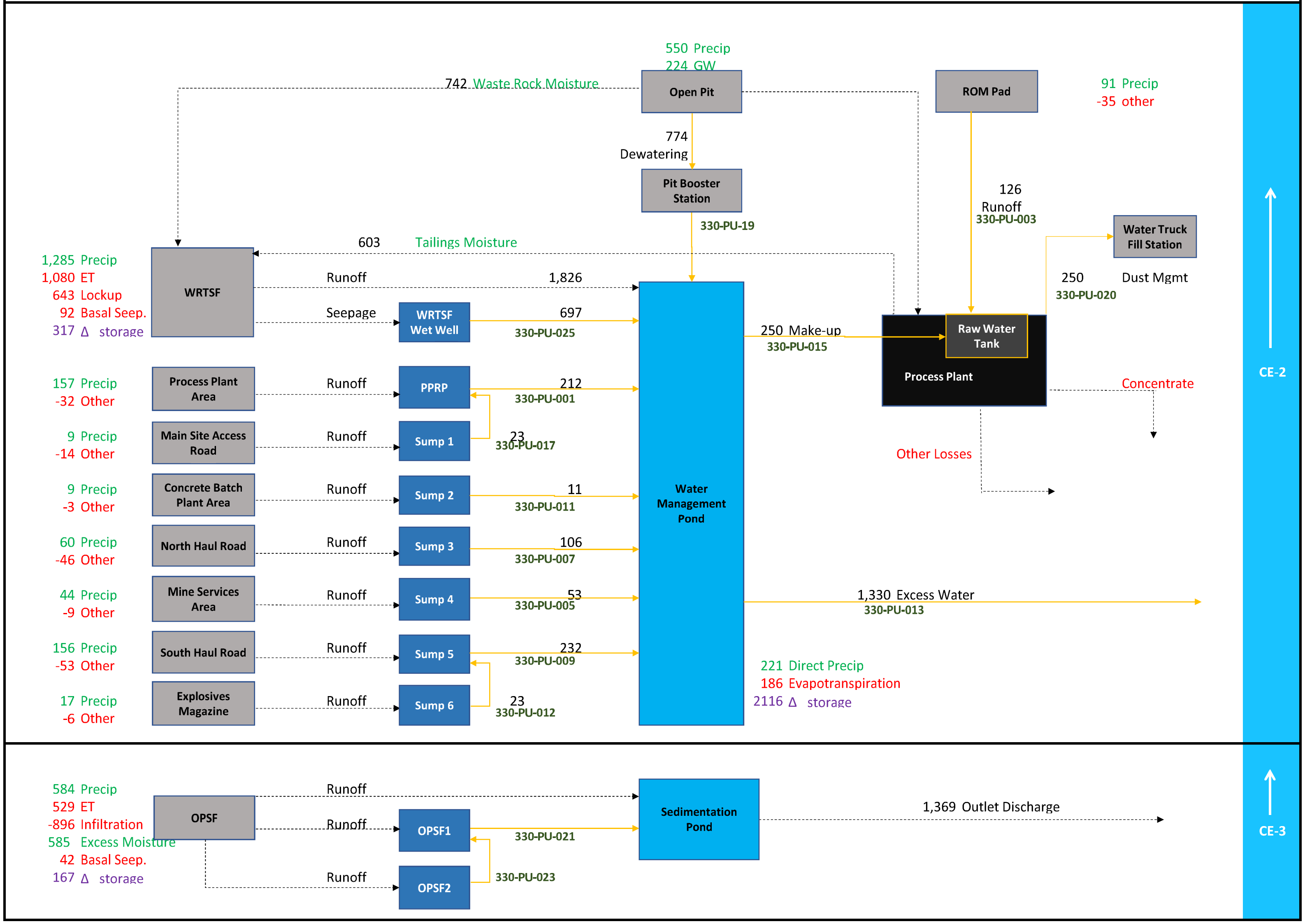
Galaxy Lithium
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m³/day

Year	**3**
Functional Season	**Spring**
Climate conditions	**Normal**



Legend

123 Inflows	RO Runoff	330-PU-021/022	Pump Names
123 Outflows to a receiver	Other Seepage and evapotranspiration		Pumped Flows
123 Losses and Transfers	123 Changes in storage		Non-pumped Flows

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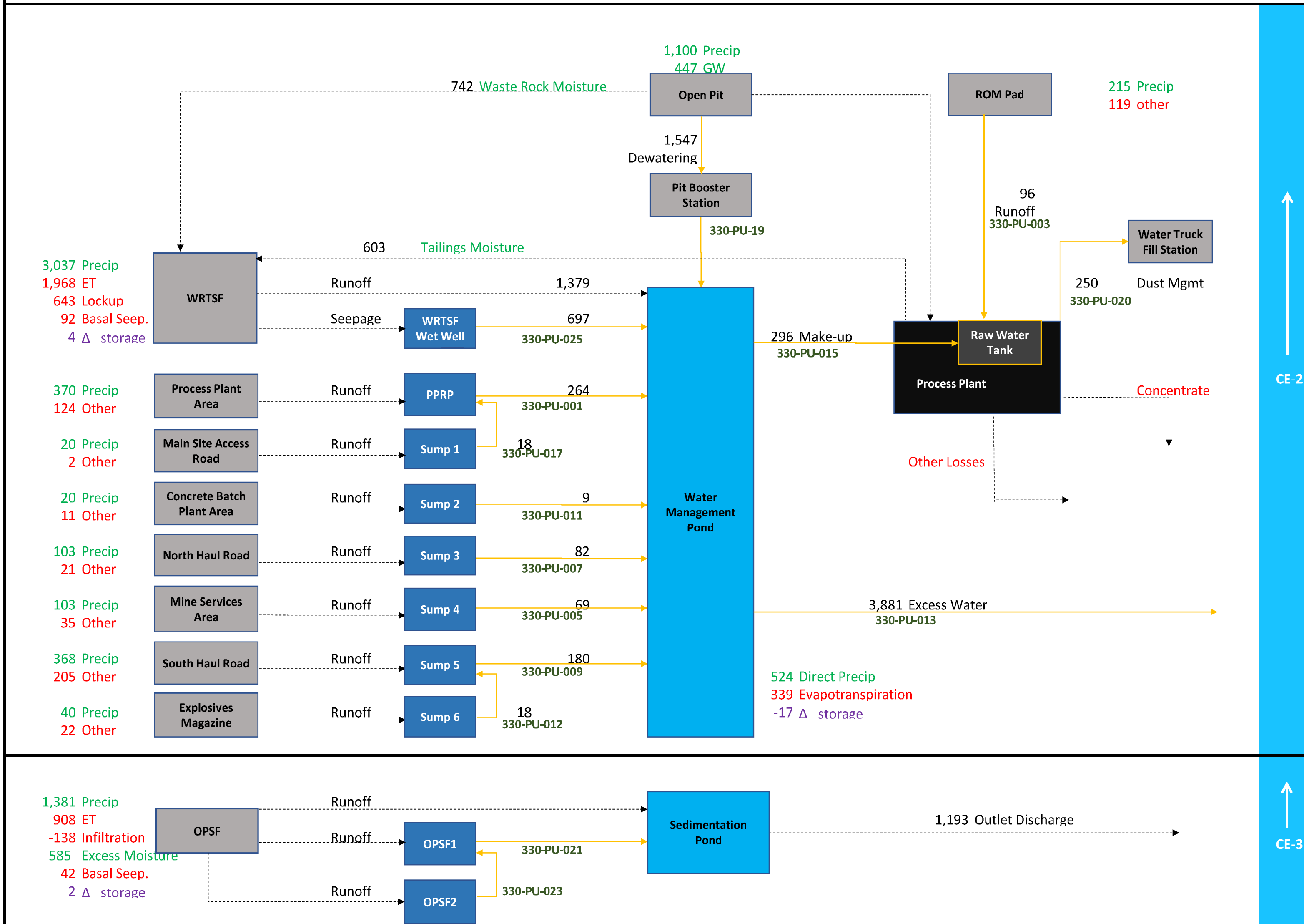
Galaxy Lithium
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m³/day

Year	**3**
Functional Season	**Summer/Fall**
Climate conditions	**Normal**



Legend

123 Inflows	RO	Runoff	330-PU-021/022 Pump Names
123 Outflows to a receiver	Other	Seepage and evapotranspiration	Pumped Flows
123 Losses and Transfers	123	Changes in storage	Non-pumped Flows

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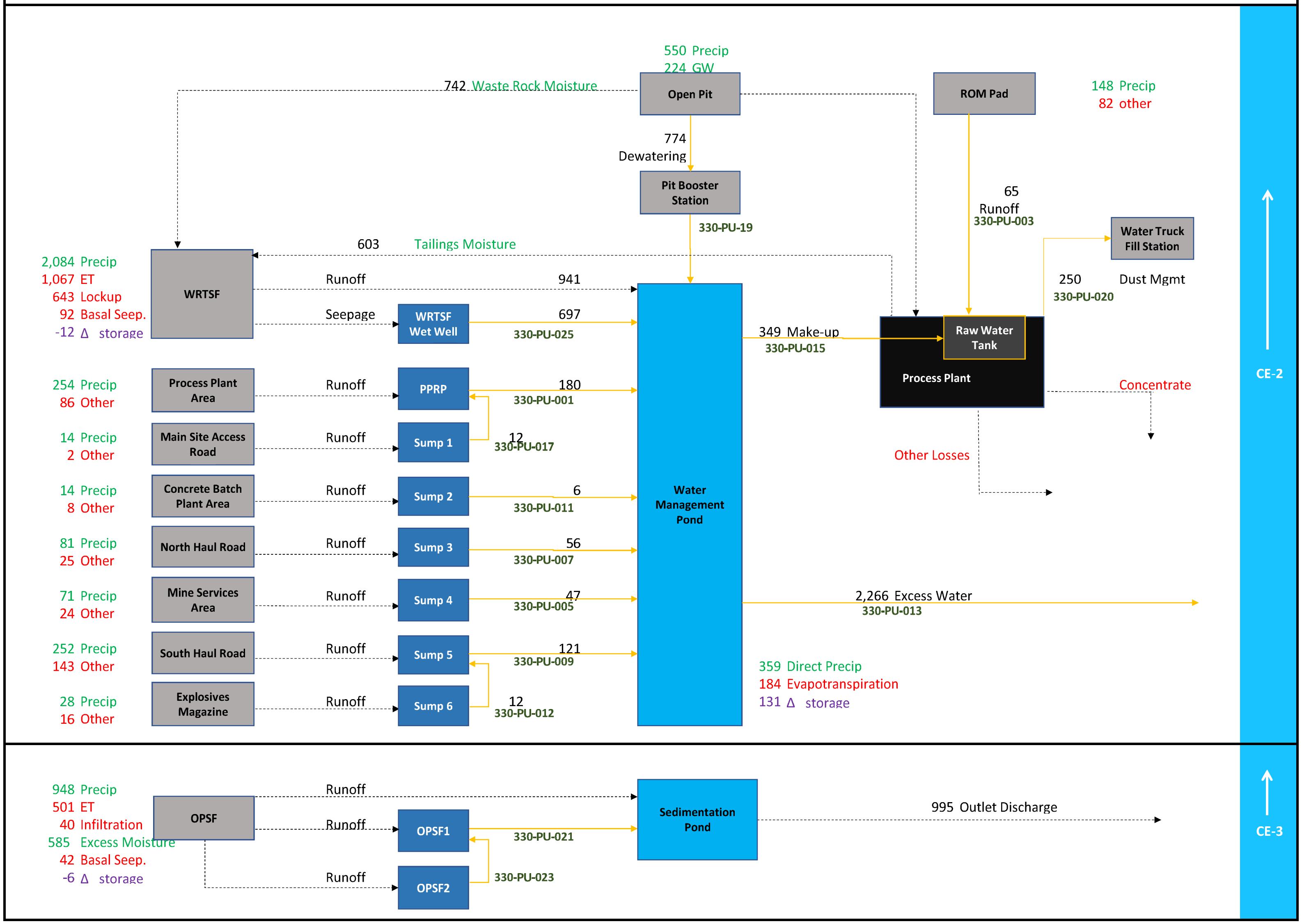
Galaxy Lithium
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year **3**
Functional Season *
Climate conditions **Normal**



Legend
123 Inflows
123 Outflows to a receiver
123 Losses and Transfers
RO Runoff
Other Seepage and evapotranspiration
123 Changes in storage
330-PU-021/022 Pump Names
Pumped Flows
Non-pumped Flows

Stantec

Galaxy Lithium

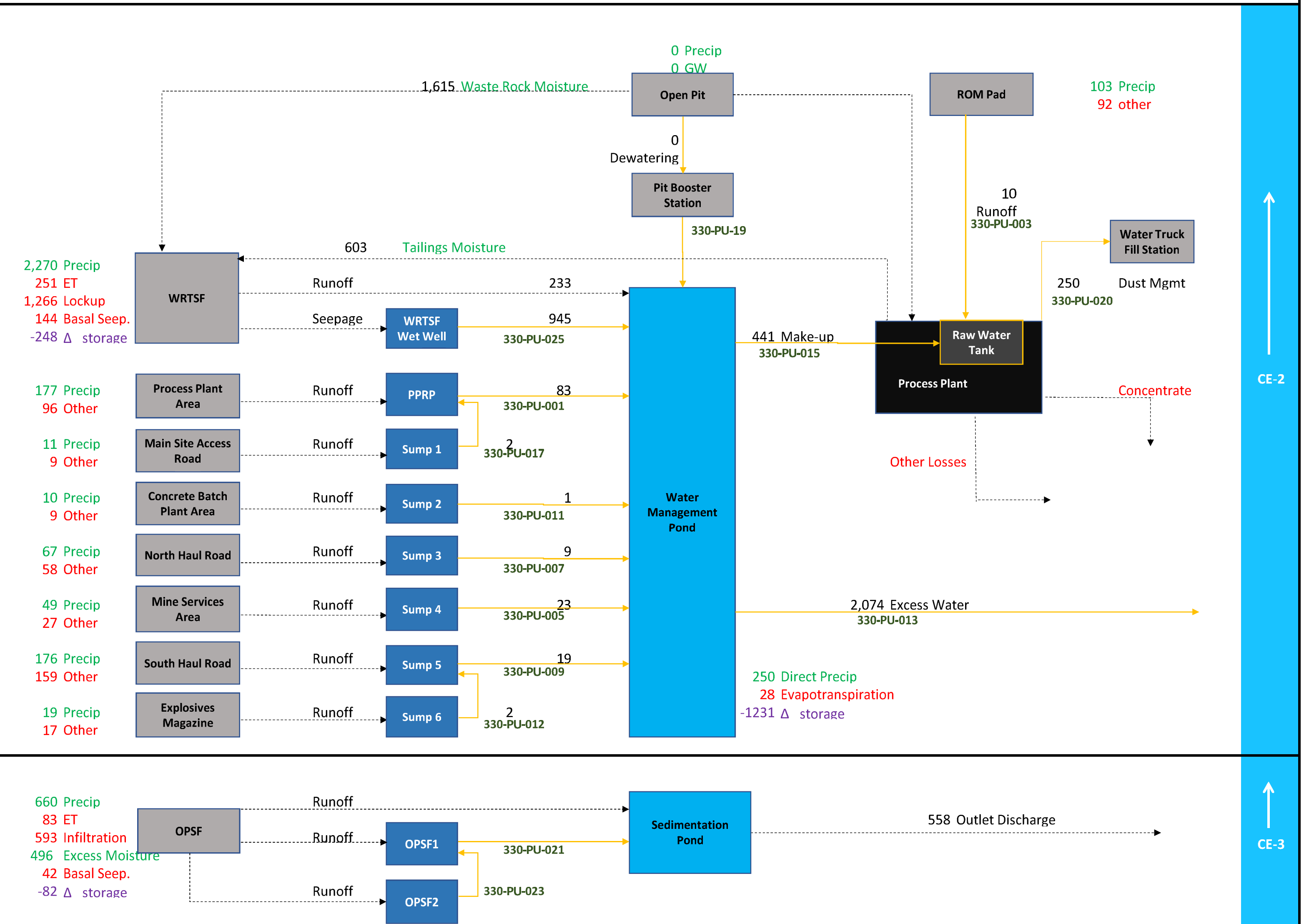
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	5
Functional Season	Winter (Nov-April)
Climate conditions	Normal



Legend

123 Inflows	RO	Runoff	330-PU-021/022	Pump Names
123 Outflows to a receiver	Other	Seepage and evapotranspiration		Pumped Flows
123 Losses and Transfers	123	Changes in storage		Non-pumped Flows

Stantec

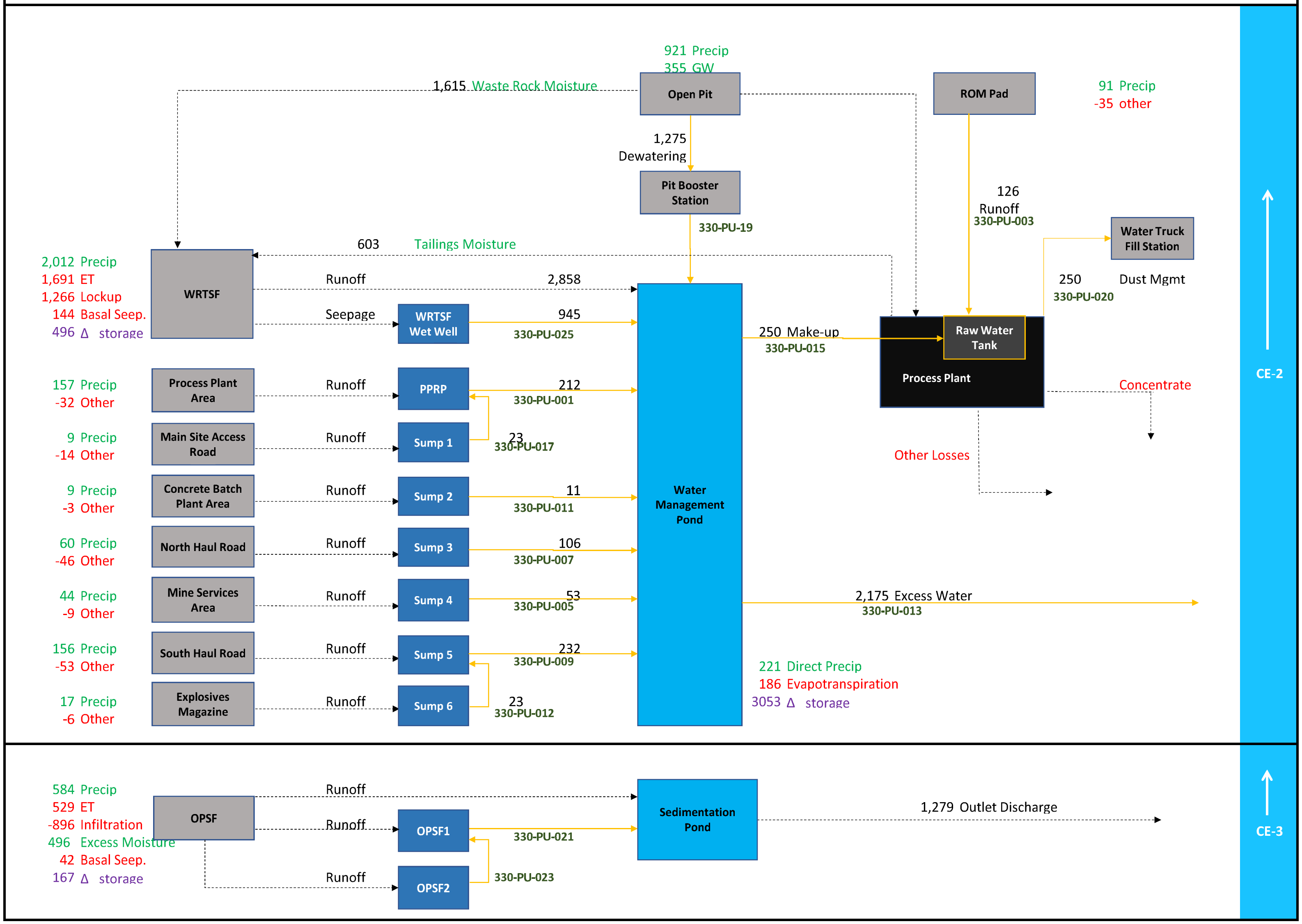
Galaxy Lithium
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m³/day

Year	5
Functional Season	Spring
Climate conditions	Normal



Legend

123 Inflows	RO Runoff	330-PU-021/022	Pump Names
123 Outflows to a receiver	Other Seepage and evapotranspiration		Pumped Flows
123 Losses and Transfers	123 Changes in storage		Non-pumped Flows

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Galaxy Lithium

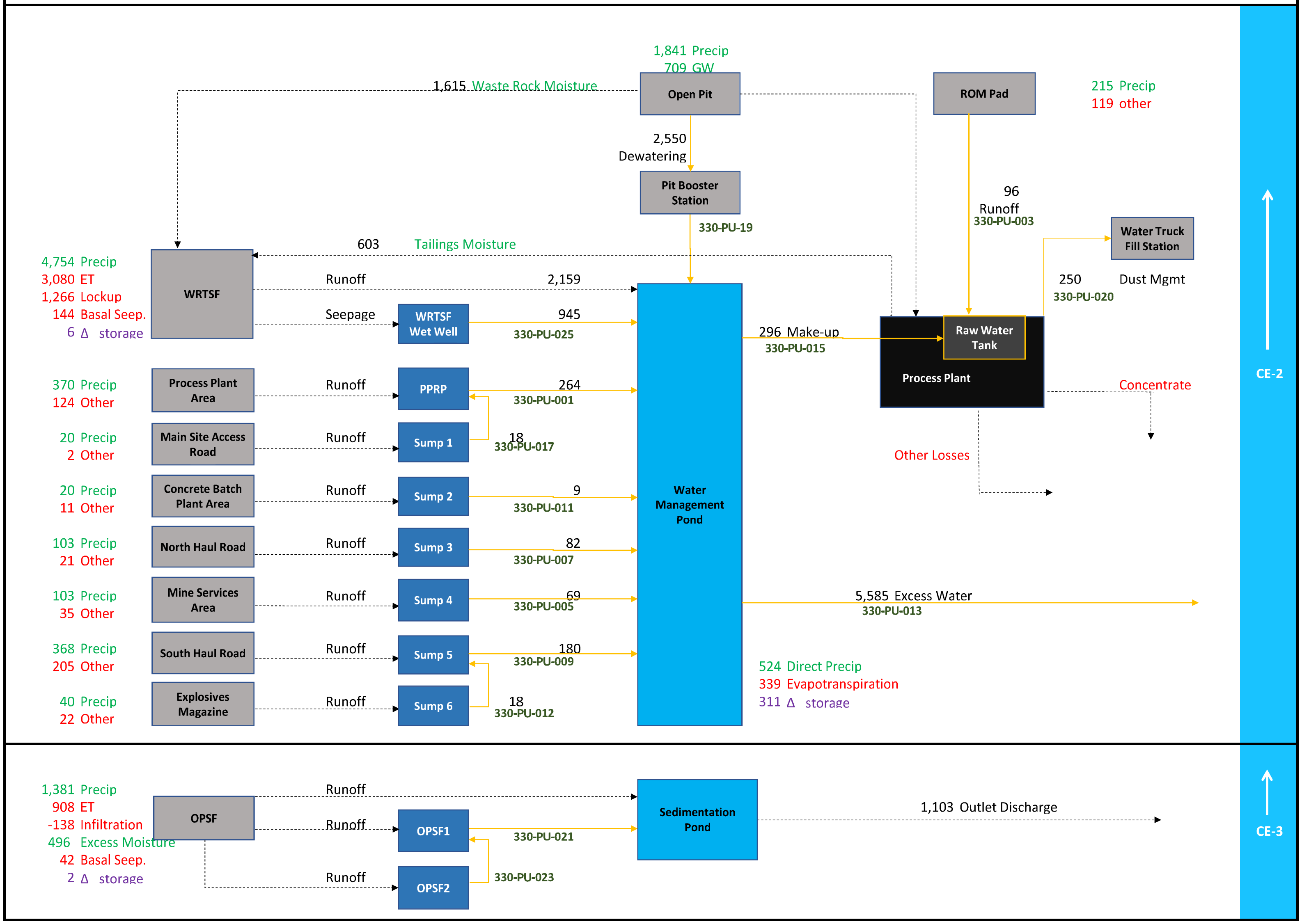
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	5
Functional Season	Summer/Fall
Climate conditions	Normal



Legend

123 Inflows	RO	Runoff	330-PU-021/022 Pump Names
123 Outflows to a receiver	Other	Seepage and evapotranspiration	Pumped Flows
123 Losses and Transfers	123	Changes in storage	Non-pumped Flows

Stantec

Galaxy Lithium

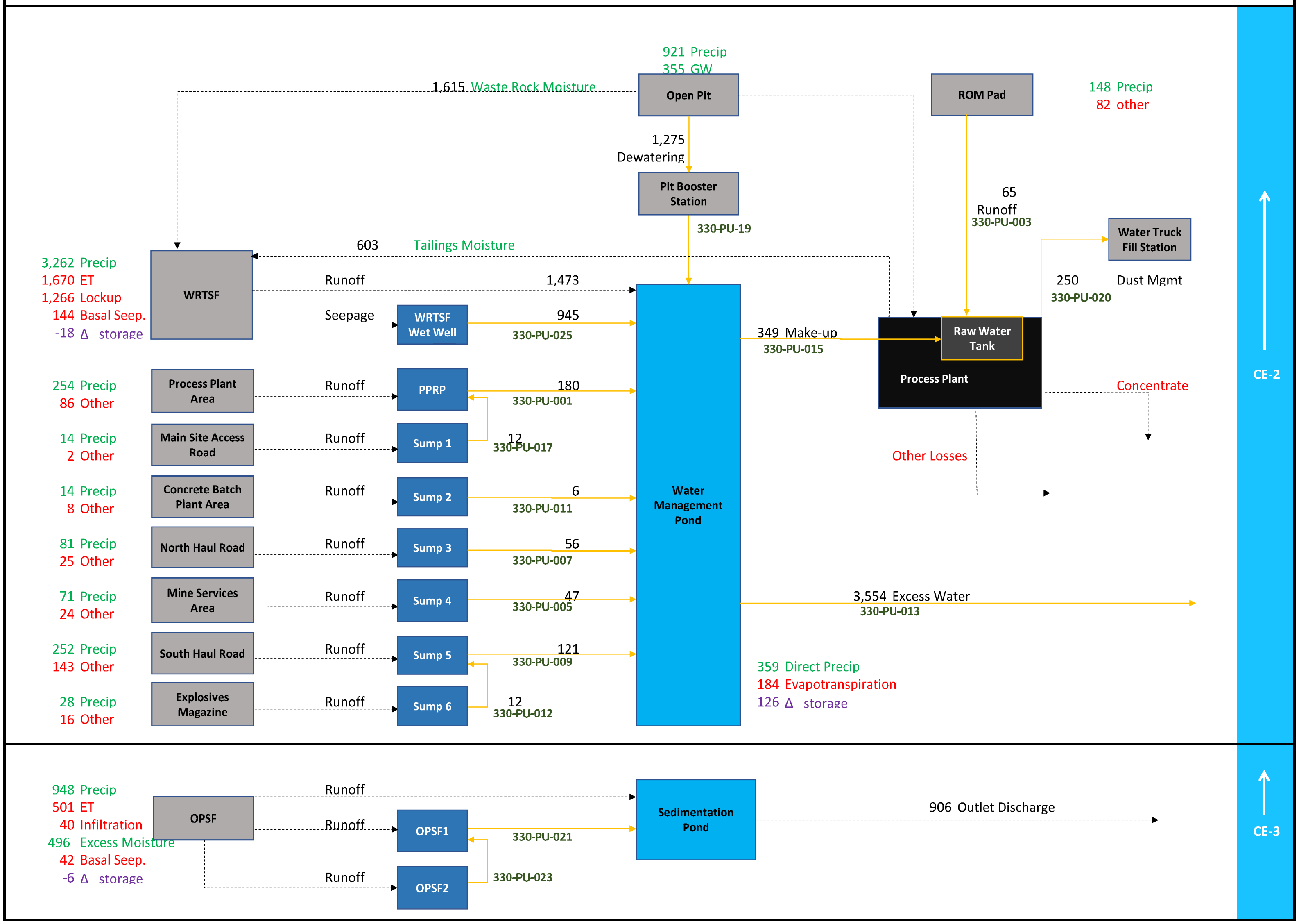
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	**5**
Functional Season	*****
Climate conditions	**Normal**



Legend	123 Inflows	RO	Runoff	330-PU-021/022	Pump Names
	123 Outflows to a receiver	Other	Seepage and evapotranspiration		Pumped Flows
	123 Losses and Transfers	123	Changes in storage		Non-pumped Flows

Stantec

Galaxy Lithium

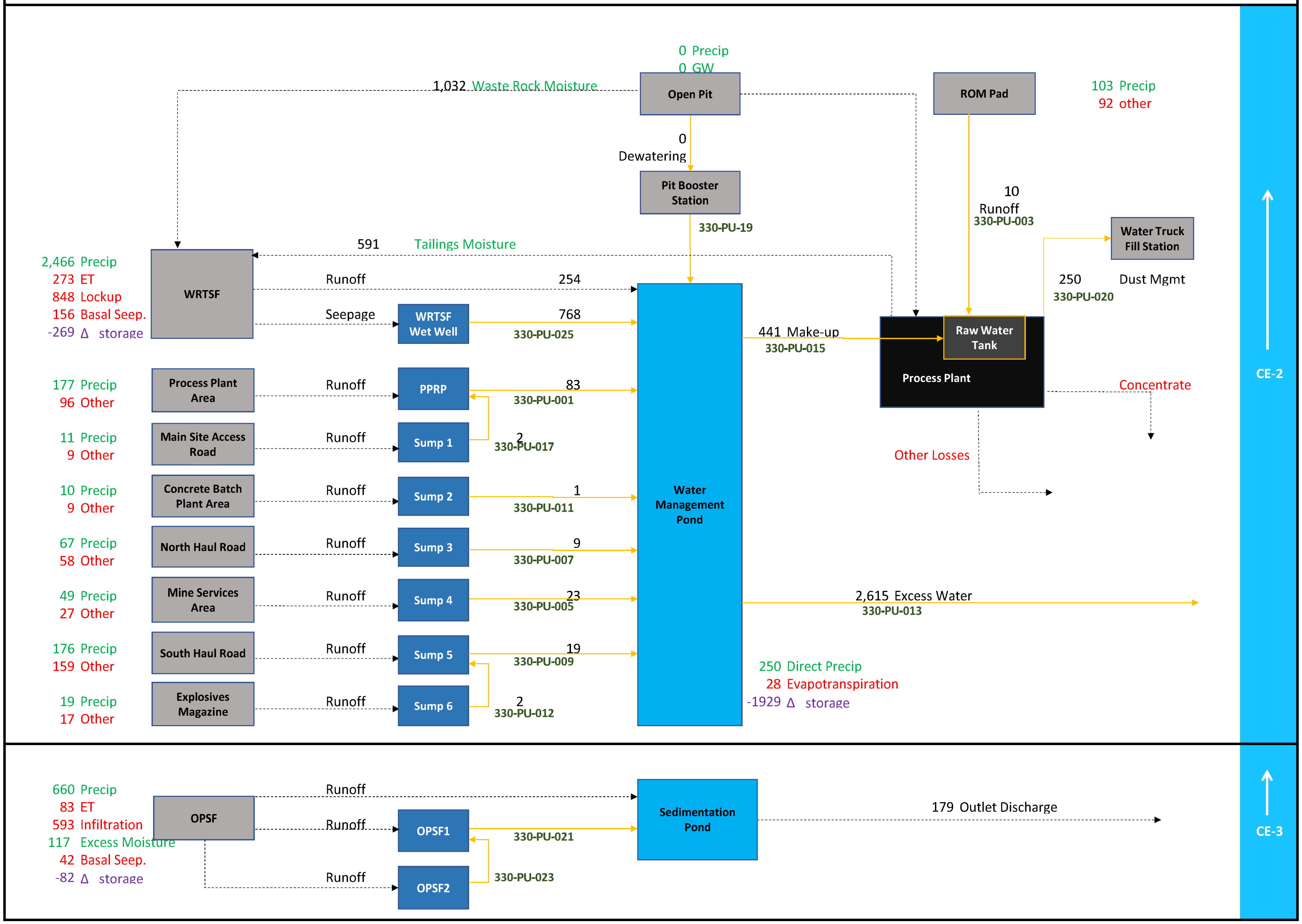
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m³/day

Year	**>0**
Functional Season	**Winter (Nov-April)**
Climate conditions	**Normal**



Legend

123 Inflows	RO	Runoff	330-PU-021/022 Pump Names
123 Outflows to a receiver	Other	Seepage and evapotranspiration	Pumped Flows
123 Losses and Transfers	123	Changes in storage	Non-pumped Flows

Stantec

Galaxy Lithium

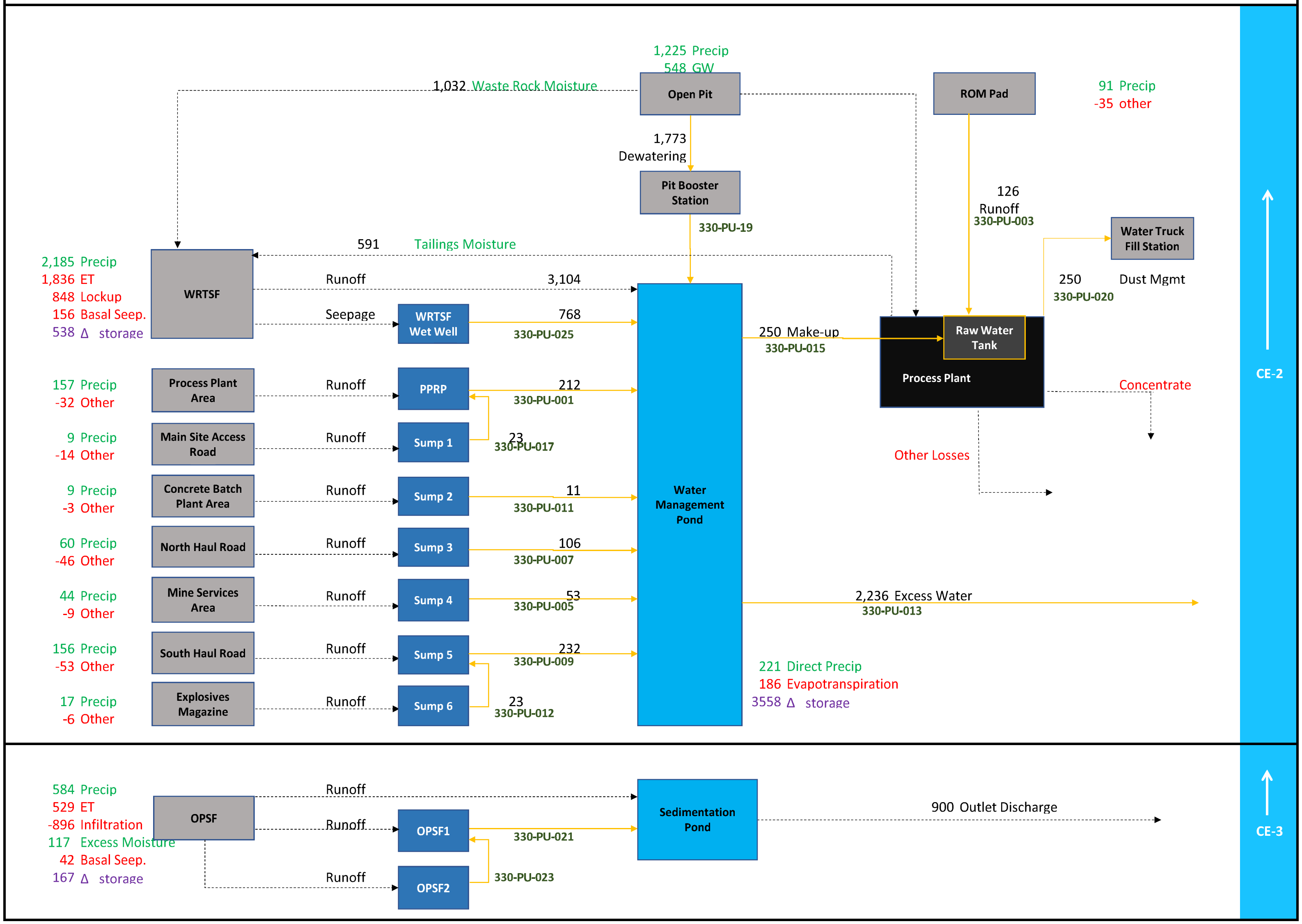
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m³/day

Year	>0
Functional Season	Spring
Climate conditions	Normal



Legend

123 Inflows	RO Runoff	330-PU-021/022 Pump Names
123 Outflows to a receiver	Other Seepage and evapotranspiration	Pumped Flows
123 Losses and Transfers	123 Changes in storage	Non-pumped Flows

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Galaxy Lithium

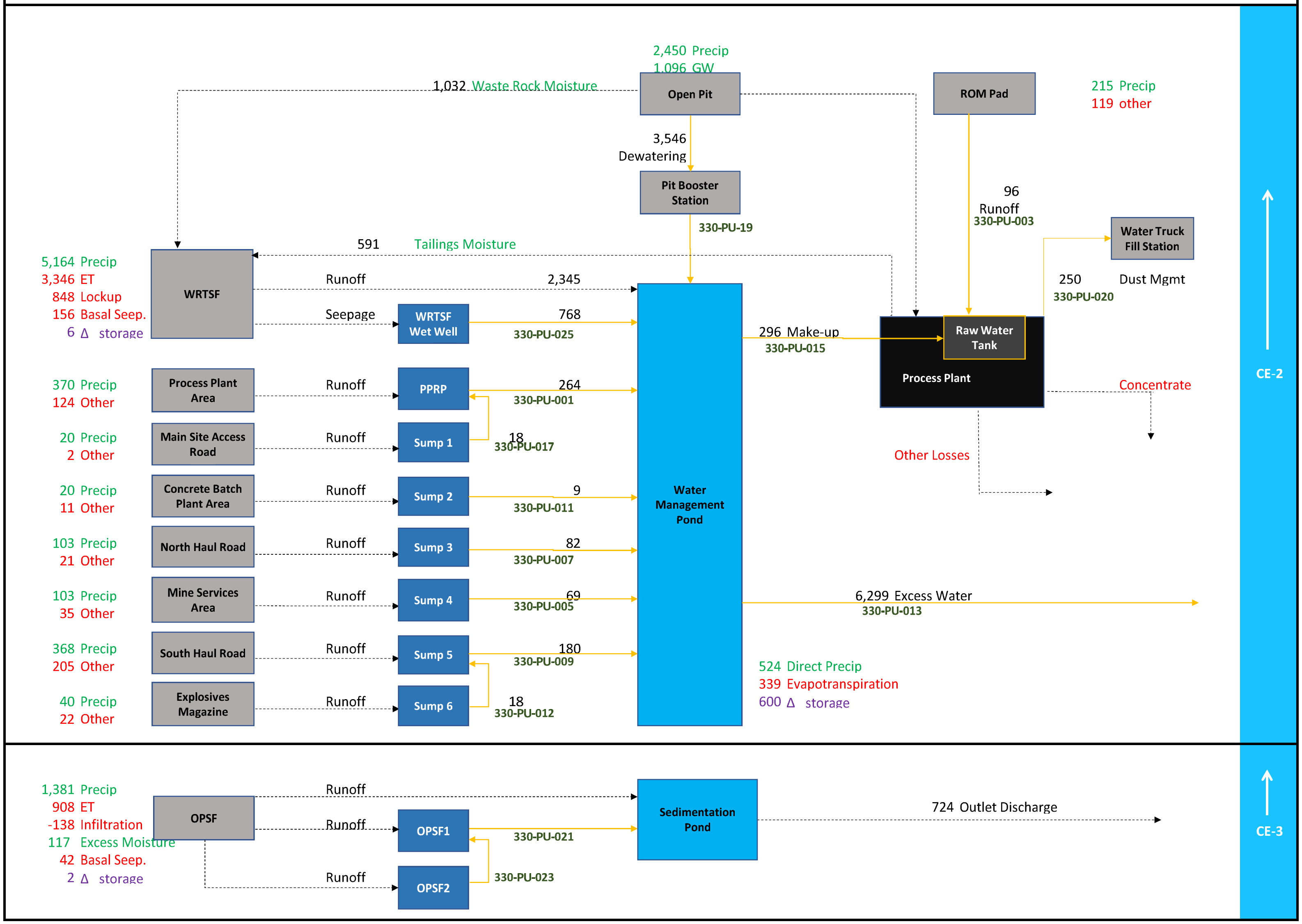
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	**>0**
Functional Season	**Summer/Fall**
Climate conditions	**Normal**



Legend

123 Inflows	RO	Runoff	330-PU-021/022	Pump Names
123 Outflows to a receiver	Other	Seepage and evapotranspiration		Pumped Flows
123 Losses and Transfers	123	Changes in storage		Non-pumped Flows

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Galaxy Lithium

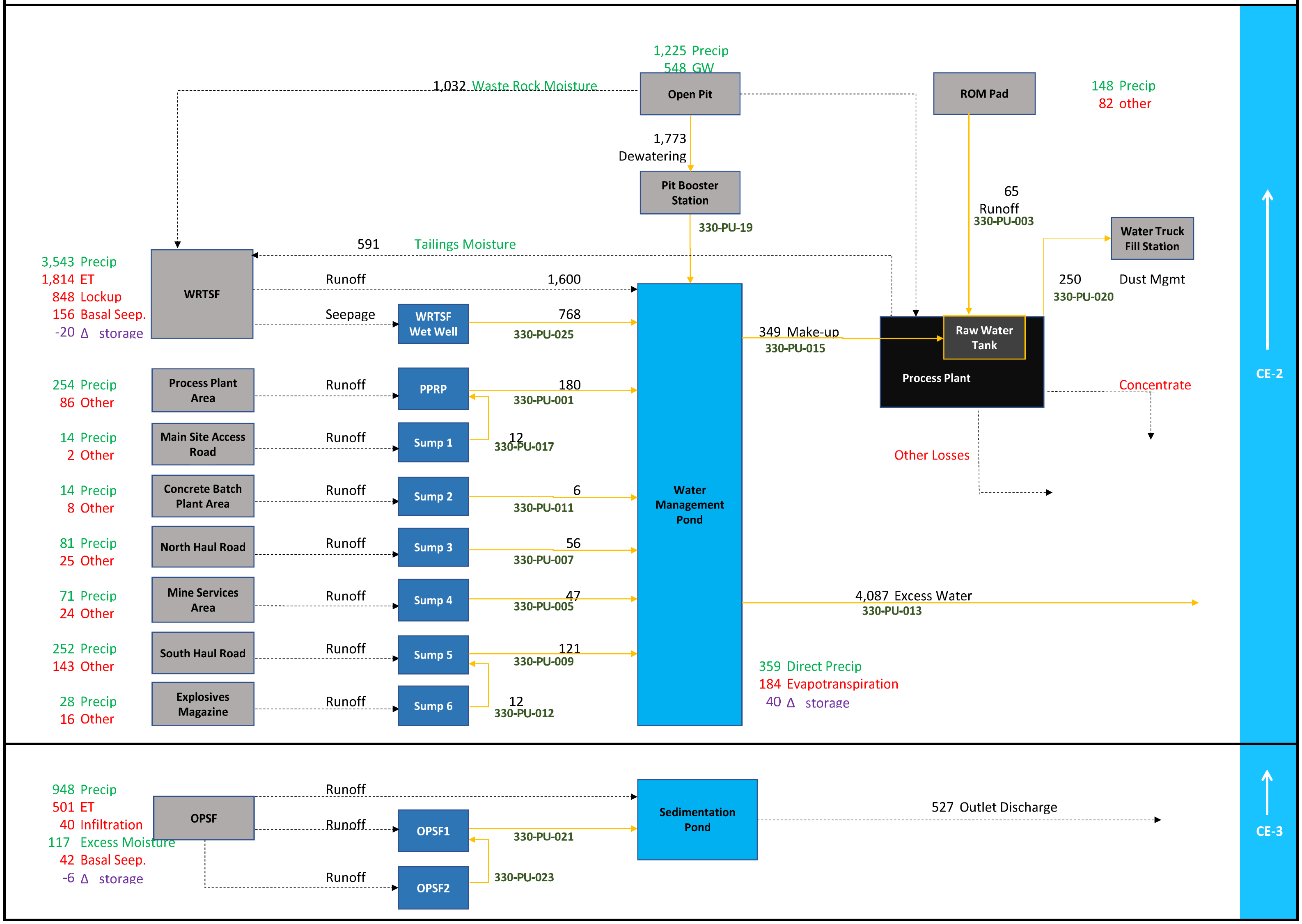
James Bay Project - Feasibility Study

23/Aug/2019

Site Wide Water Balance

Average Flows in m^3/day

Year	>0
Functional Season	*
Climate conditions	**Normal**



Legend					
123 Inflows		RO	Runoff	330-PU-021/022	Pump Names
123 Outflows to a receiver		Other	Seepage and evapotranspiration		Pumped Flows
123 Losses and Transfers		123	Changes in storage		Non-pumped Flows

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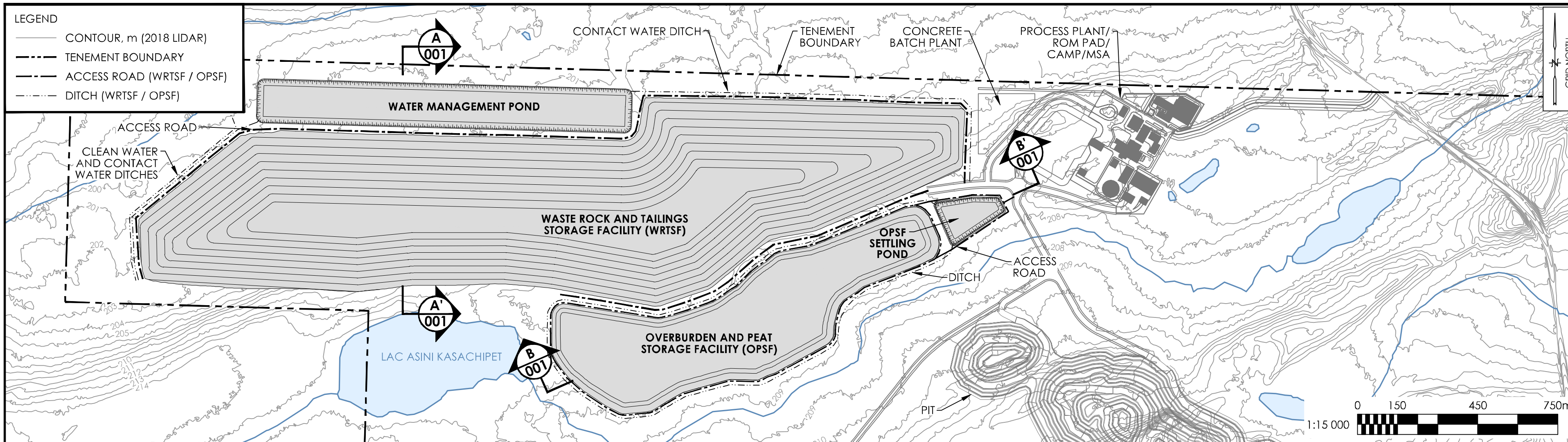
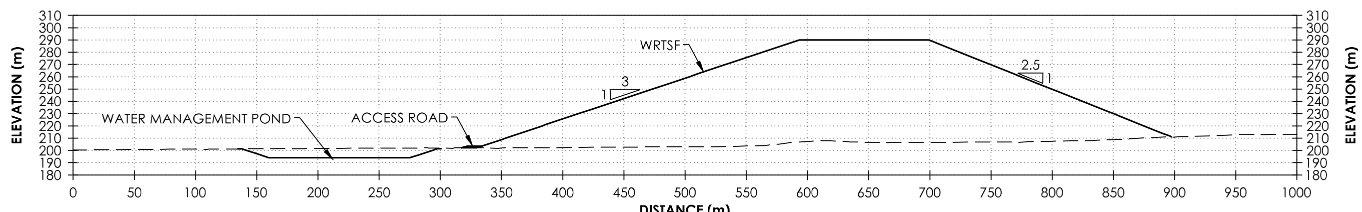
APPENDIX B

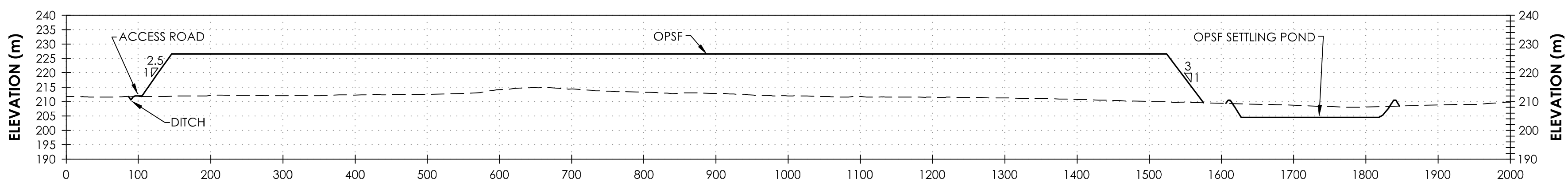
Waste Rock Storage Facility and Water Management Plan Design Drawings





OVERALL WRTSF & POND SECTION A-A' 001

SCALE 1 : 4000 (H)
1 : 4000 (V)



OVERALL OPSF & POND SECTION B-B' 001

SCALE 1 : 6000 (H)
1 : 1500 (V)

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:
LIDAR: 2018, WSP
CANVEC DATA: NATURAL RESOURCES CANADA

PRELIMINARY NOT FOR CONSTRUCTION

GENERAL ARRANGEMENT AND SECTIONS - ULTIMATE FACILITIES

OVERBURDEN AND PEAT STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions

No.	Details	Dwn. By:	App'd By:	Date:
1	Issued for Feasibility Study	JL	KH	2019-09-05

Job No.: 121622255
Dwg. No.: GXY-JBL-GA-DR-001-01

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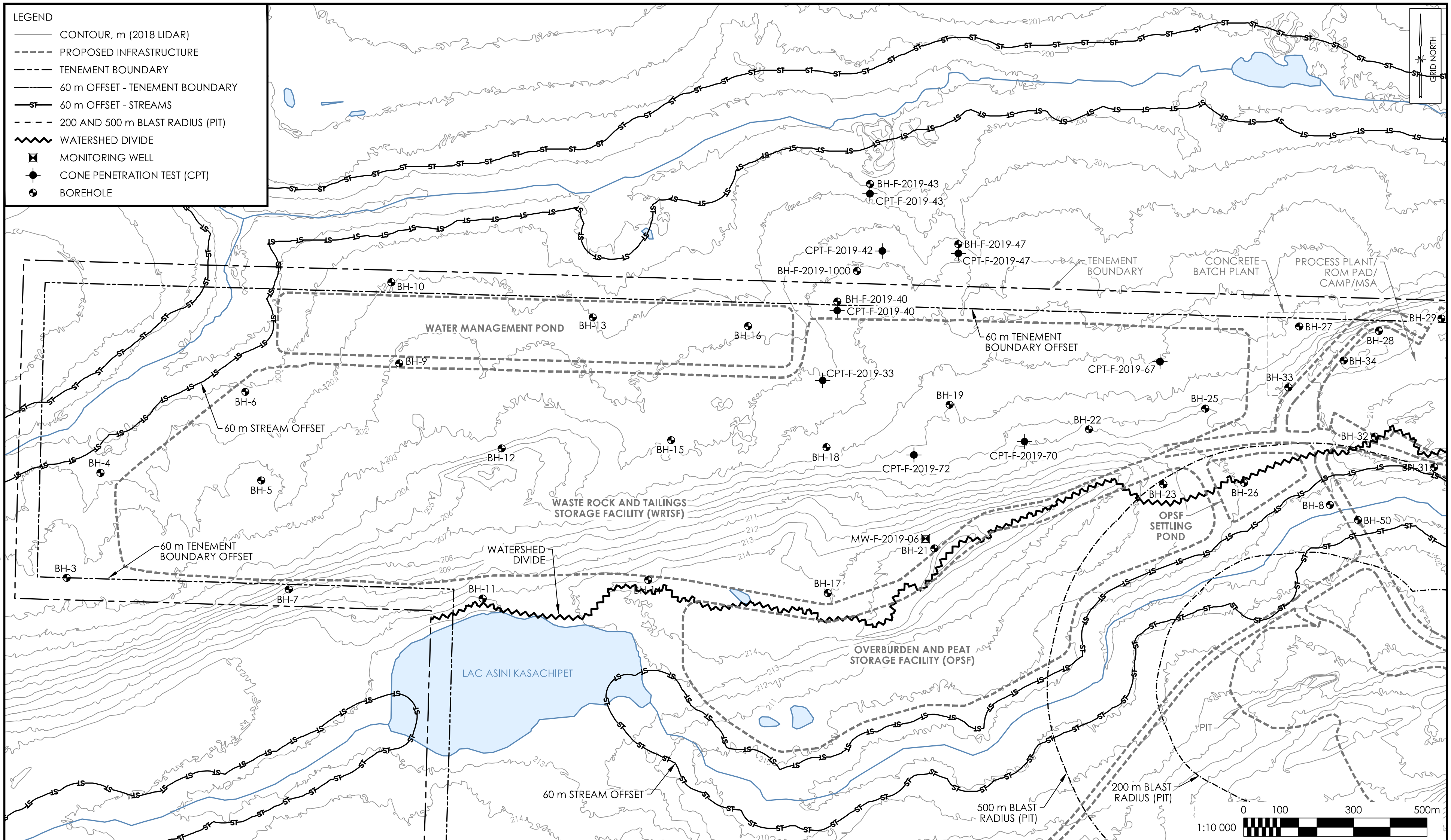

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Reference:
LIDAR: 2018, WSP
CANVEC DATA: NATURAL RESOURCES CANADA

PRELIMINARY NOT FOR CONSTRUCTION

EXISTING CONDITIONS, BOUNDARIES AND KEY FEATURES

WASTE ROCK AND TAILINGS STORAGE FACILITY
OVERBURDEN AND PEAT STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions

No.	Details	Dwn. By:	App'd By:	Date:
1	Issued for Feasibility Study	JL	KH	2019-09-05

Job No.: 121622255
Dwg. No.: GXY-JBL-EC-DR-002-01

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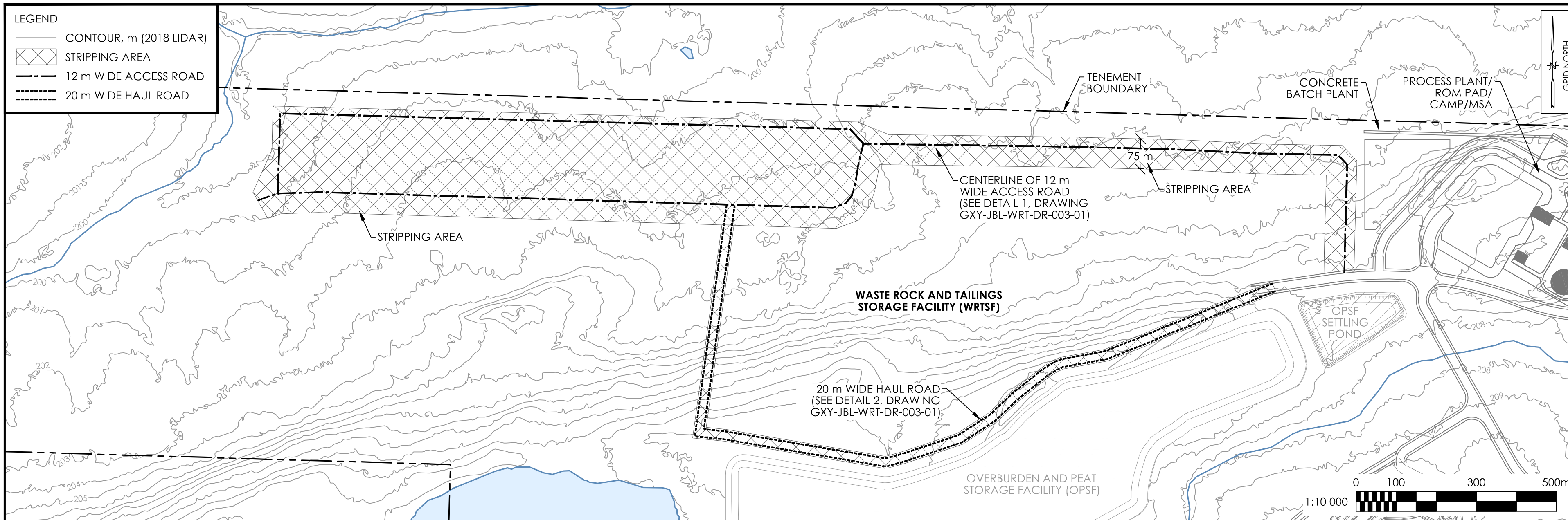
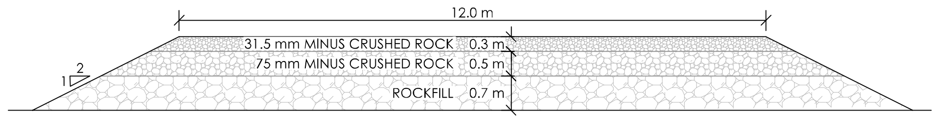
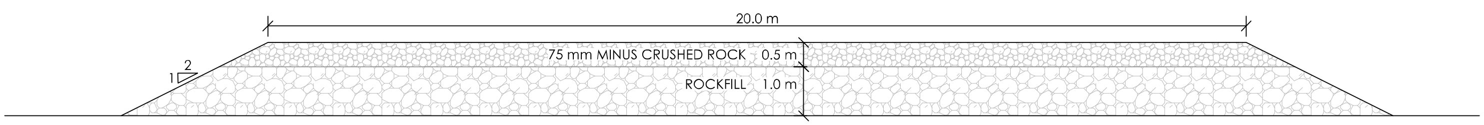




TYPICAL ACCESS ROAD 1/003
SCALE 1 : 100



TYPICAL HAUL ROAD 2/003
SCALE 1 : 100

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:
LIDAR: 2018, WSP
CANVEC DATA: NATURAL RESOURCES CANADA

PRELIMINARY NOT FOR CONSTRUCTION

STRIPPING AREAS & ACCESS ROADS - WRTSF PREPRODUCTION
WASTE ROCK AND TAILINGS STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions				
No.	Details	Dwn. By:	App'd By:	Date:
1	Issued for Feasibility Study	JL	KH	2019-09-05

Job No.: 121622255
Dwg. No.: GXY-JBL-WRT-DR-003-01

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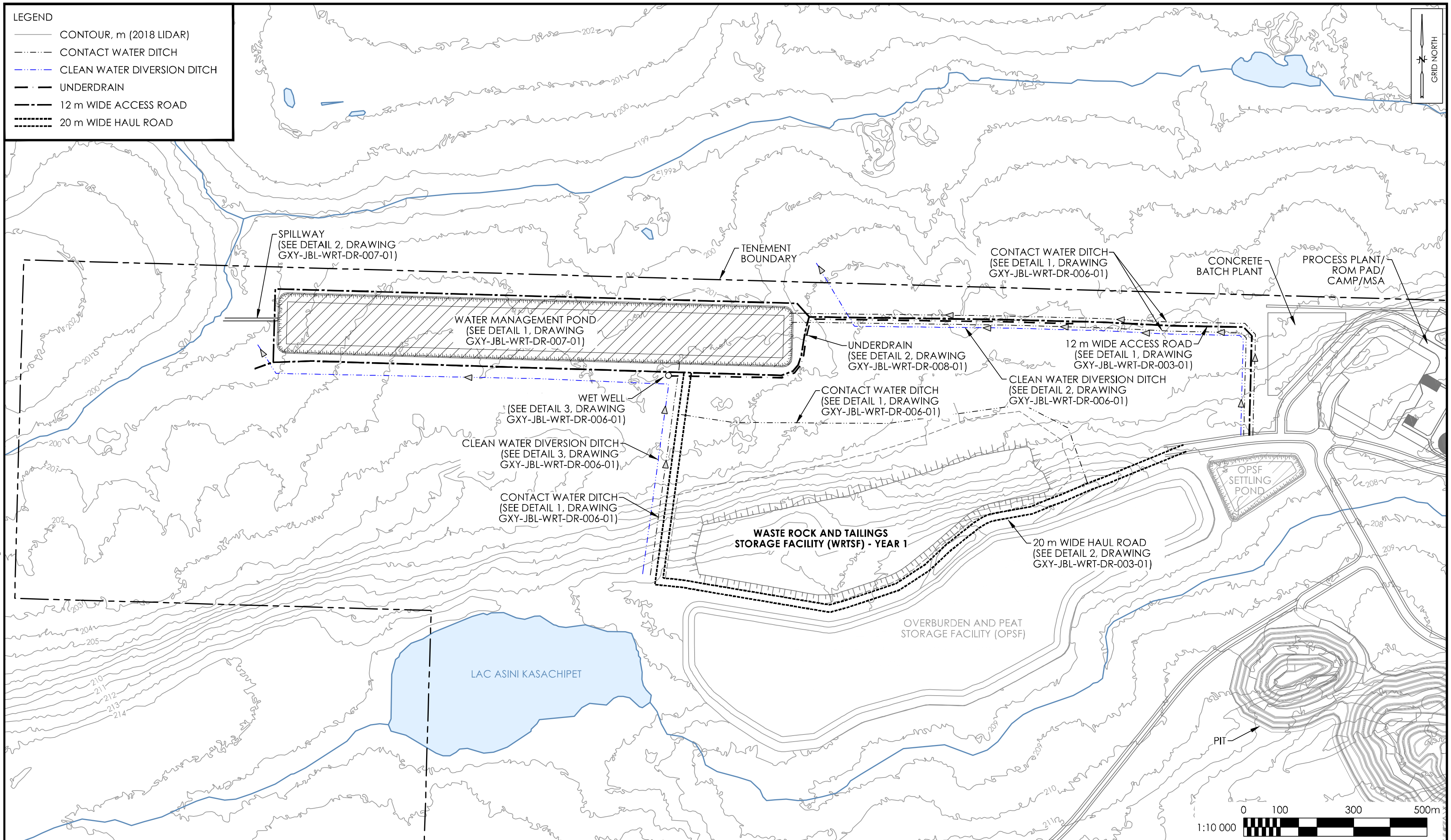

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:
LIDAR: 2018, WSP
CANVEC DATA: NATURAL RESOURCES CANADA

PRELIMINARY NOT FOR CONSTRUCTION

DITCH AND UNDERDRAIN ALIGNMENTS - WRTSF PREPRODUCTION

WASTE ROCK AND TAILINGS STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions

No.	Details	Dwn. By:	App'd By:	Date:
1	Issued for Feasibility Study	JL	KH	2019-09-05

Job No.: 121622255
Dwg. No.: GXY-JBL-WRT-DR-004-01

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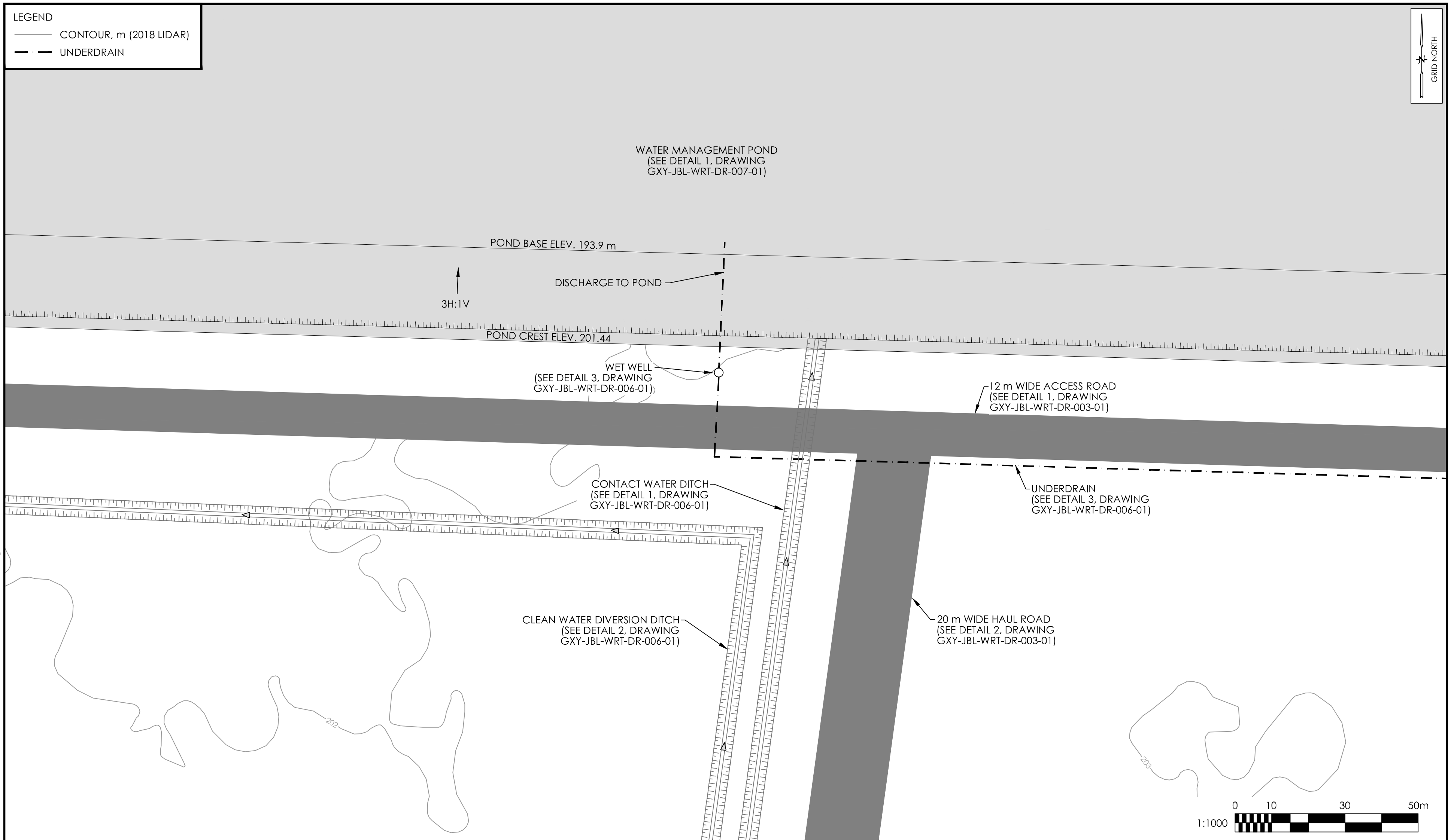

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:
LIDAR: 2018, WSP
CANVEC DATA: NATURAL RESOURCES CANADA

PRELIMINARY NOT FOR CONSTRUCTION

WET WELL - WRTSF PREPRODUCTION

WASTE ROCK AND TAILINGS STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions

No.	Details	Dwn. By:	App'd By:	Date:
1	Issued for Feasibility Study	JL	KH	2019-09-05

Job No.: 121622255
Dwg. No.: GXY-JBL-WRT-DR-005-01

Stantec

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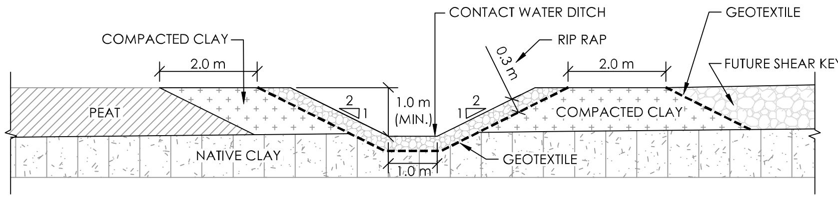
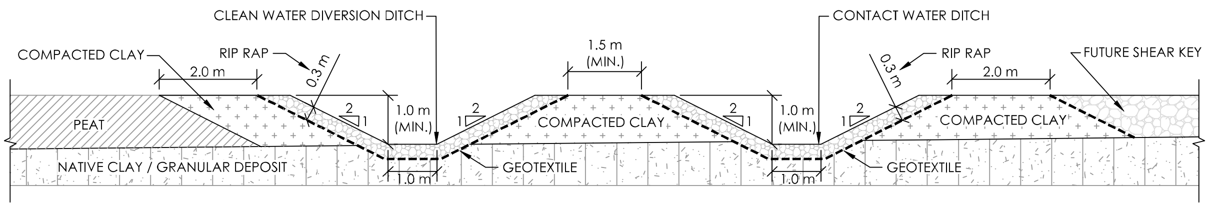
NOTE:
GEOTEXTILE TO BE SECURED IN AN ANCHOR TRENCH WHERE PRESENT (SEE DETAIL 3, DRAWING GXY-JBL-WRT-DR-007-01)



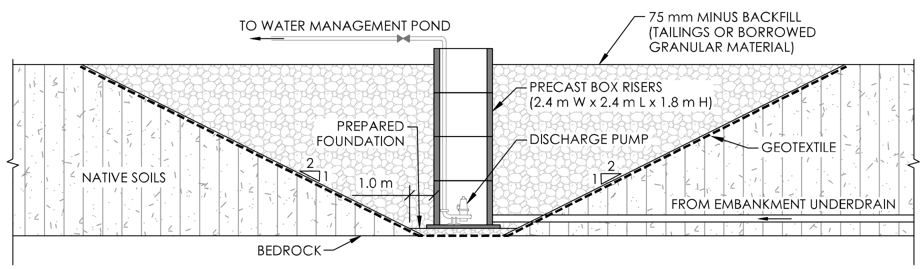
TYPICAL COLLECTION DITCH 1/006
SCALE 1 : 100

NOTE:
GEOTEXTILE TO BE SECURED IN AN ANCHOR TRENCH WHERE PRESENT (SEE DETAIL 3, DRAWING GXY-JBL-WRT-DR-007-01)



TYPICAL CLEAN WATER DIVERSION DITCH AND COLLECTION DITCH 2/006
SCALE 1 : 100

NOTE:
1. PRECAST BOX RISERS AS PER ASTM C-1433.
2. GEOTEXTILE TO BE SECURED IN AN ANCHOR TRENCH WHERE PRESENT (SEE DETAIL 3, DRAWING GXY-JBL-WRT-DR-007-01)



TYPICAL WETWELL 3/006
SCALE 1 : 200

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:

PRELIMINARY NOT FOR CONSTRUCTION

TYPICAL SECTIONS - WRTSF PREPRODUCTION
WASTE ROCK AND TAILINGS STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions				
No.	**Details**	**Dwn. By:**	**App'd By:**	**Date:**
1	Issued for Feasibility Study	JL	KH	2019-09-05

Job No.: 121622255
Dwg. No.: GXY-JBL-WRT-DR-006-01

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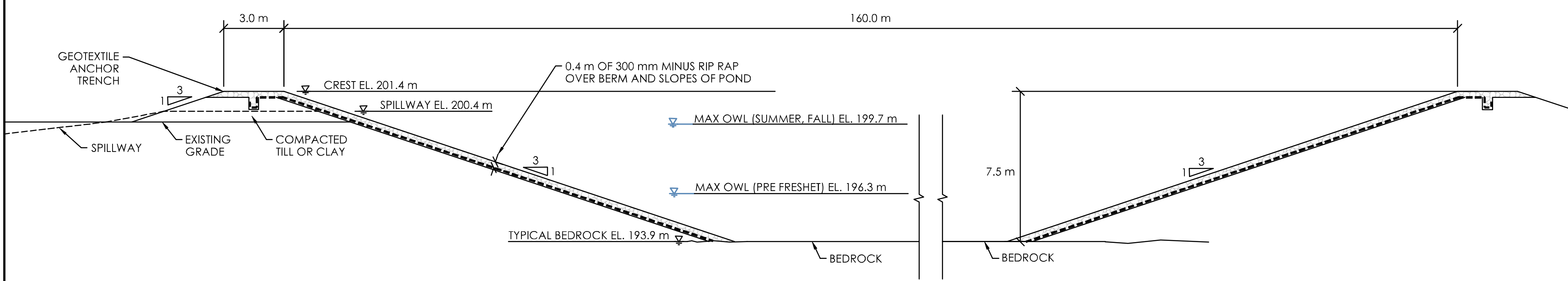
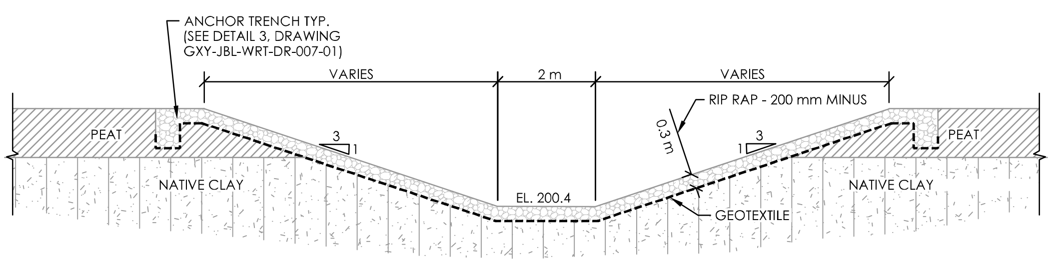
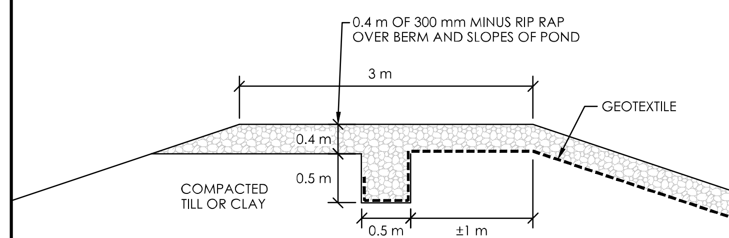


TYPICAL WATER MANAGEMENT POND SECTION 1/007
SCALE 1 : 200



TYPICAL SPILLWAY SECTION 2/007
SCALE 1 : 100



TYPICAL GEOTEXTILE ANCHOR TRENCH 3/007
SCALE 1 : 50

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Reference:

PRELIMINARY NOT FOR CONSTRUCTION

TYPICAL POND SECTIONS - WRTSF PREPRODUCTION
WASTE ROCK AND TAILINGS STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions

No.	Details	Dwn. By:	App'd By:	Date:
1	Issued for Feasibility Study	JL	KH	2019-09-05
2	Height Correction	AL	MS	2019-09-25

Job No.: 121622255
Dwg. No.: GXY-JBL-WRT-DR-007-01

Stantec

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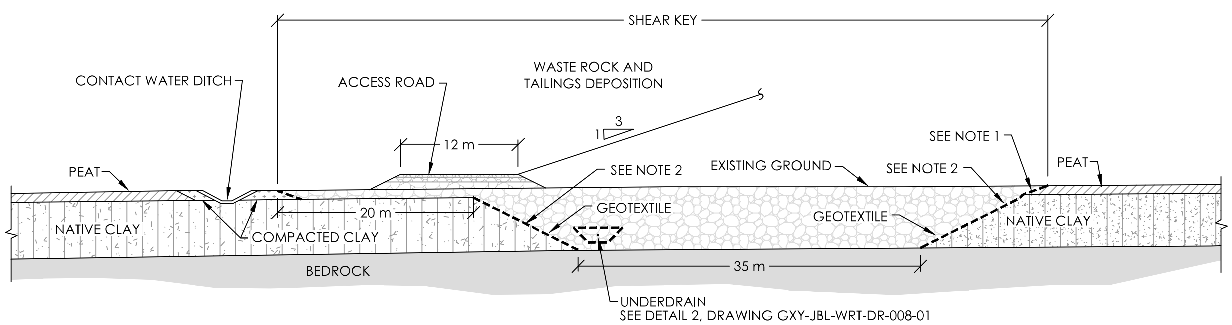
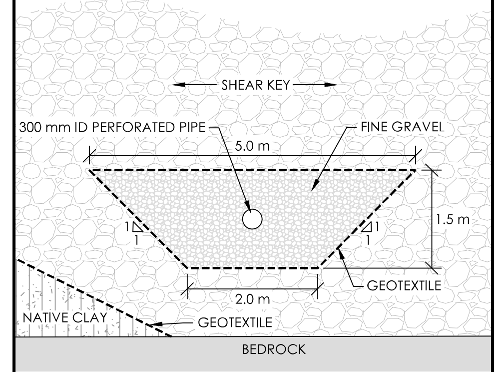
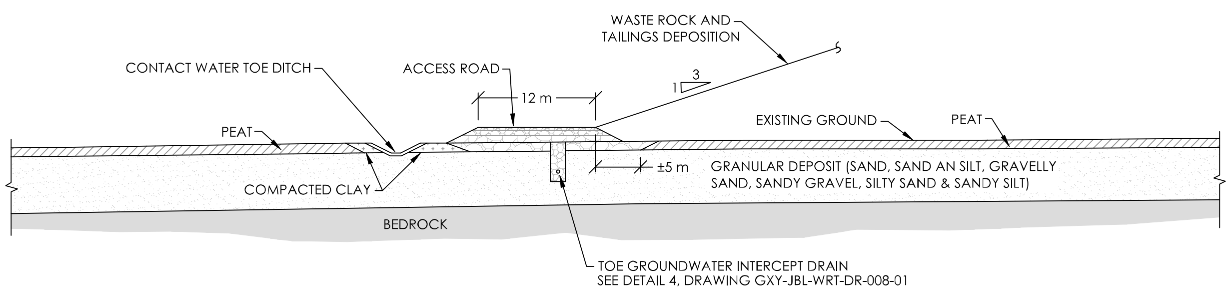
NOTES:
1. SLOPES IN PEAT ABOVE WATER LINE TO BE A MINIMUM OF 1V : 2.75H, BELOW WATER LINE TO BE A MINIMUM OF 1V : 5.5H.
2. SLOPES IN CLAY ABOVE WATER LINE TO BE A MINIMUM OF 1V : 1H, BELOW WATER LINE TO BE A MINIMUM OF 1V : 2H.



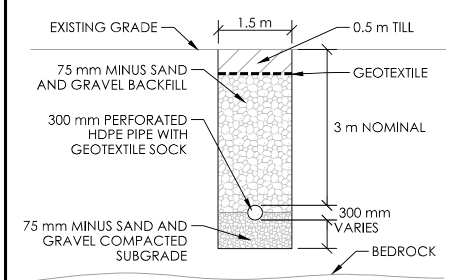
TYPICAL SHEAR KEY (EMBANKMENT OVER NATIVE CLAY) 1/008
SCALE 1 : 500



TYPICAL UNDERDRAIN DETAIL 2/008
SCALE 1 : 75



TYPICAL TOE DRAIN (EMBANKMENT OVER GRANULAR DEPOSITS) 3/008
SCALE 1 : 500



TYPICAL TOE GROUNDWATER UNDERDRAIN 4/008
SCALE 1 : 100

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Reference:

PRELIMINARY NOT FOR CONSTRUCTION

SHEAR KEY AND TOE DRAIN TYPICAL DETAILS
WASTE ROCK AND TAILINGS STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions

No.	Details	Dwn. By:	App'd By:	Date:
1	Issued for Feasibility Study	JL	KH	2019-09-05

Job No.: 121622255
Dwg. No.: GXY-JBL-WRT-DR-008-01

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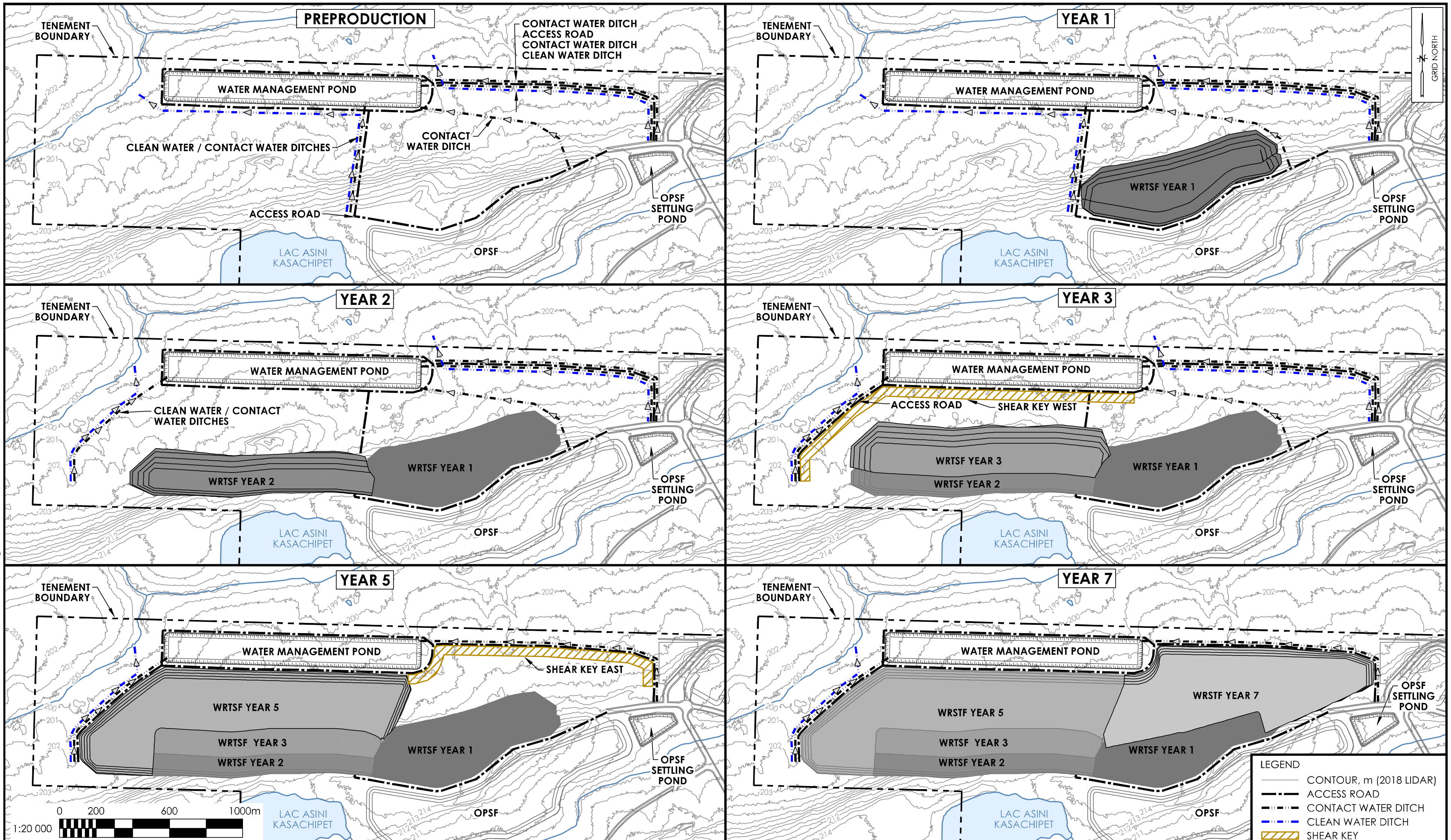

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:
LIDAR: 2018, WSP
CANVEC DATA: NATURAL RESOURCES CANADA

PRELIMINARY NOT FOR CONSTRUCTION

PROGRESSIVE DEVELOPMENT - ACCESS ROADS, SHEAR KEY AND DITCHES

WASTE ROCK AND TAILINGS STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions				
No.	**Details**	**Dwn. By:**	**App'd By:**	**Date:**
1	Issued for Feasibility Study	JL	KH	2019-09-05

Job No.: 121622255
Dwg. No.: GXY-JBL-WRT-DR-009-01

Stantec

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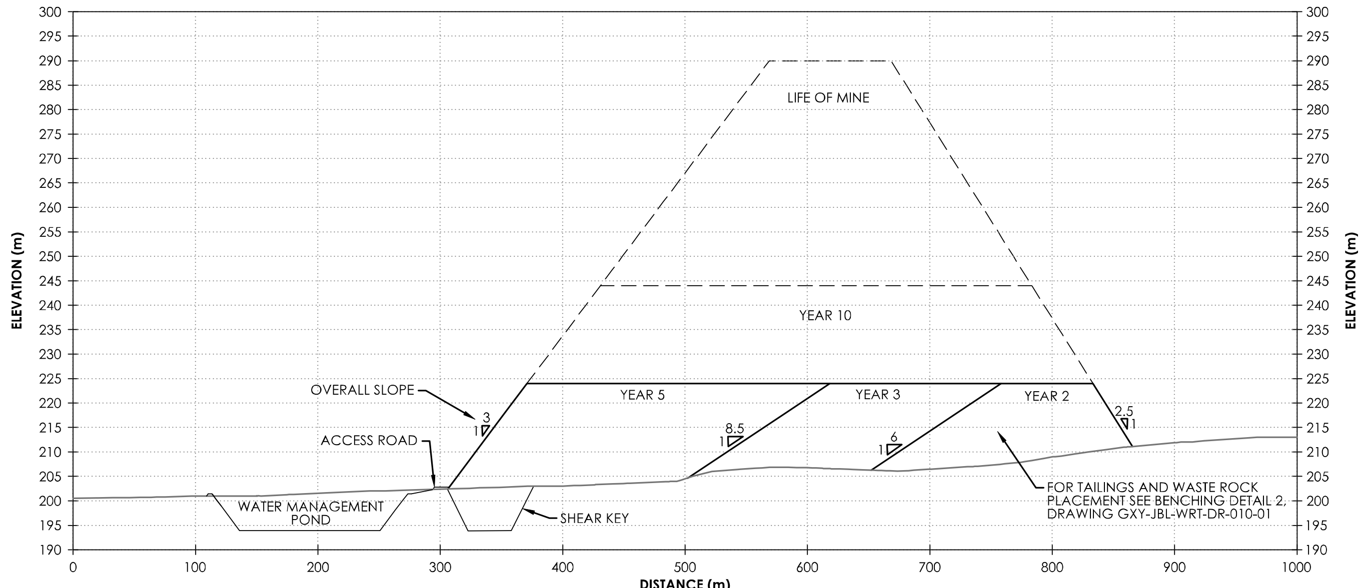
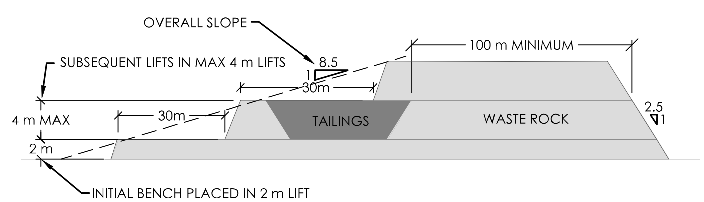


FILLING PLAN 1/010
SCALE 1 : 4000 (H)
1 : 1000 (V)



TYPICAL BENCHING DETAIL 2/010
N.T.S.

THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

Reference:

PRELIMINARY NOT FOR CONSTRUCTION

TYPICAL FILLING PLAN METHODOLOGY
WASTE ROCK AND TAILINGS STORAGE FACILITY
JAMES BAY LITHIUM PROJECT, QUEBEC

Client: GALAXY RESOURCES LTD.

Revisions				
No.	**Details**	**Dwn. By:**	**App'd By:**	**Date:**
1	Issued for Feasibility Study	JL	KH	2019-09-05

Job No.: 121622255
Dwg. No.: GXY-JBL-WRT-DR-010-01

Stantec

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