Lupin Mine Reclamation

2021 Construction Summary Report – Cell 3 – Rev.2

February 8, 2022

Prepared for:

Mandalay Resources Ltd.

Prepared by:

Alvin Tong

Stantec Consulting Ltd.

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Abbreviations

DMS	Discovery Mining Services
EOR	Engineer of Record
FCPR/the Plan	Final Closure and Reclamation Plan
Golder	Golder Associates
JDS	JDS Energy and Mining Inc.
LMI	Lupin Mine Inc.
Lupin/Lupin Mine/Site	The Lupin Mine
Mandalay	Mandalay Resource Corporation
QA	Quality assurance
Stantec	Stantec Consulting Ltd.
TCA	Tailings Containment Area

Executive Summary

The Lupin Mine is undergoing active closure activities under the approved Final Closure and Reclamation Plan (FCRP). Lupin Mine Inc. (LMI), as the owner, retained JDS Energy and Mining (JDS) as the construction manager and retained Discovery Mining Solution (DMS) as the dewatering and earthworks contractor. Stantec Consulting Ltd. (Stantec) is the Engineer of Record (EOR) for the tailings containment area (TCA) and was tasked with providing quality assurance (QA) and associated documentation for construction activities.

Cell 3 was designed to be fully covered by 1 m of esker material, with a surface channel draining into Cell 4. The outflow channel was designed through a small section of L Dam to be primarily composed of coarse sand and gravel with cobble material overlaying a geotextile cover placed on esker material and original ground.

The Cell 3 cover and surface water management construction were completed between June 18, 2021 and October 7, 2021. Photographs of the construction and as-built survey of the Cell 3 cover and outflow are provided in this report. Minor field adjustments were required to complete construction activities, including a small area where the esker cover is slightly less than the designed 1 m thickness due to drainage and erosion considerations. Instrumentation will be installed in this area to monitor the long-term cover performance.

1.0 INTRODUCTION

1.1 GENERAL

The Lupin Mine (Lupin or Lupin Mine or Site) is owned by Lupin Mines Incorporated (LMI), a wholly owned indirect subsidiary of Mandalay Resources Corporation (Mandalay). The Mine is 100% owned by LMI. All rights, title, interests, liabilities, and obligation for the Site rest with LMI. This construction summary report was produced to satisfy the Lupin Water License requirements and is intended to be a part of a larger document outlining overall 2021 construction activities.

Table 1: Revision Log

Revision #	Date	Change Summary
1	Nov 18, 2021	• N/A
2	Feb 8, 2022	• Added photographs showing typical particle size assurance. • Correct the design flow value for Q_{100}. • Added surface channel centerline and section lines on cover thickness evaluation figure. • Added description for the surveyed tailings surface on the as-built drawings.

1.1.1 Location

The Lupin Mine is located on the northwest shore of Contwoyto Lake, approximately 400km northeast of Yellowknife, Northwest Territories (Figure 1). The site consists of a mill, camp and support facilities, fuel storage, airstrip, and the TCA (Figure 2). The Lupin Mine is only accessible by air or winter road. The air access is serviced by a gravel runway, capable of handling large aircraft. Charter flights are typically deployed from Yellowknife for worker rotation and re-supply during the open water seasons.

1.1.2 Roles and Responsibilities

The 2021 closure activities involved four primary parties for the duration of the work (Table 1). LMI is the owner of the site. JDS Energy and Mining (JDS) served as the construction manager and Discovery Mining Solution (DMS) served as the dewatering, earthworks, and camp contractor. Stantec is the engineer of record for the tailings containment area (TCA) and provided technical support for water treatment and discharge from the TCA.

Table 2: Role and Responsibility

Company	Role	Responsibility
LMI	Owner	To obtain necessary licenses and closure related permits
Stantec	Engineering of Record for the TCA	TCA closure design, dam stability requirements, TCA water treatment and discharge guidance, and cover construction quality assurance
JDS	Construction Manager	Execution of the closure work as outlined in the FCRP
DMS	Dewatering, Earthworks, and Camp Contractor	Water treatment and discharge to the environment. Execution of the closure work as outlined in the FCRP

2.0 RECLAMATION PLAN OVERVIEW

2.1 FINAL CLOSURE AND RECLAMATION PLAN

The objective of the Final Closure and Reclamation Plan (FCRP; Golder, 2018) is to return Lupin and affected areas to an ecosystem that is compatible with the surrounding natural environment.

2.2 TCA CLOSURE DESIGN

The TCA closure design includes covering the remaining exposed tailings in Cell 3 and Cell 5 with a minimum 1 m thick esker cover. Surface water management features were designed to be constructed on Cell 3 and 5 covers with dedicated outlet structures to provide passive drainage to Cell 4 and Pond 1, respectively. An engineered spillway was designed to allow passive drainage from Cell 4 into Pond 1. Dam K and Dam M were planned to be re-sloped and reinforced to meet closure design. The construction drawings are included in Appendix A and were previously submitted to the Nunavut Water Board. Cell 3 design-specific details are included below.

2.2.1 Cell 3 Cover and Outlet

Cell 3 was designed to be fully covered by 1 m of esker material with a surface channel draining into Cell 4. Cover tie-in to the existing ground and structures were planned to be field-fitted by the resident geotechnical engineer with the assistance of a surveyor. The outflow channel was designed through a section near the south abutment of Dam L to be primarily composed of coarse sand and gravel with cobble material overlaying a geotextile cover placed on original ground and esker material. Surface water management design criteria can be found in Table 2. The associated design flow for the 1:100-year event is 1.56 m^3/s. Detailed Cell 3 design criteria can be found in Table 3 and Drawings 006 to 009 in Appendix A.

Some tailings were expected to be excavated along the northern portion of the channel alignment to ensure the minimum cover thickness requirement was met. The excavated tailings were planned to be placed within an exposed tailings area at the northern corner of Cell 4 and Cell 5. The excavation requirements were planned to be directed by the field engineer with the support of a surveyor.

Table 2: Cell 3 Surface Water Management Design Criteria

Parameter	Value
Minimum cover above tailings	1m
Design Event	1 in 100-year
Design maximum flow (Q_{100})	1.56 m^3/s
Cover maximum grade	0.5%
Cover Channel width	5m
Cover Channel Side slopes	Min. (40%) 2.5H:1V
Outflow channel side slopes	Min. (20%) 5H:1V
Outflow channel bottom	12m
Outflow channel maximum grade	6%
Outflow channel armoring size	D_{50} = 0.30m

Table 3: List of Cell 3 Engineering Drawings and Documents

Document	Description	Revision and Issued Date
Drawings		
Drawing 001	- Tailings Containment Area Closure Specification	Rev C 07/29/2020
Drawing 006	- Cell 3 Closure Plan View	Rev C 09/23/2020
Drawing 007	- Cell 3 Closure Profile Along Channel Centerline	Rev B 08/06/2020
Drawing 008	- Cell 3 Closure Cross-Sections	Rev C 08/06/2020
Drawing 009	- Cell 3 Closure Outflow Channel	Rev A 08/06/2020

3.0 2021 CELL 3 CONSTRUCTION

3.1 QUALITY MANAGEMENT FRAMEWORK

Stantec's role during closure is the EOR of the TCA. The scope of work is to provide engineering design for the TCA closure activities, technical support for the construction manager and site personnel, quality assurance (QA) on the TCA construction to ensure the completed work meets the specifications and observe and document site activities.

Stantec provided an onsite engineering representative and surveyor for the entire construction season to provide construction QA and technical support. Through the site and office representatives, Stantec documented the construction progress via daily reports, and where applicable, field communications and site instructions. Aerial and ground surveys were completed to document progress, provide QA, and to support the contractor with the earthworks.

3.2 CELL 3 CONSTRUCTION OVERVIEW

3.2.1 Construction Summary

The Cell 3 cover and surface water management construction were completed between June 18th 2021 and October 7th 2021. The outflow channel was constructed through a small section of L Dam and was primarily composed of coarse sand and gravel with cobble material overlaying a geotextile cover placed on esker material and original ground. The cover construction material was sourced from the historical esker borrow. The esker material was typically sand with rounded gravel and cobbles. Large boulders, frozen material and other deleterious material were rejected at the source. Selective coarse gravel and cobbles were used as riprap and armoring at specified locations. Photographs of the construction progress and completion are provided in Appendix B. Cover thickness evaluation, as-built survey of the Cell 3 cover and outflow are provided in Appendix C.

3.2.2 Field Adjustments

After lowering the water level in Cell 4 for construction of the Cell 3 outflow channel, minor amount tailings were encountered in the designed channel location. After reviewing the site conditions and topography, it was decided that the outlet should be extended further into Cell 4 than the original design to cover the exposed tailings with sufficient cover and to maintain required drainage.

During QA checks of the Cell 3 cover, it was discovered there is a small area with <1 m cover at the tie-in of the Cell 3 outflow channel near chainage 0+700 and the Dam K cutoff ditch. A transition is required to allow passive drainage from the cutoff ditch to flow into the design channel. In order to maintain the required gradient, the transition reduced the cover thickness to overall 0.6 to 0.7m over an approximate 50 m^2 area. Increasing the cover thickness over this transition would impact surface water management and would cause significant erosion elsewhere along Dam K. As this transition area does not meet the minimum 1 m esker cover design, it will be instrumented with a volumetric water content sensor (VWC) to monitor the depth of saturated conditions that are maintained in the cover.

4.0 CLOSURE

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Prepared by:

REGISTERED PROFESSIONAL ENGINEER
C. A. TONG
LICENSEE
Feb 8, 2022
YUKON

Alvin Tong, P.Eng.
Senior Geotechnical Engineer

Reviewed by:

McKinley, Jim
Digitally signed by McKinley, Jim
Date: 2022.02.07 09:43:09 -07'00'

Jim McKinley, Ph.D., P.Eng.
Senior Hydrogeologist

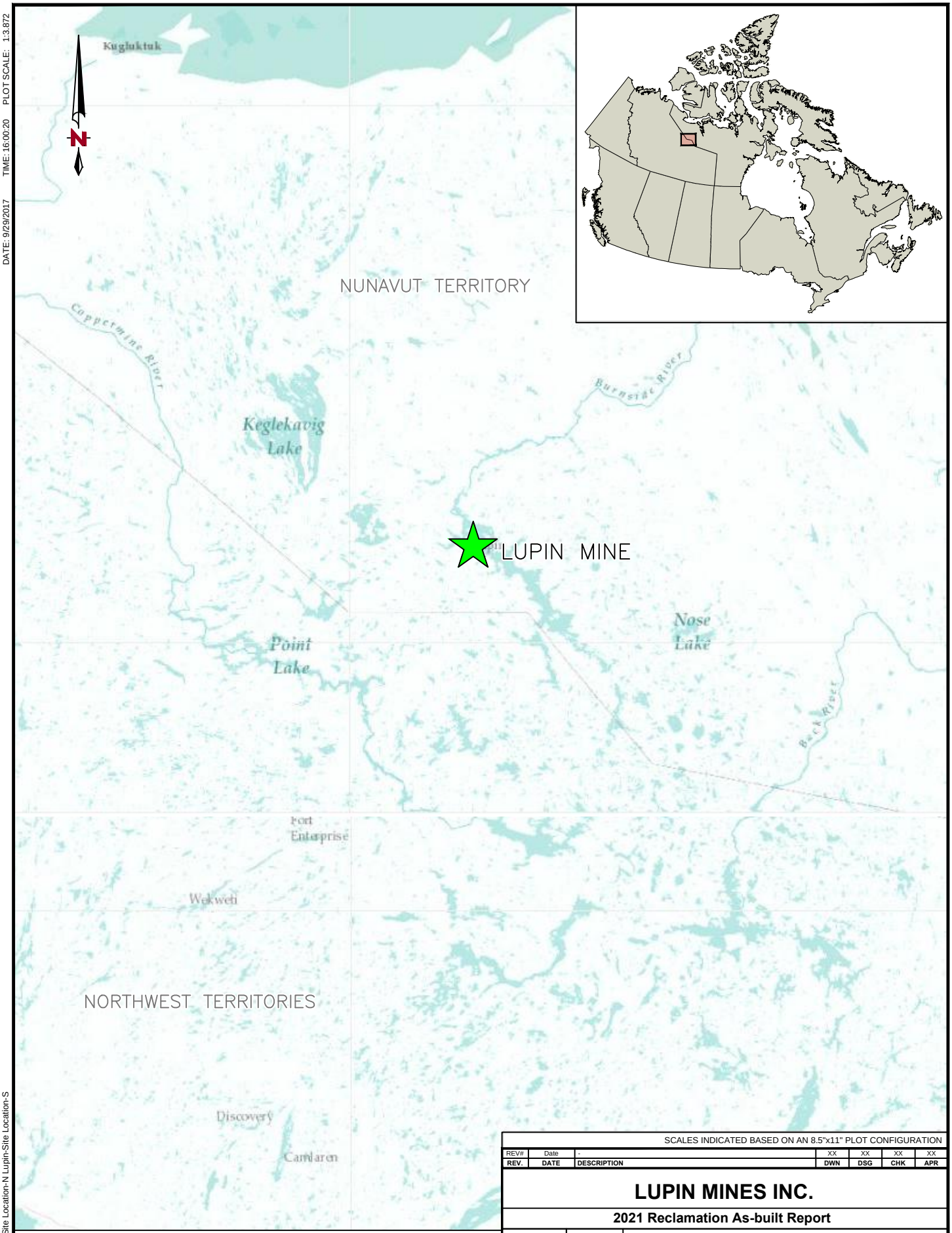
5.0 REFERENCES

Golder Associates, 2018. Lupin Mine Site, Final Closure and Reclamation Plan. Report submitted to the Nunavut Water Board, July 2018.

Stantec Consulting, 2019. 2019 Lupin Tailings Area Inspection Report, Annual Geotechnical Inspection of the Tailings Containment Area. Report submitted to Lupin Mine Incorporated, October 24, 2019.

Stantec Consulting, 2020. 2020 Lupin Tailings Area Inspection Report, Annual Geotechnical Inspection of the Tailings Containment Area. Report submitted to Lupin Mine Incorporated, December 18, 2020.

Stantec Consulting, 2020. Supporting Information for the Dam Stability and Cover Design. Memo submitted to Lupin Mine Incorporated, January 10, 2020.



SCALES INDICATED BASED ON AN 8.5"x11" PLOT CONFIGURATION

REV#	Date	-	XX	XX	XX	XX
REV.	DATE	DESCRIPTION	DWN	DSG	CHK	APR

LUPIN MINES INC.

2021 Reclamation As-built Report

SCALE:	AS SHOWN
DATE:	2016-10-20
CO-ORD. SYS.:	UTM-NAD83-12
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

SITE LOCATION

Stantec

PROJECT NO.:	FIG. NO.:	REV.:
129500081	1	A

DATE: 9/29/2017 TIME: 16:00:20 PLOT SCALE: 1:3,872

FILENAME: Z:\924-2_DSI\DISC\DRAFTING\01.SITE LOCATION.DWG
XREF FILE(S):
IMAGE FILE(S): Lupin-Site Location-N Lupin-Site Location-S

LEGEND

THERMISTORS STATUS

- ACTIVELY MONITORED
- DAMAGED
- MONITORED DURING DSR-NO CALIBRATION DATA
- UNLOCATED-LOCATION ESTIMATED FROM HISTORICAL MAP
- VOLUMETRIC WATER CONTENT SENSOR STRINGS
- TEST PITS
- STANDPIPE

500m 0 500 1000m

SCALE 1:20,000

SCALES INDICATED BASED ON AN 8,5"x11" PLOT CONFIGURATION

LUPIN MINES INC.

TAILINGS CONTAINMENT STUDY AREA

SCALE:	AS SHOWN
DATE:	2021-11-07
CO-ORD. SYS.:	CSRS.UTM-8N
DRW'N BY:	KM
DSG'N BY:	--
REV'D BY:	AT
APP'D BY:	SE

TAILINGS CONTAINMENT AREA

Stantec

PROJECT NO.:	FIG. NO.:	REV.:
129500083	4	A

FILENAME: \\CA0200-PPFSS01\SHARED_PROJECTS\129500081\DISC\DRAFTING\04_TAILINGS CONTAINMENT AREA\TAILINGS CONTAINMENT AREA.DWG
XREF FILE(S):
IMAGE FILE(S): 2021 TCA ortho mosaic 10cm lupin mine wv2 2012aug21 north lupin mine wv2 2012aug21 south
DATE: 11/7/2021 TIME: 23:28:08 PLOT SCALE: 1:3,872

Appendix A ISSUED-FOR-CONSTRUCTION DRAWINGS

TABLE 1. FOUNDATION PREPARATION SPECIFICATIONS

FOUNDATION	
GENERAL	• FOUNDATION SURFACES THAT WILL BE RECEIVING COVER FILL SHALL BE CLEARED OF SNOW, ICE, AND OTHER DETERIORATIVE MATERIAL. THE FOUNDATION SHALL BE INSPECTED BY THE CONTRACTOR'S FOREMAN AND OWNERS SITE ENGINEER (WHEN THEY ARE ON SITE) AND DOCUMENTED USING GPS REFERENCED PHOTOS TO CONFIRM ADHERENCE WITH FOUNDATION PREPARATION SPECIFICATIONS. • WRITTEN FOUNDATION APPROVAL BY AREA SHALL BE PROVIDED BY THE OWNERS SITE ENGINEER (WHEN THEY ARE ON SITE) OR THE ENGINEER OF RECORD (REMOTELY WHEN THE OWNERS SITE ENGINEER IS NOT ON SITE) PRIOR TO PLACEMENT. WHEN THE OWNERS SITE ENGINEER IS NOT ON SITE THE GPS REFERENCED PHOTO DOCUMENTATION SHALL BE PROVIDED TO THE ENGINEER 72HRS PRIOR TO PLANNED PLACEMENT TO ALLOW FOR SUFFICIENT TIME FOR REVIEW AND APPROVAL. THE PHOTO DOCUMENTATION PROVIDED SHALL CAPTURE DIRECTIONS IN SUCH A WAY THAT ALL LIMITS OF THE CONSTRUCTION AREA WILL BE DOCUMENTED FOR REVIEW. • SITE DRAINAGE AND DEWATERING MEASURES ARE THE RESPONSIBILITY OF THE EARTHWORKS CONTRACTOR. TEMPORARY AND FINAL CONSTRUCTION SURFACES SHOULD BE GRADED TOWARD THE DITCHES AND/OR AWAY FROM THE DAM CREST TO ENSURE THERE IS NO PONDING OF WATER NEAR THE DAM TO PREVENT OVERFLOW OR OVERTOPPING. • DEVIATIONS FROM THE SPECIFICATIONS MUST BE APPROVED BY THE TAILINGS CONTAINMENT AREA (TCA) ENGINEER OF RECORD. • CONTRACTOR SHALL PRESERVE SURVEY CONTROL STAKES FOR PROGRESSION AS LONG AS POSSIBLE BETWEEN SURVEY PERIODS, OR BE RESPONSIBLE TO REPLACE THEM AS NEEDED. ONCE THE CONTROL STAKE IS REMOVED, THE CONTRACTOR MUST MOVE CONSTRUCTION ACTIVITIES TO AN AREA WITH SUFFICIENT SURVEY CONTROL. THE CONTRACTOR MUST PROVIDE THE OWNER 1 WEEKS' NOTICE IN ADVANCE OF WHEN THEY REQUIRE THE DAMAGED SURVEY CONTROL POINTS REPAIRED. • THE CONTRACTOR IS RESPONSIBLE TO MANAGE SURROUNDING SURFACE RUN–ON TO TAILINGS COVER TO MINIMIZE THE AMOUNT OF IMPACTED WATER WITHIN THE COVER PLACEMENT AREA.
COVER FOUNDATION PREPARATION SPECIFICATIONS	• THE FOUNDATION SHALL BE CAPABLE OF SUPPORTING COVER FILL AND CONSTRUCTION EQUIPMENT TO THE SATISFACTION OF THE CONTRACTOR, SUBJECTED TO ENGINEER'S APPROVAL. • PRIOR TO AND DURING FILL PLACEMENT, APPROVED FOUNDATION SURFACES SHALL BE CLEARED OF ALL ICE, HARDEN SNOWBANKS THICKER THAN 30mm, LARGE BODIES OF PONDED WATER THAT ARE GREATER THAN 5mX5m AND GREATER THAN DEPTH, AND ANY OTHER MATERIAL DEEMED UNSUITABLE BY THE OWNERS SITE ENGINEER. A THIN LAYER OF FRESH, UNCOMPACTED SNOW (<50mm) IS PERMITTED TO REMAIN IN PLACE DURING COVER CONSTRUCTION.
DAM OUTFALL CHANNEL AREA FOUNDATION	• THE FOUNDATION SHALL BE CAPABLE OF SUPPORTING FILL AND CONSTRUCTION EQUIPMENT TO THE REGULATED SAFETY STANDARDS AND TO THE SATISFACTION OF THE CONTRACTOR AND SUBJECT TO APPROVAL OF THE ENGINEER. • THE EXCAVATED SURFACE MUST BE SURVEYED TO ENSURE DESIGN IS MET PRIOR TO BACKFILL. THE CONTRACTOR IS RESPONSIBLE TO SCHEDULE THE WORK IN LINE WITH THE MONTHLY SURVEY. • 100% OF THE SURFACE OF THE FOUNDATION AND PREVIOUSLY PLACED LIFTS SHALL BE CLEAR OF ALL SNOW OR ICE PRIOR TO THE PLACEMENT OF GEOTEXTILE AND/OR COARSE FILL MATERIAL. • THE FINAL COARSE FILL MATERIAL. SURFACE MUST BE BLENDED INTO THE TOP OF COVER TO ENSURE A SMOOTH TRANSITION. THE ENGINEER MUST INSPECT AND APPROVE THE SURVEYED EXCAVATION AND FINAL STRUCTURES.

TABLE 2. FILL PLACEMENT SPECIFICATIONS

COVER

- ALL TEMPORARY AND FINAL SLOPES SHALL BE TRACK PACKED TO LIMIT SURFACE EROSION.
- UNLESS OTHERWISE APPROVED BY THE OWNERS SITE ENGINEER, FILL MATERIALS SHALL BE PLACED, AND SPREAD, IN –HORIZONTAL LIFTS AND IN SUCH A MANNER TO PREVENT SEGREGATION AND STRATIFICATION.
- IMPACTED WATER FROM THE TAILINGS CELLS DISPLACED DURING COVER MATERIAL PLACEMENT MUST BE MANAGED AND DISCHARGE IN SUCH A WAY THAT WILL NOT IMPACT THE WATER TREATMENT IN POND 1 AND POND 2.
- FILL MATERIALS SHALL JOIN ONTO COMPETENT NATURAL, EXCAVATED, OR APPROVED FILL BY BLENDING INTO THE EXISTING TERRAIN SLOPES OR BY TERRACING OR STEPPING INTO SLOPES AS APPROVED BY THE OWNERS SITE ENGINEER.
- FINISHED COVER SURFACE SHALL BE SMOOTHED TO GRADING TOLERANCE OF ESTABLISHED ROUGH GRADES AND CROSS SECTIONS, AS DETERMINED BY THE OWNERS ENGINEER BASED ON SITE CONDITIONS, AND NOT UNIFORMLY HIGH OR LOW. THE FINAL SURFACE SHALL BE FREE DRAINING TOWARDS THE WATER MANAGEMENT STRUCTURES WITH NO PONDING WATER, AS APPROVED BY THE OWNERS ENGINEER.
- DEVIATIONS FROM THE SPECIFICATIONS MUST BE APPROVED BY THE TAILINGS CONTAINMENT AREA (TCA) ENGINEER OF RECORD (EOR). C
- THE CONTRACTOR IS RESPONSIBLE FOR ANY SHORT–TERM SETTLEMENT AND DEFORMATION ON THE COVER DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE TO PLACE ADDITIONAL FILL WHERE IT IS NECESSARY TO MEET MINIMUM 1m COVER THICKNESS OR TO MEET DESIGN LINES.
- CONTRACTOR SHALL PRESERVE SURVEY CONTROL STAKES FOR PROGRESSION AS LONG AS POSSIBLE BETWEEN SURVEY PERIODS OR BE RESPONSIBLE TO REPLACE THEM AS NEEDED. ONCE THE CONTROL STAKE IS REMOVED, THE CONTRACTOR MUST MOVE CONSTRUCTION ACTIVITIES TO AN AREA WITH SUFFICIENT SURVEY CONTROL. THE CONTRACTOR MUST PROVIDE THE OWNER 1 WEEKS' NOTICE IN ADVANCE OF WHEN THEY REQUIRE THE DAMAGED SURVEY CONTROL POINTS REPAIRED.

FILL TYPE	PERMITTED MATERIALS	PLACEMENT SPECIFICATIONS
COVER FILL	• ESKER	• MAXIMUM SIZE OF MATERIAL SHALL BE 50% OF THE LIFT THICKNESS OR AS DIRECTED BY THE RESIDENT ENGINEER BASED ON LOCALLY AVAILABLE MATERIALS. • PLACEMENT OF FROZEN FILL IS RESTRICTED UNLESS APPROVED BY THE ENGINEER. SOME FROZEN COVER FILL IS PERMITTED PROVIDED THAT: •• THE DIAMETER OF THE FROZEN LUMPS IS LESS THAN 250mm IN DIAMETER OR 50% OF THE LIFT THICKNESS, WHICHEVER IS SMALLER •• THEY MAKE UP LESS THAN 5% BY VOLUME OF ANY GIVEN TRUCK LOAD •• THE FROZEN MATERIALS ARE APPROVED IN CONSULTATION WITH THE RESIDENT ENGINEER
COARSE FILL	• BORROW SOURCE COARSE ESKER, SORTED	• COARSE FILL MATERIAL SHALL MEET OR EXCEED THE GRADATION RECOMMENDATIONS PRESENTED ON THE DESIGN DRAWINGS FOR THE APPLICABLE WORK AREAS •• THE RESIDENT ENGINEER WILL ASSIST THE CONTRACTOR IN IDENTIFYING POTENTIAL SUITABLE SOURCES OF COARSE FILL WITHIN APPROVED BORROW AREAS. •• SELECTIVE MINING TO EXPOSE COARSE SEAMS MAY BE REQUIRED BY THE CONTRACTOR IN ORDER TO SORT MATERIAL WITH REDUCED FINES CONTENT AND MEET DESIGN FILL GRADATIONS, AS DIRECTED BY THE RESIDENT ENGINEER • THE RESIDENT ENGINEER SHALL VERIFY AND RECORD COARSE FILL GRADATION USING STANDARD FIELD METHODS. • EXTENT OF PLACEMENT AND GRADATION PRESENTED ON DESIGN DRAWINGS MAY VARY UPON APPROVAL BY THE TCA EOR AND IS DEPENDENT ON FIELD CONDITIONS, GEOLOGY, AND/OR AVAILABILITY OF LARGER DIAMETER MATERIALS
GEOTEXTILE FILTER FABRIC	• GEOTEXTILE FILTER FABRIC	• GEOTEXTILE SHALL BE A COMPOSITE NON–WOVEN GEOTEXTILE AND EXTRUDED GEOGRID COMPOSITE PRODUCT (NILEX EASYGRID OR EQUIVALENT) AND SHALL MEET THE SPECIFICATIONS PROVIDED IN TABLE 3. • GEOTEXTILE SHALL BE INSTALLED IN OVERLAPPING CONFIGURATION WITH A MINIMUM 0.3m OVERLAP BETWEEN PANELS AS SPECIFIED BY MANUFACTURER'S INSTALLATION GUIDANCE, OR AS APPROVED BY THE TCA EOR. • GEOTEXTILE SHALL BE STORED ON DRY, LEVEL GROUND TO PREVENT FILTRATION OF WATER AND FREEZING, AND GEOTEXTILE ROLLS SHOULD BE STACKED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS. THEY MUST BE STORED WITHIN THEIR PROTECTIVE WRAPPING TO PREVENT UV DEGRADATION. THE GEOTEXTILE ROLLS MUST BE HANDLED WITH PROPER EQUIPMENT OR SLINGS TO PREVENT DAMAGE TO THE PRODUCT. • THE CONTRACTOR MUST PROVIDE MANUFACTURERS' QA/QC DATASHEETS AND SHIPPING MANIFESTS FOR THE RESIDENT GEOTECHNICAL ENGINEER'S REVIEW PRIOR TO DEPLOYMENT.

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TABLE 3. GEOTEXTILE SPECIFICATIONS

PARAMETER	VALUE	PARAMETER	VALUE
GRAB TENSILE STRENGTH (kN/m)	32	APPARENT OPENING SIZE(MICRONS)	90
ELONGATION	10%	PERMITTIVITY (SEC^{-1})	2
RESISTANCE TO STATIC PUNCTURE (N)	2100	GRID OPENING SIZE (mm)	4

C

Stantec
111 Dunsmir Street
Vancouver, BC, V6B 6A3
Tel: +1(604) 696-8000
www.stantec.com

Client: LUPIN MINES INC.

Project: LUPIN MINE CLOSURE

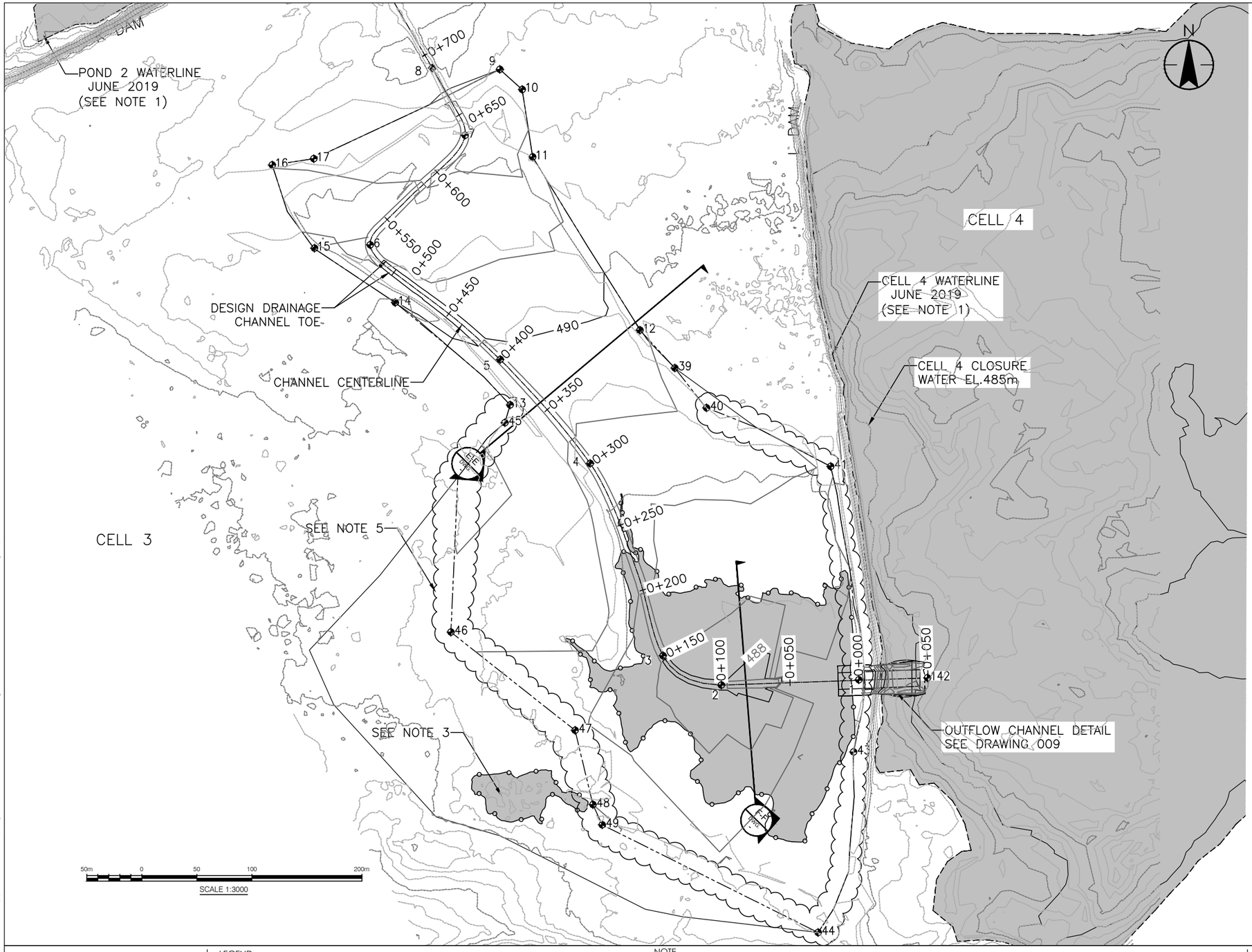
Title: TAILING CONTAINMENT AREA CLOSURE SPECIFICATION B

Scale:- | Drawing No. 001

SS	PK	AT	2020.07.29
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Revision: C

Project No.: 129500081



WORK POINTS DESCRIPTION

POINT NUMBER		NORTHING	EASTING	ELEVATION
CHANNEL CENTERLINE	1	7288600	487305	487.2
	2	7288596	487205	487.5
	3	7288618	487163	488
	4	7288757	487110	488.9
	5	7288833	487044	489.4
	6	7288916	486950	490.1
	7	7288996	487019	490.7
	8	7289045	486995	491.2
COVER DESIGN	9	7289044	487044	491.5
	10	7289029	487060	491.3
	11	7288980	487068	490.6
	12	7288854	487146	489.6
	13	7288800	487052	489.7
	14	7288874	486968	490
	15	7288914	486909	490.3
	16	7288974	486879	491
	17	7288979	486909	491.1
	39	7288827	487171	489.1
	40	7288798	487194	489.2
	41	7288755	487285	489
	42	7288632	487307	489
	43	7288547	487301	489
	44	7288416	487275	489
	45	7288787	487048	489.5
	46	7288635	487008	489.6
	47	7288563	487099	489.1
	48	7288509	487112	489.5
	49	7288495	487118	489.6

C

Stantec
111 Dunsmir Street
Vancouver, BC, V6B 6A3
Tel: +1(604) 696-8000
www.stantec.com

LEGEND

- 2m EXISTING GROUND CONTOURS
- 0.5m EXISTING GROUND CONTOURS
- 2m DESIGN CONTOURS
- 0.5m DESIGN CONTOURS
- CHANNEL BOUNDARY
- DESIGN COVER EXTENT. TIE TO EXISTING GROUND. SEE NOTE 4.
- BATHYMETRY SURVEY WATERLINE (JUNE 2019)
- NO DATA. SEE NOTE 3
- SEE NOTE 5
- WATER COVERED AREA

NOTE

1. EXISTING TOPOGRAPHIC CONTOURS AND WATER COVERED AREAS DELINEATED FROM LIDAR SURVEY COMPLETED AUGUST 2019 AND BATHYMETRY SURVEYS COMPETED JUNE 2019.
2. COORDINATES ARE PRESENTED IN NAD83 UTM, ZONE 12.
3. TOPOGRAPHY AND BATHYMETRY SURVEYS NOT AVAILABLE FOR THESE AREAS DUE TO PONDED WATER. THE CONTRACTOR SHALL REMOVE ANY PONDED WATER PRIOR TO PLACEMENT OF COVER FILL IN THESE AREAS. THE CONTRACTOR SHALL ALSO ADJUST THE COVER FILL SURFACE ELEVATIONS AND/OR SUBEXCAVATE IN THESE AREAS TO ENSURE A MINIMUM 1.0M FILL COVER OVER TAILINGS AS DIRECTED BY THE RESIDENT GEOTECHNICAL ENGINEER.
4. OUTLINE OF FILL COVER PLACEMENT IS APPROXIMATE BASED ON INTERPRETATION OF PREVIOUS SURVEYS AND AERIAL PHOTOGRAPHY. THE CONTRACTOR SHALL CONFIRM THE LOCATION AND MINIMUM THICKNESS OF FILL COVER ALONG THE TIE-IN LIMITS.
5. COVER TIE IN WILL BE FIELD FITTED UNDER DIRECTION OF THE RESIDENT GEOTECHNICAL ENGINEER DEPENDING ON ACTUAL FIELD CONDITION AND TOPOGRAPHIC INFORMATION TO PROVIDE POSITIVE FREE DRAINAGE AND MINIMIZE PONDING.

Client
LUPIN MINES INC.

Project
LUPIN MINE CLOSURE

Title
CELL 3 CLOSURE
PLAN VIEW

Scale: 1:3000 Drawing No. 006
SS Dwn. PK Dsgn. AT Chkd. 2020.08.18 YYYY.MM.DD Revision: C
Project No.: 129500081

2020.09.23 12:13:02 PM
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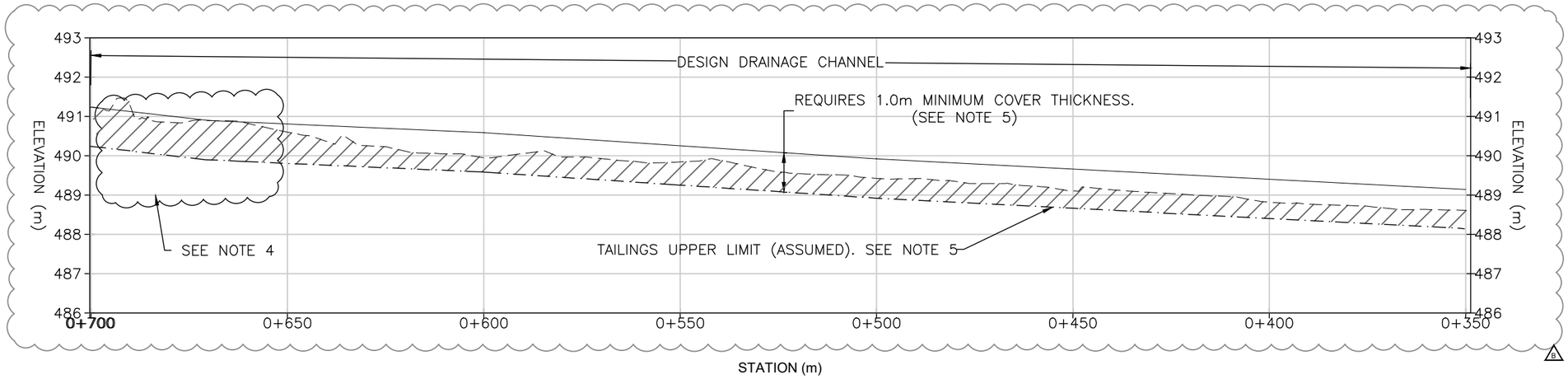
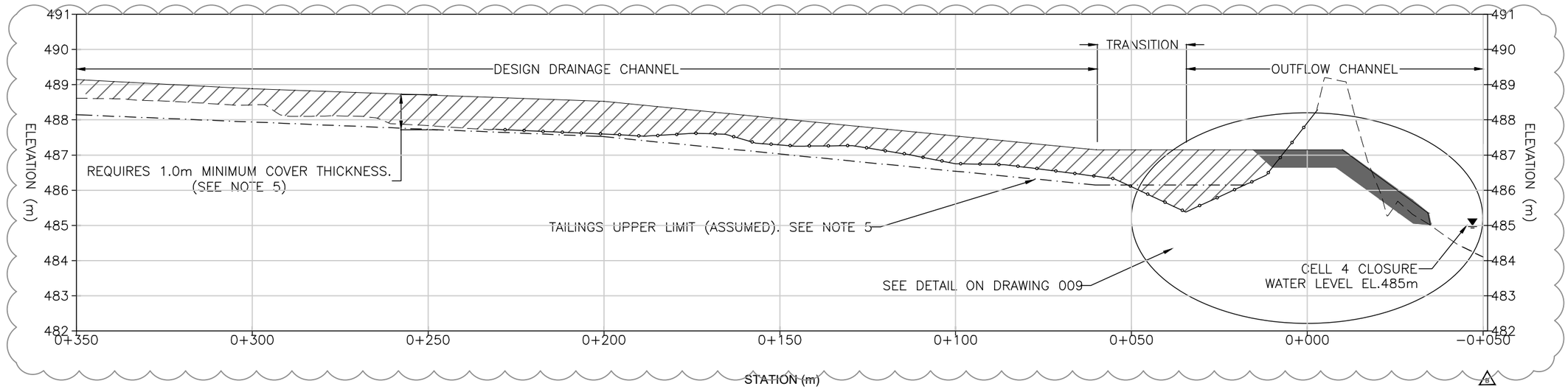
ORIGINAL SHEET - ANSI B (11"x 17")



CHANNEL CENTERLINE PROFILE (STA 0+350 TO STA 0+760)

VERTICAL EXAGGERATION: 10X



CHANNEL CENTERLINE PROFILE (STA 0+00 TO STA 0+350)

VERTICA EXAGGERATION: 10X

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LEGEND

- EXISTING GROUND PROFILE
- DESIGN COVER
- NO DATA (SEE NOTE 3)
- ESKER COVER FILL MATERIAL
- OUTFLOW CHANNEL MATERIAL. SEE DRAWING 005
- SEE NOTE 4

NOTE

1. EXISTING TOPOGRAPHIC CONTOURS AND WATER COVERED AREAS DELINEATED FROM LIDAR SURVEY COMPLETED AUGUST 2019 AND BATHYMETRY SURVEYS COMPETED JUNE 2019.
2. COORDINATES ARE PRESENTED IN NAD83 UTM, ZONE 12.
3. TOPOGRAPHY AND BATHYMETRY SURVEYS NOT AVAILABLE FOR THESE AREAS DUE TO PONDED WATER. THE CONTRACTOR SHALL REMOVE ANY PONDED WATER PRIOR TO PLACEMENT OF COVER FILL IN THESE AREAS. THE CONTRACTOR SHALL ALSO ADJUST THE COVER FILL SURFACE ELEVATIONS AND/OR SUBEXCAVATE IN THESE AREAS TO ENSURE A MINIMUM 1.0m FILL COVER OVER TAILINGS AS DIRECTED BY THE RESIDENT GEOTHECHNICAL ENGINEER.
4. OUTLINE OF FILL COVER PLACEMENT IS APPROXIMATE BASED ON INTERPRETATION OF PREVIOUS SURVEYS AND AERIAL PHOTOGRAPHY. THE CONTRACTOR SHALL CONFIRM THE LOCATION AND MINIMUM THICKNESS OF FILL COVER ALONG THE TIE-IN LIMITS WITH THE RESIDENT GEOTECHNICAL ENGINEER.
5. DEPTH OF COVER BELOW EXISTING GROUND HAS NOT BEEN CONFIRMED. THE CONTRACTOR SHALL CONDUCT SUBEXACATION AND BACKFILL ACTIVITIES IN THESE AREAS AS DIRECTED BY THE RESIDENT GEOTECHNICAL ENGINEER TO ENSURE A MINIMUM 1.0m FILL COVER OVER TAILINGS.

Client
LUPIN MINES INC.

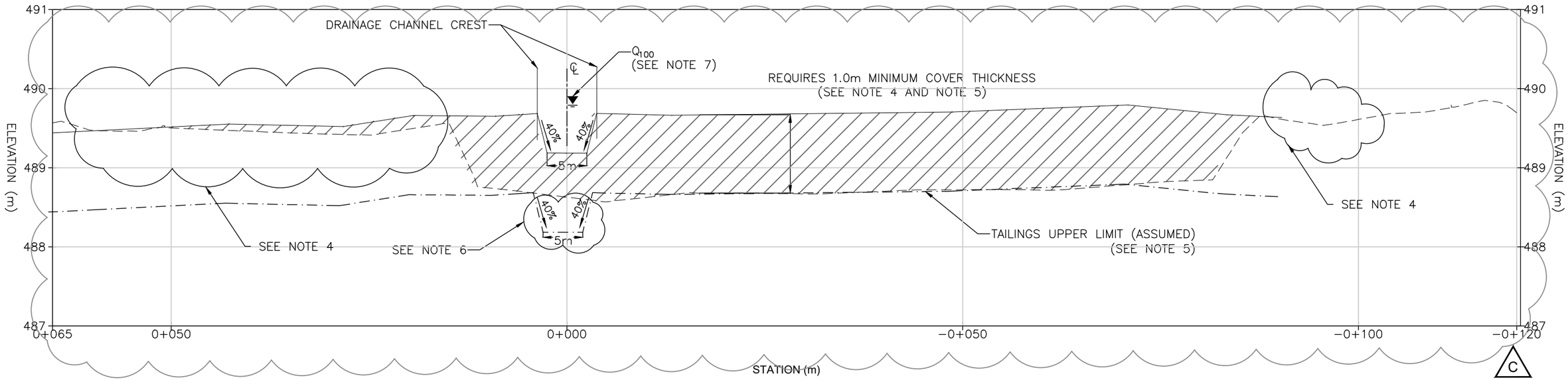
Project
LUPIN MINE CLOSURE

Title
CELL 3 CLOSURE
PROFILE ALONG CHANNEL CENTERLINE

Scale:- Drawing No. 007

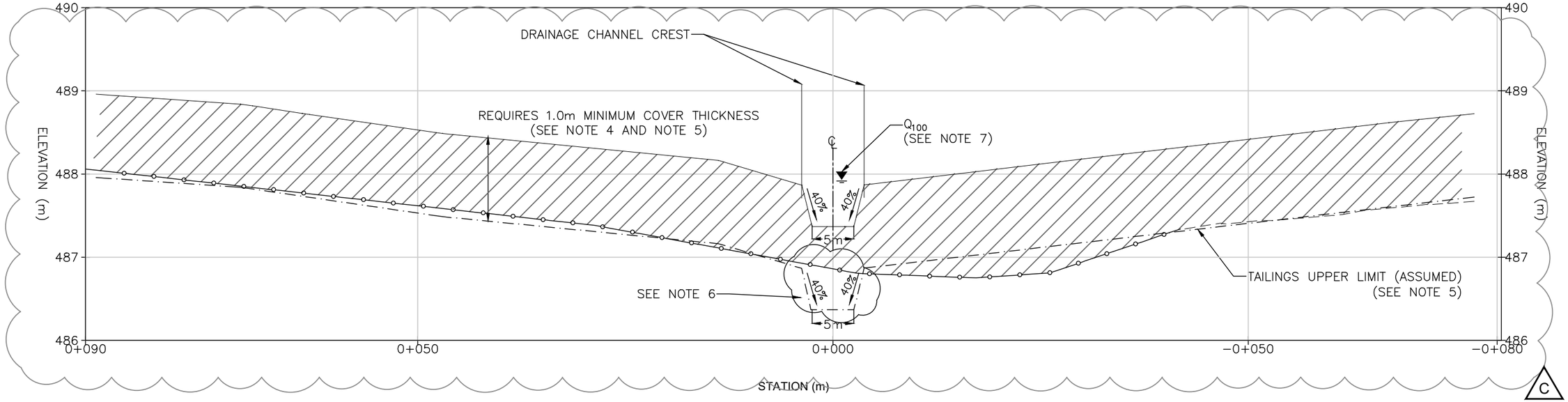
SS	PK	AT	2020.08.05	
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD	Revision: B

Project No.:129500081



CROSS–SECTION E–E

VERTICAL EXAGGERATION: 10X



CROSS–SECTION F–F

VERTICAL EXAGGERATION: 10X

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LEGEND

- EXISTING GROUND PROFILE
- DESIGN COVER
- DRAINAGE CHANNEL CENTERLINE
- NO DATA (SEE NOTE 3)
- SEE NOTE 6
- COVER FILL MATERIAL

C

NOTE

1. EXISTING TOPOGRAPHIC CONTOURS AND WATER COVERED AREAS DELINEATED FROM LIDAR SURVEY COMPLETED AUGUST 2019 AND BATHYMETRY SURVEYS COMPETED JUNE 2019.
2. COORDINATES ARE PRESENTED IN NAD83 UTM, ZONE 12.
3. TOPOGRAPHY AND BATHYMETRY SURVEYS NOT AVAILABLE FOR THESE AREAS DUE TO PONDED WATER. THE CONTRACTOR SHALL REMOVE ANY PONDED WATER PRIOR TO PLACEMENT OF COVER FILL IN THESE AREAS. THE CONTRACTOR SHALL ALSO ADJUST THE COVER FILL SURFACE ELEVATIONS AND/OR SUBEXCAVATE IN THESE AREAS TO ENSURE A MINIMUM 1.0m FILL COVER OVER TAILINGS AS DIRECTED BY THE RESIDENT GEOTECHNICAL ENGINEER.
4. OUTLINE OF FILL COVER PLACEMENT IS APPROXIMATE BASED ON INTERPRETATION OF PREVIOUS SURVEYS AND AERIAL PHOTOGRAPHY. THE CONTRACTOR SHALL CONFIRM THE LOCATION AND MINIMUM THICKNESS OF FILL COVER ALONG THE TIE IN LIMITS.
5. DEPTH OF COVER BELOW EXISTING GROUND HAS NOT BEEN CONFIRMED. THE CONTRACTOR SHALL CONDUCT SUBEXACATION AND BACKFILL ACTIVITIES IN THESE AREAS AS DIRECTED BY THE RESIDENT GEOTECHNICAL ENGINEER TO ENSURE A MINIMUM 1.0m FILL COVER OVER TAILINGS.
6. COVER TIE IN WILL BE FIELD FITTED UNDER DIRECTION OF THE RESIDENT GEOTECHNICAL ENGINEER DEPENDING ON ACTUAL FIELD CONDITION AND TOPOGRAPHIC INFORMATION TO PROVIDE POSITIVE FREE DRAINAGE AND MINIMIZE PONDING.
7. ILLUSTRATES APPROXIMATE FLOW DEPTH FOR 1–IN–100–YEAR, 24–HOUR STORM EVENT.

Client
LUPIN MINES INC.

Project
LUPIN MINE CLOSURE

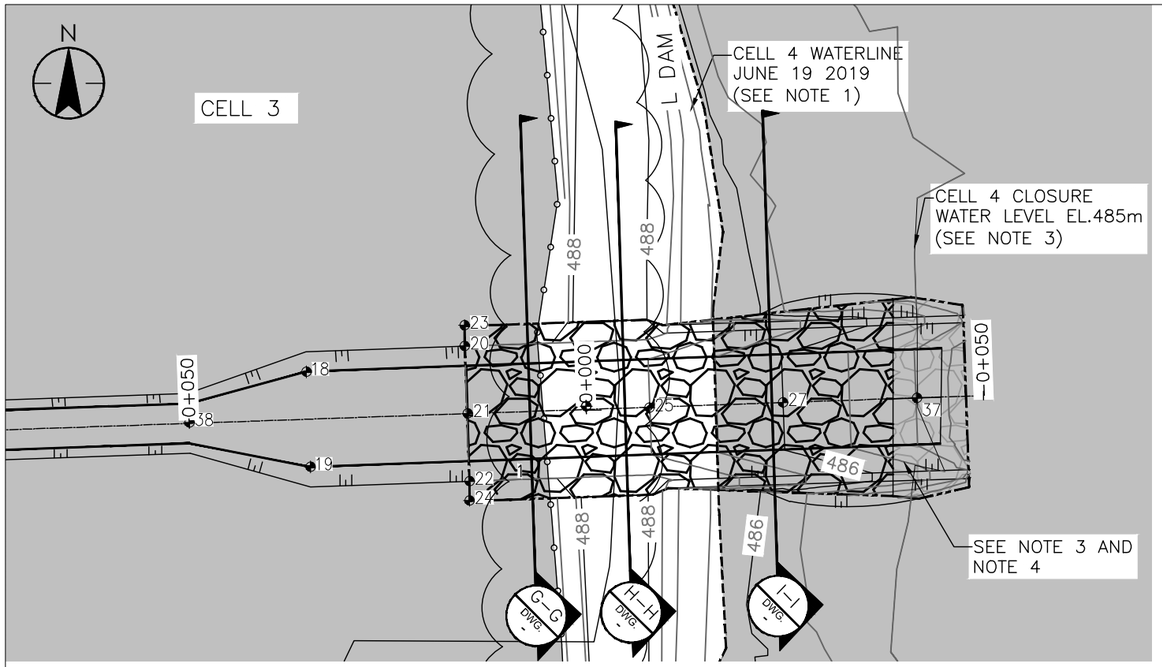
Title
CELL 3 CLOSURE
CROSS-SECTIONS

Scale:- | Drawing No. 008

SS	PK	AT	2020.08.05
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

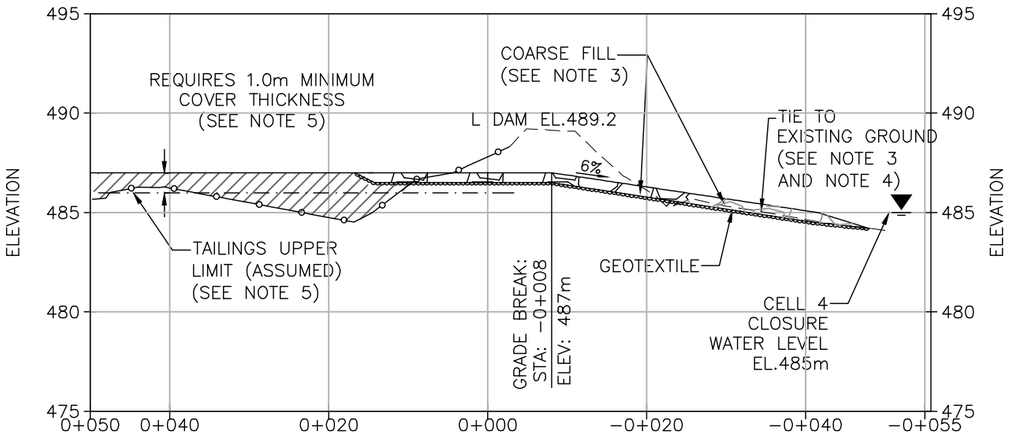
Revision: C

Project No.: 129500081



PLAN VIEW – OUTFLOW CHANNEL

SCALE 1:750



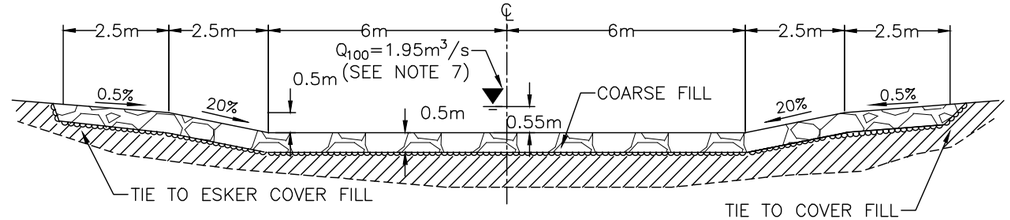
PROFILE – OUTFLOW CHANNEL

VERTIVAL EXAGGERATION: 2.5X

POINT NUMBER	NORTHING	EASTING	ELEVATION
18	7288604	487270	487.0
19	7288592	487270	487.0
20	7288608	487290	487.5
21	7288599	487290	487.0
22	7288591	487290	487.5
23	7288610	487295	488.0

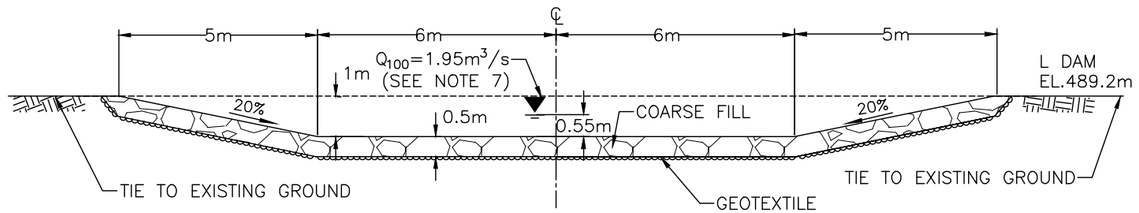
POINT NUMBER	NORTHING	EASTING	ELEVATION
24	7288588	487295	488.0
25	7288599	487312	487.0
27	7288600	487330	486.0
37	7288601	487353	485.0
38	7288597	487255	487.0

OUTFLOW WORK POINTS



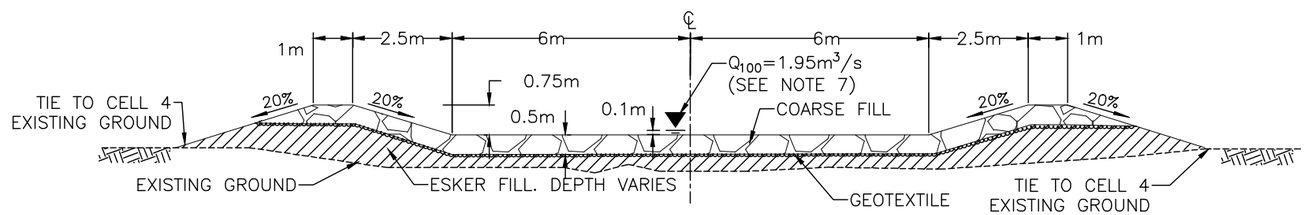
CROSS SECTION G–G

N.T.S



CROSS–SECTION H–H

N.T.S



CROSS–SECTION I–I

N.T.S

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LEGEND

- 2m EXISTING GROUND CONTOURS
- 0.5m EXISTING GROUND CONTOURS
- 2m DESIGN CONTOURS
- 0.5m DESIGN CONTOURS
- APPROXIMATE OUTFLOW CHANNEL WORKS EXTENT
- GEOTEXTILE
- WATERLINE
- NO DATA, SEE NOTE 3 ON DRAWING 006.
- SEE NOTE 5
- WATER COVERED AREA
- COVER FILL MATERIAL
- COARSE FILL
- COARSE FILL EXTENDED PLACEMENT. (SEE NOTE 3)

NOTE

1. EXISTING TOPOGRAPHIC CONTOURS AND WATER COVERED AREAS DELINEATED FROM LIDAR SURVEY COMPLETED AUGUST 2019 AND BATHYMETRY SURVEYS COMPETED JUNE 2019.
2. COORDINATES ARE PRESENTED IN NAD83 UTM, ZONE 12.
3. CLOSURE ELEVATION WATER EXTENT SHOWN IS APPROXIMATE. COARSE FILL SHALL EXTEND AT LEAST TO THE EDGE OF WATER.
4. ROCK PLACEMENT AND TIE IN TO EXISTING TOPOGRAPHY SHALL BE FIELD FITTED UNDER THE DIRECTION OF THE RESIDENT GEOTECHNICAL ENGINEER AND MAY BE ADJUSTED DEPENDING ON TOPOGRAPHY, GEOLOGY, AND/OR AVAILABILITY OF LARGER ROCK MATERIALS. REFER TO CONSTRUCTION SPECIFICATIONS DRAWING 001 TABLE 2.
5. COVER TIE IN WILL BE FIELD FITTED UNDER DIRECTION OF THE RESIDENT GEOTECHNICAL ENGINEER DEPENDING ON ACTUAL FIELD CONDITION AND TOPOGRAPHIC INFORMATION.
6. COARSE FILL FOR OUTFLOW CHANNEL THROUGH L–DAM SHALL BE PRIMARILY MADE UP OF GRAVEL, COBBLE AND STONE MATERIAL RANGING FROM 25MM TO 400MM WITH D_{50} AT LEAST 300MM. MINOR AMOUNTS OF SAND AND/OR LARGER STONE MAY BE PERMITTED IN WELL–GRADED MIXTURES, DEPENDING ON LOCALLY AVAILABLE MATERIALS. MATERIAL USED SHALL BE FIELD–VERIFIED FOR GRAIN SIZE DISTRIBUTION AND APPROVED BY THE RESIDENT ENGINEER. REFER TO CONSTRUCTION SPECIFICATIONS DRAWING 001 TABLE 2.
7. COARSE FILL SHALL BE PLACED IN A MINIMUM OF TWO PACKED LIFTS AS DIRECTED BY THE RESIDENT ENGINEER, ENSURING MATERIAL PLACEMENT IS STABLE, WELL GRADED AND PLACED IN A UNIFORM MANNER WHICH MINIMIZES LARGE VOIDS. ILLUSTRATES APPROXIMATE FLOW DEPTH AND FLOW RATE (Q) FOR 1–IN–100–YEAR, 24–HOUR STORM EVENT.

Client

LUPIN MINES INC.

Project

LUPIN MINE CLOSURE

Title

CELL 3 CLOSURE

OUTFLOW CHANNEL

Scale:- | Drawing No. 009

SS	PK	AT	2020.08.05
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Revision: A

Project No.: 129500081

2020.08.06 7:29:11 PM \\ca0200-ppfss01\shared_projects\129500081\disc\drafting\05_tca structures detailed design\plan view-cell 3

Appendix B PHOTOGRAPHS

Photo 1: Esker cover placement in Cell 3. The cell has been dewatered prior to cover placement.

Photo 2: Cell 3 outflow channel during construction.

Photo 3: Completed Cell 3 esker cover. The cover surface was graded to be smooth and free draining.

Photo 4: Geotextile fabric in Cell 3 outflow channel.

Photo 5: Excavator works to lay coarse material onto geotextile fabric in Cell 3 outflow channel.

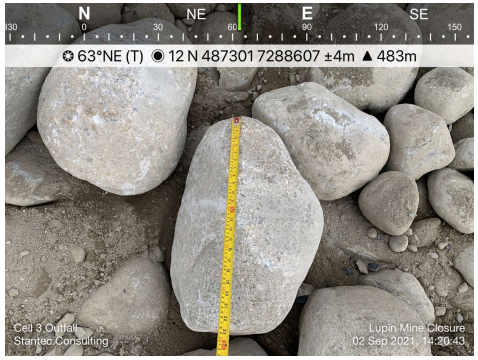


Photo 6: Typical particle size of the coarse gravel and sand.

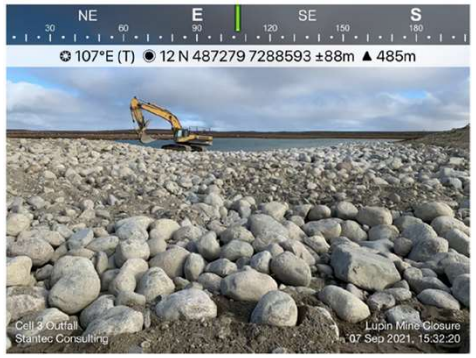
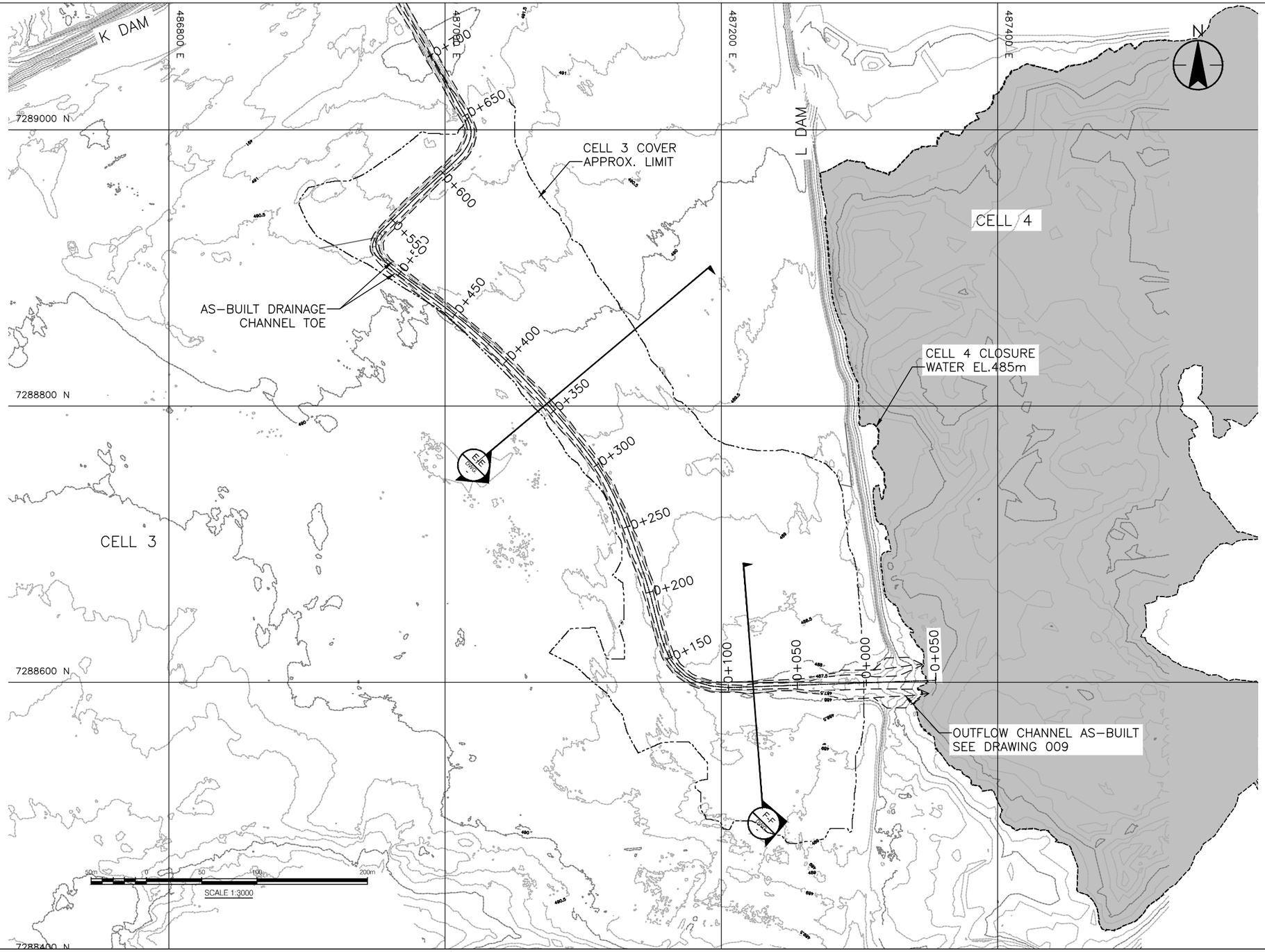


Photo 7: Completed Cell 3 outflow channel.

LMI	**Lupin Mine Incorporated**		
	2021 Construction Summary Report		
Construction Summary Photograph Log for Cell 3			
Stantec	PN: 129500081	FIGURE 1	REV. 1

Appendix C AS-BUILTS DRAWINGS



LEGEND

- 2m EXISTING GROUND CONTOURS
- 0.5m EXISTING GROUND CONTOURS
- APPROXIMATE AS-BUILT CHANNEL
- AS-BUILT COVER EXTENT. TIE TO EXISTING GROUND. SEE NOTE 3.
- BATHYMETRY SURVEY WATERLINE (2021)
- WATER COVERED AREA

NOTE

1. EXISTING TOPOGRAPHIC CONTOURS AND WATER COVERED AREAS DELINEATED FROM AERIAL SURVEY ON OCTOBER 4th, 2021.
2. COORDINATES ARE PRESENTED IN NAD83 UTM, ZONE 8N.
3. OUTLINE OF AS-BUILT COVER LIMIT SHOWN IS APPROXIMATE TO REPRESENT BOUNDARY OF SIGNIFICANT FILL. THIN LIFTS AND GRADING WERE DONE ON A LARGER AREA TO FACILITATE DRAINAGE.

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Client: LUPIN MINES INC.

Project: LUPIN MINE CLOSURE

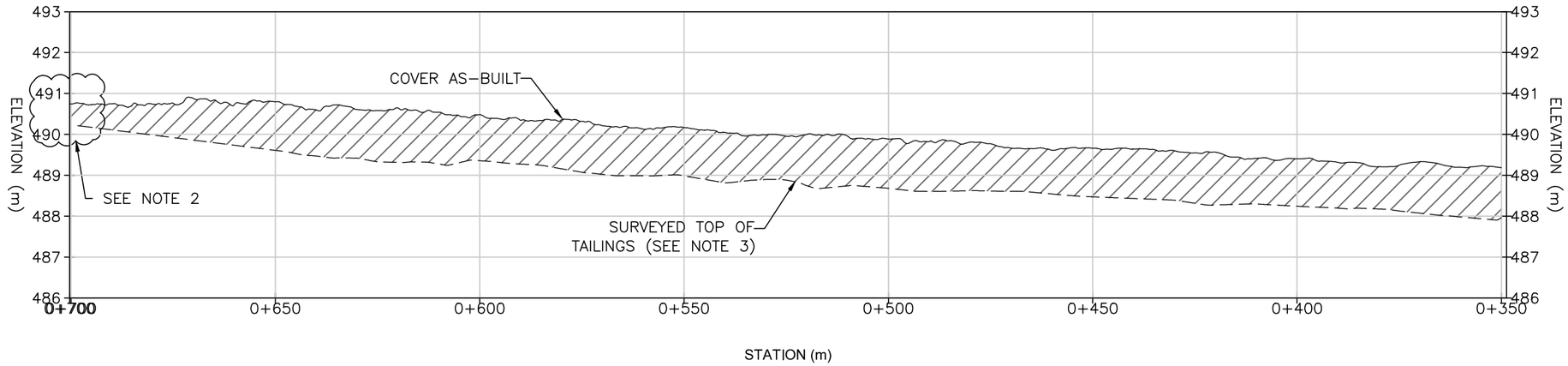
Title: CELL 3 CLOSURE

AS-BUILT PLAN VIEW

Scale: 1:3000 Drawing No. 006

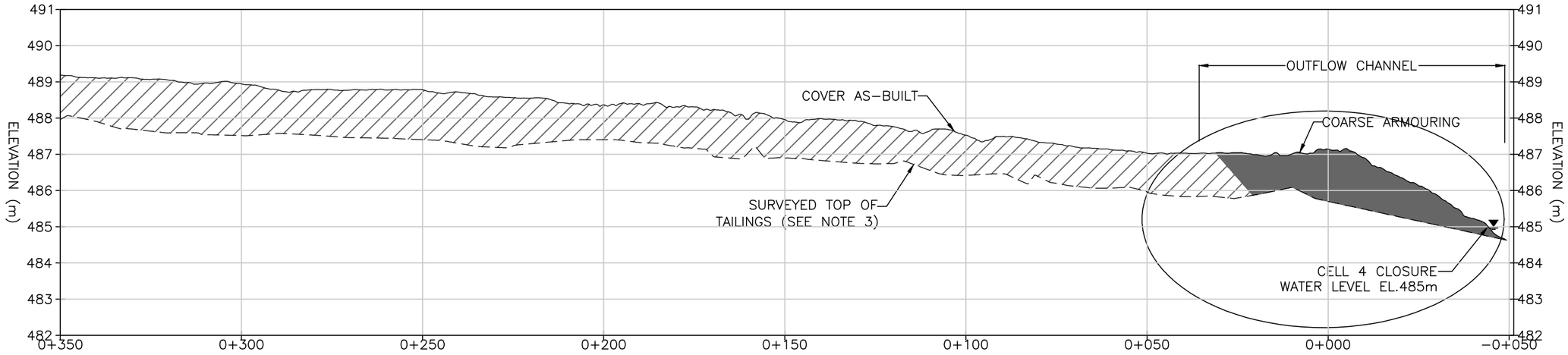
KM (Dwn.) -- (Dsgn.) AT (Chkd.) 2021.11.18 (YYYY.MM.DD) Revision: 0

Project No.: 129500081



CHANNEL CENTERLINE PROFILE (STA 0+350 TO STA 0+760)

VERTICAL EXAGGERATION: 10X



CHANNEL CENTERLINE PROFILE (STA 0+00 TO STA 0+350)

VERTICA EXAGGERATION: 10X

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LEGEND

- EXISTING GROUND PROFILE
- DESIGN COVER
- ESKER COVER FILL MATERIAL
- OUTFLOW CHANNEL MATERIAL. SEE DRAWING 005

NOTE

1. EXISTING TOPOGRAPHIC CONTOURS AND WATER COVERED AREAS DELINEATED FROM AERIAL SURVEY ON OCTOBER 4th, 2021.
2. A SMALL AREA OF COVER IS LESS THAN THE DESIGN MINIMUM OF 1m. THE COVER HERE WAS CONSTRUCTED AS SHOWN TO FACILITATE DRAINAGE.
3. SURVEYED TAILINGS SURFACE IS COMPILATED FROM GROUND AND AERIAL SURVEYS ON EXPOSED TAILINGS, AND TESTPIT RESULTS IN HISTORICAL COVER AROUND THE 2020/2021 CONSTRUCTION LIMITS.

Client
LUPIN MINES INC.

Project
LUPIN MINE CLOSURE

Title
CELL 3 CLOSURE

AS-BUILT PROFILE ALONG CHANNEL CENTERLINE

Scale: AS SHOWN | Drawing No. 007

KM	--	AT	2022.02.04	
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD	Revision: 1

Project No.: 129500081

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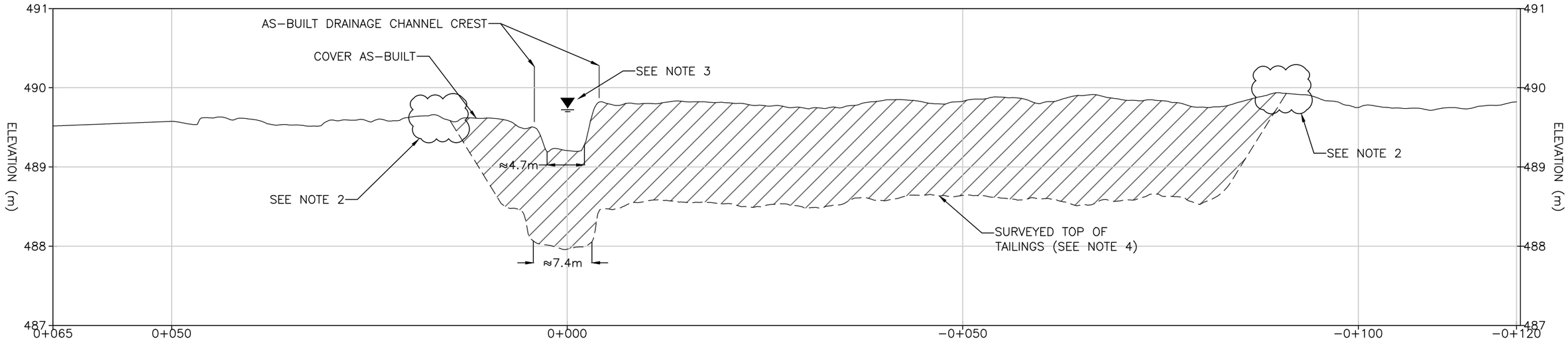
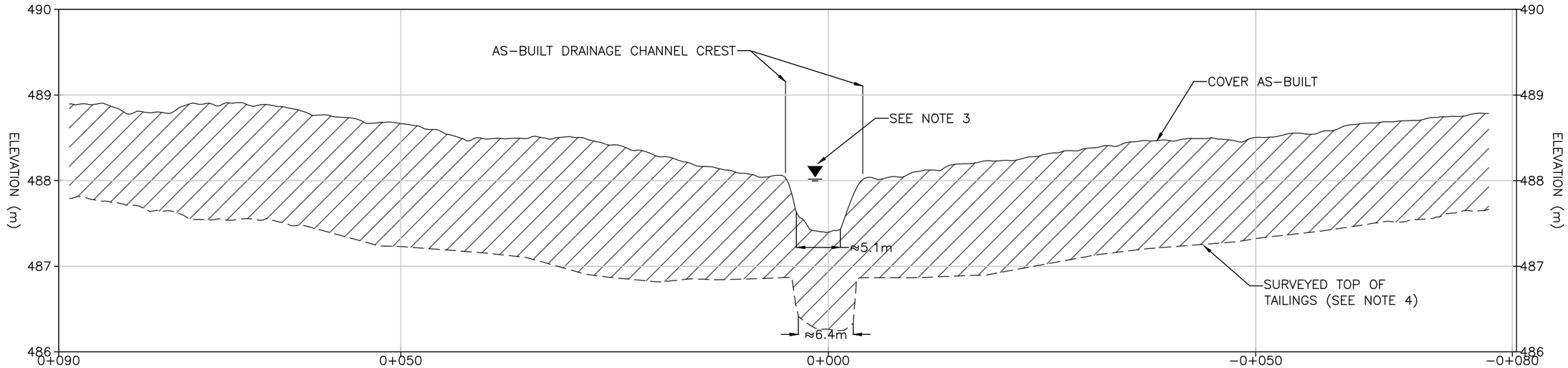
ORIGINAL SHEET - ANSI B (11"x 17")



CROSS–SECTION E–E
VERTICAL EXAGGERATION: 10X



CROSS–SECTION F–F
VERTICAL EXAGGERATION: 10X

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LEGEND

- SURVEYED TOP OF TAILINGS
- COVER AS–BUILT
- COVER FILL MATERIAL

NOTE

1. EXISTING TOPOGRAPHIC CONTOURS AND WATER COVERED AREAS DELINEATED FROM AERIAL SURVEY ON OCTOBER 4th, 2021.
2. OUTLINE OF AS–BUILT COVER LIMIT SHOWN IS APPROXIMATE TO REPRESENT BOUNDARY OF SIGNIFICANT FILL. THIN LIFTS AND GRADING WERE DONE ON A LARGER AREA TO FACILITATE DRAINAGE.
3. ILLUSTRATES APPROXIMATE FLOW DEPTH FOR 1–IN–100–YEAR, 24–HOUR STORM EVENT.
4. SURVEYED TAILINGS SURFACE IS COMPILATED FROM GROUND AND AERIAL SURVEYS ON EXPOSED TAILINGS, AND TESTPIT RESULTS IN HISTORICAL COVER AROUND THE 2020/2021 CONSTRUCTION LIMITS.

Client
LUPIN MINES INC.

Project
LUPIN MINE CLOSURE

Title
CELL 3 CLOSURE

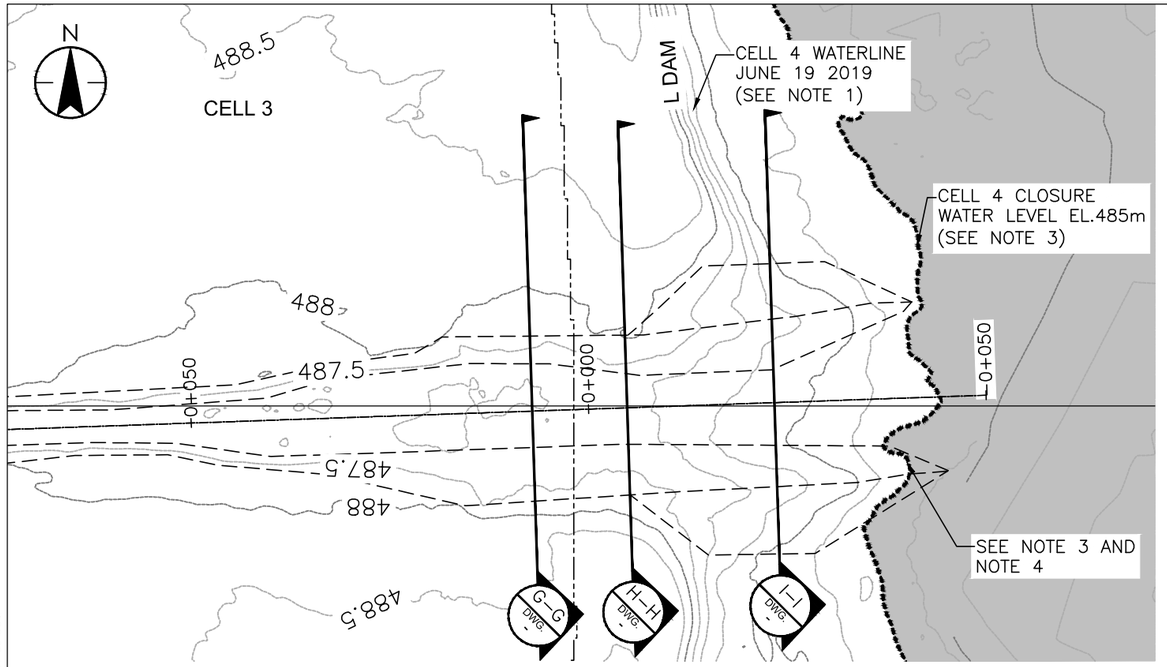
AS-BUILT CROSS-SECTIONS

Scale: AS SHOWN | Drawing No. 008

KM	--	AT	2022.02.04
Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

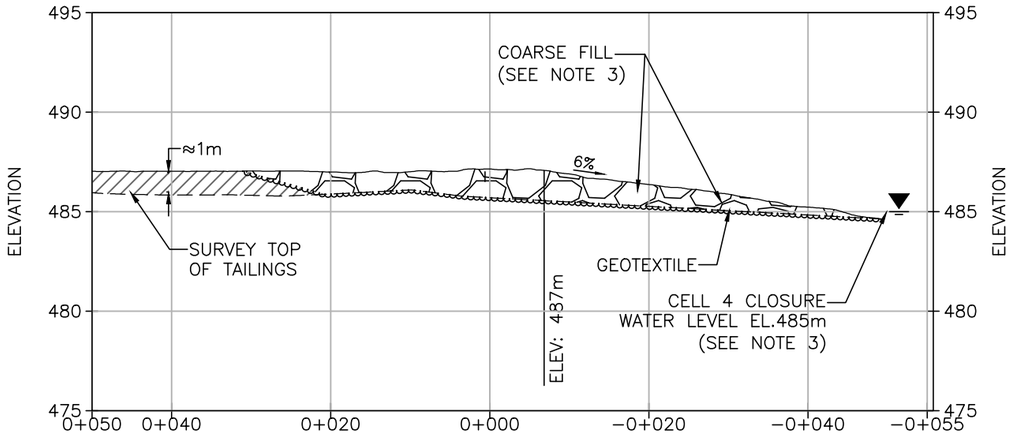
Revision: 1

Project No.: 129500081



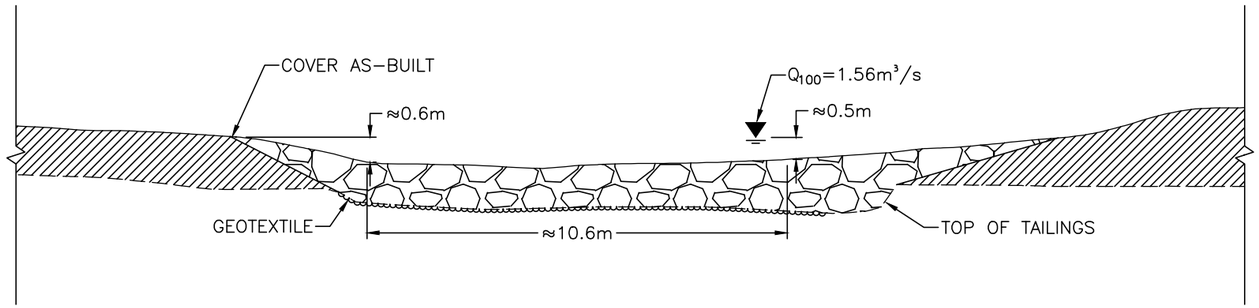
PLAN VIEW – OUTFLOW CHANNEL

SCALE 1:750



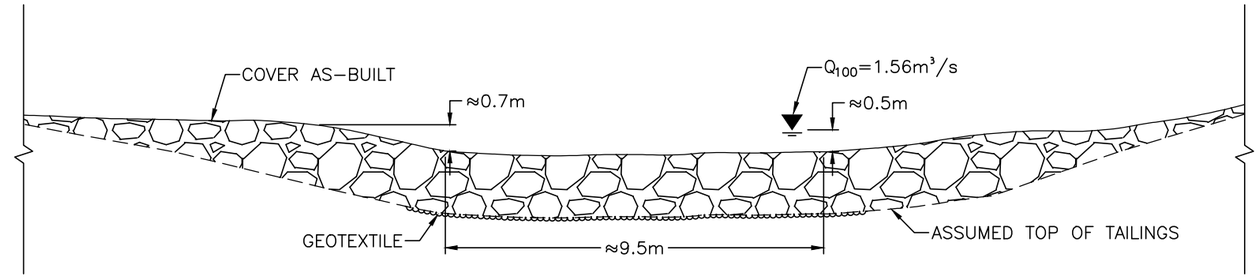
PROFILE – OUTFLOW CHANNEL

VERTIVAL EXAGGERATION: 2.5X



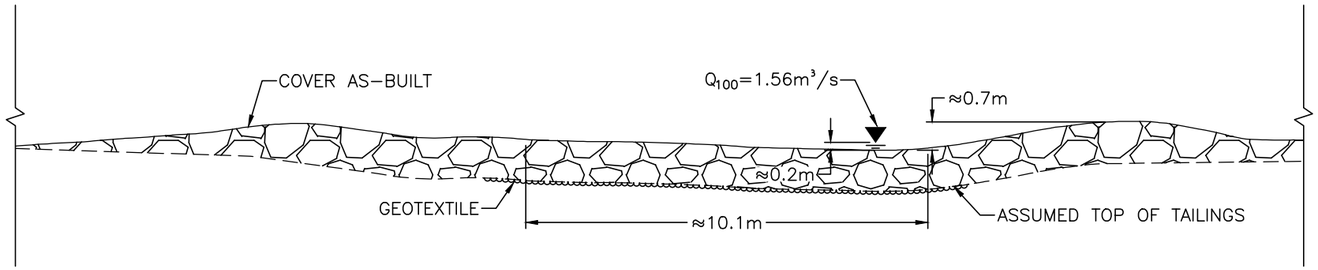
CROSS SECTION G–G

N.T.S



CROSS–SECTION H–H

N.T.S



CROSS–SECTION I–I

N.T.S

LEGEND

- 2m EXISTING GROUND CONTOURS
- 0.5m EXISTING GROUND CONTOURS
- APPROXIMATE AS–BUILT OUTFLOW CHANNEL
- GEOTEXTILE
- WATERLINE
- WATER COVERED AREA
- COVER FILL MATERIAL
- COARSE FILL (SEE NOTE 4)

NOTE

1. EXISTING TOPOGRAPHIC CONTOURS AND WATER COVERED AREAS DELINEATED FROM AERIAL SURVEY ON OCTOBER 4th, 2021.
2. COORDINATES ARE PRESENTED IN NAD83 UTM, ZONE 8N.
3. COARSE FILL WAS EXTENDED TO EDGE OF WATER AT TIME OF CONSTRUCTIONS.
4. COARSE FILL FOR OUTFLOW CHANNEL THROUGH L–DAM IS PRIMARILY MADE UP OF GRAVEL, COBBLE AND STONE MATERIAL RANGING FROM 25mm TO 400mm WITH D_{50} AT LEAST 300mm. MINOR AMOUNTS OF SAND AND/OR LARGER STONE WAS USED FRO WELL–GRADED MIXTURES.
5. ILLUSTRATES APPROXIMATE FLOW DEPTH AND FLOW RATE (Q) FOR 1–IN–100–YEAR, 24–HOUR STORM EVENT @ MAX. 1.56m³/s.

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Client: LUPIN MINES INC.

Project: LUPIN MINE CLOSURE

Title: CELL 3 CLOSURE

AS-BUILT OUTFLOW CHANNEL

Scale: AS SHOWN | Drawing No. 009

KM (Dwn.) | -- (Dsgn.) | AT (Chkd.) | 2022.02.04 (YYYY.MM.DD) | Revision: 1

Project No.: 129500081

CELL3 - Tailings Cover Check