



23 September 2024

**CLOSURE AND FINANCIAL
PROVISION ASSESSMENT OF
NOOITGEDACHT TSF AT
HARMONY GOLD MINE, USING
THE DMR GUIDELINES AS AT
JULY 2024**

**ENVIRONMENTAL IMPACT
MANAGEMENT SERVICES (EIMS)**

P237_ Nooitgedacht Closure Assessment Report

TABLE OF CONTENTS

1. INTRODUCTION	3
1.1. BACKGROUND.....	3
2. MINE OVERVIEW	4
3. CLOSURE COST ASSESSMENT	5
3.1 INPUT PARAMETERS FOR QUANTUM PROVISION.....	5
3.2 PRIMARY RISK CLASS FOR TYPE OF MINERALS MINED	5
3.3 RISK CLASS	6
3.4 AREA SENSITIVITY	6
3.5 CLOSURE COMPONENTS	7
3.6 UNIT RATES FOR CLOSURE COMPONENTS.....	8
3.7 WEIGHTING FACTOR 1 AND 2	9
3.8 ESCALATION	9
3.9 CLOSURE METHODS AND ASSUMPTIONS	9
3.9.1 COMPONENTS 2 (B): STEEL AND REINFORCED CONCRETE STRUCTURES AND HOUSING, FACILITIES AND SERVICES.	10
3.9.2 COMPONENT 10: GENERAL SURFACE REHABILITATION	10
3.9.3 COSTS.....	11
4. CONCLUSION	13
5. RECOMMENDATIONS	13
6. REFERENCES	13

LIST OF FIGURES

FIGURE 1: GOOGLE EARTH IMAGE OF THE POSITION OF THE PROPOSED NOOITGEDACHT TSF.....	3
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LIST OF TABLES

TABLE 1: ACTIVITIES AS PER DMR GUIDELINES.....	4
TABLE 2: CONSUMER PRICE INDICES HEADLINE YEAR-ON-YEAR RATES.....	9
TABLE 3: SUMMARY OF THE UNSCHEDULED CLOSURE COST FOR NOOITGEDACHT TSF	11

LIST OF APPENDICES

APPENDIX A.....	CONCEPTUAL ENGINEERING DRAWINGS
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1. INTRODUCTION

1.1. Background

MineLock Environmental Engineers (MineLock) was commissioned by Environmental Impact Management Services (EIMS) to develop an premature DME closure quantum as part of the Basic Assessment, for the newly designed Nooitgedacht tailings storage facility (TSF) at the Harmony Gold Mining Company Limited (Harmony), to the south of to the dormant Free State North 1 (FSN) and the proposed new Valley TSF.

Harmony Gold presently requires a total of 1.2 billion tonnes of storage capacity from TSF's in the Welkom area, thus the Nooitgedacht TSF design was prompted. As can be seen from the Google Earth image in Figure 1 below, an area to the south has been identified as possible deposition site.



Figure 1: Google Earth image of the position of the proposed Nooitgedacht TSF

For premature closure, only relevant activities within a year from the first day of disturbance of the Nooitgedacht TSF was considered. According to the schedule provided by EIMS (see Appendix A), the construction of the Nooitgedacht TSF is planned to take 1182 working days, starting on 03 November 2025 and ending on 14 May 2030, thus earthworks, bottom liner system and supporting infrastructure are to be demolished during year one of the premature closure.



The following items were considered for the Year 1 premature closure quantum of the Nooitgedacht TSF:

- South-West Wall:
 - Removal of partially installed (87%) bottom barrier system;
 - Removal of underdrainage system;
 - Demolition of partially completed (67%) embankments (cyclone, starter and paddock walls, including all areas prepared in-between);
- North-East Wall:
 - Demolition of completed embankments (cyclone, starter and paddock walls, including all areas prepared in-between); and
- Decommissioning of Return water dam and supporting infrastructure.

The embankments and bottom liner system designs as designed and provided by Geotheta, Appendix A, was incorporated into the premature closure quantum.

Due to the new Nooitgedacht tailings storage facility being planned to be constructed partially on top of the old decommissioned TSF, the following items were not allowed for in the closure quantum as it has already been accounted for in Harmony's yearly Closure Cost Assessment (Digby Wells Environmental, 2023):

- Rehabilitation of old decommissioned TSF footprint;
- Dismantling of any existing infrastructure and roads; and
- Ground and surface water monitoring of footprint.

No allowance was made for Post closure monitoring and aftercare as part of the premature closure quantum as no tailings material has been deposited during this first year period. Allowance for future deposition should form part of Harmony Gold's upcoming annual update.

2. MINE OVERVIEW

Harmony is a gold mine located approximately 8km north-west of Welkom in the Free State. Table 1 presents the infrastructure and features associated with the Nooitgedacht TSF.

Table 1: Activities as per DMR Guidelines

Component	Description	Applicable
1	Dismantling of processing plant and related structures (incl. overland conveyors and Power lines)	N/A*
2 (A)	Demolition of steel buildings and structures	N/A*
2 (B)	Demolition of reinforced concrete buildings and structures	Spillway and silt trap infrastructure as part of Return water dam
3	Rehabilitation of access roads	N/A*
4 (A)	Demolition and rehabilitation of electrified railway lines	N/A*
4 (B)	Demolition and rehabilitation of non-electrified railway lines	N/A*
5	Demolition of housing and/or administration facilities	N/A*
6	Opencast rehabilitation including final voids and ramps	N/A*



Component	Description	Applicable
7	Sealing of shafts, adits and inclines	N/A*
8 (A)	Rehabilitation of overburden and spoils	N/A*
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt producing waste)	N/A*
8 (C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	N/A*
9	Rehabilitation of subsided areas	N/A*
10	General surface rehabilitation	Nooitgedacht Tailings Storage Facility and Return water dam assumed to be empty at this stage and no deposition has taken place
11	River diversions	N/A*
12	Fencing	N/A**
13	Water management	N/A*
14	2 to 3 years of maintenance and aftercare	NA*

*assume that existing infrastructure is quantified in Harmony’s yearly costing

**no fence is to be constructed around the TSF

3. CLOSURE COST ASSESSMENT

This section presents the basis of the calculation of the quantum for financial provisions for closure. The assessment and calculations are based on the 2005 DMR ‘Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision’ provided by a Mine (Department of Mineral Resources, 2005).

3.1 Input parameters for quantum provision

No	Input data
1	Risk ranking for mine type and mineral by-product
2	Environmental sensitivity of the mining area
3	Level of information available
4	Type of mining operation
5	Geographical location of the mine
6	Closure components & Areas of disturbance (Components Map)

3.2 Primary Risk Class for type of minerals mined

Mineral	Ore	Size: Larger if > than (tpm)	Primary risk class			
			Large Mine		Small Mine	
			Mine and mine waste	Mine, mine waste, plant and plant waste	Mine and mine waste	Mine, mine waste, plant and plant waste
Gold		10 000	B	A	B	A



3.3 Risk Class

Determine risk class	
Class A	a high probability of the occurrence of the impact with a severe consequence,
Class B	a moderate probability of occurrence of the impact with a manageable consequence,
Class C	a low probability of occurrence of the impact with a negligible consequence.

3.4 Area Sensitivity

Sensitivity	Area sensitivity		
	Biophysical	Sensitivity criteria Social	Economic
Low	<ul style="list-style-type: none"> • Largely disturbed from natural state. • Limited natural fauna and flora remains. • Exotic plant species evident. • Unplanned development. • Water resources disturbed and impaired. 	<ul style="list-style-type: none"> • The local communities are not within sighting distance of the mining operation. • Lightly inhabited area (rural). 	<ul style="list-style-type: none"> • The area is insensitive to development. • The area is not a major source of income to the local communities.
Medium	<ul style="list-style-type: none"> • Mix of natural and exotic fauna and flora. • Development is a mix of disturbed and undisturbed areas, within an overall planned framework. • Water resources are well controlled. 	<ul style="list-style-type: none"> • The local communities are in the proximity of the mining operation (within sighting distance). • Peri-urban area with density aligned with a development framework. • Area developed with an established 	<ul style="list-style-type: none"> • The area has a balanced economic development where a degree of income for the local communities is derived from the area. • The economic activity could be influenced by indiscriminate development.
High	<ul style="list-style-type: none"> • Largely in natural state. • Vibrant fauna and flora, with species diversity and abundance matching the nature of the area. • Well planned development. • Area forms part of an overall ecological regime of conservation value. • Water resources emulate their original state. 	<ul style="list-style-type: none"> • The local communities are in close proximity of the mining operation (on the boundary of the mine). • Densely inhabited area (urban/dense settlements). • Developed and well-established communities. 	<ul style="list-style-type: none"> • The local communities derive the bulk of their income directly from the area. • The area is sensitive to development that could compromise the existing economic activity.



3.5 Closure components

Component No.	Main description	Applicable closure components for mine type		
		Open-cast	Under ground	Combination
1	Dismantling of processing plant and related structures (including overland conveyors and power lines)	No	No	No
2(A)	Demolition of steel buildings and structures	No	No	No
2(B)	Demolition of reinforced concrete buildings and structures	No	No	Yes
3	Rehabilitation of access roads	No	No	No
4(A)	Demolition and rehabilitation of electrified railway lines	No	No	No
4(B)	Demolition and rehabilitation of non-electrified railway lines	No	No	No
5	Demolition of housing and facilities	No	No	No
6	Opencast rehabilitation including final voids and ramps	No	No	No
7	Sealing of shafts, adits and inclines	No	No	No
8(A)	Rehabilitation of overburden and spoils	No	No	No
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	No	No	No
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	No	No	No
9	Rehabilitation of subsided areas	No	No	No
10	General surface rehabilitation, including grassing of all denuded areas	No	No	Yes



Component No.	Main description	Applicable closure components for mine type		
		Open-cast	Under ground	Combination
11	River diversions	No	No	No
12	Fencing	No	No	No
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required)	No	No	No
14	2 to 3 years of maintenance and aftercare	No	No	No

3.6 Unit rates for closure components

The components in the DMR guideline that has multiplication factors different than 1 are listed below. It is, however, not necessarily applicable to the costing of this site.

Component 6 - Opencast Rehabilitation:

COMPONENT 6					OPENCAST REHABILITATION			
		UNIT			MASTER RATE			
		<i>ha</i>			R 213 206.21			
		Multiplication factor						
Risk Class (A, B or C)	A	0.04	0.52	1.00				
	B	0.04	0.52	1.00				
	C	0.04	0.52	1.00				
		Low	Medium	High				
		Environmental Sensitivity						

Component 8 (c) - Processing water deposits & Evaporation ponds:

COMPONENT 8 (C)					PROCESSING WATER DEPOSITS & EVAPORATION PONDS			
		UNIT			MASTER RATE			
		<i>ha</i>			R 529 598.05			
		Multiplication factor						
Risk Class (A, B or C)	A	0.59	0.80	1.00				
	B	0.55	0.76	0.90				
	C	0.51	0.66	0.81				
		Low	Medium	High				
		Environmental Sensitivity						



Component 13 – Water Management:

COMPONENT 13		WATER MANAGEMENT		
		UNIT		MASTER RATE
		ha		R 44 096.42
		Multiplication factor		
Risk Class (A, B or C)	A	0.60	0.67	1.00
	B	0.41	0.60	0.67
	C	0.17	0.25	0.33
		Low	Medium	High
		Environmental Sensitivity		

3.7 Weighting Factor 1 and 2

Weighting factor 1 is applied to all closure components:

Nature of the Terrain/Accessibility	Flat	Undulating	Rugged
Weighting Factor 1	1.00	1.10	1.20

Weighting factor 2 is applied to preliminary and general item only:

Proximity to urban area where goods and services are supplied	Urban	Peri-urban	Remote
Weighting Factor 2	1.00	1.05	1.10

3.8 Escalation

In South Africa, the Consumer Price Index or CPI measures changes in the prices paid by consumers for a basket of goods and services and is published Stats SA (Consumer Price Index, Statistical Release P0141).

The master rates were updated (escalated) by multiplying the master rate of the previous year with the new (average) CPI value. The average CPI was published end of July 2024.

Table 2: Consumer price indices headline year-on-year rates

Year	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Average
2023	6.9	7	7.1	6.8	6.3	5.4	4.7	4.8	5.4	5.9	5.5	5.1	5.91
2024	5.3	5.6	5.3	5.2	5.2	5.1	4.6	-	-	-	-	-	5.19

3.9 Closure methods and assumptions

The DMR Guideline presents generally accepted closure methods, based on experience in the field, which have been used as the basis for determining the Master Rates for the various closure components in the “rules-based” approach. Where relevant, specific reference is made to the site conditions and requirements applicable to the closure of the Nooitgedacht TSF. In addition, the relevant mine structures and components requiring closure are listed.



3.9.1 Components 2 (B): Steel and reinforced concrete structures and housing, facilities and services

According to the DMR Guideline, the generally accepted closure methods applicable to this component include:

- All structures should be demolished to 1m below ground level.
- The rubble is to be buried adjacent to the sites, provided this adheres to the National Waste Management Strategy.
- Silos should be imploded and buried.
- The areas should be shaped, top soiled with 300mm of topsoil and vegetated or as stated in the relevant EMP document.
- Monitoring and maintenance are costed in the relevant areas.
- The concrete hardstand is the area between buildings such as workshops, offices, etc.

3.9.2 Component 10: General surface rehabilitation

Final surface rehabilitation of areas disturbed by mining and related activities should be aligned to the selected final land use. The generally accepted closure methods applicable to general surface rehabilitation includes:

- Surface topography that emulates the surrounding areas and aligned to the general landscape character. Steep slopes more than 6 percent should also be avoided if possible.
- Landscaping that would facilitate surface runoff and result in free draining areas. If possible, the drainage lines should be reinstated.
- An area without unnecessary remnants of structures and surface infrastructure to give the rehabilitated area a “neat” appearance. Special attention must be given to shape and/or removal of heaps of excess material being the legacy of prolonged mining and related activity.
- An area suitable for revegetation.

The unit cost for general rehabilitation allows for shaping and landscaping of disturbed areas. The Master Rate for the shaping of material to a depth/thickness of about 500mm. An extra over allowance in the unit cost of 50% has been made to cover the removal and/or destruction of surface infrastructure remnants and/or other undesirable objects such as trees, foundations, concrete slabs, etc.

In this study area it is assumed to include the removal of the liner systems for the TSF only.



3.9.3 Costs

The quantum for financial provisions for un-scheduled closure was estimated using the rule-based approach defined in the DMR Guideline. Refer to Table 3 for a summarised breakdown of the closure cost assessment estimate as of July 2024.

Table 3: Summary of the unscheduled closure cost for Nooitgedacht TSF

CALCULATION OF THE QUANTUM							
MINE: HARMONY GOLD MINING COMPANY LIMITED EVALUATORS: MINELOCK ENVIRONMENTAL ENGINEERS (PTY) LTD						LOCATION: FREE STATE DATE: 2024/08/30	
NO	DESCRIPTION	UNIT	A QUANTITY	B MASTER RATE JULY 2024	C MULTIPLICATION FACTOR	D WEIGHTING FACTOR	AMOUNT RAND JULY 2024
1	Dismantling of processing plant and related structures (Including overland conveyors and power lines)	m ³	-	R 19.43	1.00	1.00	R 0.00
2(A)	Demolition of steel buildings and structures	m ²	-	R 270.66	1.00	1.00	R 0.00
2(B)	Demolition of reinforced concrete buildings and structures	m ²	2 163.02	R 398.86	1.00	1.00	R 862 738.10
3	Rehabilitation of access roads Including all haul roads	m ²	-	R 48.44	1.00	1.00	R 0.00
4(A)	Demolition and rehabilitation of electrified railway lines	m	-	R 470.09	1.00	1.00	R 0.00
4(B)	Demolition and rehabilitation of non-electrified railway lines	m ²	-	R 256.41	1.00	1.00	R 0.00
5	Demolition of housing and/or administration facilities	m ²	-	R 541.32	1.00	1.00	R 0.00
6	Opencast rehabilitation including final voids and ramps	ha	-	R 275 499.10	0.52	1.00	R 0.00
7	Sealing of shafts, adits and inclines	m ³	-	R 145.30	1.00	1.00	R 0.00
8(A)	Rehabilitation of overburden and spoils	ha	-	R 189 174.14	1.00	1.00	R 0.00



CALCULATION OF THE QUANTUM

MINE: HARMONY GOLD MINING COMPANY LIMITED

LOCATION: FREE STATE

EVALUATORS: MINELOCK ENVIRONMENTAL ENGINEERS (PTY) LTD

DATE: 2024/08/30

NO	DESCRIPTION	UNIT	A QUANTITY	B MASTER RATE JULY 2024	C MULTIPLICATION FACTOR	D WEIGHTING FACTOR	AMOUNT RAND JULY 2024
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	-	R 235 612.97	1.00	1.00	R 0.00
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	-	R 684 331.77	0.80	1.00	R 0.00
9	Rehabilitation of subsided areas	ha	-	R 158 404.86	1.00	1.00	R 0.00
10	General surface rehabilitation	ha	85.63	R 149 857.83	1.00	1.00	R 12 831 983.19
11	River diversions	ha	-	R 149 857.83	1.00	1.00	R 0.00
12	Fencing	m	-	R 170.94	1.00	1.00	R 0.00
13	Water management	ha	-	R 56 980.16	0.67	1.00	R 0.00
14	Maintenance and aftercare	ha	-	R 19 943.06	1.00	1.00	R 0.00
15(A)	Specialist study	Sum	-	R 0.00	1.00	1.00	R 0.00
15(B)	Specialist study	Sum	-	R 0.00	1.00	1.00	R 0.00
Sub Total 1							R 13 694 721.29
Weighting factor 2 (1)							R 13 694 721.29
1	Preliminary and general	12 % of Sub Total 1					R 1 643 366.56
Sub Total 2							R 15 338 087.85
7	Contingencies	10 % of Sub Total 1					R 1 369 472.13
Grand Total 3 (Excluding VAT)							R 16 707 559.98



4. CONCLUSION

The financial provision for premature rehabilitation and closure for Nooitgedacht TSF for Harmony is documented in this Report. All information was provided by EIMS and Harmony. No site visits were conducted and in those cases where information was not available, estimates / assumptions were made based on experience.

The Master Rates was escalated with an average CPI published until end July 2024.

Notwithstanding the above, the premature closure quantum documented in this Report reflects the costs for premature closure costs provision in July 2024 aligned with the Harmony current approved EMPR.

5. RECOMMENDATIONS

Aspects that require further attention have been identified. These aspects may improve the accuracy of futures closure cost estimates.

- To ensure that the financial provision is up-to-date and in accordance to the NEMA requirements, annual revision of closure costing is recommended. This will also assist in accommodating changes in the closure costing due to any facilities that was constructed or demolished as well as any changes in the closure approach;

6. REFERENCES

Department of Mineral Resources. (2005). *Guideline Document for The Evaluatuon of The Quantum of Closure-Related Financial Provision Provided by a Mine.*

Department: Statistics South Africa. (2024, July). Statistical Release P0141. *Consumer Price Index July 2024.*

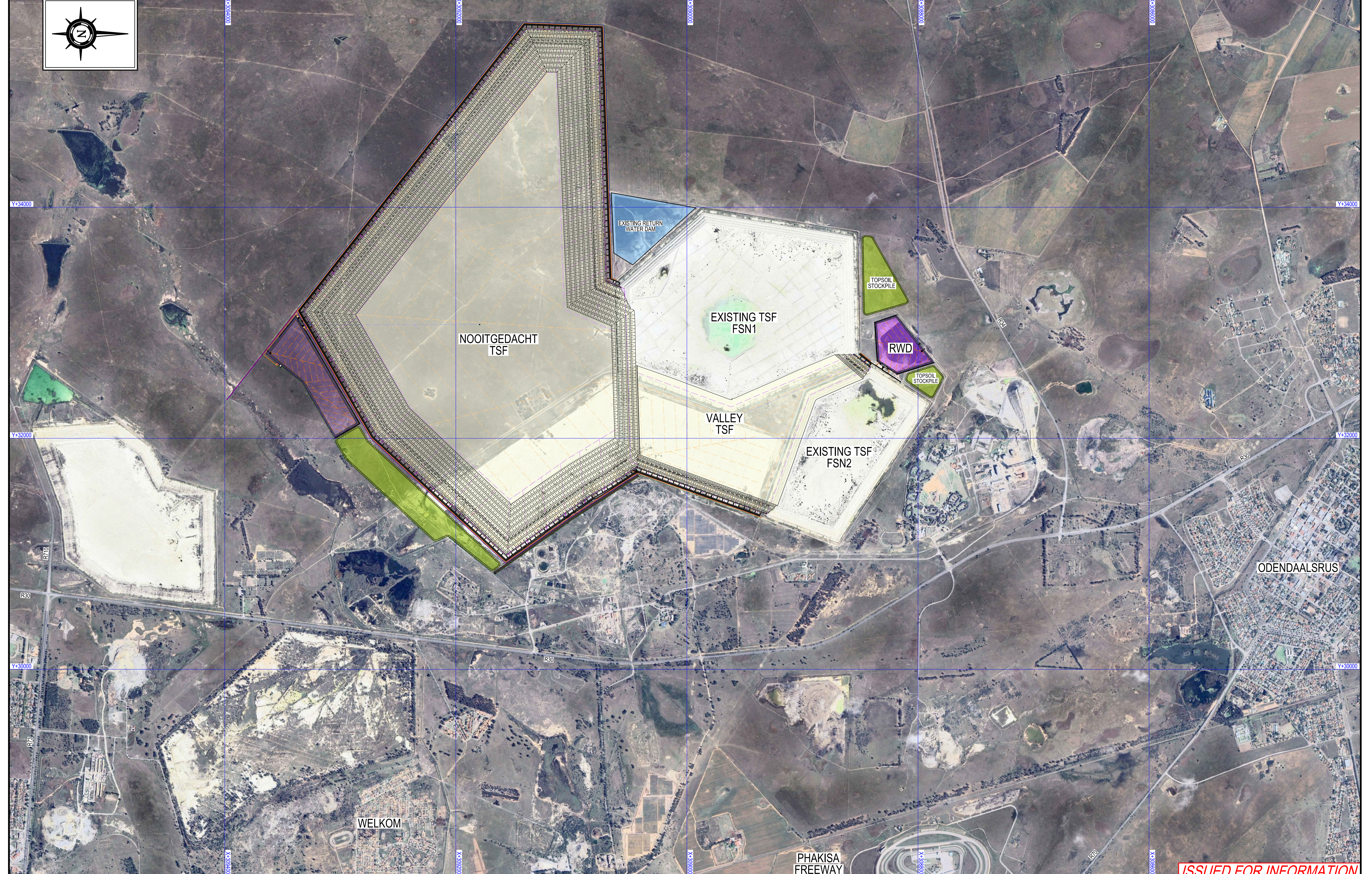
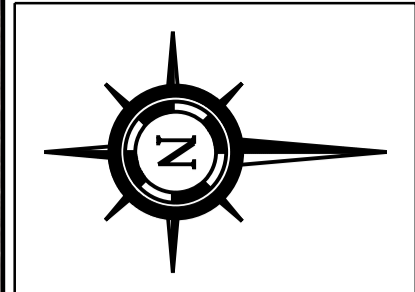
Environmental Impact Management Services. (2023). *Environmental Management Programme. Proposed Harmony Nooitgedacht Tailings Storage Facility Project.*



APPENDIX A

Geotheta drawings and schedule





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REVISIONS		REFERENCE DRAWINGS		REFERENCE DRAWINGS		
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			003	FINAL HEIGHT GENERAL ARRANGEMENT		

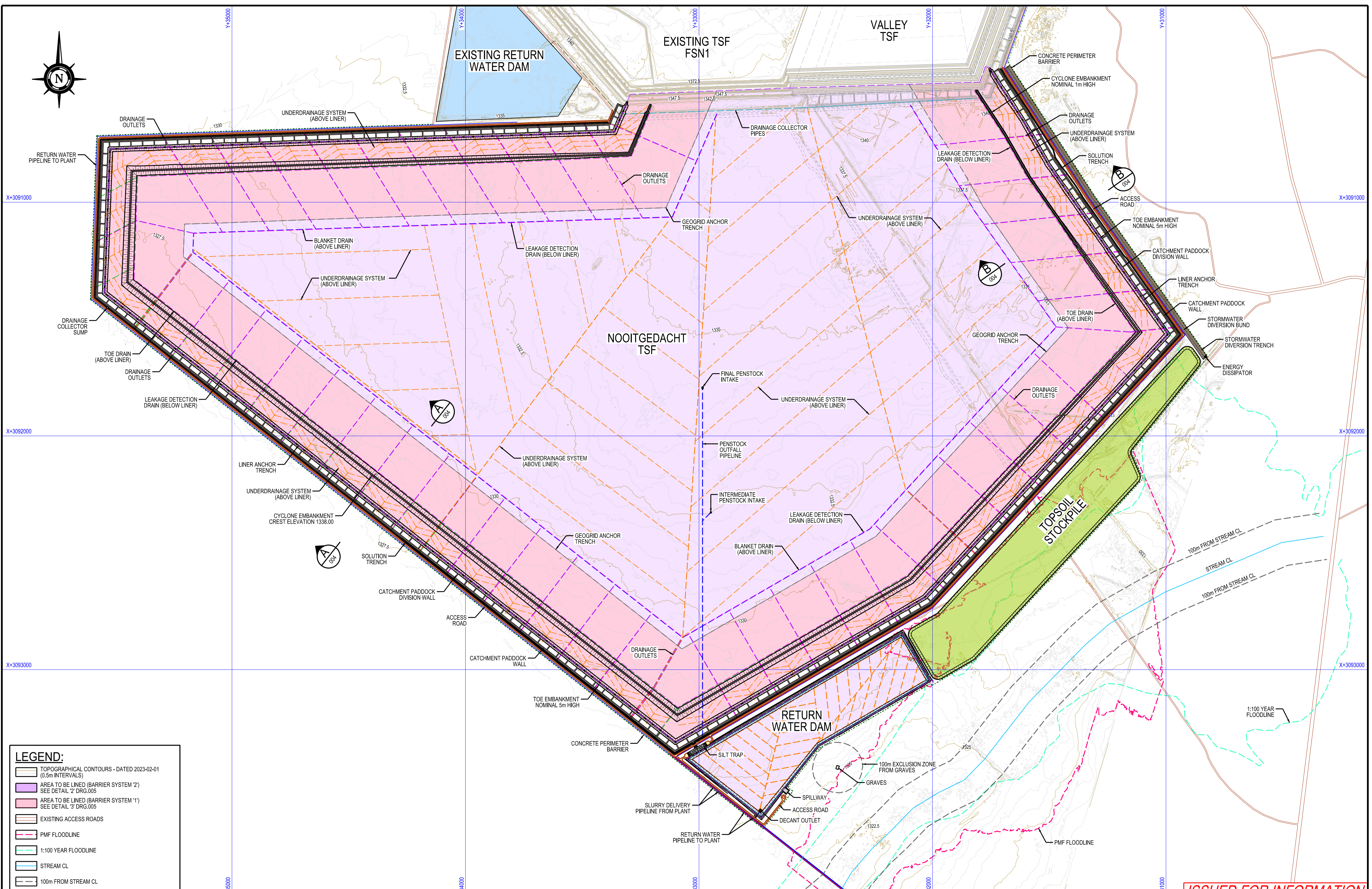
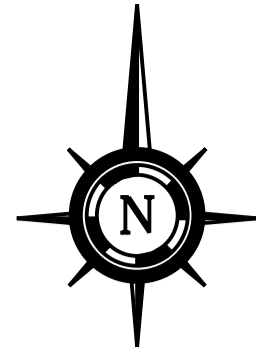
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CLIENT		TITLE	
HARMONY		HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) OVERALL SITE LAYOUT	
DRG No.	2401265-001	REV.	A

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LEGEND:

- TOPOGRAPHICAL CONTOURS - DATED 2023-02-01 (0.5m INTERVALS)
- AREA TO BE LINED (BARRIER SYSTEM '2') SEE DETAIL '2' DRG.005
- AREA TO BE LINED (BARRIER SYSTEM '1') SEE DETAIL '3' DRG.005
- EXISTING ACCESS ROADS
- PMF FLOODLINE
- 1:100 YEAR FLOODLINE
- STREAM CL
- 100m FROM STREAM CL

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			004	EARTHWORKS SECTIONS	011	SOLUTION OUTFALL TRENCH PLAN, SECTIONS & DTLS
			005	EARTHWORKS SECTIONS & DETAILS	101	RWD SILT TRAP PLAN, SECTIONS & DETAILS
			006 SHT.1 & 2	DRAINAGE SECTIONS & DETAILS	104	RETURN WATER DAM GENERAL ARRANGEMENT
			007	DRAINAGE COLLECTOR PIPES SECTIONS & DETAILS		
			008	SOLUTION TRENCH SECTIONS & DETAILS		
			009 SHT.1	FINAL PENSTOCK INTAKE SECTIONS & DETAILS		
			009 SHT.2	INTERMEDIATE PENSTOCK INTAKE SECTIONS & DTLS		

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			008	SOLUTION TRENCH SECTIONS & DETAILS		
			009 SHT.1	FINAL PENSTOCK INTAKE SECTIONS & DETAILS		
			009 SHT.2	INTERMEDIATE PENSTOCK INTAKE SECTIONS & DTLS		

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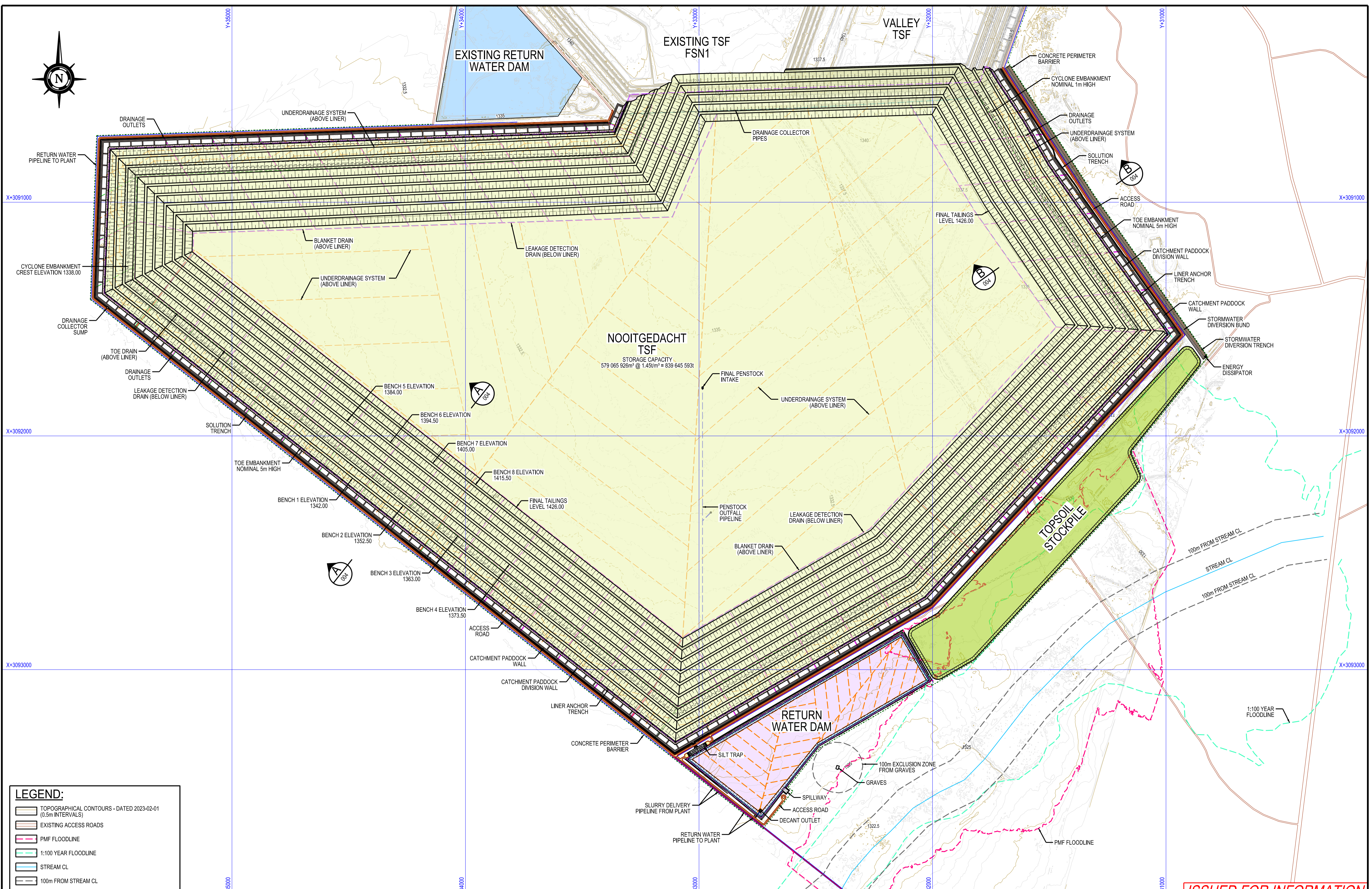
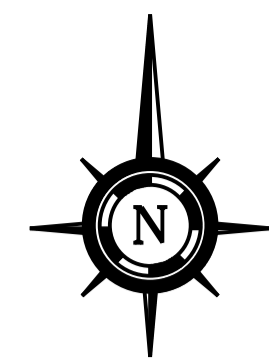
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		2024-06-20	
CHECKED		DATE	
	S.M.	2024-06-28	
DESIGNED		DATE	
	S.M.I.H.	2024-06-17	

CLIENT		TITLE	
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			004	EARTHWORKS SECTIONS	011	SOLUTION OUTFALL TRENCH PLAN, SECTIONS & DTLS
			005	EARTHWORKS SECTIONS & DETAILS	101	RWD SILT TRAP PLAN, SECTIONS & DETAILS
			006 SHT.1 & 2	DRAINAGE SECTIONS & DETAILS	104	RETURN WATER DAM GENERAL ARRANGEMENT
			007	DRAINAGE COLLECTOR PIPES SECTIONS & DETAILS		
			008	SOLUTION TRENCH SECTIONS & DETAILS		
			009 SHT.1	FINAL PENSTOCK INTAKE SECTIONS & DETAILS		
			009 SHT.2	INTERMEDIATE PENSTOCK INTAKE SECTIONS & DTLS		

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			004	EARTHWORKS SECTIONS	011	SOLUTION OUTFALL TRENCH PLAN, SECTIONS & DTLS
			005	EARTHWORKS SECTIONS & DETAILS	101	RWD SILT TRAP PLAN, SECTIONS & DETAILS
			006 SHT.1 & 2	DRAINAGE SECTIONS & DETAILS	104	RETURN WATER DAM GENERAL ARRANGEMENT
			007	DRAINAGE COLLECTOR PIPES SECTIONS & DETAILS		
			008	SOLUTION TRENCH SECTIONS & DETAILS		
			009 SHT.1	FINAL PENSTOCK INTAKE SECTIONS & DETAILS		
			009 SHT.2	INTERMEDIATE PENSTOCK INTAKE SECTIONS & DTLS		

APPROVED BY				CO-ORD SYSTEM		SCALE	
NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE	CO-ORD SYSTEM	SCALE		
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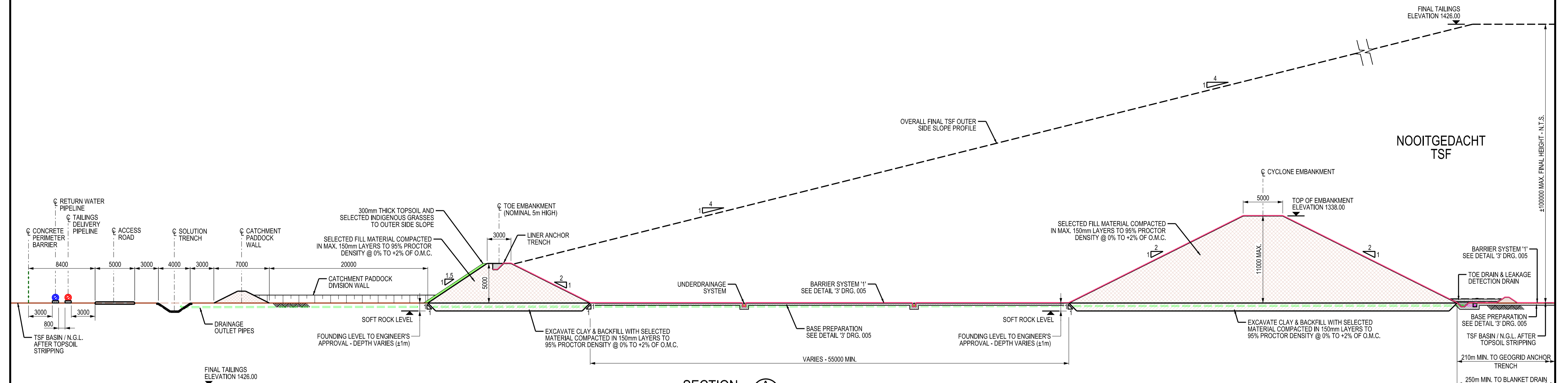
GEOTHETA CONSULTING ENGINEERS AND SCIENTISTS

Ground Floor, Twickenham Building, The Campus,
Cnr Skane & Main, Bryanston, 2021
Republic of South Africa
Phone : +27 11 575 3002
E-mail : hello@geotheta.com

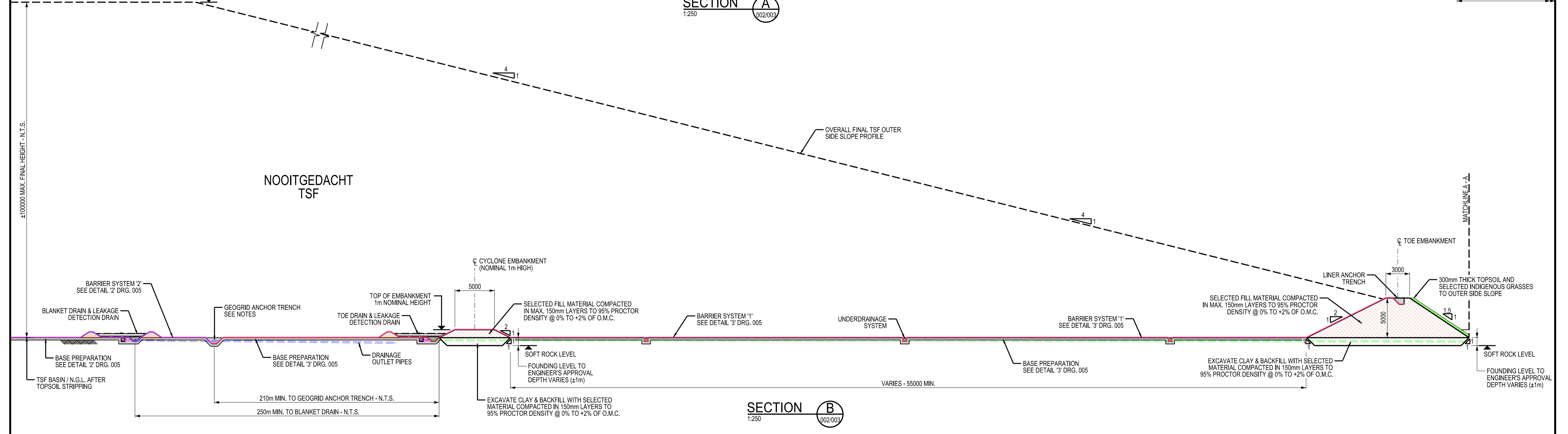
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DATE	2024-06-20	CHECKED	S.M.
DATE	2024-06-28	DESIGNED	S.M./I.H.
DATE	2024-06-17		

CLIENT		TITLE	
HARMONY		HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) FINAL HEIGHT GENERAL ARRANGEMENT	
DRG No.	2401265-003	REV.	A

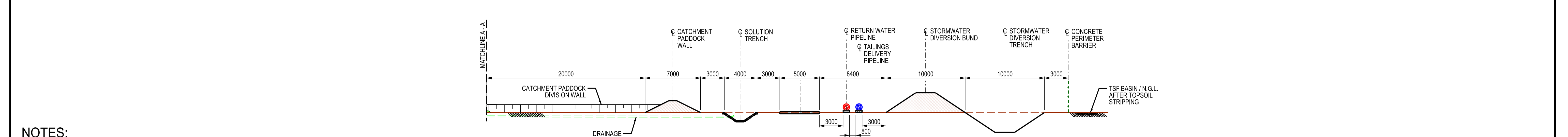
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SECTION A
1:250
002/003



SECTION B
1:250
002/003



SECTION B CONTINUED
1:250
502/503

- NOTES:**
- GEOGRID TO TERMINATE AT ANCHOR TRENCH (±210m FROM CYCLONE EMBANKMENT INNER TOE)
 - BARRIER SYSTEM '1' AS PER DETAIL '3' TO TERMINATE AT GEOGRID ANCHOR TRENCH. THEREAFTER BARRIER SYSTEM '2' AS PER DETAIL '2' STARTS & COVERS ENTIRE TSF BASIN FOOTPRINT.

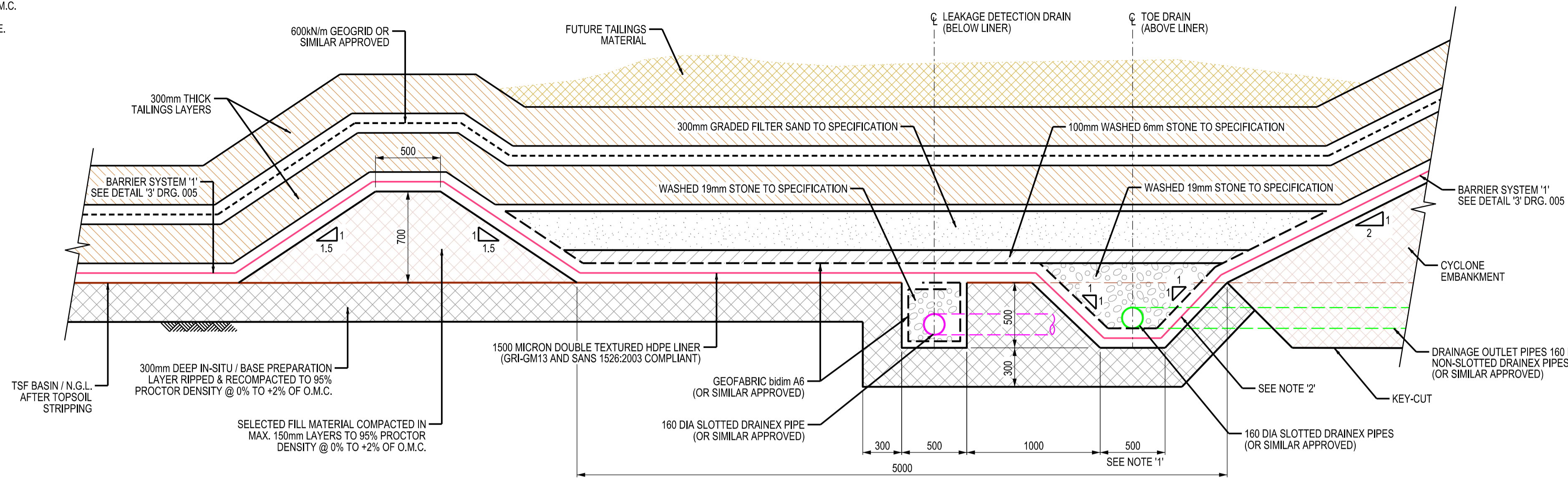
ISSUED FOR INFORMATION

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A	2024-06-20	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT
B	2024-07-19	003	FINAL HEIGHT GENERAL ARRANGEMENT
		004	EARTHWORKS SECTIONS
		005	EARTHWORKS SECTIONS & DETAILS
		006 SHT. 1 & 2	DRAINAGE SECTIONS & DETAILS
		007	DRAINAGE COLLECTOR PIPES SECTIONS & DETAILS
		008	SOLUTION TRENCH SECTIONS & DETAILS

<p>GEOTHETA CONSULTING ENGINEERS AND SCIENTISTS</p> <p>Ground Floor, Twickenham Building, The Campus, Cnr Skane & Main, Bryanston, 2021 Republic of South Africa Phone : +27 11 575 3002 E-mail : hello@geotheta.com</p>				<p>DRAWN: 2024-06-20</p> <p>CHECKED: S.M.</p> <p>DATE: 2024-06-28</p> <p>DESIGNED: S.M.I.H.</p> <p>DATE: 2024-06-17</p>	<p>CLIENT: HARMONY</p> <p>TITLE: HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) EARTHWORKS SECTIONS</p> <p>DRG No. 2401265-004</p> <p>REV. B</p>																
<p>APPROVED BY:</p> <table border="1"> <tr> <th>NAME</th> <th>QUALIFICATION & REG. No.</th> <th>SIGNATURE</th> <th>DATE</th> </tr> <tr> <td>GERRIT J. VAN RYSSSEN</td> <td>PR.ENG 202302750</td> <td></td> <td>22.07.24</td> </tr> </table>				NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE	GERRIT J. VAN RYSSSEN	PR.ENG 202302750		22.07.24	<p>CO-ORD SYSTEM: AS SHOWN</p> <p>SCALE: A1 AS SHOWN, A3 AS SHOWN X2</p>	<p>APPROVED BY:</p> <table border="1"> <tr> <th>NAME</th> <th>QUALIFICATION & REG. No.</th> <th>SIGNATURE</th> <th>DATE</th> </tr> <tr> <td>GERRIT J. VAN RYSSSEN</td> <td>PR.ENG 202302750</td> <td></td> <td>22.07.24</td> </tr> </table>	NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE	GERRIT J. VAN RYSSSEN	PR.ENG 202302750		22.07.24
NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE																		
GERRIT J. VAN RYSSSEN	PR.ENG 202302750		22.07.24																		
NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE																		
GERRIT J. VAN RYSSSEN	PR.ENG 202302750		22.07.24																		
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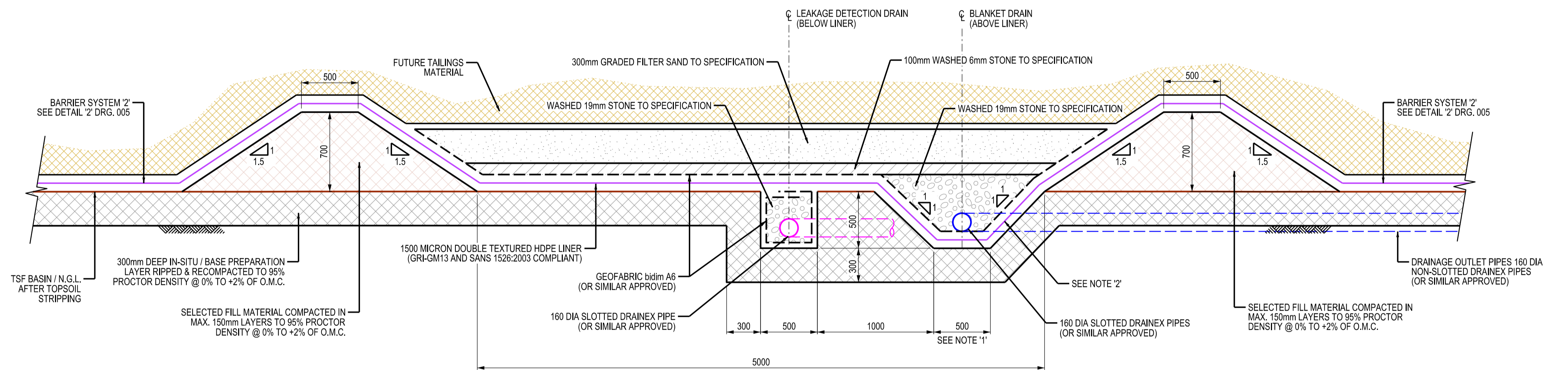
NOTES:

1. RIP & RECOMPACT BASE OF TRENCHES 150mm DEEP TO 95% PROCTOR DENSITY @ 0% TO +2% OF O.M.C.
2. HDPE PIPE BOOT TO TOE DRAIN AT OUTLET PIPE. (SEE DETAIL '1').



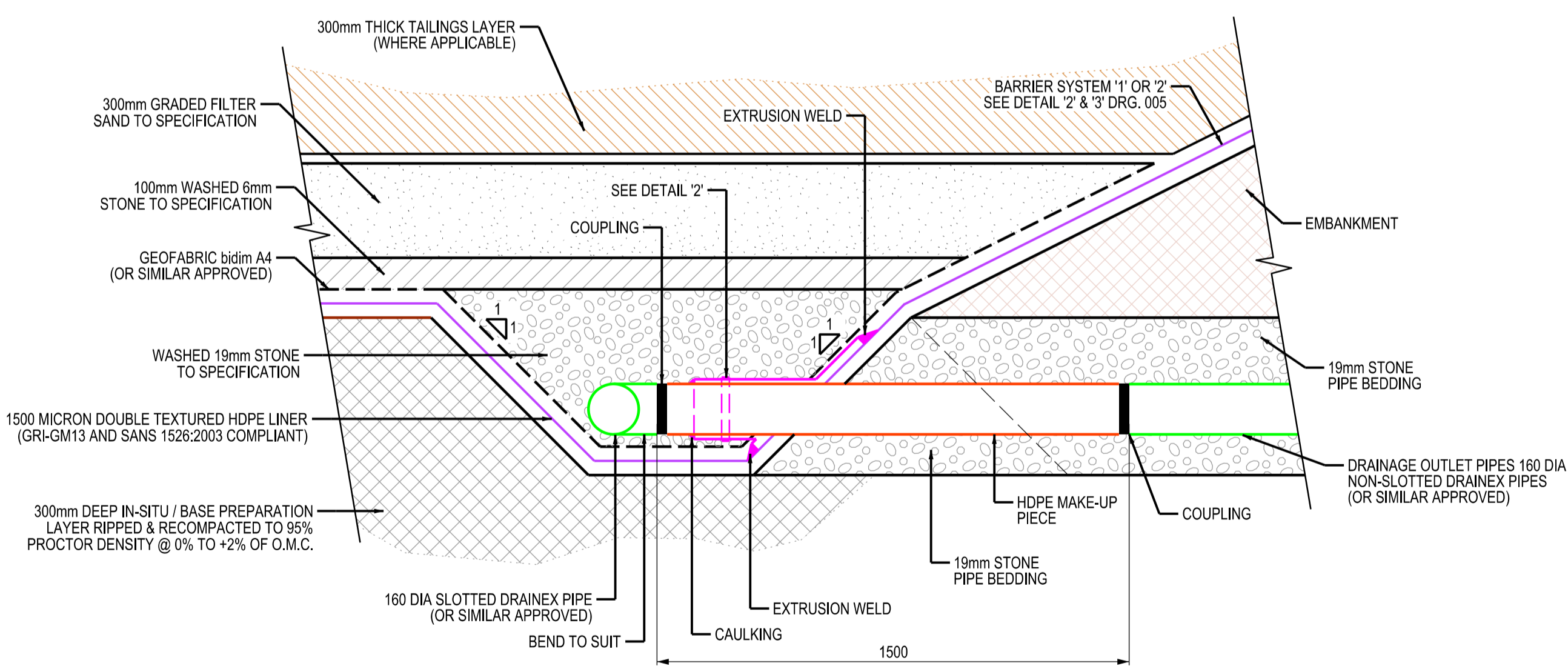
TYPICAL SECTION - TOE DRAIN & LEAKAGE DETECTION DRAIN

SCALE 1:25



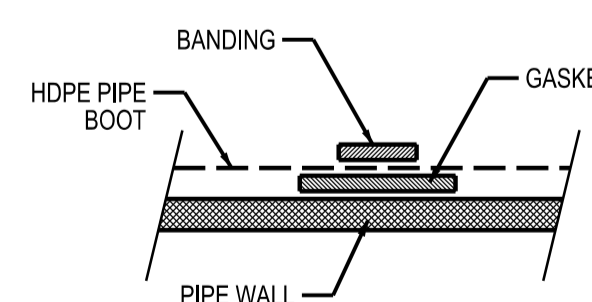
TYPICAL SECTION - BLANKET DRAIN & LEAKAGE DETECTION DRAIN

SCALE 1:25



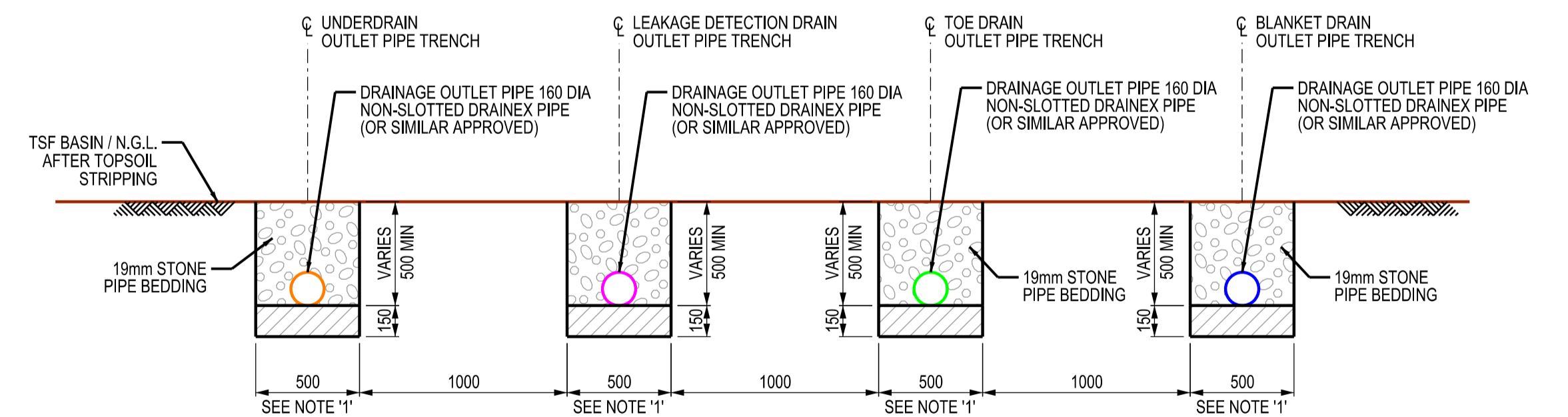
DETAIL '1' - TYPICAL SECTION HDPE PIPE BOOT

SCALE 1:15



DETAIL '2'

N.T.S.



TYPICAL SECTION - DRAINAGE OUTLET PIPES

SCALE 1:25

ISSUED FOR INFORMATION

REVISIONS		REFERENCE DRAWINGS		REFERENCE DRAWINGS	
REV	DATE	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
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B	2024-07-19	003	FINAL HEIGHT GENERAL ARRANGEMENT		
		005	EARTHWORKS SECTIONS & DETAILS		
		006 SHT.2	DRAINAGE SECTIONS & DETAILS		
		008	DRAINAGE COLLECTOR PIPES SECTIONS & DETAILS		

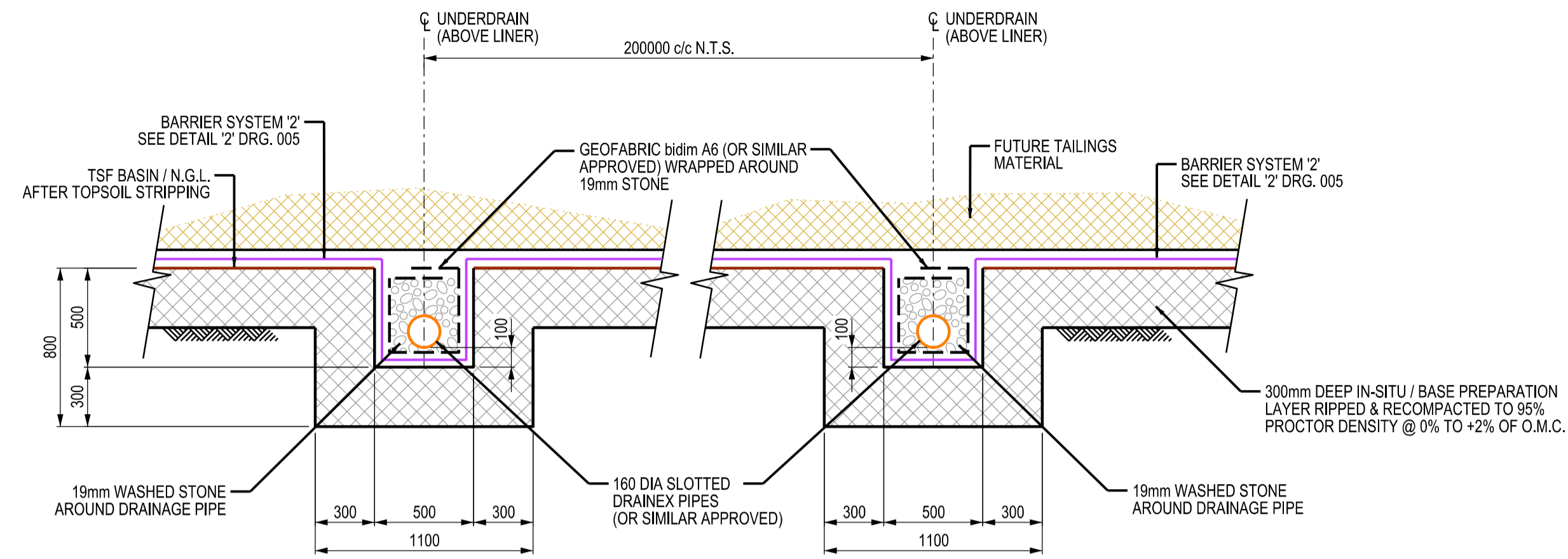
<p>GEOTHETA CONSULTING ENGINEERS AND SCIENTISTS</p> <p>Ground Floor, Twickenham Building, The Campus, Cnr Skane & Main, Bryanston, 2021 Republic of South Africa Phone : +27 11 575 3002 E-mail : hello@geotheta.com</p>				<p>APPROVED BY</p> <p>NAME: GERRIT J VAN RYSSSEN QUALIFICATION & REG. No.: PR.ENG SIGNATURE: [Signature] DATE: 22.07.24</p>	<p>CO-ORD SYSTEM</p> <p>SCALE</p> <p>A1 AS SHOWN A3 AS SHOWN X2</p>
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<p>DRAWN</p> <p>DATE</p> <p>CHECKED</p> <p>DATE</p> <p>DESIGNED</p> <p>DATE</p>	<p>2024-06-20</p> <p>S.M.</p> <p>2024-06-28</p> <p>S.M.I.H.</p> <p>2024-06-17</p>
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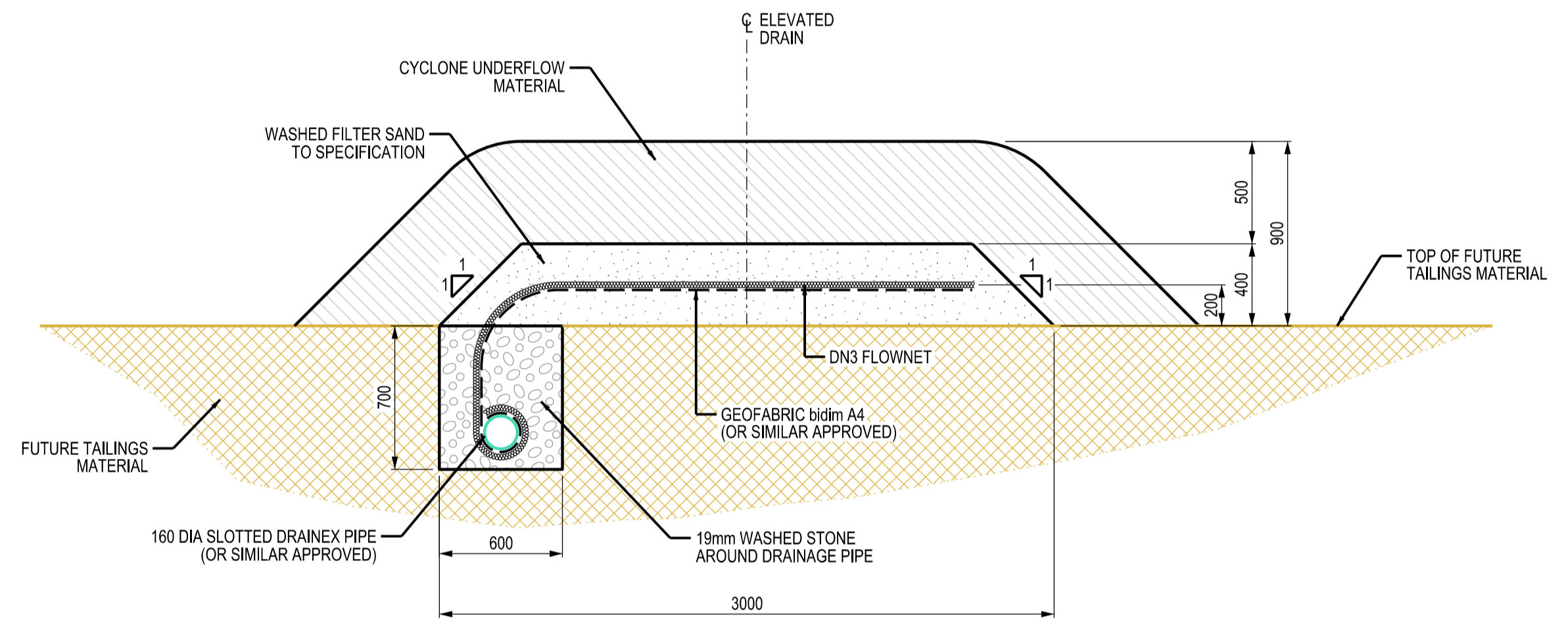
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<p>REV.</p> <p>B</p>

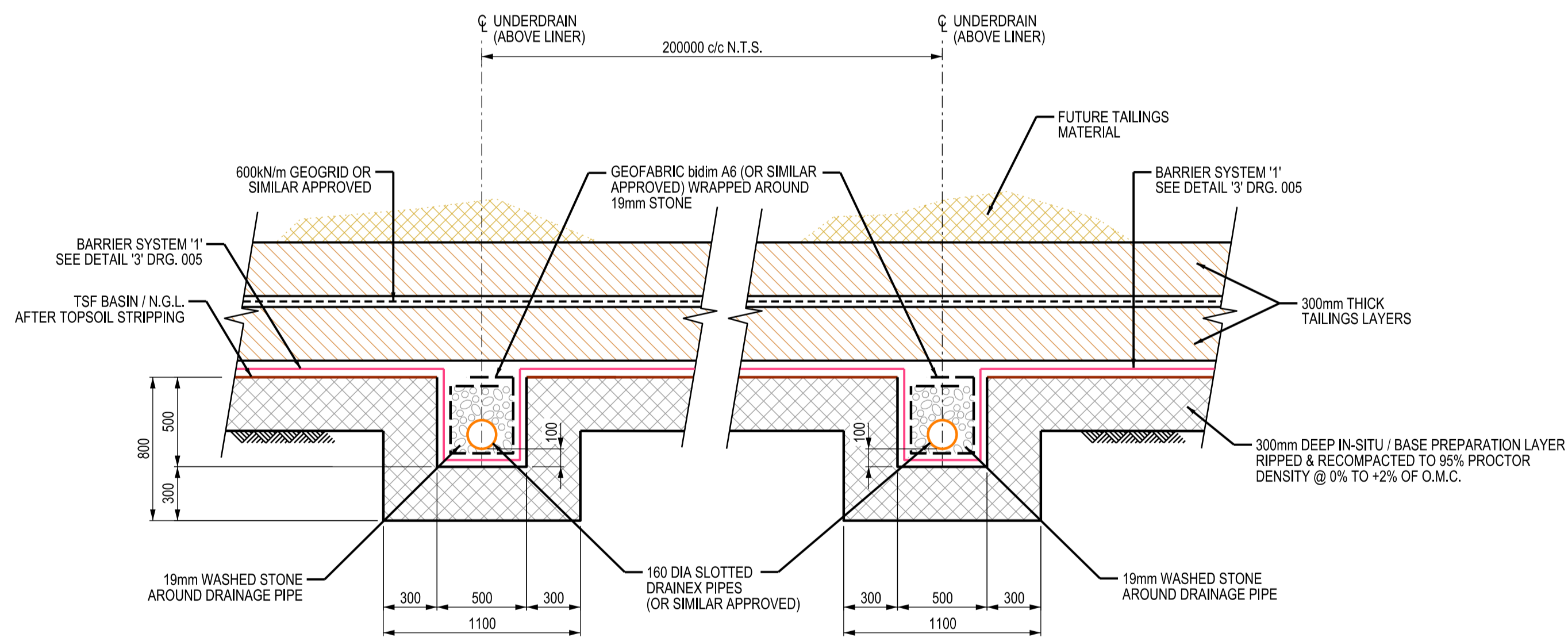
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**TYPICAL SECTION - UNDERDRAINAGE SYSTEM (ABOVE LINER)
(CENTRAL BASIN AREA)**
SCALE 1:25



**TYPICAL SECTION - ELEVATED DRAIN
(FUTURE TSF)**
SCALE 1:25



**TYPICAL SECTION - UNDERDRAINAGE SYSTEM (ABOVE LINER)
(BASIN AREA BETWEEN OUTER EMBANKMENTS)**
SCALE 1:25

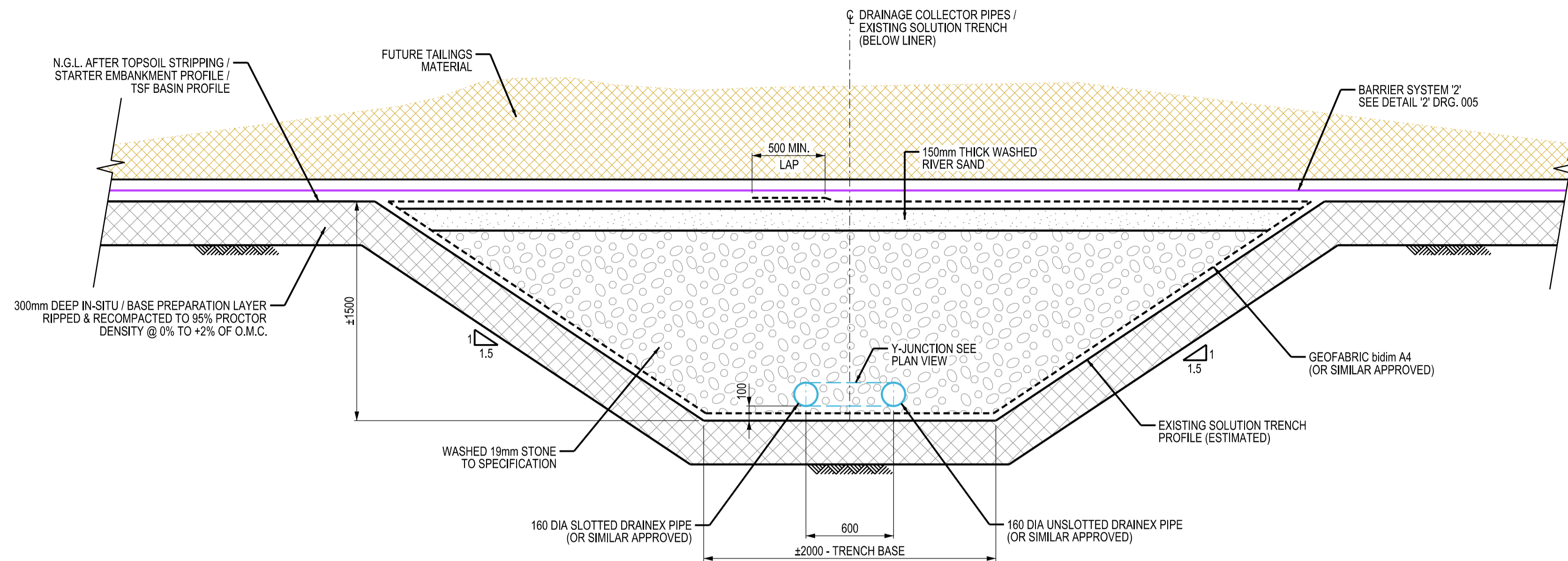
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B	2024-07-19	BASE PREPARATION LAYER & GEOGRID DETAIL REVISED	003	FINAL HEIGHT GENERAL ARRANGEMENT		
			005	EARTHWORKS SECTIONS & DETAILS		
			006 SHT.1	DRAINAGE SECTIONS & DETAILS		
			008	DRAINAGE COLLECTOR PIPES SECTIONS & DETAILS		

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APPROVED BY			
NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE
GERRIT J. VAN RYSSSEN	PR.ENG 202302750		22.07.24

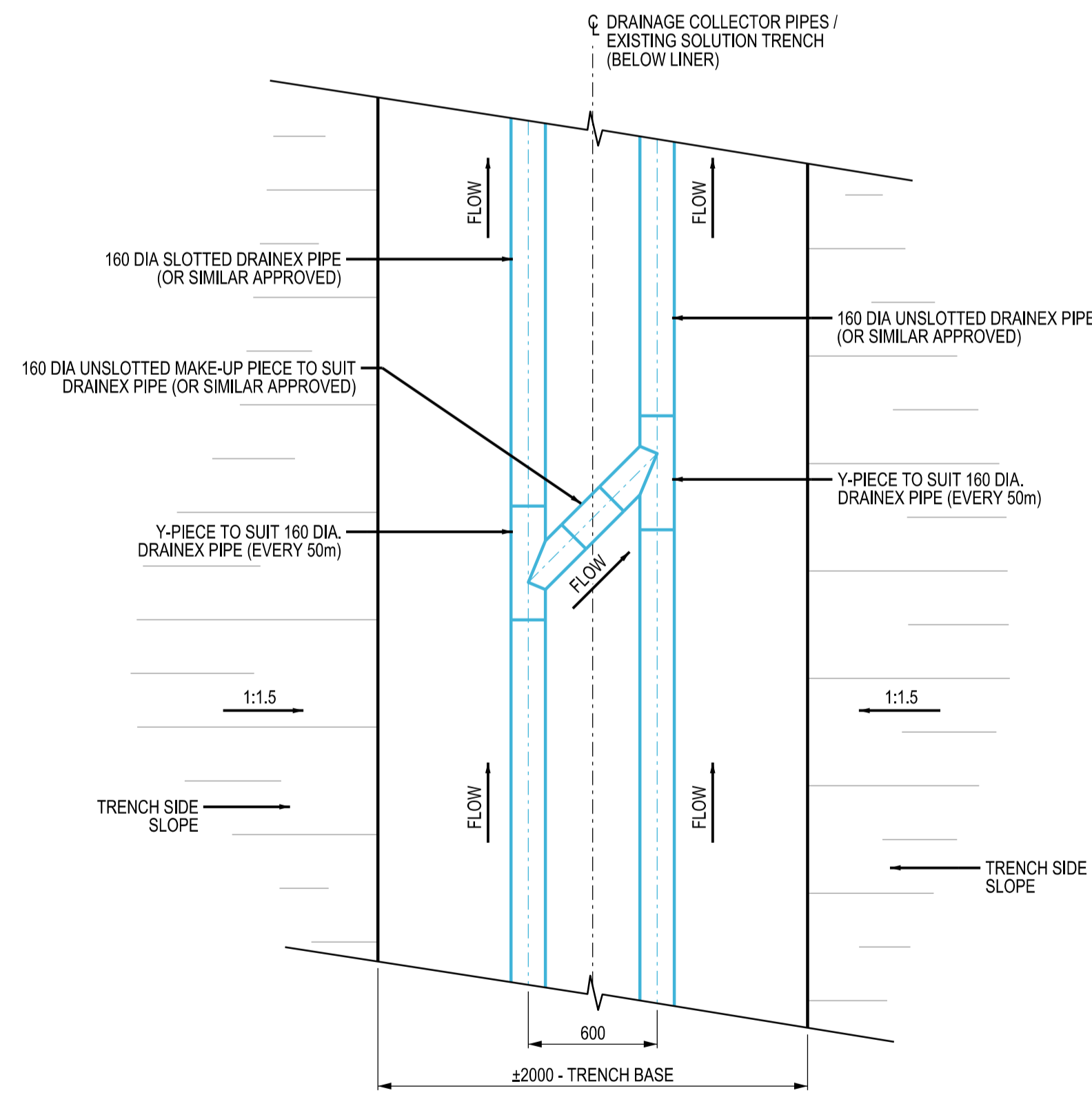
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CHECKED	S.M.		RE-DESIGN (CYCLONED)
DATE	2024-06-28		DRAINAGE
DESIGNED	S.M.I.H.		SECTIONS & DETAILS
DATE	2024-06-17	DRG No.	2401265-006 SHT. 2
CO-ORD SYSTEM	SCALE	REV.	B
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	A3 AS SHOWN X2		

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**TYPICAL SECTION - DRAINAGE COLLECTOR PIPES
(CENTRAL BASIN AREA)**

SCALE 1:25



**PLAN - DRAINAGE COLLECTOR PIPES
(PRIOR TO STONE PLACEMENT)**

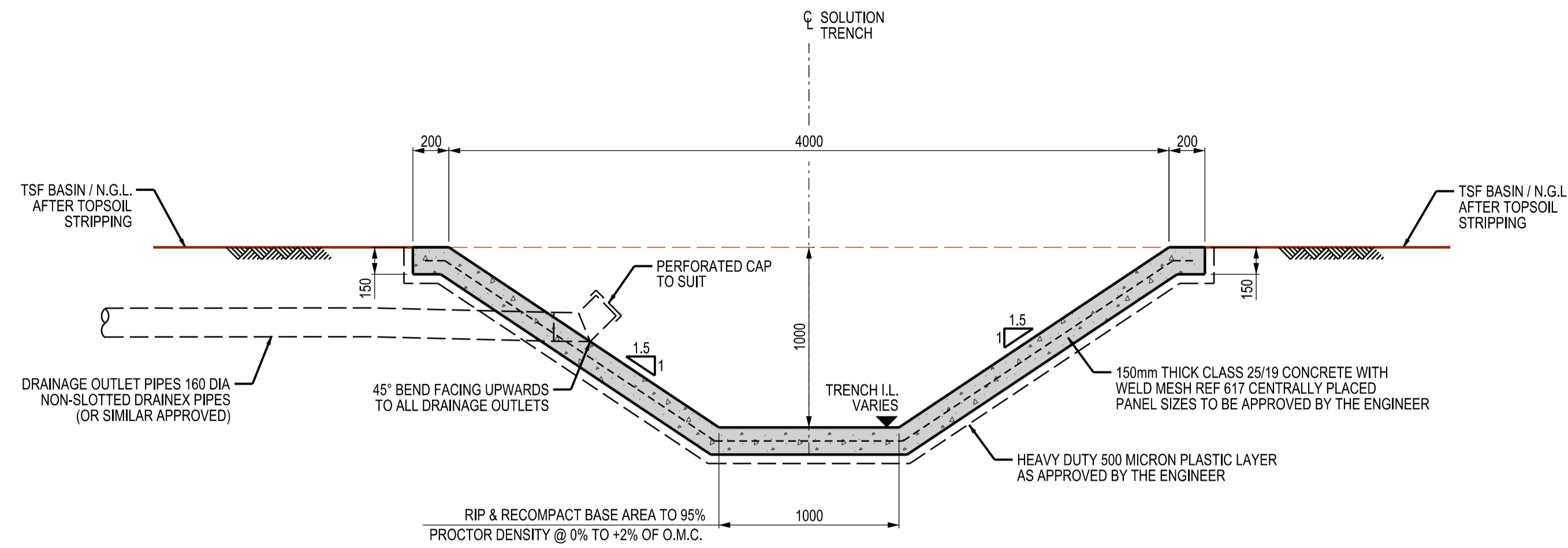
SCALE 1:25

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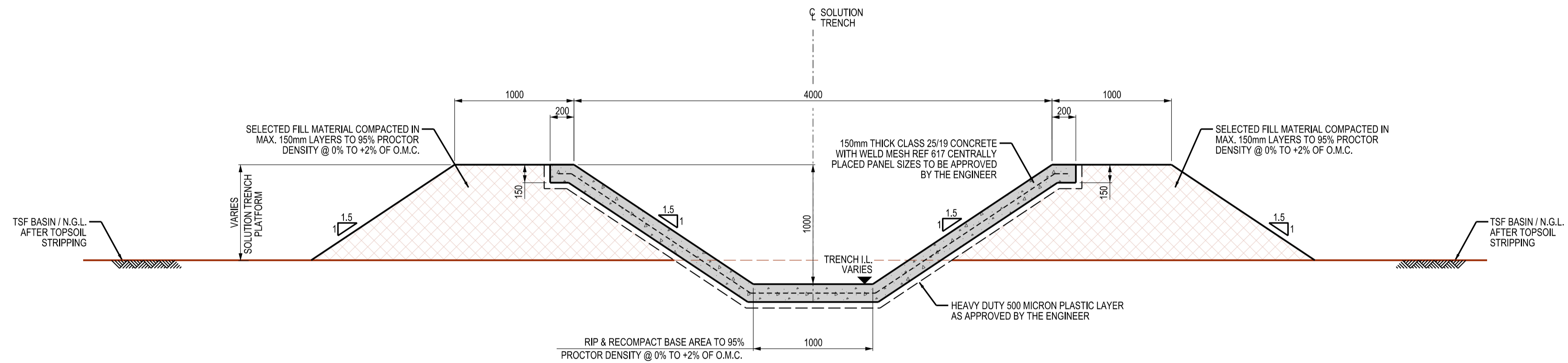
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A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT	.	.	GERRIT J. VAN RYSSSEN	PR.ENG		22.07.24	.	A1 AS SHOWN	2024-06-20	HARMONY	B	
B	2024-07-19	BASE PREPARATION LAYER REVISED	003	FINAL HEIGHT GENERAL ARRANGEMENT								A3 AS SHOWN X2	2024-06-28	HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) DRAINAGE COLLECTOR PIPES SECTIONS & DETAILS		
			005	EARTHWORKS SECTIONS & DETAILS									2024-06-17			
			006 SHT. 1 & 2	DRAINAGE SECTIONS & DETAILS									2024-06-17			
							Ground Floor, Twickenham Building, The Campus, Cnr Skane & Math, Bryanston, 2021 Republic of South Africa Phone : +27 11 575 3002 E-mail : hello@geoetheta.com		APPROVED BY NAME: GERRIT J. VAN RYSSSEN QUALIFICATION & REG. No.: PR.ENG SIGNATURE: DATE: 22.07.24		CO-ORD SYSTEM: . SCALE: A1 AS SHOWN, A3 AS SHOWN X2		DRG No. 2401265-007		REV. B	
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NOTES:

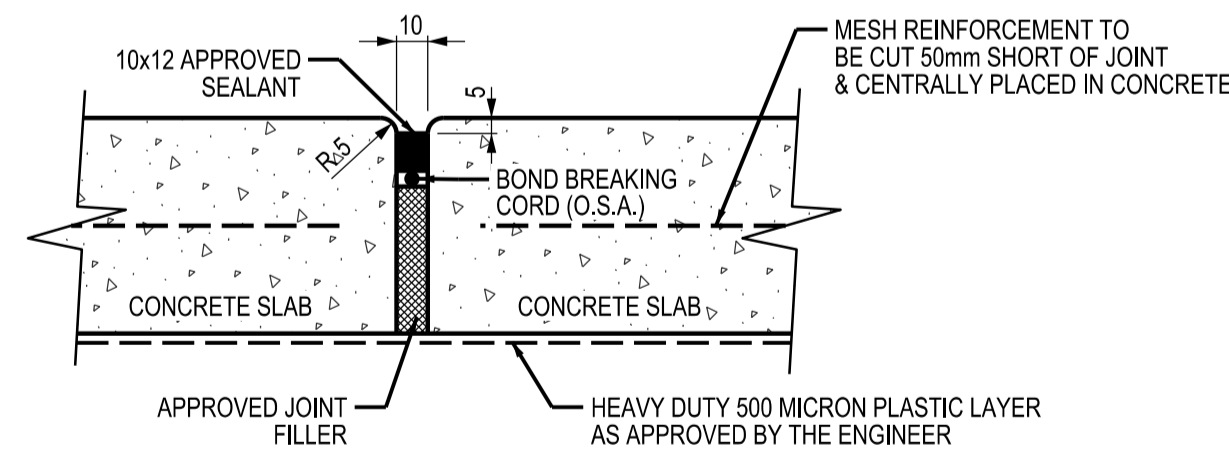
1. WELD MESH TO BE REF 617 CENTRALLY PLACED.
2. MINIMUM REINFORCING LAP LENGTH TO BE 600mm.
3. EARTH ADJACENT TO CONCRETE TO BE COMPACTED.
4. ALL CONCRETE TO HAVE A SMOOTH FINISH.
5. ALL CONCRETE CORNERS IN CONTACT WITH THE LINING TO BE CHAMFERED MIN. 25mm.
6. ALL CONSTRUCTION JOINTS TO BE AS PER DETAIL '1'. PANEL SIZES TO BE APPROVED BY THE ENGINEER. JOINTS TO BE WELL CLEANED & SCRABBLED TO EXPOSE FRESH AGGREGATE & THOROUGHLY WETTED BEFORE NEXT POUR.



TYPICAL SECTION - SOLUTION TRENCH
SCALE 1:25



TYPICAL SECTION - SOLUTION TRENCH ON PLATFORM
SCALE 1:25



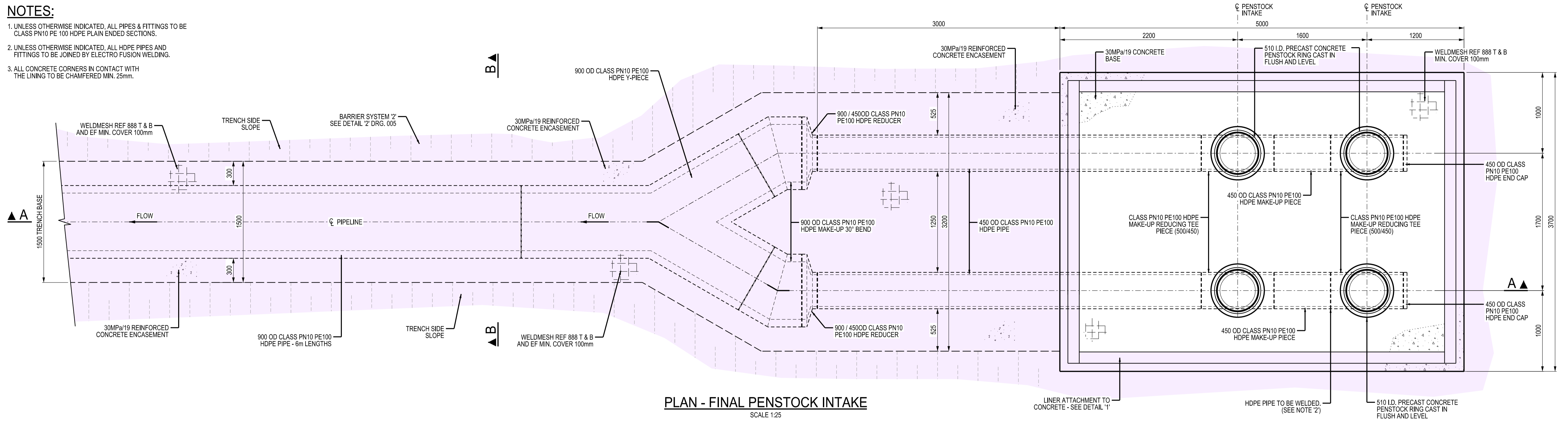
**DETAIL '1' - SECTION
CONSTRUCTION JOINT**
N.T.S.

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A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT	.	.	GERRIT J. VAN RYSSSEN	PR.ENG		22.07.24	.	A1 A3	2024-06-20 2024-06-28	HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) SOLUTION TRENCH SECTIONS & DETAILS	2401265-008	A
			003	FINAL HEIGHT GENERAL ARRANGEMENT												
			005	EARTHWORKS SECTIONS & DETAILS												
			016	DRAINAGE COLLECTOR SUMP DETAILS												
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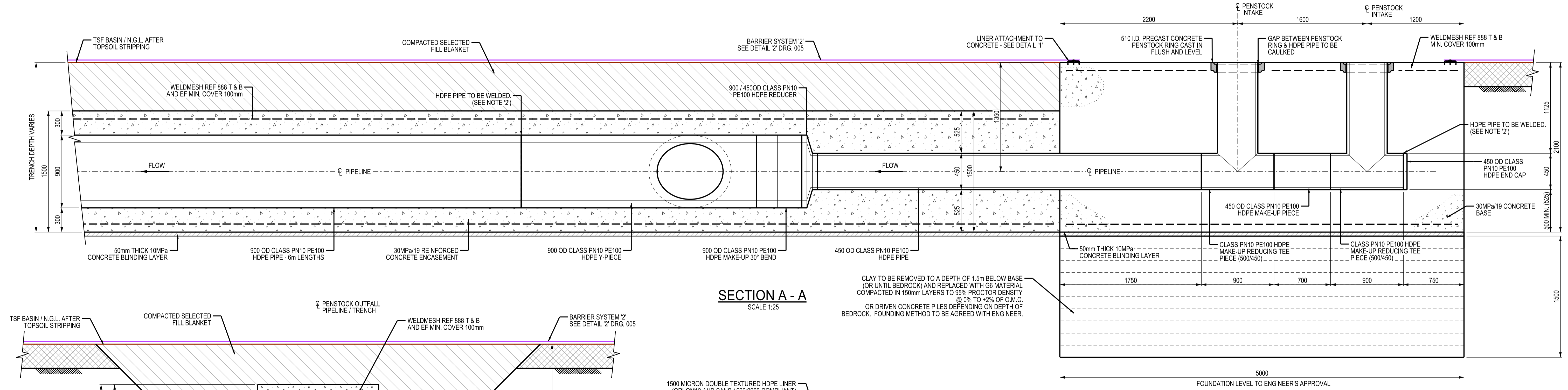
NOTES:

- UNLESS OTHERWISE INDICATED, ALL PIPES & FITTINGS TO BE CLASS PN10 PE 100 HDPE PLAIN ENDED SECTIONS.
- UNLESS OTHERWISE INDICATED, ALL HDPE PIPES AND FITTINGS TO BE JOINED BY ELECTRO FUSION WELDING.
- ALL CONCRETE CORNERS IN CONTACT WITH THE LINING TO BE CHAMFERED MIN. 25mm.



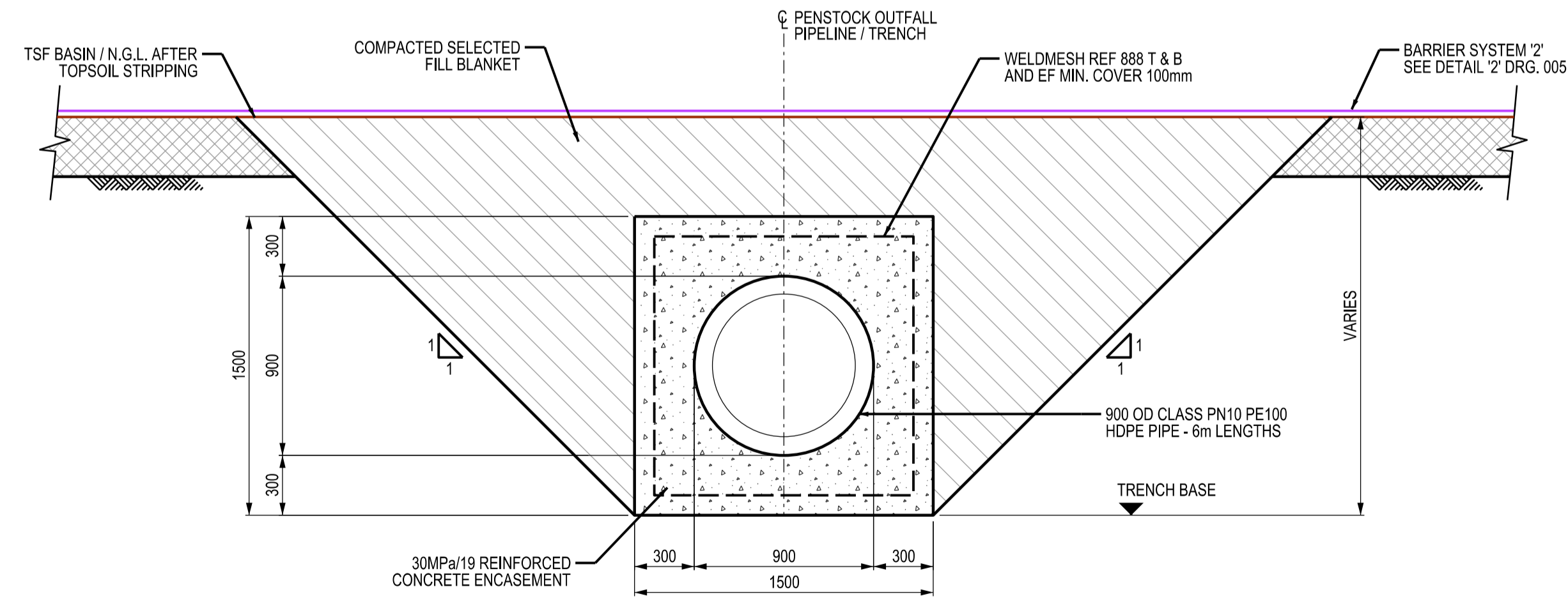
PLAN - FINAL PENSTOCK INTAKE

SCALE 1:25



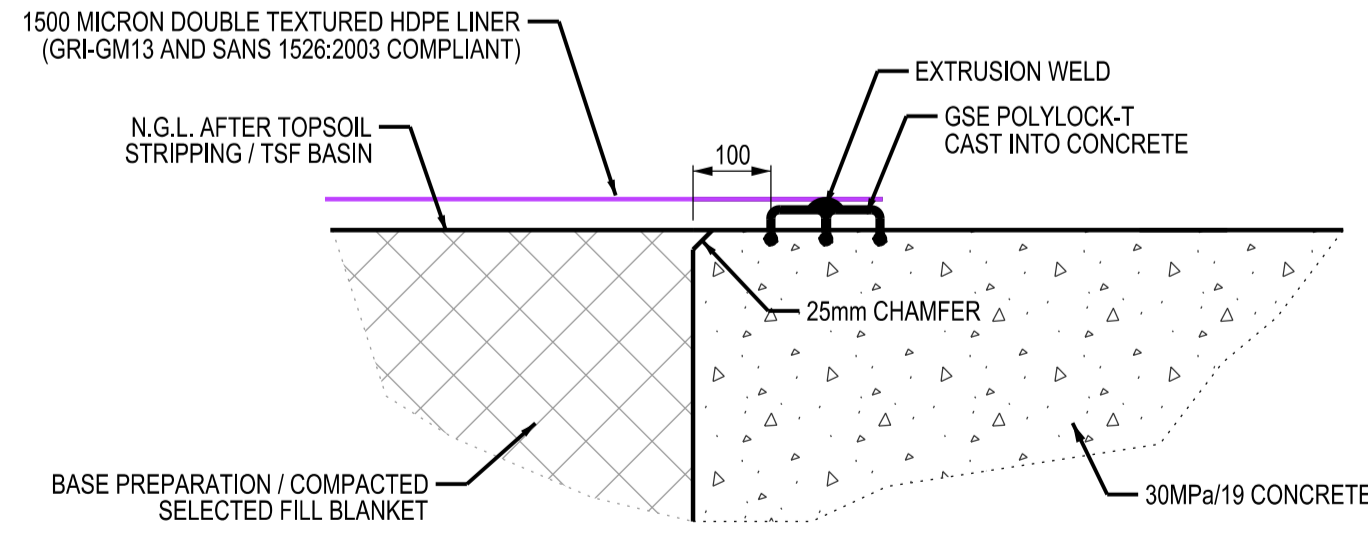
SECTION A - A

SCALE 1:25



SECTION B - B

SCALE 1:25



DETAIL '1' - TYPICAL SECTION LINER ATTACHMENT TO CONCRETE

SCALE 1:10

REVISIONS		REFERENCE DRAWINGS		REFERENCE DRAWINGS		
REV	DATE	DESCRIPTION	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
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			005	EARTHWORKS SECTIONS & DETAILS		
			009 SHT.2	INTERMEDIATE PENSTOCK INTAKE SECTIONS & DTLS		

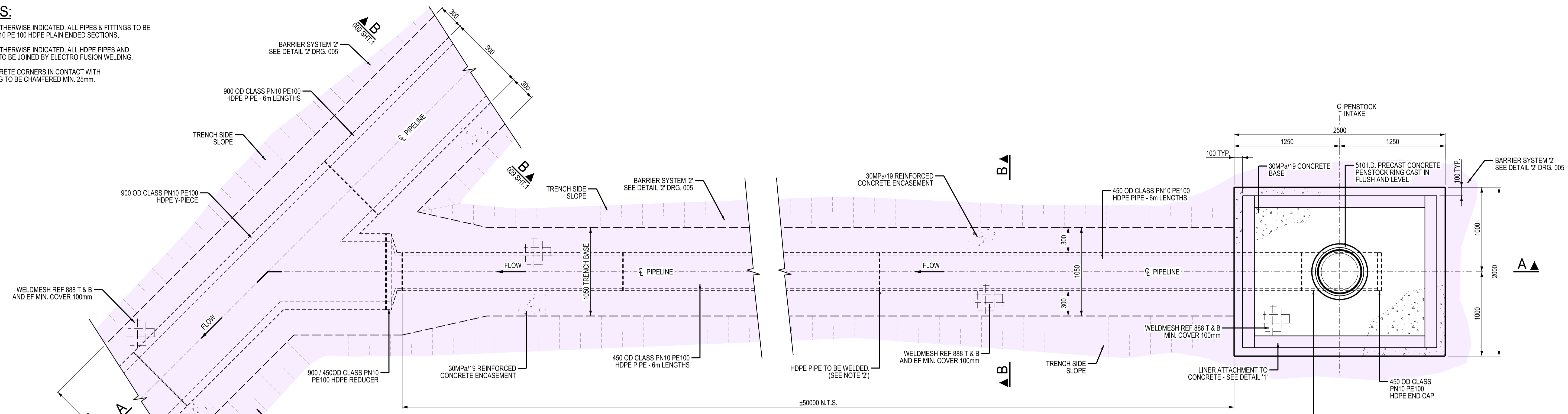
<p>GEOTHETA CONSULTING ENGINEERS AND SCIENTISTS</p> <p>Ground Floor, Twickenham Building, The Campus, Cnr Steane & Main, Bryanston, 2021 Republic of South Africa Phone : +27 11 575 3002 E-mail : hello@geotheta.com</p>				<p>APPROVED BY</p>		<p>5D</p>		<p>CLIENT</p> <p>HARMONY</p>	
				NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE	CO-ORD SYSTEM	SCALE
GERRIT J. VAN RYSSSEN	PRE.ENG	<i>[Signature]</i>	22.05.24		A1 AS SHOWN A3 AS SHOWN X2	<p>DRG No.</p> <p>2401265-009 SHT. 1</p>		<p>REV.</p> <p>A</p>	

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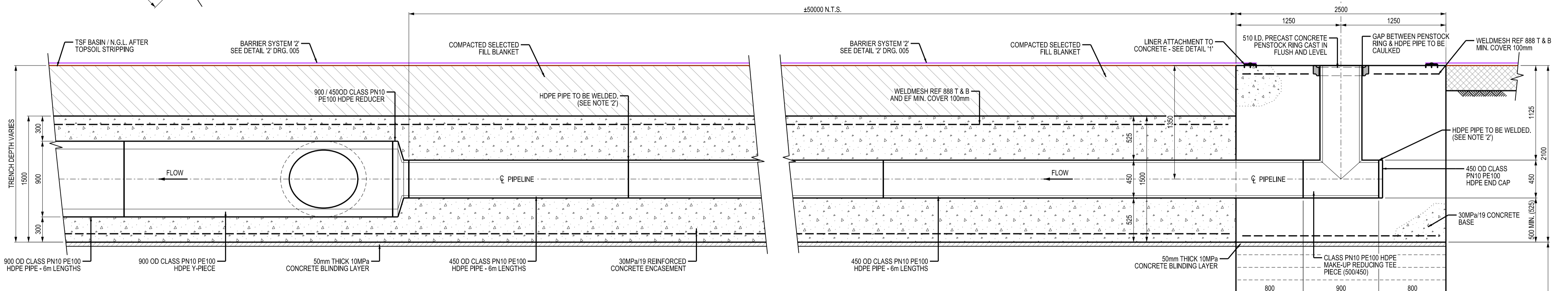
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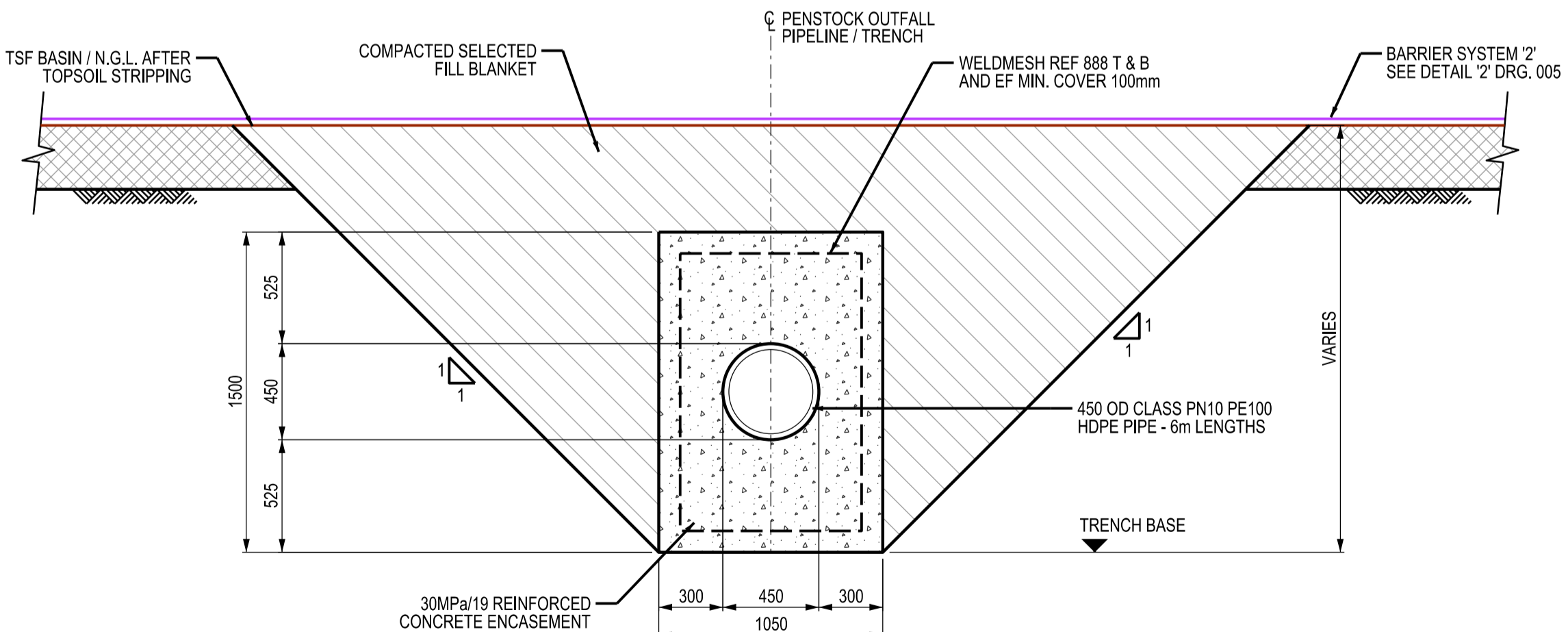
- UNLESS OTHERWISE INDICATED, ALL PIPES & FITTINGS TO BE CLASS PN10 PE 100 HDPE PLAIN ENDED SECTIONS.
- UNLESS OTHERWISE INDICATED, ALL HDPE PIPES AND FITTINGS TO BE JOINED BY ELECTRO FUSION WELDING.
- ALL CONCRETE CORNERS IN CONTACT WITH THE LINING TO BE CHAMFERED MIN. 25mm.



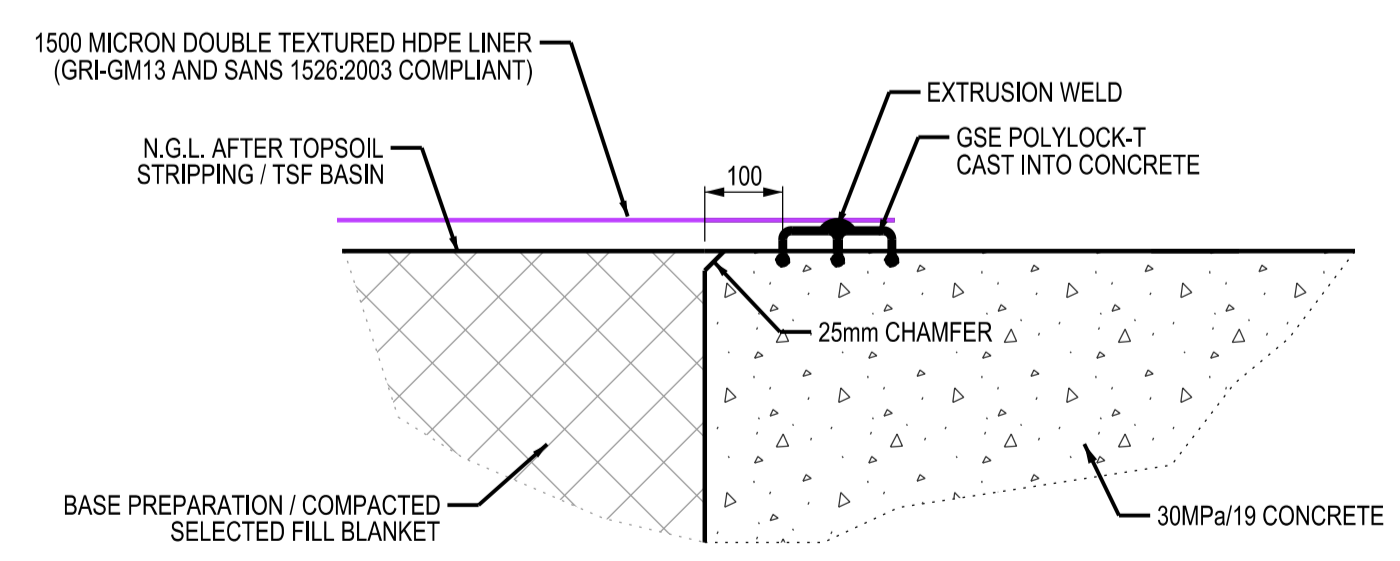
PLAN - INTERMEDIATE PENSTOCK INTAKE
SCALE 1:25



SECTION A - A
SCALE 1:25



SECTION B - B
SCALE 1:25



DETAIL '1' - TYPICAL SECTION LINER ATTACHMENT TO CONCRETE
SCALE 1:10

CLAY TO BE REMOVED TO A DEPTH OF 1.5m BELOW BASE (OR UNTIL BEDROCK) AND REPLACED WITH G6 MATERIAL COMPACTED IN 150mm LAYERS TO 95% PROCTOR DENSITY @ 0% TO +2% OF O.M.C. OR DRIVEN CONCRETE PILES DEPENDING ON DEPTH OF BEDROCK. FOUNDING METHOD TO BE AGREED WITH ENGINEER.

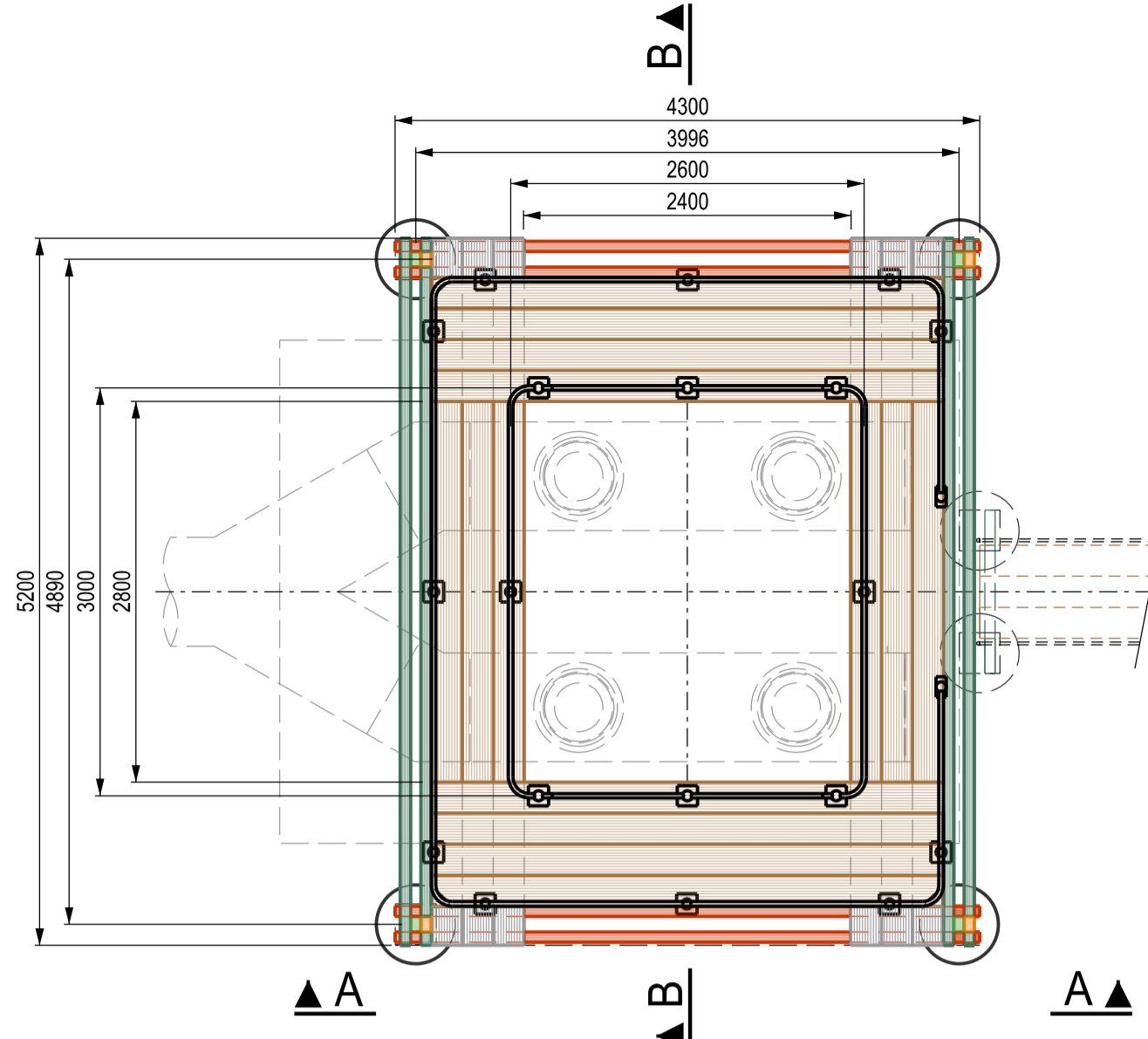
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			003	FINAL HEIGHT GENERAL ARRANGEMENT				AS SHOWN	
			005	EARTHWORKS SECTIONS & DETAILS				AS SHOWN X2	
			009 SHT.1	FINAL PENSTOCK INTAKE SECTIONS & DTLS					

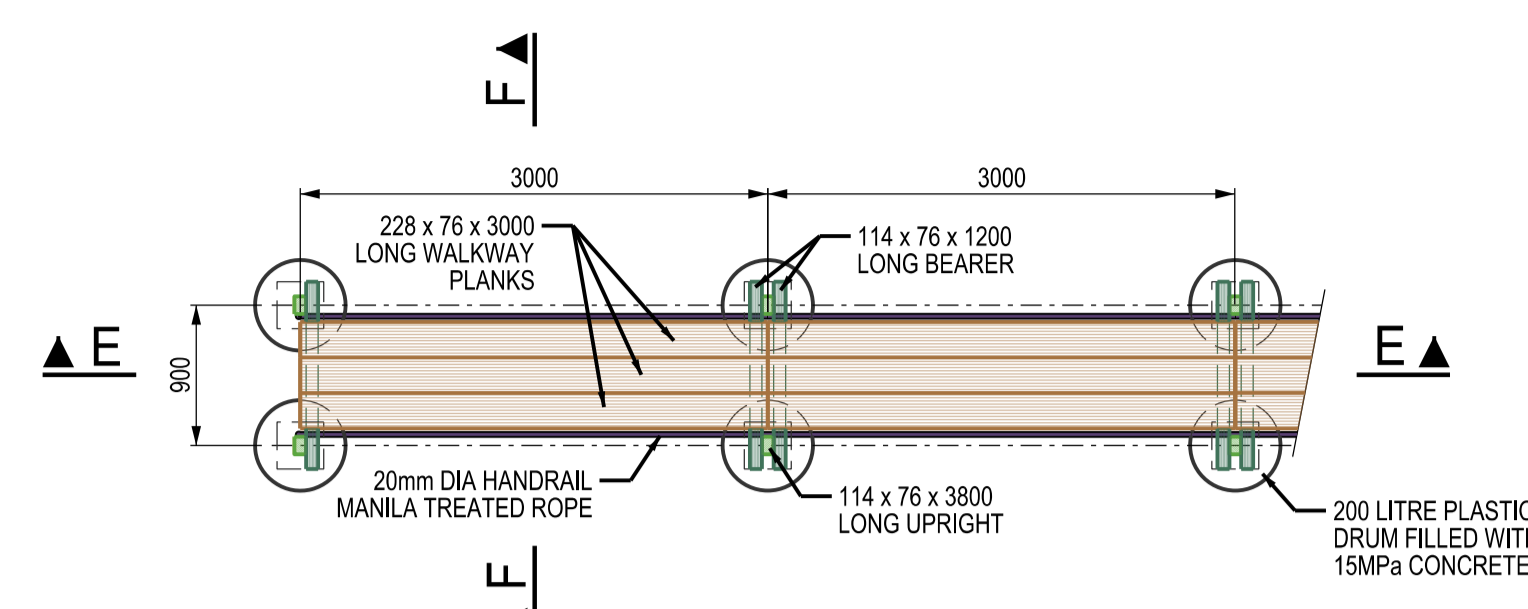
GEOETHETA CONSULTING ENGINEERS AND SCIENTISTS				APPROVED BY		CO-ORD SYSTEM		SCALE	
NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE	NAME	DATE	SCALE	SCALE	SCALE	SCALE
GERRIT J. VAN RYSSSEN	PR.ENG 202302750		22.07.24			A1	AS SHOWN	A3	AS SHOWN X2

TITLE		DRG No.	REV.
HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) INTERMEDIATE PENSTOCK INTAKE SECTIONS & DETAILS		2401265-009 SHT. 2	A

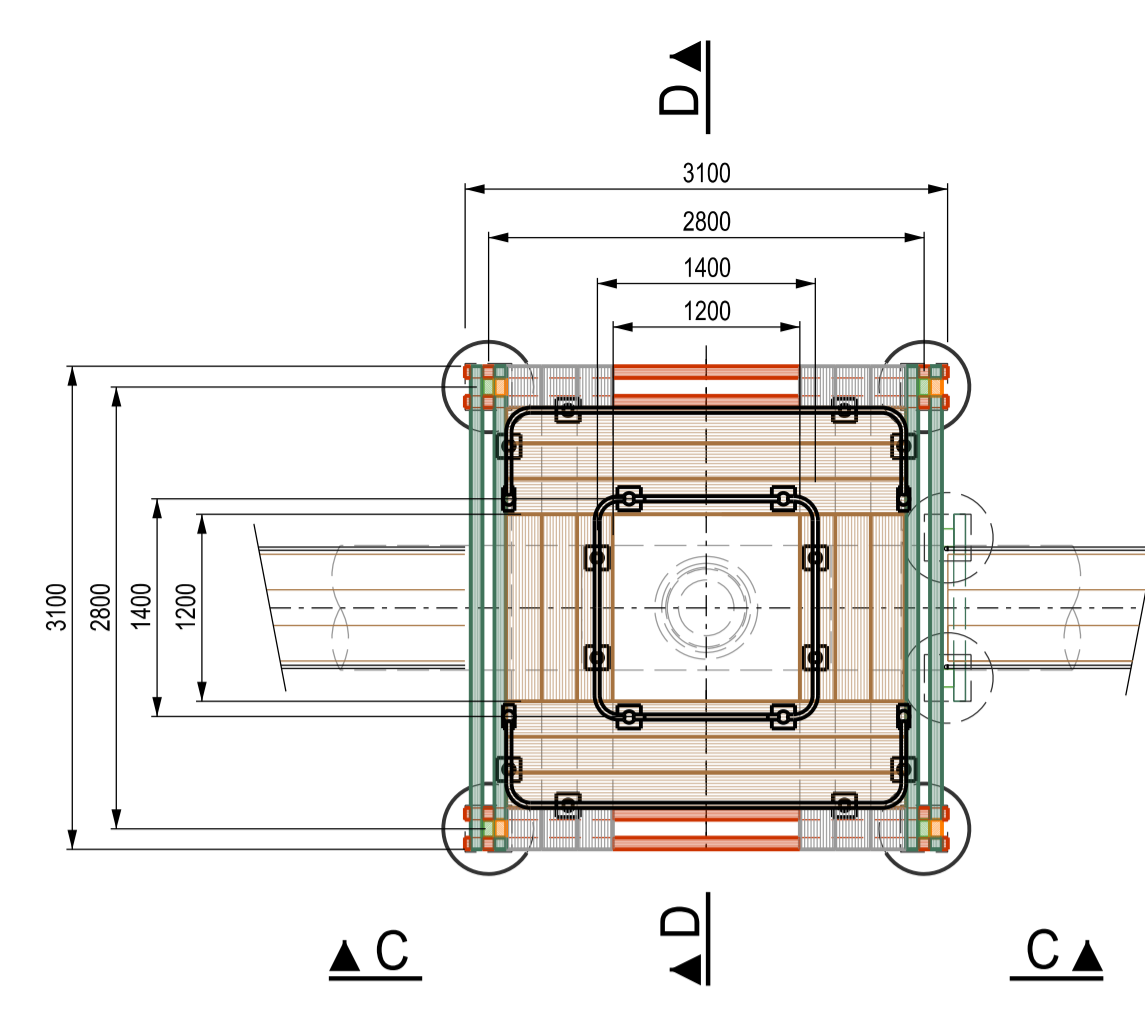
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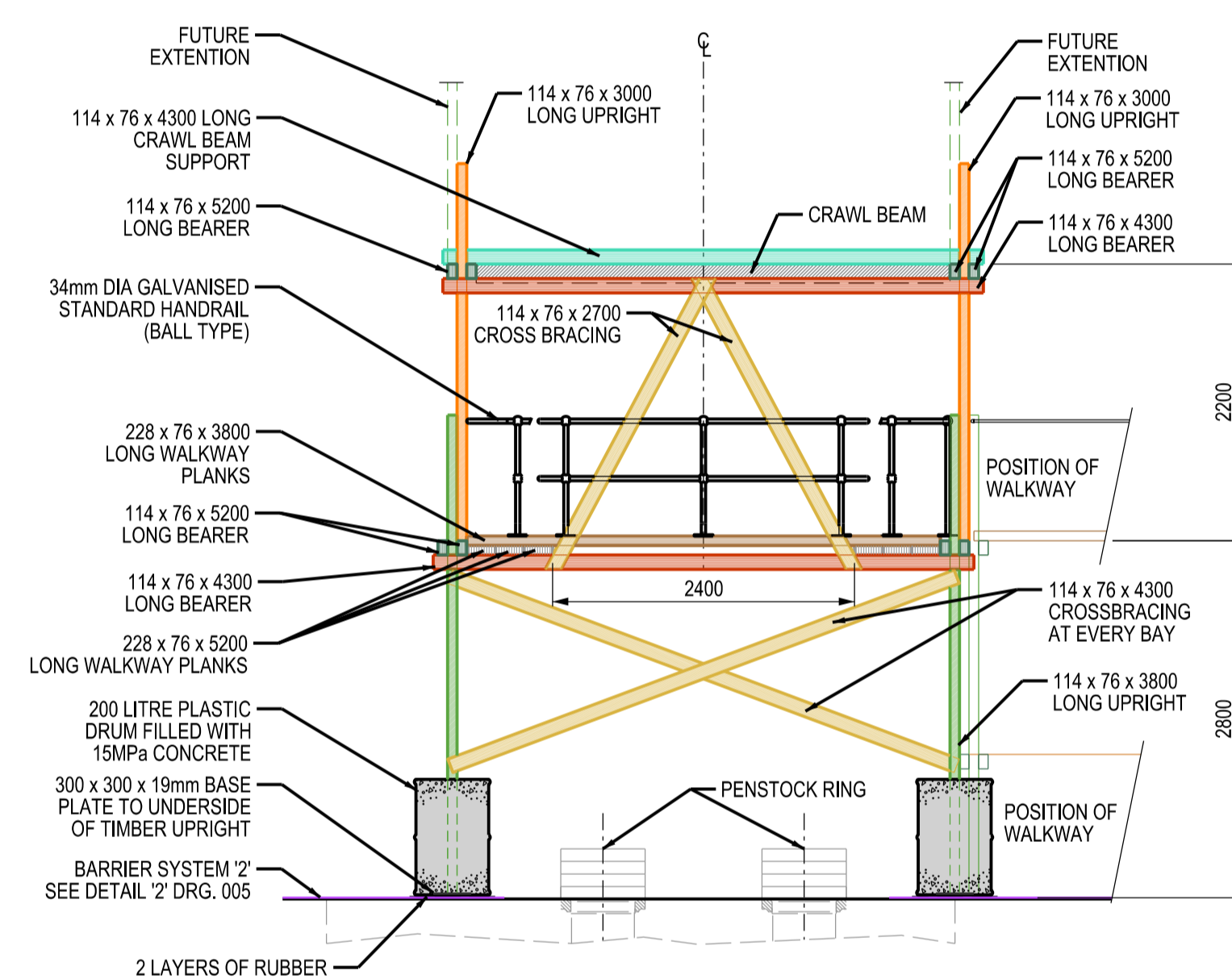
PLAN - PLATFORM AT FINAL PENSTOCK INTAKE
SCALE 1:50



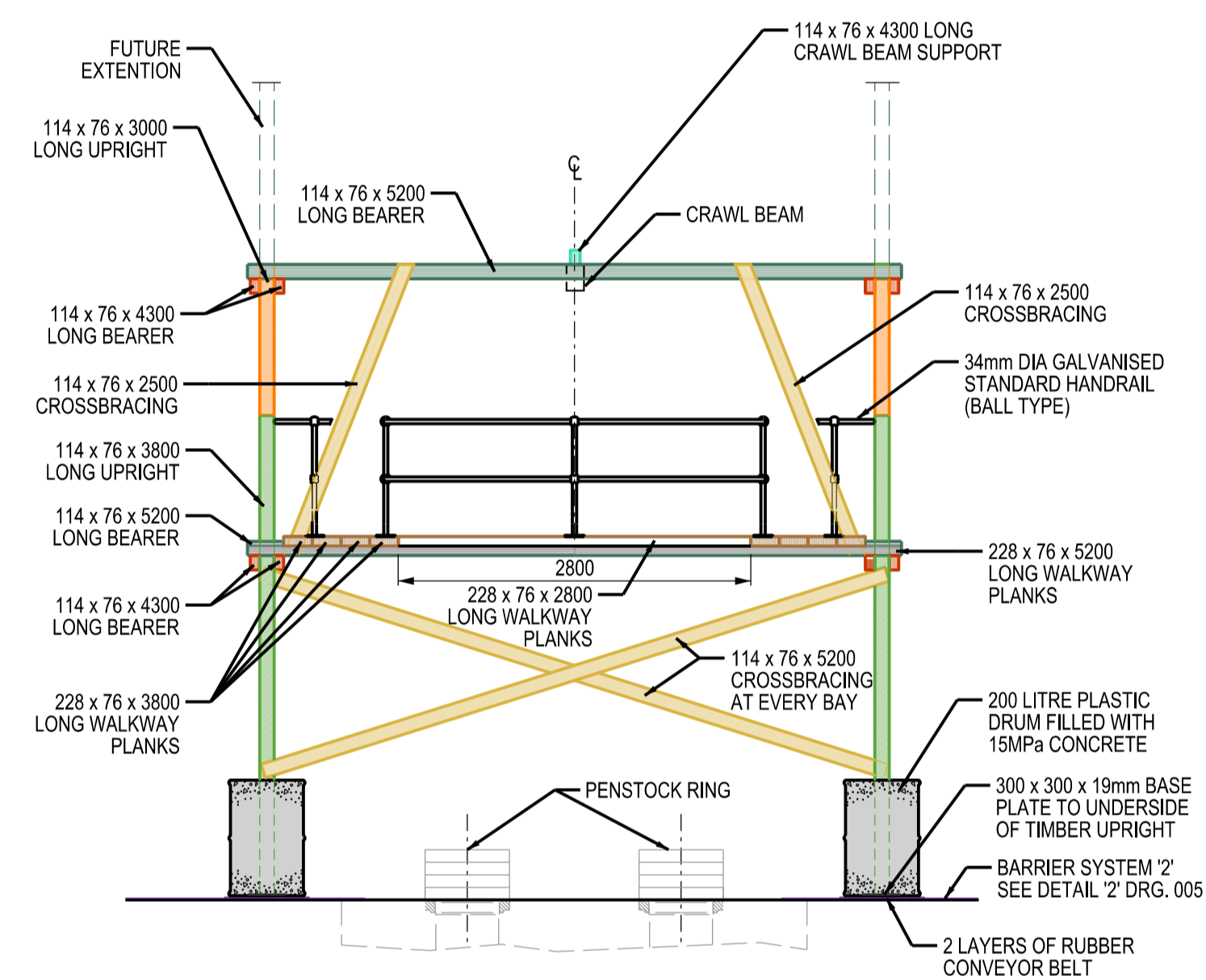
PLAN CATWALK
SCALE 1:50



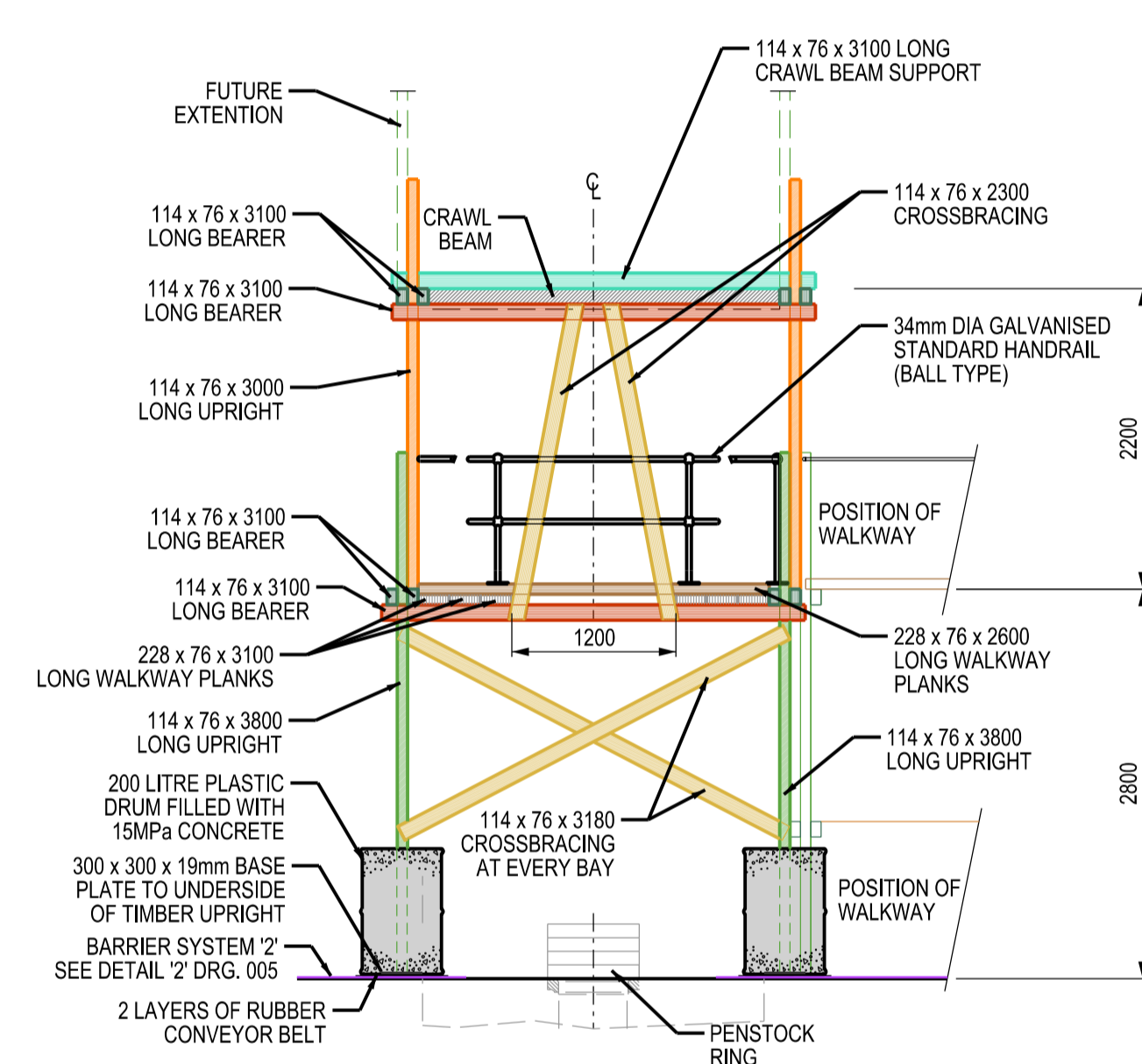
PLAN - PLATFORM AT INTERMEDIATE PENSTOCK INTAKE
SCALE 1:50



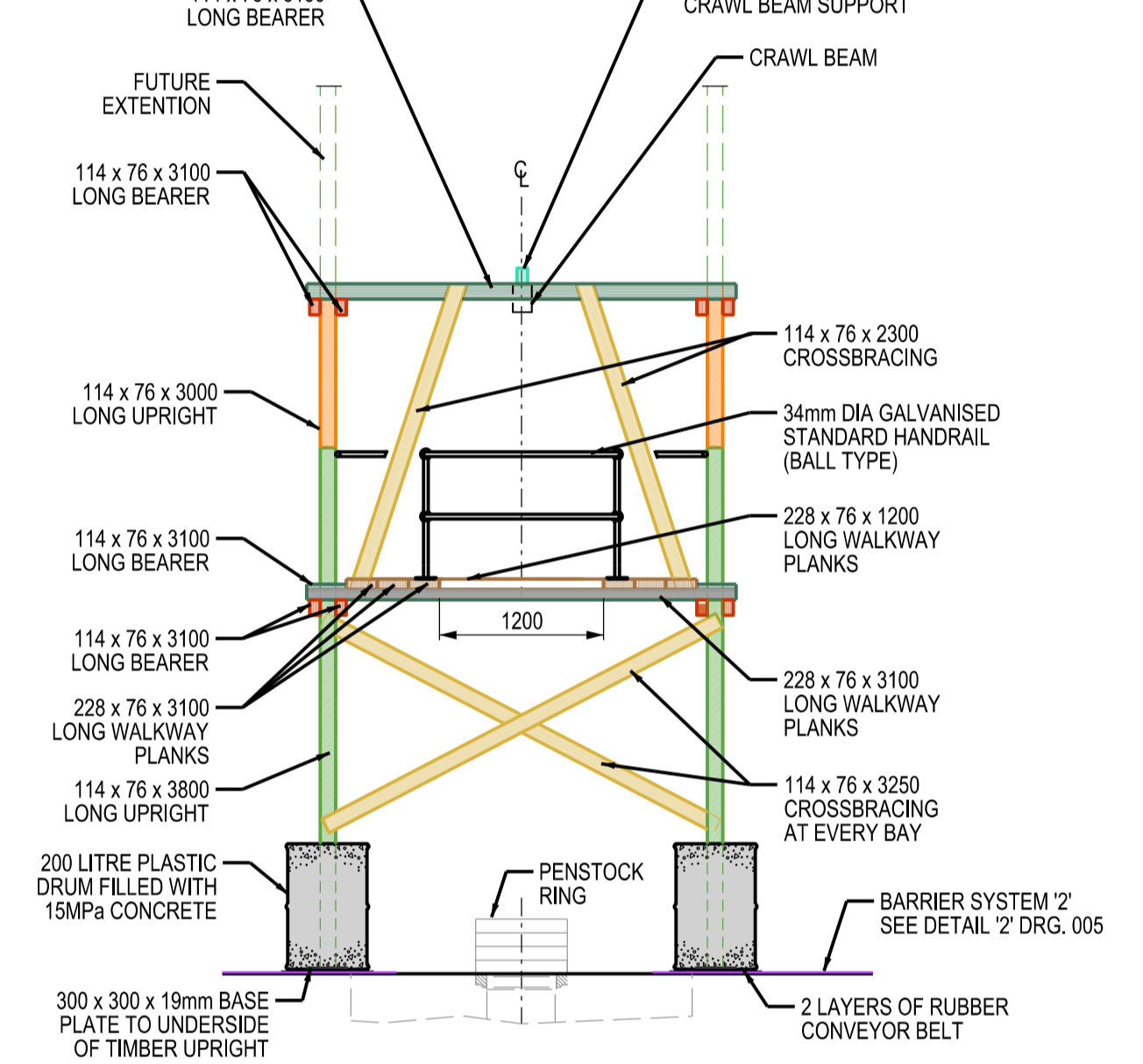
ELEVATION A - A
PLATFORM AT FINAL PENSTOCK INTAKE
SCALE 1:50



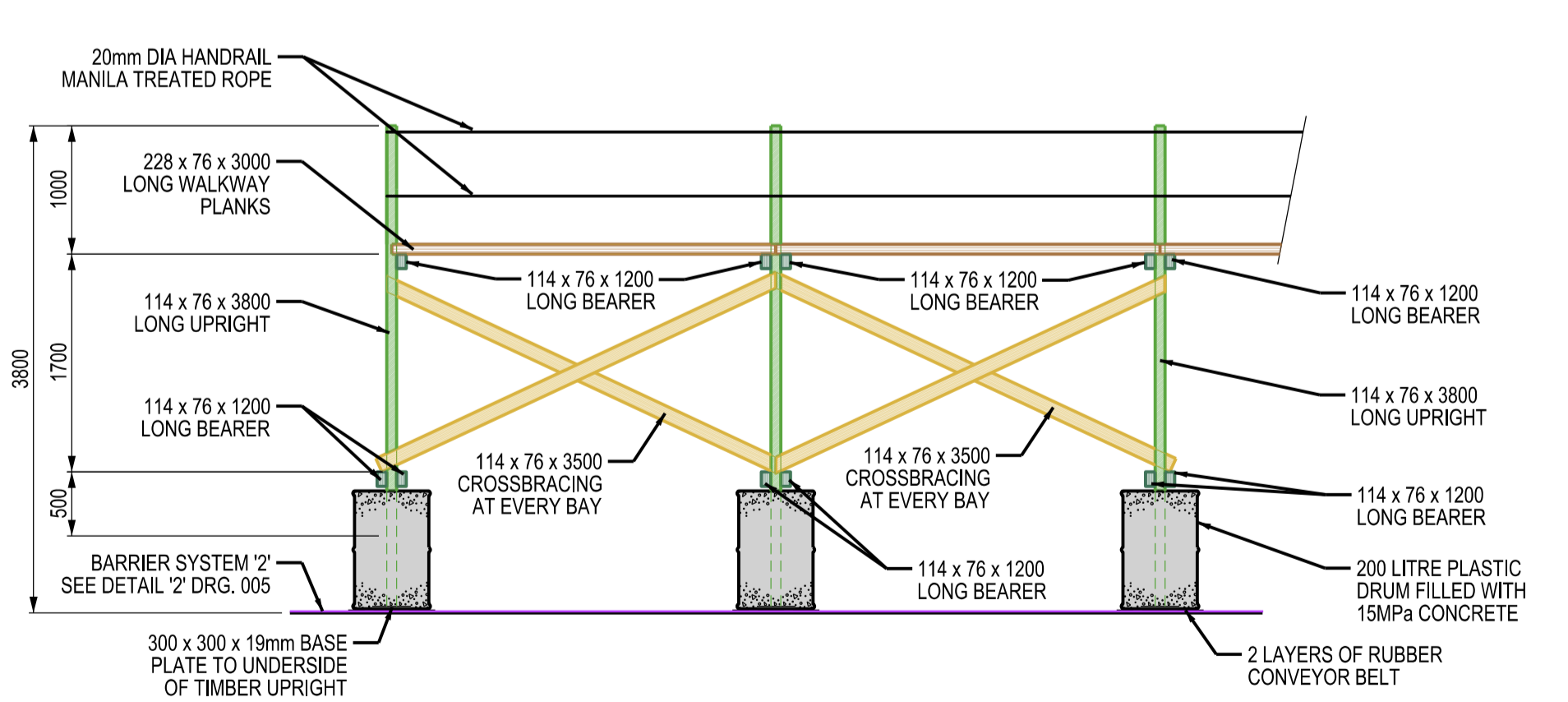
SECTION B - B
PLATFORM AT FINAL PENSTOCK INTAKE
SCALE 1:50



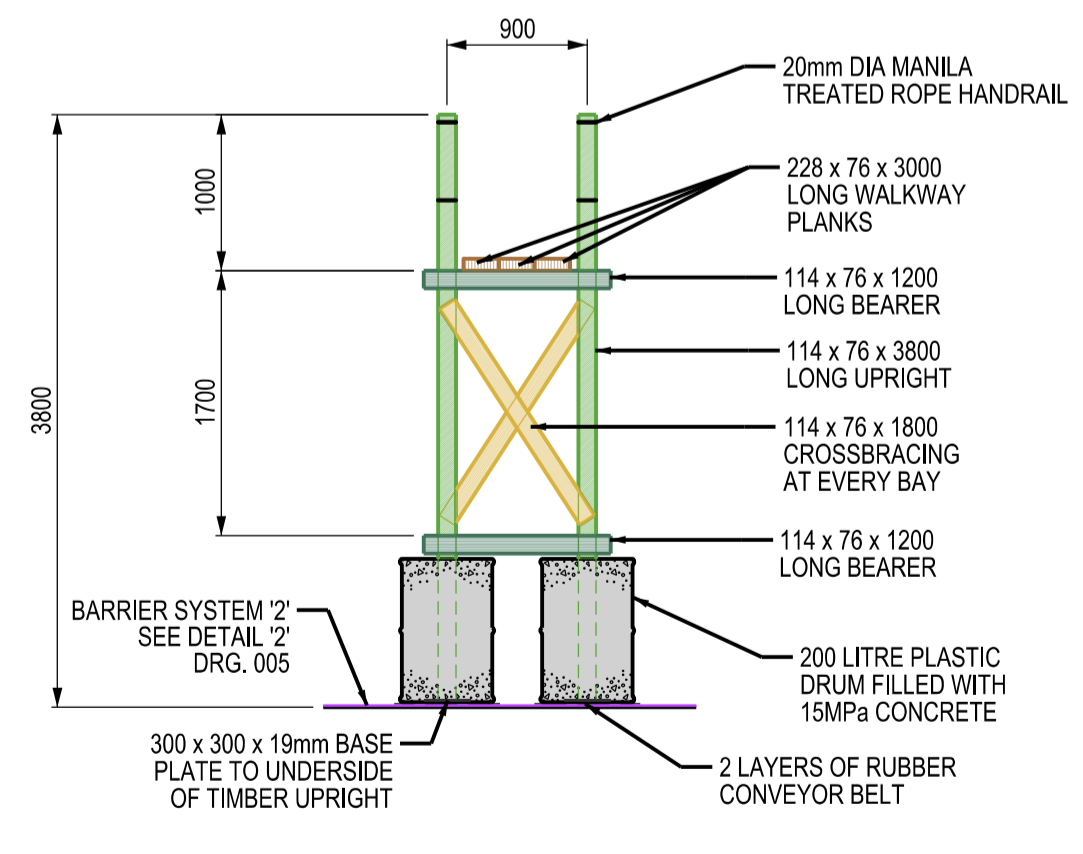
ELEVATION C - C
PLATFORM AT INTERMEDIATE PENSTOCK INTAKE
SCALE 1:50



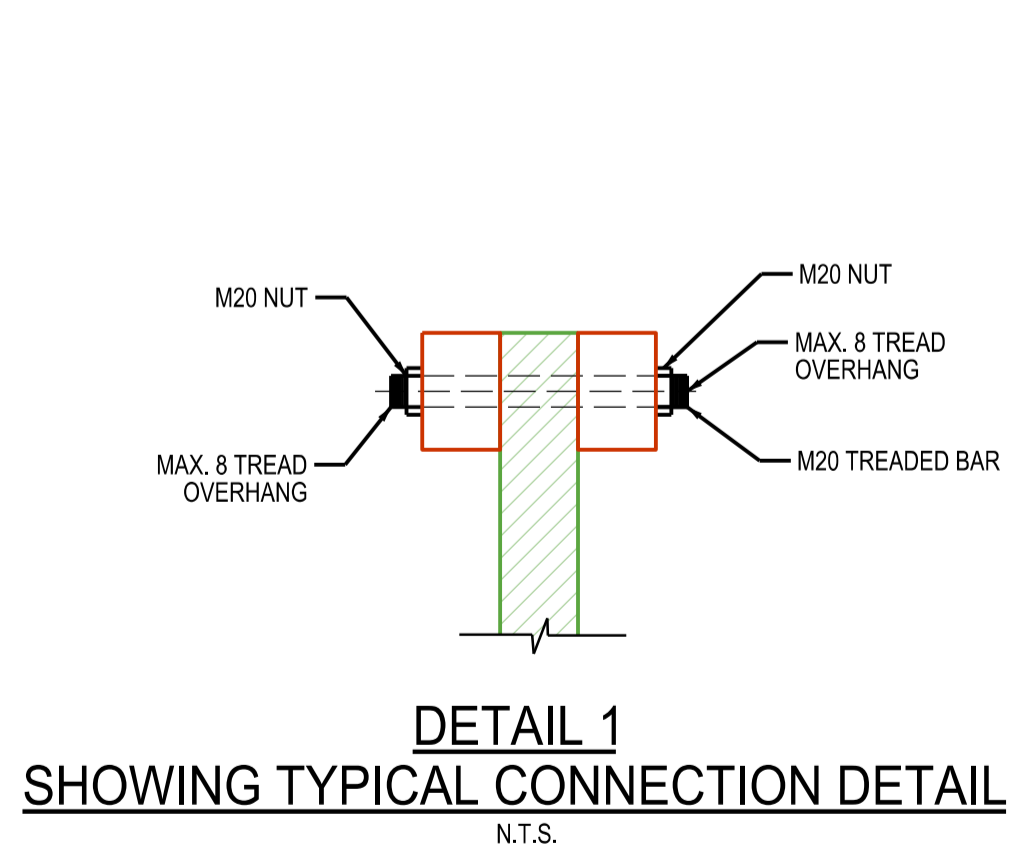
SECTION D - D
PLATFORM AT INTERMEDIATE PENSTOCK INTAKE
SCALE 1:50



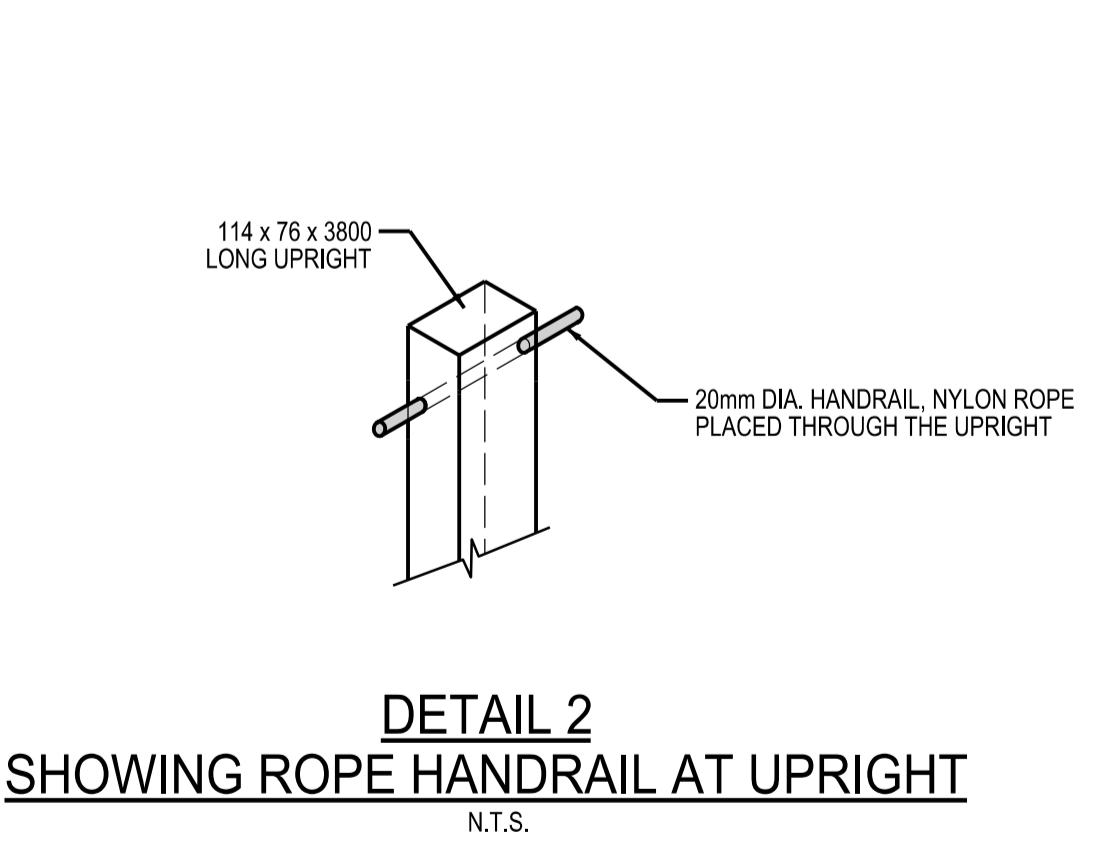
SECTION E - E
CATWALK
SCALE 1:50



SECTION F - F
CATWALK
SCALE 1:50



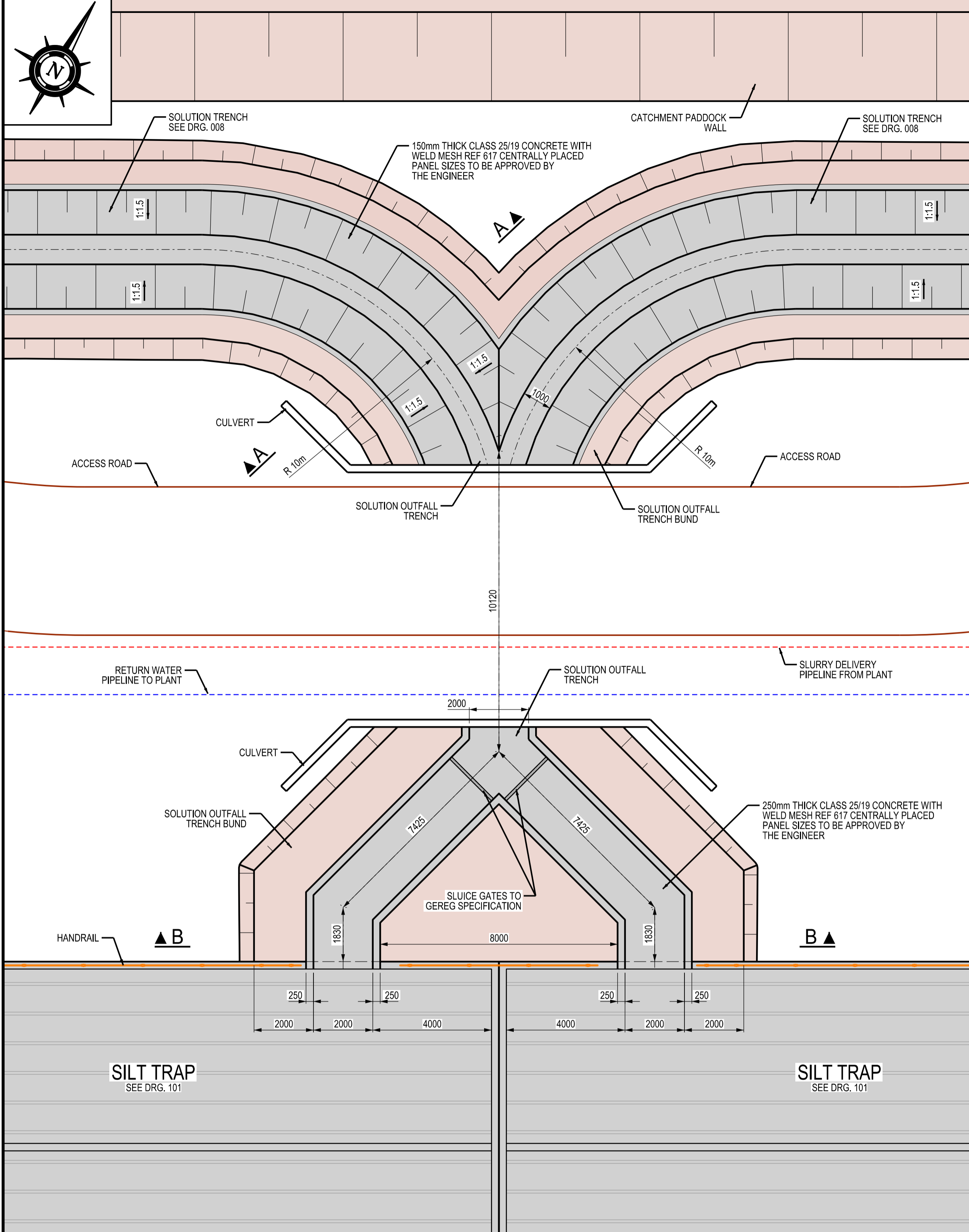
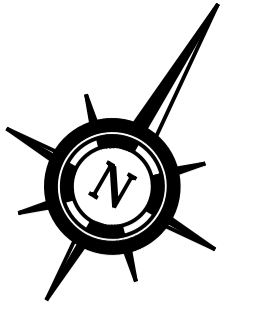
DETAIL 1
SHOWING TYPICAL CONNECTION DETAIL
N.T.S.



DETAIL 2
SHOWING ROPE HANDRAIL AT UPRIGHT
N.T.S.

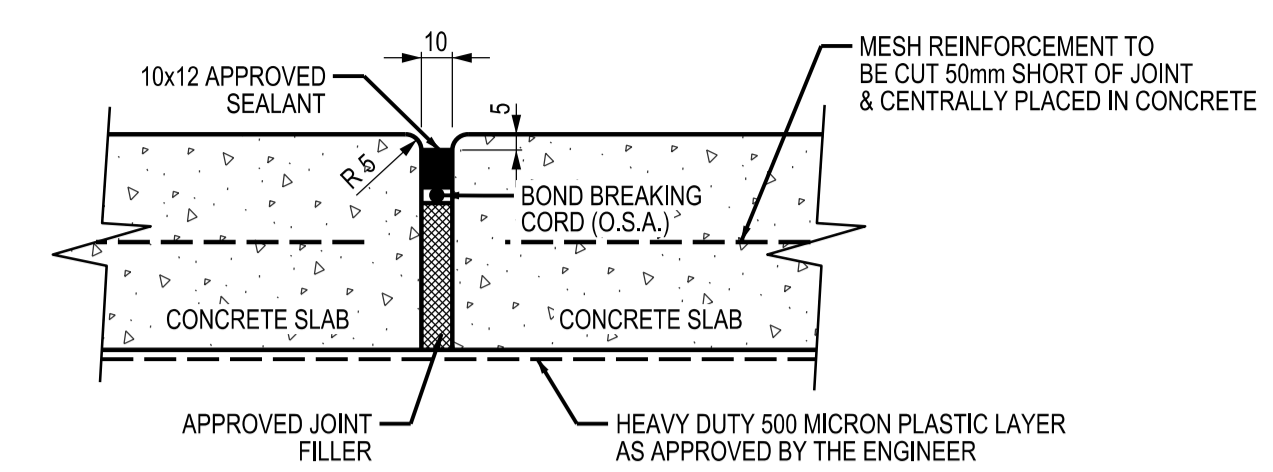
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REVISIONS		REFERENCE DRAWINGS		REFERENCE DRAWINGS		GEOETHETA CONSULTING ENGINEERS AND SCIENTISTS		DRAWN		CLIENT	
REV	DATE	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE	Ground Floor, Twickenham Building, The Campus, Cnr Skane & Main, Bryanston, 2021 Republic of South Africa Phone : +27 11 575 3002 E-mail : hello@geotheta.com		DATE	SCALE	HARMONY	
A	2024-06-20	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT			APPROVED BY		2024-06-20	AS SHOWN	HARMONY - NOOITGEDACHT TSF	
		003	FINAL HEIGHT GENERAL ARRANGEMENT			NAME QUALIFICATION & REG. No. SIGNATURE DATE			AS SHOWN X2	RE-DESIGN (CYCLODED)	
		005	EARTHWORKS SECTIONS & DETAILS			GERRIT J. VAN RYSSSEN PR.ENG 202302759		22.07.24		PENSTOCK CATWALK	
		009 SHT.1	FINAL PENSTOCK INTAKE SECTIONS & DTLS			CO-ORD SYSTEM		2024-06-17		TYPICAL DETAILS	
		009 SHT.2	INTERMEDIATE PENSTOCK INTAKE SECTIONS & DTLS			SCALE				DRG No. 2401265-010	
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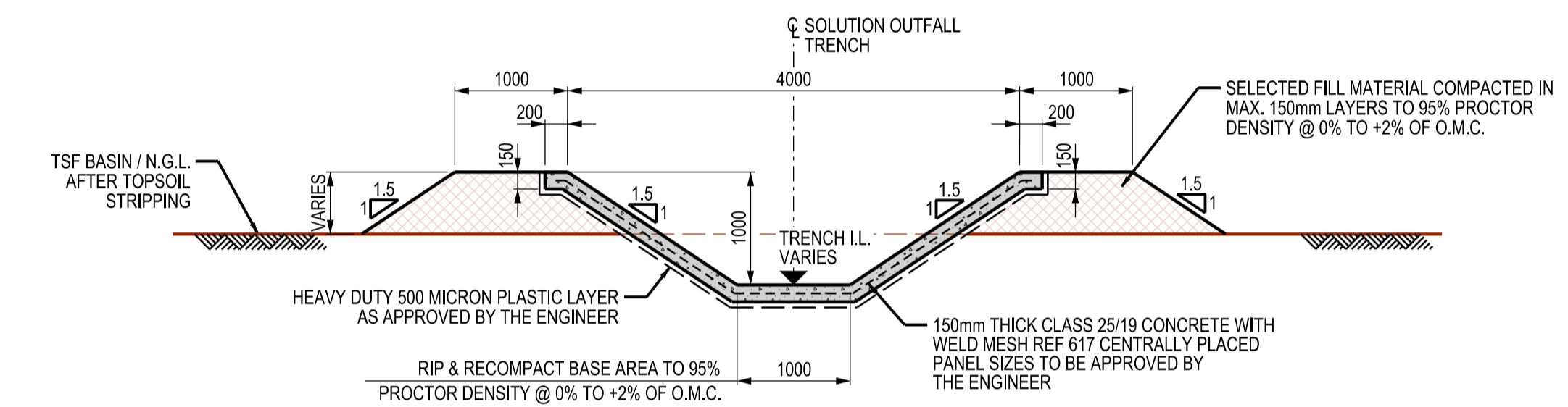


PLAN - SOLUTION OUTFALL TRENCH
SCALE 1:100

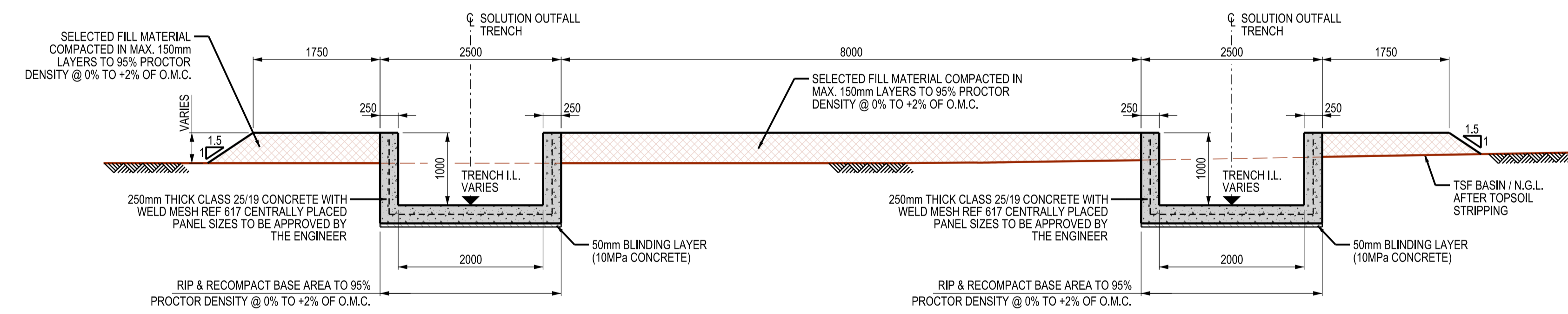
- NOTES:**
1. WELD MESH TO BE REF 617 CENTRALLY PLACED.
 2. MINIMUM REINFORCING LAP LENGTH TO BE 600mm.
 3. EARTH ADJACENT TO CONCRETE TO BE COMPACTED.
 4. ALL CONCRETE TO HAVE A SMOOTH FINISH.
 5. ALL CONCRETE CORNERS IN CONTACT WITH THE LINING TO BE CHAMFERED MIN. 25mm.
 6. ALL CONSTRUCTION JOINTS TO BE AS PER DETAIL '1'. PANEL SIZES TO BE APPROVED BY THE ENGINEER. JOINTS TO BE WELL CLEANED & SCRABBLED TO EXPOSE FRESH AGGREGATE & THOROUGHLY WETTED BEFORE NEXT POUR.



DETAIL '1' - SECTION CONSTRUCTION JOINT
N.T.S.



SECTION A - A
SCALE 1:50



SECTION B - B
SCALE 1:50

REVISIONS		REFERENCE DRAWINGS		REFERENCE DRAWINGS		
REV	DATE	DESCRIPTION	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT	.	.
			008	SOLUTION TRENCH SECTIONS & DETAILS		
			101	SILT TRAP PLAN, SECTIONS & DETAILS		

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Republic of South Africa
Phone : +27 11 575 3002
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APPROVED BY	DATE	CO-ORD SYSTEM	SCALE
GERRIT J. VAN RYSSSEN	22.07.24	WGS 84 LO27	A1 AS SHOWN A3 AS SHOWN X2

ISSUED FOR INFORMATION

CLIENT: HARMONY

TITLE: HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) SOLUTION OUTFALL TRENCH PLAN, SECTIONS & DETAILS

DRG No. 2401265-011

REV. A

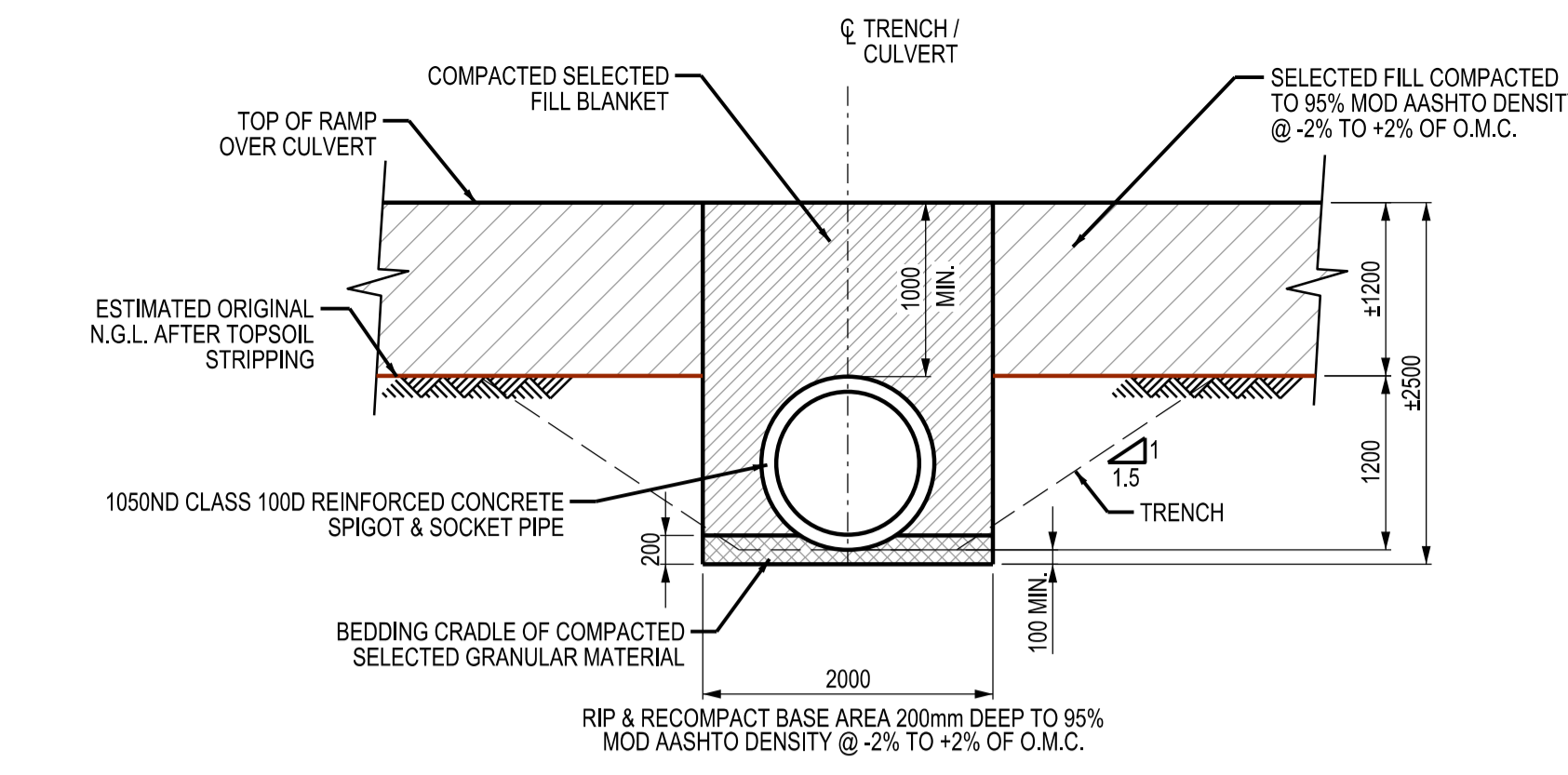
GENERAL NOTES

- 1) THESE NOTES SERVE AS AN ADDENDUM TO THE SPECIFICATION IN THE BILL OF QUANTITIES FOR THIS PROJECT. IN CASES WHERE THE SPECIFICATIONS IN THE BILL OF QUANTITIES DIFFER FROM THESE NOTES, THESE NOTES SHALL TAKE PREFERENCE.
- 2) THE CONTRACTOR SHALL COMPLY WITH ALL STANDARDS/SPECIFICATIONS WHICH ARE REFERRED TO IN THESE NOTES.
- 3) DRAWINGS SHALL BE CHECKED BY THE CONTRACTOR AND ANY DISCREPANCIES IN DIMENSIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE WORK IS COMMENCED.
- 4) DRAWINGS MAY NOT BE SCALED.

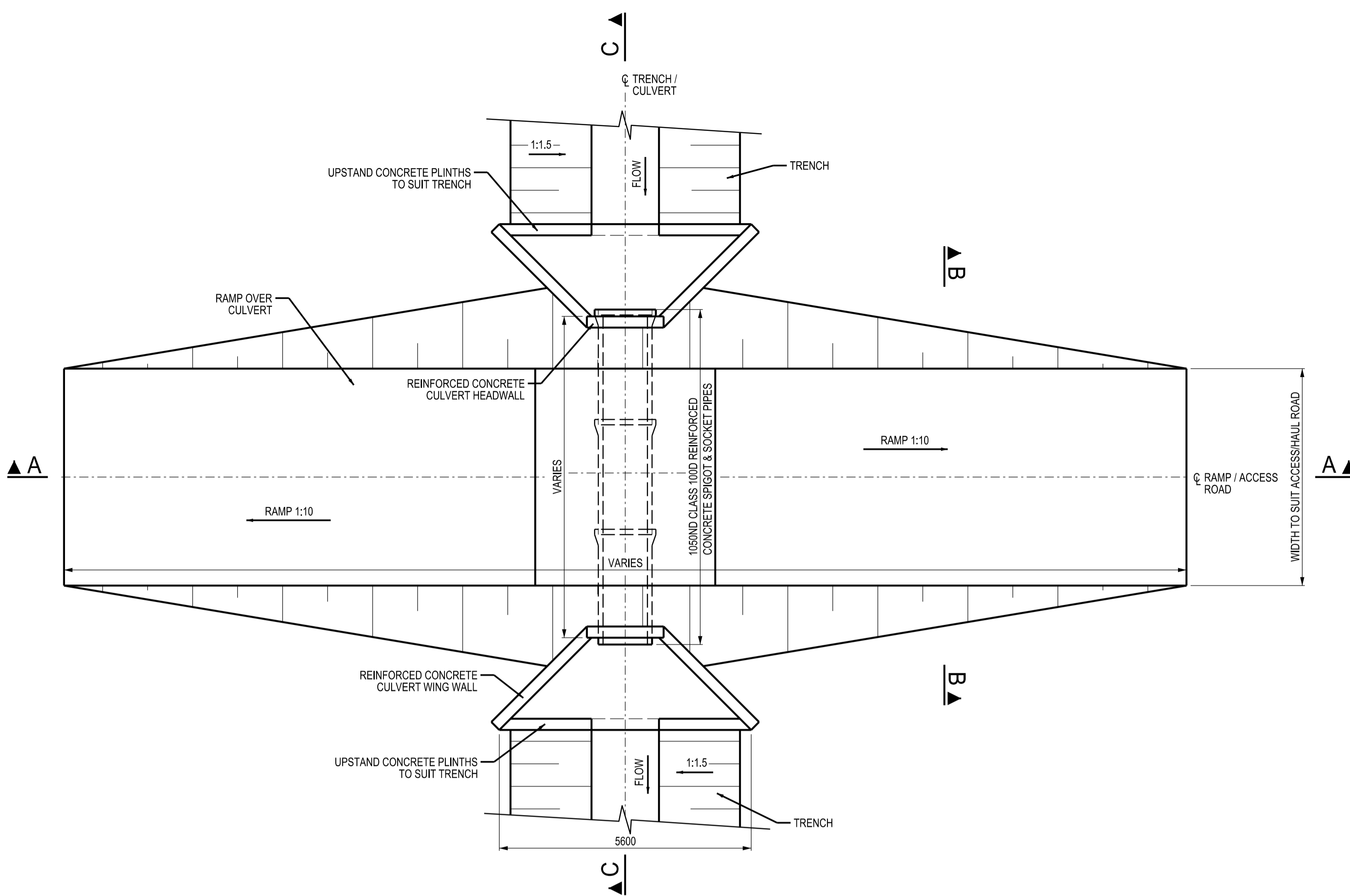
CONCRETE
EXCEPT WHERE MENTIONED OTHERWISE, THE CONCRETE WORK SHALL COMPLY WITH SANS 1200 G LATEST REVISION.

STRUCTURAL ELEMENT	CHARACTERISTIC 28 DAY STRENGTH (MPa)
FOUNDATIONS	
1) BACKFILLING:	ALL BACKFILLING TO FOUNDATIONS TO BE COMPACTED TO 95% Mod. AASHTO DENSITY (min).
2) BLINDING:	ALL BASES TO BE PROVIDED WITH 75mm BLINDING.
3) ALL SPECIFIED FOUNDING LEVELS ARE PROVISIONAL AND NEED TO BE CONFIRMED BY THE ENGINEER ON SITE	

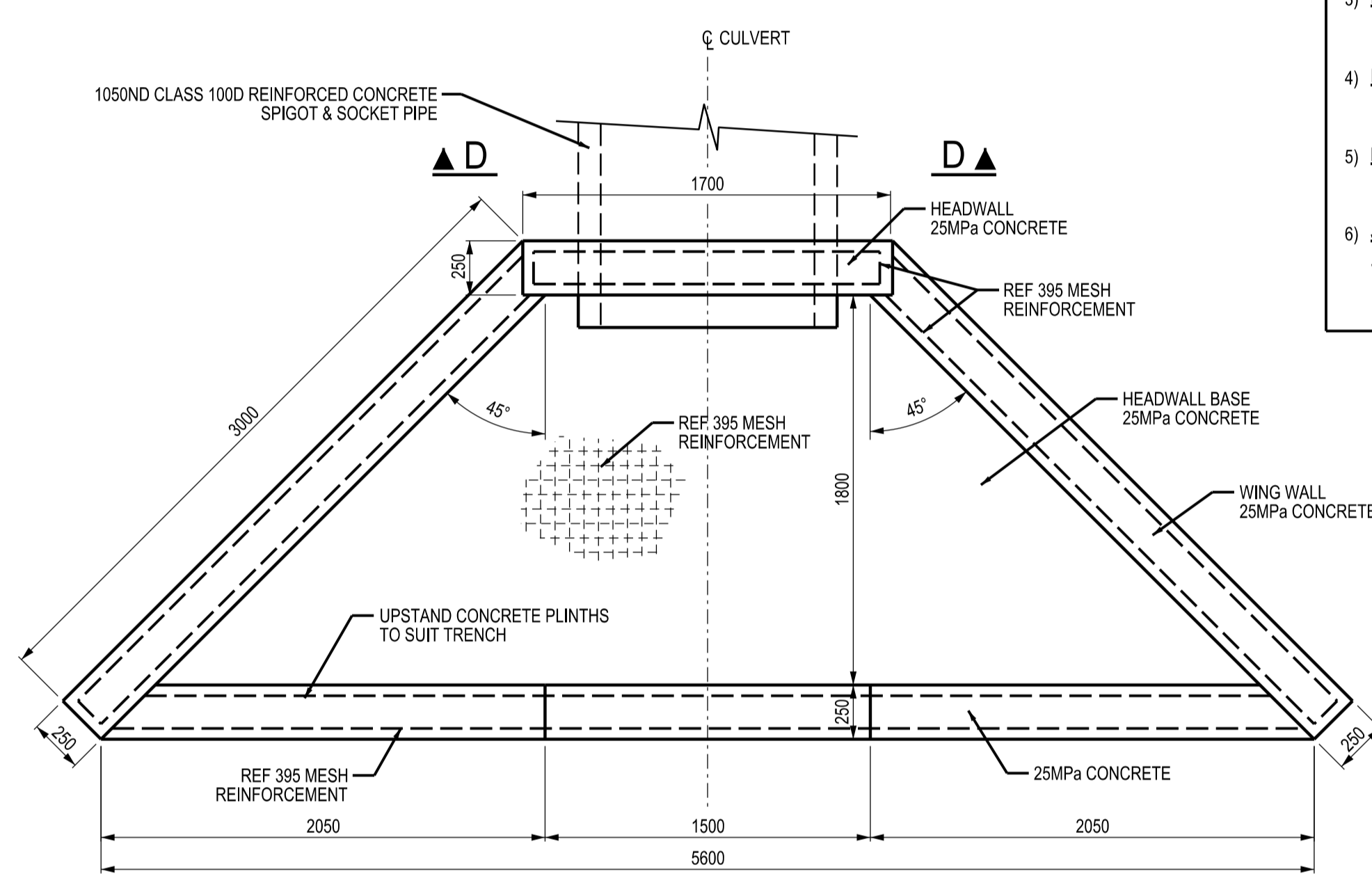
- NOTES**
- 1) **CULVERT TYPES**
1050ND CLASS 100D SPIGOT & SOCKET REINFORCED CONCRETE PIPES ON CLASS C BEDDING
 - 2) **CONSTRUCTION AND INSTALLATION CODES**
PER SANS 1200 OR PROJECT SPECIFICATION.
 - 3) **FOUNDATIONS**
A BEARING CAPACITY OF 200 kpa IS ASSUMED TO BE AVAILABLE.
 - 4) **FINISHING**
VISIBLE SURFACES - WOOD FLOAT (ie TOP OF SLAB FOR FOUNDATIONS).
 - 5) **REINFORCING**
FLOOR SLABS - MESH REF No 395
WING WALLS - MESH REF No 395 } ALL HIGH YIELD
 - 6) **JOINTS**
JOINTS BETWEEN PRECAST UNITS TO BE SEALED WITH GEOTEXTILE - 3.1mm THICK & 340g/m² OR SIMILAR.



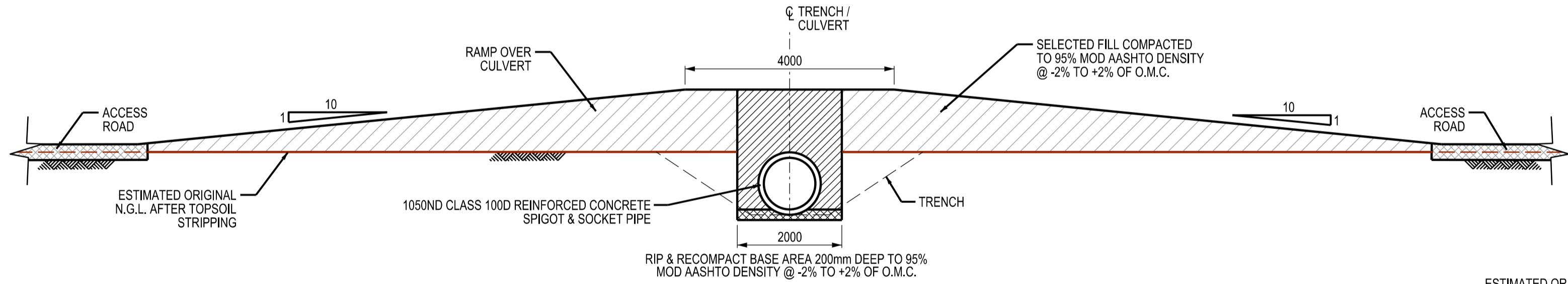
SECTION D - D
1050ND CLASS 100D SPIGOT & SOCKET REINFORCED CONCRETE PIPE ON CLASS C BEDDING
SCALE 1:50



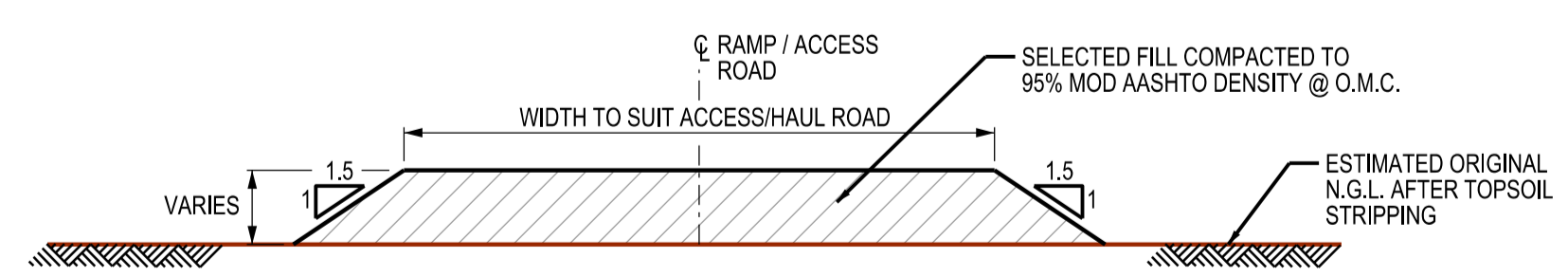
PLAN - TYPICAL ACCESS ROAD CULVERT FOR TRENCH
SCALE 1:75



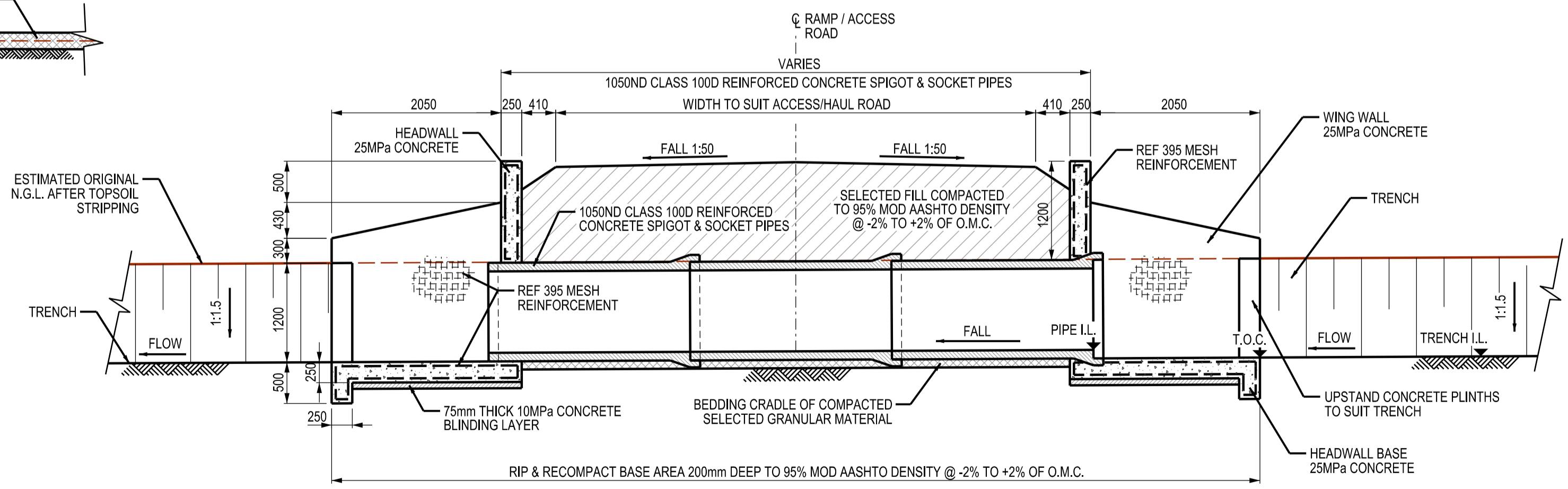
PLAN - CULVERT HEADWALL
SCALE 1:25



SECTION A - A
SCALE 1:75



SECTION B - B
SCALE 1:75



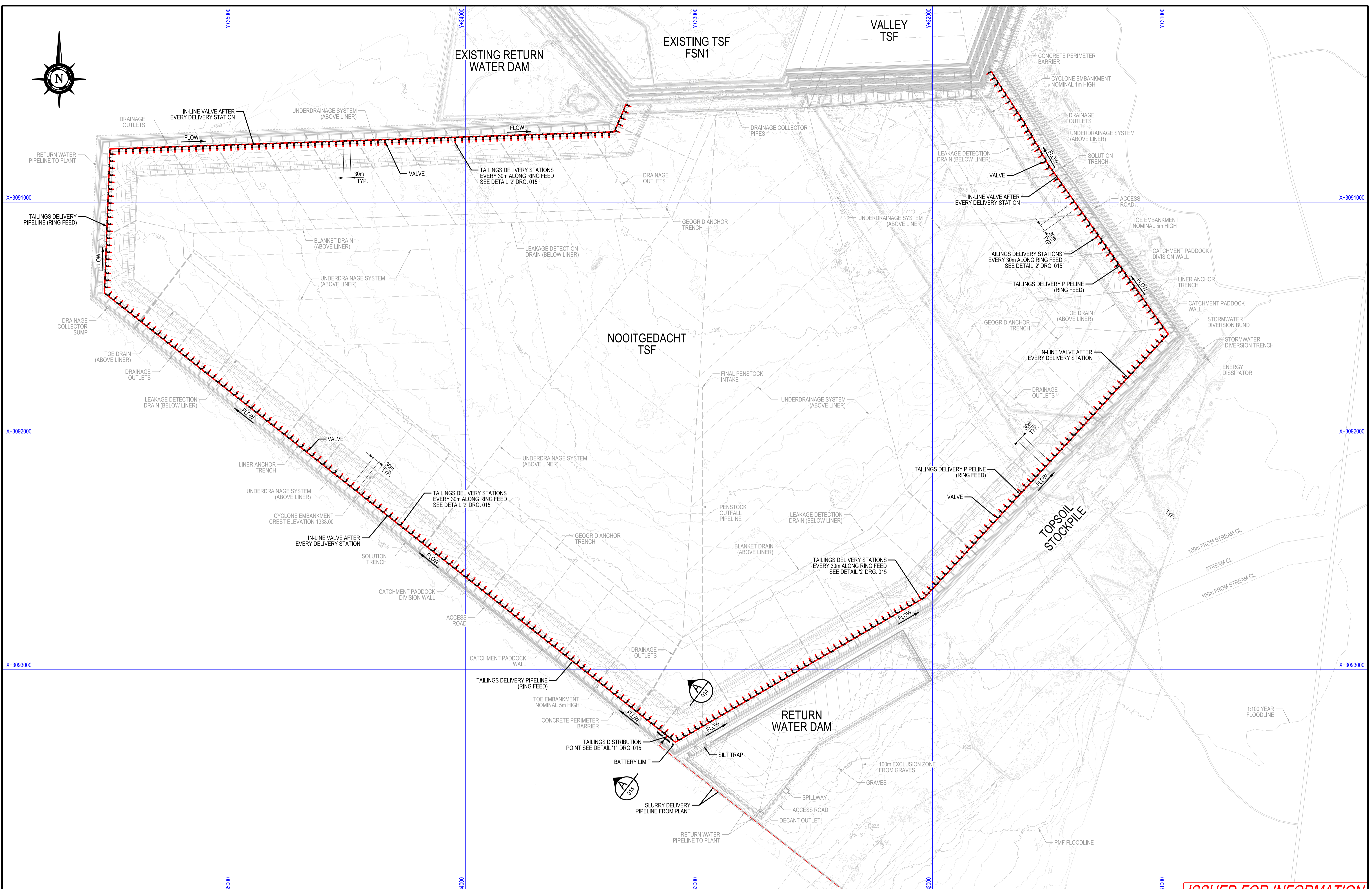
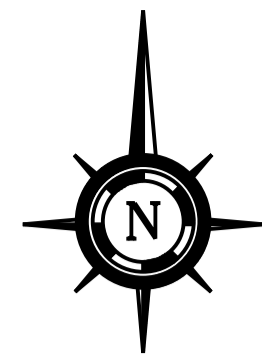
SECTION C - C
SCALE 1:50

ISSUED FOR INFORMATION

REVISIONS		REFERENCE DRAWINGS		REFERENCE DRAWINGS		
REV	DATE	DESCRIPTION	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT		
			003	FINAL HEIGHT GENERAL ARRANGEMENT		
			004	EARTHWORKS SECTIONS		

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				<p>APPROVED BY</p> <p>NAME: [Signature] QUALIFICATION & REG. No.: [Signature] SIGNATURE: [Signature] DATE: 22.07.24</p>	<p>CO-ORD SYSTEM: AS SHOWN</p> <p>SCALE: AS SHOWN X2</p>	<p>DRG No.: 2401265-012</p> <p>REV. A</p>

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REV	DATE	DESCRIPTION
A	2024-06-20	ISSUED FOR INFORMATION

DRG.No.	DRAWING TITLE
002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT
014	TAILINGS DELIVERY PIPELINE DETAILS 1
015	TAILINGS DELIVERY PIPELINE DETAILS 2

DRG.No.	DRAWING TITLE

GERRIT J. VAN RYSSSEN
 PR.ENG
 202302750

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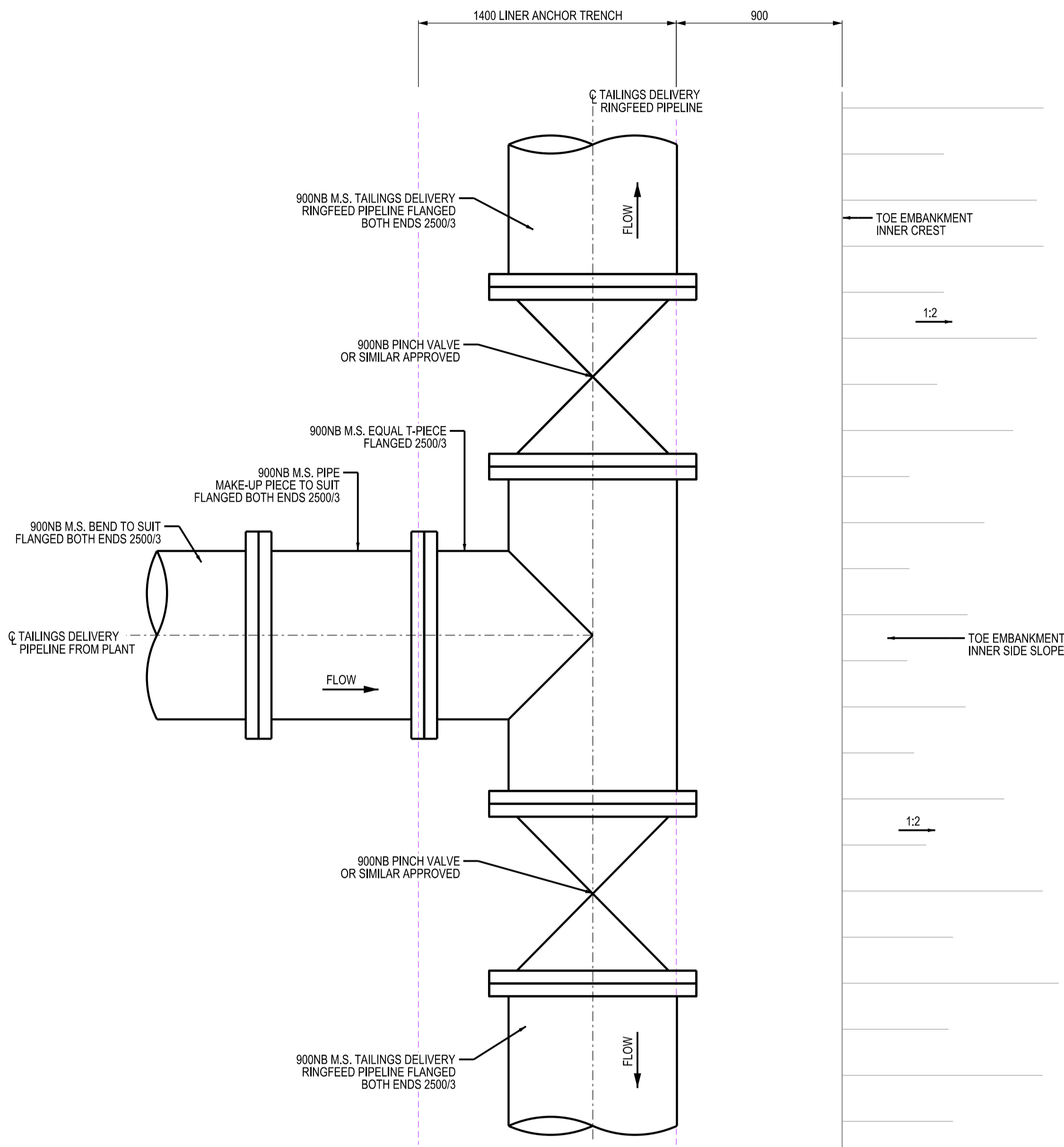
APPROVED BY

NAME: [Signature] QUALIFICATION & REG. No.: [Signature] SIGNATURE: [Signature] DATE: 22.07.24

DATE	SCALE
2024-06-20	A1 1:5000
2024-06-28	A3 1:10000

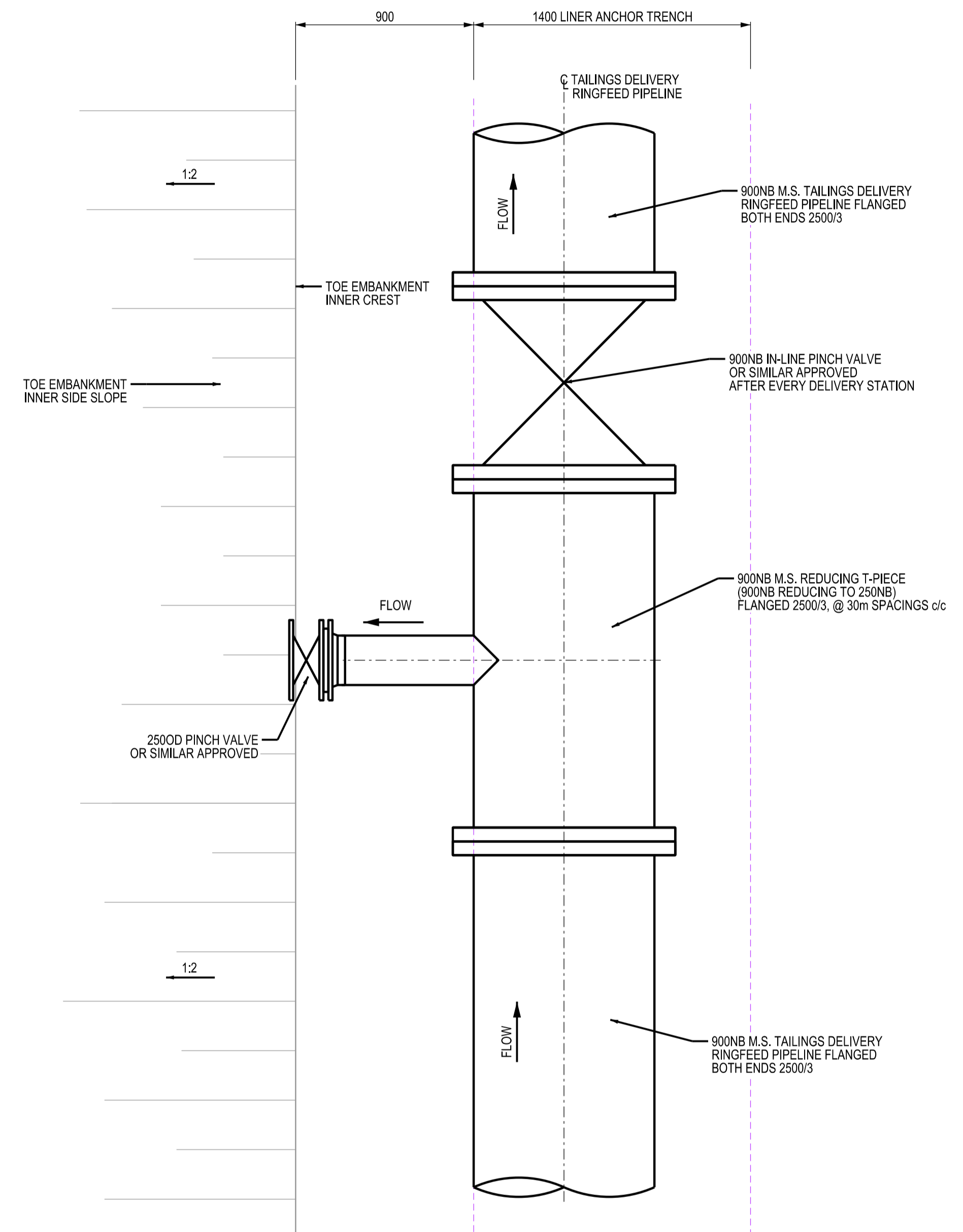
CLIENT	TITLE	DRG No.	REV.
HARMONY	HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) TAILINGS DELIVERY PIPELINE LAYOUT	2401265-013	A

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DETAIL '1' - ENLARGED PLAN ON TAILINGS DISTRIBUTION POINT FROM PLANT (1 No. REQUIRED)

SCALE 1:20



DETAIL '2' - PLAN ON TYPICAL TAILINGS DELIVERY STATION (336 No. REQUIRED)

SCALE 1:20

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REVISIONS		REFERENCE DRAWINGS		REFERENCE DRAWINGS		
REV	DATE	DESCRIPTION	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
A	2024-06-20	ISSUED FOR INFORMATION	013	TAILINGS DELIVERY PIPELINE LAYOUT	.	.
			014	TAILINGS DELIVERY PIPELINE DETAILS 1		

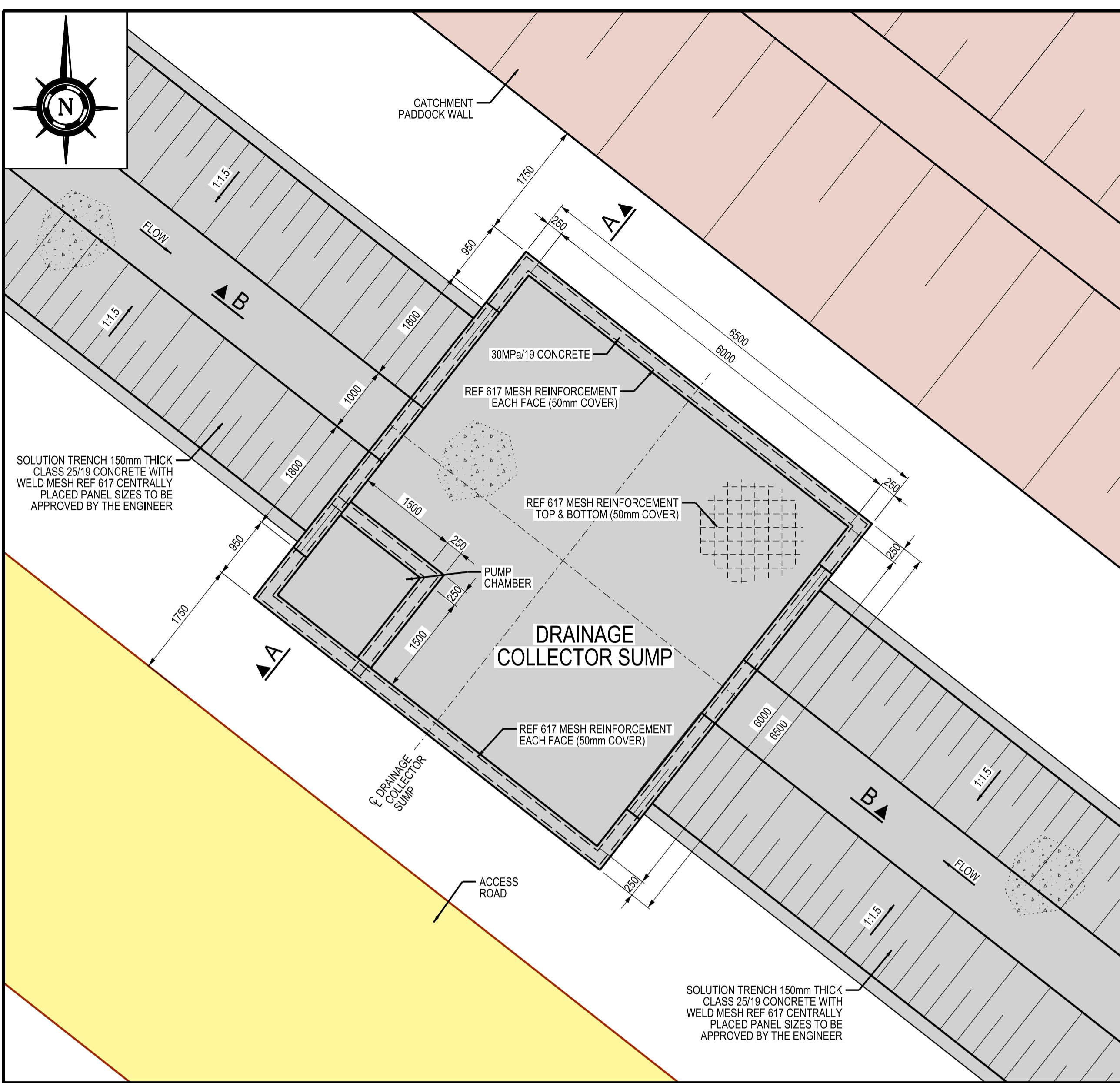
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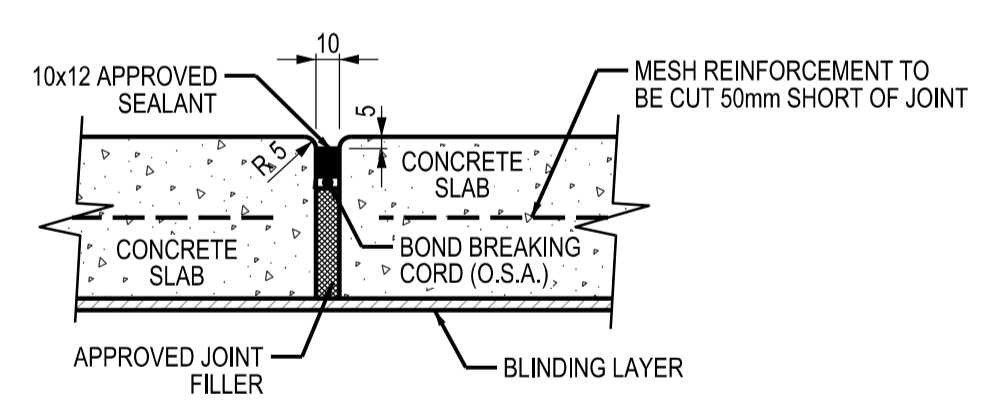
APPROVED BY
 NAME: GERRIT J. VAN RYSSSEN
 QUALIFICATION & REG. No.: PR.ENG
 SIGNATURE: [Signature]
 DATE: 22.07.24

DRAWN	2024-06-20
CHECKED	S.M.
DATE	2024-06-28
DESIGNED	S.M.I.H.
DATE	2024-06-17
CO-ORD SYSTEM	SCALE
WGS 84 LO27	A1 AS SHOWN A3 AS SHOWN X2

CLIENT	HARMONY	
TITLE	HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) TAILINGS DELIVERY PIPELINE DETAILS 2	
DRG No.	2401265-015	REV. A

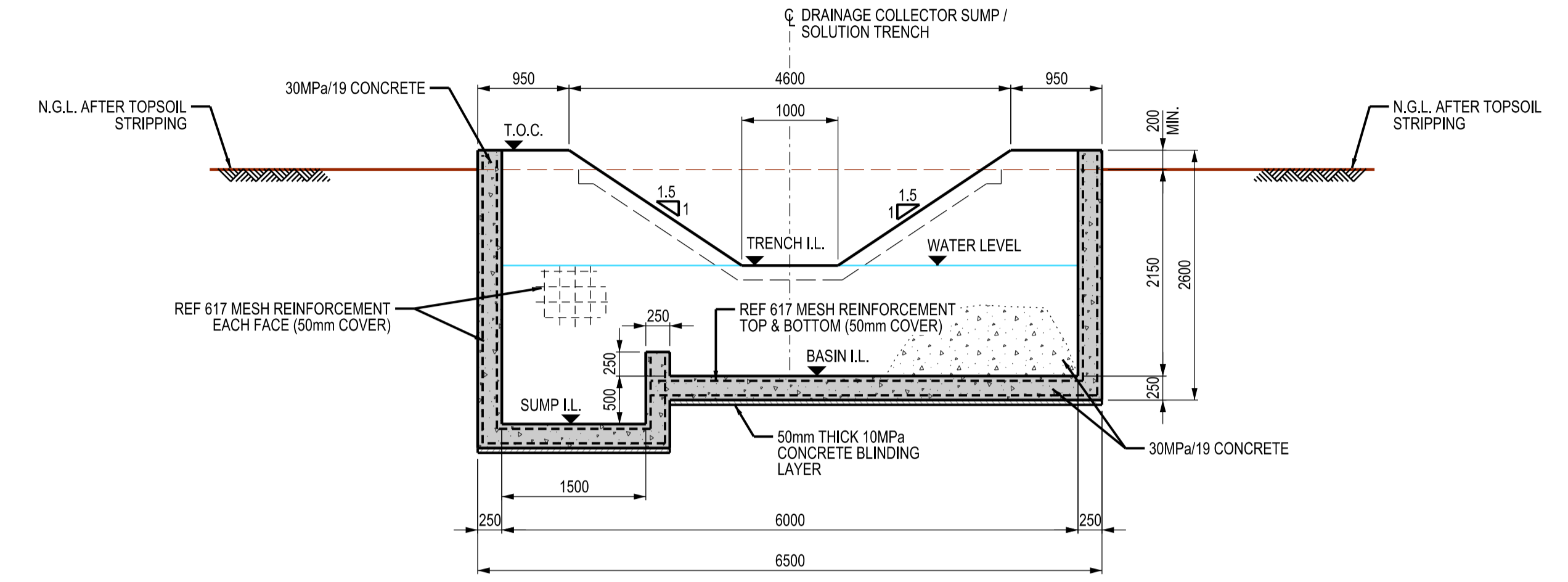


PLAN - DRAINAGE COLLECTOR SUMP
SCALE 1:50

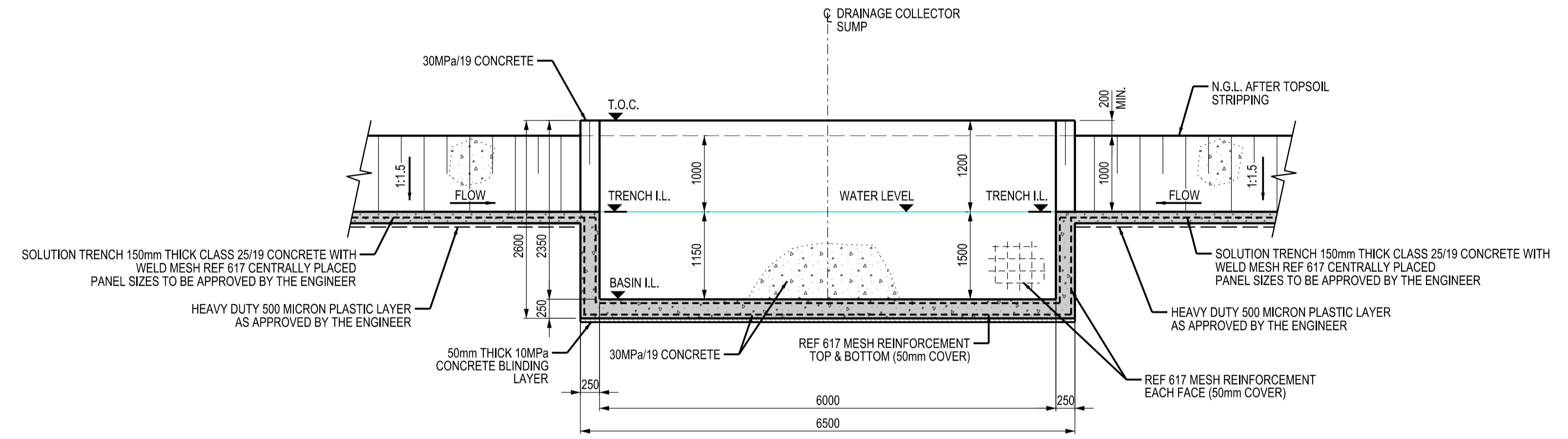


DETAIL '1' - SECTION CONSTRUCTION JOINT
N.T.S.

- NOTES:**
1. WELD MESH TO BE REF 617 - COVER TO REINFORCING TO BE 50mm MIN.
 2. EARTH ADJACENT TO CONCRETE TO BE COMPACTED.
 3. ALL EXPOSED CONCRETE TO HAVE A SMOOTH FINISH.
 4. ALL CONCRETE CORNERS IN CONTACT WITH THE LINING TO BE CHAMFERED MIN. 25mm.
 5. ALL CONSTRUCTION JOINTS TO BE AS PER DETAIL '1'. PANEL SIZES TO BE APPROVED BY THE ENGINEER. JOINTS TO BE WELL CLEANED & SCRABBLED TO EXPOSE FRESH AGGREGATE & THOROUGHLY WETTED BEFORE NEXT POUR.



SECTION A - A
SCALE 1:50



SECTION B - B
SCALE 1:50

ISSUED FOR INFORMATION

REVISIONS		REFERENCE DRAWINGS		REFERENCE DRAWINGS		
REV	DATE	DESCRIPTION	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT	.	.
			003	FINAL HEIGHT GENERAL ARRANGEMENT		
			004	EARTHWORKS SECTIONS		
			008	SOLUTION TRENCH SECTIONS & DETAILS		

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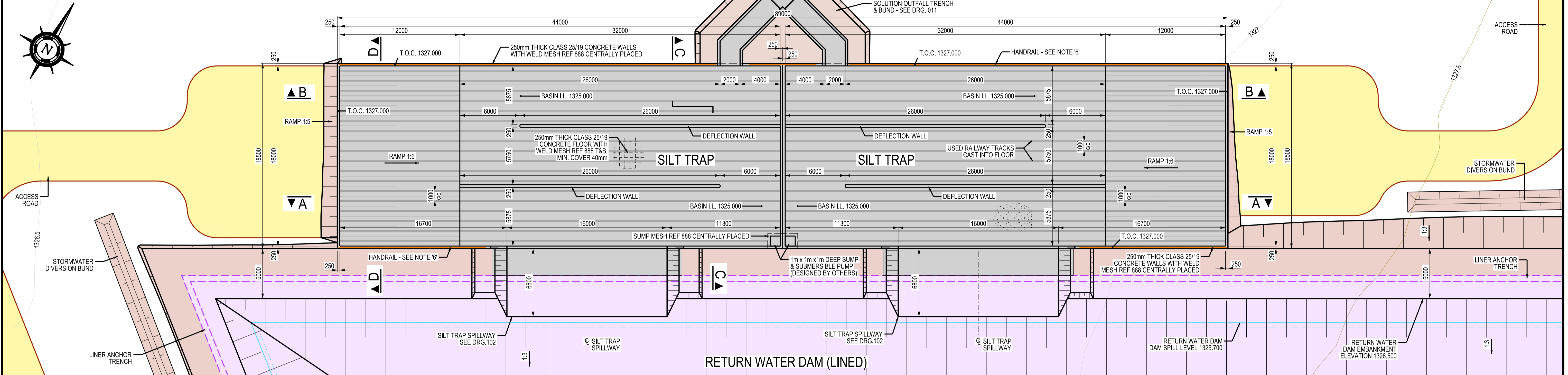
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E-mail : hello@geotheta.com

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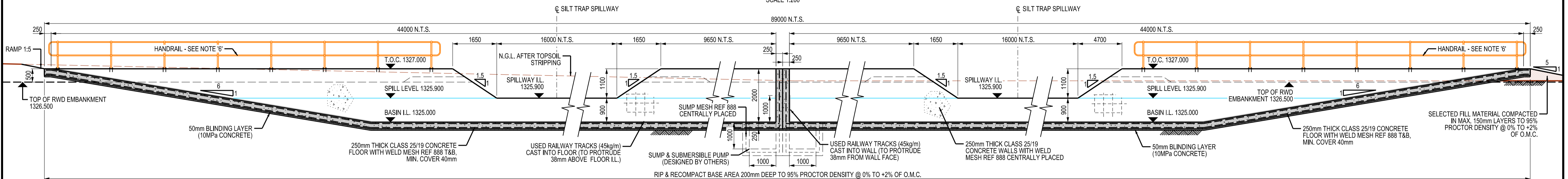
NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE
GERRIT J. VAN RYSSSEN	PR.ENG 202302750	<i>[Signature]</i>	22.07.24

DRAWN	2024-06-20
CHECKED	S.M.
DATE	2024-06-28
DESIGNED	S.M.I.H.
DATE	2024-06-17
CO-ORD SYSTEM	SCALE
A1	AS SHOWN
A3	AS SHOWN X2

CLIENT	HARMONY	
TITLE	HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) DRAINAGE COLLECTOR SUMP DETAILS	
DRG No.	2401265-016	REV. A

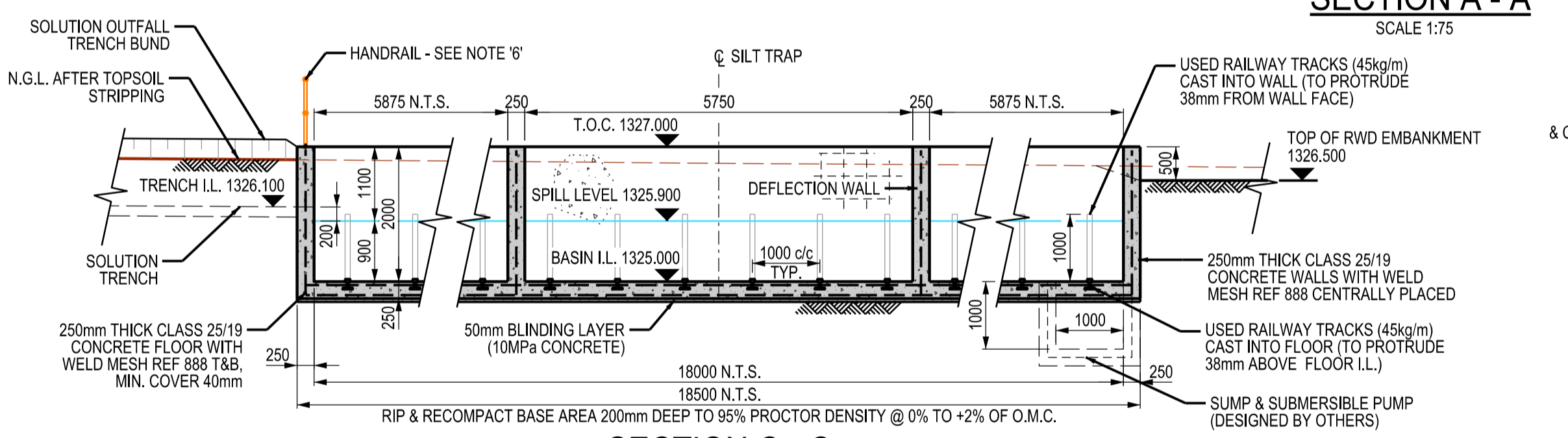


PLAN - SILT TRAP
SCALE 1:200

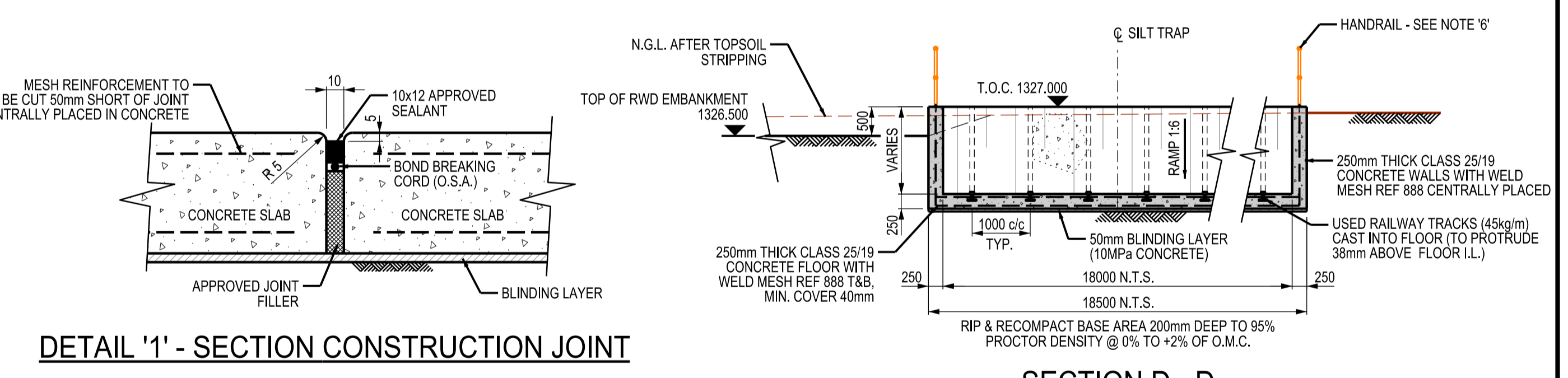


SECTION A - A
SCALE 1:75

- NOTES:**
- WELD MESH TO BE REF 888 (Y12 @ 200) CENTRALLY PLACED IN WALLS, TOP & BOTTOM IN FLOOR WITH MIN. 40mm COVER.
 - MINIMUM REINFORCING LAP LENGTH TO BE 600mm.
 - EARTH ADJACENT TO CONCRETE TO BE COMPACTED.
 - ALL CONCRETE TO HAVE A SMOOTH FINISH.
 - ALL CONSTRUCTION JOINTS TO BE AS PER DETAIL '1'. PANEL SIZES TO BE APPROVED BY THE ENGINEER. JOINTS TO BE WELL CLEANED & SCRABBLED TO EXPOSE FRESH AGGREGATE & THOROUGHLY WETTED BEFORE NEXT POUR.
 - ALL HANDRAILS TO BE STANDARD MS90 BALL TYPE TOP MOUNT HANDRAIL WITH STANCHIONS @ 2m c/c TYP. SECURED TO CONCRETE WITH M16 x 100mm LONG CINCH ANCHOR BOLTS C/W NUT & WASHER.
 - SILT TRAP INCLUDES INFRASTRUCTURE TO ENABLE CLEANING.



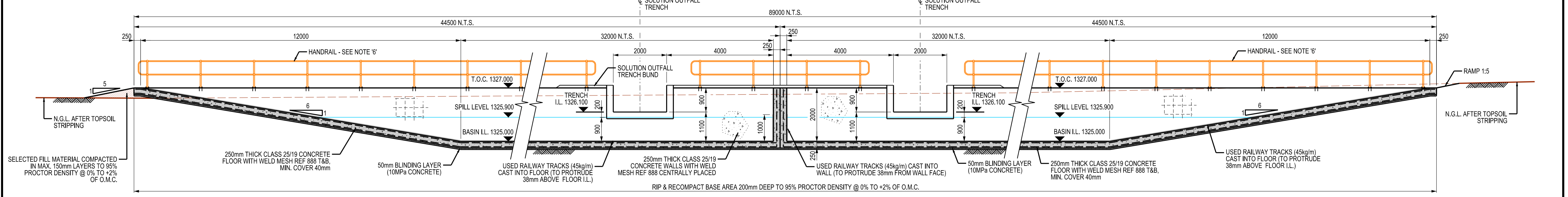
SECTION C - C
SCALE 1:75



SECTION D - D
SCALE 1:75



DETAIL '1' - SECTION CONSTRUCTION JOINT
N.T.S.



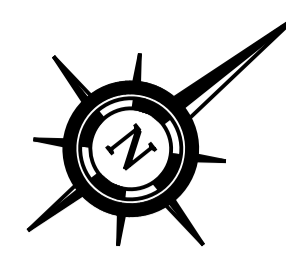
SECTION B - B
SCALE 1:75

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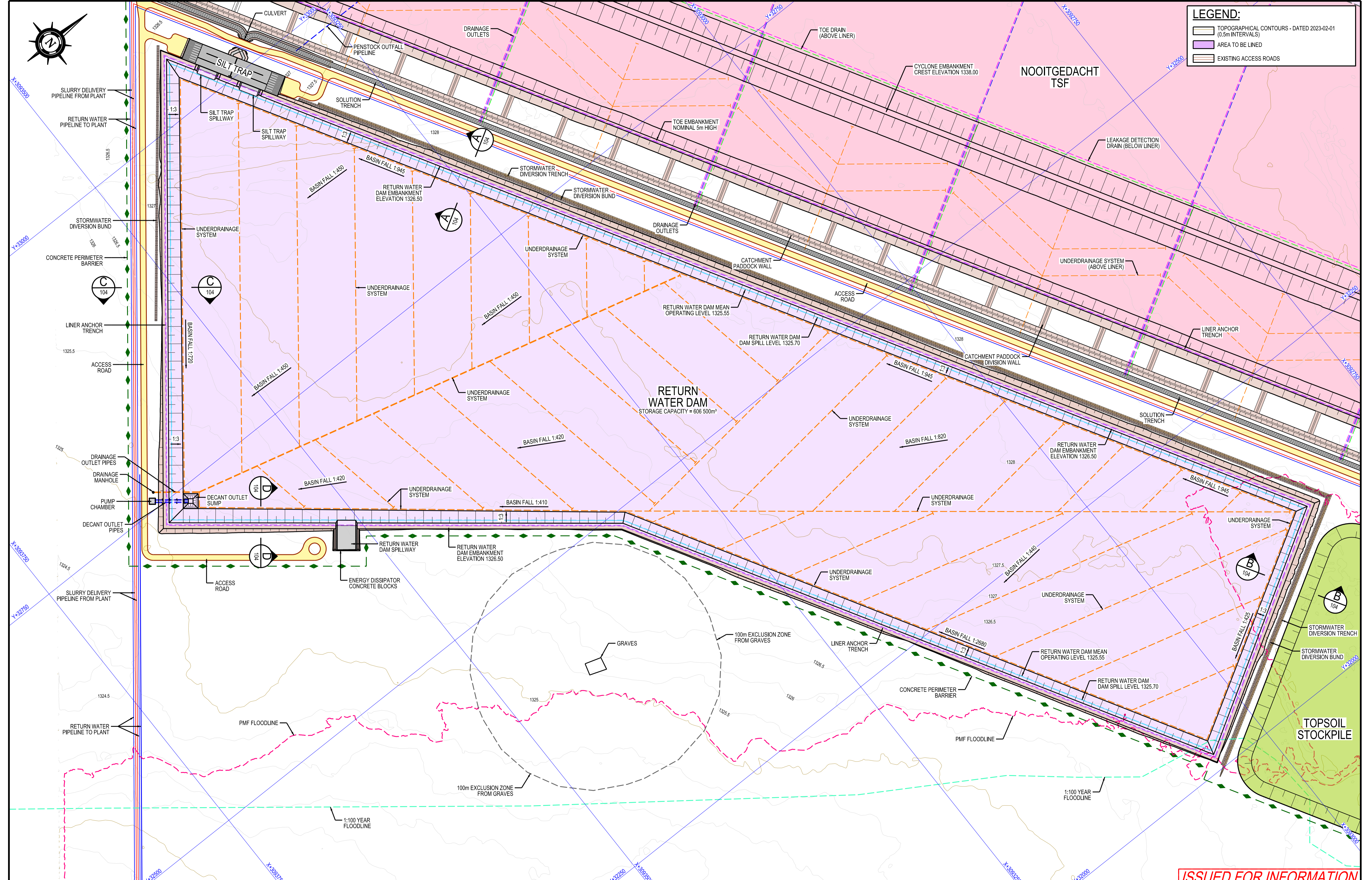
REV	DATE	DESCRIPTION	DRG.No.	REFERENCE DRAWINGS
A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT
B	2024-07-19	REINFORCEMENT DETAILS REVISED	011	SOLUTION OUTFALL TRENCH PLAN, SECTIONS & DTLS
			102	SILT TRAP SPILLWAY DETAILS
			103	RETURN WATER DAM GENERAL ARRANGEMENT
			104	RETURN WATER DAM SECTIONS & DETAILS

<p>GEOTHETA CONSULTING ENGINEERS AND SCIENTISTS</p> <p>Ground Floor, Twickenham Building, The Campus, Cnr Skane & Main, Bryanston, 2021 Republic of South Africa Phone : +27 11 575 3002 E-mail : hello@geotheta.com</p>				<p>DRAWN 2024-06-20</p> <p>CHECKED S.M.</p> <p>DATE 2024-06-28</p> <p>DESIGNED S.M.I.H.</p> <p>DATE 2024-06-17</p>	<p>CLIENT HARMONY</p> <p>TITLE HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLODED) RETURN WATER DAM SILT TRAP PLAN, SECTIONS & DETAILS</p>
<p>APPROVED BY</p> <p>NAME: GERRIT J. VAN RYSSSEN, QUALIFICATION & REG. No.: PR.ENG, SIGNATURE: [Signature], DATE: 22.07.24</p>				<p>CO-ORD SYSTEM WGS 84 LO27</p> <p>SCALE A1 AS SHOWN, A3 AS SHOWN X2</p>	<p>DRG No. 2401265-101</p> <p>REV. B</p>

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LEGEND:	
	TOPOGRAPHICAL CONTOURS - DATED 2023-02-01 (0.5m INTERVALS)
	AREA TO BE LINED
	EXISTING ACCESS ROADS



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REV	DATE	DESCRIPTION	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT		
			101	SILT TRAP PLAN, SECTIONS & DETAILS		
			102	SILT TRAP SPILLWAY DETAILS		
			104	RETURN WATER DAM SECTIONS & DETAILS		
			105	RETURN WATER DAM SPILLWAY DETAILS		
			106	RETURN WATER DAM UNDERDRAINAGE DETAILS		
			107	RETURN WATER DAM DECANT STRUCTURE DETAILS		

APPROVED BY			
NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE
GERRIT J. VAN RYSSSEN	PR.ENG 202302750		22.07.24

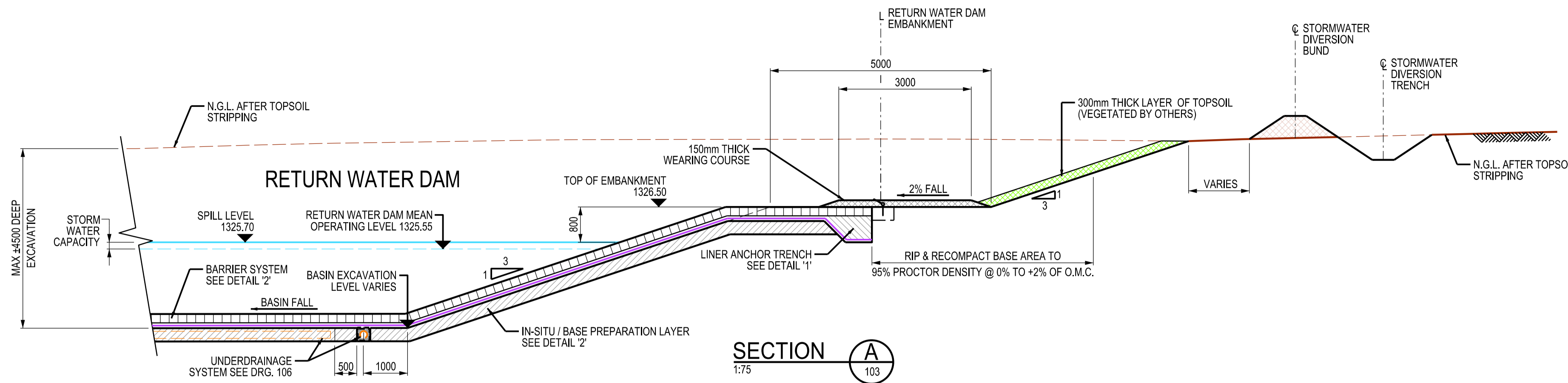
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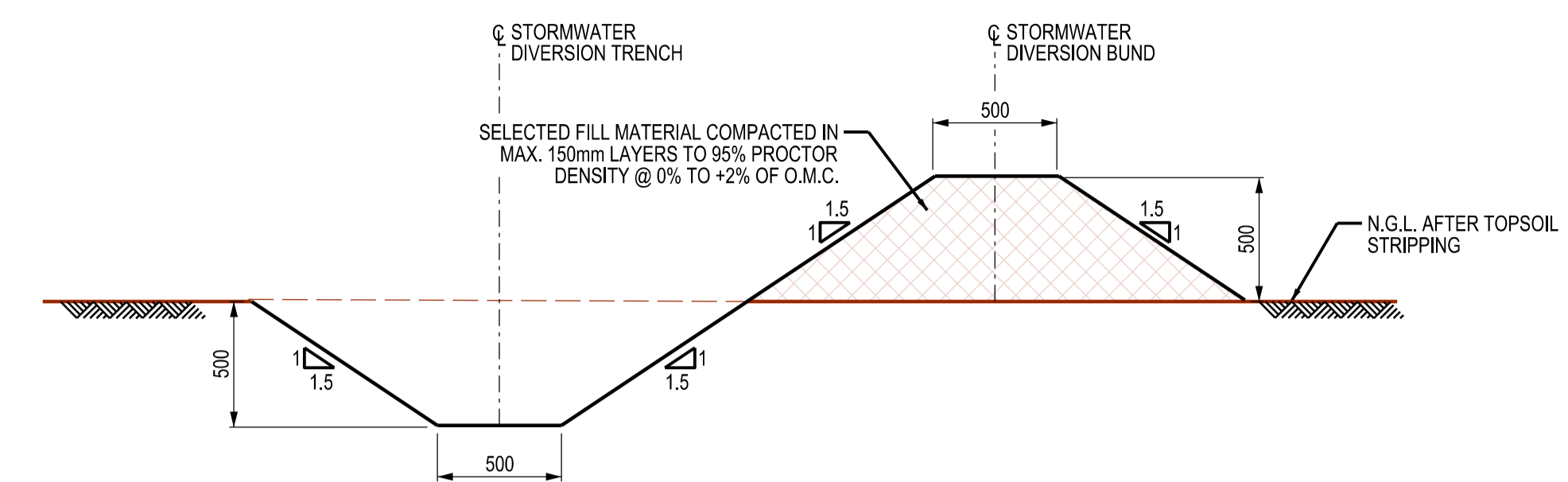
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CHECKED	S.M.
DATE	2024-06-28
DESIGNED	S.M.I.H.
DATE	2024-06-17
CO-ORD SYSTEM	WGS 84 LO27
SCALE	A1 1:1500 A3 1:3000

CLIENT	HARMONY	
TITLE	HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) RETURN WATER DAM GENERAL ARRANGEMENT	
DRG No.	2401265-103	REV. A

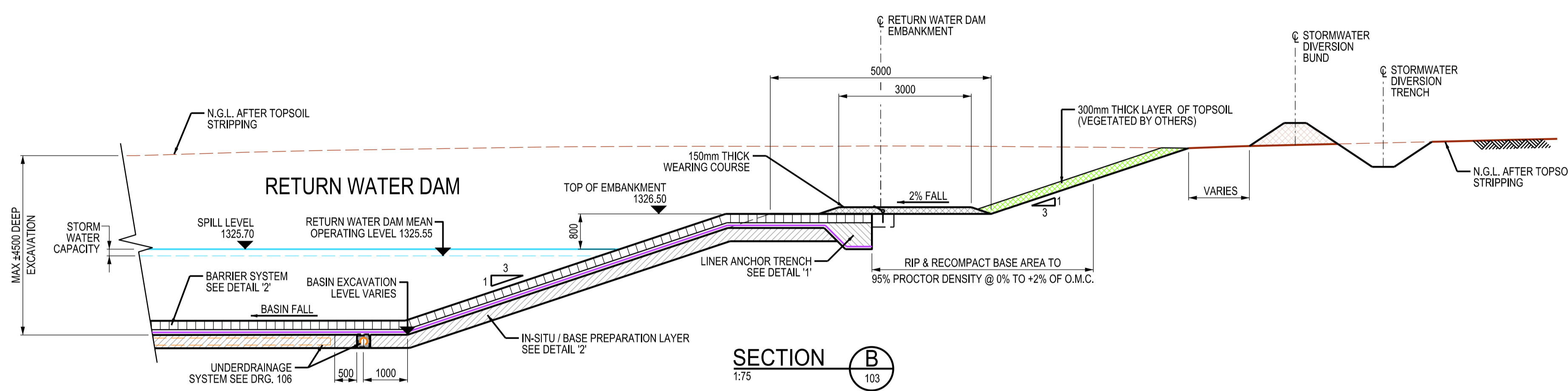
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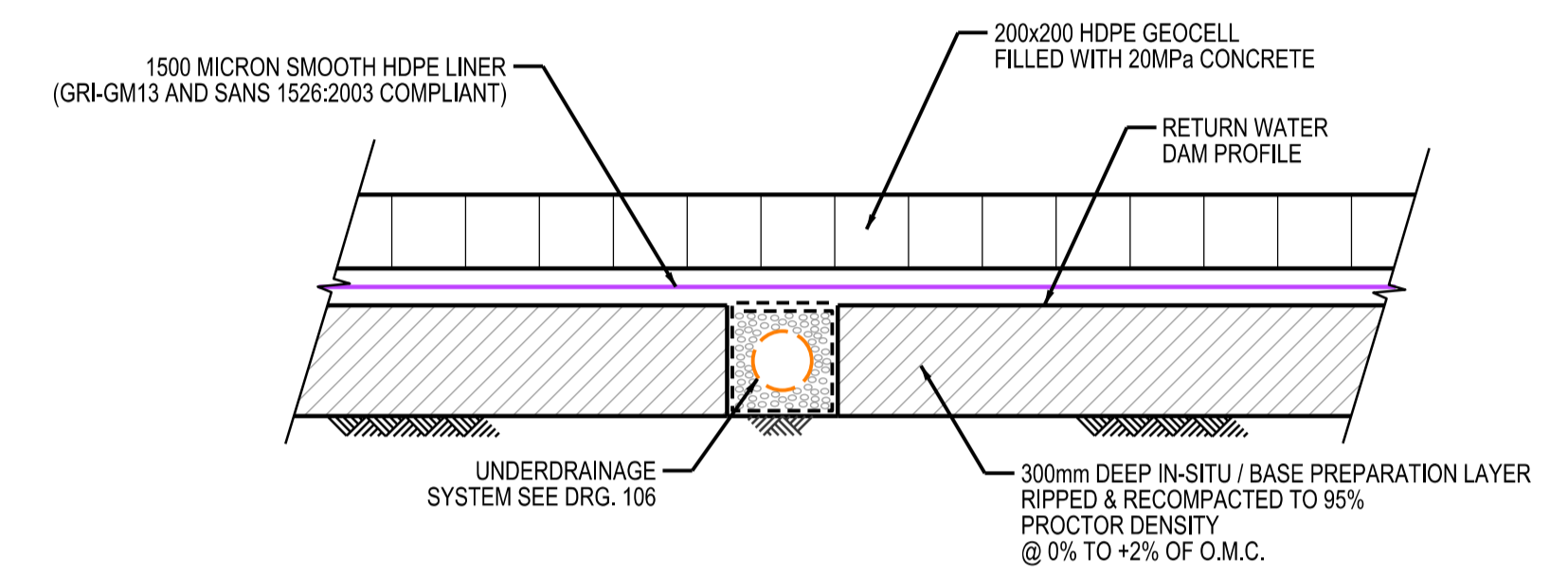
SECTION A
1:75



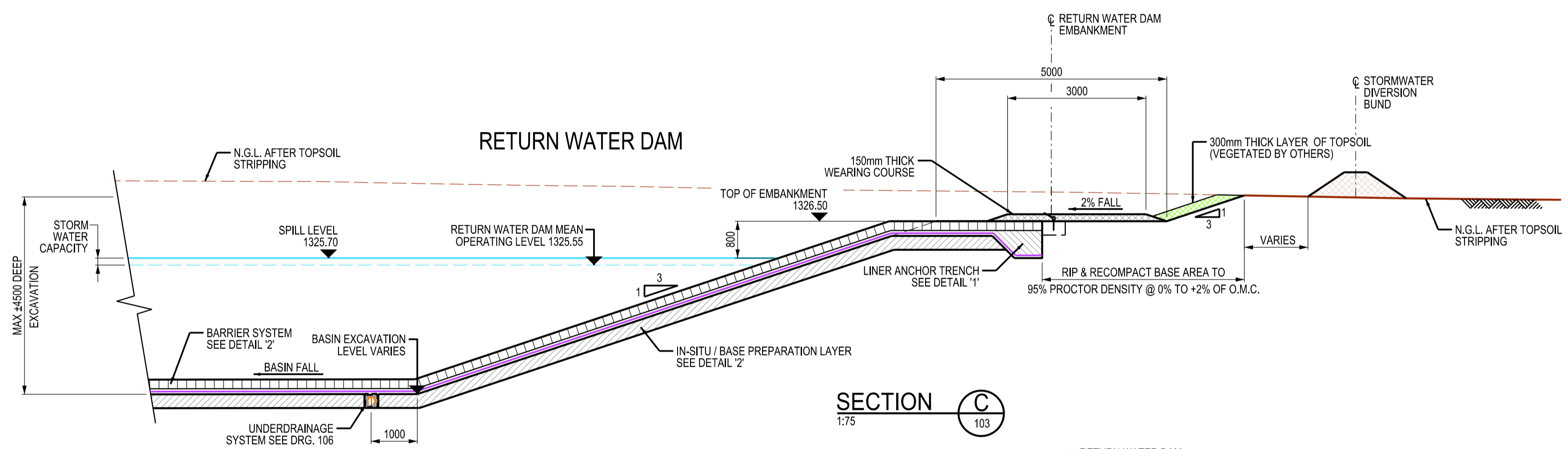
TYPICAL SECTION - STORMWATER DIVERSION BUND / TRENCH
SCALE 1:25



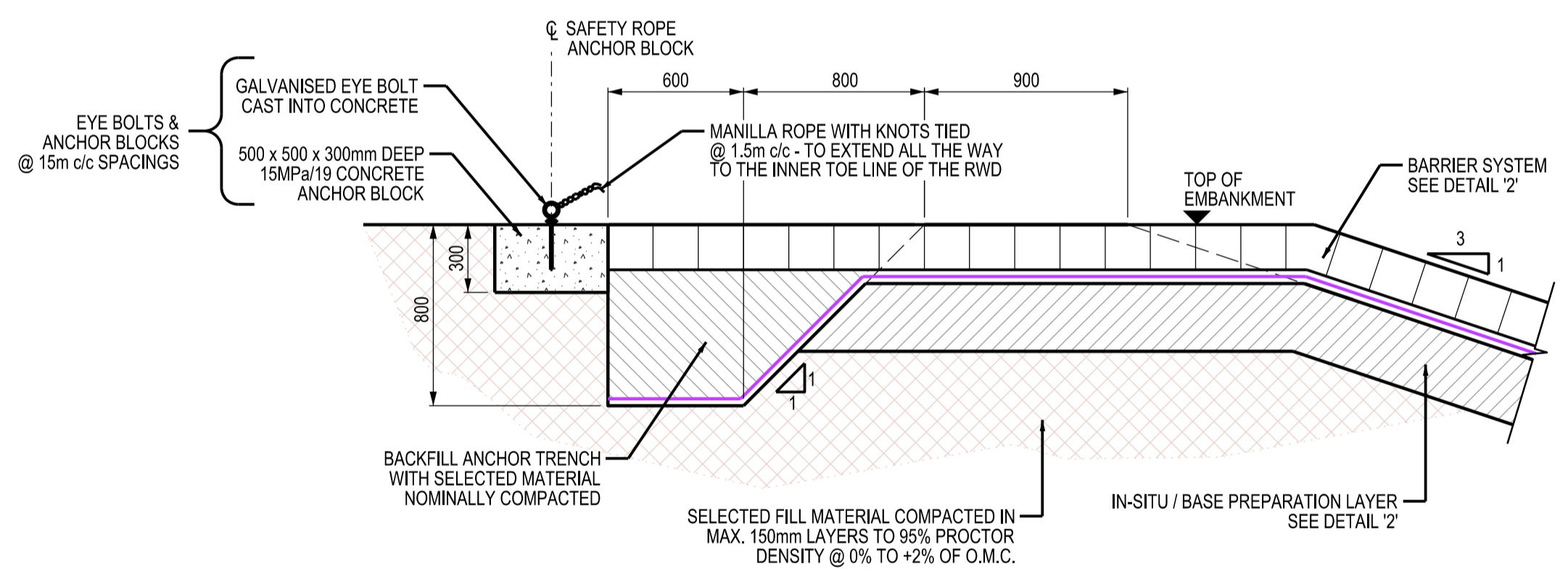
SECTION B
1:75



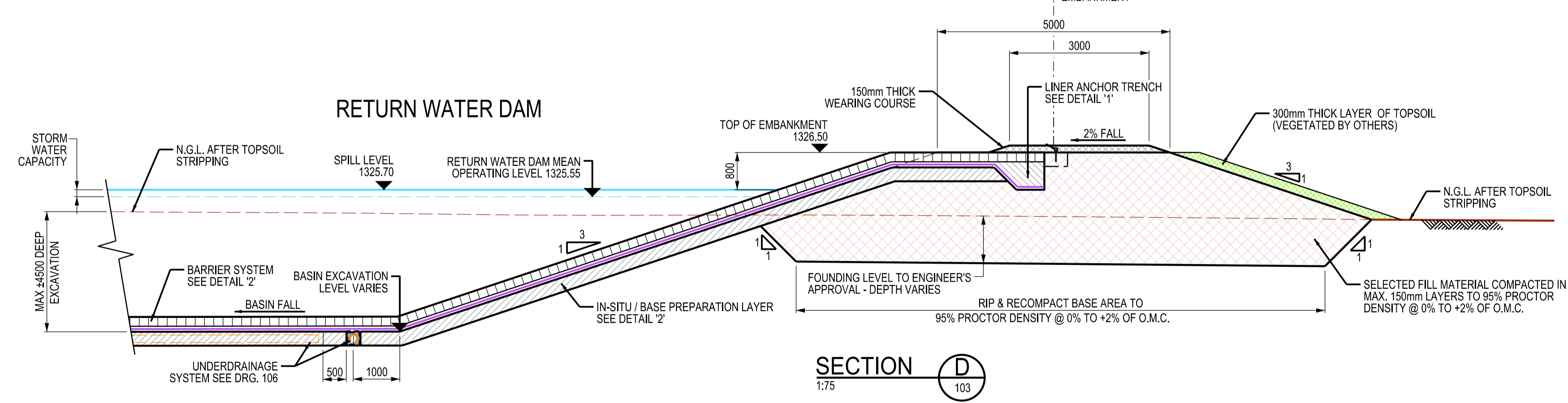
DETAIL '2' - BARRIER SYSTEM
SCALE 1:20



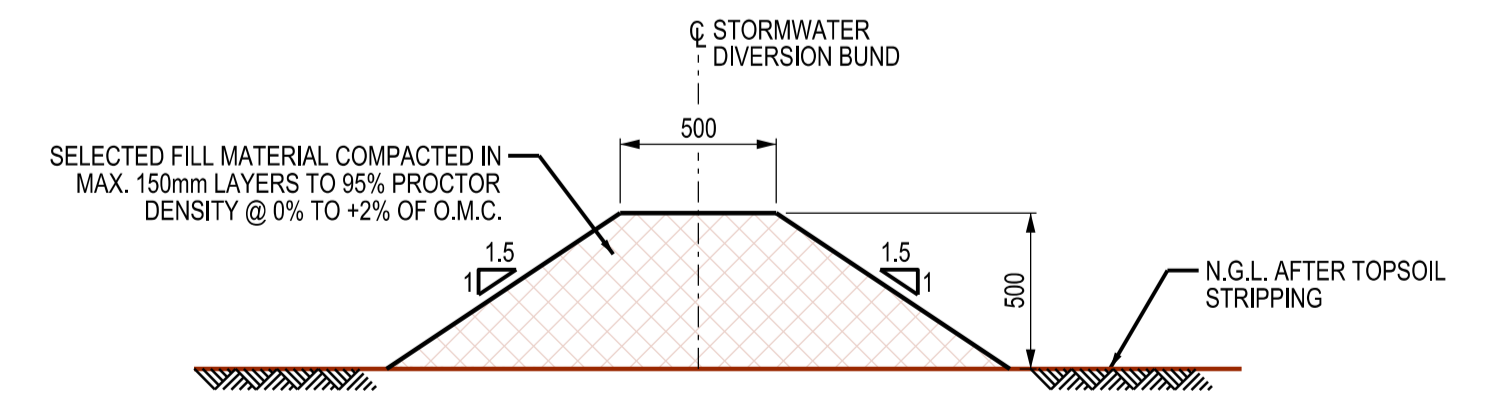
SECTION C
1:75



DETAIL '1' - SECTION SHOWING LINER ANCHOR TRENCH AND ANCHOR BLOCK FOR SAFETY ROPE
SCALE 1:25



SECTION D
1:75



TYPICAL SECTION - STORMWATER DIVERSION BUND
SCALE 1:25

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REVISIONS		REFERENCE DRAWINGS		REFERENCE DRAWINGS		
REV	DATE	DESCRIPTION	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT		
			103	RETURN WATER DAM GENERAL ARRANGEMENT		
			106	RETURN WATER DAM UNDERDRAINAGE DETAILS		

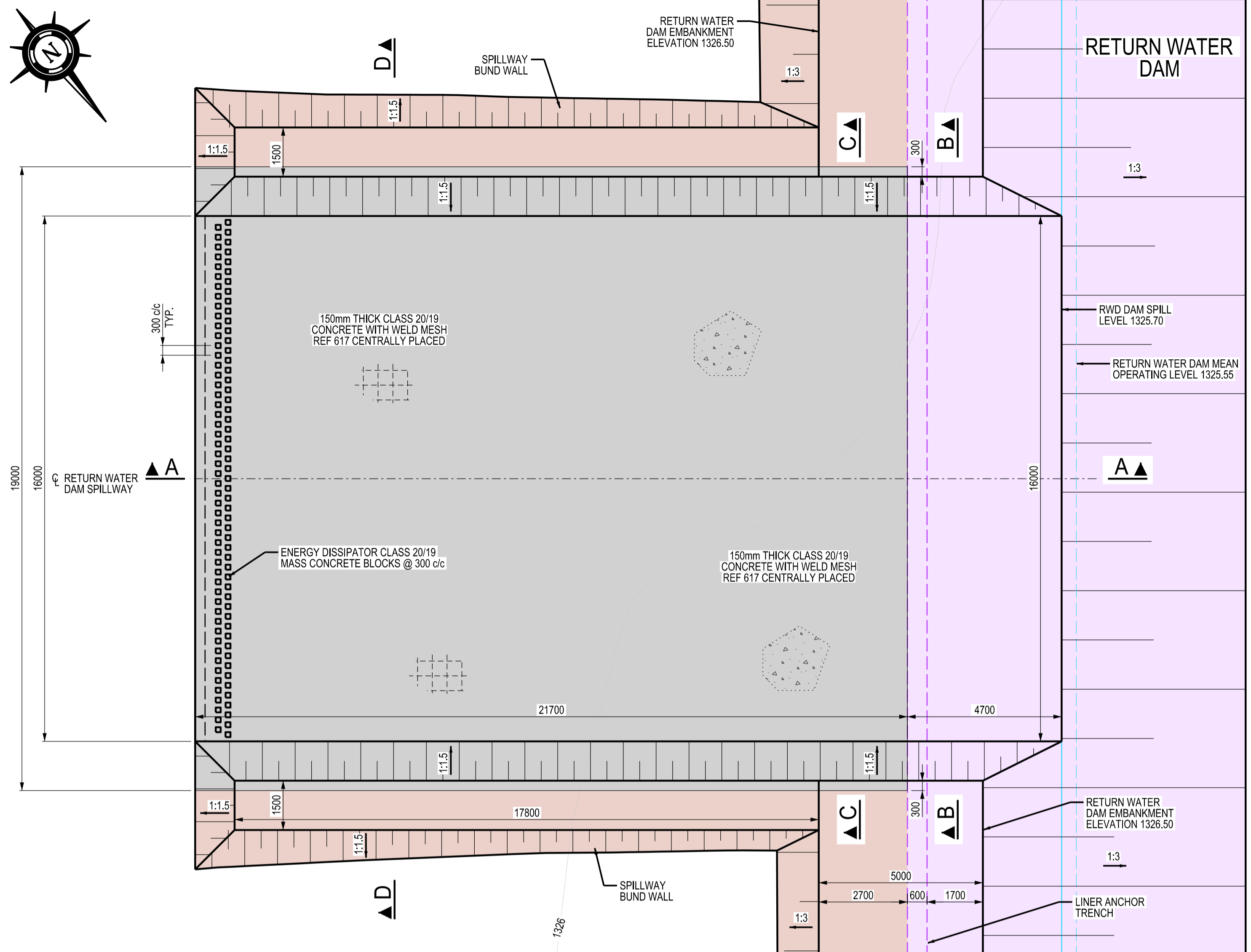
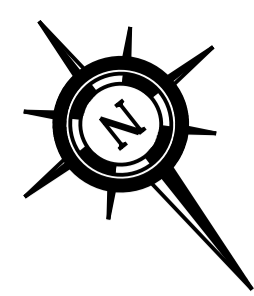
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APPROVED BY
 NAME: GERRIT J. VAN RYSSSEN
 QUALIFICATION & REG. No.: PR.ENG
 SIGNATURE: [Signature]
 DATE: 22.07.24

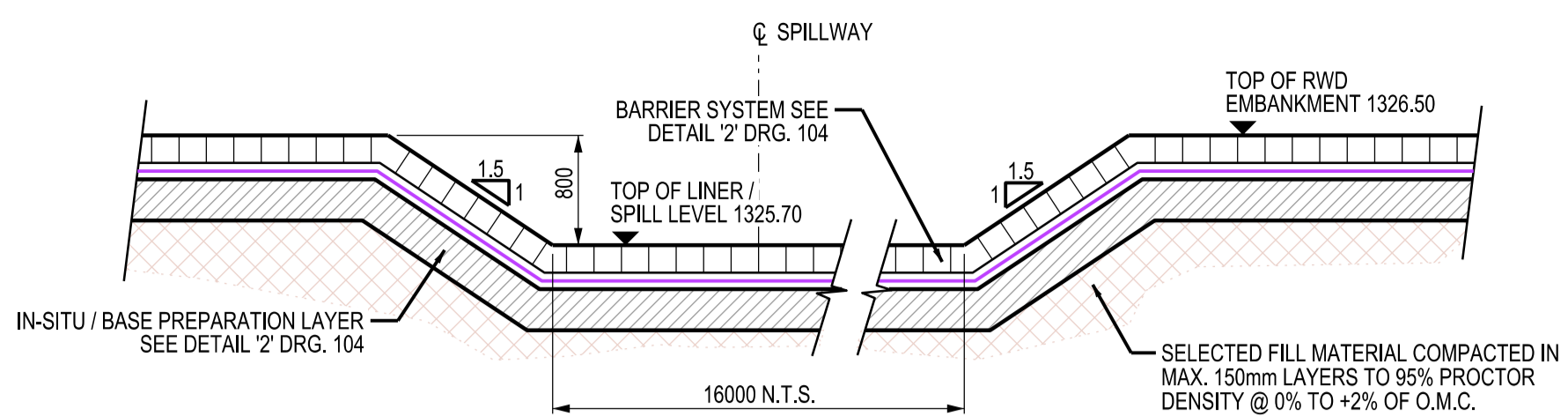
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2024-06-28	AS SHOWN X2

CLIENT	TITLE	DRG No.	REV.
HARMONY	HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) RETURN WATER DAM SECTIONS & DETAILS	2401265-104	A

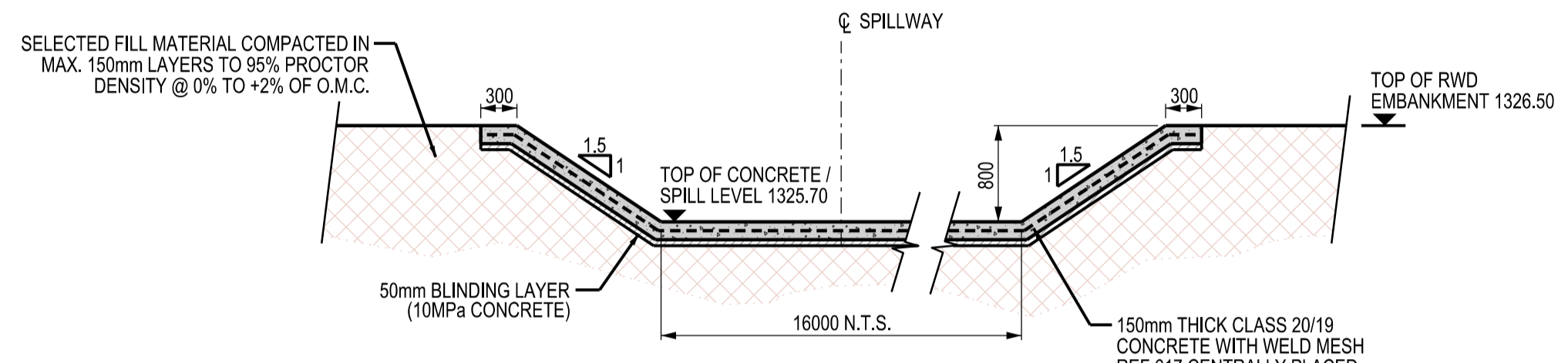


PLAN - RETURN WATER DAM SPILLWAY
SCALE 1:100

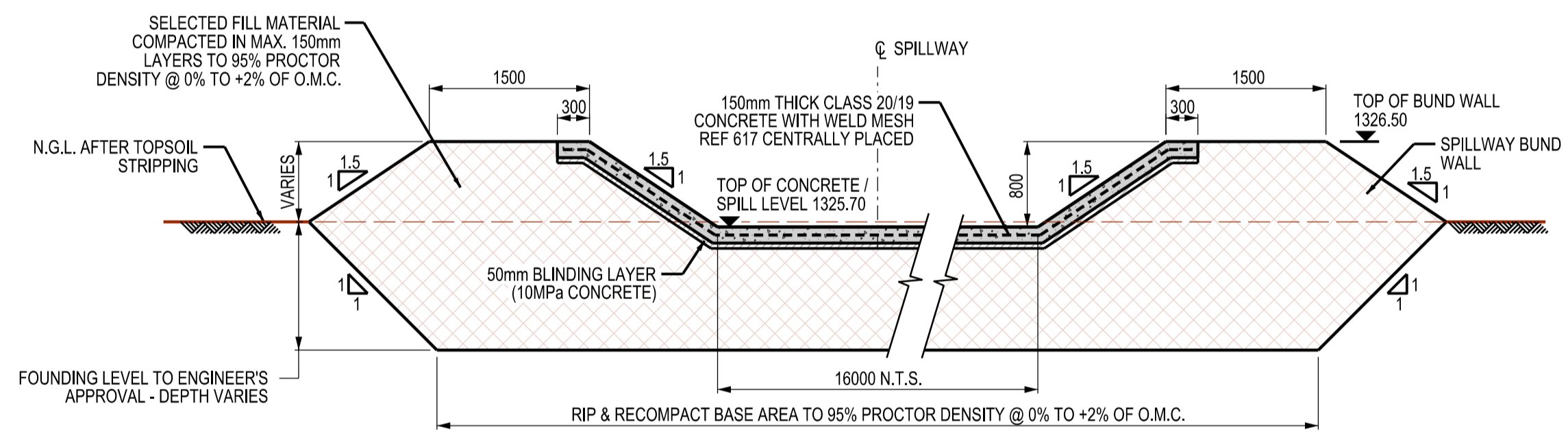
- NOTES:**
1. WELD MESH TO BE REF 617 CENTRALLY PLACED.
 2. MINIMUM REINFORCING LAP LENGTH TO BE 600mm.
 3. EARTH ADJACENT TO CONCRETE TO BE COMPACTED.
 4. ALL CONCRETE TO HAVE A SMOOTH FINISH.
 5. ALL CONCRETE CORNERS IN CONTACT WITH THE LINING TO BE CHAMFERED MIN. 25mm.
 6. ALL CONSTRUCTION JOINTS TO BE AS PER DETAIL '1'. PANEL SIZES TO BE APPROVED BY THE ENGINEER. JOINTS TO BE WELL CLEANED & SCRABBLED TO EXPOSE FRESH AGGREGATE & THOROUGHLY WETTED BEFORE NEXT POUR.



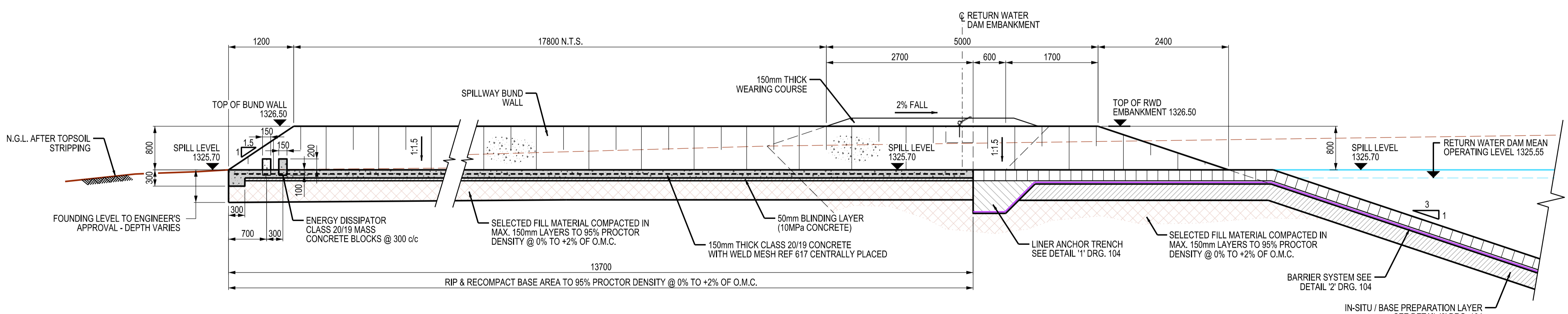
**SECTION B - B
SPILLWAY HDPE PORTION**
SCALE 1:50



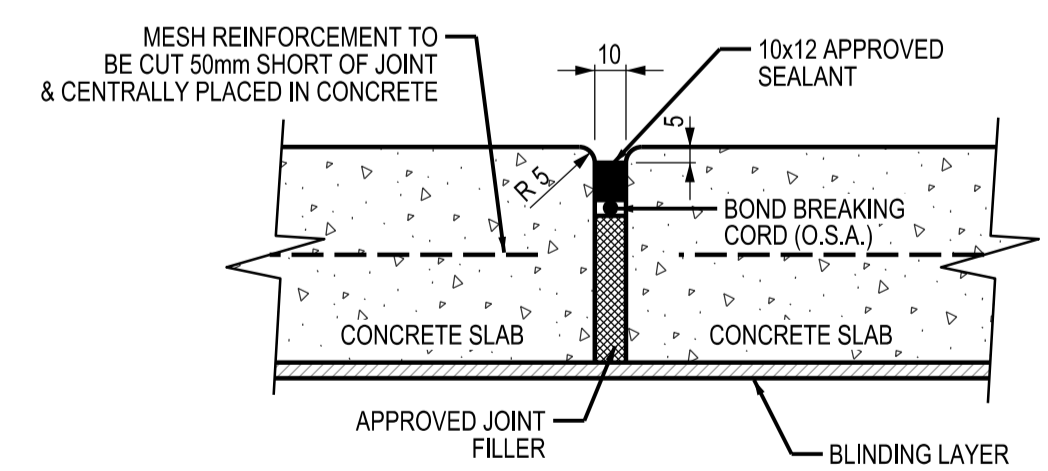
**SECTION C - C
SPILLWAY CONCRETE PORTION**
SCALE 1:50



**SECTION D - D
SPILLWAY CONCRETE PORTION**
SCALE 1:50



SECTION A - A
SCALE 1:50



**DETAIL '1' - SECTION
CONSTRUCTION JOINT**
N.T.S.

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REVISIONS		REFERENCE DRAWINGS	
REV	DATE	DESCRIPTION	DRG.No.
A	2024-06-20	ISSUED FOR INFORMATION	002
			104

REFERENCE DRAWINGS		REFERENCE DRAWINGS	
DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT		
104	RETURN WATER DAM SECTIONS & DETAILS		

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APPROVED BY: *[Signature]*

NAME	QUALIFICATION & REG. No.	SIGNATURE	DATE
GERRIT J. VAN RYSSSEN	PR.ENG 202302750	<i>[Signature]</i>	22.07.24

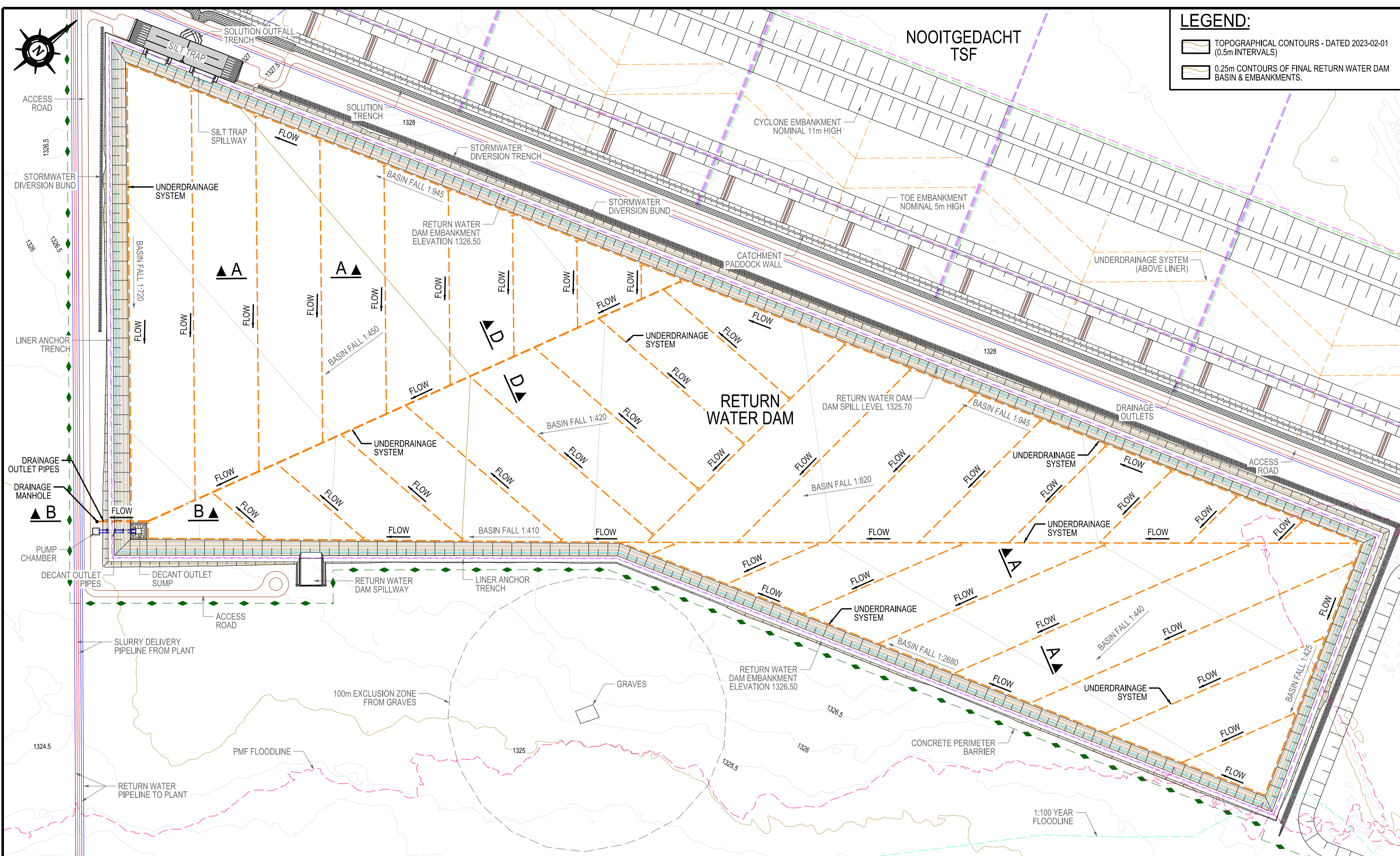
CO-ORD SYSTEM: WGS 84 LO27

DRAWN	DATE	CHECKED	DATE	DESIGNED	DATE
	2024-06-20	S.M.	2024-06-28	S.M.I.H.	2024-06-17

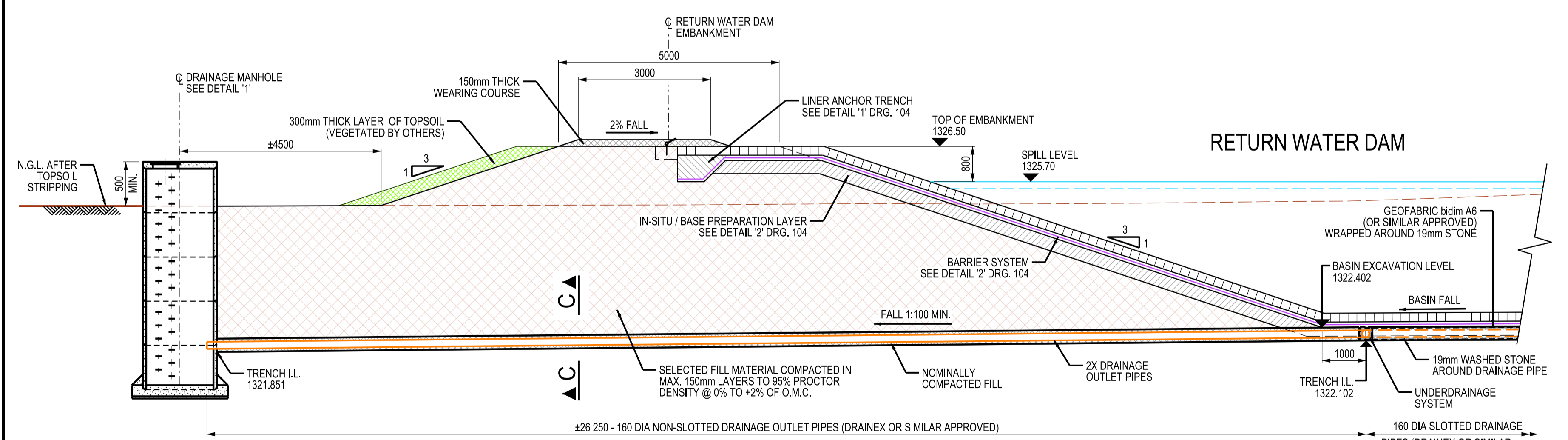
SCALE	SCALE
A1 AS SHOWN	A3 AS SHOWN X2

CLIENT	TITLE	DRG No.	REV.
HARMONY	HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) RETURN WATER DAM SPILLWAY DETAILS	2401265-105	A

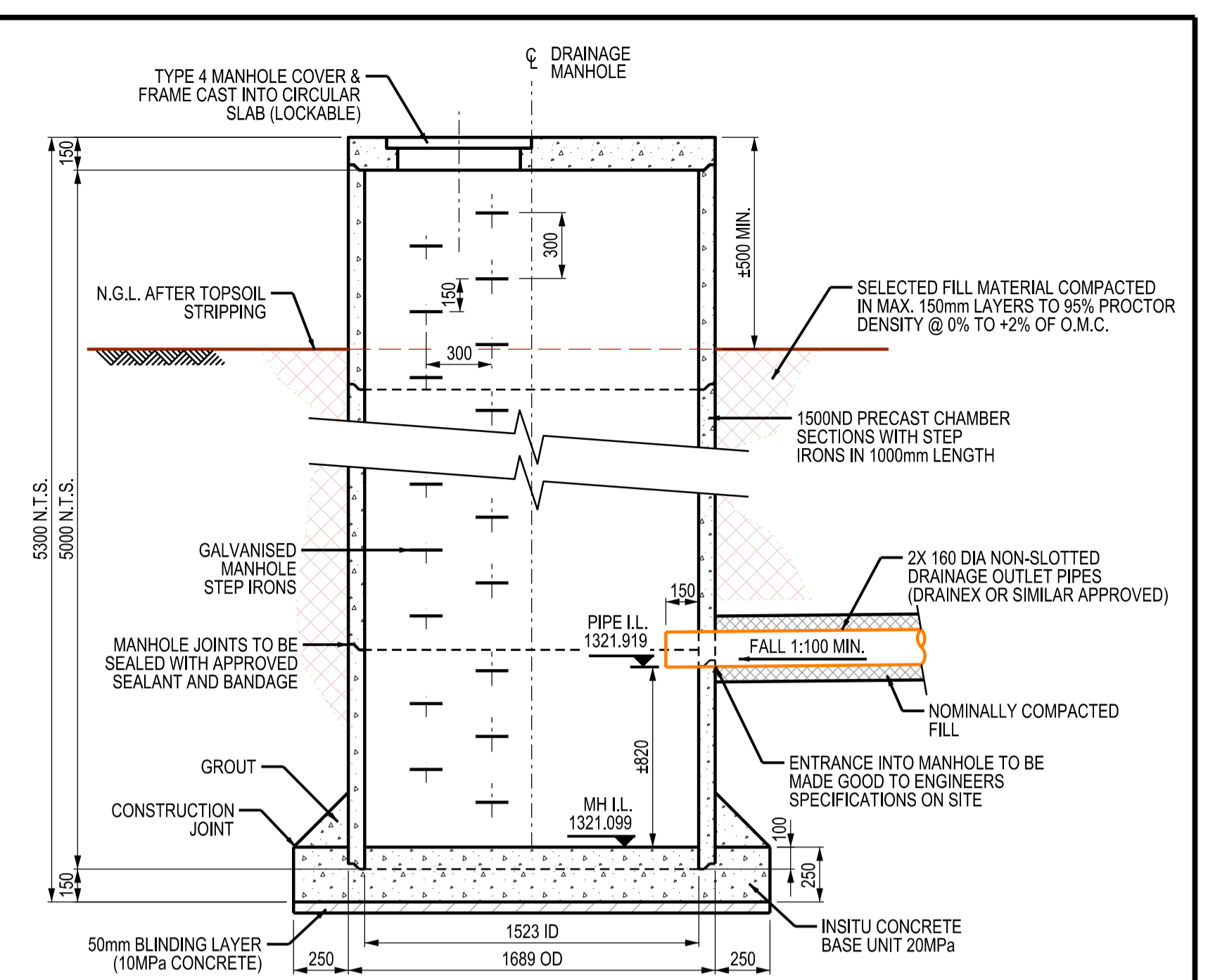
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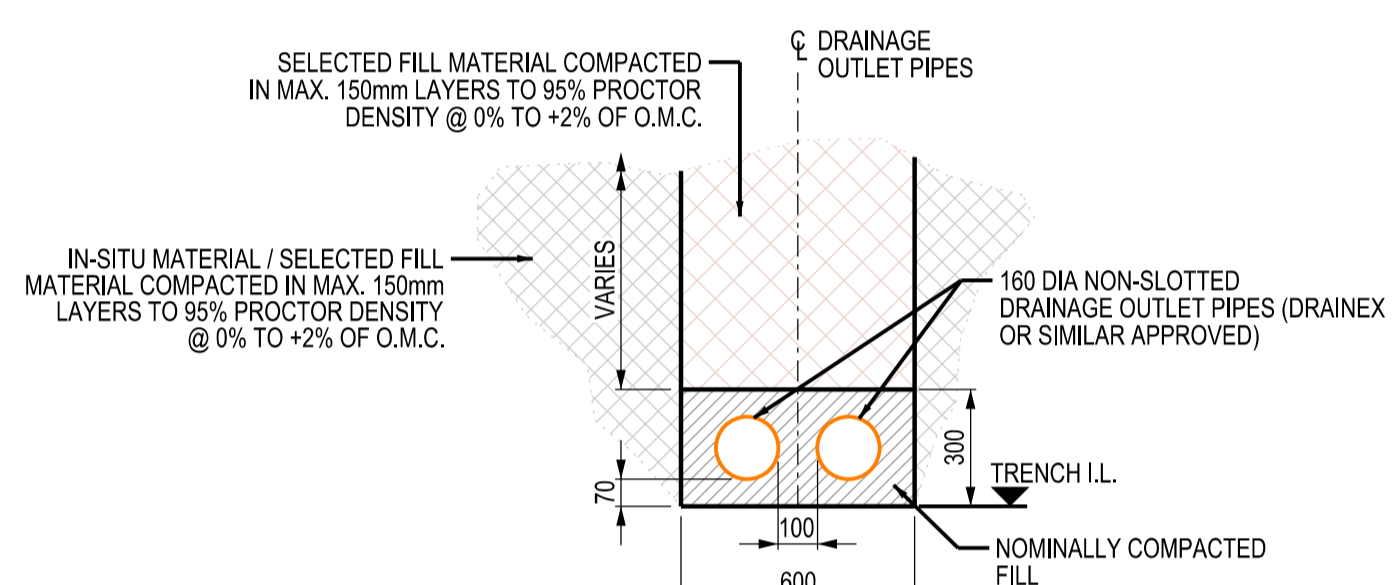
PLAN - RETURN WATER DAM UNDERDRAINAGE SYSTEM
SCALE 1:2000



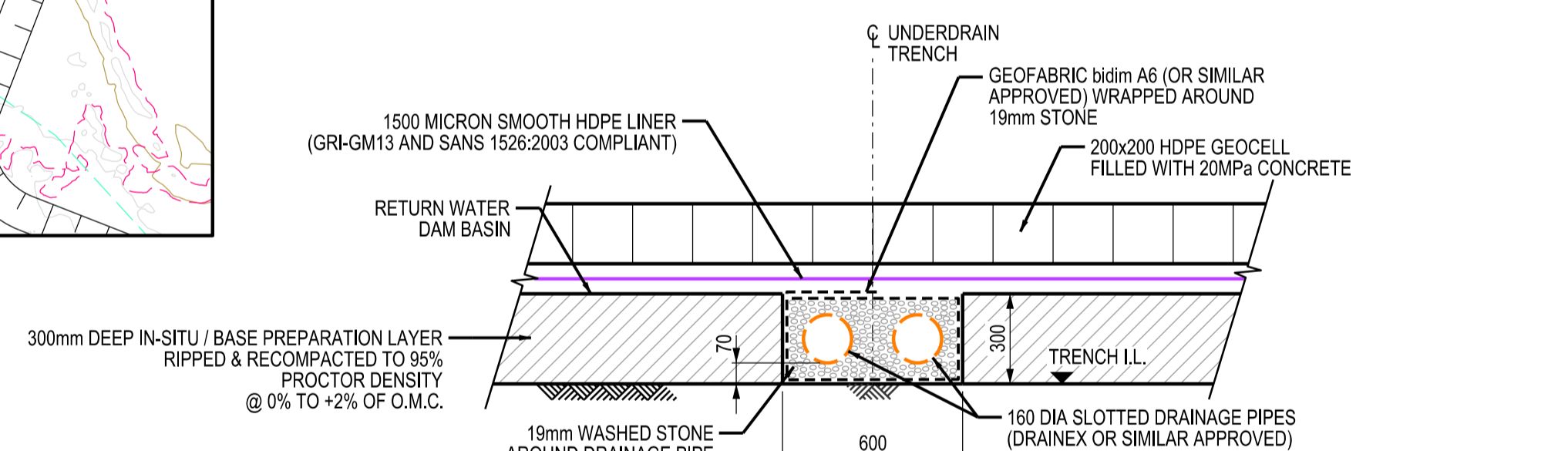
**SECTION B - B
DRAINAGE OUTLET PIPES TO MANHOLE**
SCALE 1:75



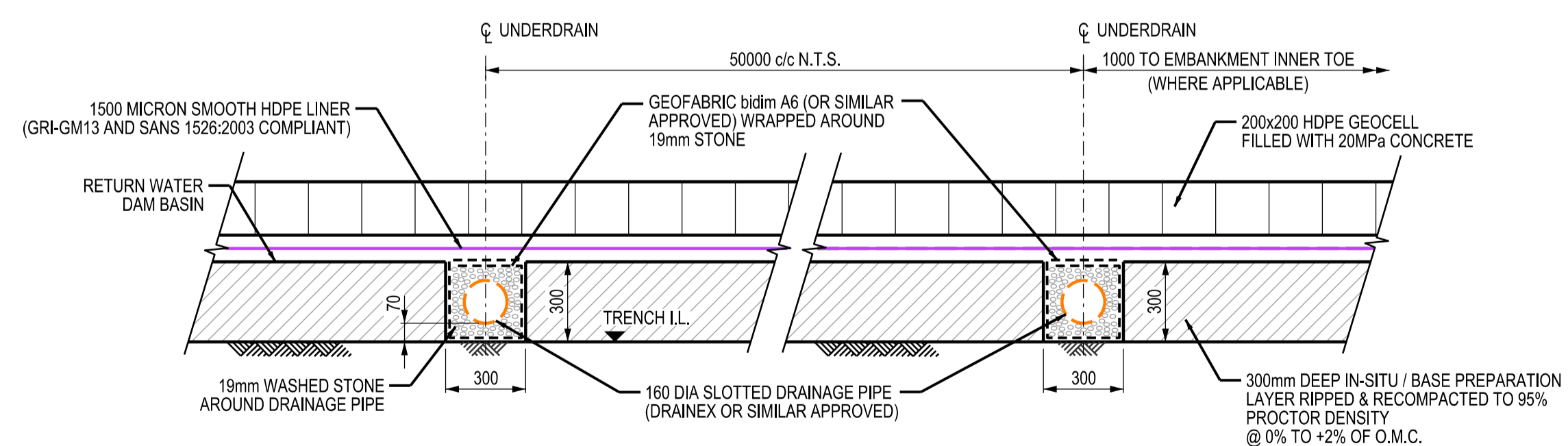
DETAIL '1' - SECTION DRAINAGE MANHOLE
SCALE 1:25



**SECTION C - C
NON-PERFORATED DRAINAGE OUTLET PIPES**
SCALE 1:20



**SECTION D - D
SLOTTED UNDERDRAINAGE SYSTEM IN BASIN**
SCALE 1:20



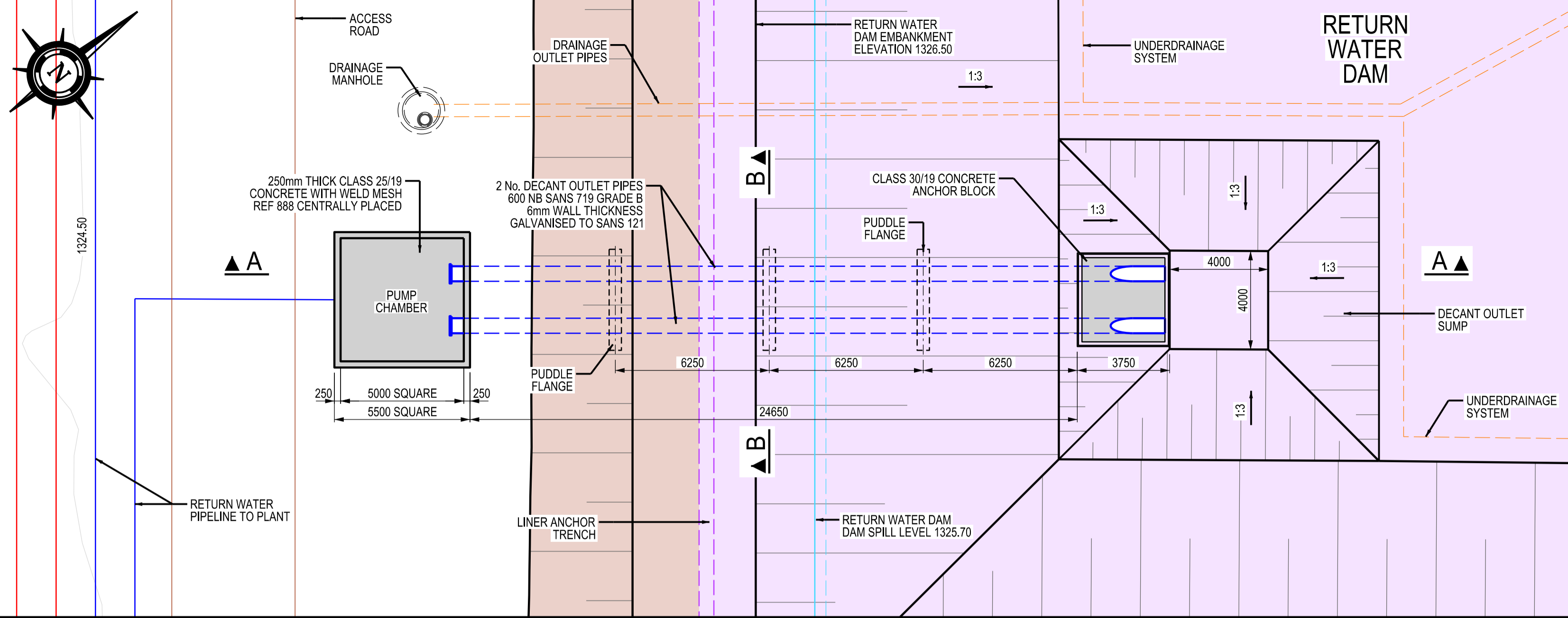
**SECTION A - A
SLOTTED UNDERDRAINAGE SYSTEM IN BASIN**
SCALE 1:20

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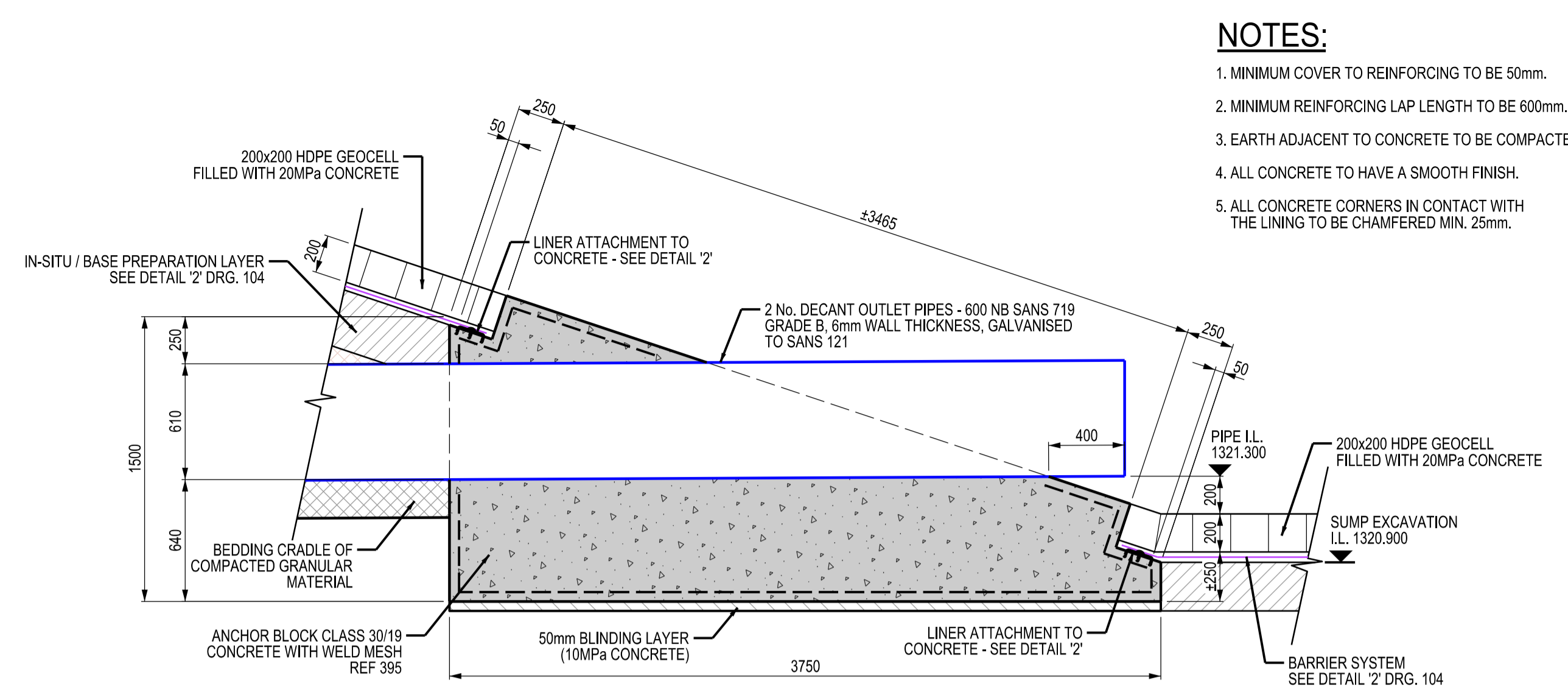
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REV	DATE	DESCRIPTION	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT		
			103	RETURN WATER DAM GENERAL ARRANGEMENT		
			104	RETURN WATER DAM SECTIONS & DETAILS		

GEOTHETA CONSULTING ENGINEERS AND SCIENTISTS Ground Floor, Twickenham Building, The Campus, Cnr Skane & Main, Bryanston, 2021 Republic of South Africa Phone : +27 11 575 3002 E-mail : hello@geotheta.com				DRAWN: 2024-06-20 CHECKED: S.M. DATE: 2024-06-28 DESIGNED: S.M.I.H. DATE: 2024-06-17		CLIENT: HARMONY TITLE: HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLONED) RETURN WATER DAM UNDERDRAINAGE DETAILS	
APPROVED BY: GERRIT J. VAN RYSSSEN NAME: GERRIT J. VAN RYSSSEN QUALIFICATION & REG. No.: PR.ENG SIGNATURE: [Signature] DATE: 22.07.24				CO-ORD SYSTEM: WGS 84 LO27 SCALE: A1 AS SHOWN, A3 AS SHOWN X2		DRG No.: 2401265-106 REV. A	

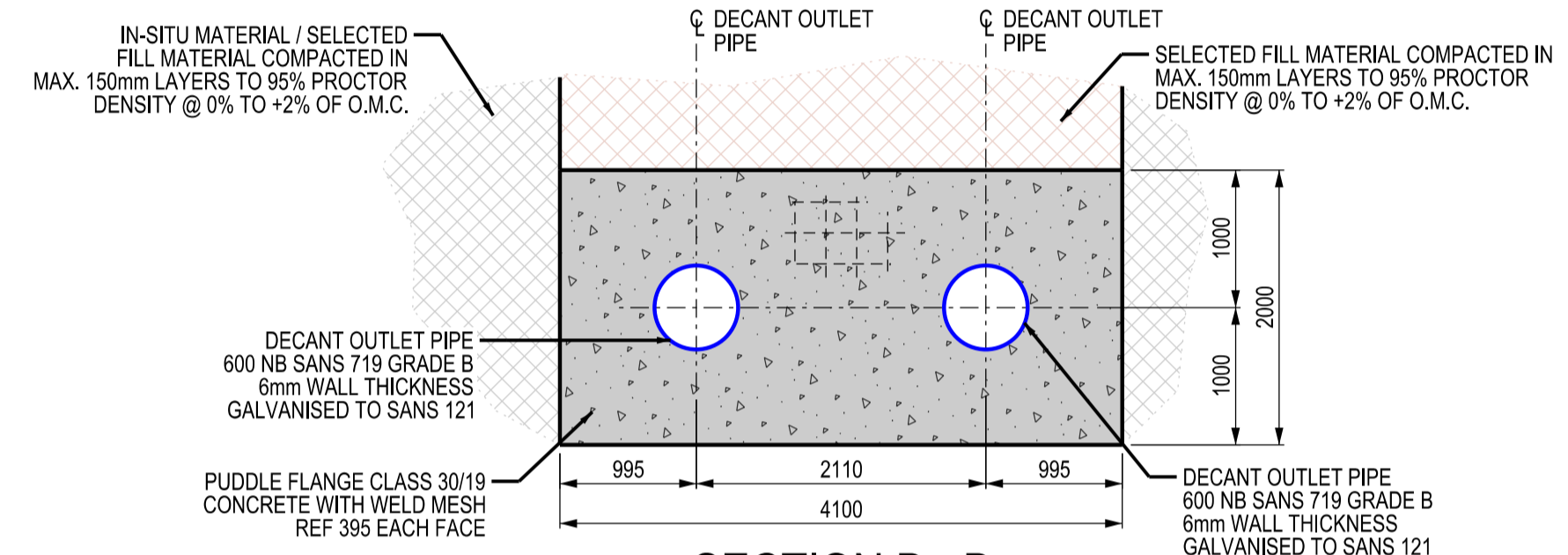
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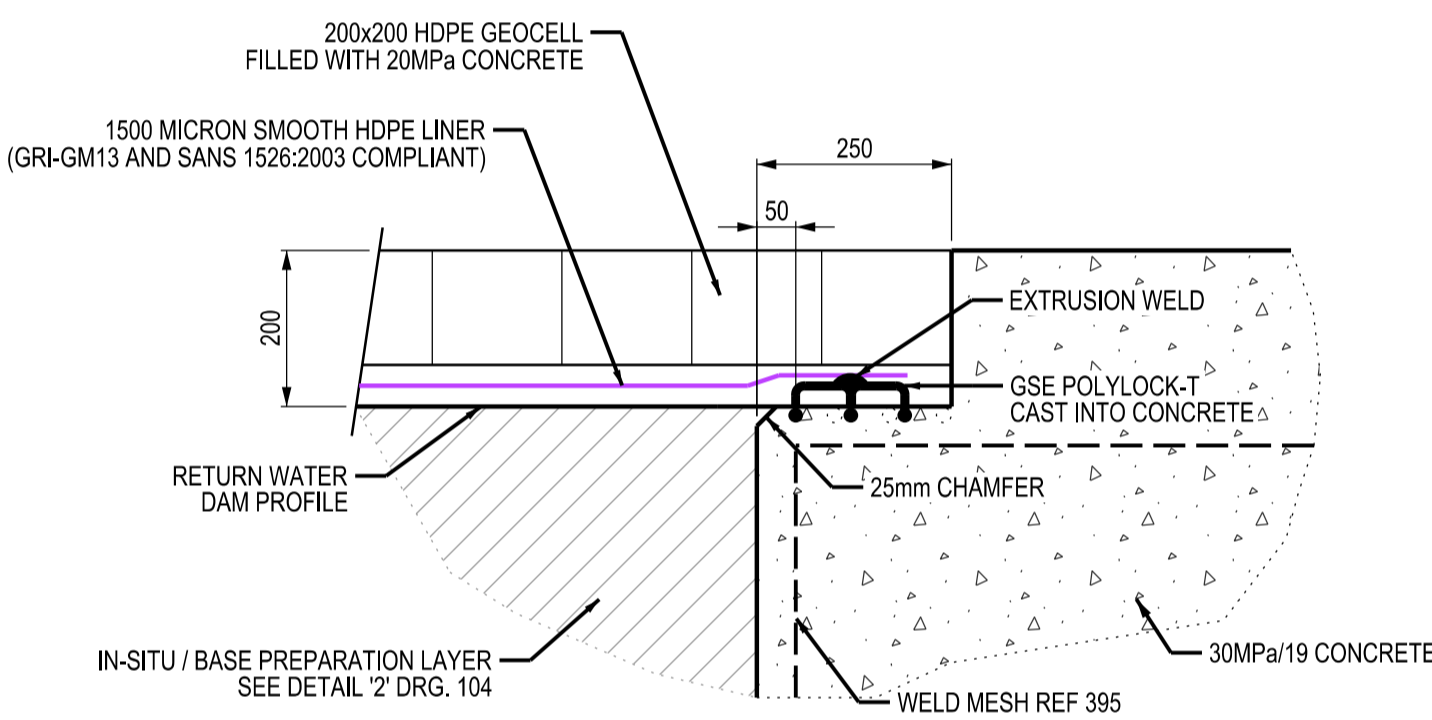
PLAN - RETURN WATER DAM DECANT STRUCTURE
SCALE 1:150



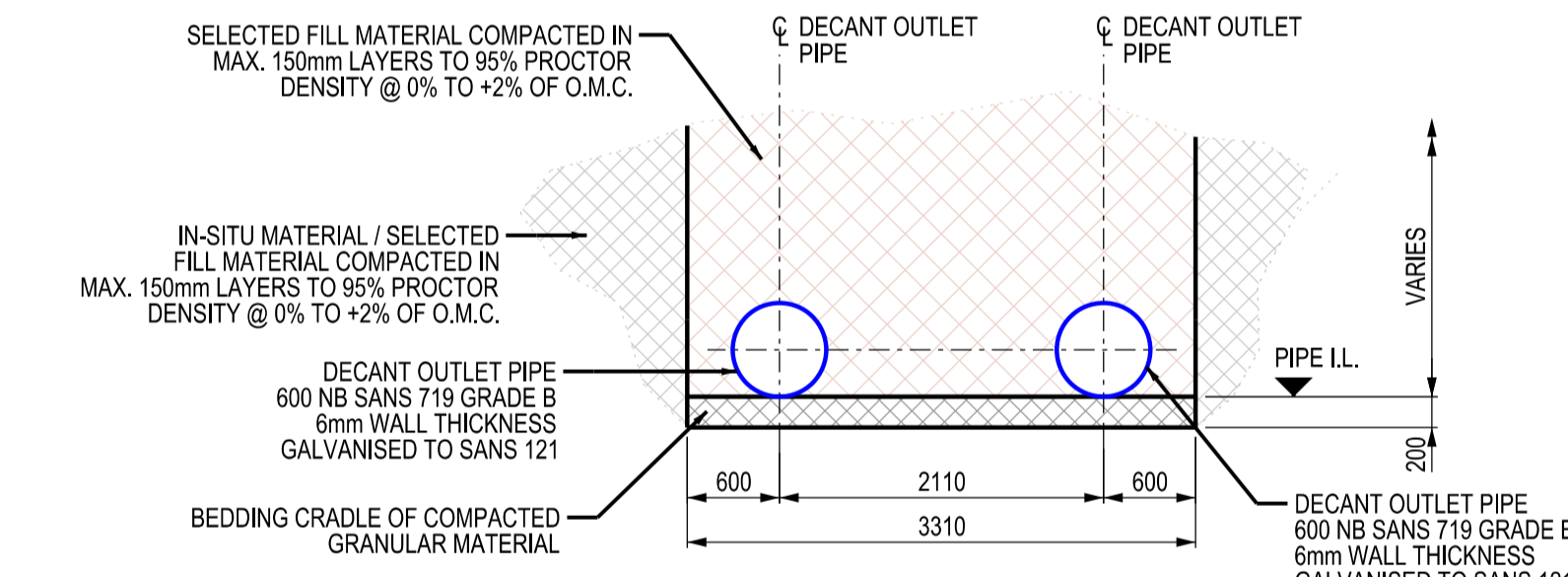
DETAIL '1' - SECTION - DECANT OUTLET PIPE ANCHOR BLOCK
SCALE 1:25



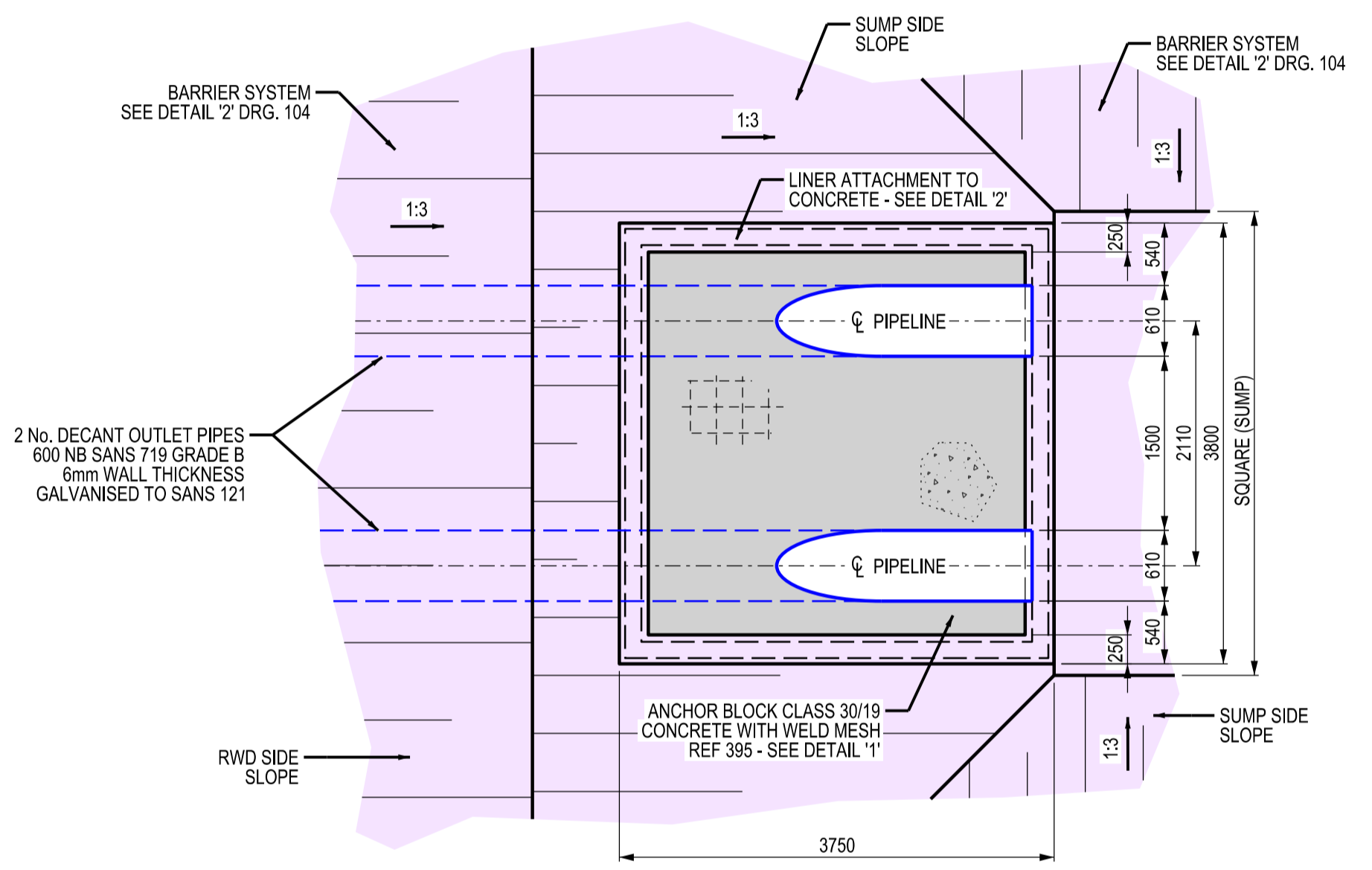
SECTION B - B PUDDLE FLANGES
SCALE 1:50



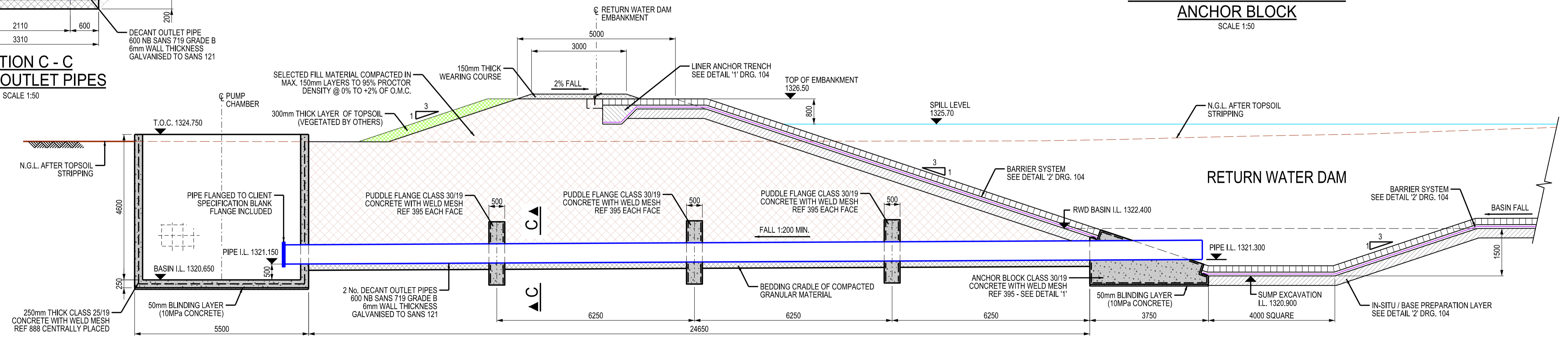
DETAIL '2' - TYPICAL SECTION LINER ATTACHMENT TO CONCRETE
SCALE 1:10



SECTION C - C DECANT OUTLET PIPES
SCALE 1:50



PLAN - DECANT OUTLET PIPE ANCHOR BLOCK
SCALE 1:50



SECTION A - A DECANT OUTLET PIPES TO PUMP CHAMBER
SCALE 1:75

- NOTES:**
1. MINIMUM COVER TO REINFORCING TO BE 50mm.
 2. MINIMUM REINFORCING LAP LENGTH TO BE 600mm.
 3. EARTH ADJACENT TO CONCRETE TO BE COMPACTED.
 4. ALL CONCRETE TO HAVE A SMOOTH FINISH.
 5. ALL CONCRETE CORNERS IN CONTACT WITH THE LINING TO BE CHAMFERED MIN. 25mm.

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REV	DATE	DESCRIPTION	DRG.No.	DRAWING TITLE	DRG.No.	DRAWING TITLE
A	2024-06-20	ISSUED FOR INFORMATION	002	PRE-DEPOSITION WORKS GENERAL ARRANGEMENT		
			103	RETURN WATER DAM GENERAL ARRANGEMENT		
			104	RETURN WATER DAM SECTIONS & DETAILS		

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APPROVED BY:
NAME: GERRIT J. VAN RYSSSEN, QUALIFICATION & REG. No.: PR.ENG, SIGNATURE: [Signature], DATE: 22.07.24, CO-ORD SYSTEM: WGS 84 LO27

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DATE	SCALE
2024-06-20	AS SHOWN
2024-06-28	AS SHOWN X2

CLIENT	TITLE	DRG No.	REV.
HARMONY	HARMONY - NOOITGEDACHT TSF RE-DESIGN (CYCLOMED) RETURN WATER DAM DECANT STRUCTURE DETAILS	2401265-107	A

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Gantt Chart (2026-2030)											
							H2	2026 H1	H2	2027 H1	H2	2028 H1	H2	2029 H1	H2	2030 H1		
1		Nooitgedacht TSF Budget Schedule	1182 days	Mon 25/11/03	Tue 30/05/14		[Gantt bar for task 1]											
2		Contract Start date	1 day	Mon 25/11/03	Mon 25/11/03		[Gantt bar for task 2]											
3		Safety file approval	5 days	Tue 25/11/04	Mon 25/11/10	2	[Gantt bar for task 3]											
4		Onboarding Process, Medical, Training & Inductions	20 days	Tue 25/11/11	Mon 25/12/08	3	[Gantt bar for task 4]											
5		Site Establishment	23 days	Fri 25/11/21	Tue 25/12/23		[Gantt bar for task 5]											
6		Laydown area	15 days	Fri 25/11/21	Thu 25/12/11	4S+8 days	[Gantt bar for task 6]											
7		Offices	15 days	Thu 25/11/27	Wed 25/12/17	6S+4 days	[Gantt bar for task 7]											
8		Plant establishment	15 days	Wed 25/12/03	Tue 25/12/23	7S+4 days	[Gantt bar for task 8]											
9		Initial setting out	2 days	Tue 25/12/09	Wed 25/12/10	8S+4 days	[Gantt bar for task 9]											
10		South West wall section	452 days	Thu 25/12/11	Fri 27/09/03	9	[Gantt bar for task 10]											
11		Site Clearance	45 days	Thu 25/12/11	Wed 26/02/11		[Gantt bar for task 11]											
12		Clear and grub	30 days	Thu 25/12/11	Wed 26/01/21	9	[Gantt bar for task 12]											
13		Topsoil stripping	30 days	Thu 26/01/01	Wed 26/02/11	12S+15 days	[Gantt bar for task 13]											
14		TSF bulk earthworks	262 days	Thu 26/02/12	Fri 27/02/12	13	[Gantt bar for task 14]											
15		Excavation	43 days	Thu 26/02/12	Mon 26/04/13	13	[Gantt bar for task 15]											
16		Cyclone wall box-cut	15 days	Thu 26/02/12	Wed 26/03/04	13	[Gantt bar for task 16]											
17		Toe wall box-cut	8 days	Thu 26/02/12	Mon 26/02/23		[Gantt bar for task 17]											
18		Rip and recompact of in-situ material	28 days	Thu 26/03/05	Mon 26/04/13	16	[Gantt bar for task 18]											
19		Cyclone wall	8 days	Thu 26/03/05	Mon 26/03/16	16	[Gantt bar for task 19]											
20		Toe wall	3 days	Thu 26/03/05	Mon 26/03/09	17	[Gantt bar for task 20]											
21		Catchment paddocks	20 days	Tue 26/03/17	Mon 26/04/13	16;19;20	[Gantt bar for task 21]											
22		Construct embankment walls	190 days	Tue 26/03/17	Mon 26/12/07		[Gantt bar for task 22]											
23		Cyclone wall	90 days	Tue 26/03/17	Mon 26/07/20	19	[Gantt bar for task 23]											
24		Toe wall	45 days	Tue 26/07/21	Mon 26/09/21	20;23	[Gantt bar for task 24]											
25		Catchment paddocks	110 days	Tue 26/04/14	Mon 26/09/14	21	[Gantt bar for task 25]											
26		Stormwater diversion bund wall	60 days	Tue 26/09/15	Mon 26/12/07	25	[Gantt bar for task 26]											
27		Supply and place tailings material over liner	20 days	Mon 26/11/23	Fri 26/12/18		[Gantt bar for task 27]											
28		Between toe wall and cyclone wall	20 days	Mon 26/11/23	Fri 26/12/18	47FF+2 days	[Gantt bar for task 28]											
29		Supply and place geogrid over tailings layer	20 days	Mon 26/12/21	Fri 27/01/15		[Gantt bar for task 29]											
30		Between toe wall and cyclone wall	20 days	Mon 26/12/21	Fri 27/01/15	28	[Gantt bar for task 30]											
31		Supply and place tailings material over geogrid	20 days	Mon 27/01/18	Fri 27/02/12		[Gantt bar for task 31]											
32		Between toe wall and cyclone wall	20 days	Mon 27/01/18	Fri 27/02/12	30	[Gantt bar for task 32]											
33		Drains	270 days	Tue 26/03/17	Mon 27/03/29		[Gantt bar for task 33]											
34		Toe drains	130 days	Tue 26/09/22	Mon 27/03/22	47S+10 days;24	[Gantt bar for task 34]											
35		Underdrains	130 days	Fri 26/04/10	Thu 26/10/08	47S+10 days	[Gantt bar for task 35]											
36		Leakage detection drains	100 days	Tue 26/03/17	Mon 26/08/03	19;20	[Gantt bar for task 36]											
37		Drainage collector pipes	30 days	Thu 27/02/11	Wed 27/03/24	34FF+2 days;35FF+2 days;36FF+2 da	[Gantt bar for task 37]											
38		Drain outlets	3 days	Thu 27/03/25	Mon 27/03/29	37	[Gantt bar for task 38]											

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	H2	2026	H1	H2	2027	H1	H2	2028	H1	H2	2029	H1	H2	2030	H1
39		Solution trench	114 days	Tue 27/03/30	Fri 27/09/03																
40		Excavation	90 days	Tue 27/03/30	Mon 27/08/02	21;38															
41		Bedding preparation	90 days	Thu 27/04/15	Wed 27/08/18	40SS+12 days															
42		Class 25 Mpa/19 mm concrete	90 days	Mon 27/05/03	Fri 27/09/03	41SS+12 days															
43		Liner installation	195 days	Thu 26/03/19	Wed 26/12/16																
44		Surface preparation	189 days	Thu 26/03/19	Tue 26/12/08	36SS+2 days															
45		Panel placement	189 days	Mon 26/03/23	Thu 26/12/10	44SS+2 days															
46		Seam welding	189 days	Wed 26/03/25	Mon 26/12/14	45SS+2 days															
47		Non-destructive testing	189 days	Fri 26/03/27	Wed 26/12/16	46SS+2 days															
48		North West wall section	189 days	Tue 26/09/22	Fri 27/06/11																
49		Site Clearance	30 days	Tue 26/09/22	Mon 26/11/02																
50		Clear and grub	15 days	Tue 26/09/22	Mon 26/10/12	9;23;24															
51		Topsoil stripping	15 days	Tue 26/10/13	Mon 26/11/02	50SS+15 days															
52		TSF bulk earthworks	154 days	Tue 26/11/03	Fri 27/06/04																
53		Excavation	21 days	Tue 26/11/03	Tue 26/12/01																
54		Cyclone wall box-cut	5 days	Tue 26/11/03	Mon 26/11/09	51															
55		Toe wall box-cut	3 days	Fri 26/11/27	Tue 26/12/01																
56		Rip and recompact of in-situ material	28 days	Tue 26/11/10	Thu 26/12/17																
57		Cyclone wall	5 days	Tue 26/11/10	Mon 26/11/16	54															
58		Toe wall	2 days	Wed 26/12/02	Thu 26/12/03	55															
59		Catchment paddocks	10 days	Fri 26/12/04	Thu 26/12/17	54;57;58															
60		Construct embankment walls	103 days	Tue 26/11/17	Thu 27/04/08																
61		Cyclone wall	40 days	Tue 26/11/17	Mon 27/01/11	57															
62		Toe wall	15 days	Tue 27/01/12	Mon 27/02/01	58;61															
63		Catchment paddocks	20 days	Fri 26/12/18	Thu 27/01/14	59															
64		Stormwater diversion bund wall	60 days	Fri 27/01/15	Thu 27/04/08	63															
65		Supply and place tailings material over liner	20 days	Mon 27/03/15	Fri 27/04/09																
66		Between toe wall and cyclone wall	20 days	Mon 27/03/15	Fri 27/04/09	85FF+10 days															
67		Supply and place geogrid over tailings layer	20 days	Mon 27/04/12	Fri 27/05/07																
68		Between toe wall and cyclone wall	20 days	Mon 27/04/12	Fri 27/05/07	66															
69		Supply and place tailings material over geogrid	20 days	Mon 27/05/10	Fri 27/06/04																
70		Between toe wall and cyclone wall	20 days	Mon 27/05/10	Fri 27/06/04	68															
71		Drains	85 days	Fri 26/12/04	Thu 27/04/01																
72		Toe drains	60 days	Mon 27/01/04	Fri 27/03/26	62FF+25 days;85SS+10 days															
73		Underdrains	60 days	Mon 27/01/04	Fri 27/03/26	85SS+10 days															
74		Leakage detection drains	30 days	Fri 26/12/04	Thu 27/01/14	57;58															
75		Drainage collector pipes	12 days	Mon 27/03/15	Tue 27/03/30	72FF+2 days;73FF+2 days;74FF+2 da															
76		Drain outlets	2 days	Wed 27/03/31	Thu 27/04/01	75															

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	H2	2026	H1	H2	2027	H1	H2	2028	H1	H2	2029	H1	H2	2030	H1
77		Solution trench	51 days	Fri 27/04/02	Fri 27/06/11																
78		Excavation	35 days	Fri 27/04/02	Thu 27/05/20	59;76															
79		Bedding preparation	35 days	Wed 27/04/14	Tue 27/06/01	78SS+8 days															
80		Class 25 Mpa/19 mm concrete	35 days	Mon 27/04/26	Fri 27/06/11	79SS+8 days															
81		Liner installation	76 days	Fri 26/12/11	Fri 27/03/26																
82		Surface preparation	70 days	Fri 26/12/11	Thu 27/03/18	74SS+5 days;44															
83		Panel placement	70 days	Tue 26/12/15	Mon 27/03/22	82SS+2 days															
84		Seam welding	70 days	Thu 26/12/17	Wed 27/03/24	83SS+2 days															
85		Non-destructive testing	70 days	Mon 26/12/21	Fri 27/03/26	84SS+2 days															
86		South East wall Section	207 days	Tue 27/02/02	Wed 27/11/17																
87		Site Clearance	45 days	Tue 27/02/02	Mon 27/04/05																
88		Clear and grub	30 days	Tue 27/02/02	Mon 27/03/15	9;62															
89		Topsoil stripping	30 days	Tue 27/02/23	Mon 27/04/05	88SS+15 days															
90		TSF bulk earthworks	138 days	Tue 27/04/06	Thu 27/10/14																
91		Excavation	5 days	Tue 27/04/06	Mon 27/04/12	89															
92		Cyclone wall box-cut	5 days	Tue 27/04/06	Mon 27/04/12	89															
93		Toe wall box-cut	2 days	Tue 27/04/06	Wed 27/04/07																
94		Rip and recompact of in-situ material	15 days	Thu 27/04/08	Wed 27/04/28																
95		Cyclone wall	2 days	Tue 27/04/13	Wed 27/04/14	92															
96		Toe wall	1 day	Thu 27/04/08	Thu 27/04/08	93															
97		Catchment paddocks	10 days	Thu 27/04/15	Wed 27/04/28	92;95;96															
98		Construct embankment walls	72 days	Thu 27/04/15	Fri 27/07/23																
99		Cyclone wall	32 days	Thu 27/04/15	Fri 27/05/28	95															
100		Toe wall	10 days	Mon 27/05/31	Fri 27/06/11	96;99															
101		Catchment paddocks	22 days	Thu 27/04/29	Fri 27/05/28	97															
102		Stormwater diversion bund wall	40 days	Mon 27/05/31	Fri 27/07/23	101															
103		Supply and place tailings material over liner	10 days	Fri 27/08/06	Thu 27/08/19																
104		Between toe wall and cyclone wall	10 days	Fri 27/08/06	Thu 27/08/19	123FF+10 days															
105		Supply and place geogrid over tailings layer	20 days	Fri 27/08/20	Thu 27/09/16																
106		Between toe wall and cyclone wall	20 days	Fri 27/08/20	Thu 27/09/16	104															
107		Supply and place tailings material over geogrid	20 days	Fri 27/09/17	Thu 27/10/14																
108		Between toe wall and cyclone wall	20 days	Fri 27/09/17	Thu 27/10/14	106															
109		Drains	70 days	Thu 27/04/15	Wed 27/07/21																
110		Toe drains	30 days	Mon 27/06/07	Fri 27/07/16	100FF+25 days;123SS+10 days															
111		Underdrains	30 days	Fri 27/05/14	Thu 27/06/24	123SS+10 days															
112		Leakage detection drains	20 days	Thu 27/04/15	Wed 27/05/12	95;96															
113		Drainage collector pipes	10 days	Wed 27/07/07	Tue 27/07/20	110FF+2 days;111FF+2 days;112FF+															
114		Drain outlets	1 day	Wed 27/07/21	Wed 27/07/21	113															

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	H2	2026	H1	H2	2027	H1	H2	2028	H1	H2	2029	H1	H2	2030	H1	
115		Solution trench	85 days	Thu 27/07/22	Wed 27/11/17																	
116		Excavation	65 days	Thu 27/07/22	Wed 27/10/20	97;114																
117		Bedding preparation	65 days	Thu 27/08/05	Wed 27/11/03	116SS+10 days																
118		Class 25 Mpa/19 mm concrete	65 days	Thu 27/08/19	Wed 27/11/17	117SS+10 days																
119		Liner installation	76 days	Thu 27/04/22	Thu 27/08/05																	
120		Surface preparation	70 days	Thu 27/04/22	Wed 27/07/28	112SS+5 days;82																
121		Panel placement	70 days	Mon 27/04/26	Fri 27/07/30	120SS+2 days																
122		Seam welding	70 days	Wed 27/04/28	Tue 27/08/03	121SS+2 days																
123		Non-destructive testing	70 days	Fri 27/04/30	Thu 27/08/05	122SS+2 days																
124		Basin section	907 days	Tue 26/03/10	Wed 29/08/29	20																
125		Penstock	434 days	Tue 26/03/10	Fri 27/11/05	20																
126		Intermediate penstock	100 days	Tue 26/03/10	Mon 26/07/27																	
127		Penstock outfall pipe	75 days	Tue 26/03/10	Mon 26/06/22	20																
128		Penstock inlet	25 days	Tue 26/06/23	Mon 26/07/27	127																
129		Final penstock	2 days	Tue 26/06/02	Wed 26/06/03																	
130		Penstock outfall pipe	1 day	Tue 26/06/02	Tue 26/06/02	140																
131		Penstock inlet	1 day	Wed 26/06/03	Wed 26/06/03	130																
132		Catwalk	70 days	Thu 26/06/04	Wed 26/09/09																	
133		Walkway	60 days	Thu 26/06/04	Wed 26/08/26	131																
134		Catwalk platform	10 days	Thu 26/08/27	Wed 26/09/09	133																
135		Site Clearance	105 days	Mon 27/06/14	Fri 27/11/05																	
136		Clear and grub	90 days	Mon 27/06/14	Fri 27/10/15	9;99;100																
137		Topsoil stripping	90 days	Mon 27/07/05	Fri 27/11/05	136SS+15 days																
138		TSF bulk earthworks	907 days	Tue 26/03/10	Wed 29/08/29																	
139		Rip and recompact of in-situ material	60 days	Tue 26/03/10	Mon 26/06/01																	
140		TSF basin	60 days	Tue 26/03/10	Mon 26/06/01																	
141		Supply and place tailings material over liner	75 days	Thu 29/05/17	Wed 29/08/29																	
142		TSF basin	75 days	Thu 29/05/17	Wed 29/08/29	150FF+10 days																
143		Drains	322 days	Fri 27/08/20	Mon 28/11/13																	
144		Underdrains	320 days	Fri 27/08/20	Thu 28/11/09	150SS+10 days																
145		Drainage collector pipes	30 days	Tue 28/10/03	Mon 28/11/13	144FF+2 days																
146		Liner installation	535 days	Thu 27/07/29	Wed 29/08/15																	
147		Surface preparation	529 days	Thu 27/07/29	Tue 29/08/07	140SS+2 days;120																
148		Panel placement	529 days	Mon 27/08/02	Thu 29/08/09	147SS+2 days																
149		Seam welding	529 days	Wed 27/08/04	Mon 29/08/13	148SS+2 days																
150		Non-destructive testing	529 days	Fri 27/08/06	Wed 29/08/15	149SS+2 days																
151		North East wall section	986 days	Tue 26/06/02	Tue 30/03/12																	
152		Site Clearance	35 days	Tue 26/06/02	Mon 26/07/20																	

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	H2	2026	H1	H2	2027	H1	H2	2028	H1	H2	2029	H1	H2	2030	H1
153		Clear and grub	20 days	Tue 26/06/02	Mon 26/06/29	9;140															
154		Topsoil stripping	20 days	Tue 26/06/23	Mon 26/07/20	153SS+15 days															
155		TSF bulk earthworks	951 days	Tue 26/07/21	Tue 30/03/12																
156		Excavation	12 days	Tue 26/07/21	Wed 26/08/05																
157		Cyclone wall box-cut	12 days	Tue 26/07/21	Wed 26/08/05	154															
158		Toe wall box-cut	5 days	Wed 26/07/22	Tue 26/07/28	154															
159		Rip and recompact of in-situ material	24 days	Wed 26/07/29	Mon 26/08/31																
160		Cyclone wall	8 days	Thu 26/08/06	Mon 26/08/17	157;140															
161		Toe wall	3 days	Wed 26/07/29	Fri 26/07/31	158															
162		Catchment paddocks	20 days	Tue 26/08/04	Mon 26/08/31	161															
163		Construct embankment walls	65 days	Tue 26/08/18	Mon 26/11/16																
164		Cyclone wall	25 days	Tue 26/08/18	Mon 26/09/21	160															
165		Toe wall	15 days	Tue 26/09/22	Mon 26/10/12	164															
166		Catchment paddocks	32 days	Tue 26/09/01	Wed 26/10/14																
167		Stormwater diversion bund wall	23 days	Thu 26/10/15	Mon 26/11/16	166															
168		Supply and place tailings material over liner	30 days	Thu 29/11/08	Wed 29/12/19																
169		Between toe wall and cyclone wall	30 days	Thu 29/11/08	Wed 29/12/19	188FF+10 days															
170		Supply and place geogrid over tailings layer	20 days	Thu 29/12/20	Wed 30/01/16																
171		Between toe wall and cyclone wall	20 days	Thu 29/12/20	Wed 30/01/16	169															
172		Supply and place tailings material over geogrid	20 days	Thu 30/01/17	Wed 30/02/13																
173		Between toe wall and cyclone wall	20 days	Thu 30/01/17	Wed 30/02/13	171															
174		Drains	851 days	Tue 26/08/18	Tue 29/11/20																
175		Toe drains	55 days	Thu 29/08/30	Wed 29/11/14	165FF+25 days;188SS+10 days															
176		Underdrains	55 days	Thu 29/08/30	Wed 29/11/14	188SS+10 days															
177		Leakage detection drains	40 days	Tue 26/08/18	Mon 26/10/12	160;161															
178		Drainage collector pipes	10 days	Mon 29/11/05	Fri 29/11/16	175FF+2 days;176FF+2 days;177FF+															
179		Drain outlets	2 days	Mon 29/11/19	Tue 29/11/20	178															
180		Solution trench	80 days	Wed 29/11/21	Tue 30/03/12																
181		Excavation	50 days	Wed 29/11/21	Tue 30/01/29	162;179															
182		Bedding preparation	50 days	Wed 29/12/12	Tue 30/02/19	181SS+15 days															
183		Class 25 Mpa/19 mm concrete	50 days	Wed 30/01/02	Tue 30/03/12	182SS+15 days															
184		Liner installation	86 days	Wed 29/08/08	Wed 29/12/05																
185		Surface preparation	80 days	Wed 29/08/08	Tue 29/11/27	177SS+5 days;147															
186		Panel placement	80 days	Fri 29/08/10	Thu 29/11/29	185SS+2 days															
187		Seam welding	80 days	Tue 29/08/14	Mon 29/12/03	186SS+2 days															
188		Non-destructive testing	80 days	Thu 29/08/16	Wed 29/12/05	187SS+2 days															
189		Return Water Dam	216 days	Thu 25/12/11	Thu 26/10/08																
190		Site clearance	20 days	Thu 25/12/11	Wed 26/01/07																

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Gantt Chart (2026-2030)											
191		Clear and grub	10 days	Thu 25/12/11	Wed 25/12/24	9	[Gantt bar for 191: Thu 25/12/11 to Wed 25/12/24]											
192		Topsoil stripping and stockpiling	10 days	Thu 25/12/25	Wed 26/01/07	191	[Gantt bar for 192: Thu 25/12/25 to Wed 26/01/07]											
193		RWD bulk earthworks	150 days	Thu 26/01/08	Wed 26/08/05		[Gantt bar for 193: Thu 26/01/08 to Wed 26/08/05]											
194		Excavation	113 days	Thu 26/01/08	Mon 26/06/15		[Gantt bar for 194: Thu 26/01/08 to Mon 26/06/15]											
195		RWD basin	100 days	Thu 26/01/22	Wed 26/06/10	196	[Gantt bar for 195: Thu 26/01/22 to Wed 26/06/10]											
196		RWD embankment key-cut	10 days	Thu 26/01/08	Wed 26/01/21	192	[Gantt bar for 196: Thu 26/01/08 to Wed 26/01/21]											
197		Silt trap	2 days	Thu 26/06/11	Fri 26/06/12	195	[Gantt bar for 197: Thu 26/06/11 to Fri 26/06/12]											
198		Spillway	1 day	Mon 26/06/15	Mon 26/06/15	197	[Gantt bar for 198: Mon 26/06/15 to Mon 26/06/15]											
199		Rip and recompact of in-situ material	140 days	Thu 26/01/22	Wed 26/08/05		[Gantt bar for 199: Thu 26/01/22 to Wed 26/08/05]											
200		RWD basin	120 days	Thu 26/02/19	Wed 26/08/05	195SS+20 days;201	[Gantt bar for 200: Thu 26/02/19 to Wed 26/08/05]											
201		RWD embankment	10 days	Thu 26/01/22	Wed 26/02/04	196	[Gantt bar for 201: Thu 26/01/22 to Wed 26/02/04]											
202		Silt trap	2 days	Mon 26/06/15	Tue 26/06/16	197	[Gantt bar for 202: Mon 26/06/15 to Tue 26/06/16]											
203		Construct embankment walls	40 days	Thu 26/02/05	Wed 26/04/01		[Gantt bar for 203: Thu 26/02/05 to Wed 26/04/01]											
204		RWD embankments	30 days	Thu 26/02/05	Wed 26/03/18	201	[Gantt bar for 204: Thu 26/02/05 to Wed 26/03/18]											
205		Stormwater diversion bund wall	10 days	Thu 26/03/19	Wed 26/04/01	204	[Gantt bar for 205: Thu 26/03/19 to Wed 26/04/01]											
206		Underdrainage	108 days	Mon 26/02/23	Wed 26/07/22		[Gantt bar for 206: Mon 26/02/23 to Wed 26/07/22]											
207		Excavate trench	102 days	Mon 26/02/23	Tue 26/07/14	200SS+2 days	[Gantt bar for 207: Mon 26/02/23 to Tue 26/07/14]											
208		Place drainage material	102 days	Thu 26/02/26	Fri 26/07/17	207SS+3 days	[Gantt bar for 208: Thu 26/02/26 to Fri 26/07/17]											
209		Cover with bidim and backfill	102 days	Tue 26/03/03	Wed 26/07/22	208SS+3 days	[Gantt bar for 209: Tue 26/03/03 to Wed 26/07/22]											
210		Concrete works	82 days	Wed 26/06/17	Thu 26/10/08		[Gantt bar for 210: Wed 26/06/17 to Thu 26/10/08]											
211		Geocells	45 days	Tue 26/06/30	Mon 26/08/31	219SS+10 days	[Gantt bar for 211: Tue 26/06/30 to Mon 26/08/31]											
212		Spillway	20 days	Wed 26/07/29	Tue 26/08/25	198;213	[Gantt bar for 212: Wed 26/07/29 to Tue 26/08/25]											
213		Silt trap	30 days	Wed 26/06/17	Tue 26/07/28	202	[Gantt bar for 213: Wed 26/06/17 to Tue 26/07/28]											
214		Concrete curing time	28 days	Tue 26/09/01	Thu 26/10/08	211;212	[Gantt bar for 214: Tue 26/09/01 to Thu 26/10/08]											
215		RWD Liner	48 days	Thu 26/06/11	Mon 26/08/17		[Gantt bar for 215: Thu 26/06/11 to Mon 26/08/17]											
216		Surface preparation	45 days	Thu 26/06/11	Wed 26/08/12	200SS+15 days;209FF+15 days	[Gantt bar for 216: Thu 26/06/11 to Wed 26/08/12]											
217		Panel placement	45 days	Fri 26/06/12	Thu 26/08/13	216SS+1 day	[Gantt bar for 217: Fri 26/06/12 to Thu 26/08/13]											
218		Seam welding	45 days	Mon 26/06/15	Fri 26/08/14	217SS+1 day	[Gantt bar for 218: Mon 26/06/15 to Fri 26/08/14]											
219		Non-destructive testing	45 days	Tue 26/06/16	Mon 26/08/17	218SS+1 day	[Gantt bar for 219: Tue 26/06/16 to Mon 26/08/17]											
220		Tailings delivery pipeline	359 days	Tue 26/04/21	Fri 27/09/03		[Gantt bar for 220: Tue 26/04/21 to Fri 27/09/03]											
221		Delivery pipeline for initial deposition	85 days	Tue 26/04/21	Mon 26/08/17	23FF+20 days	[Gantt bar for 221: Tue 26/04/21 to Mon 26/08/17]											
222		Final delivery pipeline	150 days	Mon 27/02/08	Fri 27/09/03	164FF+30 days	[Gantt bar for 222: Mon 27/02/08 to Fri 27/09/03]											
223		First deposition	1 day	Tue 27/01/12	Tue 27/01/12	219;214;28SS;128;221	[Gantt bar for 223: Tue 27/01/12 to Tue 27/01/12]											
224		De-establishment	44 days	Wed 30/03/13	Mon 30/05/13	214;26;42;64;80;102;118;167;183;1	[Gantt bar for 224: Wed 30/03/13 to Mon 30/05/13]											
225		Completion	1 day	Tue 30/05/14	Tue 30/05/14	223;169;224;222;179;205	[Gantt bar for 225: Tue 30/05/14 to Tue 30/05/14]											