

WATER SENSITIVE URBAN DESIGN (WSUD) AND FLOOD MANAGEMENT REPORT

PROPOSED INDUSTRIAL DEVELOPMENT

22-23 Lambridge Place, Penrith

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Prepared for: VAUGHANS CONSTRUCTIONS

Client Details: Email: ding.xu@vaughans.com.au
Phone: 03 9362 5613

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Prepared by	John Kokkinos	Revision	1
Approved by	Benjamin Barrett	Revision	1

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1. EXECUTIVE SUMMARY

Sparks & Partners have been engaged by Vaughans Constructions to provide civil engineering services to support the proposed Development Application for an industrial development at 22-23 Lambridge Place, Penrith. The engineering services include the design and documentation of the stormwater drainage infrastructure and finished pavement levels for the proposed development.

Penrith City Council being the approval authority for the proposed development, require a Water Sensitive Urban Design (WSUD) report be prepared that takes into consideration the objectives and controls under Penrith City Council Development Control Plan 2014 (PCCDCP) Section 3. In response to this requirement Sparks and Partners has undertaken modelling of the proposed WSUD measures and prepared this report to demonstrate that the proposed industrial development identifies and incorporates water conservation and stormwater management measures into its design and operation in accordance with the requirements of Section 3 of the PCCDCP.

Penrith City Council have advised that the site is flood affected. The site levels have been designed to ensure no loss of flood storage due to the proposed development.

2. INTRODUCTION

2.1 Existing Site

The site is located at 22-23 Lambridge Place, Penrith within the Penrith City Council Local Government Area (LGA). The site has a gradual fall towards the eastern boundary with the highest point located towards the north western boundary corner. The site is currently undeveloped and mainly consists of landscape and pervious surfaces. As the site is owned by the same owners occupying the neighbouring lot at 24-27 Lambridge Place, Penrith, the site is primarily used as storage and parking for trucks. An existing stormwater drainage network is located at the south western boundary corner.

2.2 Proposed Development

The proposed development occupies a total site area of 6,543m² and consists of a warehouse building along the western boundary, storage shed at the south eastern boundary corner, hardstand, car park pavement areas and landscaping. The proposed development extends into 24-27 Lambridge Place joining onto the existing building to provide internal access between the two sites and additional cold warehouse storage space. The buildings occupy 1,431m², the pavement area occupies 4,396m² and the landscaping occupies 716m². Detailed architectural plans of the proposed development have been prepared by Pace Architects and are to be read in conjunction with this report.



Figure 1. Site Location – Aerial Image (Source: Six Maps)

3. INTEGRATED WATER MANAGEMENT

3.1 General

The objective of WSUD is to provide a strategy that brings together the different aspects of the water cycle as a whole rather than an ad hoc approach to water management. This includes the management aspects of freshwater, wastewater and stormwater. The following integrated water management strategies have been considered and addressed for the proposed development:

1. Employ an integrated water collection and recycling system for capturing and recycling roofwater;
2. Control the quality of stormwater that is disposed from the site;
3. Control the quantity of stormwater that is discharged for the site.

To demonstrate the above concept stormwater drainage plans and associated details have been prepared along with detailed modelling using the Council endorsed MUSICX software package. The concept stormwater drainage plans detail the location of the water management infrastructure including pits, pipes, rainwater tank, above ground on-site stormwater detention, filter chamber and filter baskets, and are included in Appendix A.

3.2 Water Conservation

Water usage reduction is to be achieved throughout the development through the use of a minimum of AAA rated water fixtures. These fixtures in the development comprise of two (2) toilets, associated wash basins, showers and a kitchenette facility.

3.3 Rainwater Reuse

Through the reuse of collected roofwater for non-potable reuse the proposed demand on potable water resources is reduced. The proposed development will capture roof water from part of the building roof area (1,111m²) and convey this to a rainwater tank with a minimum effective storage of 20,000 litre for storage and reuse throughout the development. Re-use purposes will primarily include toilet flushing and irrigation uses. A water balance of the proposed reuse system has been completed to model the effectiveness and efficiency of the system. The water balance model was constructed using the MUSICX software package with the following inputs:

- Penrith City Council MUSIC-link data.
- Daily re-use demand = 0.17kL/day (2 toilets at 0.1kL/day over 6/7 days per week)
- Annual re-use demand = 178.4kL (446m² total irrigation area x 0.4kL/m² for sprinkler system irrigation)

Using the above determined non-potable demand the MUSICX model determines the rainwater tank has an approximate efficiency of 83.4%. This resultant efficiency is compliant

with the minimum 80% requirement as per the PCCDCP and WSUD guidelines. A MUSIC-link report is provided in Appendix B for reference.

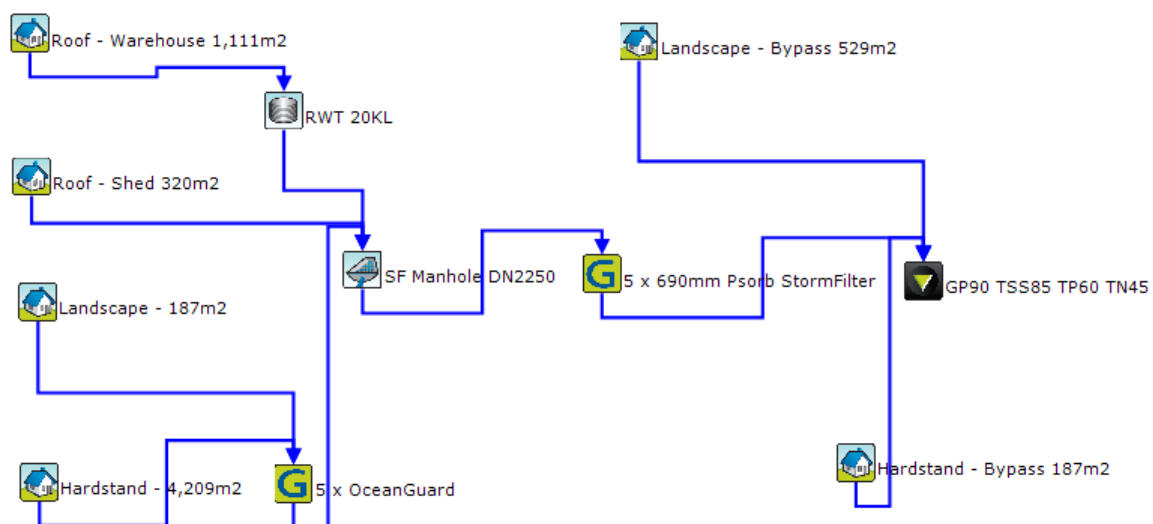
3.4 Stormwater Quality

To ensure the quality of stormwater leaving the site is acceptable and meets council's requirements specific water quality treatment measures are to be employed. These treatment measures are to treat the collected stormwater runoff prior to discharge to the council's drainage swale located in Lambridge Place. The treatment measures consist of a 20,000 litre rainwater tank, Ocean Protect precast stormfilter manhole DN2250 internal offline with 5 x 690mm P sorb cartridges and 5 x Ocean Protect Oceaguards. The combination of these measures provides a treatment train approach to the treatment of stormwater runoff.

Modelling of the proposed treatment measures has been undertaken using the MUSICX software package version 1. The modelling inputs have been based on the pre-loaded PCC nodes using MUSIC-link. The modelling results of the water quality achieved for the site is detailed in Table 1 – MUSIC Model Results below, along with a figure of the prepared model.

	Source Load	Residual Load	% Reduction Achieved	PCC % Reduction Requirement	Compliance with PCC Requirement
Total Suspended Solids (kg/yr)	971.7	126.7	86.5	85	Yes
Total Phosphorus (kg/yr)	1.68	0.6351	62.19	60	Yes
Total Nitrogen (kg/yr)	8.243	4.505	45.35	45	Yes
Gross Pollutants (kg/yr)	96.57	3.099	96.8	90	Yes

Table 1. MUSIC Model Results



3.5 Stormwater Quantity

The proposed development requires the implementation of on-site detention (OSD) as per Appendix D of Council's Stormwater Drainage Policy to control stormwater discharge from the site. The proposed development has an approximate area of 89% draining to the proposed on-site detention (OSD) facility which includes hardstand (4,209m²), roof (1,431m²) and landscaped (187m²) areas. A catchment plan of the proposed development is included in the Appendix A.

As per Council's Stormwater Drainage Policy the stormwater modelling software DRAINS has been used to determine the required volume and discharge for the proposed development. The site is flood affected and becomes inundated with flood waters during the 100 year ARI storm event. As this occurs, the OSD is ineffective and cannot discharge stormwater runoff due to surround flood water conditions. The above ground OSD basin has been designed such that the post development rate of runoff for all storm events up to and including the 50 year ARI does not exceed the rate of runoff from the pre-developed site, and provide flood offset storage volume for the 100 year ARI storm event. A summary of the above analysis has been included on engineering drawing DA1201 prepared by Sparks and Partners which has been provided within Appendix A.

3.6 Maintenance and Monitoring

To ensure the continued efficient and correct operation of the proposed WSUD infrastructure a 'maintenance and monitoring schedule' is included in the Appendix D of this report. The schedule details the frequency of inspections, what is to be inspected and what rectifications to make if required for the water management infrastructure located within the proposed development. The schedule is to be implemented upon commissioning of the water management infrastructure and remain in place for the life of the development; with all records kept on site for inspection should the approval authority deem it necessary.

4. FLOOD MANAGEMENT

The development has been identified by Council as being flood affected therefore is required to address items under section *C3.5 Flood Planning* of the PCCDCP.

4.1 Nature of Flooding

Council's flood information detailing the impacts of mainstream flooding estimates the 100 year ARI storm event flood level is to be RL25.000m AHD. A copy of Council's flood information letter has been provided in Appendix C for reference. Currently Council is undertaking an overland flow flood study for the Cranebrook catchment.

4.2 Flood Storage Offset

To manage the flood waters without negatively impacting neighboring sites, the proposed development has been designed such that the development does not reduce the flood storage volume from the predeveloped site. The existing site condition provides a flood storage volume of 1,908m³, and the proposed development provides a flood storage volume of 1,915m³, providing an additional 7m³ of flood storage.

4.3 Building Floor Level

The proposed warehouse building provides a finished floor level of RL26.300m, satisfying the 0.5m minimum freeboard required from the 100 year ARI flood level for habitable floors. The proposed shed will only be used for storage purposes and has a finished floor level of RL25.100m, providing 0.1m freeboard from the 100 year ARI flood level (RL25.000m AHD).

4.4 Risk to Person and Property

In the event of mainstream flood as per Council's flood letter, it is likely Lambridge Place will be inundated due to flood waters, where evacuation from site would not be possible in such an event. In the extreme event that flood water inundate the building, persons may take refuge on the first floor located at RL29.300m AHD, approximately 4.3m of freeboard to the 100 year ARI flood level.

CONCLUSION

Based on the preparation of the concept stormwater drainage plans and MUSICX modeling results it is demonstrated that the principles of water sensitive urban design have been incorporated into the design and operation of the proposed development at 22-23 Lambridge Place, Penrith, in accordance with PCCDCP 2014 Section 3. It is demonstrated that the proposed development achieves reductions in potable water import by capturing rainwater on site and reusing this for non-potable uses including irrigation and toilet flushing, achieves pollution reduction targets set by council, and employs OSD for the control of stormwater discharge from the site in accordance with targets set by council. It is also demonstrated that the proposed developments employed water conservation measures will continue to operate effectively and efficiently through the implementation and use of a monitoring and maintenance schedule ensuring the integrity of the system is maintained.

APPENDIX A. CONCEPT DRAINAGE PLANS

PROPOSED INDUSTRIAL DEVELOPMENT, 22-23 LAMBRIDGE PLACE, PENRITH



DRAWING SCHEDULE	
DWG No.	DRAWING NAME
DA1101	COVER PAGE & DRAWING SCHEDULE
DA1201	SPECIFICATION SHEET
DA2101	CONCEPT SEDIMENT & EROSION CONTROL PLAN
DA2701	CONCEPT SEDIMENT & EROSION CONTROL DETAILS
DA4101	CONCEPT STORMWATER & GRADING PLAN
DA4301	CONCEPT STORMWATER CATCHMENT PLAN
DA4701	CONCEPT STORMWATER MANAGEMENT DETAILS
DA4711	CONCEPT STORMWATER OSD SECTIONS & DETAILS
DA8101	CONCEPT FLOOD STORAGE OFFSET PLAN
DA8501	CONCEPT FLOOD STORAGE OFFSET SECTIONS

LOCALITY PLAN
NOT TO SCALE - COURTESY OF SIX MAPS

DEVELOPMENT APPLICATION ISSUE

NOT TO SCALE

IMPORTANT
DO NOT SCALE OFF THIS DRAWING. USE DIMENSIONS & ARCHITECTURAL DRAWINGS ONLY.
DRAWINGS TO BE READ IN CONJUNCTION WITH SPECIFICATION.
THE INFORMATION ON THIS DRAWING REMAINS THE PROPERTY OF SPARKS & PARTNERS CONSULTING ENGINEERS. REPRODUCTION OF THE WHOLE OR PART OF THIS DOCUMENT CONSTITUTES AN INFRINGEMENT OF COPYRIGHT.

REFERENCES

DATE	AMENDMENT	INIT	REV	DATE	AMENDMENT	INIT	REV
18.08.21	50% ISSUE	JK	1				
27.08.21	DA ISSUE	JK	2				

STRUCTURAL	MECHANICAL	ELECTRICAL	CIVIL
-	-	-	-

CLIENT

BUILDER

PROJECT

PROPOSED INDUSTRIAL DEVELOPMENT,
22-23 LAMBRIDGE PLACE, PENRITH

ARCHITECT

SPARKS + PARTNERS
CONSULTING ENGINEERS
HYDRAULIC | CIVIL | FIRE

Level 1, 91 George Street | Parramatta | NSW 2150
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au
https://sparksandpartners.com.au/

DRAWING TITLE	
CIVIL DESIGN COVER PAGE & DRAWING SCHEDULE	
DATE	DRAWN JK DESIGNED JK CHECKED BB
AUG 2021	SCALE NTS SIZE A1 REVISION
PROJECT No 21117	DRAWING No DA1101 2

SURVEY

- LEVELS BASED ON SURVEY PREPARED BY:
CBH SURVEY, REFERENCE NUMBER 2017235-1, DATED 27/07/17

SITE WORKS - GENERAL

- ALL WORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH LOCAL COUNCIL, AUSTRALIAN AND AUTHORITY STANDARDS.
- ALL TRENCHING WORKS ARE TO BE RESTORED TO ORIGINAL CONDITION.
- THE INTEGRITY OF ALL EXISTING AND NEW SERVICES IS TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
- ALL PLANS ARE TO BE READ IN CONJUNCTION WITH APPROVED ARCHITECTS, STRUCTURAL ENGINEERS AND OTHER CONSULTANT'S PLANS. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER FOR CLARIFICATION.
- THE ENGINEER SHALL BE GIVEN A MIN. OF 48 HOURS NOTICE FOR ALL STORMWATER DRAINAGE AND PAVEMENT INSPECTIONS. CONCRETE SHALL NOT BE DELIVERED UNTIL ENGINEERS' APPROVAL IS OBTAINED.

SITE WORKS - ACCESS AND SAFETY

- ALL WORKS ARE TO BE UNDERTAKEN IN A SAFE MANNER IN ACCORDANCE WITH ALL STATUTORY AND INDUSTRIAL RELATION REQUIREMENTS.
- ACCESS TO ADJACENT BUILDINGS AND PROPERTIES SHALL BE MAINTAINED AT ALL TIMES.
- WHERE NECESSARY SAFE PASSAGE SHALL BE PROVIDED FOR VEHICLES AND PEDESTRIANS THROUGH OR ADJACENT TO THE SITE.

DEVELOPMENT APPLICATION (DA) STAGE

- DOCUMENTS ARE PROVIDED FOR DA APPROVAL PURPOSES ONLY AND ARE NOT TO BE USED FOR CONSTRUCTION
- STORMWATER DESIGN SHOWN IS CONCEPTUAL ONLY AND SUBJECT TO FINAL DESIGN AT CONSTRUCTION CERTIFICATE STAGE
- FINISHED LEVELS SHOWN ARE CONCEPTUAL ONLY AND SUBJECT TO DETAILED DESIGN AT CONSTRUCTION CERTIFICATE STAGE. FINAL FINISHED LEVELS TO BE ±0.5m FROM LEVELS SHOWN

STORMWATER DESIGN CRITERIA

- DESIGN CRITERIA.
 - ROOF DRAINAGE - REFER TO HYDRAULIC PLANS
 - PIPED DRAINAGE - 1:20YR ARI
 - OVERLAND FLOWS - GAP FLOW BETWEEN 1:20YR ARI & 1:100YR ARI

APPROVAL AUTHORITY

- CIVIL DESIGN IS SUBJECT TO APPROVAL FROM THE FOLLOWING AUTHORITIES:
 - PENRITH CITY COUNCIL

DESIGN GUIDES

- COUNCIL GUIDELINE STORMWATER DRAINAGE POLICY 2016
- COUNCIL DCP SECTION C3 WATER MANAGEMENT
- SYDNEY WATER
- AS1170.0:2002 STRUCTURAL DESIGN ACTIONS PART 0
- AS1170.1:2002 STRUCTURAL DESIGN ACTIONS PART 1
- AS1428.1:2009 DESIGN FOR ACCESS AND MOBILITY, PART 1: GENERAL REQUIREMENTS FOR ACCESS - NEW BUILDING WORK
- AS2032:2006 INSTALLATION OF PVC PIPE SYSTEMS
- AS2865:2009 CONFINED SPACES
- AS2890.1:2004 PARKING FACILITIES, PART 1: OFF-STREET CAR PARKING
- AS2890.2:2002 PARKING FACILITIES, PART 2: OFF-STREET COMMERCIAL VEHICLE FACILITIES
- AS2890.6:2009 PARKING FACILITIES, PART 6: OFF-STREET PARKING FOR PEOPLE WITH DISABILITIES
- AS3500.3:2018 PLUMBING AND DRAINAGE, PART 3: STORMWATER DRAINAGE
- AS3600:2018 CONCRETE STRUCTURES
- AS3725:2007 DESIGN FOR INSTALLATION OF BURIED CONCRETE PIPES

SAFETY IN DESIGN

- CONTRACTOR SHALL ENSURE ALL ACCESS TO THE TANKS & CHAMBERS ARE COMPLETE WITH RELEVANT CONFINED SPACE SIGNAGE.
- ALL PERSONNEL REQUIRED TO INSPECT AND MAINTAIN SERVICES WITHIN THESE AREAS SHALL BE TRAINED IN ACCORDANCE WITH WHS/OHS REQUIREMENTS
- REFER TO RELEVANT SAFETY IN DESIGN REPORT FOR CONSTRUCTION RISK MATRIX

SEDIMENT AND EROSION CONTROL

- THE CONTRACTOR SHALL INSTIGATE ALL SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH COUNCIL AND THE "BLUE BOOK" (MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION, PRODUCED BY THE DEPARTMENT OF HOUSING). THESE MEASURES ARE TO BE REGULARLY INSPECTED AND MAINTAINED.
- THE SEDIMENT & EROSION CONTROL PLAN PRESENTS CONCEPTS ONLY, THE CONTRACTOR SHALL AT ALL TIMES BE RESPONSIBLE FOR THE ESTABLISHMENT & MANAGEMENT OF A DETAILED SCHEME MEETING COUNCIL'S DESIGN, AND ALL OTHER REGULATORY AUTHORITY REQUIREMENTS.
- WHERE PRACTICAL, THE SOIL EROSION HAZARD ON THE SITE SHALL BE KEPT AS LOW AS POSSIBLE. TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:
 - INSTALL ALL TEMPORARY SEDIMENT FENCES AND BARRIER FENCES. WHERE FENCES ARE ADJACENT TO EACH OTHER THE SEDIMENT FENCE CAN BE INCORPORATED INTO THE BARRIER FENCE.
 - CONSTRUCT TEMPORARY STABILISED SITE ACCESS, INCLUDING SHAKE DOWN AND WASH PAD.
 - INSTALL SEDIMENT CONTROL MEASURES AS OUTLINED ON THESE SEDIMENT AND CONTROL PLANS (ONCE APPROVED)
- THE CONTRACTOR SHALL UNDERTAKE SITE DEVELOPMENT WORKS SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF MINIMUM WORKABLE SIZE.
- AT ALL TIMES AND IN PARTICULAR DURING WINDY AND DRY WEATHER, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL. TACIFIERS MAY BE USED TO CONTROL DUST DURING EXTENDED PERIODS OF DRY WEATHER.
- ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) SHALL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.
- WATER SHALL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN STABILISED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED OUT.
- TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES SHALL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE STABILISED / REHABILITATED.
- THE CONTRACTOR SHALL ALLOW FOR THE ESTABLISHMENT OF ANY OTHER EROSION PROTECTION MEASURES (IF APPLICABLE).
- THE CONTRACTOR SHALL REGULARLY INSPECT (MINIMUM TWICE PER WEEK) ALL EROSION AND SEDIMENT CONTROL MEASURES TO ENSURE THEY ARE OPERATING EFFECTIVELY. REPAIRS AND/OR MAINTENANCE SHALL BE UNDERTAKEN REGULARLY AND AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.
- ACCEPTABLE RECEPTORS SHALL BE USED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER. WASTE FROM THESE RECEPTORS SHALL BE DISPOSED OF IN ACCORDANCE WITH REGULATORY AUTHORITY REQUIREMENTS. PAY ALL FEES AND PROVIDE EVIDENCE OF SAFE DISPOSAL.

SEDIMENT BASIN ASSESSMENT

ASSESSMENT AS PER SECTION 4.4, SECTION 6.3.2 (D) AND APPENDIX A OF THE BLUE BOOK.

ASSESSMENT OF EROSION HAZARD
R-FACTOR - 2,500 MAP 10, APPENDIX B
SITE GRADIENT - (10/47.0) 2.1%
SITE CLASSED AS LOW EROSION HAZARD BASED ON A-LINE IN FIGURE 4.6 - THEREFORE BASIC MEASURES CAN BE IMPLEMENTED.

ASSESSMENT OF EXPORT SOIL VOLUME

R = 2500
K = 0.075
LS = 1.02
P = 12
C = 12
A = 229.5 T/Ha/YR
DENSITY OF SEDIMENT = 1.9 T/m³
SITE AREA = 0.6313Ha
SOIL VOLUME = 76.3m³/YR < 150CUM/YR WHICH IS THE TRIGGER VALUE FOR A SEDIMENT BASIN

FINISHED LEVELS

- LEVELS BASED ON SITE SURVEY INFORMATION. THE CONTRACTOR SHALL VERIFY LEVELS PRIOR TO CONSTRUCTION COMMENCEMENT, ANY DISCREPANCIES SHALL BE NOTIFIED TO THE ENGINEER OR SUPERINTENDENT FOR CLARIFICATION
- CARPARK & SERVICE AREA LAYOUT AND GRADES TO COMPLY WITH AS2890.
- DRIVEWAY LAYOUT AND DESIGN TO COMPLY WITH APPROVAL AUTHORITY ACCESS DRIVEWAY DESIGN AND CONSTRUCTION SPECIFICATION.
- ALL CONTOUR LINES & SPOT LEVELS INDICATE FINISHED PAVEMENT LEVELS U.N.O. ON PLAN.
- PERMANENT BATTER SLOPES ARE TO HAVE A MAXIMUM GRADE OF 1V:3H.
- ALL FOOTPATHS ARE TO FALL AWAY FROM THE BUILDING AT 2.5% NOMINAL GRADE.
- ALL PAVEMENTS ARE TO BE SET AT 50mm BELOW THE FINISHED FLOOR LEVEL OF THE WAREHOUSE AND OFFICE AREAS U.N.O

STORMWATER

- ALL WORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH THE FOLLOWING AUSTRALIAN STANDARDS AS2032, AS3500 AND AS3725 AS A MINIMUM.
- ALL PIPES LESS THAN OR EQUAL TO Ø300mm IN SIZE ARE TO BE SOLVENT WELD-JOINTED uPVC CLASS SN4 U.N.O.
- ALL PIPES Ø375mm OR GREATER IN SIZE ARE TO BE MIN. CLASS 2 REINFORCED CONCRETE PIPE (RCP) WITH SPIGGOT AND SOCKETED JOINT OR VANTAGE PIPE PLUS (VPIPE-) FIBRE REINFORCED CONCRETE (FRC) WITH VANTAGE PIPE PLUS JOINT U.N.O.
- ALL PIPES ARE TO BE LAID AT MIN. 1.0% GRADE U.N.O.
- PIPE BEDDING IS TO BE HS2 UNDER ROADS AND TRAFFICKED AREAS AND SHALL BE H2 IN LANDSCAPED AND PEDESTRIAN TRAFFICKED AREAS U.N.O.
- ALL PIPE BENDS AND JUNCTIONS ARE TO BE MADE WITH EITHER PURPOSE MADE FITTINGS OR STORMWATER DRAINAGE PITS.
- MINIMUM COVER FROM THE OBVERT OF THE STORMWATER PIPE OF 300mm IS TO BE PROVIDED IN LANDSCAPED AREAS AND 300mm IN VEHICULAR TRAFFICKED AREAS U.N.O.
- WHERE MINIMUM COVER CANNOT BE ACHIEVED, CONCRETE ENCASEMENT OF THE AFFECTED PIPE MAY BE UNDERTAKEN WITH 20MPa CONCRETE WITH A MIN. COVER OF 150mm TO ALL SIDES OF THE PIPE. THE CONTRACTOR SHALL CONFIRM THIS REQUIREMENT WITH THE ENGINEER OR SUPERINTENDENT.
- LAID PIPELINES ARE TO HAVE THE FOLLOWING CONSTRUCTED TOLERANCES:
 - HORIZONTAL -1:300 ANGULAR DEVIATION FROM REQUIRED ALIGNMENT;
 - VERTICAL -1:300 ANGULAR DEVIATION FROM REQUIRED ALIGNMENT.
- ALL DRAINAGE PITS ARE TO BE CAST IN-SITU. PRECAST DRAINAGE PITS MAY BE USED WITH APPROVAL FROM THE ENGINEER. THE CONTRACTOR SHALL SUBMIT A PRECAST PIT INSTALLATION WORK METHOD STATEMENT FOR ASSESSMENT BY THE ENGINEER FOR APPROVAL.
- DRAINAGE PIT COVERS ARE TO BE EITHER GALVANISED STEEL OR CAST IRON CLASS 'B' IN LANDSCAPED AND PEDESTRIAN TRAFFICKED AREAS AND CLASS 'D' IN ALL VEHICULAR TRAFFICKED AREAS U.N.O.
- DRAINAGE PIT COVERS ARE TO BE 'HEELSAFE' TYPE IN ALL PEDESTRIAN TRAFFICKED AREAS U.N.O.
- EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED PRIOR TO COMMENCING WORKS ON SITE.
- PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
- DOWN PIPES CONNECTED DIRECT TO PIPES TO BE CONNECTED AT 45° TO THE FLOW DIRECTION WITH A CLEANING EYE PROVIDED AT GROUND LEVEL.

EXISTING UTILITIES

- UTILITY INFORMATION SHOWN ON PLAN DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE BASED ON AVAILABLE DOCUMENTARY EVIDENCE
- THE PRESENCE OF A UTILITY SERVICE, SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION PRIOR TO THE COMMENCEMENT OF ROAD WORKS, AND THE RELATED UTILITY PLANS OBTAINED BY DIALING 110 OR FAX 130 652 077 (DIAL BEFORE YOU DIG)
- UTILITY LOCATION, SIZE AND DEPTH TO BE CONFIRMED BY SERVICE LOCATING OR NON-DESTRUCTIVE EXCAVATION PRIOR TO CONSTRUCTION. ALL CLASHES WITH PROPOSED SERVICES ARE TO BE RESOLVED
- CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY THE RELEVANT SERVICES AUTHORITIES OF THE WORKS AND VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO ANY CONSTRUCTION ACTIVITIES COMMENCING
- THE CONTRACTOR SHALL LIAISE AND COORDINATE THE TIMING OF THE CONSTRUCTION OF THE WORKS WITH THE RELEVANT SERVICES CONCURRENTLY AT THIS SITE
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE CAUSED TO EXISTING SERVICES AS A RESULT OF THE CONSTRUCTION WORKS

DESIGN SUMMARY

- OSD REQUIREMENTS:
SITE AREA = 6,543m²

AS THE SITE EXCEEDS 5,000m², THE OSD HAS BEEN DESIGNED IN ACCORDANCE WITH THE PENRITH CITY COUNCIL STORMWATER DRAINAGE SPECIFICATION FOR BUILDING DEVELOPMENTS, USING COUNCIL'S PREFERRED MODELING SOFTWARE, 'DRAINS'.

THE SITE IS FLOOD AFFECTED AND BECOMES INUNDATED WITH FLOOD WATERS DURING THE 100 YEAR ARI STORM EVENT. AS THIS OCCURS, THE OSD IS INEFFECTIVE AND CANNOT DISCHARGE STORMWATER RUNOFF DUE TO SURROUNDING FLOOD WATER CONDITIONS. THE OSD HAS BEEN DESIGNED TO CATER FOR ALL STORM EVENTS UP TO AND INCLUDING THE 50 YEAR ARI, AND PROVIDES FLOOD STORAGE FOR THE 100 YEAR ARI STORM EVENT.

REFER TO THE OSD SUMMARY TABLE BELOW FOR POST DEVELOPMENT FLOW CALCULATIONS AND MINIMUM OSD STORAGE TO BE PROVIDED TO MEET COUNCIL'S REQUIREMENTS.

STORM EVENT (ARI)	PRE DEVELOPMENT PEAK Q (L/s)	POST DEVELOPMENT PEAK Q (L/s)			TOTAL POST DEVELOPMENT PEAK Q (L/s)	MINIMUM OSD VOLUME (m3)
		ORIFICE	OVERFLOW	BYPASS		
5	145.0	123	0	17.0	140.0	20.73
10	198.0	124	0	23.0	147.0	34.11
20	245.0	125	0	28.0	153.0	54.95
50	285.0	126	0	32.0	158.0	84.80

REFER TO STORMWATER MANAGEMENT PLANS FOR OSD DETAILS.

- WATER CONSERVATION
RAINWATER TANKS ARE TO BE IMPLEMENTED TO REDUCE THE AMOUNT OF POTABLE WATER USAGE THROUGHOUT THE DEVELOPMENT AND ACHIEVE MINIMUM 80% SUPPLY IN ACCORDANCE WITH PENRITH CITY COUNCIL REQUIREMENTS. DETAILED WATER BALANCE USING MUSIC SOFTWARE HAS BEEN UNDERTAKEN WITH THE FOLLOWING INPUTS AND RESULTS.

REUSE FOR TOILETS:	0.1kL/DAY/TOILET
LANDSCAPING IRRIGATION:	0.4kL/m ² /yr
LANDSCAPING AREA:	446m ²
No. OF TOILETS:	2
ROOF AREA TO RAINWATER TANK:	1,111m ²
RAINWATER TANK STORAGE PROVIDED:	20kL

YEARLY WATER DEMAND REQUESTED: 241kL

REUSE SUPPLIED 201kL

SUPPLY EFFICIENCY 83%

- STORMWATER QUALITY
STORMWATER QUALITY IS PROVIDED IN ACCORDANCE WITH PENRITH CITY COUNCIL WATER SENSITIVE URBAN DESIGN (WSUD) POLICY.

POLLUTANT REDUCTION TARGETS FOR STORMWATER RUNOFF

- 90% REDUCTION IN GROSS POLLUTANTS (GP);
- 85% REDUCTION IN TOTAL SUSPENDED SOLIDS (TSS)
- 60% REDUCTION IN TOTAL PHOSPHORUS (TP)
- 45% REDUCTION IN TOTAL NITROGEN (TN)

MUSIC MODELLING HAS BEEN UNDERTAKEN TO DEMONSTRATE COMPLIANCE WITH PENRITH CITY COUNCIL'S WATER SENSITIVE URBAN DESIGN GUIDELINES AND DETERMINED RELEVANT SIZING OF TREATMENT MEASURES.

STORMWATER TREATMENT MEASURES AS FOLLOWS:

- 5 x OCEAN PROTECT OCEANGUARDS
- OCEAN PROTECT PRECAST MANHOLE DN250 WITH 5 x 690mm Psorb CARTRIDGES
- RAINWATER TANK EFFECTIVE STORAGE VOLUME 20kL

POLLUTANT REDUCTION TARGETS ACHIEVED:

- 97% REDUCTION IN GROSS POLLUTANTS (GP);
- 86% REDUCTION IN TOTAL SUSPENDED SOLIDS (TSS)
- 62% REDUCTION IN TOTAL PHOSPHORUS (TP)
- 45% REDUCTION IN TOTAL NITROGEN (TN)

DEVELOPMENT APPLICATION ISSUE

IMPORTANT
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27.08.21	DA ISSUE	JK	2				

1 2 3 4 5 6 7 8 9 10

Document Set ID: 9731048
Version: 1, Version Date: 10/09/2021

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PROJECT

PROPOSED INDUSTRIAL DEVELOPMENT,
22-23 LAMBRIDGE PLACE, PENRITH

ARCHITECT



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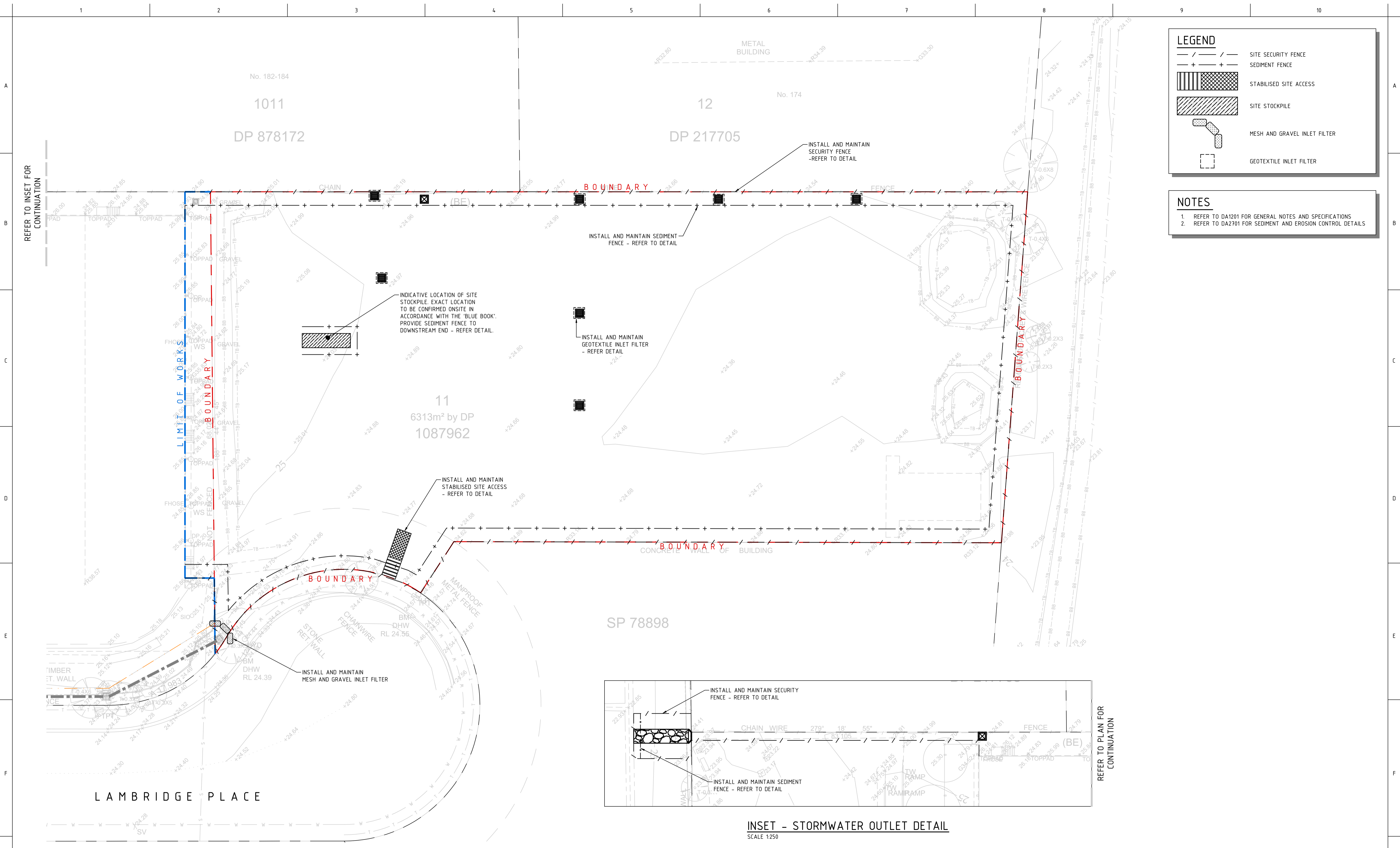


DRAWING TITLE

CIVIL DESIGN
SPECIFICATION SHEET

DATE	DRAWN	DESIGNED	CHECKED
AUG 2021	JK	JK	BB
PROJECT No	SCALE	SIZE	REVISION
21117	NTS	A1	
DRAWING No			2

1 2 3 4 5 6 7 8 9 10



LEGEND

- / — / — SITE SECURITY FENCE
- + — + — SEDIMENT FENCE
- [Hatched Box] STABILISED SITE ACCESS
- [Hatched Box] SITE STOCKPILE
- [Symbol] MESH AND GRAVEL INLET FILTER
- [Symbol] GEOTEXTILE INLET FILTER

NOTES

- REFER TO DA1201 FOR GENERAL NOTES AND SPECIFICATIONS
- REFER TO DA2701 FOR SEDIMENT AND EROSION CONTROL DETAILS

DEVELOPMENT APPLICATION ISSUE

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 PROPOSED INDUSTRIAL DEVELOPMENT,
 22-23 LAMBRIDGE PLACE, PENRITH

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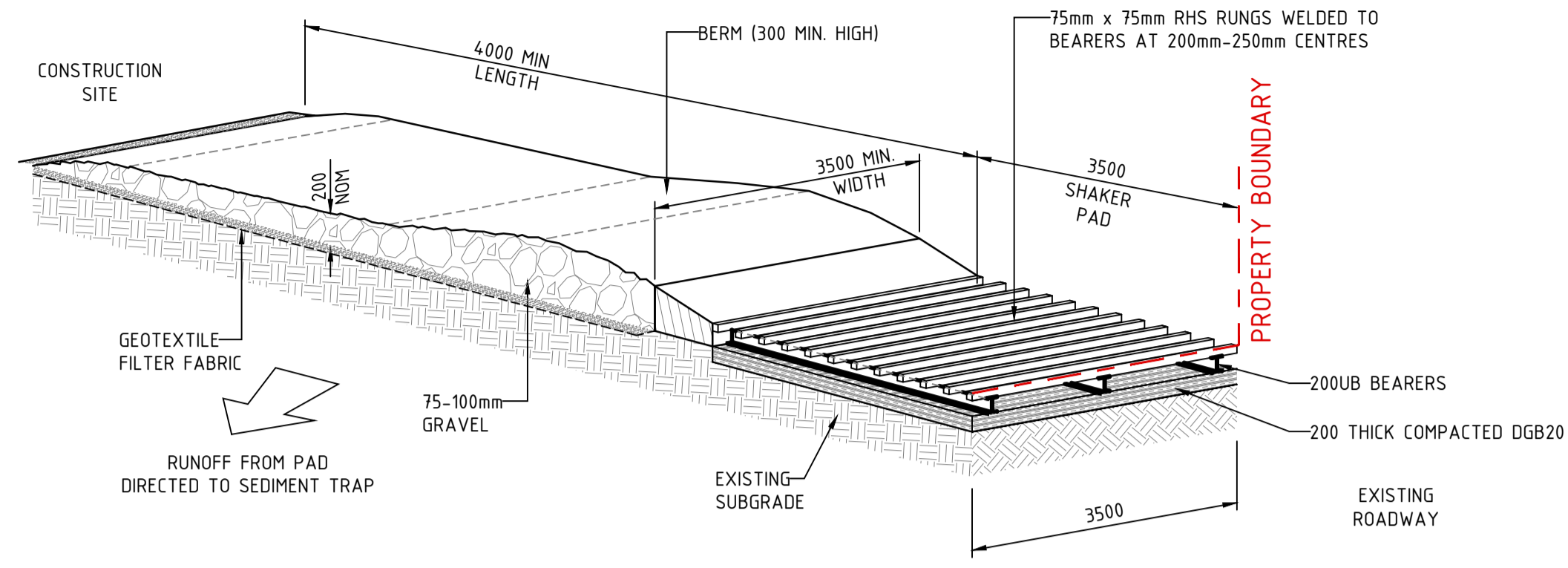
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DRAWING TITLE
 CIVIL DESIGN
 CONCEPT SEDIMENT & EROSION
 CONTROL PLAN

DATE	DRAWN	DESIGNED	CHECKED	BB
AUG 2021	JK	JK	JK	BB

SCALE: 1:250 @ A1 SIZE: A1 REVISION:

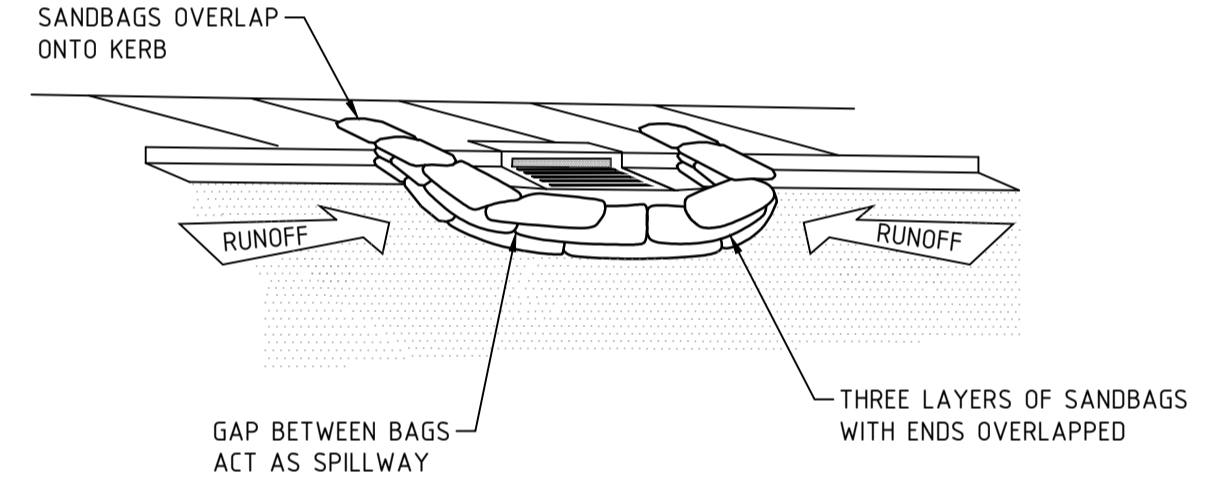
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21117	DA2101	2



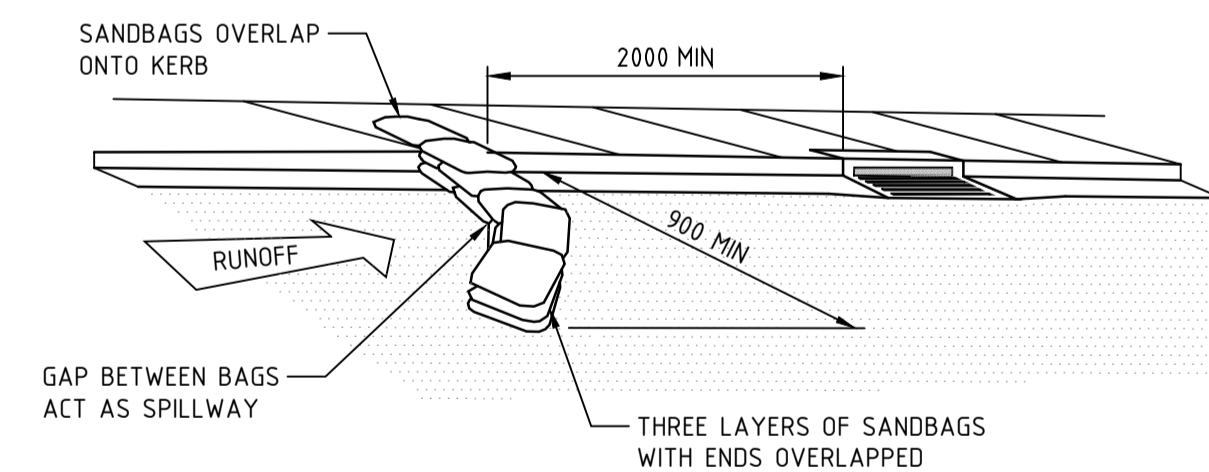
STABILISED SITE ACCESS WITH SHAKER PAD
NOT TO SCALE

MAINTENANCE

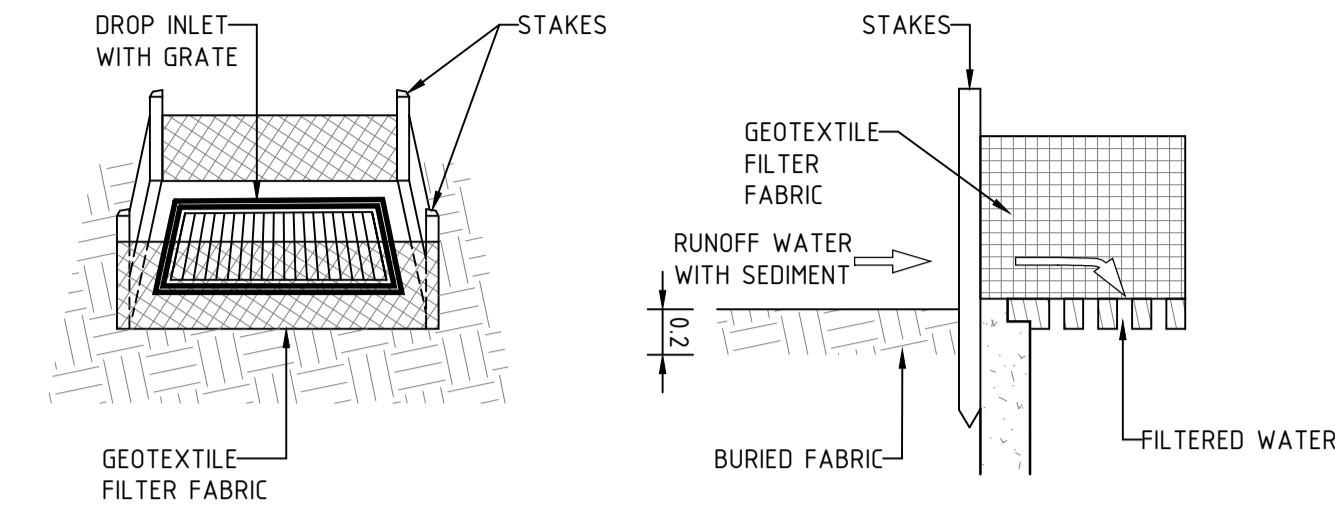
- THE TEMPORARY ACCESS SHALL BE MAINTAINED IN A CONDITION THAT PREVENTS TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS OF WAY.
- THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL GRAVEL AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
- ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS OF WAY MUST BE REMOVED IMMEDIATELY.
- INSTALL BARRIER ON EITHER SIDE OF SHAKER PAD TO ENSURE VEHICLES ARE GUIDED ON TO THE PAD.
- INVERT OF SHAKER PAD TO BE DRAINED VIA AGRICULTURAL PIPE WRAPPED IN GEOTEXTILE FABRIC.



SEDIMENT TRAP FOR KERB INLET (AT LOW POINT - SANDBAG)
NOT TO SCALE



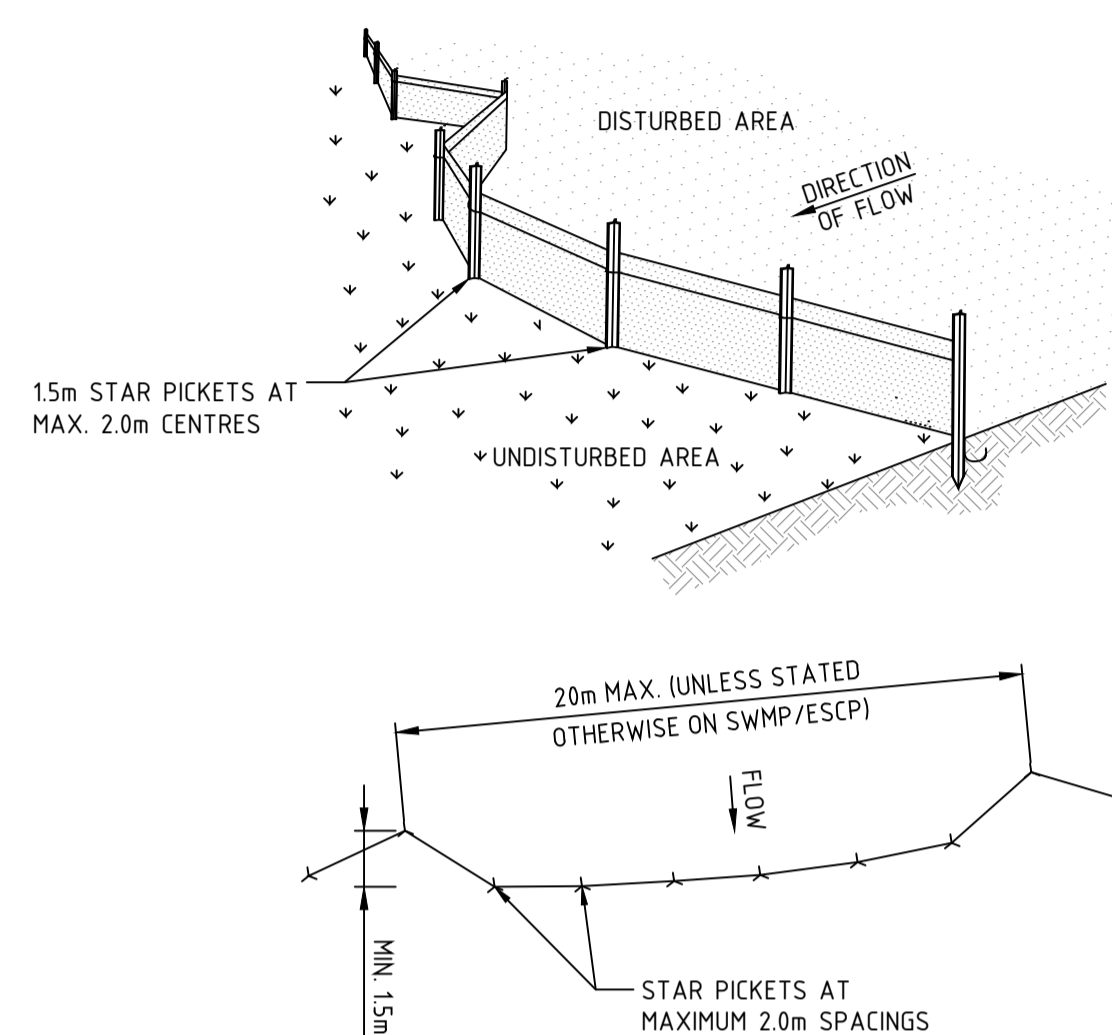
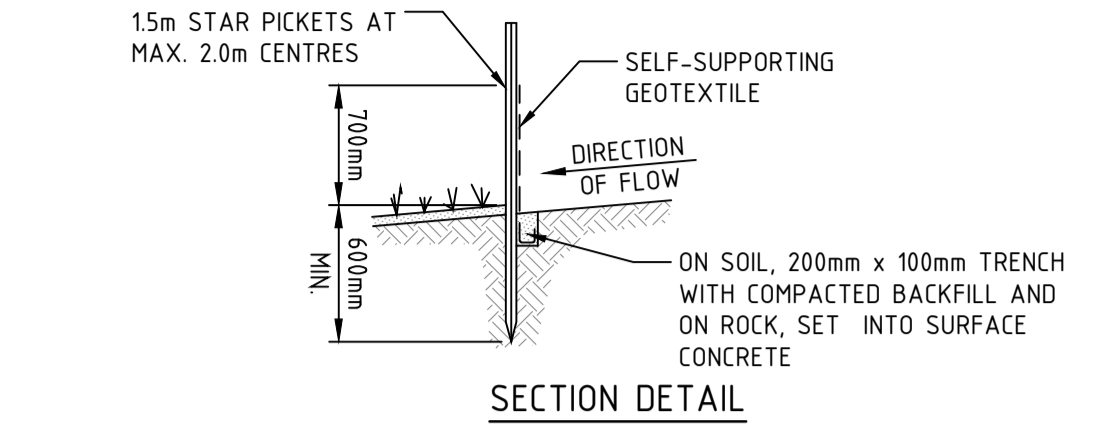
SEDIMENT TRAP FOR KERB INLET (ON GRADE - SANDBAG)
NOT TO SCALE



GEOTEXTILE INLET FILTER DROP INLET SEDIMENT TRAP
NOT TO SCALE

NOTES:

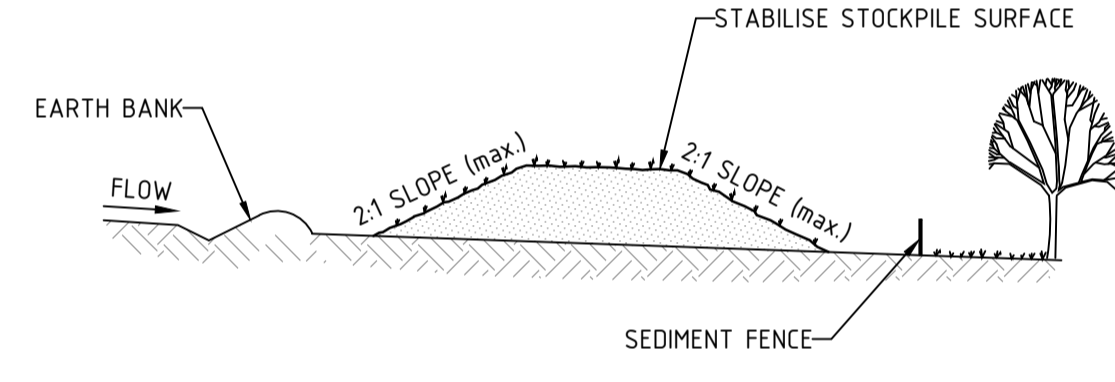
1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. CUT A 200mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.0m LONG STAR PICKETS INTO GROUND AT THE FOUR CORNERS OF PIT WALLS. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.



SEDIMENT FENCE
NOT TO SCALE

NOTES:

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50L/s IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 200mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND AT 2.0m INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.



STOCKPILE
NOT TO SCALE

NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

DEVELOPMENT APPLICATION ISSUE

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MECHANICAL	-
ELECTRICAL	-
CIVIL	-

CLIENT

BUILDER

PROJECT

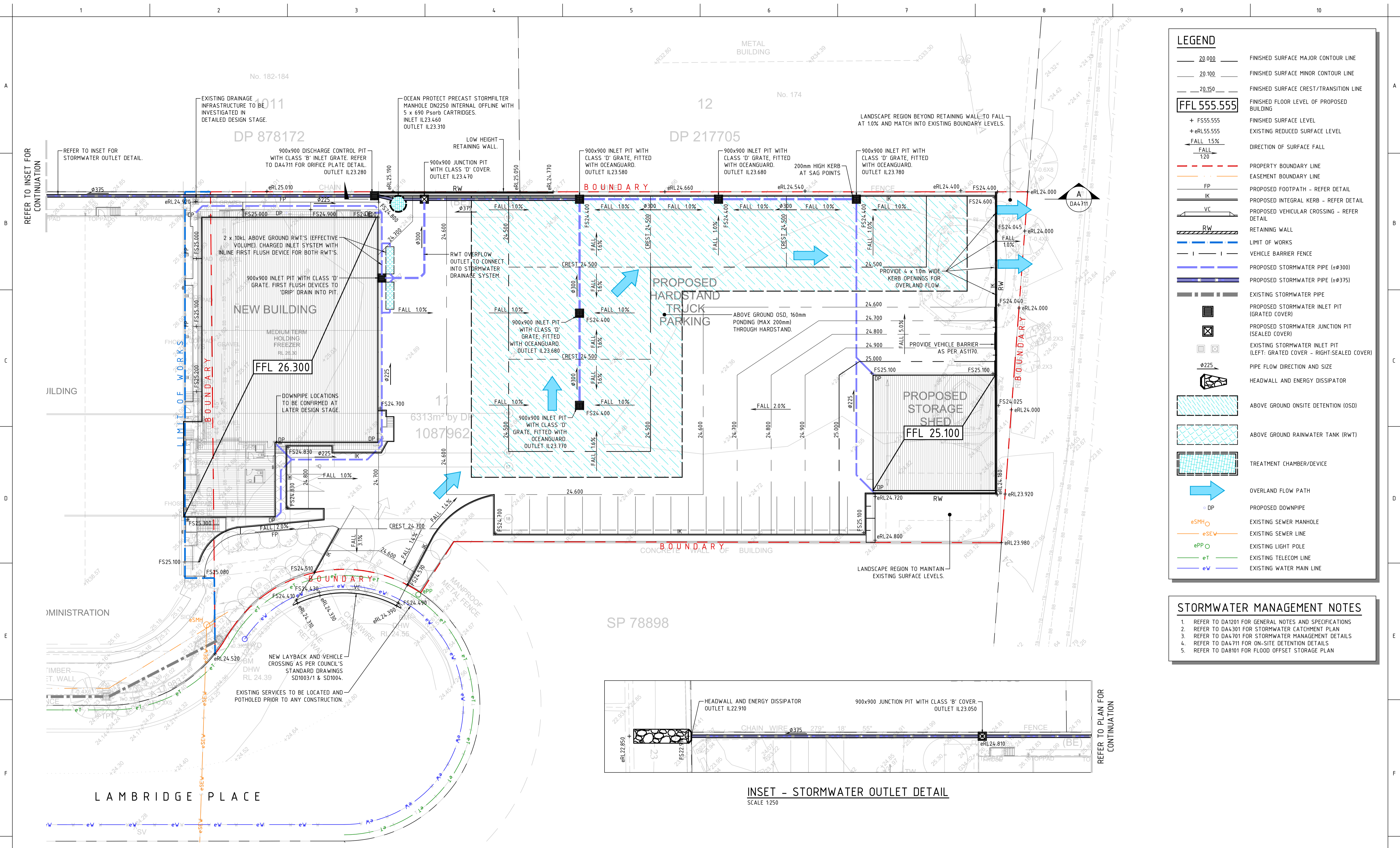
PROPOSED INDUSTRIAL DEVELOPMENT,
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ARCHITECT

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AUG 2021	JK	JK	JK	
PROJECT No	SCALE	SIZE	REVISION	
21117	NTS	A1		
DRAWING No				
DA2701				2

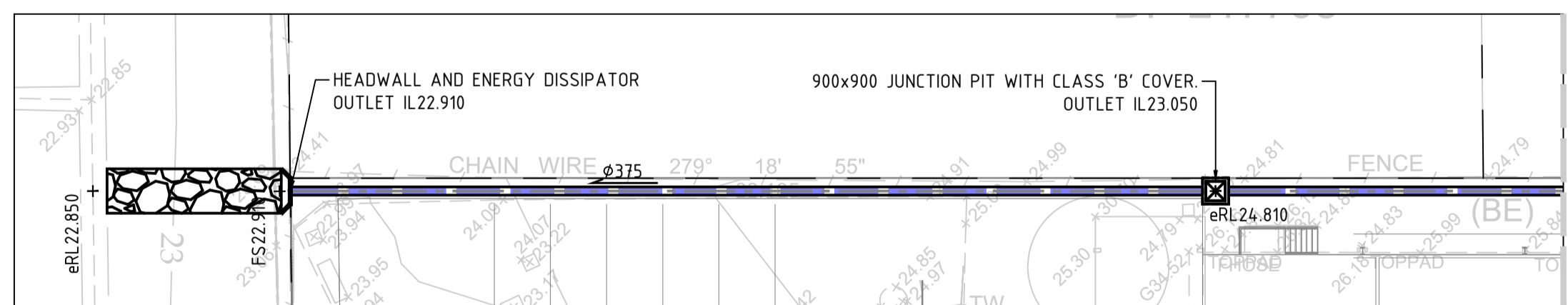


LEGEND

- FINISHED SURFACE MAJOR CONTOUR LINE
- FINISHED SURFACE MINOR CONTOUR LINE
- FINISHED SURFACE CREST/TRANSITION LINE
- FINISHED FLOOR LEVEL OF PROPOSED BUILDING
- FINISHED SURFACE LEVEL
- EXISTING REDUCED SURFACE LEVEL
- DIRECTION OF SURFACE FALL
- PROPERTY BOUNDARY LINE
- EASEMENT BOUNDARY LINE
- PROPOSED FOOTPATH - REFER DETAIL
- PROPOSED INTEGRAL KERB - REFER DETAIL
- PROPOSED VEHICULAR CROSSING - REFER DETAIL
- RETAINING WALL
- LIMIT OF WORKS
- VEHICLE BARRIER FENCE
- PROPOSED STORMWATER PIPE (ø300)
- PROPOSED STORMWATER PIPE (ø375)
- EXISTING STORMWATER PIPE
- PROPOSED STORMWATER INLET PIT (GRATED COVER)
- PROPOSED STORMWATER JUNCTION PIT (SEALED COVER)
- EXISTING STORMWATER INLET PIT (LEFT: GRATED COVER - RIGHT: SEALED COVER)
- PIPE FLOW DIRECTION AND SIZE
- HEADWALL AND ENERGY DISSIPATOR
- ABOVE GROUND ONSITE DETENTION (OSD)
- ABOVE GROUND RAINWATER TANK (RWT)
- TREATMENT CHAMBER/DEVICE
- OVERLAND FLOW PATH
- PROPOSED DOWNPIPE
- EXISTING SEWER MANHOLE
- EXISTING SEWER LINE
- EXISTING LIGHT POLE
- EXISTING TELECOM LINE
- EXISTING WATER MAIN LINE

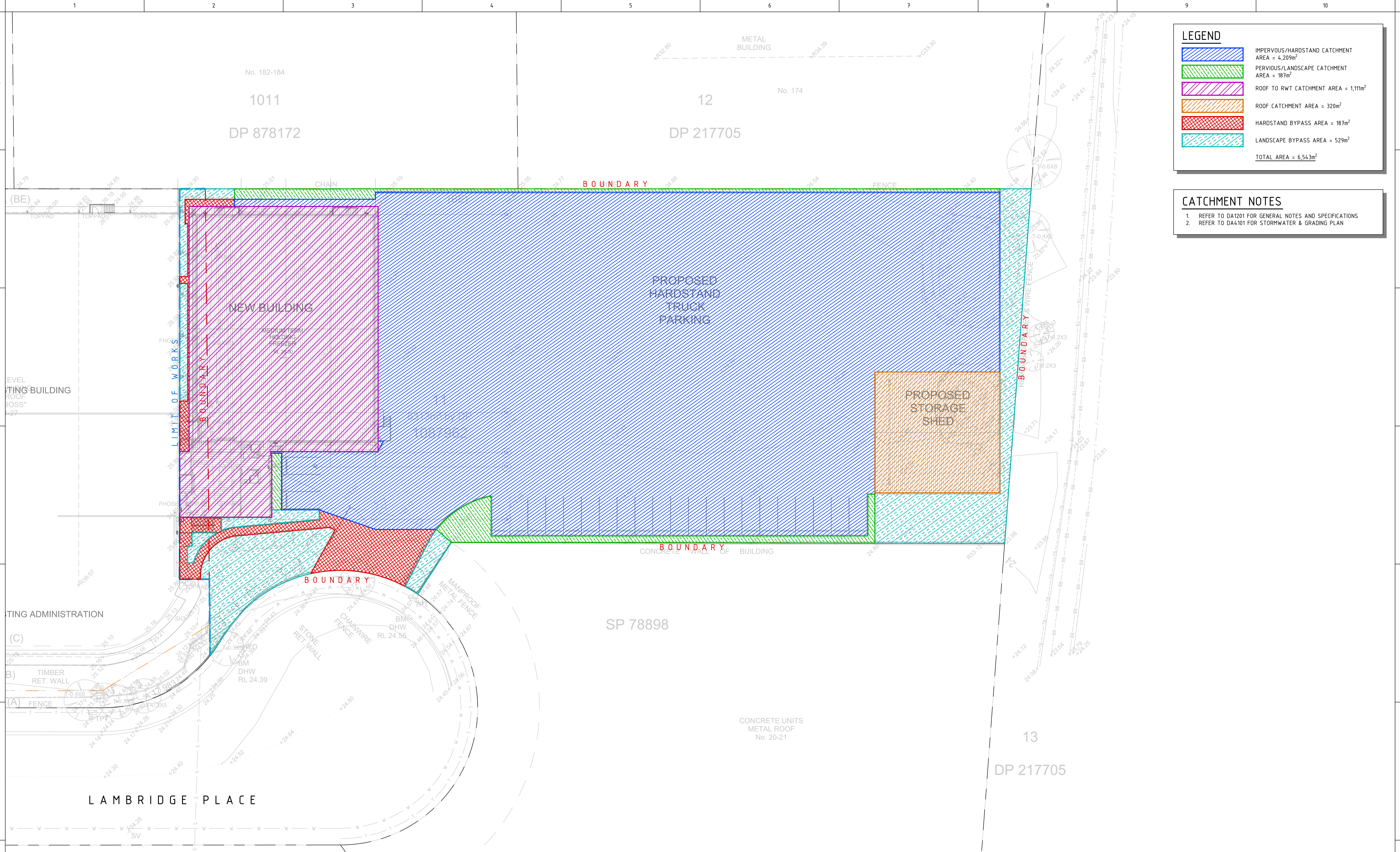
STORMWATER MANAGEMENT NOTES

- REFER TO DA1201 FOR GENERAL NOTES AND SPECIFICATIONS
- REFER TO DA4301 FOR STORMWATER CATCHMENT PLAN
- REFER TO DA4701 FOR STORMWATER MANAGEMENT DETAILS
- REFER TO DA4711 FOR ON-SITE DETENTION DETAILS
- REFER TO DA8101 FOR FLOOD OFFSET STORAGE PLAN



DEVELOPMENT APPLICATION ISSUE

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LEGEND	
	IMPERVIOUS/HARDSTAND CATCHMENT AREA = 4,209m ²
	PERVIOUS/LANDSCAPE CATCHMENT AREA = 187m ²
	ROOF TO RW CATCHMENT AREA = 1,111m ²
	ROOF CATCHMENT AREA = 320m ²
	HARDSTAND BYPASS AREA = 187m ²
	LANDSCAPE BYPASS AREA = 529m ²
TOTAL AREA = 6,543m ²	

- CATCHMENT NOTES**
- REFER TO DA1201 FOR GENERAL NOTES AND SPECIFICATIONS
 - REFER TO DA4101 FOR STORMWATER & GRADING PLAN

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PROJECT
PROPOSED INDUSTRIAL DEVELOPMENT,
22-23 LAMBRIDGE PLACE, PENRITH

ARCHITECT

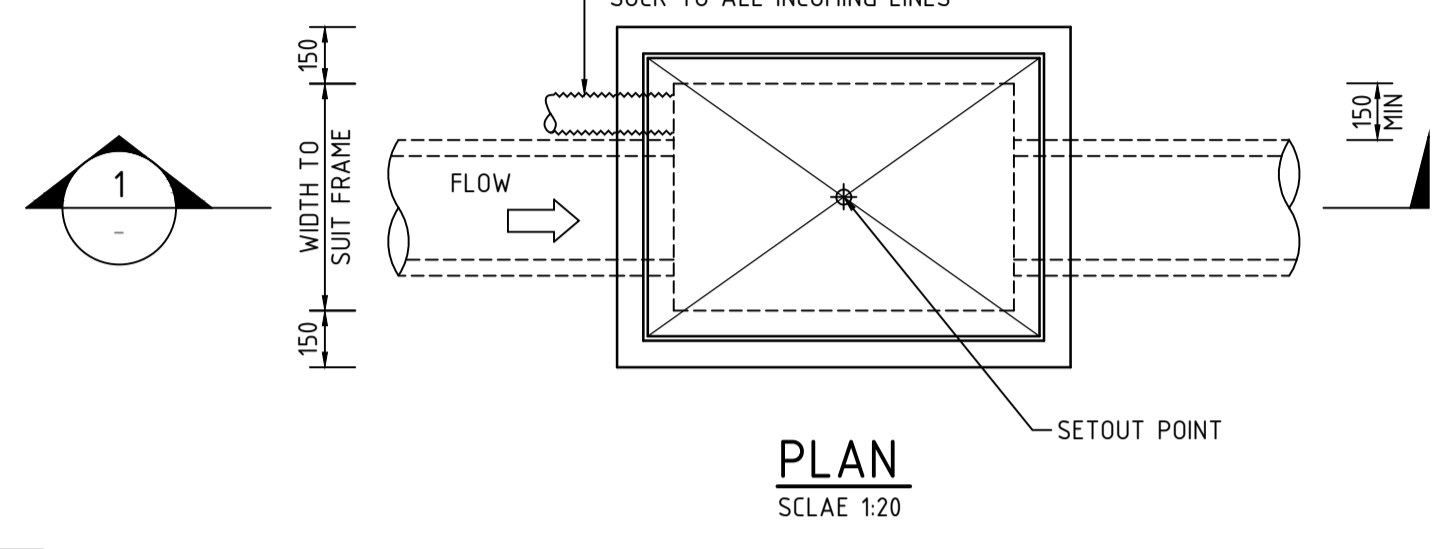
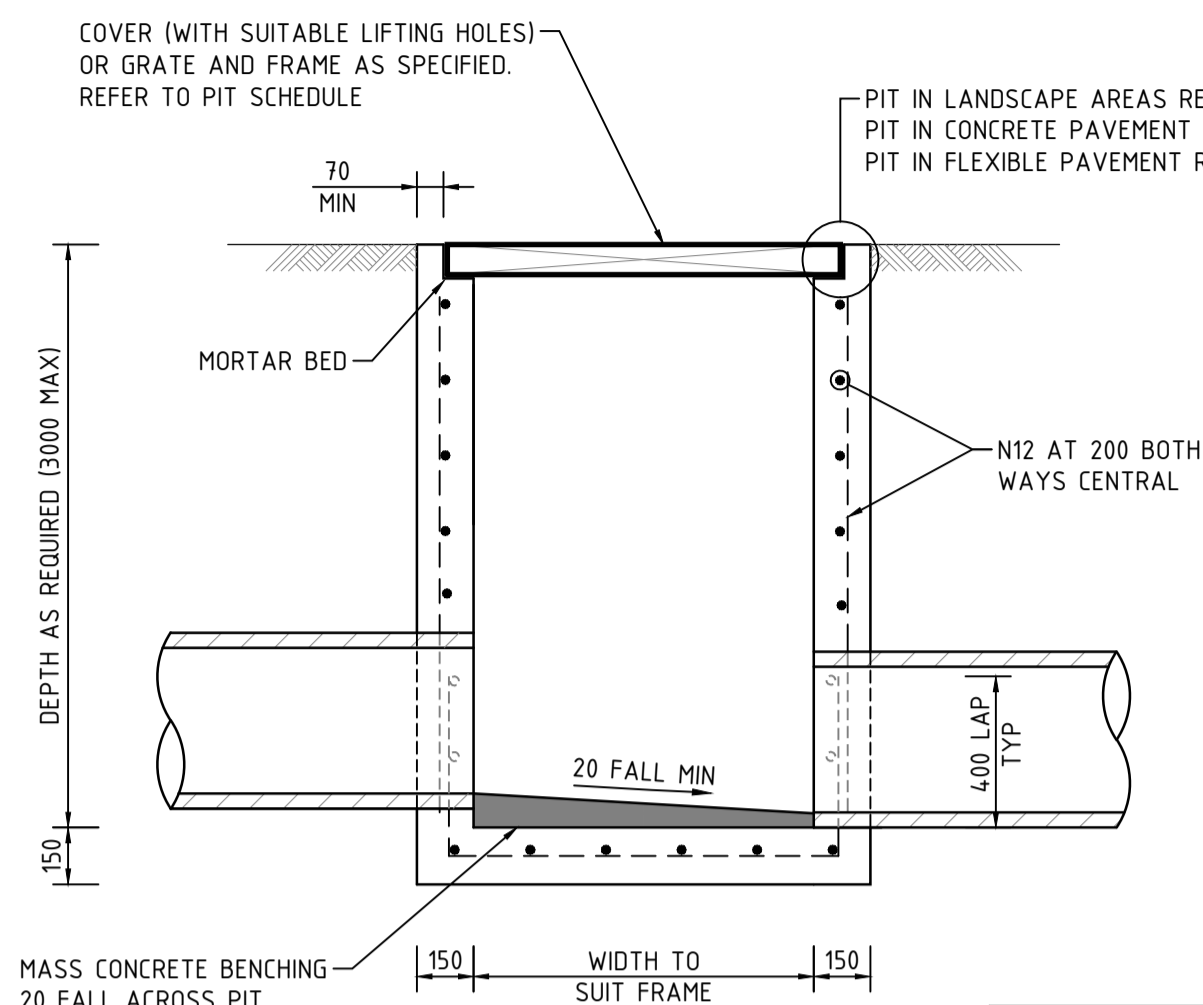
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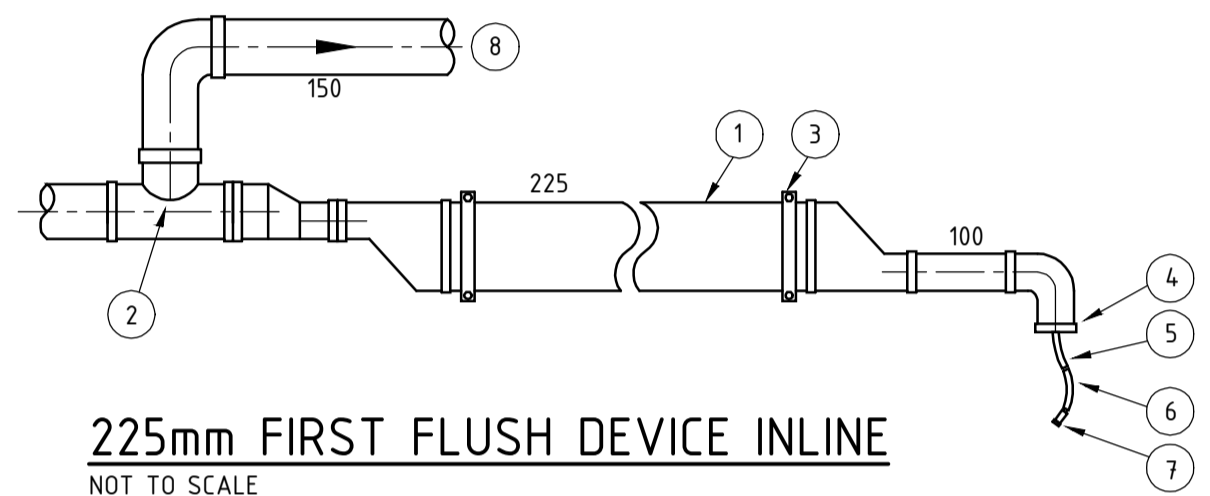
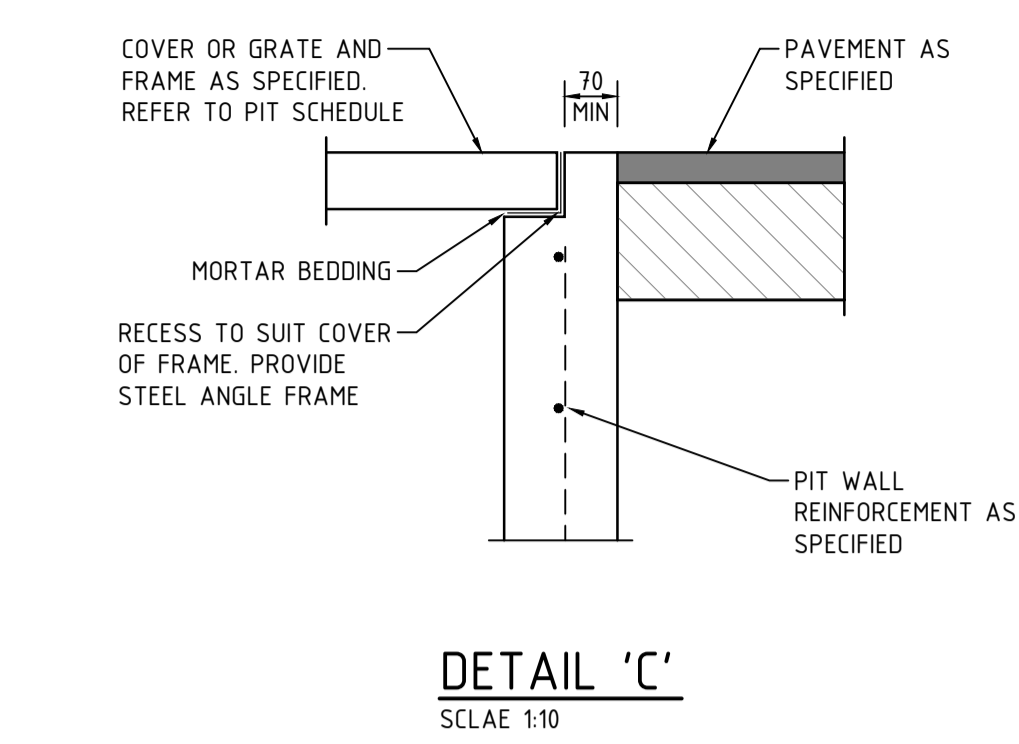
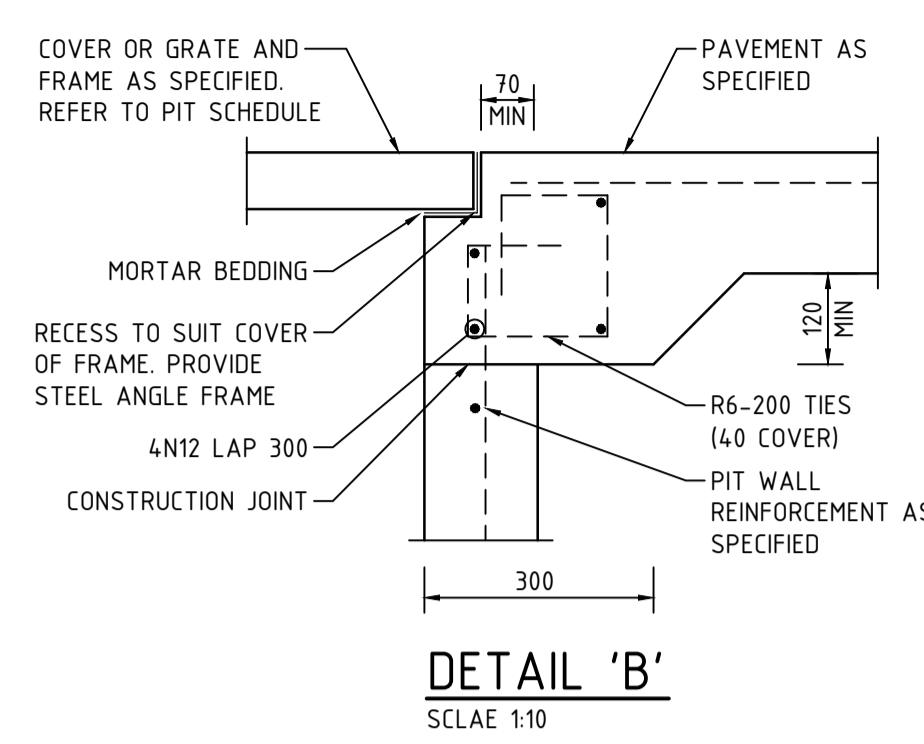
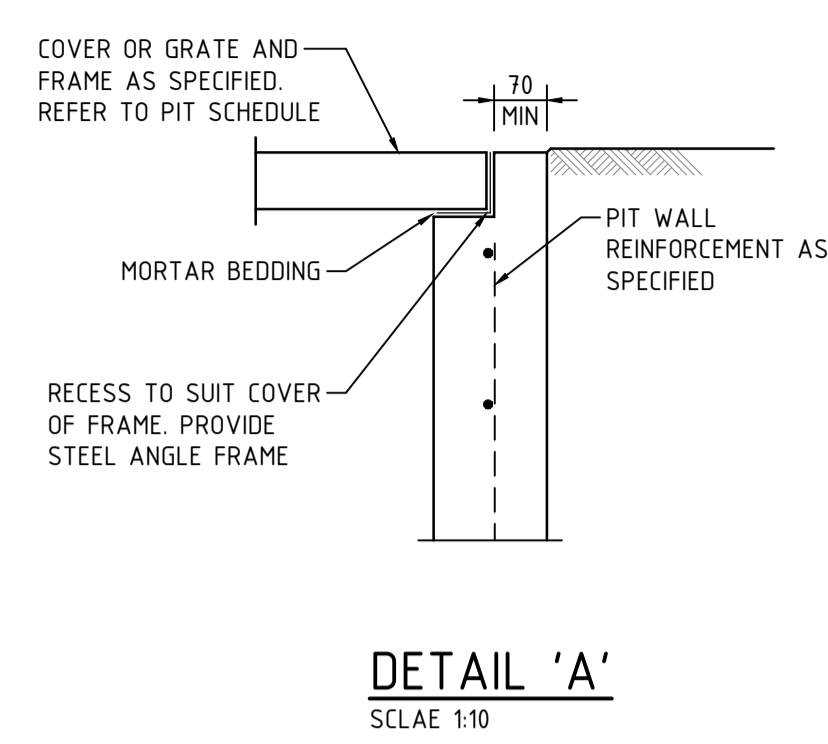
DRAWING TITLE
CIVIL DESIGN
CONCEPT STORMWATER
CATCHMENT PLAN

DATE	DRAWN	DESIGNED	CHECKED	BB
AUG 2021	JK	JK	JK	
PROJECT No	SCALE	SIZE	REVISION	
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DRAWING No	DA4301		2	

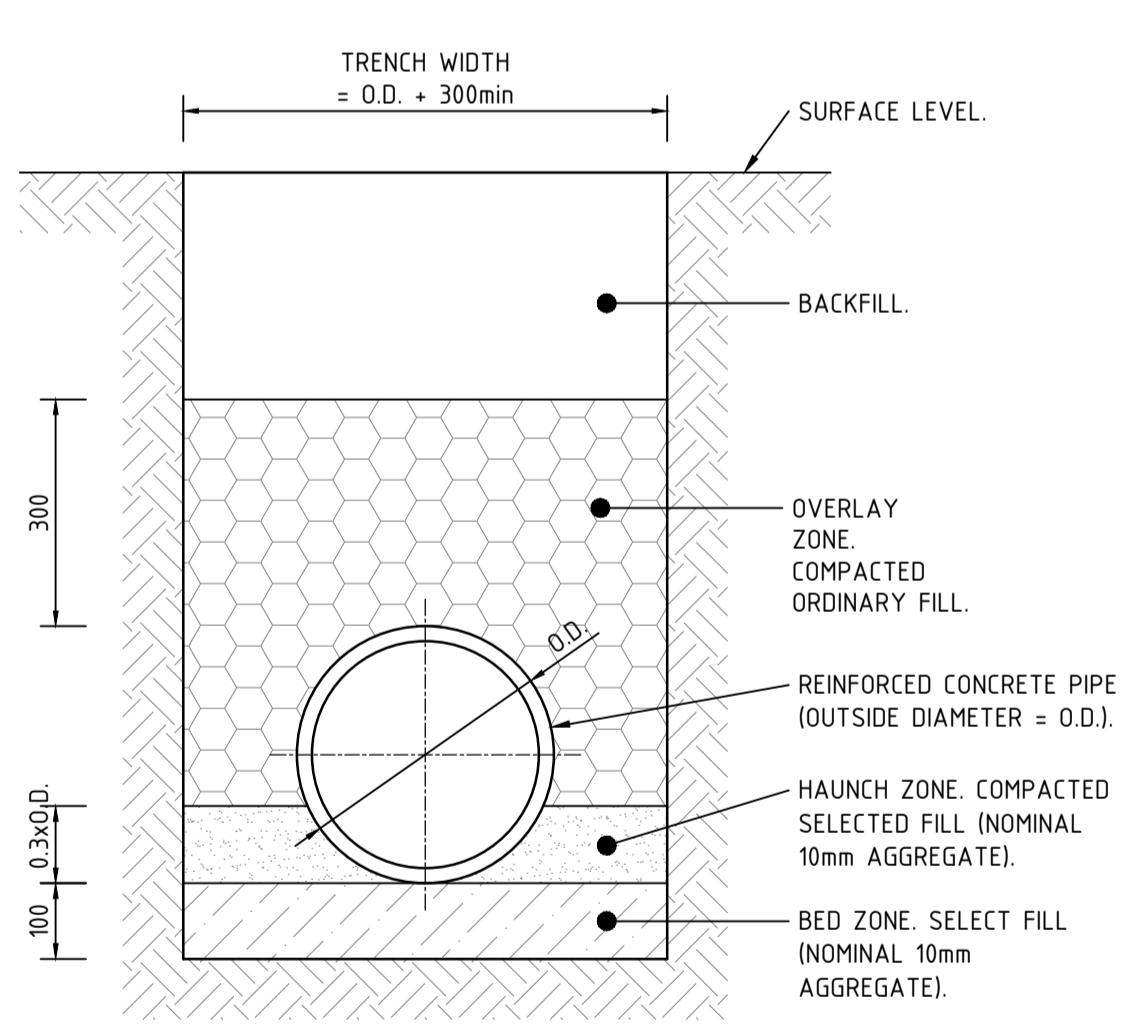
DEVELOPMENT APPLICATION ISSUE



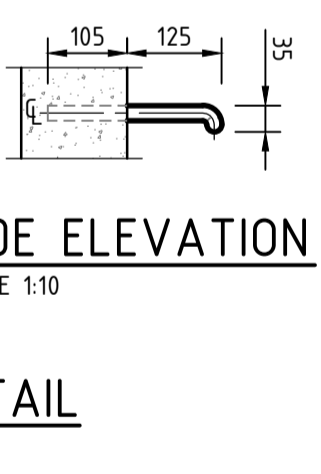
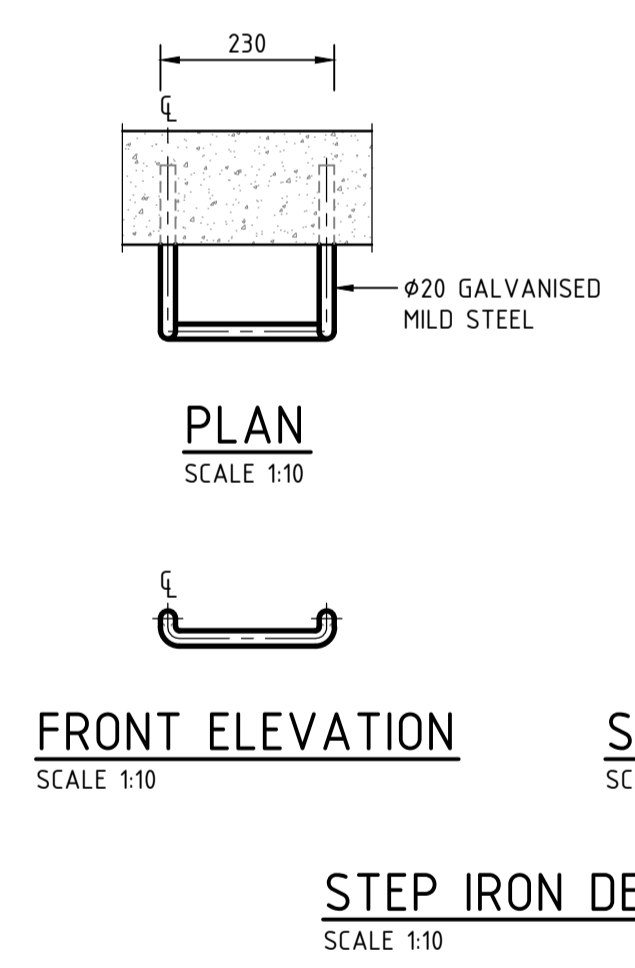
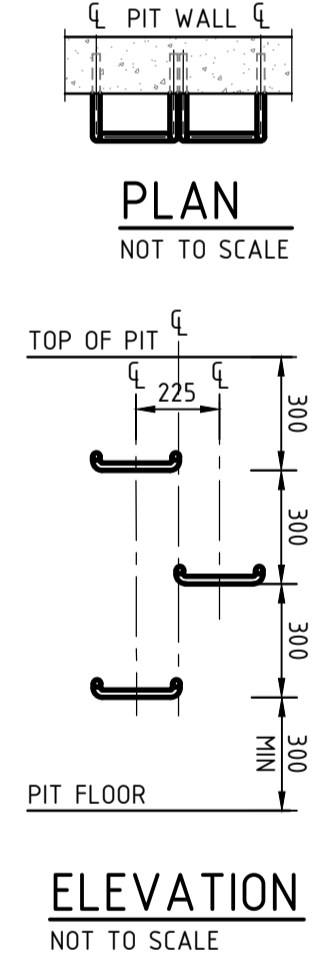
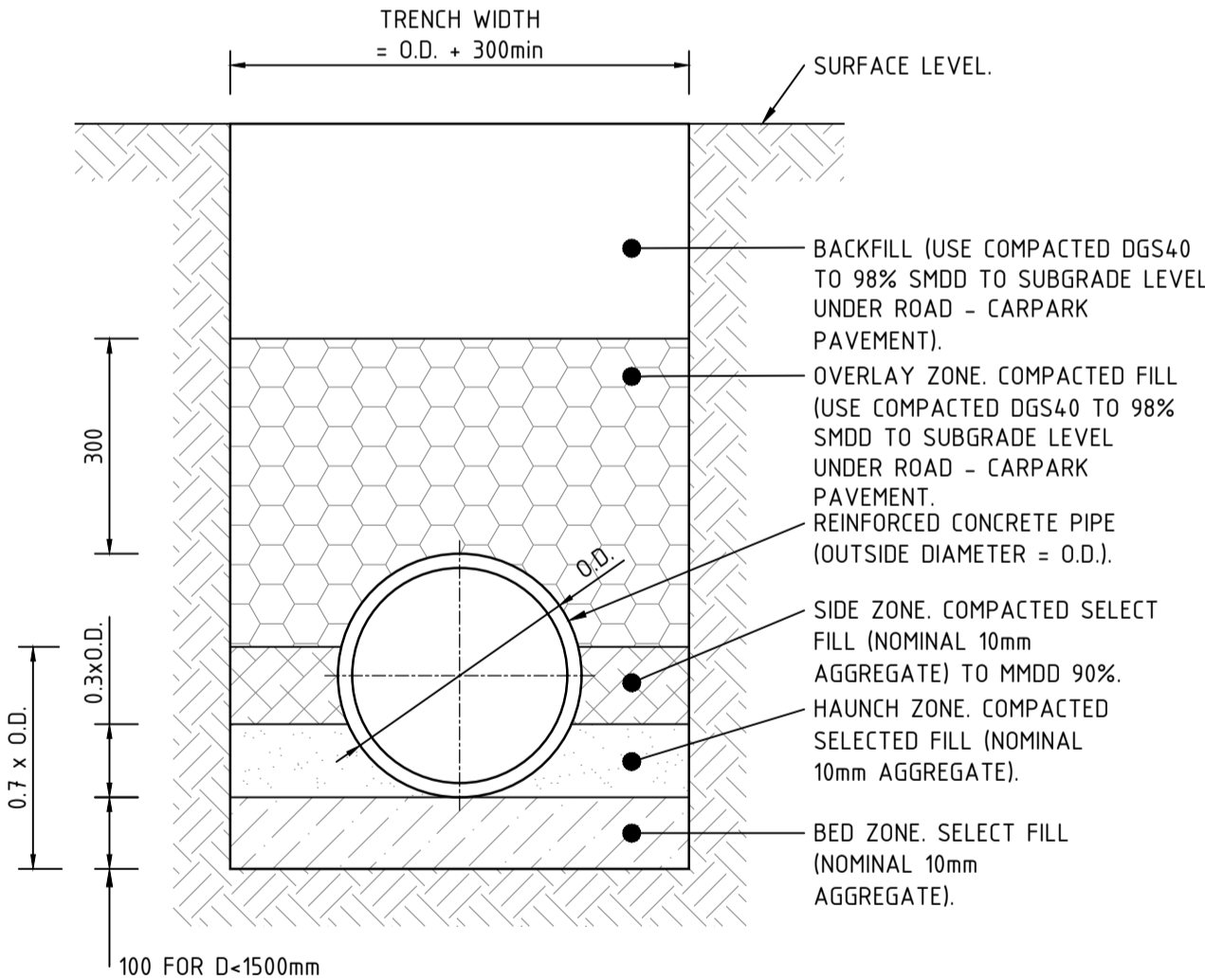
SURFACE INLET / JUNCTION PIT
(PIPE SIZES = Ø450)
SCALE 1:20



- NOTES:**
- DIVERTER CHAMBER
 - TEE JUNCTION
 - PIPE/WALL BRACKET (BOUGHT SEPARATELY)
 - SCREW CAP
 - DRIP OUTLET
 - DRIP IRRIGATOR
 - IRRIGATOR HOSE DRAIN TO PIT
 - RAINWATER TO TANK



- NOTES:**
- TRENCH WIDTH MAY NEED TO BE INCREASED SUBJECT TO ACHIEVING ADEQUATE COMPACTION.
 - MINIMUM PIPE COVER: NOT UNDER ROADS = 300mm (NOT UNDER ROADS) = 600mm FOR CLASS 2 PIPES (UNDER ROADS). THE CONTRACTOR SHALL ENSURE THAT THE SHORING OF TRENCHES IS INSTALLED AS REQUIRED BY STATUTORY REQUIREMENTS.
 - ENSURE BACKFILLING COMPACTION MEETS THE FOLLOWING STANDARDS:
A) TRENCHES UNDER PAVED AREAS & BUILDINGS - 100% SMDD
B) TRENCHES NOT UNDER PAVEMENTS - 90% SMDD



STEP IRON PLACEMENT TO PIT WALL
NOT TO SCALE

TYPICAL PIPE TRENCH
SCALE 1:10

TYPICAL PIPE TRENCH (UNDER RIGID PAVEMENTS)
SCALE 1:10

DEVELOPMENT APPLICATION ISSUE

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DATE	AMENDMENT	INIT	REV	DATE	AMENDMENT	INIT	REV

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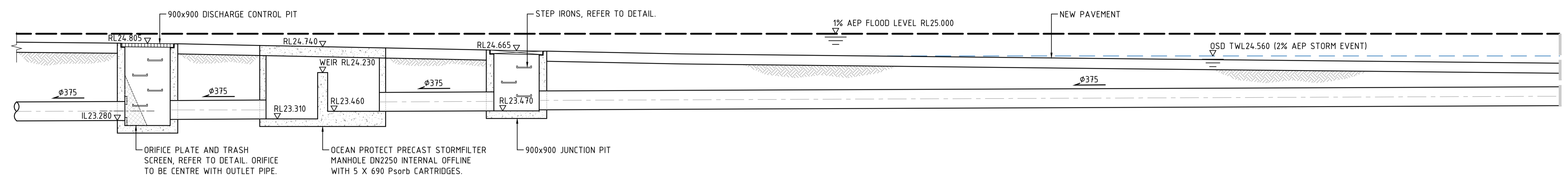
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22-23 LAMBRIDGE PLACE, PENRITH

ARCHITECT

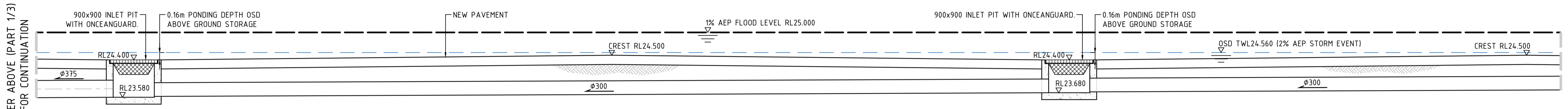
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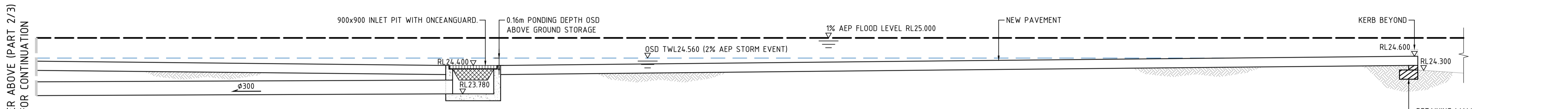
DATE	DRAWN	DESIGNED	CHECKED	BB
AUG 2021	JK	JK	JK	BB
PROJECT No	SCALE	SIZE	REVISION	
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DRAWING No				
DA4701				2



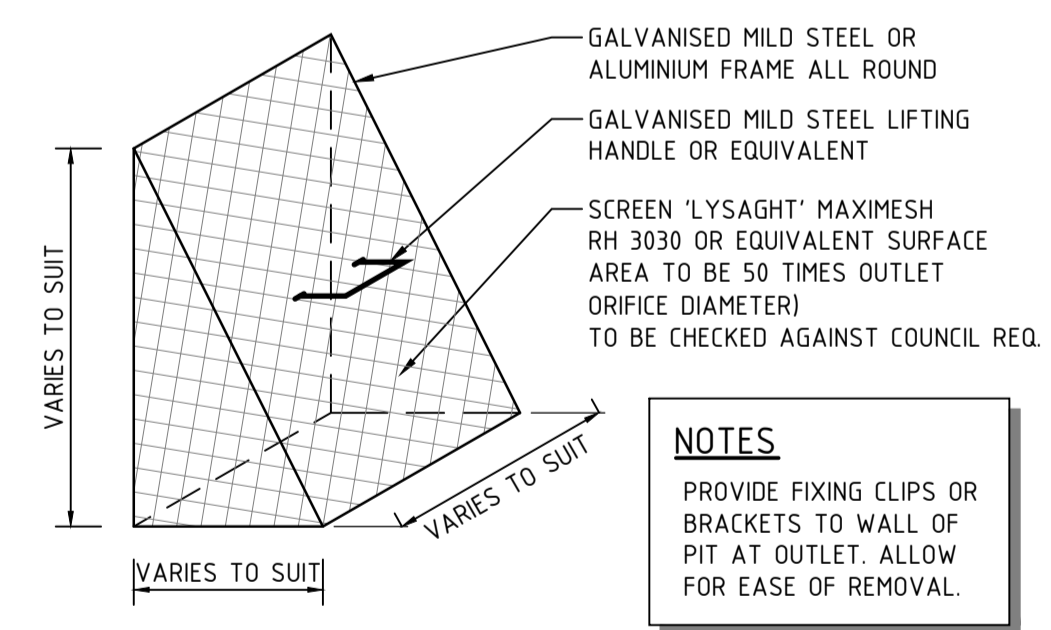
OSD SECTION - PART 1/3
SCALE 1:50



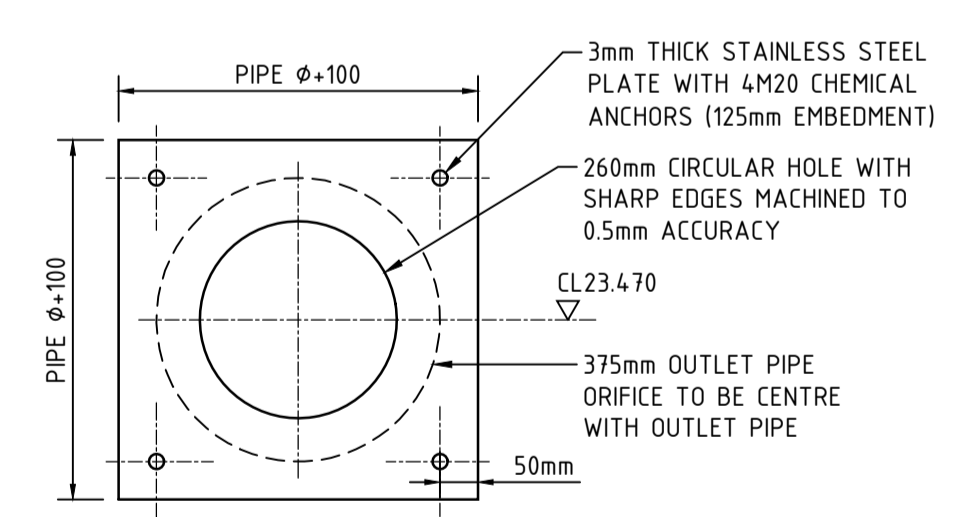
OSD SECTION - PART 2/3
SCALE 1:50



OSD SECTION - PART 3/3
SCALE 1:50



TYPICAL REMOVABLE SCREEN DETAIL
NOT TO SCALE



ORIFICE PLATE
SCALE 1:10

DATE	AMENDMENT	INIT	REV	DATE	AMENDMENT	INIT	REV
27.08.21	DA ISSUE	JK	1				

DATE	AMENDMENT	INIT	REV	DATE	AMENDMENT	INIT	REV

DATE	AMENDMENT	INIT	REV

CLIENT

BUILDER

PROJECT

PROPOSED INDUSTRIAL DEVELOPMENT,
22-23 LAMBRIDGE PLACE, PENRITH

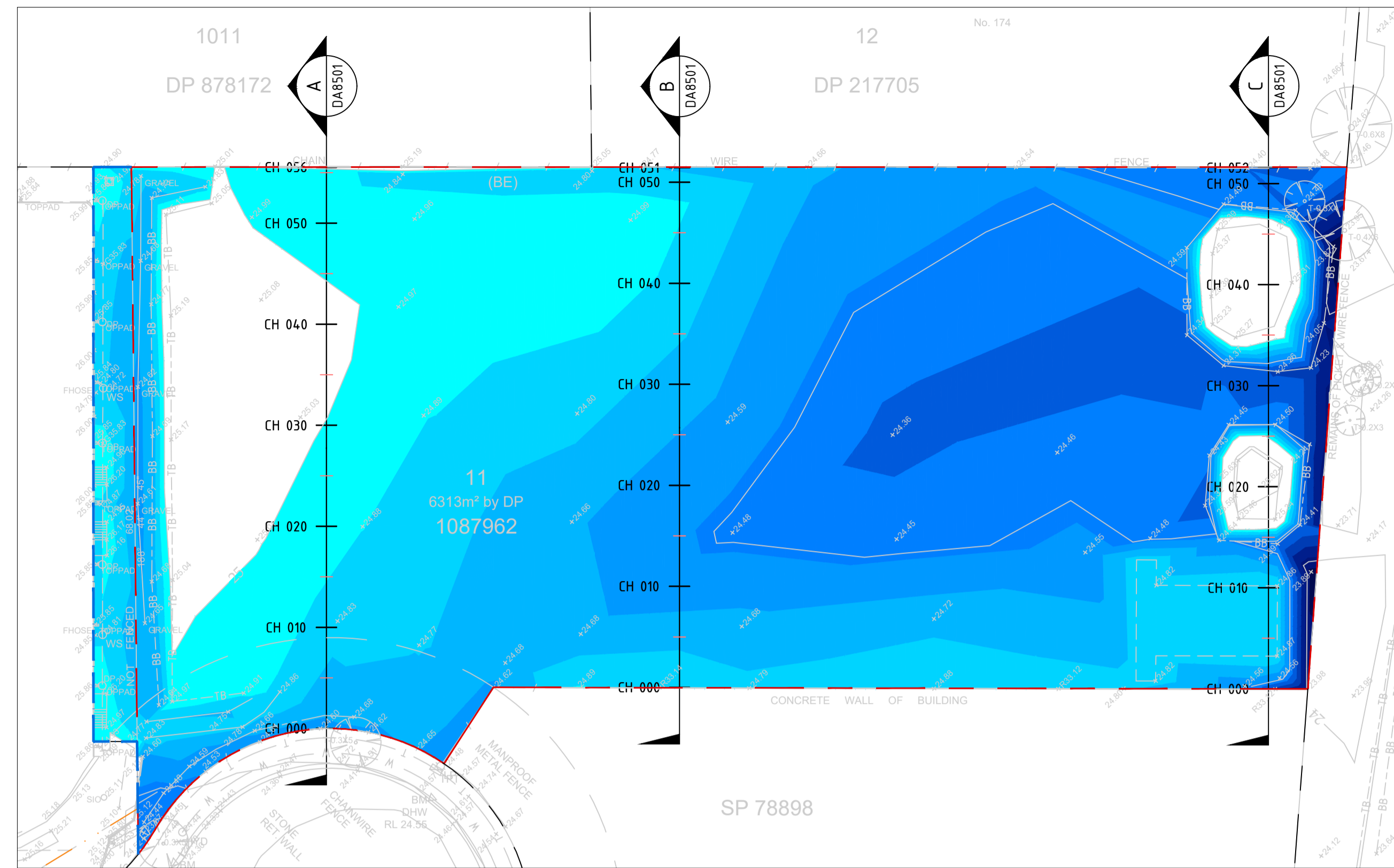
ARCHITECT

SPARKS + PARTNERS
CONSULTING ENGINEERS
HYDRAULIC | CIVIL | FIRE

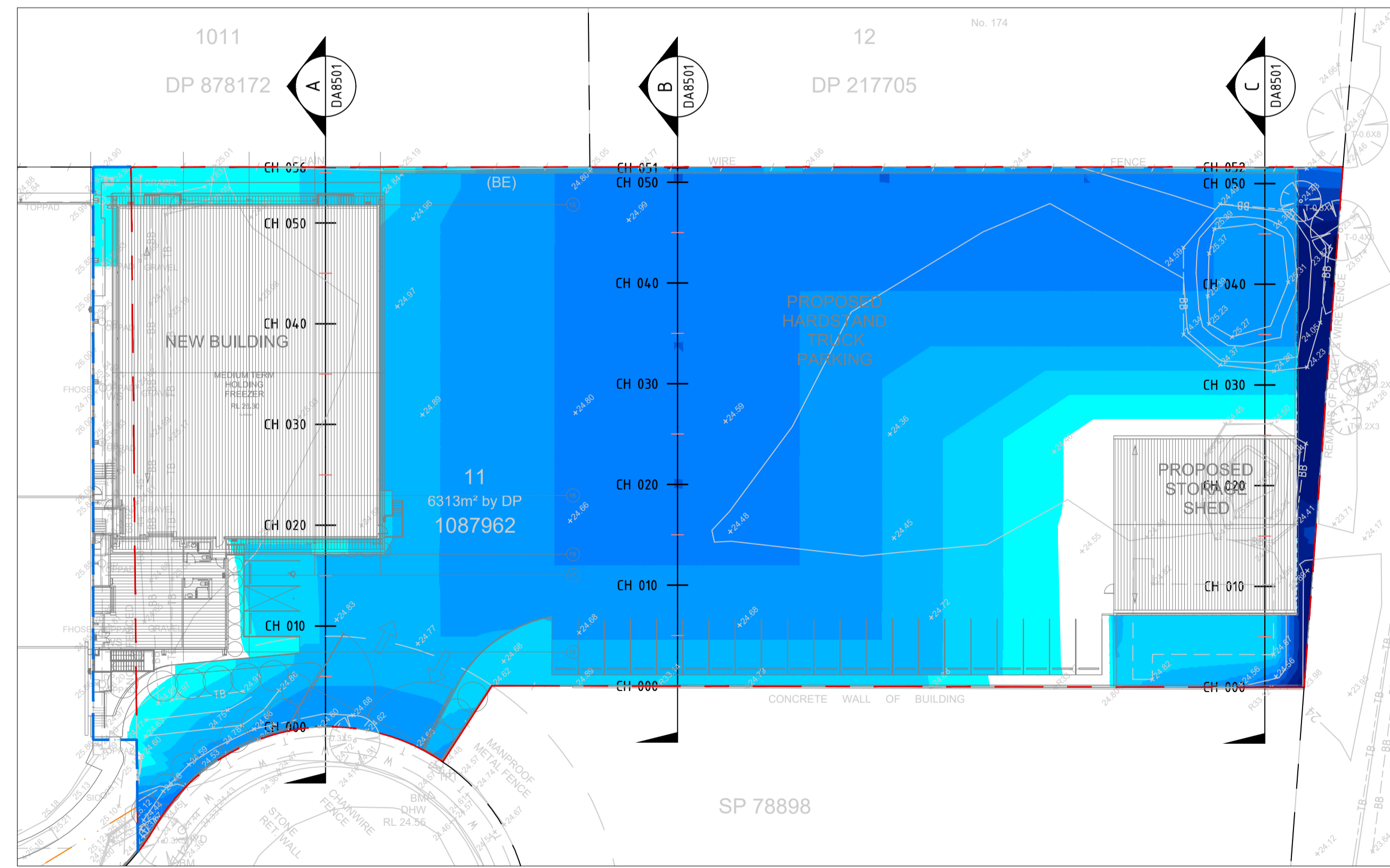
Level 1, 91 George Street | Parramatta | NSW 2150
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au
https://sparksandpartners.com.au/

DATE	DRAWN	DESIGNED	CHECKED	REVISION
AUG 2021	JK	JK	BB	
21117	AS SHOWN	A1	DA4711	1

DEVELOPMENT APPLICATION ISSUE



CONCEPT FLOOD STORAGE OFFSET PLAN - EXISTING
SCALE 1:400

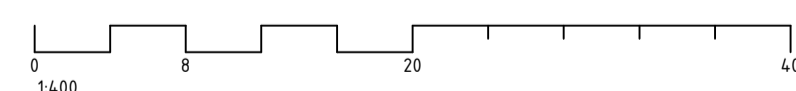


CONCEPT FLOOD STORAGE OFFSET PLAN - PROPOSED
SCALE 1:400

FLOOD STORAGE OFFSET SUMMARY	
FLOOD STORAGE VOLUME GAIN/LOSS SUMMARY:	
EXISTING FLOOD STORAGE VOLUME =	1,908m ³
PROPOSED FLOOD STORAGE VOLUME =	1,915m ³
NET FLOOD STORAGE VOLUME INCREASE =	7m ³

- FLOOD MANAGEMENT NOTES**
- REFER TO DA1201 FOR GENERAL NOTES AND SPECIFICATIONS
 - REFER TO DA4101 FOR STORMWATER MANAGEMENT PLAN
 - REFER TO DA8501 FOR FLOOD SECTIONS

LEGEND	
[Lightest Blue]	0 TO 0.12m
[Light Blue]	0.12 TO 0.24m
[Medium Light Blue]	0.24 TO 0.36m
[Medium Blue]	0.36 TO 0.48m
[Dark Blue]	0.48 TO 0.6m
[Very Dark Blue]	0.6 TO 0.72m
[Darkest Blue]	0.72 TO 0.84m
[Black]	0.84 TO 0.96m
[Black]	0.96 TO 1.08m
[Black]	1.08 TO 1.2m



DATE	AMENDMENT	INIT	REV
18.08.21	50% ISSUE	JK	1
27.08.21	DA ISSUE	JK	2

DATE	AMENDMENT	INIT	REV

DATE	AMENDMENT	INIT	REV

DATE	AMENDMENT	INIT	REV

CLIENT

PROJECT

PROPOSED INDUSTRIAL DEVELOPMENT,
22-23 LAMBRIDGE PLACE, PENRITH

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DRAWING TITLE

CIVIL DESIGN
CONCEPT FLOOD STORAGE OFFSET
PLAN

REFERENCES

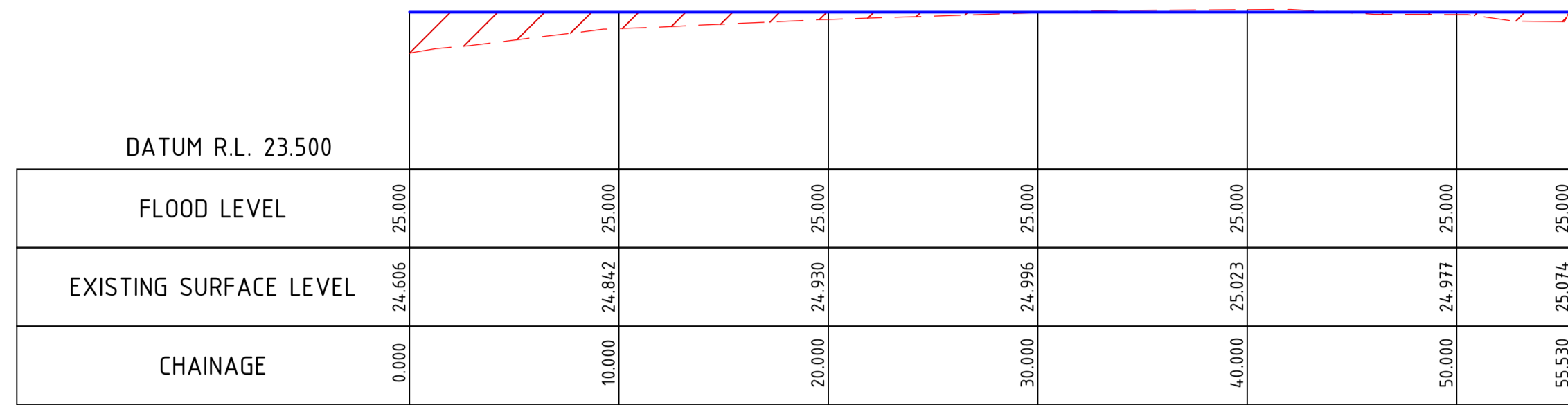
BUILDER

ARCHITECT

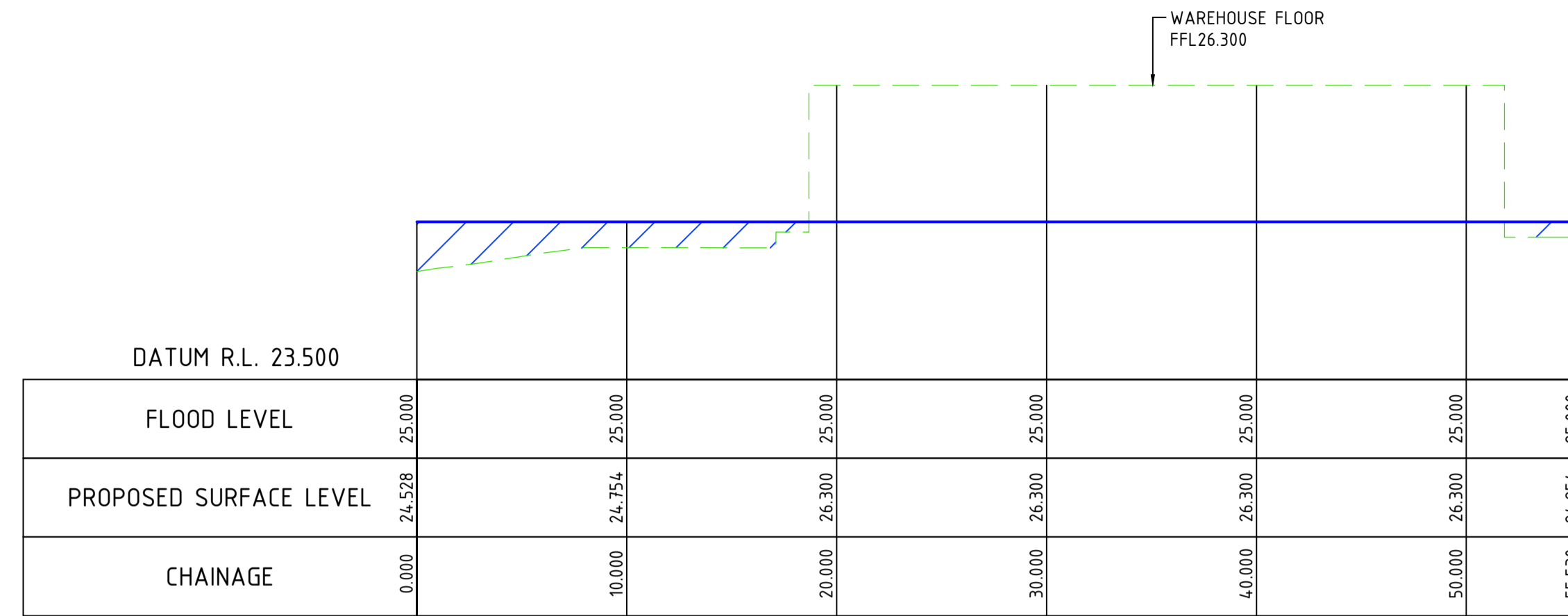
DATE	DRAWN	DESIGNED	CHECKED	BB
AUG 2021	JK	JK	JK	
PROJECT No	SCALE	SIZE	REVISION	
21117	1:400 @ A1	A1		
DRAWING No				2
				DA8101

LEGEND

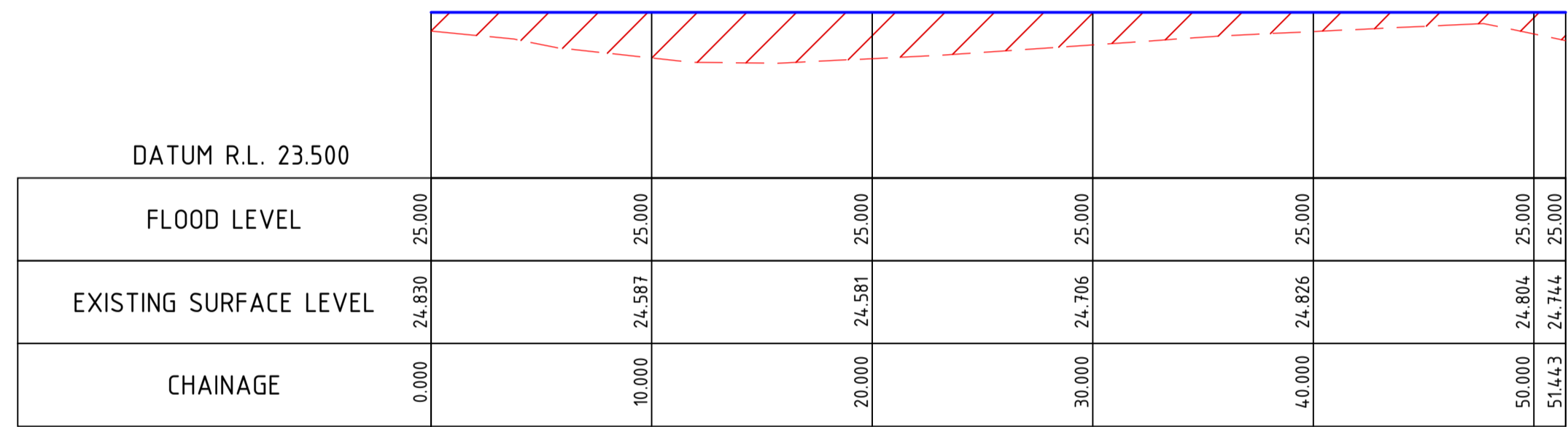
- PROPOSED FLOOD STORAGE AREA
- EXISTING FLOOD STORAGE AREA
- 1% AEP FLOOD LEVEL (RL25.000)
- EXISTING SURFACE LEVEL
- PROPOSED SURFACE LEVEL



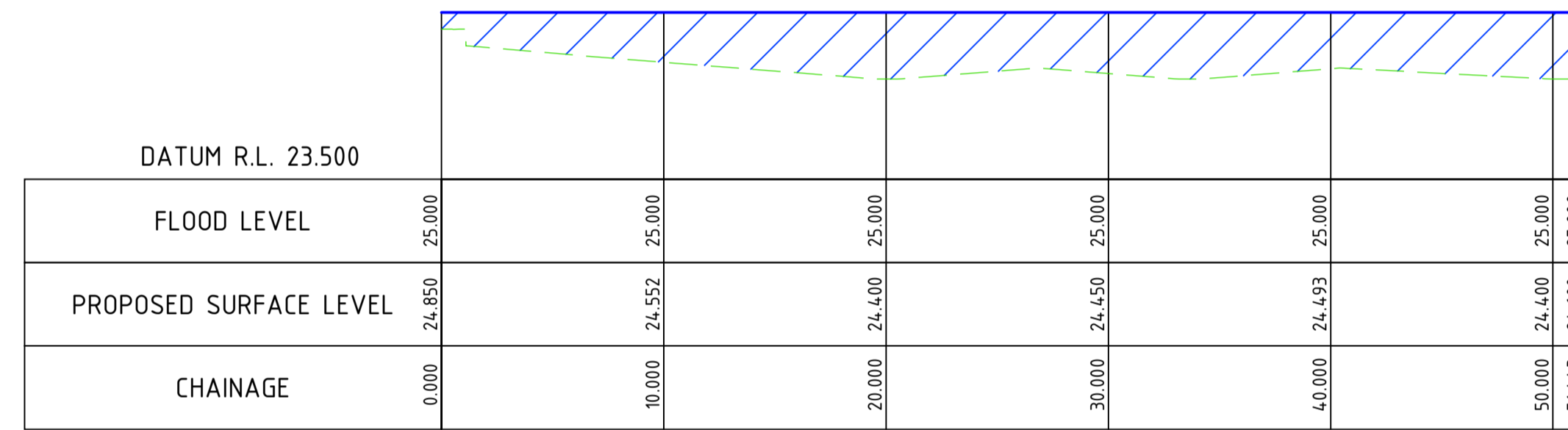
EXISTING FLOOD STORAGE - SECTION A
SCALE 1:250
SCALE 1:50



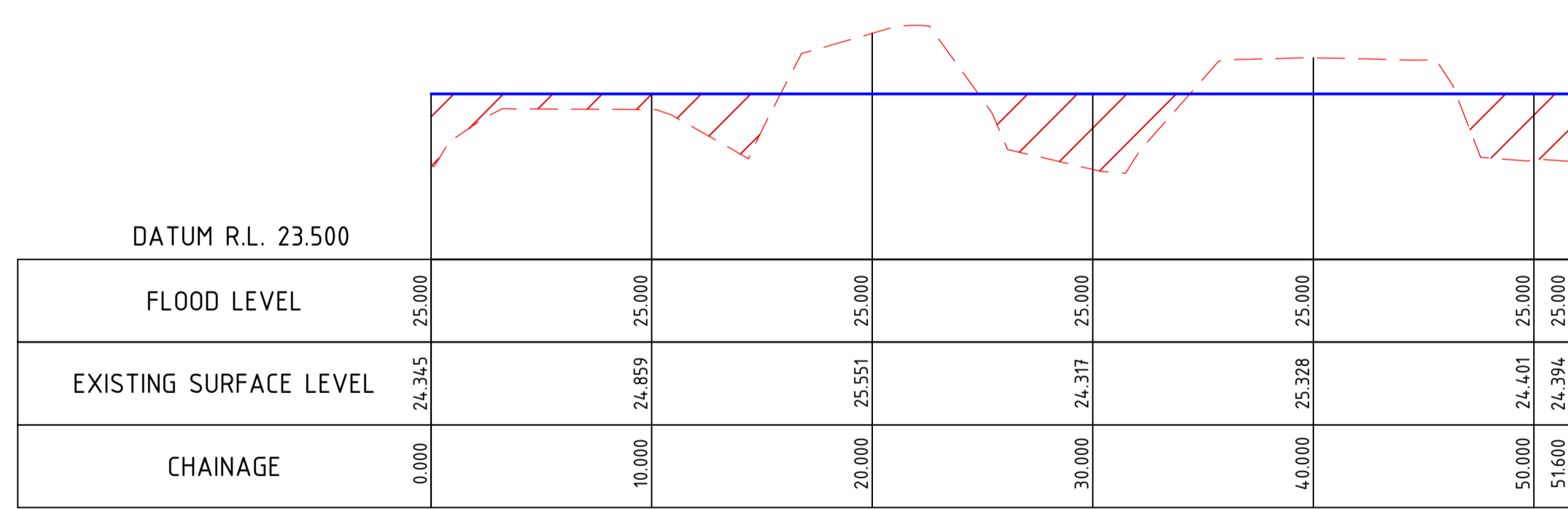
PROPOSED FLOOD STORAGE - SECTION A
SCALE 1:250
SCALE 1:50



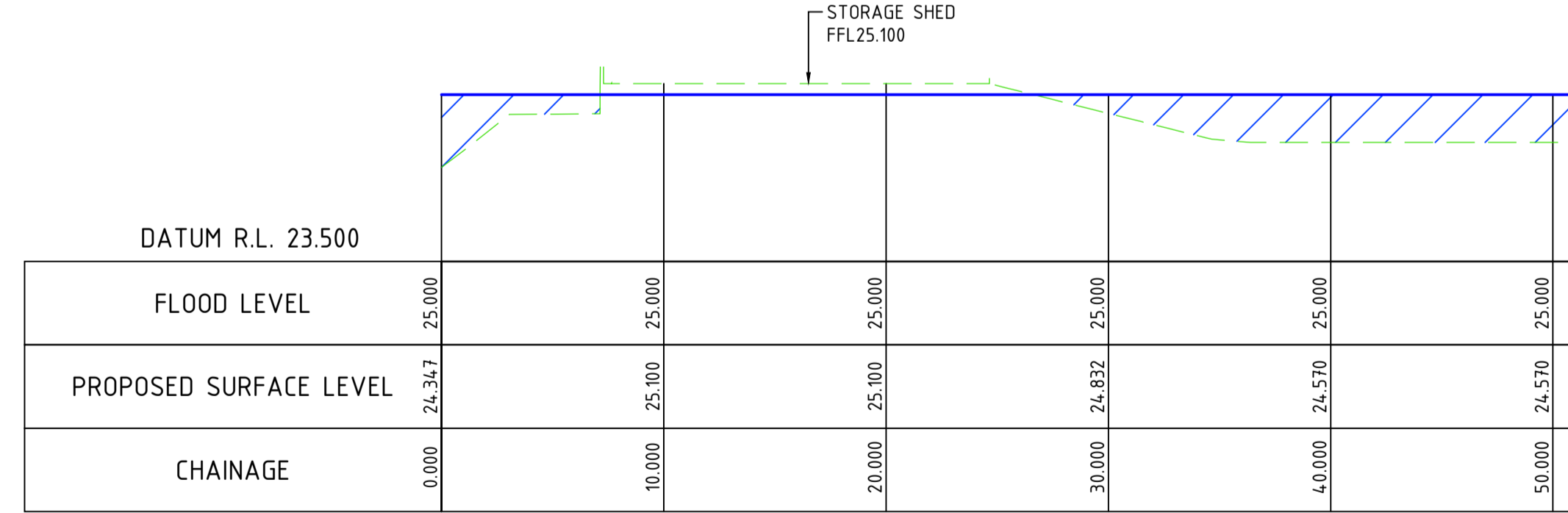
EXISTING FLOOD STORAGE - SECTION B
SCALE 1:250
SCALE 1:50



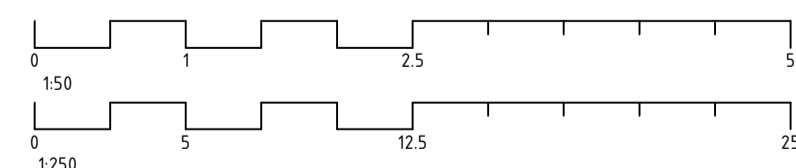
PROPOSED FLOOD STORAGE - SECTION B
SCALE 1:250
SCALE 1:50



EXISTING FLOOD STORAGE - SECTION C
SCALE 1:250
SCALE 1:50



PROPOSED FLOOD STORAGE - SECTION C
SCALE 1:250
SCALE 1:50



DATE	AMENDMENT	INIT	REV	DATE	AMENDMENT	INIT	REV
18.08.21	50% ISSUE	JK	1				
27.08.21	DA ISSUE	JK	2				

DISCIPLINE	INIT	REV
STRUCTURAL		
MECHANICAL		
ELECTRICAL		
CIVIL		

CLIENT

BUILDER

PROJECT

PROPOSED INDUSTRIAL DEVELOPMENT,
22-23 LAMBRIDGE PLACE, PENRITH

ARCHITECT

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DRAWING TITLE

CIVIL DESIGN
CONCEPT FLOOD STORAGE OFFSET
SECTIONS

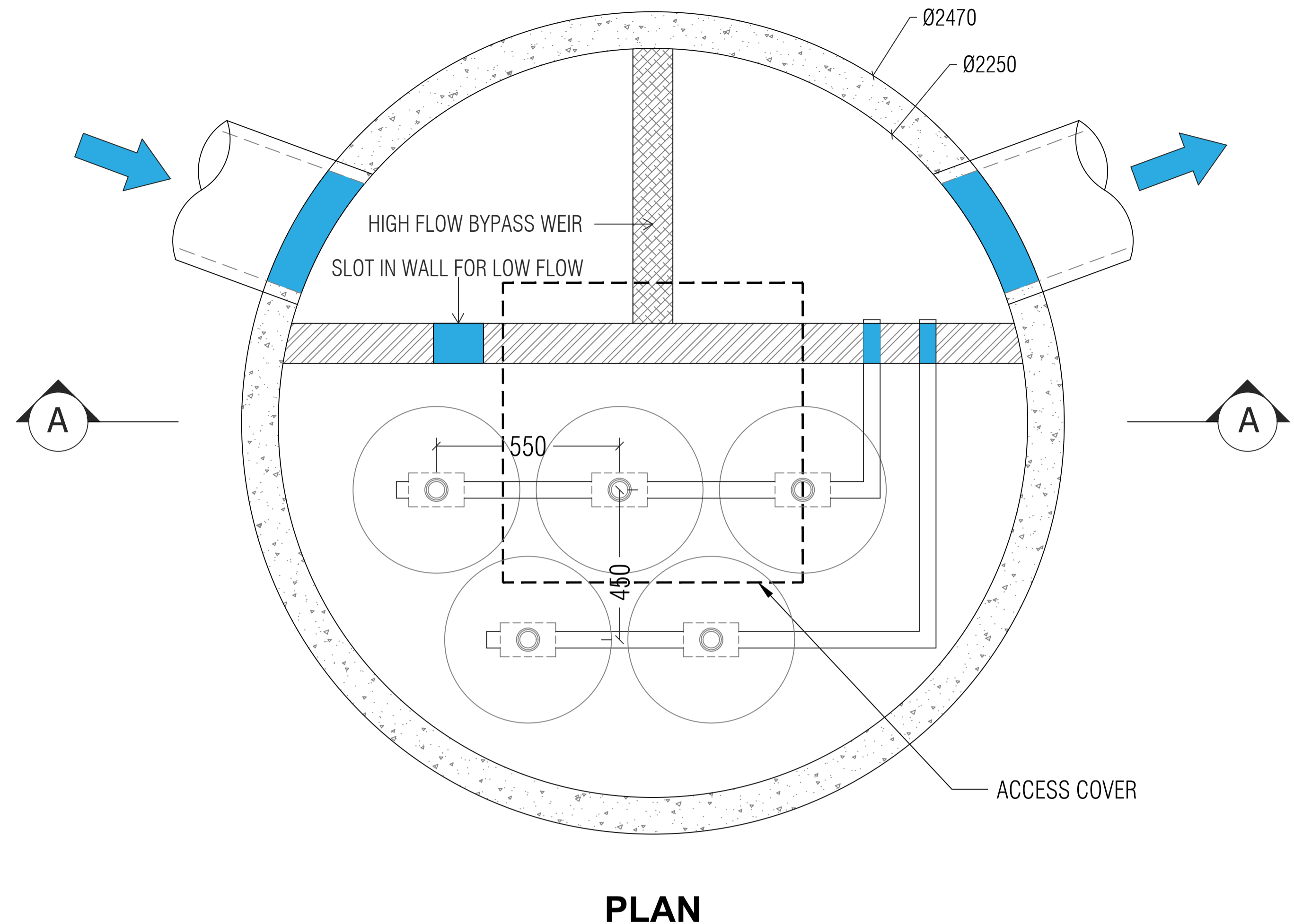
DATE	DRAWN	DESIGNED	CHECKED	BB
AUG 2021	JK	JK		

PROJECT No	SCALE	SIZE	REVISION
21117	AS SHOWN	A1	

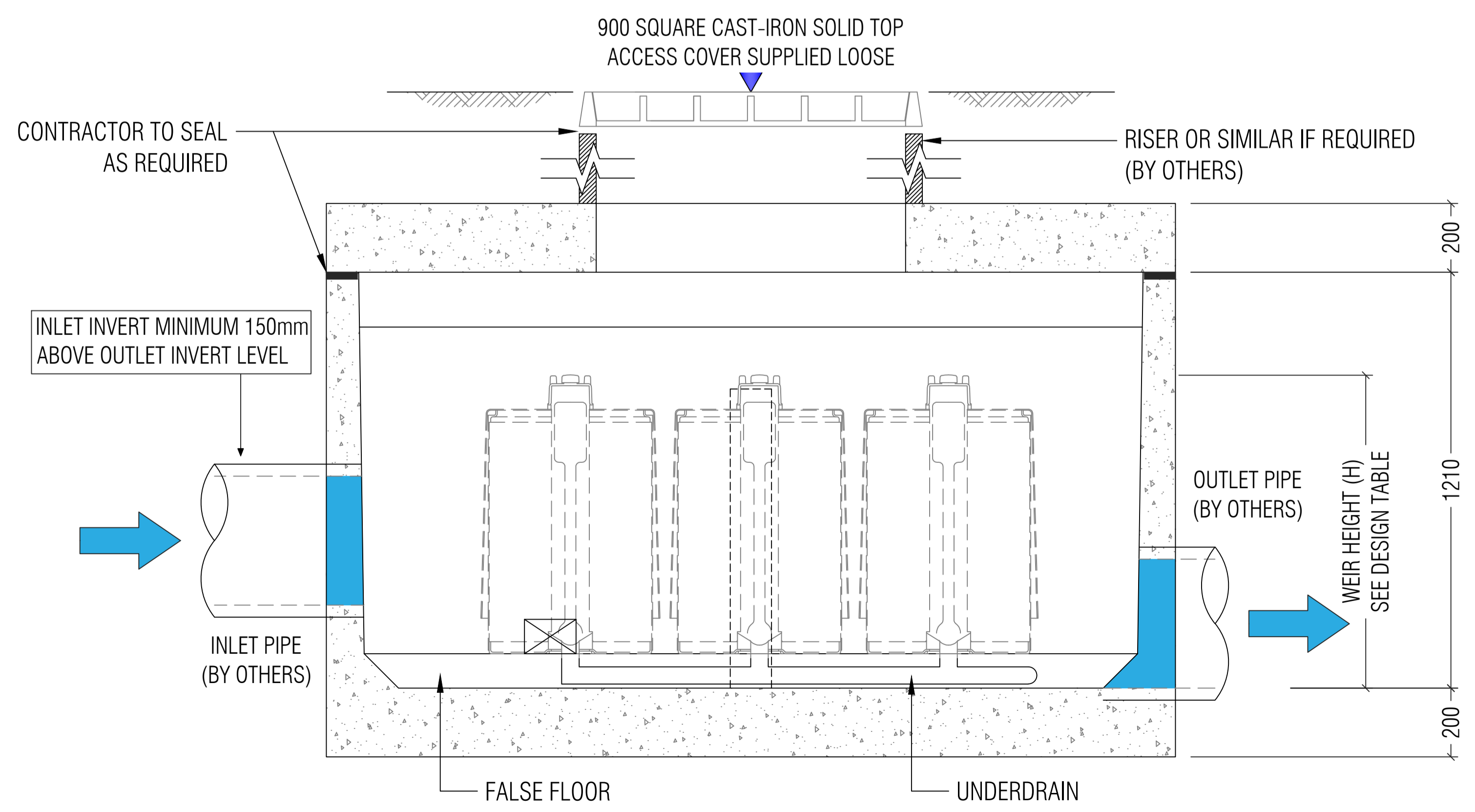
DRAWING No	REVISION
DA8501	2

DEVELOPMENT APPLICATION ISSUE

NOT FOR CONSTRUCTION



PLAN

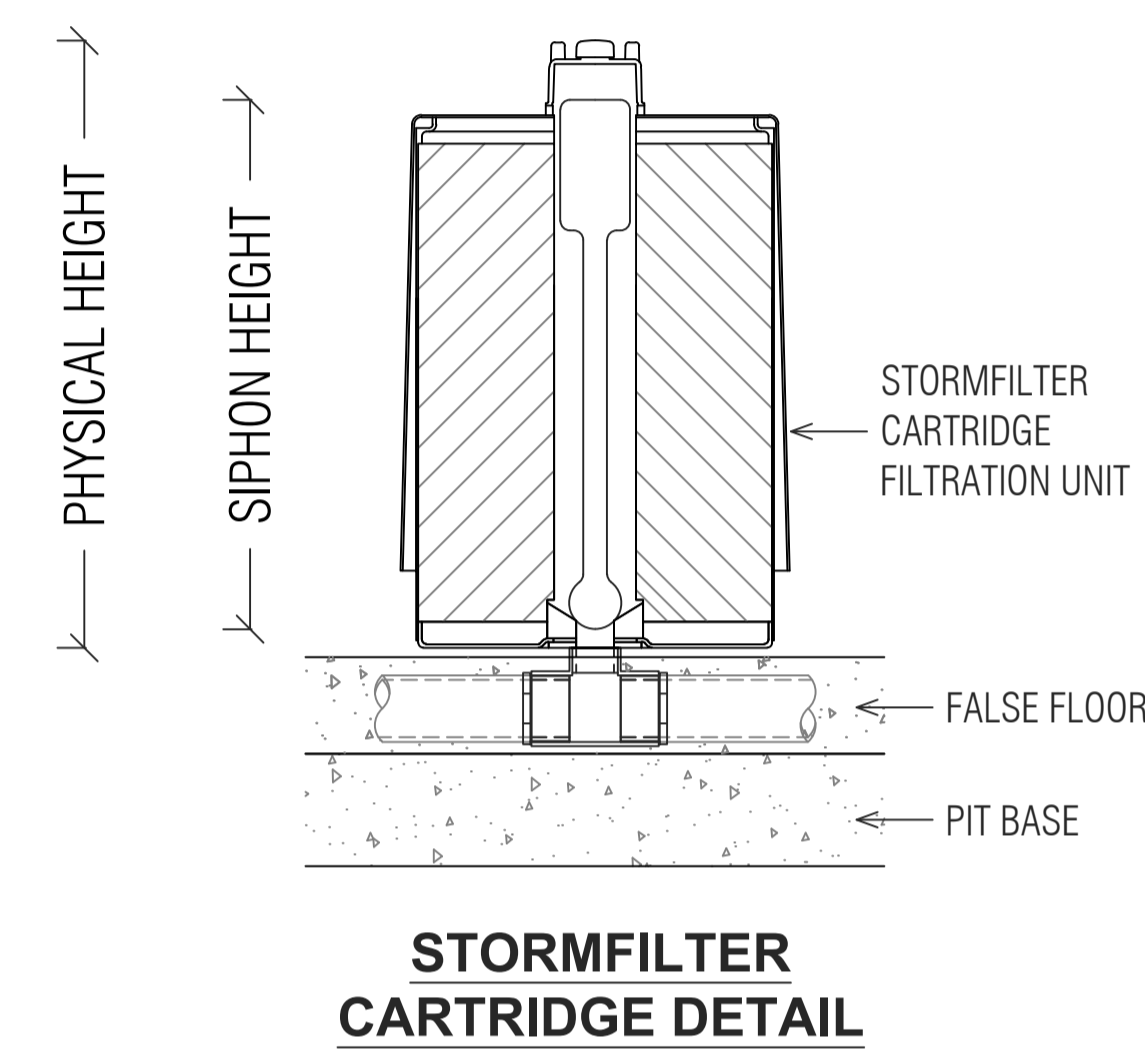


SECTION A-A

STORMFILTER DESIGN TABLE

- STORMFILTER TREATMENT CAPACITY VARIES BY NUMBER OF FILTER CARTRIDGES INSTALLED.
- THE STANDARD CONFIGURATION IS SHOWN. ACTUAL CONFIGURATION OF THE SPECIFIED STRUCTURE(S) PER CERTIFYING ENGINEER WILL BE SHOWN ON SUBMITTAL DRAWING(S).
- FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF-CLEANING. RADIAL MEDIA DEPTH SHALL BE 178mm.

CARTRIDGE NAME / SIPHON HEIGHT (mm)	690	460	310
CARTRIDGE PHYSICAL HEIGHT (mm)	840	600	600
TYPICAL WEIR HEIGHT [H] (mm)	920	690	540
CARTRIDGE FLOW RATE FOR ZPG MEDIA (L/s)	1.6	1.1	0.7
CARTRIDGE FLOW RATE FOR PSORB MEDIA (L/s)	0.9	0.46	0.39



STORMFILTER CARTRIDGE DETAIL

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	[]		
NUMBER OF CARTRIDGES REQ'D	5		
SIPHON HEIGHT (310 / 460 / 690)	[]		
MEDIA TYPE (ZPG / PSORB)	[]		
WATER QUALITY FLOW RATE (L/S)	[]		
HYDRAULIC CAPACITY (L/S)	-		
PIPE DATA:	I.L.	MATERIAL	DIAMETER
INLET PIPE #1	[]	[]	[]
INLET PIPE #2	[]	[]	[]
INLET PIPE #3	[]	[]	[]
OUTLET PIPE	[]	[]	[]
PRECAST MANHOLE WEIGHT	6500kg		
PRECAST LID WEIGHT	2000kg		

GENERAL NOTES

1. PRECAST STRUCTURE SUPPLIED WITH CORE HOLES TO SUIT OUTER DIAMETER OF NOMINATED PIPE SIZE / MATERIAL.
2. PRECAST STRUCTURE SHALL MEET W80 WHEEL LOAD RATING ASSUMING A MAXIMUM EARTH COVER OF 2.0m AND A GROUND WATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. CERTIFYING ENGINEER TO CONFIRM ACTUAL GROUNDWATER ELEVATION. PRECAST STRUCTURE SHALL BE IN ACCORDANCE WITH AS3600.
3. IF THE PEAK FLOW RATE, AS DETERMINED BY THE SITE CERTIFYING ENGINEER, EXCEEDS THE PEAK HYDRAULIC CAPACITY OF THE SYSTEM, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED.
4. ALL WATER QUALITY TREATMENT DEVICES REQUIRE PERIODIC MAINTENANCE. REFER TO OPERATION AND MAINTENANCE MANUAL FOR GUIDELINES AND ACCESS REQUIREMENTS.
5. SITE SPECIFIC PRODUCTION DRAWING WILL BE PROVIDED ON PLACEMENT OF ORDER.
6. DRAWING NOT TO SCALE.

INSTALLATION NOTES

1. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY CERTIFYING ENGINEER.
2. CONTRACTOR TO PROVIDE ALL EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE (LIFTING DETAIL PROVIDED SEPARATELY).
3. CONTRACTOR TO APPLY SEALANT TO ALL JOINTS AND TO PROVIDE, INSTALL AND GROUT INLET AND OUTLET PIPES.



PHONE: 1300 354 722 www.oceanprotect.com.au

OCEAN PROTECT
5 CARTRIDGE STORMFILTER SYSTEM
 DN2250 MANHOLE
 SPECIFICATION DRAWING

APPENDIX B. MUSIC-link REPORT

MUSIC-link Report

Project Details		Company Details	
Project:	21117_C_MUSICXModel [1]	Company:	Sparks & Partners Consulting Engineers
Report Export Date:	25/08/2021	Contact:	John Kokkinos
Catchment Name:	GP90 TSS85 TP60 TN45	Address:	Level 1, 91 George Street Parramatta
Catchment Area:	0.6543ha	Phone:	02 9891 5033
Impervious Area*:	89.0570074889195%	Email:	john@sparksandpartners.com.au
Rainfall Station:			
Modelling Time-step:	Six minutes		
Modelling Period:	01/01/99 - 31/12/2008 11:54:00 PM		
Mean Annual Rainfall:	691.065mm		
Evapotranspiration:	1157.977mm		
MUSICX Version:	1.1.0.11873 (5.0.3.11873)		
MUSIC-link data Version:	2.1		
Study Area:	Penrith City Council		
Scenario:	Penrith Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness		Treatment Nodes		Source Nodes	
Node:	Reduction	Node Type	Number	Node Type	Number
Flow	5.686%	Rainwater Tank Nodes	1	Urban_Roof Nodes	2
TSS	86.499%	Generic Treatment Nodes	2	Urban_SealedRoad Nodes	2
TP	62.188%	Sedimentation Basin Nodes	1	Urban_Mixed Nodes	2
TN	45.347%				
GP	96.791%				

Comments

Non-conformance items are highlighted for the stormfilter chamber and the residence times and treatment K values as it is modelled as a detention basin node.

The values are adjusted to better reflect that actual operation of the chamber which will have a shorter residence time when compared to an actual detention basin, which ensures the node does not overestimate the treatment efficiency by using the default values provided.

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Generic	5 x690mm Psorb StormFilter	High Flow Bypass	None	99	0.004 m ³ /s
Generic	5 x OceanGuard	High Flow Bypass	None	99	0.1 m ³ /s
Rainwater	RWT 20KL	% Reuse Demand Met	80	None	83.357 %
Receiving	GP90 TSS85 TP60 TN45	Flow Reduction	None	None	5.686 %
Receiving	GP90 TSS85 TP60 TN45	GP Reduction	90	None	96.791 %
Receiving	GP90 TSS85 TP60 TN45	TN Reduction	45	None	45.347 %
Receiving	GP90 TSS85 TP60 TN45	TP Reduction	60	None	62.188 %
Receiving	GP90 TSS85 TP60 TN45	TSS Reduction	85	None	86.499 %
Sedimentation	SF Manhole DN2250	High Flow Bypass Out	None	None	0 ML/y
Urban_Mixed	Landscape - 187m2	Impervious Area	None	None	0 ha
Urban_Mixed	Landscape - 187m2	Pervious Area	None	None	0.019 ha
Urban_Mixed	Landscape - 187m2	Total Area	None	None	0.019 ha
Urban_Mixed	Landscape - Bypass 529m2	Impervious Area	None	None	0 ha
Urban_Mixed	Landscape - Bypass 529m2	Pervious Area	None	None	0.053 ha
Urban_Mixed	Landscape - Bypass 529m2	Total Area	None	None	0.053 ha
Urban_Roof	Roof - Shed 320m2	Impervious Area	None	None	0.032 ha
Urban_Roof	Roof - Shed 320m2	Pervious Area	None	None	0 ha
Urban_Roof	Roof - Shed 320m2	Total Area	None	None	0.032 ha
Urban_Roof	Roof - Warehouse 1,111m2	Impervious Area	None	None	0.111 ha
Urban_Roof	Roof - Warehouse 1,111m2	Pervious Area	None	None	0 ha
Urban_Roof	Roof - Warehouse 1,111m2	Total Area	None	None	0.111 ha
Urban_SealedRoad	Hardstand - 4,209m2	Impervious Area	None	None	0.421 ha
Urban_SealedRoad	Hardstand - 4,209m2	Pervious Area	None	None	0 ha
Urban_SealedRoad	Hardstand - 4,209m2	Total Area	None	None	0.421 ha
Urban_SealedRoad	Hardstand - Bypass 187m2	Impervious Area	None	None	0.019 ha
Urban_SealedRoad	Hardstand - Bypass 187m2	Pervious Area	None	None	0 ha
Urban_SealedRoad	Hardstand - Bypass 187m2	Total Area	None	None	0.019 ha

Only certain parameters are reported when they pass validation

NOTE: A successful self-validation check of your model does not constitute an approved model by Penrith City Council
MUSIC-link now in MUSICX by eWater – leading software for modelling stormwater solutions

Failing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
Sedimentation	SF Manhole DN2250	Nitrogen Parameters.K	500	500	1 m/y
Sedimentation	SF Manhole DN2250	Notional Detention Time	8	12	0.112 h
Sedimentation	SF Manhole DN2250	Phosphorus Parameters.K	6000	6000	1 m/y
Sedimentation	SF Manhole DN2250	Total Suspended Solids Parameters.K	8000	8000	1 m/y

Only certain parameters are reported when they pass validation

NOTE: A successful self-validation check of your model does not constitute an approved model by Penrith City Council
MUSIC-*link* now in MUSICX by eWater – leading software for modelling stormwater solutions

APPENDIX C. PENRITH COUNCIL FLOOD LETTER



Our reference: ECM 9636951
Contact: Dr Elias Ishak
Telephone: 4732 7579

30 June 2021

Mr Morgan Walter
91 George Street
PARRAMATTA NSW 2150

Mr Walter

Flood Level Enquiry
Lot 11 DP 1087962 - No. 22-23 Lambridge Place Penrith

Please find enclosed Flood Level information for the above property.

Should you require any further information please do not hesitate to contact me on 4732 7579.

Yours sincerely



Dr Elias Ishak
Senior Engineer – Floodplain Management

Flood Information

Lot 11 DP 1087962 - No. 22-23 Lambridge Place Penrith

Date of issue: 30 June 2021

The mainstream 1%AEP flood level affecting the above property is estimated to be RL25.0m AHD.

Please note that Council is currently in the process of undertaking an overland flow flood study for the Cranebrook catchment.

Property less than 0.5m above the 1% AEP flood level is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. The Penrith Development Control Plan 2014 is available from Council's website www.penrithcity.nsw.gov.au.



Definitions

AEP – Annual Exceedance Probability – the chance of a flood of this size occurring in any one year.

AHD – Australian Height Datum – A standard level datum used throughout Australia, approximately equivalent to mean sea level.

Notes:

1. Council is currently in the process of reviewing and finalising a contemporary flood model for the Cranebrook Catchment.
2. The contours shown above in yellow numbering are at 0.5m intervals and are based on Aerial Laser Scanning (ALS) Survey undertaken in 2002. The contour levels are approximate and for general information only. Accurate ground levels should be obtained by a Registered Surveyor.
3. The flood level is based on current information available to Council at the date of issue. The flood level may change in the future if new information becomes available. The 1% AEP flood is the flood adopted by Council for planning controls. Rarer and more extreme flood events will have a greater effect on the property.
4. Council has in the past conducted studies of possible overland water flows within the City of Penrith. Those studies have been carried out in good faith, but Council cannot verify their accuracy. In particular, Council believes there are limitations on the accuracy of the past studies in urban areas where the effect of flash flooding, and underground drainage and stormwater disposal systems is largely unknown.
5. Council's studies are reflected in flood mapping for the City which show properties potentially affected by overland flows in excess of 150mm.
6. This property is shown on Council's flood mapping as potentially so affected.
7. Council imposes flood related development controls where, in its opinion, such controls are justified. Such controls may or may not be imposed with respect to this property in the event of an application for development consent.
8. If a development proposal is submitted with respect to this property, Council will consider the possibility of flood or overland flow in the context of the application. Council may impose a requirement that the applicant for development consent carry out a detailed assessment of the possible overland water flows affecting the property (a flood study) and/or may impose other controls on any development designed to ameliorate flood risk.
9. You are strongly advised if you propose to carry out development upon the property, that you retain the assistance of an experienced flooding engineer and have carried out a detailed investigation.
10. Council accepts no liability for the accuracy of the flood levels (or any other data) contained in this certificate, having regard to the information disclosed in Notes "1" to "8". As such you should carry out and rely upon your own investigations.



Dr Elias Ishak
Senior Engineer – Floodplain Management

APPENDIX D. MAINTENANCE & MONITORING SCHEDULE

STORMWATER DRAINAGE SYSTEM MONITORING AND MAINTENANCE SCHEDULE

Author Name & Signature: JK

Date: 27th August 2021

22-23 Lambridge Place, Penrith

General Notes:

- 1 - Maintenance is to be carried out with regard to relevant occupational health and safety guidelines and standards. This includes all confined space, traffic management, fall arrest and other requirements.
- 2 - Initial monitoring and inspections of the stormwater system post commissioning are to be carried out every 3 months for the first year of operation. The amount and type of debris is to be noted and recorded. This information shall be used to determine if modification of the frequency of inspections is required.
- 3 - The frequency of inspections shown in the stormwater maintenance schedule are the maximum periods. Inspection frequencies may be reduced upon completion of the initial monitoring and inspection program as noted in note 2.
- 4 - Blank copies of the maintenance schedule are to be made and filled out during each subsequent inspection with the details kept on site for future reference.

Inspected by:

Date of Inspection:

Date of Next Inspection:

Item to be Inspected	Frequency	Performed by	Inspected	Maintenance Required	Maintenance Procedure	Maintenance Completed
			Yes/No	Yes/No		Date
General						
Eaves/Box Guttering System and Downpipes	Six Monthly/ After Major Storm	Owner / Maintenance Contractor			Inspect and remove any build up of sediment, debris, litter and vegetation within gutter system.	
Stormwater surface inlet and junction pits	Four Monthly/ After Major Storm	Owner / Maintenance Contractor			Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter and vegetation (e.g. Vacuum/eductor truck) Inspect and ensure grate is clear of sediment, debris, litter and vegetation. Ensure flush placement of grate on refitment	
General inspection of complete stormwater drainage system (that's visible)	Bi-annually	Owner / Maintenance Contractor			Inspect all drainage structures noting any dilapidation, carry out required repairs.	
Rainwater Tank						
First Flush Device	6 Monthly	Owner / Maintenance Contractor			Inspect first flush device to ensure correct operation. Remove accumulated litter & debris. If device is not functioning properly repair or replace.	
Internal Inspection	6 Monthly	Owner / Maintenance Contractor			Check for evidence of access by animals, birds or insects including the presence of mosquito larvae. If present, identify access point and close. If evidence of algal growth, find and close points of light entry.	
Tank and tank roof	6 Monthly	Owner / Maintenance Contractor			Check structural integrity of tank including roof and access covers. Any dilapidation including holes or gaps are to be noted and repaired.	
On-Site Detention Tank						
Trash Screen	Six Monthly/ After Major Storm	Owner / Maintenance Contractor			Inspect trash screen to ensure correct operation. Remove accumulated litter & debris. If device is not functioning properly repair or replace.	
Orifice Plate	Six Monthly/ After Major Storm	Owner / Maintenance Contractor			Inspect orifice plate to ensure correct operation. Check orifice diameter size is correct and no damage is present to orifice edge. Check orifice plate is securely fastened to wall with no gaps present between plate and face of wall. If gaps are present fill with sealant or mortar to provide water tight seal.	
Weep Holes in base of sump	Six Monthly/ After Major Storm	Owner / Maintenance Contractor			Inspect weep holes in base of sump. Ensure weep holes are able to drain effectively and remove accumulated sediment and debris if present.	
Treatment Devices						
Ocean Protect Stormfilter Chamber ManholeDN2250	Refer Manufactures Manual	Maintenance / Specialised Contractor			Refer to manufacturers operation and maintenance manual.	
Ocean Protect 690mm Psorb Cartridge	Refer Manufactures Manual	Maintenance / Specialised Contractor			Refer to manufacturers operation and maintenance manual.	
Ocean Protect Oceanguard	Refer Manufactures Manual	Maintenance / Specialised Contractor			Refer to manufacturers operation and maintenance manual.	