Site Classification Report

Ibis Place, Kurrajong Estate Stage 6,
Scone NSW 2337

Prepared for: McCloy Group Pty Ltd
EP4090.001 11 April 2025

Citation Certification ISO 9001 Quality management system

Citation Certification ISO 45001 OH&S management system

Citation Certification ISO 14001 Environment management system

EP RISK

Site Classification Report

Ibis Place, Kurrajong Estate Stage 6, Scone NSW 2337

McCloy Group Pty Ltd
Suite 2/317 Hunter Street
Newcastle 2300

11 April 2025

Our Ref: EP4090.001

LIMITATIONS

This Site Classification Report was conducted on the behalf of McCloy Group Pty Ltd for the purpose/s stated in **Section 1**.

EP Risk has prepared this document in good faith, but is unable to provide certification outside of areas over which EP Risk had some control or were reasonably able to check. The report also relies upon information provided by third parties. EP Risk has undertaken all practical steps to confirm the reliability of the information provided by third parties and do not accept any liability for false or misleading information provided by these parties.

It is not possible in a Site Classification Report to present all data, which could be of interest to all readers of this report. Readers are referred to any referenced investigation reports for further data.

Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

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QUALITY CONTROL

Version	Author	Date	Reviewer	Date	Quality Review	Date
v01	J. Aguirre/O. Pruteanu	08/04/2025	J. Young	11/04/2025	O. Pruteanu	11/04/2025

DOCUMENT CONTROL

Version	Date	Reference	Submitted to
v01	*11/04/2025*	*EP4090.001*	*McCloy Group Pty Ltd*

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1 Introduction

EP Risk Management Pty Ltd (EP Risk) was engaged by McCloy Group Pty Ltd to undertake a Site Classification Assessment at Ibis Place, Kurrajong Estate Stage 6, Scone NSW 2337.

The engagement was carried out in line with the conditions of engagement and the investigation scope as outlined in our proposal EP18944 dated 3 March 2025.

The client provided the civil drawings of Kurrajong Estate – Stage 6 by MM Hyndes Bailey included in **Appendix A – Development Plans**.

1.1 Objectives and Scope

It is understood that the site classification is needed following the completion of the earthworks for the twenty-one (21) lots in Stage 6, at Kurrajong Estate, Scone NSW.

EP Risk carried out the following scope of works for the geotechnical investigation:

- Prepared all the work health and safety documentation and procured Before You Dig Australia plans for the site.
- Advanced twenty-one (21) boreholes (BHs) to a maximum depth of 3.0m below ground level (BGL) or prior bedrock refusal.
- Conducted Dynamic Cone Penetrometer (DCP) testing adjacent to the BH to assess the consistency of the subsurface.
- Collection of representative undisturbed samples for laboratory testing.
- Upon completion, the boreholes were filled with spoil and lightly compacted at the surface.
- Preparation of a geotechnical report including investigation findings, laboratory test results, and site classification.

2 Site Location and Description

The Site is located at Ibis Place, Kurrajong Estate, Scone NSW 2337, legally identified as lot 517 DP1294333 and is bounded by Scone Airport to the north, rural land to the west and residential areas to the east and south.

Site elevation is approximately Reduced Level (R.L) 230m Australian Height Datum (AHD) on the southwest corner of the site to approximately R.L 220m AHD on the northeast corner of the site. Site drainage is assumed to follow surface gradient contours in a predominately northeast direction towards lower elevated parts of the site.

Site vegetation comprised of short maintained grass and taller grass primarily on the west and north boundary of the site. Photos collected during site investigation is shown in **Appendix B – Photolog**.

An excerpt from NearMap with the indicative site location is shown in Figure 1.

Figure 1 - Indicative Site Location

3 Desktop Study

3.1 Regional Geology

Based on geological data sourced from NSW Government website (www.minview.geoscience.nsw.gov.au), the Site is underlain by:

- Lopingian Aged (259.1 – 251.902 Ma) – Jerrys Plains Subgroup (Pwj) of Whittingham Coal Measures known to contain coarse grained sandstone, fine to medium grained lithic to quartz-lithic sandstone, mudstone, coal seams and thin coaly partings, carbonaceous claystone, tuffaceous claystone and siltstone with fossil plant debris, pebbles paraconglomerate.

An excerpt of the geological map is shown in Figure 2.

Figure 2 - Geological Map (Pwj - Jerrys Plains Subgroup)

3.2 Soil Landscape

Based on the information provided by the NSW Office of Environment and Heritage, Soil Landscapes of Central and Eastern NSW, on site soil landscape has been identified as Dartbrook (SI5601db).

Dartbrook soil covers smooth undulating rises and low hills with elevation ranges of 100-140m and 200-260m. Slopes are gently (0-10%) and long and smooth (100-2,500m). Local relief is 30-80m. Drainage lines occur at intervals of 400-600m, with some to 1,000m. Some of this landscape is made up of old gravel terrace remnants by the Hunter River. Minor to moderate sheet erosion on some hillslopes and high shrink-swell potential.

3.3 Mine Subsidence

Reference to the Mine Subsidence District Data Source, the Site is not located within a Mine Subsidence District. Muswellbrook Mine Subsidence District is located 9.5km south from the site.

3.4 Acid Sulphate Soils (ASS)

The NSW Government data available on NSW Planning Portal indicates the site is located in an area with no known acid sulphate soils. An extract of the acid soil sulphate map is shown in Figure 3.

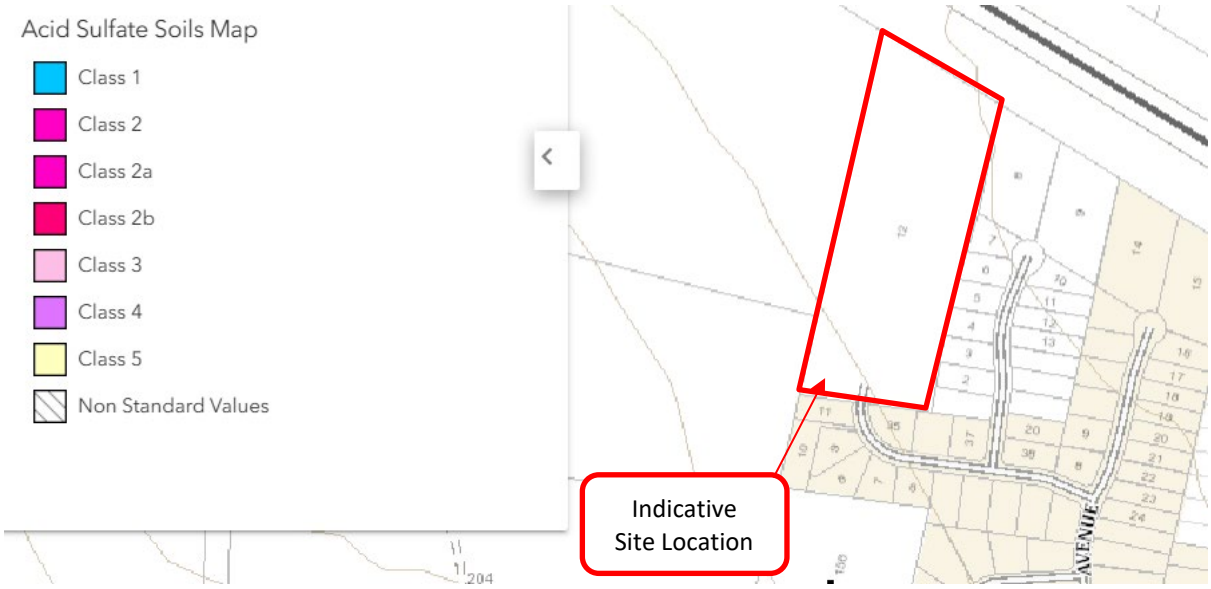

Figure 3 - ASS Map Excerpt

4 Geotechnical Investigation

4.1 Investigation Methodology

The site investigation was conducted on 14 March 2025 under full time supervision of an experienced EP Risk Geotechnical Professional in accordance with AS1726-2017 Geotechnical Site Investigations. The investigation involved the following:

- Preparation of a Safe Work Method Statement (SWMS) for all the fieldwork and procuring the site service plans from Before You Dig Australia.
- Drilling twenty-one (21) boreholes at locations of interest within the footprint of the proposed development.
- Logging of soil/rocks encountered and collection of representative soil and rock samples to be tested by a NATA-accredited laboratory.

The BH were drilled use a 4WD mounted drilling rig fitted with a 100mm V-bit auger. The locations of the BH are shown in **Appendix C – Geotechnical Investigation Locations**.

4.2 Subsurface Profile

A project geological classification has been developed based on the results of the investigation and a summary of the units and their distribution are presented in Table 1 and Table 2. The borehole logs and accompanying explanatory notes are presented in **Appendix D – Borehole Logs.**

Table 1. Observed Geotechnical Units

Unit #	Origin	Material	Description
Unit 1	Topsoil	Silty CLAY	Low to medium plasticity, black
Unit 2	Residual Soil	Silty/Sandy CLAY	Medium to high plasticity, black, brown, white, grey, with fine to medium grained sand, fine to medium grained, sub-rounded to sub-angular gravel.

Table 2. Distribution of Subsurface Geological units Across the Investigated Locations		
BH ID	Depth Below Ground Level (m BGL)	
	Topsoil	Residual Soil
	Unit 1	Unit 2
BH01	0.0-0.2	0.2-3.0*
BH02	0.0-0.2	0.2-3.0*
BH03	0.0-0.1	0.1-3.0*
BH04	0.0-0.1	0.1-3.0*
BH05	0.0-0.2	0.2-3.0*
BH06	0.0-0.2	0.2-3.0*
BH07	0.0-0.2	0.2-3.0*
BH08	0.0-0.2	0.2-3.0*
BH09	0.0-0.2	0.2-3.0*
BH10	0.0-0.2	0.2-3.0*
BH11	0.0-0.2	0.2-3.0*
BH12	0.0-0.2	0.2-3.0*
BH13	0.0-0.2	0.2-3.0*
BH14	0.0-0.1	0.1-3.0*
BH15	0.0-0.1	0.1-3.0*
BH16	0.0-0.1	0.1-3.0*
BH17	0.0-0.1	0.1-3.0*
BH18	0.0-0.1	0.1-3.0*
BH19	0.0-0.1	0.1-3.0*
BH20	0.0-0.1	0.1-3.0*
BH21	0.0-0.2	0.2-3.0*
*)-limit of the investigation NE-not encountered		

4.3 Groundwater

Groundwater was not encountered during the investigation. It should be noted that groundwater conditions will vary with seasonal changes and weather conditions along with site related conditions.

4.4 Laboratory Results

Geotechnical laboratory testing was conducted on selected bulk, disturbed and undisturbed samples collected during the site investigation. All testing was performed by Coffey Testing – NATA accredited laboratory in accordance with the relevant Australian Standards and technical procedures. The detailed results of laboratory testing are presented in **Appendix E – Laboratory Test Results** and are summarised in the following sections.

4.4.1 Shrink Swell

Undisturbed soil samples were collected during the site investigation and the shrink-swell test results are presented in Table 3.

Table 3. Shrink-Swell Index Test Results

BH ID	Soil Type	Depth (m BGL)	Shrinkage		Swell			Shrink – Swell Index (Iss%)
			Shrinkage Field Moisture Content (%)	Dried Shrinkage (%)	Field Moisture Content (%)	Inundated Moisture Content (%)	Swell Strain (%)	
BH03	Silty CLAY	0.6-1.1	28.8	6.0	27.2	40.5	7.1	**5.3**
BH06	Silty CLAY	0.5-1.0	30.7	7.6	33.7	40.8	5.2	**5.7**
BH09	Silty CLAY	0.5-1.0	26.8	5.5	28.7	38.9	7.9	**5.2**
BH12	Silty CLAY	1.0-1.5	24.7	6.4	26.6	35.9	8.2	**5.8**
BH13	Silty CLAY	0.6-1.1	28.2	6.6	28.3	35.9	5.7	**5.3**
BH16	Silty CLAY	0.6-1.1	31.2	6.9	30.0	37.5	8.9	**6.3**
BH19	Silty CLAY	0.6-1.1	31.9	6.6	30.8	39.6	6.0	**5.3**
Lot 607	Silty CLAY	0.7-1.0	28.4	5.1	28.9	31.1	6.3	**4.6**

5 Preliminary Site Classification

Australian Standard AS 2870-2011 establishes performance requirements and specific designs for common foundation conditions as well as providing guidance on the design of footing systems using engineering principles. Site classes as defined on Table 2.1 and 2.3 of AS 2870 are presented in Table 4.

Table 4. General Definition of Site Classes

Site Class	Foundation	Characteristic Surface Movement
A	Most sand and rock sites with little or no ground movement from moisture changes	-
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes	0 – 20 mm
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes	20 – 40 mm
H1	Highly reactive clay sites, which may experience high ground movement from moisture changes	40 – 60 mm
H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes	60 – 75 mm
E	Extremely reactive sites, which may experience extreme ground movement from moisture changes	> 75 mm
A to P	Filled sites (refer to clause 2.4.6 of AS 2870)	-
P	Sites which include soft soils, such as soft clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soils subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise.	

Reactive sites are sites consisting of clay soils that swell on wetting and shrink on drying, resulting in ground movements that can damage lightly loaded structures. The amount of ground movement is related to the physical properties of the clay and environmental factors such as climate, vegetation, and watering. A higher probability of damage can occur on reactive sites where abnormal moisture conditions occur, as defined in AS 2870, due to factors such as:

- Presence of trees on the building site or adjacent site, removal of trees prior to or after construction, and the growth of trees too close to a footing. The proximity of mature trees and their effect on foundations should be considered when determining building areas within each allotment (refer to AS 2870).
- Failure to provide adequate site drainage or lack of maintenance of site drainage, failure to repair plumbing leaks and excessive or irregular watering of gardens.
- Unusual moisture conditions caused by removal of structures, ground covers (such as pavements), drains, dams, swimming pools, tanks etc.

Regarding the performance of footings systems, AS 2870 states “footing systems designed and constructed in accordance with this Standard on a normal site (see Clause 1.3.2) that is:

a) not subject to abnormal moisture conditions; and

b) maintained, such that the original site classification remains valid and abnormal moisture conditions do not develop, are expected to usually experience no damage, a low incidence of damage category 1 and an occasional incidence of damage category 2.”

Damage categories are defined in Appendix C of AS 2870, which is reproduced in CSIRO Information Sheet BTF 18, Foundation Maintenance and Footing Performance: A Homeowner’s Guide attached as **Appendix F – Foundation Maintenance and Footing Performance**.

The laboratory test results summarised in Table 3 indicate that the tested natural clay soils are highly reactive with I_{ss} values ranging from 5.2% to 6.3%.

The classification of sites with controlled fill of depths greater than 0.4m (deep fill) comprising of material other that sand would be Class P. An alternative classification may however be given to sites with controlled fill where consideration is made to the potential for movement of the fill and underlying soil based on the moisture conditions at the time of construction and the long-term equilibrium moisture conditions.

Based on the subsurface profiles encountered during the test bores and in accordance with AS2870-2011; the site in its existing condition and in the absence of abnormal moisture conditions received a site classification of **Class E Extremely Reactive**, based on characteristics surface movement alone.

Following review of borehole logs and laboratory test results, EP Risk recommended Site Classification for footing and slab design as detailed in Table 5.

Table 5. Recommended Site Classifications

Lots	Recommended Site Classification
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21	Class E-D, Extremely Reactive

The above site classification assume that all foundations are founded below any topsoil, uncontrolled fill or slope wash and on natural soil profile or engineered fill. Characteristic surface movement of approximately 107mm to 130mm have been calculated for the lots in its existing condition at the time of investigation. Where the cracked zone has been eliminated due to regrade activities, the characteristic surface movement could be in excess of 140mm in the worst-case scenario. Due to the highly reactive soils to >3.0m depth across the lot, **Class E**, is recommended for footing and slab design.

The above site classification and footings recommendations are for the site conditions present at the time of fieldwork and consequently the site classifications may need to be reviewed with consideration of any site works that may be undertaken after the investigation and this report. Site works may include:

- Changes to the existing soil profile by cutting and filling.
- Landscaping, including trees removed or planted in the general building area; and
- Drainage and watering systems.

Designs and design methods presented in AS 2870-2011 are based on the performance requirement that significant damage can be avoided if site conditions are properly maintained. Performance requirements and foundation maintenance are outlined in Appendix B of AS 2870. The above site classification assumes that the performance requirements as set out in Appendix B of AS 2870 are acceptable and that site foundation maintenance is undertaken to avoid extremes of wetting and drying.

Details on appropriate site and foundation maintenance practices are presented in Appendix B of AS 2870-2011 and in CSIRO Information Sheet BTF 18, Foundation Maintenance and Footing Performance: A Homeowner's Guide. Adherence to the detailing requirement outlined in Section 5 of AS 2870-2011 is essential, Section 5.6. Additional requirements for Classes M, H1, H2 and E sites, including architectural restrictions, plumbing and drainage requirements.

5.1 Footings

All foundations should be designed and constructed in accordance with AS 2870-2011, Residential Slabs and Footings, with reference to site classifications as presented in Table 5.

All footings should be founded below any deleterious soils or uncontrolled fill in stiff or better residual clay. All footings for the same structure should be founded on strata of similar stiffness and reactivity to minimise the risk of differential movements.

Piered footings for residential type light weight structures do not necessarily need to be founded in the natural soils where fill is undertaken in accordance with AS3798-2007.

Due to the reactivity of the site soils being E-D, extremely reactive it is likely that piering will be required unless the slab and foundations are specifically designed to accommodate the potential volume change in the subsurface profile.

5.1.1 High Level Footings

High-level footing alternatives could be expected to comprise slabs on ground with edge beams or pad footings for the support of concentrated loads. Such footings designed in accordance with engineering principles and founded in stiff or better natural soils (residual soils) or in controlled fill (placed and compacted in accordance with AS3798-2007) may be proportioned on an allowable bearing capacity of 100kPa for controlled fill or for stiff or better residual clay. The founding conditions should be assessed by a geotechnical consultant or experienced engineer to confirm suitable conditions.

5.1.2 Piered Footings

Piered footings are considered as an alternative to deep edge beams or high-level footings. It is suggested that piered footings, founded in stiff or better clay soils or controlled fill could be proportioned on an end bearing pressure of 150kPa. It would be anticipated that piering will be required to address the reactivity of the site being Class E-D, unless the footings and slab are designed and constructed to accommodate the potential volume change associated with variance in the soil moisture profile due to seasonal and climatic conditions.

Where piered footings are utilised, the potential for volume change in the subsurface profile should be taken into consideration by the designer, along with potential settlement when founded in controlled fill.

All footings should be founded below any topsoil, slopewash, deleterious soils or uncontrolled fill. All footings for the same structure should be founded on strata of similar stiffness and reactivity to minimise the risk of differential movements.

Inspection of high level or pier footings excavations should be undertaken to confirm the founding conditions, and the base should be cleared of fall-in prior to the formation of the footing.

6 References

- Austroads AGPT02-17, “Guide to Pavement Technology Part 2: Pavement Structural Design,” Austroads Ltd, 2017.
- eSPADE, Online website of NSW Office of Environment and heritage (www.environment.nsw.gov.au)
- Look, Burt – Handbook of Geotechnical Investigation and Design Tables, Taylor & Francis 2007.
- NearMap, MapBrowser | Nearmap
- Minview, (MinView | Regional NSW | Mining, Exploration and Geoscience)
- NSW Department of Planning and Environment, Resources and Geoscience (www.resourcesandgeoscience.nsw.gov.au)
- Safe Work Australia, Excavation Work Code of Practice, January 2020
- Standards Australia, AS1726-2017, “Geotechnical site investigations”.
- Standards Australia AS2870-2011, “Residential Slabs and Footings”.
- Standards Australia AS3798-2007, “Guidelines on Earthworks for Commercial and Residential Structures”.
- Standards Australia, HB 160 – Soils Testing, 2006

Appendix A
DEVELOPMENT PLANS

KURRAJONG ESTATE - STAGE 6

DA162/99

DESIGN FOR ROAD, DRAINAGE, SEWER & WATER RETICULATION WORKS

CLIENT: MCCLOY GROUP

SHEET INDEX

UPPER HUNTER SHIRE COUNCIL

This document forms part of the approval referred to in Council's notice of Determination

Dated 27 April 2023

No SWC 162/1999

Endorsed by

For General Manager

MM HYNDES BAILEY & Co.

REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN

Surveying the Hunter since 1920

Ph: 02 65432475 Fax: 02 65434400 Email: office @hbsurveys.com.au

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Version No.	Details	
A	ORIGINAL ISSUE	OCTOBER 2022
B	STORMWATER UPDATE	JANUARY 2023
C	INTER ALLOTMENT UPDATE	MARCH 2023

C

General Notes

1 These drawings are to be read in conjunction with the Earthworks and Pavement specification and the Upper Hunter Shire Council Guidelines for Subdivision and Developments.
2 The drawings are a diagrammatic representation of the work only and dimensions shall not be scaled.
3 Dimensions of all Lots are subject to final survey.
4 Erosion and sedimentation controls are to be placed prior to earthworks commencing in accordance with the drawings and specifications.
  a. Controls are to be in checked daily and cleared after storm events;
  b. Controls shall be in place at the end of each day;
  c. Disturbed areas shall be topsoiled and grassed as soon as practicable.
5 It is the responsibility of any persons/contractors using this plan to locate and expose all underground services prior to the commencement of their work and to make their own separate enquiries with. DIAL BEFORE YOU DIG.
6 All disturbed areas shall be reinstated with a minimum of 100 mm of topsoil and grass seeded.
7 Hours of work are to be confined to the hours specified by Upper Hunter Shire Council.
8 Disturbance of the site and surrounding areas are to be kept to a minimum and access to local properties maintained at all times.
9 Make smooth transition to existing road and surfaces.
10 Cleanouts for subsoil to be provided at high points and every 60m.
11 Roof water connections to be placed in K26 in location directed by Superintendent

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PLANS PREPARED BY

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(PO Box 26), MUSWELLBROOK NSW 2333

CLIENT

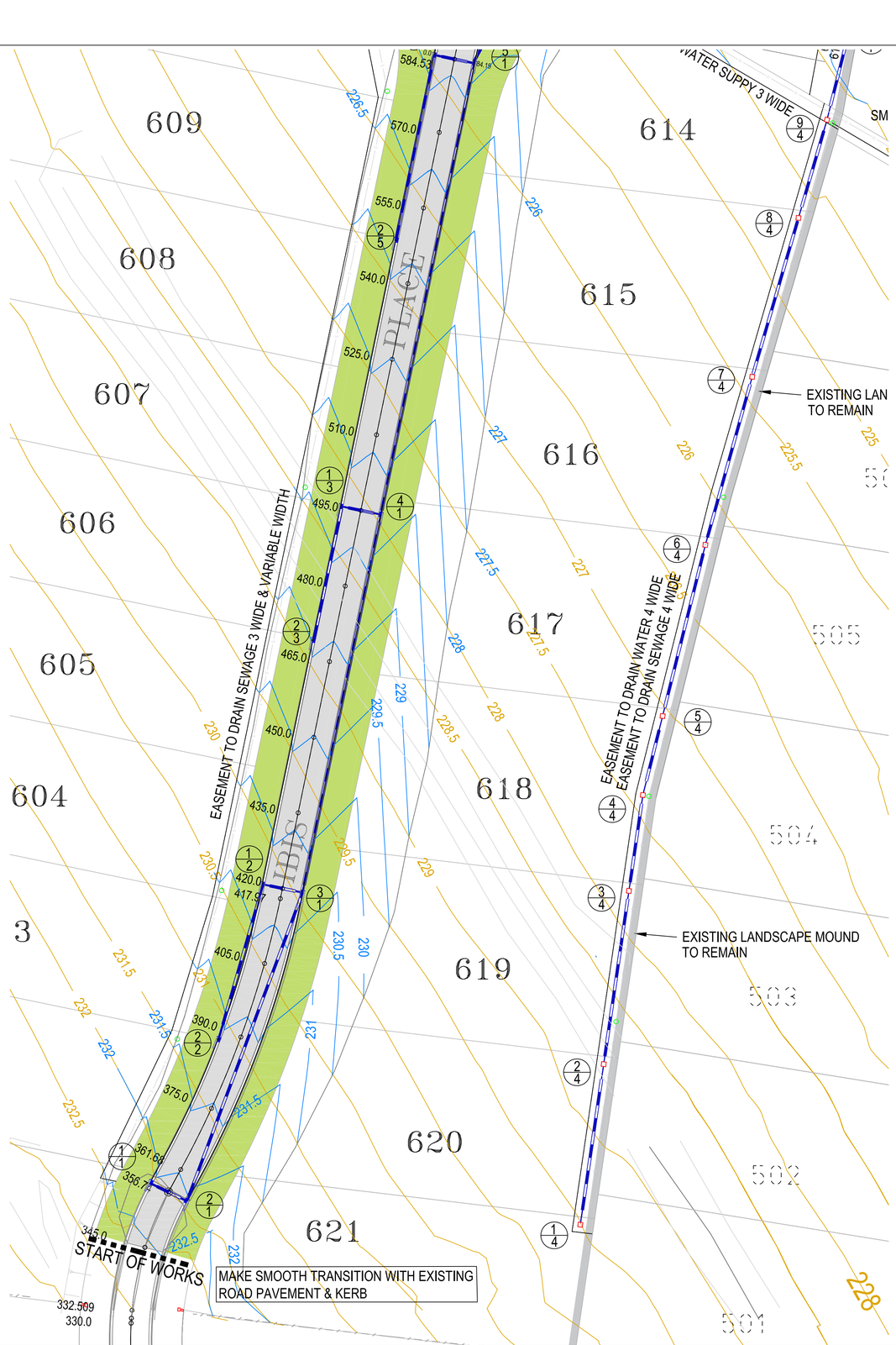
McCLOYGROUP

GENERAL ARRANGEMENT PLAN - OVERALL
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

SCALE: 1:1000
ORIGINAL DRAWING SIZE: A1
LGA: UPPER HUNTER
FILE:207203_S6_ENG
SHEET: CIVIL_001

	PLAN ISSUE	07.03.2023
A	ISSUE TO COUNCIL	REV: C
B	STORMWATER UPDATE	
C	INTER ALLOTMENT UPDATE	JOB REF: 207203



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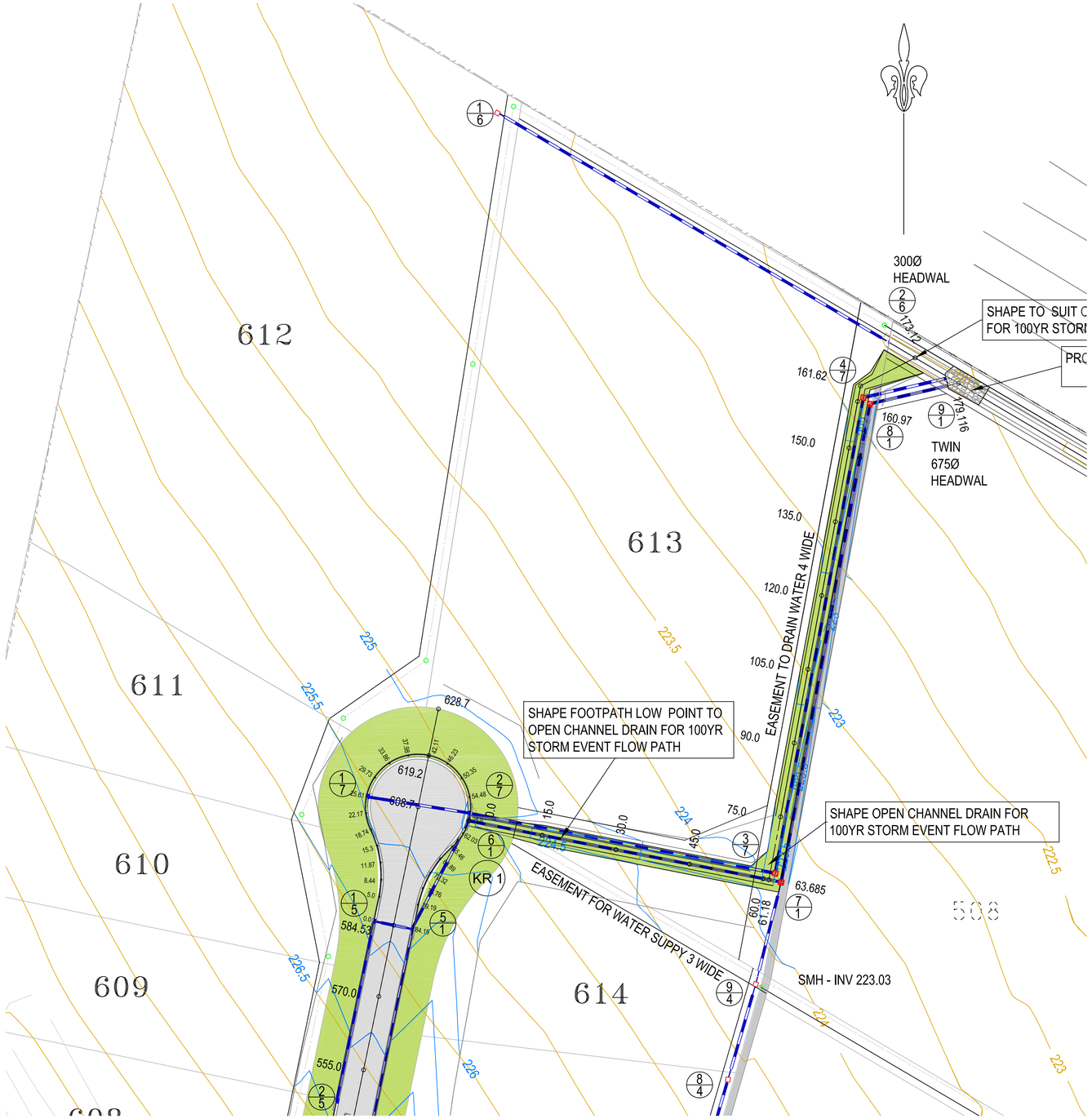
PLANS PREPARED BY	CLIENT	GENERAL ARRANGEMENT PLAN - CH345 TO CH570 STAGE 6 KURRAJONG ESTATE, SATUR	SCALE: 1:500 ORIGINAL DRAWING SIZE: A1 LGA: UPPER HUNTER FILE:207203_S6_ENG SHEET: CIVIL_002	PLAN ISSUE	07.03.2023
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* Email: office@hbsurveys.com.au (PO Box 26), MUSWELLBROOK NSW 2333	McCLOYGROUP	DESIGN: M. COLE, R. JONES DRAWN: M. COLE, R. JONES		A ISSUE TO COUNCIL B STORMWATER UPDATE C INTER ALLOTMENT UPDATE	REV: C JOB REF: 207203



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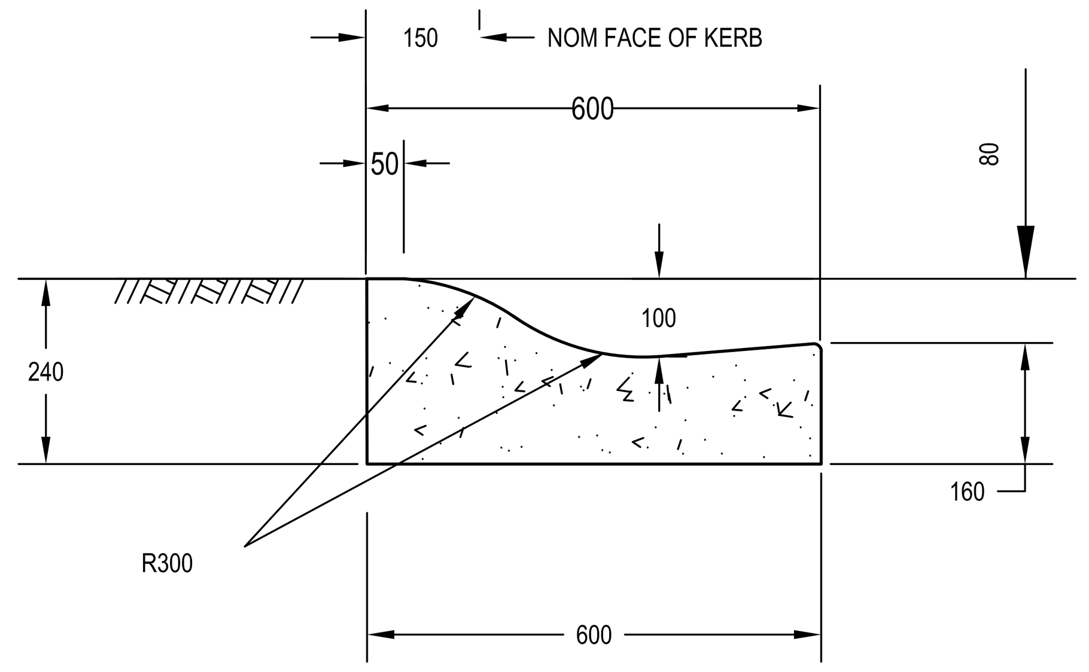
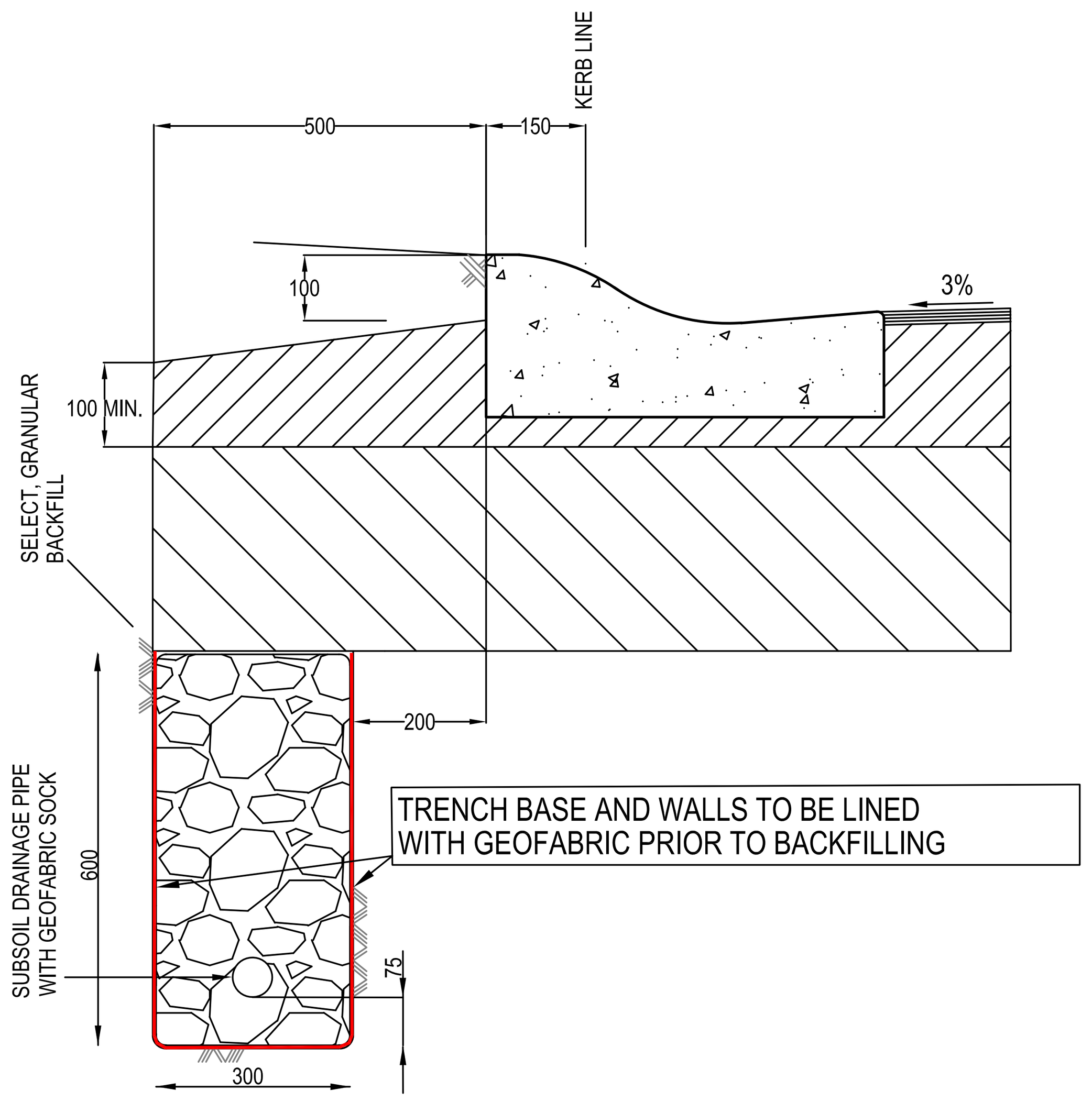
PLANS PREPARED BY	CLIENT	GENERAL ARRANGEMENT PLAN - CH 555 TO END OF WORKS STAGE 6 KURRAJONG ESTATE, SATUR	SCALE: 1:500 ORIGINAL DRAWING SIZE: A1 LGA: UPPER HUNTER FILE:207203_S6_ENG SHEET: CIVIL_003	PLAN ISSUE	07.03.2023
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* Email: office@hbsurveys.com.au (PO Box 26), MUSWELLBROOK NSW 2333	McCLOYGROUP	DESIGN: M. COLE, R. JONES DRAWN: M. COLE, R. JONES		A ISSUE TO COUNCIL B STORMWATER UPDATE C INTER ALLOTMENT UPDATE	REV: C JOB REF: 207203



ROLLED KERB DETAIL

Scale 1:10 (A1 Sheet)



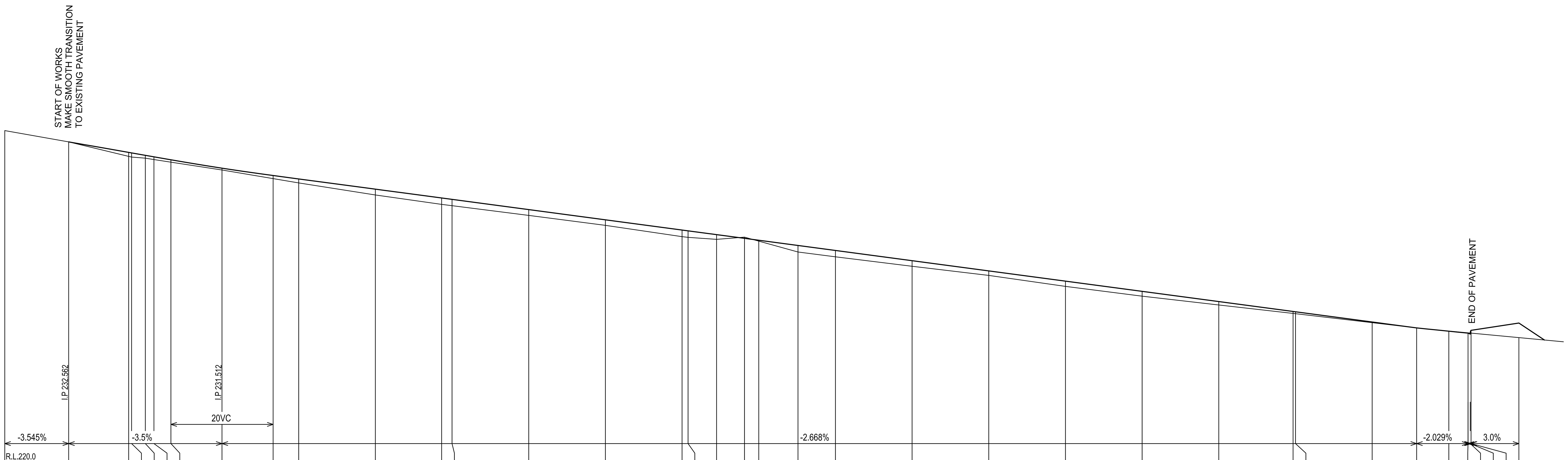
TYPICAL SUBSOIL DRAIN DETAIL

Scale 1:10 (A1 SHEET)

PAVEMENT DETAILS

PAVEMENT DESIGN BASED ON HUNTER GEOTECHNIICS DATED JAN 2008

1. 150mm 3% LIME STABILISED SUBGRADE
2. 270mm SUBBASE COURSE (UNBOUND)
3. 180mm BASE COURSE (UNBOUND)
4. 14mm/7mm 2 COAT SEAL



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CHAINAGE	332.50	345	356.74	357.31	360	361.68	365	375	385	390

DESIGN LEVEL	230.71	230.37	230.31	229.91	229.51	229.11	229.08	228.93	228.78	228.71
EXISTING LEVEL	230.48	230.12	230.06	229.68	229.29	228.85	228.82	228.75	228.83	228.68
CHAINAGE	405	417.97	420	435	450	465	466.17	471.75	477.21	480

DESIGN LEVEL	228.51	228.31	227.91	227.51	227.11	226.71	226.31	225.92	225.91	225.51
EXISTING LEVEL	228.25	228.06	227.69	227.34	226.90	226.52	226.18	225.85	225.84	225.49
CHAINAGE	487.68	495	510	525	540	555	570	584.53	585	600

DESIGN LEVEL	225.28	225.15	225.07	225.04	225.18	225.18	225.47
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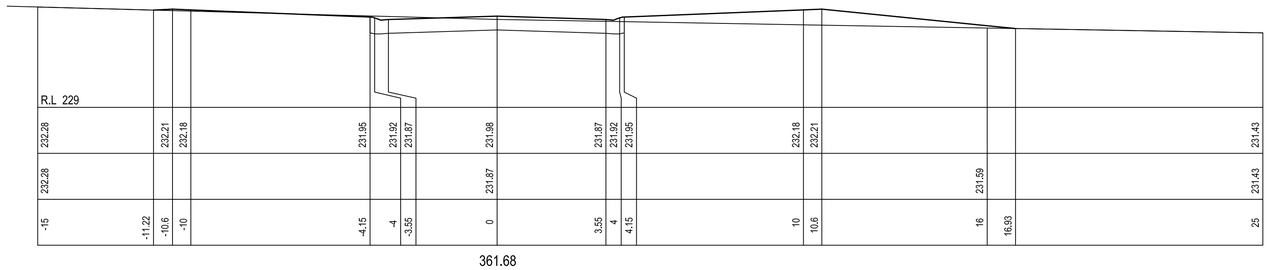
CHAINAGE	608.70	615	618.75	619.19	619.2	619.35	628.70

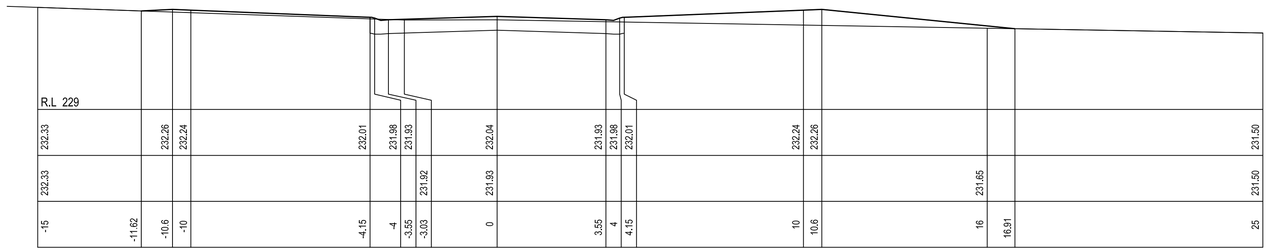
IBIS PLACE

H=1:500 V=1:100

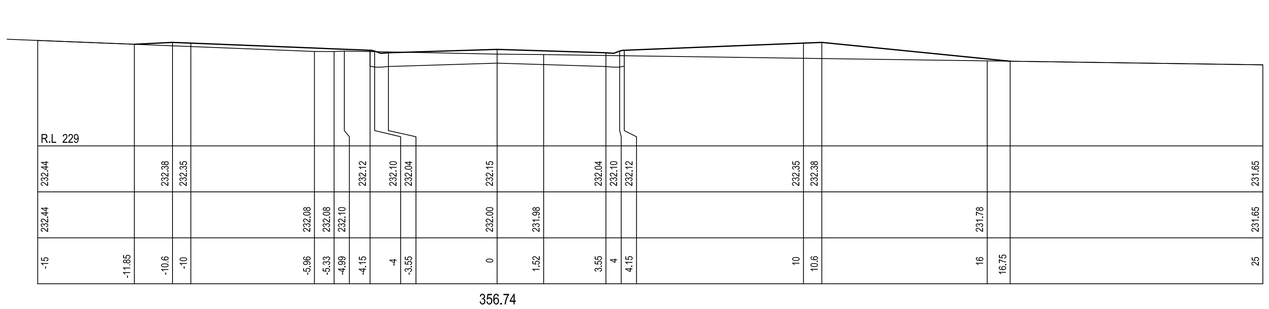
PLANS PREPARED BY	CLIENT	IBIS PLACE	SCALE: AS SHOWN	PLAN ISSUE	07.03.2023
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920*	McCLOYGROUP	LONGITUDINAL SECTION & DETAILS STAGE 6 KURRAJONG ESTATE, SATUR	ORIGINAL DRAWING SIZE: A1	A ISSUE TO COUNCIL	REV: C
Ph: 02 65432475 Email: office@hbsurveys.com.au (PO Box 26), MUSWELLBROOK NSW 2333		DESIGN: M. COLE R. JONES	LGA: UPPER HUNTER	B STORMWATER UPDATE	JOB REF: 207203
		DRAWN: M. COLE R. JONES	FILE:207203_S6_ENG	C INTER ALLOTMENT UPDATE	
			SHEET: CIVIL_004		



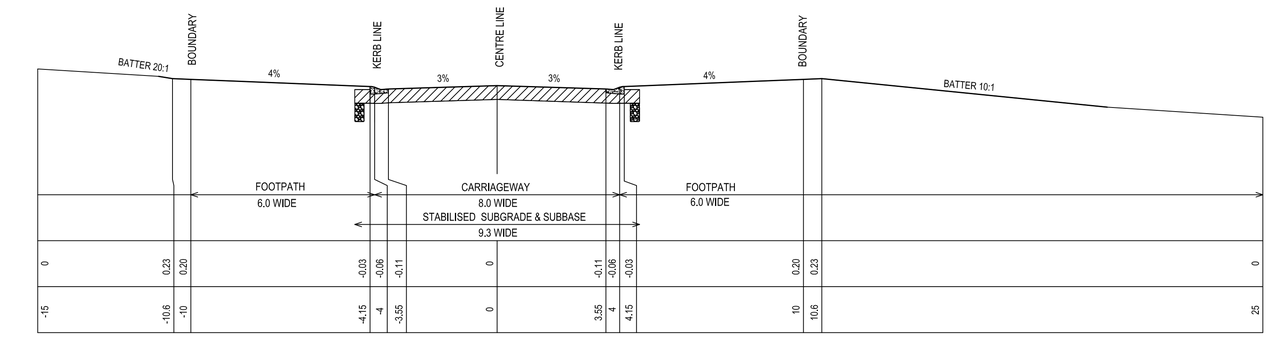
361.68



360

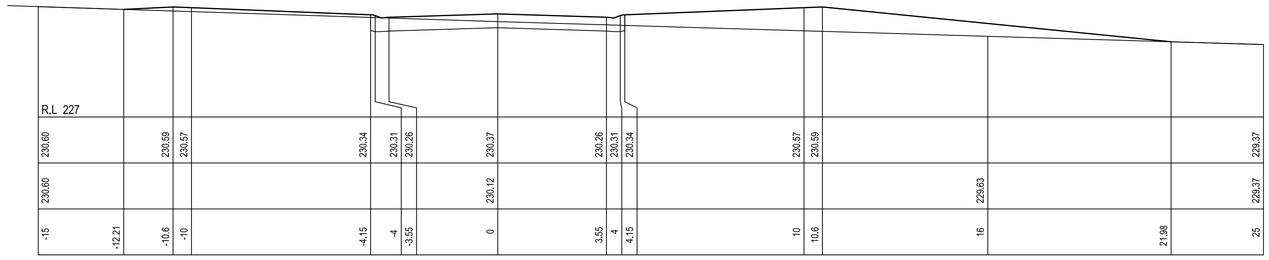


356.74

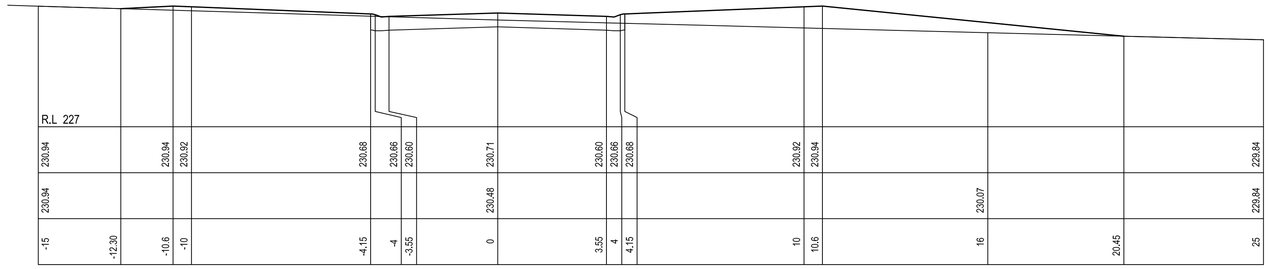


TYPICAL CROSS SECTION
IBIS PLACE
CH 356.74 - 584.53

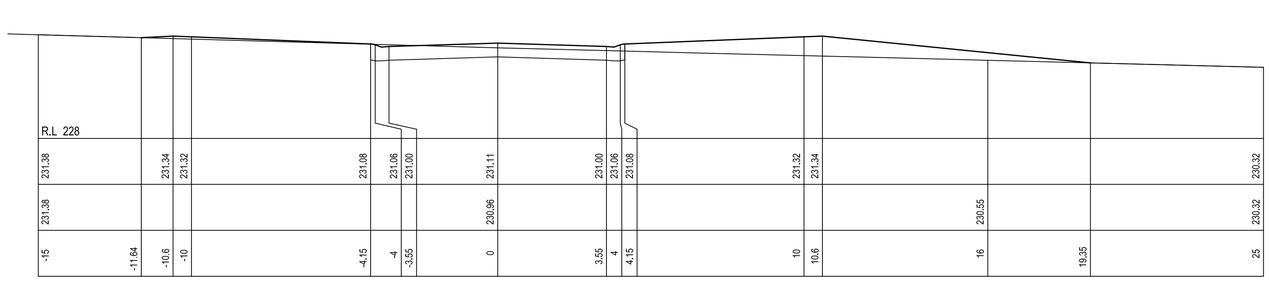
PLANS PREPARED BY	CLIENT				
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* Ph: 02 65432475 Email: office@hbsurveys.com.au (PO Box 26), MUSWELLBROOK NSW 2333	McCLOYGROUP	CROSS SECTIONS CH 356.74 - 361.68 & TYPICAL SECTION STAGE 6 KURRAJONG ESTATE, SATUR	SCALE: 1:1000 ORIGINAL DRAWING SIZE: A1 LGA: UPPER HUNTER		PLAN ISSUE 07.03.2023
		DESIGN: M. COLE, R. JONES	FILE:207203_S6_ENG	A	ISSUE TO COUNCIL
		DRAWN: M. COLE, R. JONES	SHEET: CIVIL_005	B	STORMWATER UPDATE
				C	INTER ALLOTMENT UPDATE
					REV: C
					JOB REF: 207203



417.97



405



390

375

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(PO Box 26), MUSWELLBROOK NSW 2333

CLIENT

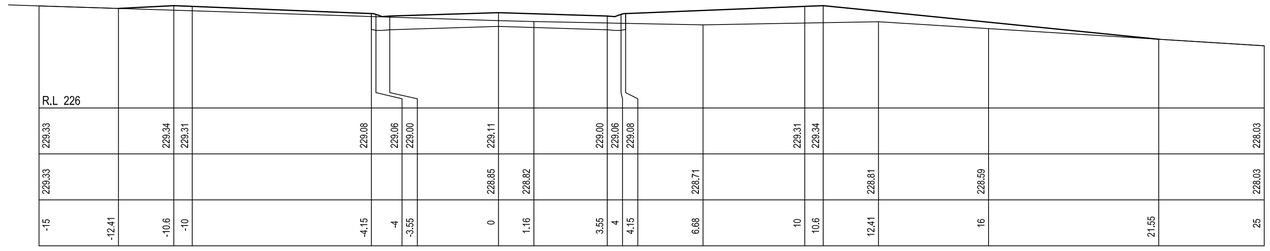
McCLOYGROUP

CROSS SECTIONS CH 375 - 417.97
STAGE 6
KURRAJONG ESTATE, SATUR

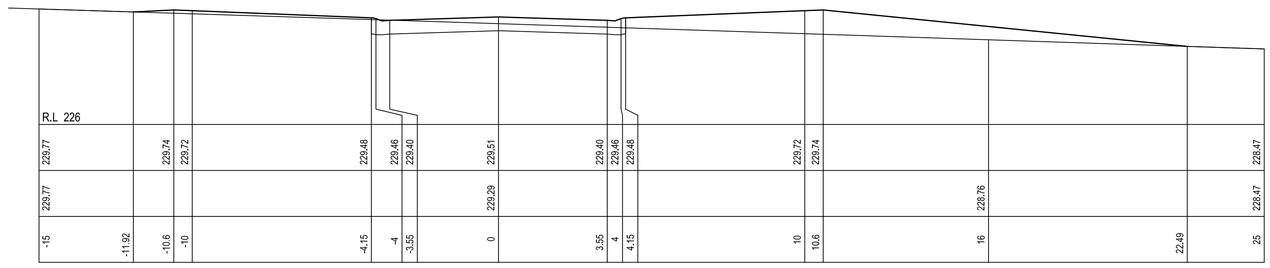
DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

SCALE: 1:1000
ORIGINAL DRAWING SIZE: A1
LGA: UPPER HUNTER
FILE:207203_S6_ENG
SHEET: CIVIL_006

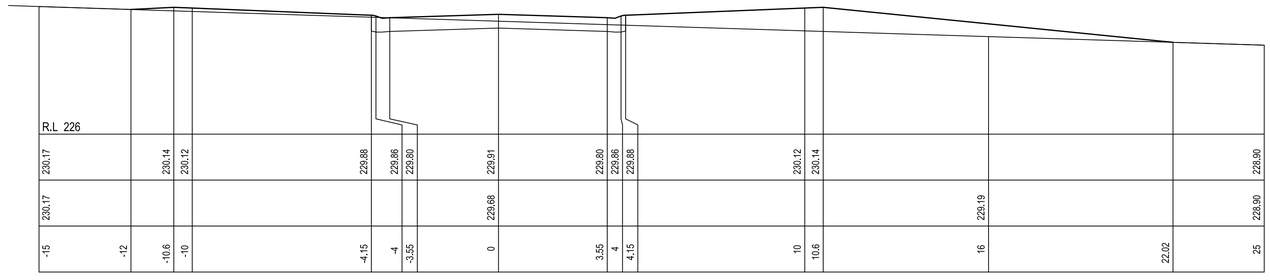
	PLAN ISSUE	07.03.2023
A	ISSUE TO COUNCIL	REV: C
B	STORMWATER UPDATE	
C	INTER ALLOTMENT UPDATE	JOB REF: 207203



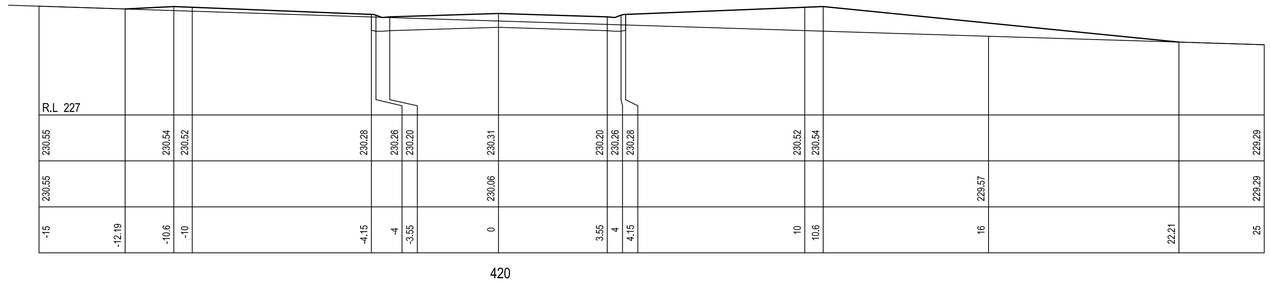
465



450



435



420

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CLIENT

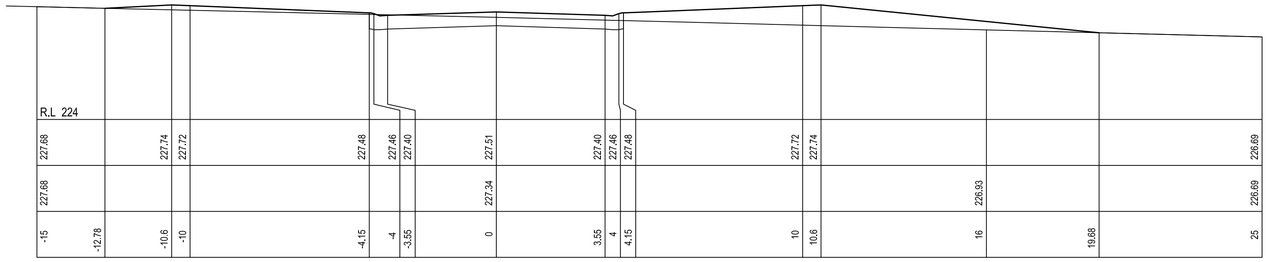
McCLOYGROUP

CROSS SECTIONS CH 420 - 465
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

SCALE: 1:1000
ORIGINAL DRAWING SIZE: A1
LGA: UPPER HUNTER
FILE:207203_S6_ENG
SHEET: CIVIL_007

	PLAN ISSUE	07.03.2023
A	ISSUE TO COUNCIL	REV: C
B	STORMWATER UPDATE	
C	INTER ALLOTMENT UPDATE	JOB REF: 207203



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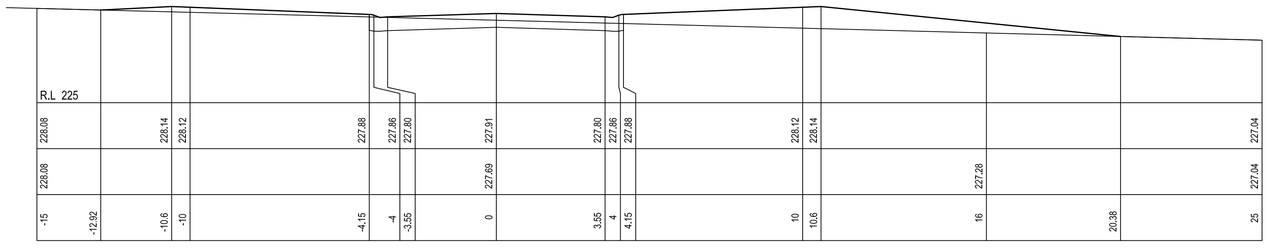

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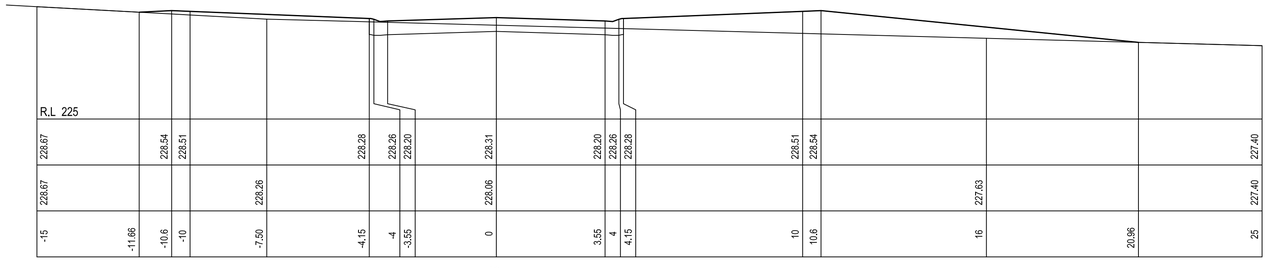

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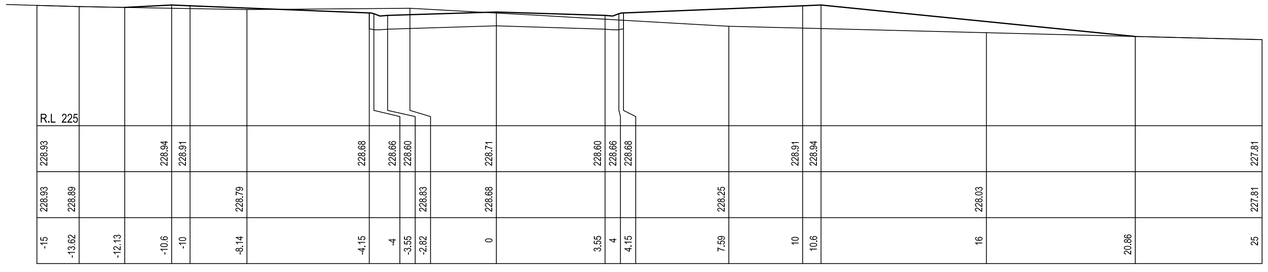

480

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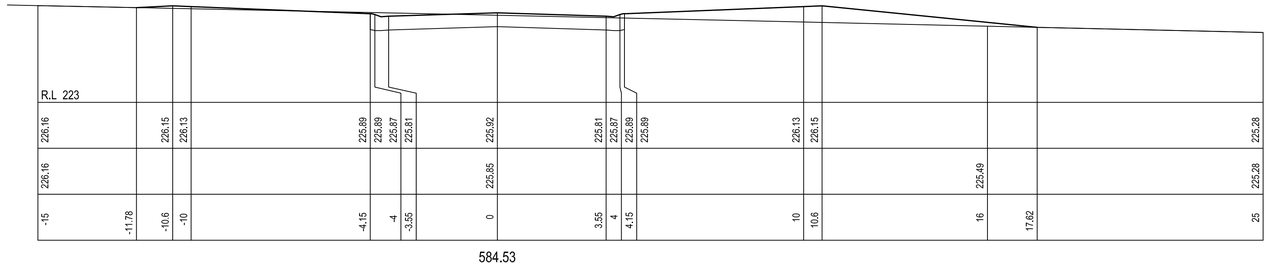
CROSS SECTIONS CH 480 - 525
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN: M. COLE, R. JONES

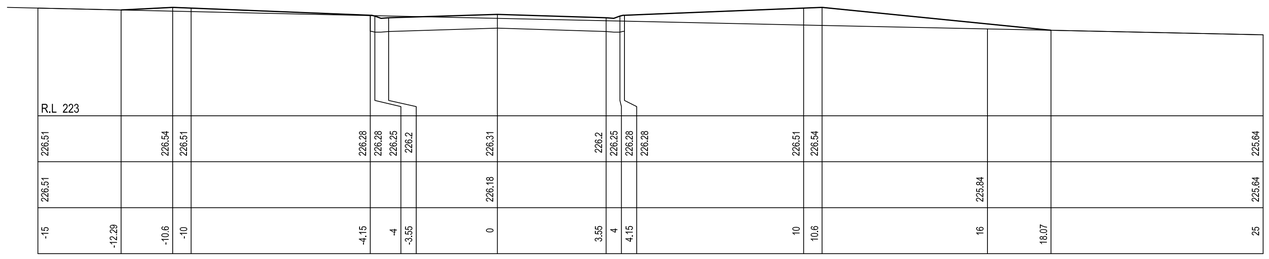
DRAWN: M. COLE, R. JONES

SCALE: 1:100
ORIGINAL DRAWING SIZE: A1
LGA: UPPER HUNTER
FILE:207203_S6_ENG
SHEET: CIVIL_008

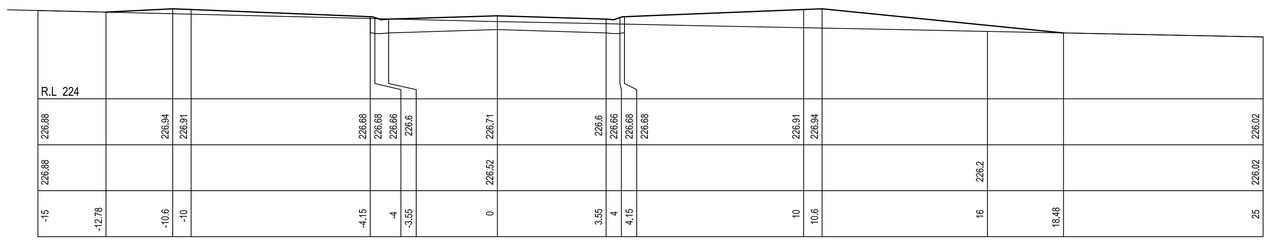
	PLAN ISSUE	07.03.2023
A	ISSUE TO COUNCIL	REV: C
B	STORMWATER UPDATE	
C	INTER ALLOTMENT UPDATE	JOB REF: 207203



584.53



570



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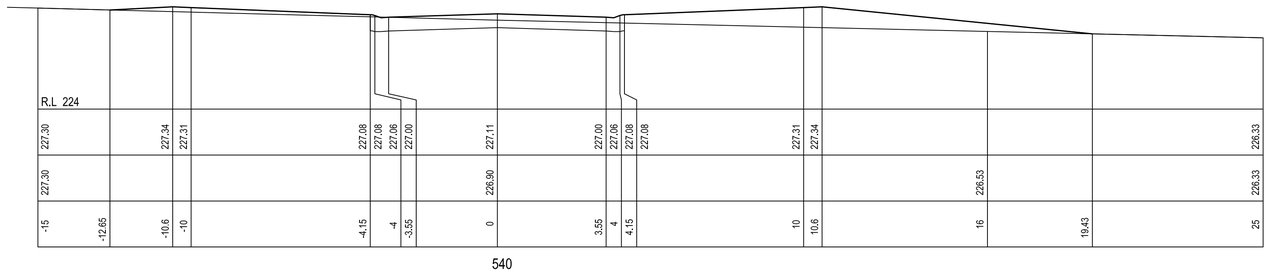

540

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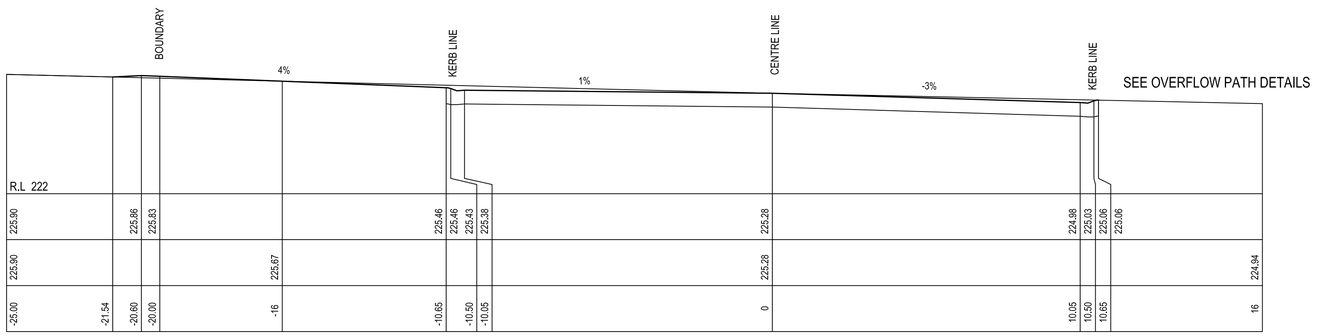
CROSS SECTIONS CH 480 - 525
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN: M. COLE, R. JONES

DRAWN: M. COLE, R. JONES

SCALE: 1:100
ORIGINAL DRAWING SIZE: A1
LGA: UPPER HUNTER
FILE:207203_S6_ENG
SHEET: CIVIL_009

	PLAN ISSUE	07.03.2023
A	ISSUE TO COUNCIL	REV: C
B	STORMWATER UPDATE	
C	INTER ALLOTMENT UPDATE	JOB REF: 207203



608.7

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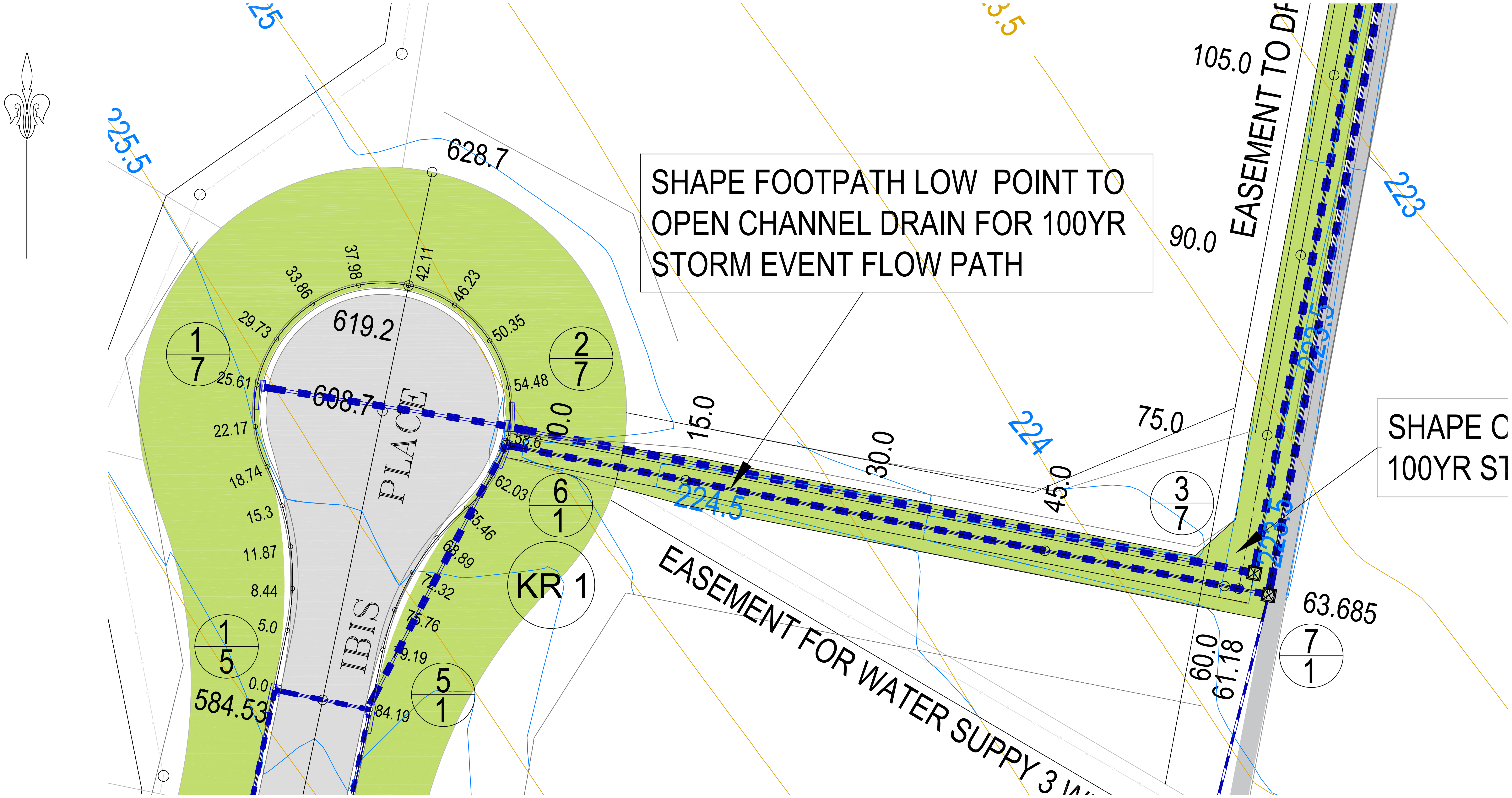
McCLOYGROUP

CROSS SECTION 608.7 - CUL-DE-SAC HEAD
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

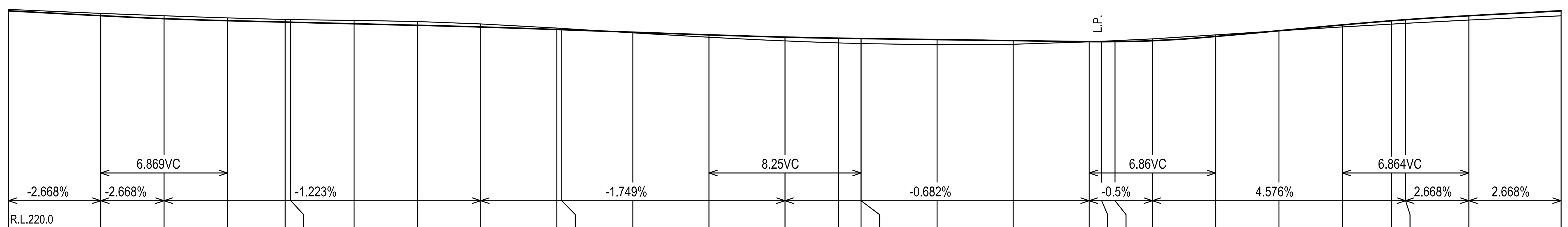
SCALE: 1:100
ORIGINAL DRAWING SIZE: A1
LGA: UPPER HUNTER
FILE:207203_S6_ENG
SHEET: CIVIL_010

	PLAN ISSUE	07.03.2023
A	ISSUE TO COUNCIL	REV: C
B	STORMWATER UPDATE	
C	INTER ALLOTMENT UPDATE	JOB REF: 207203



KERB RETURN - 1

H=1:200



CHAINAGE	DESIGN LEVEL	EXISTING LEVEL
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5	225.76	225.82
8.44	225.68	225.76
11.87	225.63	225.7
15	225.59	225.66
15.30	225.58	225.66
18.74	225.54	225.63
22.17	225.5	225.60
25.61	225.46	225.54
29.73	225.39	225.43
30	225.38	225.42
33.86	225.31	225.29
37.98	225.24	225.18
42.11	225.18	225.08
45	225.15	225.02
46.23	225.14	225.00
46.23	225.14	
50.35	225.11	224.97
54.48	225.09	224.99
58.60	225.06	225.05
59.27	225.06	
60	225.06	225.08
62.03	225.08	225.13
65.46	225.20	225.24
68.89	225.35	225.35
72.33	225.51	225.46
75	225.62	225.53
75.76	225.65	225.56
79.19	225.76	225.64
84.19	225.89	225.76

KERB RETURN 1

H=1:200 V=1:100

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(PO Box 26), MUSWELLBROOK NSW 2333

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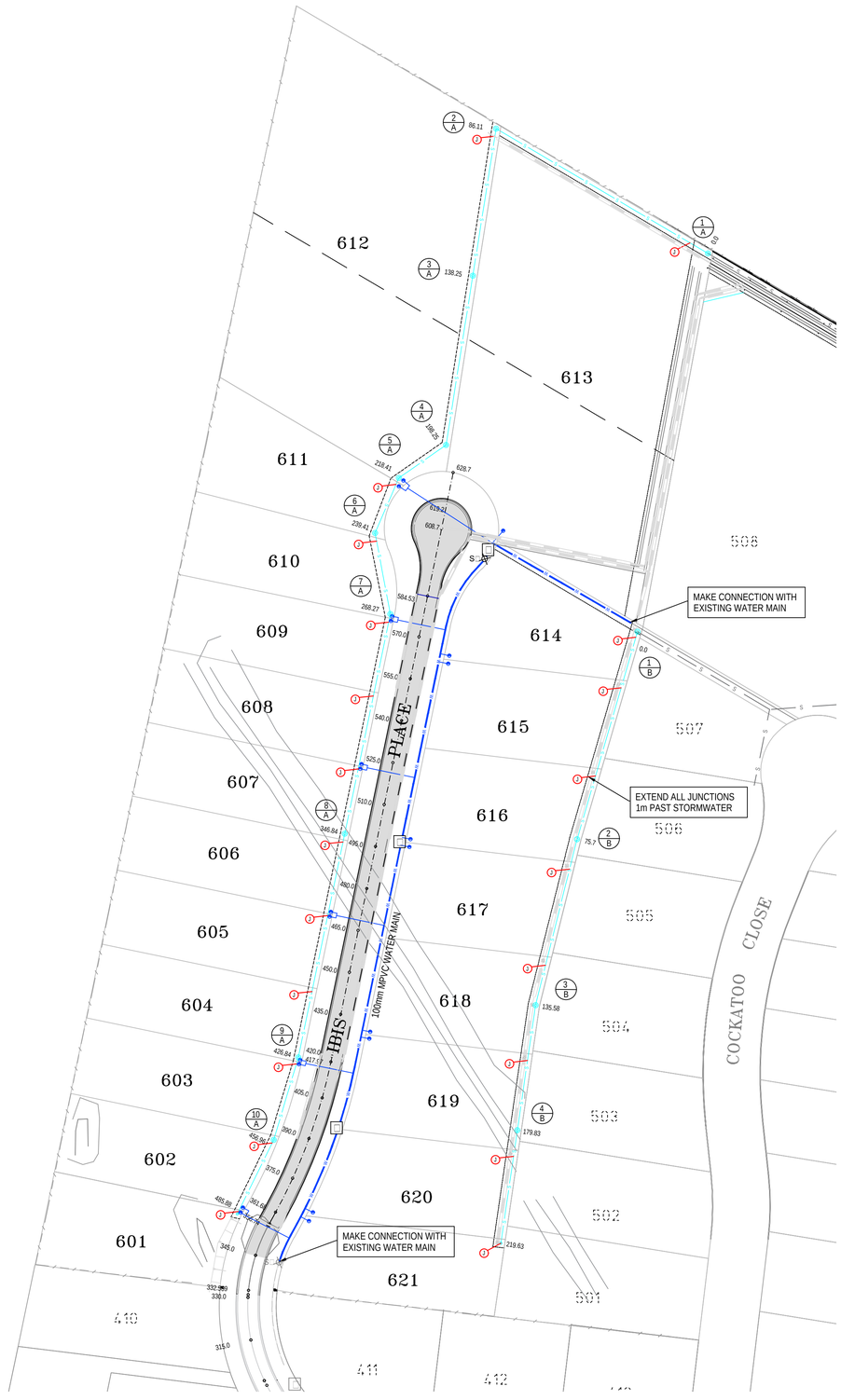
KERB RETURN - 1
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN:	DRAWN:
M. COLE R. JONES	M. COLE R. JONES

SCALE: 1:100
ORIGINAL DRAWING SIZE: A1
LGA: UPPER HUNTER
FILE:207203_S6_ENG
SHEET: CIVIL_011

	PLAN ISSUE	
A	ISSUE TO COUNCIL	07.03.2023
B	STORMWATER UPDATE	REV: C
C	INTER ALLOTMENT UPDATE	JOB REF: 207203



WA□□R □□□□S□

20□□ C□PP□R S□R□IC□ □□ C□□□CIL S□A□DARD SPLI□ WI□□ □□□
□□ PR□□ID□ 2 □ 20□□ S□R□IC□S
R□AD CR□SSI□□ □□ □□ 2□□ □ C□PP□R S□R□IC□ I□ 100□□ DW□ PIP□ S□6

H □□DRA□□
MA□□SPACI□□ 120□

□□□C□I□□

S□□P □AL□□

S□W□R MA□ □□L□

WA□□R MAI□S □P□L□□I□□LC□L□RID□ M□DI□I□D □P□C□M□
PR□SS□R□ PIP□ □□R WA□□R S□PPL□ P□12 I□ ACC□RDA□C□
WI□□ □WSA PS□209□
PIP□ SI□□ □100□ □ DIAM□□R□ □□□LQSS □□□□RWIS□ S□□W□ □□ □□□ PLA□□

ALL □AL□□S □ □I□□I□□S S□ALL □□ D□C□IL□ IR□□ WI□□ □□□ □□C□P□I□□
□□ □□DRA□□S W□IC□ WILL □□ D□□0 S□AI□L□SS S□□□L SPRI□□ □□DRA□□S
I□ ACC□RDA□C□ WI□□ A□SP□C C401

S□W□R □□□□S□

□RA□I□□ MAI□S □P□L□□I□□LC□L□RID□ □□P□C□R□□□□R RI□□ □□I□□□D
CLASS S□□

PLANS PREPARED BY	CLIENT				
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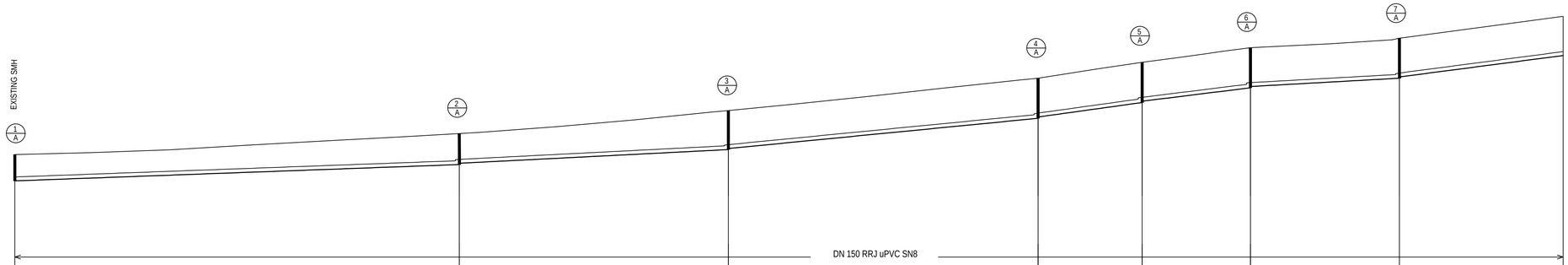
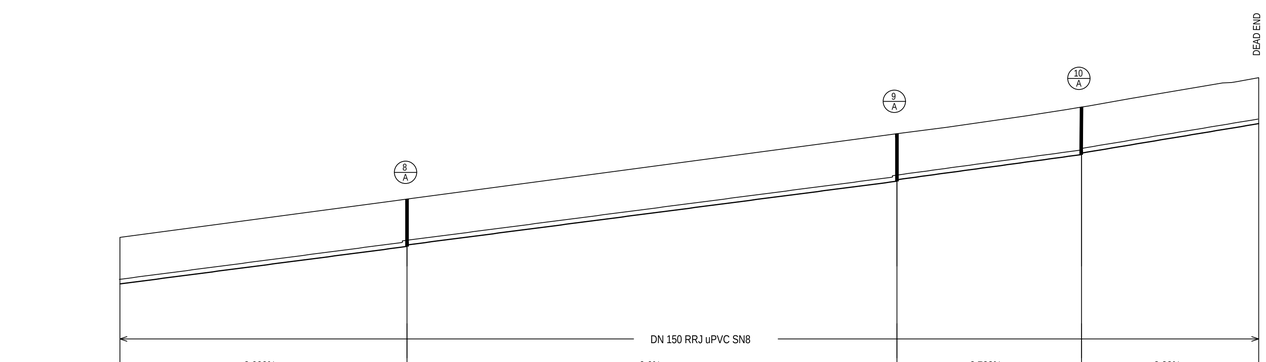
				A ISS□□ □□ C□□□CIL	R□□□C
			LGA: UPPER HUNTER	□ S□□RMWA□□R □PDA□□	
		DESIGN: M. COLE R. JONES DRAWN: M. COLE R. JONES	FILE:207203_S6_SEW	C I□□□R ALL□ □M□□□ □PDA□□	□□ □ R□□□□
			SHEET: SEW_001		207203



R.L.216.0

DEPTH TO INVERT	(-1.014)	(-1.20)	(-1.507)	(-1.55)	(-1.552)	(-1.547)	(-1.547)	
DESIGN LEVEL	220.82	221.45 / 221.50	222.03 / 222.07	223.24 / 223.29	223.85 / 223.90	224.42 / 224.47	224.79 / 224.84	
EXISTING LEVEL	221.83	222.65	223.54	224.79	225.40	225.97	226.34	
CHAINAGE	0	86.11	138.25	198.25	218.41	239.41	288.27	300

SEWER LINE A



R.L.222.0

DEPTH TO INVERT	(-1.543)	(-1.549)	(-1.552)	(-1.50)	
DESIGN LEVEL	226.89 / 226.94	229.02 / 229.07	229.89 / 229.94	230.9	
EXISTING LEVEL	228.44	230.57	231.44	232.4	
CHAINAGE	300	346.84	426.84	456.96	485.88

SEWER LINE A

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Surveying the Hunter since 1920

P□□02 6□43247□ □□ail□□□t□□□ □□□□r□□□□□□□ à□
□P□ □□□26□M□SW□LL□R□□□ □SW 2333

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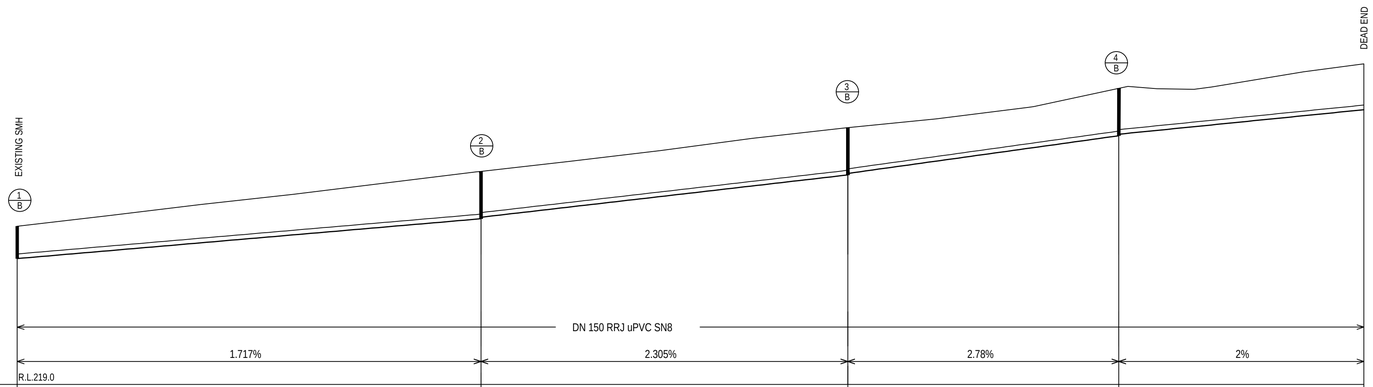
McCLOYGROUP

SEWER LINE A - LONGITUDINAL SECTION
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

SCAL□□ □ 1□□00 □ 1□100
□RI□I□AL DRAWI□□ SI□□□A1
LGA: UPPER HUNTER
FILE:207203_S6_SEW
SHEET: SEW_002

	PLA□ ISS□□	07□03□2023
A	ISS□□ □□ C□□□CIL	R□□□C
□	S□□RMWA□□R □PDA□□	
C	I□□□R ALL□ □M□□□ □PDA□□	□□□ R□□□ 207203



DEPTH TO INVERT	(-1.057)	(-1.545)	(-1.544)	(-1.544)	(-1.495)
DESIGN LEVEL	223.11	224.41	224.46	225.84	225.89	227.12	227.17	227.97
EXISTING LEVEL	224.17	225.96	227.39	228.67	229.47
CHAINAGE	0	75.70	135.58	179.83	219.83

SEWER LINE B

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P□□02 6□43247□ □□ail□□□i□□□ □□□□r□□□□□□□ a□
□P□ □□□26□M□SW□LL□R□□□ □SW 2333

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McCLOYGROUP

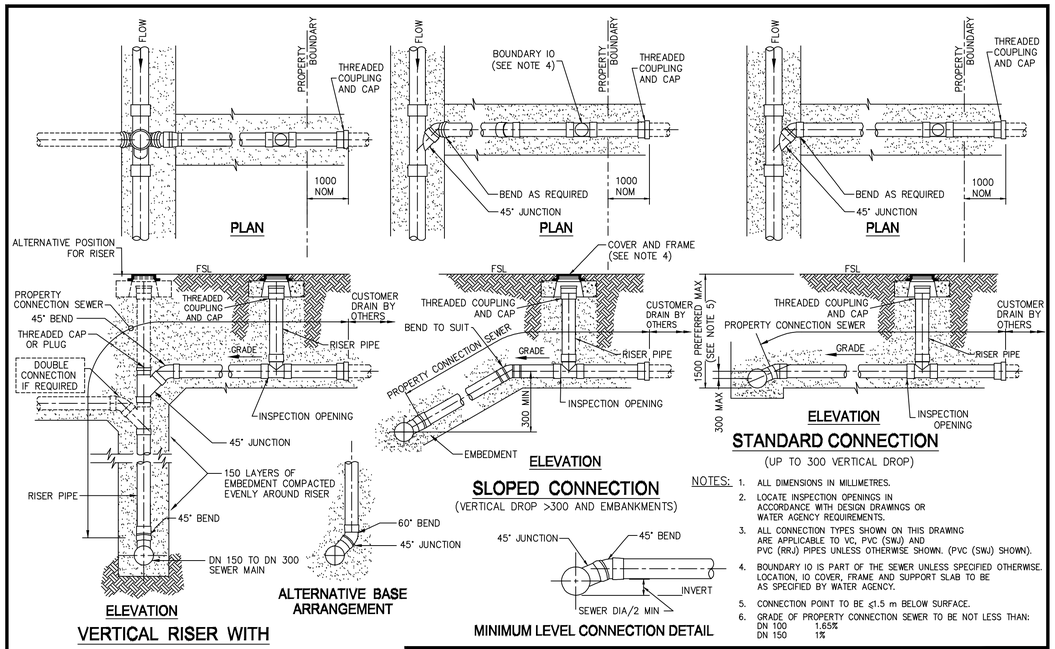
SEWER LINE B - LONGITUDINAL SECTION
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

SCAL□□ □ 1□□00 □ 1□100
□RI□I□AL DRAWI□□ SI□□□A1
LGA: UPPER HUNTER
FILE:207203_S6_SEW
SHEET: SEW_003

PLA□ ISS□□ 07□03□2023

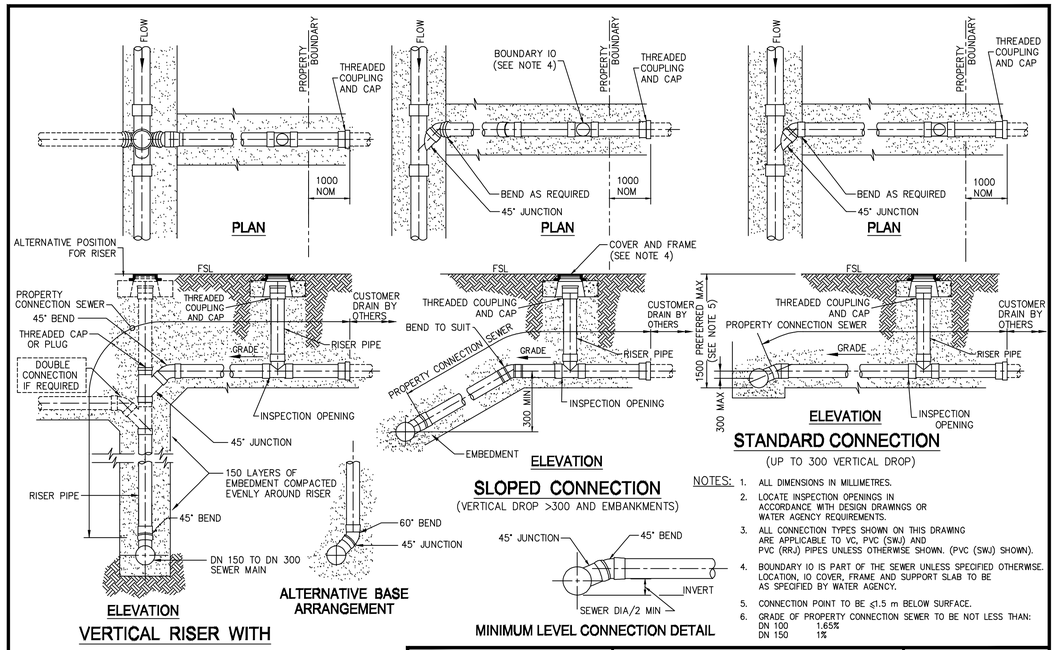
A	ISS□□ □□ C□□□CIL	R□□□C
□	S□□RMWA□□R □PDA□□	
C	I□□□R ALL□ □M□□□ □PDA□□	□□ R□□□ 207203



NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. LOCATE INSPECTION OPENINGS IN ACCORDANCE WITH DESIGN DRAWINGS OR WATER AGENCY REQUIREMENTS.
3. ALL CONNECTION TYPES SHOWN ON THIS DRAWING ARE APPLICABLE TO VC, PVC (SWJ) AND PVC (RRJ) PIPES UNLESS OTHERWISE SHOWN. (PVC (SWJ) SHOWN).
4. BOUNDARY IO IS PART OF THE SEWER UNLESS SPECIFIED OTHERWISE. LOCATION, IO COVER, FRAME AND SUPPORT SLAB TO BE AS SPECIFIED BY WATER AGENCY.
5. CONNECTION POINT TO BE ≤1.5 m BELOW SURFACE.
6. GRADE OF PROPERTY CONNECTION SEWER TO BE NOT LESS THAN:
   DN 100 1.65%
   DN 150 1%

WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA PROPERTY CONNECTION DETAILS IO INTERFACE METHOD	NOT TO SCALE SEW–1106 © WSAA. 2002

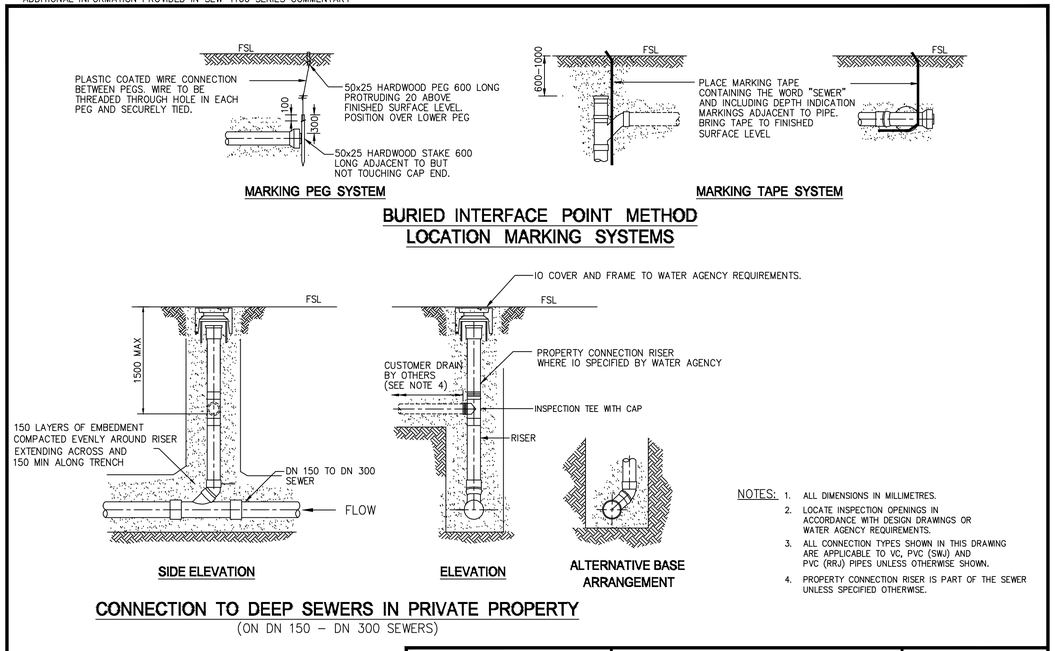
ADDITIONAL INFORMATION PROVIDED IN SEW–1100 SERIES COMMENTARY



NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. LOCATE INSPECTION OPENINGS IN ACCORDANCE WITH DESIGN DRAWINGS OR WATER AGENCY REQUIREMENTS.
3. ALL CONNECTION TYPES SHOWN ON THIS DRAWING ARE APPLICABLE TO VC, PVC (SWJ) AND PVC (RRJ) PIPES UNLESS OTHERWISE SHOWN. (PVC (SWJ) SHOWN).
4. BOUNDARY IO IS PART OF THE SEWER UNLESS SPECIFIED OTHERWISE. LOCATION, IO COVER, FRAME AND SUPPORT SLAB TO BE AS SPECIFIED BY WATER AGENCY.
5. CONNECTION POINT TO BE ≤1.5 m BELOW SURFACE.
6. GRADE OF PROPERTY CONNECTION SEWER TO BE NOT LESS THAN:
   DN 100 1.65%
   DN 150 1%

WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA PROPERTY CONNECTION DETAILS IO INTERFACE METHOD	NOT TO SCALE SEW–1106 © WSAA. 2002

ADDITIONAL INFORMATION PROVIDED IN SEW–1100 SERIES COMMENTARY

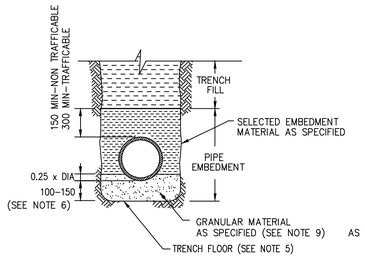


NOTES:
1. ALL DIMENSIONS IN MILLIMETRES.
2. LOCATE INSPECTION OPENINGS IN ACCORDANCE WITH DESIGN DRAWINGS OR WATER AGENCY REQUIREMENTS.
3. ALL CONNECTION TYPES SHOWN IN THIS DRAWING ARE APPLICABLE TO VC, PVC (SWJ) AND PVC (RRJ) PIPES UNLESS OTHERWISE SHOWN.
4. PROPERTY CONNECTION RISER IS PART OF THE SEWER UNLESS SPECIFIED OTHERWISE.

WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA PROPERTY CONNECTION DETAILS PRIVATE PROPERTY & MARKING SYSTEMS	NOT TO SCALE SEW–1109 © WSAA. 2002

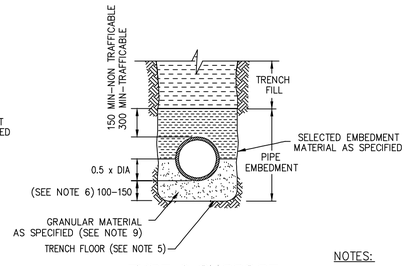
ADDITIONAL INFORMATION PROVIDED IN SEW–1100 SERIES COMMENTARY

PLANS PREPARED BY MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* P□□02 6□43247□ □□ail□□□□□□ □□□□r□□□□□□□ a□ □P□ □□□26□M□SW□LL□R□□□ □SW 2333	CLIENT McCLOYGROUP	SEWAGE DETAILS IN ACCORDANCE WITH SEWAGE CODE OF AUSTRALIA WATER SERVICES ASSOCIATION OF AUSTRALIA DESIGN: M. COLE R. JONES DRAWN: M. COLE R. JONES	SCAL□□ AS S□□W□ □RI□I□AL DRAWI□□ SI□□□A1 LGA: UPPER HUNTER FILE:207203_S6_SEW SHEET: SEW_004	PLA□ ISS□□ A ISS□□ □□ C□□□CIL □ S□□RMWA□□R □PDA□□ C I□□□R ALL□□M□□□ □PDA□□	07□03□2023 R□□□C □□□ R□□□ 207203



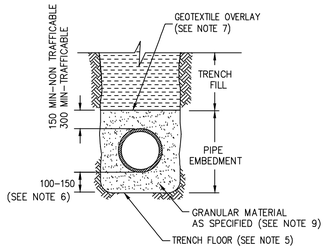
TYPE 1 SUPPORT

FOR RIGID PIPES ONLY (SEE NOTE 3)



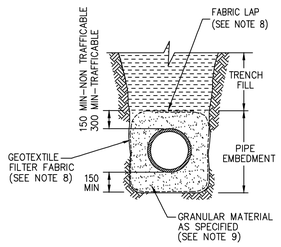
TYPE 2 SUPPORT

FOR RIGID PIPES ONLY (SEE NOTE 3)



TYPE 3 SUPPORT

FOR FLEXIBLE & RIGID PIPES (SEE NOTE 3)



TYPE 4 SUPPORT

WITH GEOTEXTILE
FOR FLEXIBLE & RIGID PIPES (SEE NOTE 3)

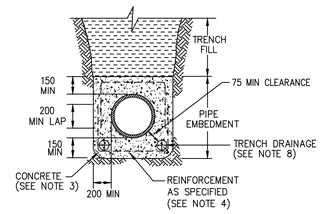
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. THIS DRAWING TO BE READ IN CONJUNCTION WITH SEW-1201.
3. PIPE CLASSIFICATION
   (a) RIGID PIPES: VC AND RC
   (b) FLEXIBLE PIPES: PVC, GRP, STEEL, DI AND PE.
4. PLACEMENT OF EMBEDMENT, TRENCHFILL & COMPACTION TO MEET THE REQUIREMENTS OF WSA 02 PART 3.
5. EXCAVATE OR COMPACT TRENCH FLOOR TO PROVIDE A FLAT FIRM BASE TO SUPPORT BEDDING MATERIAL AND MIMIMISE PIPELINE SETTLEMENT. WHEN EXCAVATED, REPLACE WITH GRANULAR MATERIAL AS SPECIFIED FOR BEDDING OR ADOPT TYPE 5, 6, 7 OR 8 SUPPORT AS REQUIRED.
6. ENSURE BEDDING IS DEEP ENOUGH THAT PIPE JOINT PROJECTIONS (SOCKETS, FLANGES) DO NOT TOUCH TRENCH FLOOR.
7. TYPE 4 SUPPORT TO BE USED WHERE MIGRATORY NATIVE SOILS (SANDS & CLAYS) ARE ENCOUNTERED ADJACENT TO THE EMBEDMENT ZONE AND SINGLE SIZE AGGREGATE IS USED:
8. LAY GEOTEXTILE FILTER FABRIC AGAINST TRENCH FLOOR AND WALLS SUCH THAT IT FULLY ENCASES THE EMBEDMENT.
   - PRESS FABRIC INTO THE VOIDS BEFORE INSTALLING EMBEDMENT TO PREVENT FABRIC TEARING.
   - PROVIDE A MINIMUM OF 250 OVERLAP AT ALL FABRIC JOINTS.
9. PURCHASE SPECIFICATIONS FOR TRENCH FILL AND EMBEDMENT MATERIAL ARE DETAILED IN WSA 02 PART 2.

EMBEDMENT TYPES TO BE SPECIFIED IN DESIGN DRAWINGS

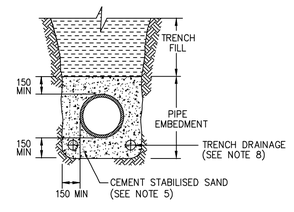
WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA	NOT TO SCALE
	STANDARD EMBEDMENT FLEXIBLE & RIGID PIPES	SEW-1202
		© WSAA. 2002

ADDITIONAL INFORMATION PROVIDED IN SEW-1200 SERIES COMMENTARY



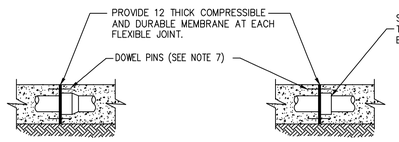
TYPE 12 SUPPORT
UTILISING CONCRETE EMBEDMENT

(RIGID & FLEXIBLE PIPES)



TYPE 13 SUPPORT
UTILISING CEMENT STABILISED EMBEDMENT

(RIGID & FLEXIBLE PIPES)



SPIGOT/SOCKET JOINT — SLEEVED COUPLING

CONCRETE ENCASEMENT JOINT DETAILS

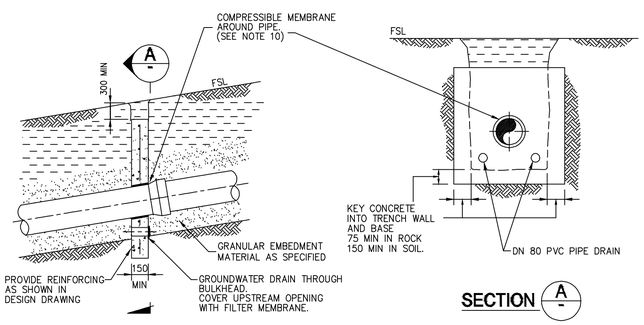
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. USE THESE SUPPORT SYSTEMS WHERE SPECIFIED BY DESIGNER DETAILS TO BE PROVIDED IN DESIGN DRAWINGS.
3. USE UNREINFORCED CONCRETE CLASS N20 MIN, AND REINFORCED CONCRETE N25 MIN. FOR AGGRESSIVE CONDITIONS USE SPECIAL CLASS CONCRETE.
4. WHERE SPECIFIED MINIMUM STEEL REINFORCEMENT OF 0.4% CONCRETE CROSS SECTION PLACED CENTRALLY AND WITH 65 MINIMUM COVER TO EXTERNAL FACE. SPECIFY REINFORCEMENT FOR THE APPLICABLE LOADING IN DESIGN DRAWINGS.
5. CEMENT STABILISED SAND OR WELL GRADED CRUSHED ROCK TO BE 25:1 SAND:CEMENT (PLACED DRY).
6. DURING THE ENCASEMENT PROCESS PIPES WILL REQUIRE A RESTRAINT SYSTEM TO PREVENT PIPE MOVEMENT AND/OR FLOTATION.
7. PROVIDE DOWEL PINS, AS DETAILED IN DESIGN DRAWINGS AT EACH CONCRETE ENCASEMENT JOINT TO PREVENT PIPE DAMAGE.
8. SEE SEW-1207 IF CONTINUOUS TRENCH DRAINAGE REQUIRED.

EMBEDMENT TYPES TO BE SPECIFIED IN DESIGN DRAWINGS

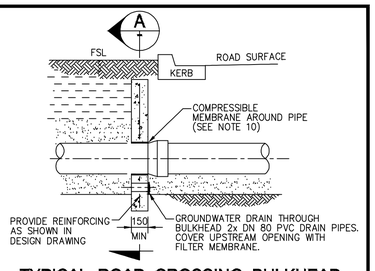
WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA	NOT TO SCALE
	SPECIAL EMBEDMENT CONCRETE & STABILISED SUPPORTS	SEW-1205
		© WSAA. 2002

ADDITIONAL INFORMATION PROVIDED IN SEW-1200 SERIES COMMENTARY

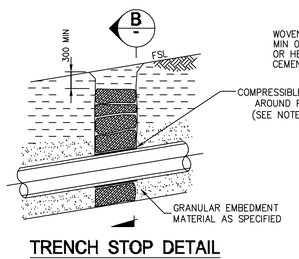


CONCRETE BULKHEAD DETAIL

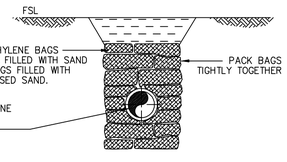
SECTION A



TYPICAL ROAD CROSSING BULKHEAD



TRENCH STOP DETAIL



SECTION B

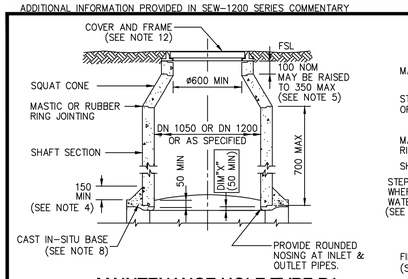
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. CONSTRUCT CONCRETE BULKHEADS AND TRENCH STOPS AT LOCATIONS SPECIFIED IN DESIGN DRAWINGS.
3. CONSTRUCT BULKHEAD ADJACENT TO KERB AND GUTTER SHOULDER OF SEALED ROADS.
4. LOCATE BULKHEAD AT A RETAINING WALL UNDER THE WALL.
5. KEY CONCRETE BULKHEADS INTO SIDES AND BOTTOM OF TRENCH AGAINST A BEARING SURFACE OF UNDISTURBED SOIL.
6. CONCRETE TO BE CLASS N25.
7. DO NOT DEFORM PIPES DURING PLACEMENT OF CONCRETE.
8. SEAL BAGS TO PREVENT LEAKAGE OF CONTAINED MATERIAL.
9. PROVIDE CONTINUOUS DRAINAGE PATH
   - THROUGH BULKHEADS AND TRENCHSTOPS
   - AROUND MAINTENANCE HOLES
   - IN TRENCH EXCAVATIONS ACROSS ROADWAYS.

   TRENCH DRAINAGE TO BE IN ACCORDANCE WITH SEW-1207.
10. COMPRESSIBLE MEMBRANE AROUND PIPE TO BE 10 THICK POLYSTYRENE FOR BULKHEADS ADJACENT TO KERBS AND 3 MIN THICK RUBBER FOR BULKHEADS AND TRENCHSTOPS ON SLOPES.
11. FOR SLOPES >30% CONTINUOUSLY ENCASE THE PIPE IN CONCRETE TO PREVENT MOVEMENT AND TRANSFER OF GROUND WATER. JOINTS TO BE WRAPPED WITH GEOTEXTILE FABRIC TO PREVENT DAMAGE TO RRJ.

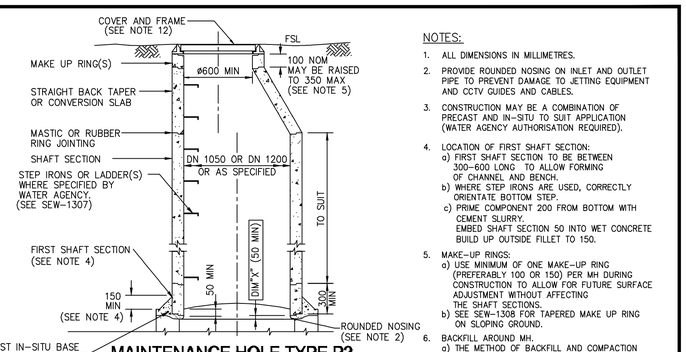
WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA	NOT TO SCALE
	TRENCH DRAINAGE BULKHEADS & TRENCHSTOP	SEW-1206
		© WSAA. 2002

ADDITIONAL INFORMATION PROVIDED IN SEW-1200 SERIES COMMENTARY



MAINTENANCE HOLE TYPE P1

FOR COMPONENT DEPTH ≤1200 (SEE NOTE 8)

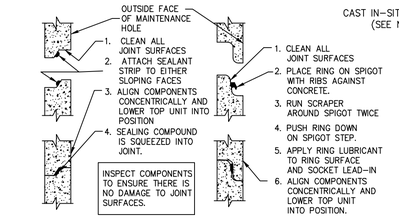


MAINTENANCE HOLE TYPE P2

FOR COMPONENT DEPTH 1200 TO 6000

NOTES:

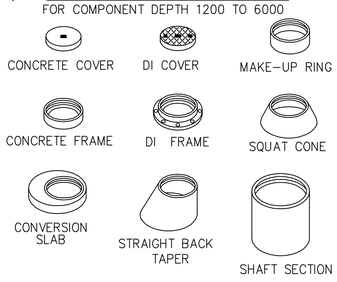
1. ALL DIMENSIONS IN MILLIMETRES.
2. PROVIDE ROUNDED NOSING ON INLET AND OUTLET PIPE TO PREVENT DAMAGE TO JETTING EQUIPMENT AND CCTV GUIDES AND CABLES.
3. CONSTRUCTION MAY BE A COMBINATION OF PRECAST AND IN-SITU TO SUIT APPLICATION (WATER AGENCY AUTHORISATION REQUIRED).
4. LOCATION OF FIRST SHAFT SECTION:
   a) FIRST SHAFT SECTION TO BE BETWEEN 300-600 LONG TO ALLOW FORMING OF CHANNEL AND BENCH.
   b) WHERE STEP IRONS ARE USED, CORRECTLY ORIENTATE BOTTOM STEP.
   c) PRIME COMPONENT 200 FROM BOTTOM WITH CEMENT SLURRY. EMBED SHAFT SECTION 50 INTO WET CONCRETE BUILD UP OUTSIDE FILLET TO 150.
5. MAKE-UP RINGS:
   a) USE MINIMUM OF ONE MAKE-UP RING (PREFERABLY 100 OR 150) PER MH DURING CONSTRUCTION TO ALLOW FOR FUTURE SURFACE ADJUSTMENT WITHOUT AFFECTING THE SHAFT SECTIONS.
   b) SEE SEW-1308 FOR TAPERED MAKE UP RING ON SLOPING GROUND.
6. BACKFILL AROUND MH.
   a) THE METHOD OF BACKFILL AND COMPACTION AROUND MH TO BE GENERALLY AS FOR PIPE EMBEDMENT.
   b) TAKE CARE TO RAISE SELECT FILL EQUALLY ALL AROUND THE MH TO AVOID UNBALANCED LATERAL LOADING.
7. FOR MH TYPE P2 INSTALL STEP IRONS OR LADDERS IN ACCORDANCE WITH WATER AGENCY. REQUIREMENTS. SEE SEW-1307
8. CONCRETE BASE TO BE SPECIAL CLASS.
9. IN WATER CHARGED GROUND OR WHERE THERE IS SIGNIFICANT RISK OF SURCHARGE USE ONLY CAST IN-SITU MH.
10. FOR PIPE CONNECTIONS TO MH SEE SEW-1302.
11. WHERE THERE IS SIGNIFICANT RISK OF INFILTRATION OR TREE ROOT INTRUSION APPLY AN EXTERNAL BITUMASTIC SEAL TAPE 150 WIDE OVER A COAT OF MANUFACTURERS RECOMMENDED PRIME SEAL TO ALL JOINTS.
12. FOR MH COVER CLASS SELECTION AND FINISHED LEVELS SEE SEW-1308.



MASTIC JOINT DETAILS — RUBBER RING JOINT DETAILS

CALCULATING TOTAL PRECAST COMPONENT DEPTH (REFER NOTE 4)

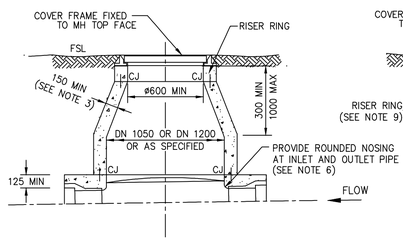
TOTAL DEPTH OF PRECAST COMPONENT = DEPTH TO INVERT OF HIGHEST NON-DROP INLET PIPE MINUS (ID OF INLET PIPE + PIPE WALL THICKNESS + DIM "X")



WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA	NOT TO SCALE
	MAINTENANCE HOLES SEWERS ≤ DN 300 PRECAST TYPES P1 & P2	SEW-1300
		© WSAA. 2002

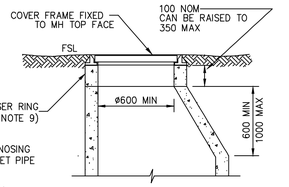
ADDITIONAL INFORMATION PROVIDED IN SEW-1300 SERIES COMMENTARY

PLANS PREPARED BY	CLIENT				
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* P□□02 6□43247□ □□ail□□□□□□ □□□□r□□□□□□□ a□ □P□ □□□26□□M□SW□LL□R□□□ □SW 2333	McCLOYGROUP	SEWAGE DETAILS IN ACCORDANCE WITH SEWAGE CODE OF AUSTRALIA WATER SERVICES ASSOCIATION OF AUSTRALIA	SCAL□□ AS S□□W□ □RI□I□AL DRAWI□□ SI□□□A1		PLA□ ISS□□	07□03□2023
			LGA: UPPER HUNTER	A	ISS□□ □□ C□□□CIL	R□□□C
				□	S□□RMWA□□R □PDA□□	
		DESIGN: M. COLE R. JONES DRAWN: M. COLE R. JONES	FILE:207203_S6_SEW	C	I□□□R ALL□□M□□□ □PDA□□	□□□R□□□ 207203
			SHEET: SEW_005			

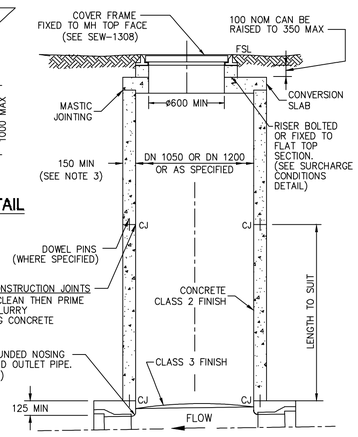


MAINTENANCE HOLE TYPE C1

FOR MH ≤ 1200 DEEP

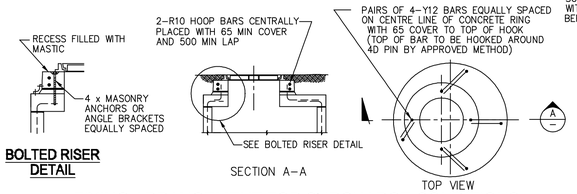


STRAIGHT BACK TAPER DETAIL



MAINTENANCE HOLE TYPE C2

FOR MH >1200 TO ≤6000 DEPTH
(TOP SECTION MAY BE AS SHOWN OR STRAIGHT BACK TAPER)



BOLTED RISER DETAIL

SECTION A–A

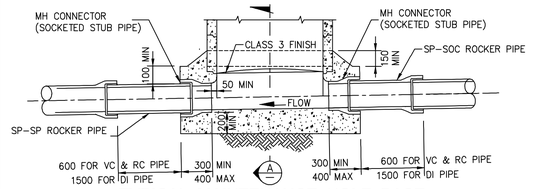
FIXING ARRANGEMENT FOR SURCHARGE CONDITIONS

NOTES:

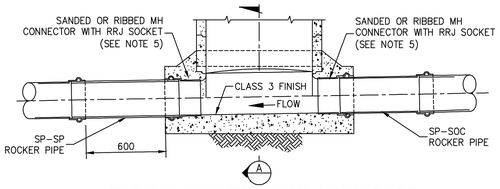
1. ALL DIMENSIONS IN MILLIMETRES.
2. ALL CONCRETE TO BE SPECIAL CLASS.
3. WALL THICKNESS TO BE 150 MIN OR 225 MIN IN AGGRESSIVE SOILS, HIGH WATER TABLE AND SALINE ENVIRONMENTS.
4. MH TYPE C1 MAY BE OF FULL OR PARTIAL CONICAL CONSTRUCTION IF ACCEPTABLE TO WATER AGENCY.
5. FOR PIPE CONNECTION DETAILS INTO MH SEE SEW–1302.
6. FORM ROUNDED NOSING ON INLET AND OUTLET PIPE TO PREVENT DAMAGE TO JETTING EQUIPMENT, CCTV GUIDES AND CABLES.
7. FIX TOP SECTIONS OF MH, COVER SURROUND AND COVER TO PREVENT SEPARATION WHERE SEWER IS SUBJECT TO SURCHARGING.
8. FOR MH TYPE C2 INSTALL STEP IRONS OR LADDERS IN ACCORDANCE WITH WATER AGENCY REQUIREMENTS SEE SEW–1307.

WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA MAINTENANCE HOLES SEWERS ≤ DN 300 CAST IN-SITU TYPES C1 & C2	NOT TO SCALE SEW–1301 ©WSAA. 2002

ADDITIONAL INFORMATION PROVIDED IN SEW–1300 SERIES COMMENTARY

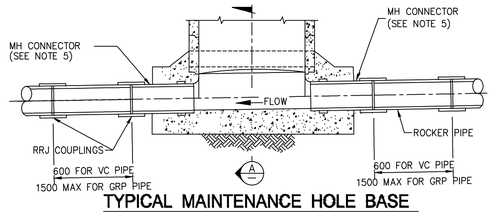


TYPICAL MAINTENANCE HOLE BASE FOR VC, RC & DI SEWERS



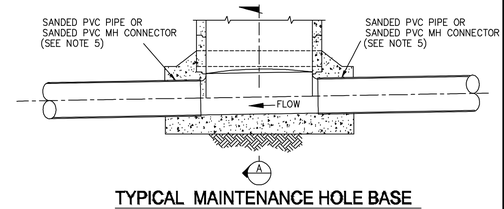
TYPICAL MAINTENANCE HOLE BASE FOR RUBBER RING JOINT PVC & ABS SEWERS

SEE VC, RC & DI BASE DETAILS FOR OTHER DIMENSIONS AND DETAILS (SEE NOTE 6)



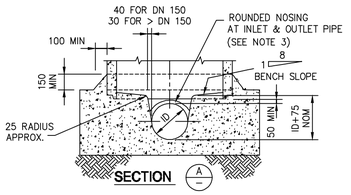
TYPICAL MAINTENANCE HOLE BASE FOR VC & GRP SLEEVE COUPLED SEWERS

SEE VC, RC & DI BASE DETAILS FOR OTHER DIMENSIONAL DETAILS



TYPICAL MAINTENANCE HOLE BASE FOR SOLVENT CEMENT JOINT PVC SEWERS

SEE VC, RC & DI BASE DETAILS FOR OTHER DIMENSIONS AND DETAILS (SEE NOTE 7)

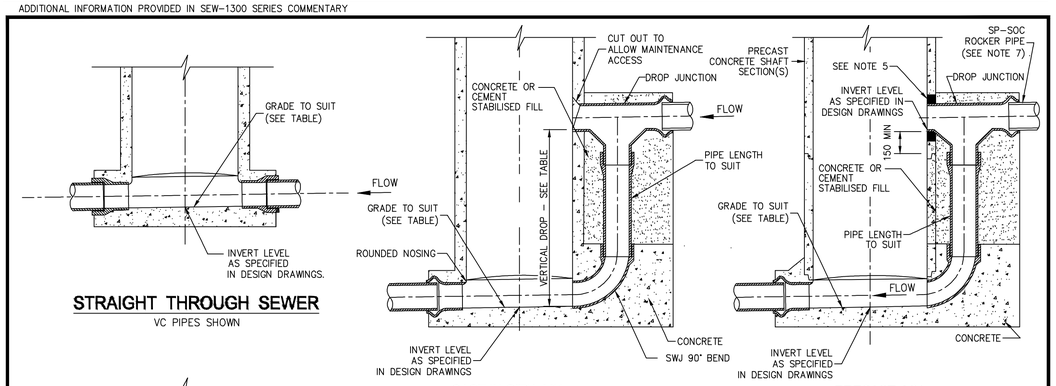


NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. PIPE CONNECTION DETAILS APPLY TO PRECAST AND CAST IN–SITU MH (SEE SEW–1300 & SEW–1301) PRECAST CONSTRUCTION SHOWN IN THIS DRAWING.
3. FORM ROUNDED NOSING ON INLET & OUTLET PIPES TO PREVENT DAMAGE TO JETTING EQUIPMENT, CCTV GUIDES & CABLES.
4. PE CONNECTION METHODS SHOWN ON SEW–1317.
5. PVC, ABS & GRP MH CONNECTORS ≥ DN 300 TO HAVE WEEP RINGS AND TO BE SANDED.
6. WHERE SPECIFIED USE RRJ ROCKER PIPES AS SHOWN IN RRJ DETAIL WITH SOLVENT CEMENT JOINT PVC SEWERS.
7. NOT SUITABLE IF THE SOIL BEARING PRESSURE IS LESS THAN 100 kPa (SEE SEW–1200).

WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA MAINTENANCE HOLES PIPE CONNECTION DETAILS	NOT TO SCALE SEW–1302 ©WSAA. 2002

ADDITIONAL INFORMATION PROVIDED IN SEW–1300 SERIES COMMENTARY



STRAIGHT THROUGH SEWER

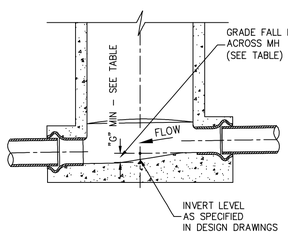
VC PIPES SHOWN

CAST IN-SITU MH SEE SEW–1301

EXTERNAL DROP JUNCTION

PVC PIPES SHOWN

PRECAST MH SEE SEW–1300



CHANGE IN DIRECTION THROUGH MAINTENANCE HOLE

PVC (RRJ) PIPES SHOWN

FALL ACROSS MH (INLET TO OUTLET INVERT)	
DEFLECTION ANGLE	"G" MIN
0° –30°	30
>30° – 60°	50
>60°	80

VERTICAL DROP	
PIPE SIZE DN	MINIMUM ▲
150	460
225	710
300	880

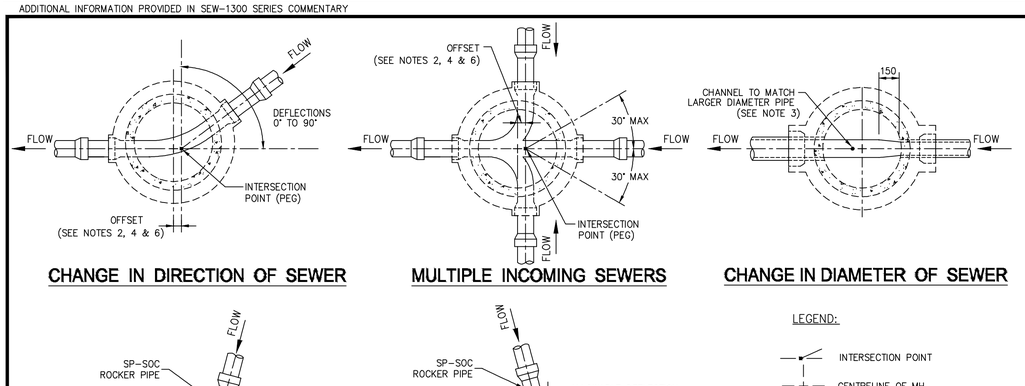
▲ BASED ON CURRENT FITTING AVAILABILITY

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. THIS DRAWING APPLICABLE TO PRECAST AND IN–SITU MH.
3. ALL CONNECTION TYPES SHOWN IN THIS DRAWING ARE APPLICABLE TO VC, PVC SOLVENT WELD (SWJ), & PVC RUBBER RING (RRJ), PE & GRP PIPES, UNLESS OTHERWISE SPECIFIED.
4. TO ENSURE BONDING COAT PVC AND GRP PIPES CAST INTO MH WALL AND BASE WITH RESIN/SOLVENT & SAND OR ABRADE FOR THE LENGTH OF WALL PENETRATION.
5. FILL JOINT AROUND INSERT PIPE WITH AUTHORISED EPOXY OR MASTIC SEALING MATERIAL.
6. FOR DETAILS OF PIPE CONNECTION TO MH SEE SEW–1302.
7. ROCKER PIPE LENGTHS AND CONNECTION SYSTEMS TO BE AS SHOWN IN SEW–1302.
8. MAXIMUM FALL ACROSS MH TO BE 150

WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA MAINTENANCE HOLES SEWERS ≤ DN 300 CHANGES IN LEVEL DETAILS	NOT TO SCALE SEW–1303 ©WSAA. 2002

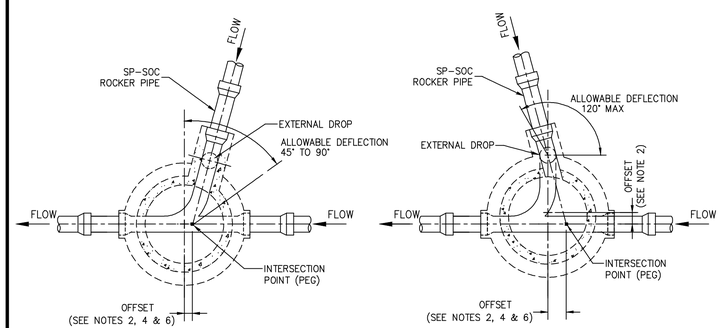
ADDITIONAL INFORMATION PROVIDED IN SEW–1300 SERIES COMMENTARY



CHANGE IN DIRECTION OF SEWER

MULTIPLE INCOMING SEWERS

CHANGE IN DIAMETER OF SEWER



INCOMING SEWERS HAVING EXTERNAL DROP

LEGEND:

INTERSECTION POINT

CENTRELINE OF MH

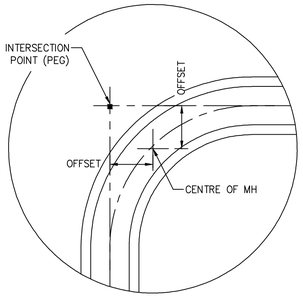
NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. WHERE NECESSARY PULL MH OFF CENTRELINE OF SEWER (MAX 200) TO IMPROVE FLOW AND ACCESSIBILITY PROVIDED THE FOLLOWING CONDITIONS ARE MET:
   – ALL TANGENT POINTS TO BE CONTAINED WITHIN MH.
   – SUFFICIENT WORK AREA AVAILABLE.
   – MAINTENANCE EQUIPMENT CAN BE USED IN ALL MAINS.
   – OFFSET AS SPECIFIED.
3. INVERT LEVELS TO BE AS SHOWN IN DESIGN DRAWINGS.
4. FOR CHANNEL INTERSECTION AND OFFSET DETAILS SEE SEW–1305.
5. FOR INLET – OUTLET ARRANGEMENTS SEE SEW–1303.
6. FOR SEWERS ON STEEP GRADES OR WHERE THE INTERSECTION ANGLE IS <45° USE DROP JUNCTION AS SHOWN ON SEW–1306.

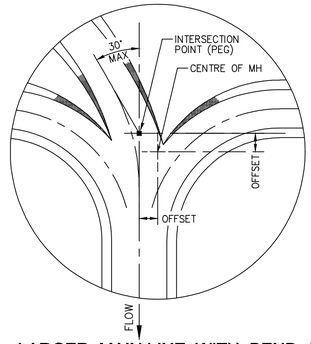
WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA MAINTENANCE HOLES SEWERS ≤ DN 300 TYPICAL CHANNEL ARRANGEMENTS	NOT TO SCALE SEW–1304 ©WSAA. 2002

ADDITIONAL INFORMATION PROVIDED IN SEW–1300 SERIES COMMENTARY

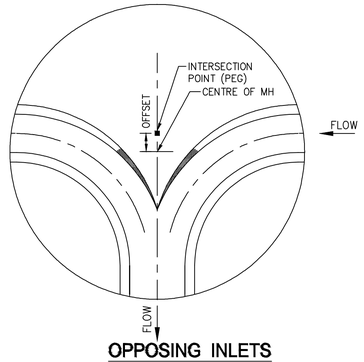
PLANS PREPARED BY MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* P□□02 6□43247□ □□ail□□□□l□□□ □□□□r□□□□□□□ a□ □P□ □□□26□M□SW□LL□R□□□ □SW 2333	CLIENT McCLOYGROUP	SEWAGE DETAILS IN ACCORDANCE WITH SEWAGE CODE OF AUSTRALIA WATER SERVICES ASSOCIATION OF AUSTRALIA DESIGN: M. COLE, R. JONES DRAWN: M. COLE, R. JONES	SCAL□□ AS S□□W□ □RI□I□AL DRAWI□□ SI□□□A1 LGA: UPPER HUNTER FILE:207203_S6_SEW SHEET: SEW_006	PLA□ ISS□□ A ISS□□ □□ C□□□CIL □ S□□RMWA□□R □PDA□□ C I□□□R ALL□□M□□□ □PDA□□	07□03□2023 R□□□C □□□R□□□ 207203



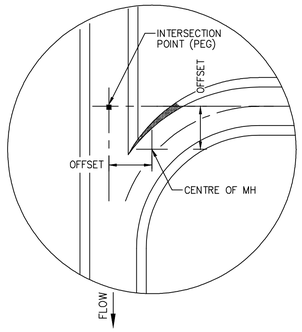
90° BEND



LARGER MAIN LINE WITH BEND & 2 x SMALLER 90° OPPOSING INLETS



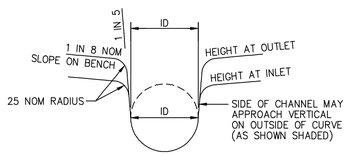
OPPOSING INLETS 90° OUTLET



STRAIGHT THROUGH & 90° INLET

LEGEND

R RADIUS
TP TANGENT POINT



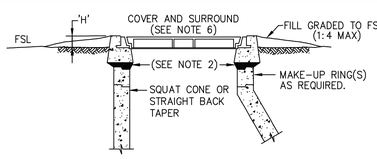
TYPICAL CHANNEL DETAILS

NOTES:

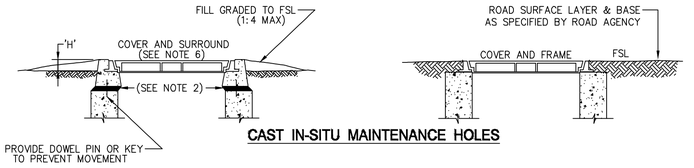
1. ALL DIMENSIONS IN MILLIMETRES.
2. AREAS SHOWN ▒▒▒▒ INDICATE WHERE THE SIDE OF THE CHANNEL APPROACHES VERTICAL ON OUTSIDE OF CURVE
3. CHANNELS SHOWN ARE FOR DN 150 & DN 225 PIPES IN STANDARD DN 1050 MH.
4. SHAPES ARE OPTIMUM HYDRAULICALLY, BUT MAY NOT ALLOW SOME MAINTENANCE EQUIPMENT ENTRY. MODIFY SHAPE TO SUIT WATER AGENCY EQUIPMENT.
5. WHERE ONE OR MORE INCOMING SEWERS EXCEED 10% GRADE DESIGNER TO CONSIDER SPECIAL DESIGN SUCH AS CURVED SEWERS OR OUTLET TRANSITIONS.
6. ACUTE ANGLE ENTRY MAY BE APPROVED BY WATER AGENCY FOR LOW FLOWS OR MAY BE ACCOMMODATED BY EXTERNAL DROP JUNCTION OR DROP CHAMBER SEE SEW–1304 & SEW–1306.

WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA MAINTENANCE HOLES TYPICAL CHANNEL DETAILS	NOT TO SCALE SEW–1305 ©WSAA. 2002

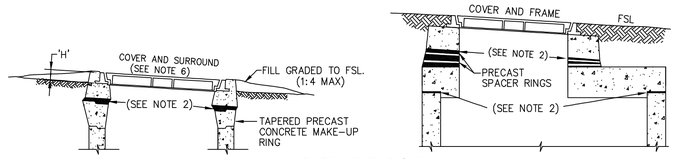
ADDITIONAL INFORMATION PROVIDED IN SEW–1300 SERIES COMMENTARY



PRECAST MAINTENANCE HOLES



CAST IN-SITU MAINTENANCE HOLES



SLOPING GROUND

(SEE NOTE 5)

NON TRAFFICABLE COVERS

TRAFFICABLE COVERS

FINISHED LEVELS OF MH COVERS	
LOCATION	H
UNDEVELOPED AREAS	100
NEW SUBDIVISIONS	75
ROADS, LANE WAYS, FOOTWAYS & DRIVEWAYS	FLUSH
EXISTING BUILT UP AREAS	25
OTHER AS SPECIFIED (EG ABOVE FLOOD LEVEL)	

SELECTION OF MH COVERS	
ALL COVERS TO BE WATER TIGHT (SEE NOTE 7)	
LOCATION	CLASS
RESERVES	B – NON–TRAFFICABLE
ROADWAYS	D – TRAFFICABLE
LOCATIONS SUBJECT TO FLOODING etc.	D – TRAFFICABLE WITH BOLT–DOWN (SEE NOTE 3)

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. SEALING METHODS
   (a) MAKE JOINTS BETWEEN SHAFT TOP/MAKE–UP RING AND COVER SUPPORT RING USING
   - BUTYL–MASTIC, OR
   - MORTAR MADE FROM 3 PARTS SAND TO 1 PART CEMENT.

   (b) APPLY BUTYL–MASTIC IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION.
   (c) THICKNESS OF CEMENT MORTAR AT ANY JOINT TO BE NO GREATER THAN 50.
   (d) SCABBLE AND CLEAN JOINT SURFACES SO THAT ALL LOOSE OR SOFT MATERIAL IS REMOVED.
   (e) JOINT SURFACES TO BE BRUSHED CLEAN, SPONGED WET AND PRIMED WITH A CEMENT/WATER SLURRY PRIOR TO PLACING THE CEMENT MORTAR.
3. IN AREAS SUBJECT TO SURCHARGE, USE CAST IN–SITU MH DOWEL OR BOLT COVER SLABS, DI COVER AND FRAME TO THE SHAFT SECTION IN SUCH A MANNER THAT SEPARATION DURING SURCHARGE IS PREVENTED. SEE SEW–1301.
4. WHERE SPECIFIED JOIN METAL FRAME TO CAST IN–SITU MH RISER AS FOLLOWS:
   (a) MAKE JOINTS BETWEEN SHAFT TOP AND METAL FRAME USING BUTYL–MASTIC AND LOCKING DOWN BOLTS, EQUALLY PLACED AROUND THE CIRCUMFERENCE.
   (b) USE 12 DIAMETER GALVANISED OR STAINLESS STEEL BOLTS EXTENDING 75 MIN INTO CONCRETE.
   (c) FOR NON–TRAFFICABLE LOCATIONS USE A MINIMUM OF TWO BOLTS.
   (d) FOR TRAFFICABLE LOCATIONS USE A MINIMUM OF FOUR BOLTS.
5. MAXIMUM PERMISSIBLE SLOPE OF COVERS:
   CLASS "B" 1 IN 4
   CLASS "D" 1 IN 10
6. COVERS MAY BE METAL, METAL WITH CONCRETE INFILL OR CONCRETE.
7. WHERE SPECIFIED USE GAS TIGHT COVERS.

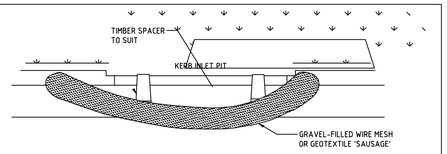
WATER SERVICES ASSOCIATION of Australia	SEWERAGE CODE OF AUSTRALIA MAINTENANCE HOLES TYPICAL MH COVER ARRANGEMENTS	NOT TO SCALE SEW–1308 ©WSAA. 2002

ADDITIONAL INFORMATION PROVIDED IN SEW–1300 SERIES COMMENTARY

PLANS PREPARED BY MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* P□□02 6□43247□ □□ail□□□□□□ □□□□r□□□□□□□ a□ □P□ □□□26□M□SW□LL□R□□□ □SW 2333	CLIENT McCLOYGROUP	SEWAGE DETAILS IN ACCORDANCE WITH SEWAGE CODE OF AUSTRALIA WATER SERVICES ASSOCIATION OF AUSTRALIA DESIGN: M. COLE, R. JONES DRAWN: M. COLE, R. JONES	SCAL□□ AS S□□W□ □RI□I□AL DRAWI□□ SI□□□A1 LGA: UPPER HUNTER FILE:207203_S6_SEW SHEET: SEW_007	PLA□ ISS□□ A ISS□□ □□ C□□□CIL □ S□□RMWA□□R □PDA□□ C I□□□R ALL□□M□□□ □PDA□□	07□03□2023 R□□□C □□□ R□□□ 207203

EROSION & SEDIMENTATION CONTROL NOTES

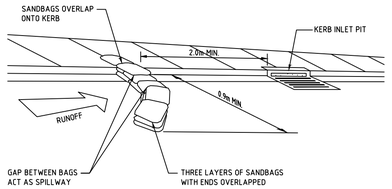
1. All works to be carried out in accordance with UPPER HUNTER SHIRE COUNCIL Engineering Guidlines for Subdivisions and Developments.
2. Erosion and sedimentation control devices are to be installed as required prior to site disturbance.
3. Site disturbance and vegetation removal shall be kept to the absolute minimum.
4. Silt is to be cleared from devices after all storm events.
5. All control devices are to be checked and maintained on a regular basis and adjustments made as necessary to ensure effective on going control.
6. All control devices are to be in place at the end of each days work.
7. Earthworks shall be rolled at the end of each day for stabilisation.
8. Topsoil shall be removed, stockpiled and stabilised for later re-use.
9. Excavated soil is to be mounded on the up hillside of trenches wherever possible.
10. Denuded areas are to be topsoiled and seeded as soon as practicable.
11. Provide turf strip behind kerb and gutter. Turf to be placed as soon as concrete kerbing has set.



KERB INLET PIT SEDIMENT TRAP DETAIL - ST

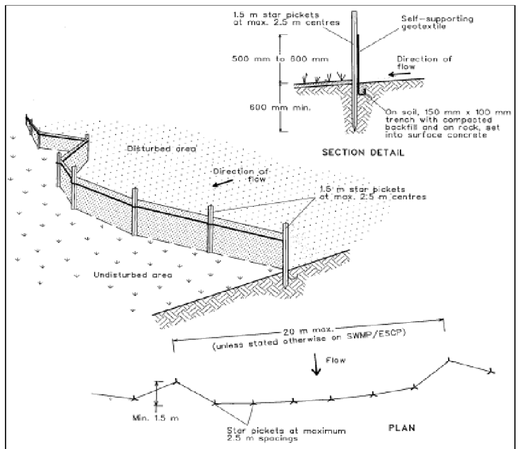
N.T.S.

IN ACCORDANCE WITH LANDCOM 'BLUE BOOK' SD6-11 MESH AND GRAVEL INLET FILTER



SANDBAG KERB INLET SEDIMENT TRAP DETAIL - SB

N.T.S.



Construction 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 50 litres per second in the design storm event, usually the 10-year event.
2. Cut a 150-mm deep trench along the upslope line of the fence for the bottom of the fabric to be entrenched.
3. Drive 1.5 metre long star pickets into ground at 2.5 metre 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 150-mm overlap.
6. Backfill the trench over the base of the fabric and compact it thoroughly over the geotextile.

SEDIMENT FENCE **SD 6-8**

S□DIM□□□ □□□C□

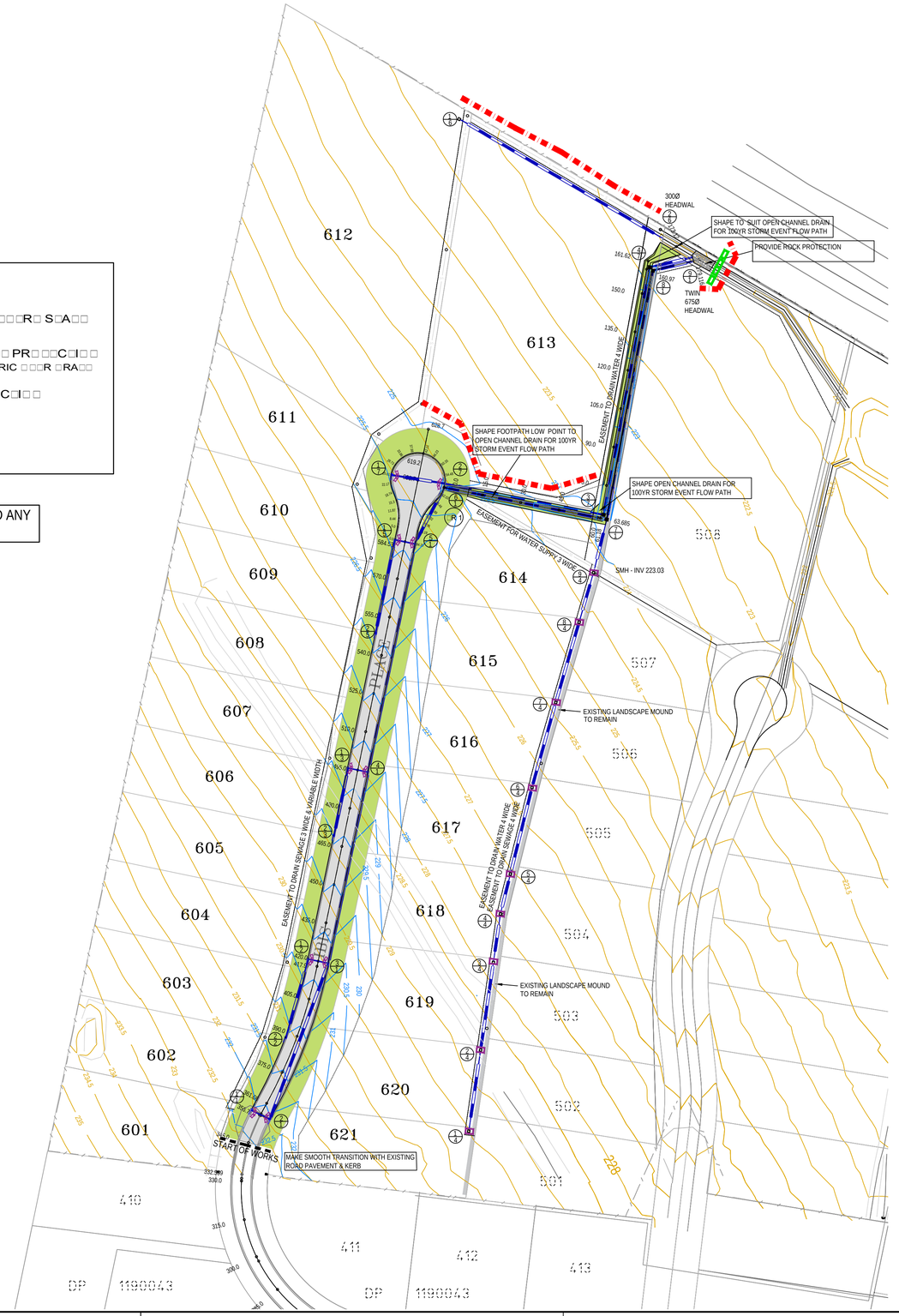
□A□ □AL□S WI□□ C□□□R□ S□A□□

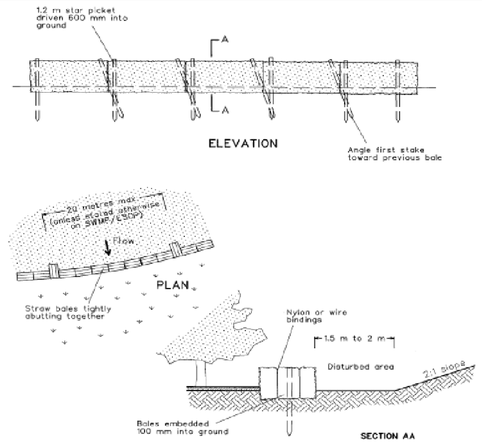
S□□RMWA□□R I□L□□ PR□ □□C□I□□
SIL□ M□S□ □R □□□□A□RIC □□□R □RA□□

□□R□ I□L□□ PR□ □□C□I□ □

□□R□ S□RIP

MULCH AND GRASS SEED ANY DISTURBED AREAS

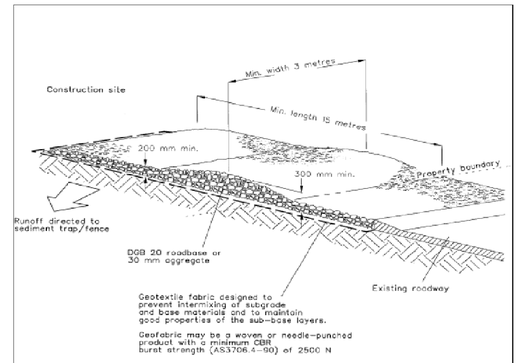




Construction Notes

1. Construct the straw bale filter as close as possible to being parallel to the contours of the site.
2. Place bales lengthwise in a row with ends tightly abutting. Use straw to fill any gaps between bales. Straws are to be placed parallel to ground.
3. Ensure that the maximum height of the filter is one bale.
4. Embed each bale in the ground 75 mm to 100 mm and anchor with two 1.2 metre star pickets or stakes. Angle the first star picket or stake in each bale towards the previously laid bale. Drive them 600 mm into the ground and, if possible, flush with the top of the bales. Where star pickets are used and they protrude above the bales, ensure they are fitted with safety caps.
5. Where a straw bale filter is constructed downslope from a disturbed batter, ensure the bales are placed 1 to 2 metres downslope from the toe.
6. Establish a maintenance program that ensures the integrity of the bales is retained - they could require replacement each two to four months.

STRAW BALE FILTER **SD 6-7**

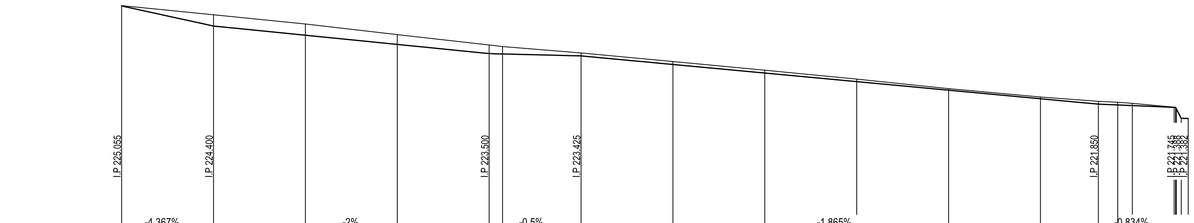


Construction Notes

1. Strip the topsoil, level the site and compact the subgrade.
2. Cover the area with needle-punched geotextile.
3. Construct a 200-mm thick pad over the geotextile using road base or 30-mm aggregate.
4. Ensure the structure is at least 15 metres long or to building alignment and at least 3 metres wide.
5. Where a sediment fence joins onto the stabilised access, construct a hump in the stabilised access to divert water to the sediment fence

STABILISED SITE ACCESS **SD 6-14**

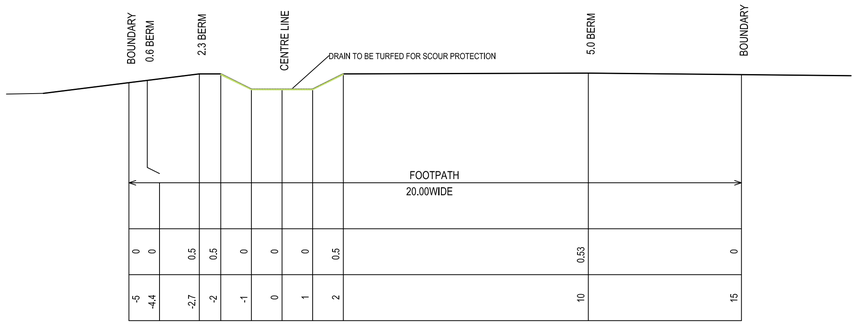
PLANS PREPARED BY	CLIENT	SEDIMENT & EROSION CONTROL PLAN STAGE 6 KURRAJONG ESTATE, SATUR	SCAL□□ 1□1000 □RI□I□AL DRAWI□□ SI□□□A1 LGA: UPPER HUNTER FILE:207203_S6_SED SHEET: SED_001
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* P□02 6□43247□ □□ail□□□□□ □□□r□□□□□□ a□ □P□ □□□26□M□SW□LL□R□□□ □SW 2333	McCLOYGROUP	DESIGN: M. COLE, R. JONES DRAWN: M. COLE, R. JONES	PLA□ ISS□□ 07□03□2023 A ISS□□ □□ C□□□CIL □ S□□RMWA□□R □PDA□□ C I□□□R ALL□□M□□□ □PDA□□ R□□□C □□□ R□□□ 207203



DESIGN LEVEL	225.06	224.4	224.1	223.8	223.5	223.49	223.43	223.15	222.87	222.59	222.31	222.03	221.85	221.82	221.80	221.75	221.75	221.70	221.39	221.38
EXISTING LEVEL	225.07	224.77	224.47	224.12	223.78	223.73	223.52	223.24	222.96	222.67	222.36	222.08	221.94	221.91	221.88	221.75	221.75	221.69	221.39	221.38
CHAINAGE	0	15	30	45	60	62.19	75	90	105	120	135	150	159.45	162.62	165	171.83	172.05	172.17	172.97	174.12

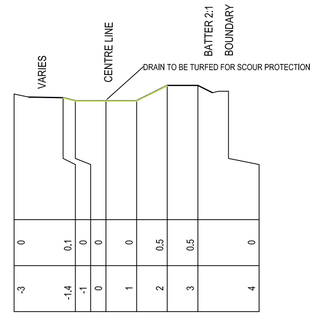
STORMWATER OVERFLOW PATH

H=1:500 V=1:100



0	0	0.5	0.5	0	0	0	0.5	0.53	0
-5	-4.4	-2.7	-2	-1	0	1	2	10	15

TYPICAL CROSS SECTION
STORMWATER OVERFLOW PATH
CH 15 - 45



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-3	-1.4	-1	0	1	2	3	4

TYPICAL CROSS SECTION
STORMWATER OVERFLOW PATH
CH 62.19 - 162.62

PLANS PREPARED BY

MM HYNDES BAILEY & Co.
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Surveying the Hunter since 1920
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CLIENT

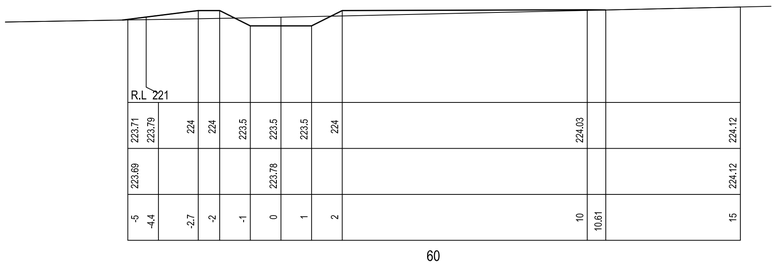
McCLOYGROUP

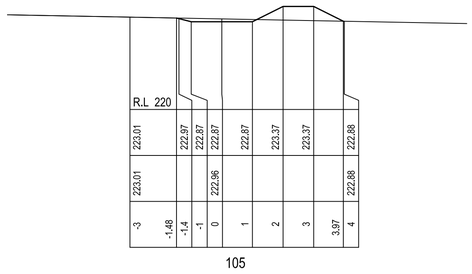
STORMWATER OVERFLOW PATH
LONGITUDINAL SECTION & TYPICAL SECTIONS
STAGE 6
KURRAJONG ESTATE, SATUR

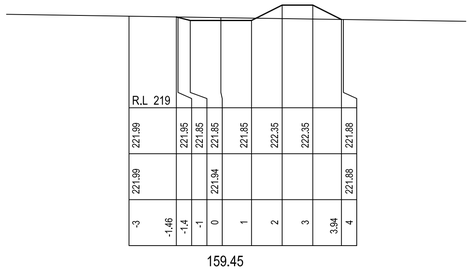
DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

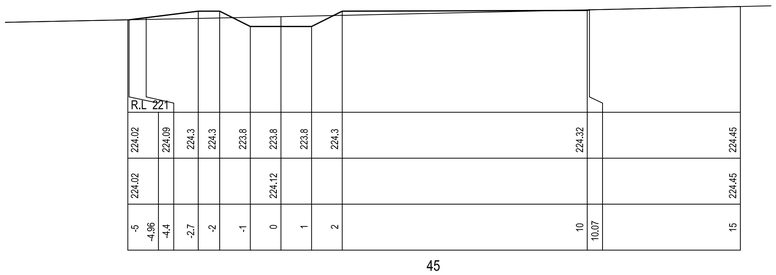
SCALE: AS SHOWN
ORIGINAL DRAWING SIZE: A1
LGA: UPPER HUNTER
FILE:207203_S6_ENG
SHEET: DRAIN_001

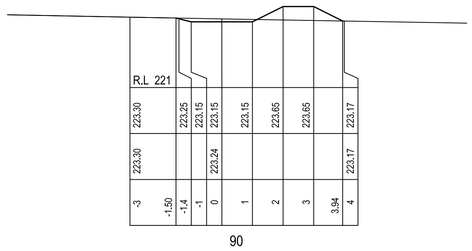
	PLAN ISSUE	07.03.2023
A	ISSUE TO COUNCIL	REV: C
B	STORMWATER UPDATE	
C	INTER ALLOTMENT UPDATE	JOB REF: 207203

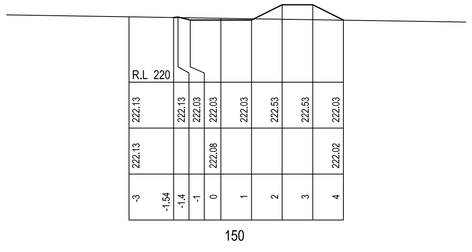


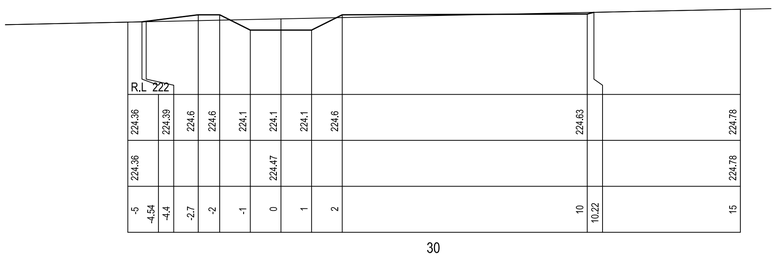


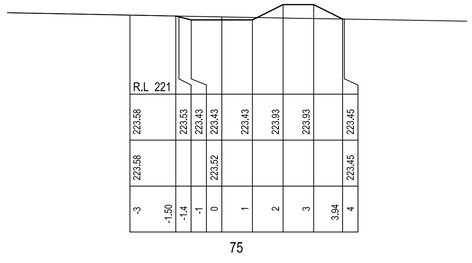


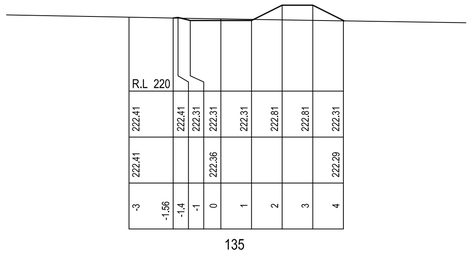


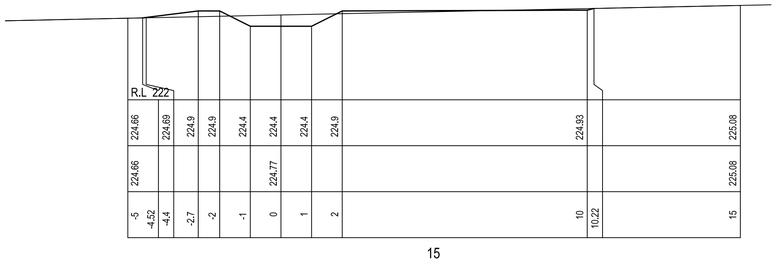


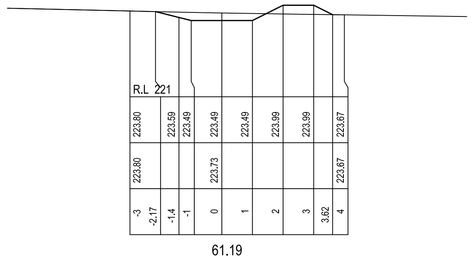


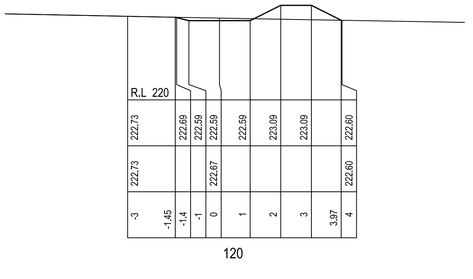


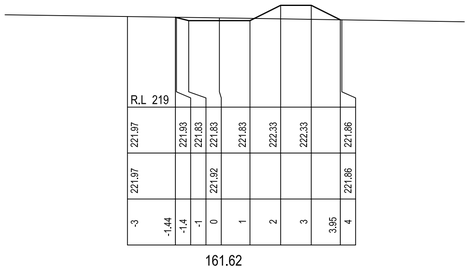












PLANS PREPARED BY	CLIENT	STORMWATER OVERFLOW PATH CROSS SECTIONS CH 15 - 162.62 STAGE 6 KURRAJONG ESTATE, SATUR	SCALE: H 1:100 V 1:100 ORIGINAL DRAWING SIZE: A1
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* Ph: 02 65432475 Email: office@hbsurveys.com.au (PO Box 26), MUSWELLBROOK NSW 2333	McCLOYGROUP	DESIGN: M. COLE, R. JONES DRAWN: M. COLE, R. JONES	LGA: UPPER HUNTER FILE:207203_S6_ENG SHEET: DRAIN_002

	PLAN ISSUE	07.03.2023
A	ISSUE TO COUNCIL	REV: C
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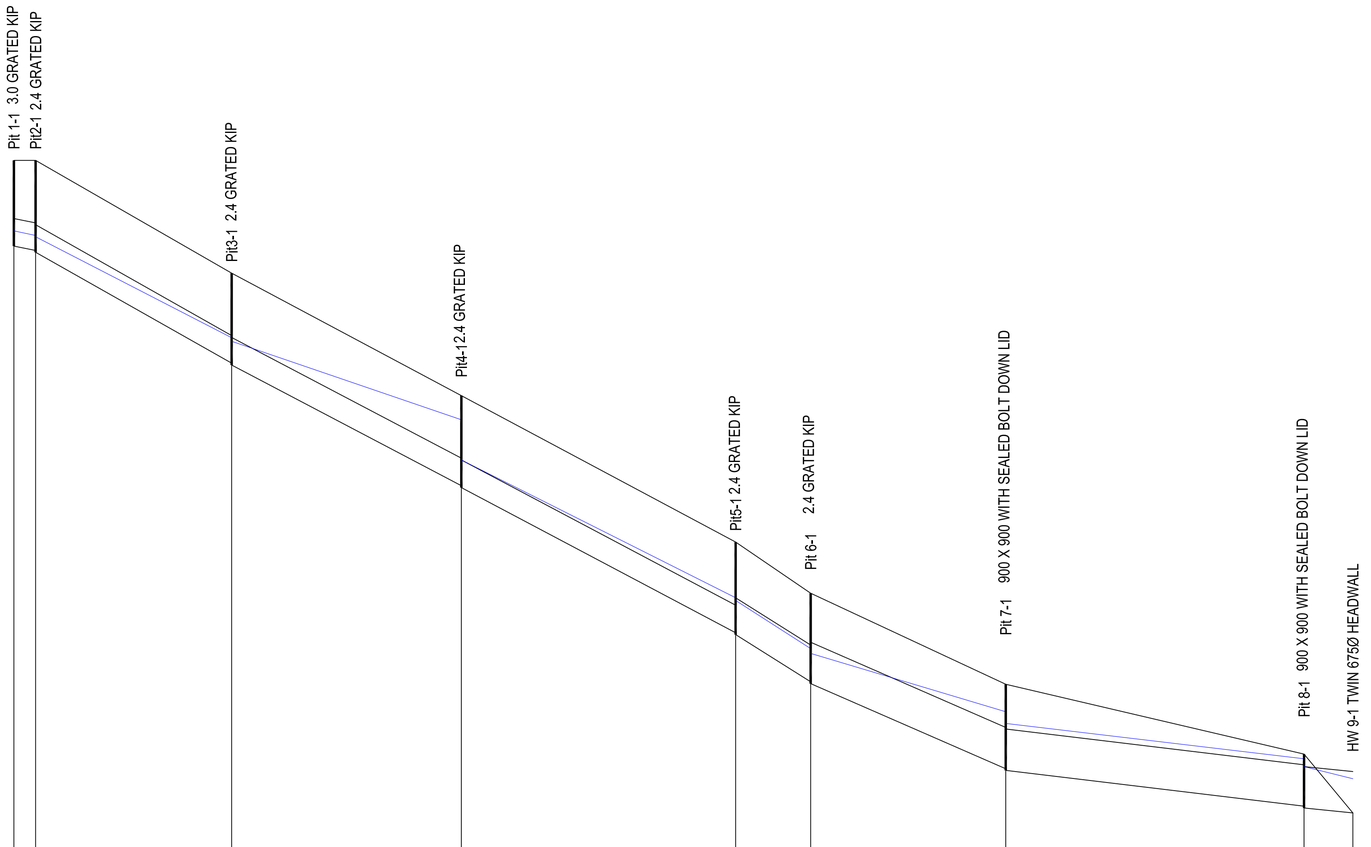
C	INTER ALLOTMENT UPDATE	JOB REF: 207203



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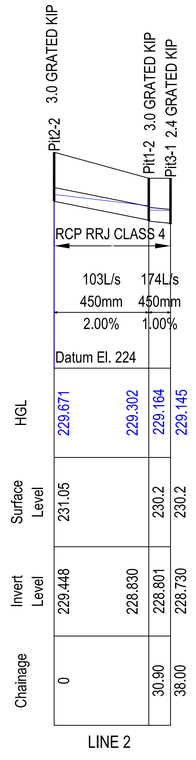
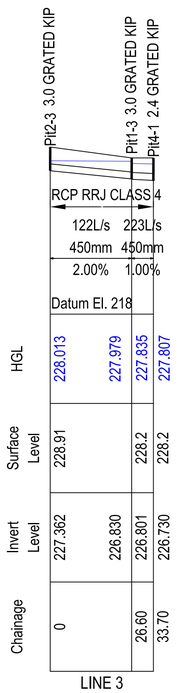
PLANS PREPARED BY	CLIENT				
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* Ph: 02 65432475 Email: office@hbsurveys.com.au (PO Box 26), MUSWELLBROOK NSW 2333	McCLOYGROUP	DRAINAGE LONG SECTION - LINE 1 STAGE 6 KURRAJONG ESTATE, SATUR	SCALE: H 1:100 ORIGINAL DRAWING SIZE: A1 LGA: UPPER HUNTER		PLAN ISSUE 07.03.2023
		DESIGN: M. COLE, R. JONES DRAWN: M. COLE, R. JONES	FILE:207203_S6_DRAIN SHEET: DRAIN_003	A ISSUE TO COUNCIL B STORMWATER UPDATE C INTER ALLOTMENT UPDATE	REV: C JOB REF: 207203



LINE 2



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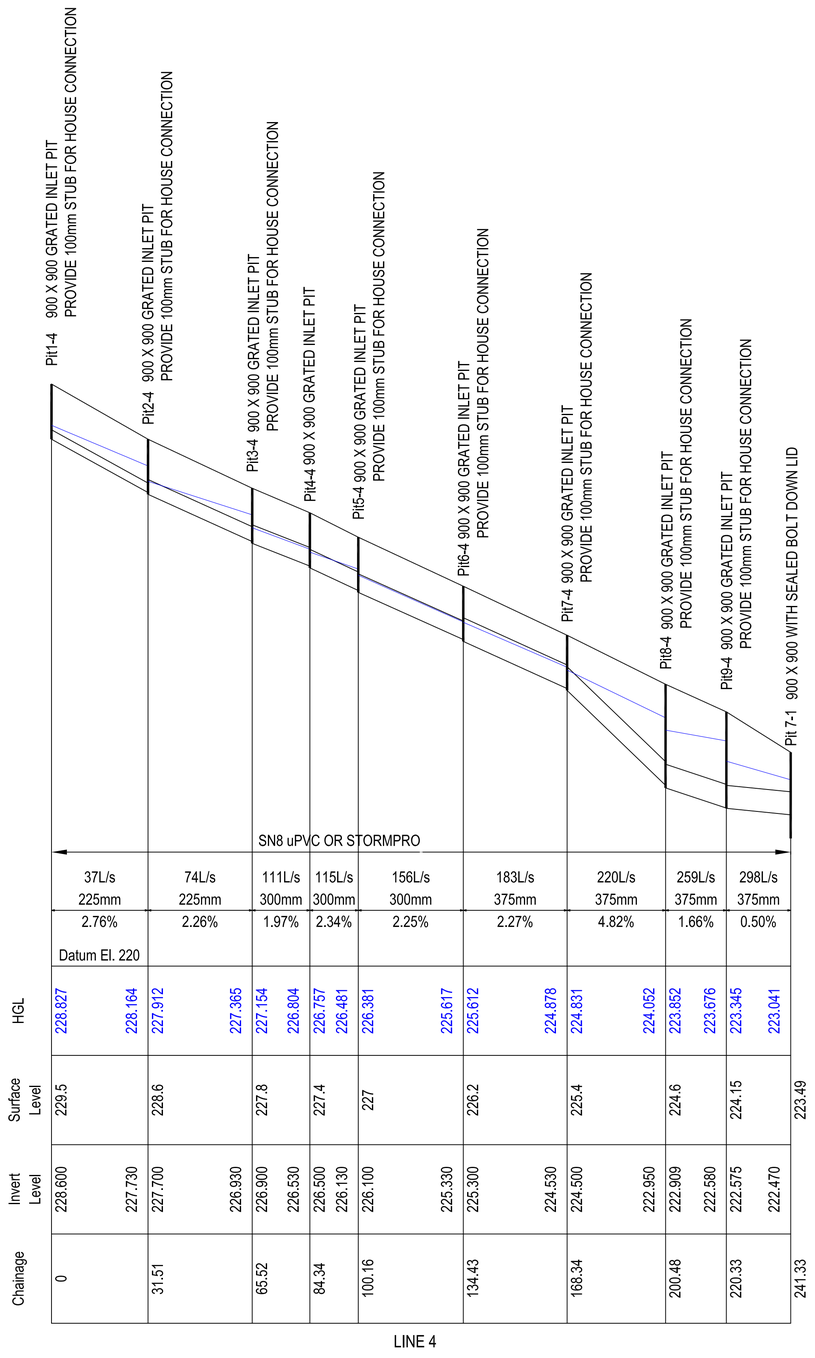

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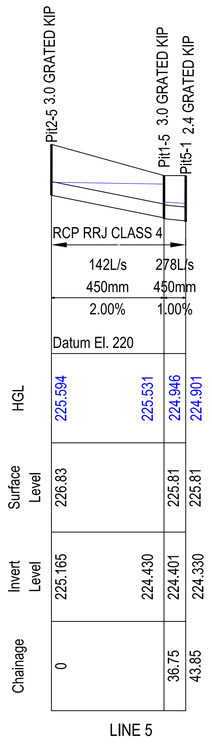

LINE 5

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PLANS PREPARED BY	CLIENT	DRAINAGE LONG SECTIONS - LINE 2, 3 4 & 5	SCALE: H 1:100
MM HYNDES BAILEY & Co.		STAGE 6	ORIGINAL DRAWING SIZE: A1
REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN		KURRAJONG ESTATE, SATUR	LGA: UPPER HUNTER
Surveying the Hunter since 1920	McCLOYGROUP	DESIGN: M. COLE R. JONES / DRAWN: M. COLE R. JONES	FILE:207203_S6_DRAIN
Ph: 02 65432475 Email: office@hbsurveys.com.au (PO Box 26), MUSWELLBROOK NSW 2333			SHEET: DRAIN_004

PLAN ISSUE		07.03.2023
A	ISSUE TO COUNCIL	REV: C
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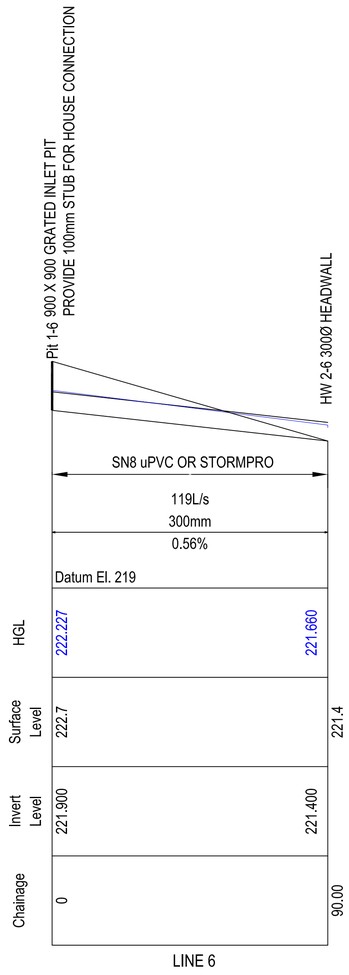
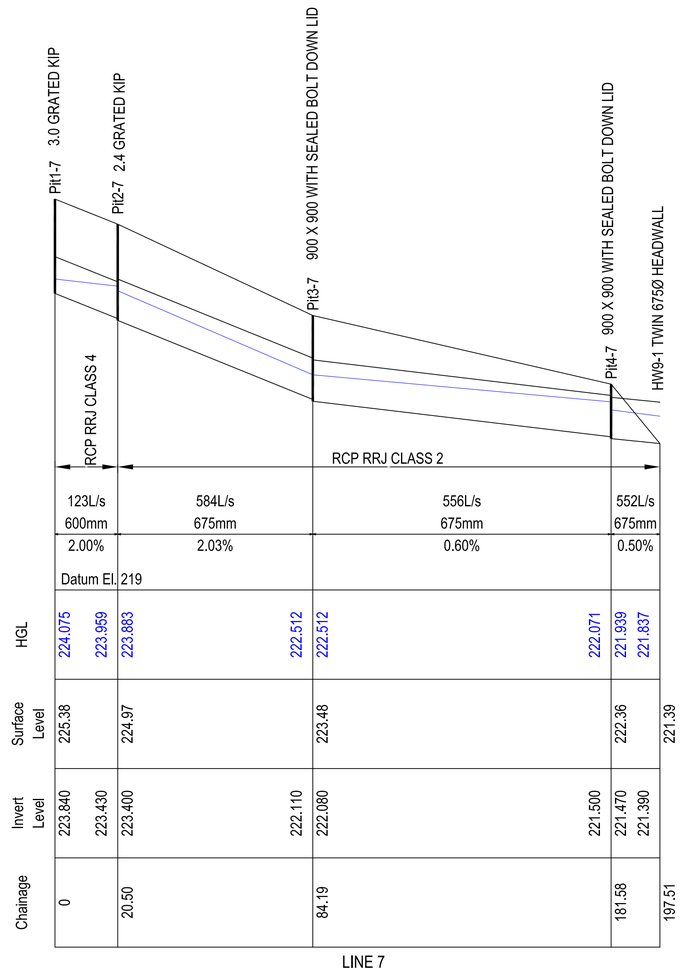
C	INTER ALLOTMENT UPDATE	JOB REF: 207203





PLANS PREPARED BY

MM HYNDES BAILEY & Co.
REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN
Surveying the Hunter since 1920
Ph: 02 65432475 Email: office@hbsurveys.com.au
(PO Box 26), MUSWELLBROOK NSW 2333

CLIENT

McCLOYGROUP

DRAINAGE LONG SECTIONS - LINE 6 & 7
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

SCALE: H 1:100
ORIGINAL DRAWING SIZE: A1
LGA: UPPER HUNTER
FILE:207203_S6_DRAIN
SHEET: DRAIN_005

	PLAN ISSUE	07.03.2023
A	ISSUE TO COUNCIL	REV: C
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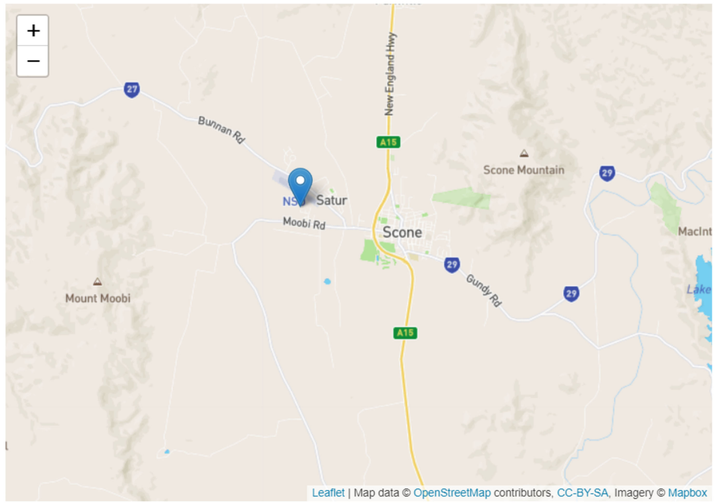
DRAINS INPUTS

Australian Rainfall & Runoff Data Hub - Results

Input Data

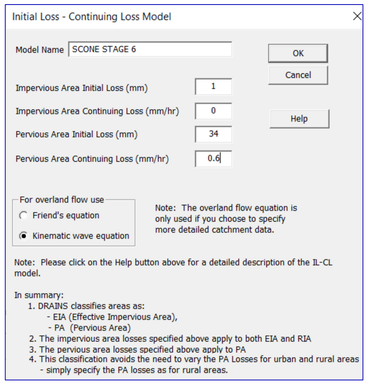
Longitude	150.833
Latitude	-32.043
Selected Regions (clear)	
River Region	show
ARF Parameters	show
Storm Losses	show
Temporal Patterns	show
Areal Temporal Patterns	show
BOM IFDs	show
Median Preburst Depths and Ratios	show
10% Preburst Depths	show
25% Preburst Depths	show



RAINFALL DATA LOCATION PLAN

IFD DATA ARR 2016

DRAINS MODEL INTIAL LOSS / CONTINUING LOSS (IL/CL)



Storm Losses

Note: Burst Loss = Storm Loss - Preburst

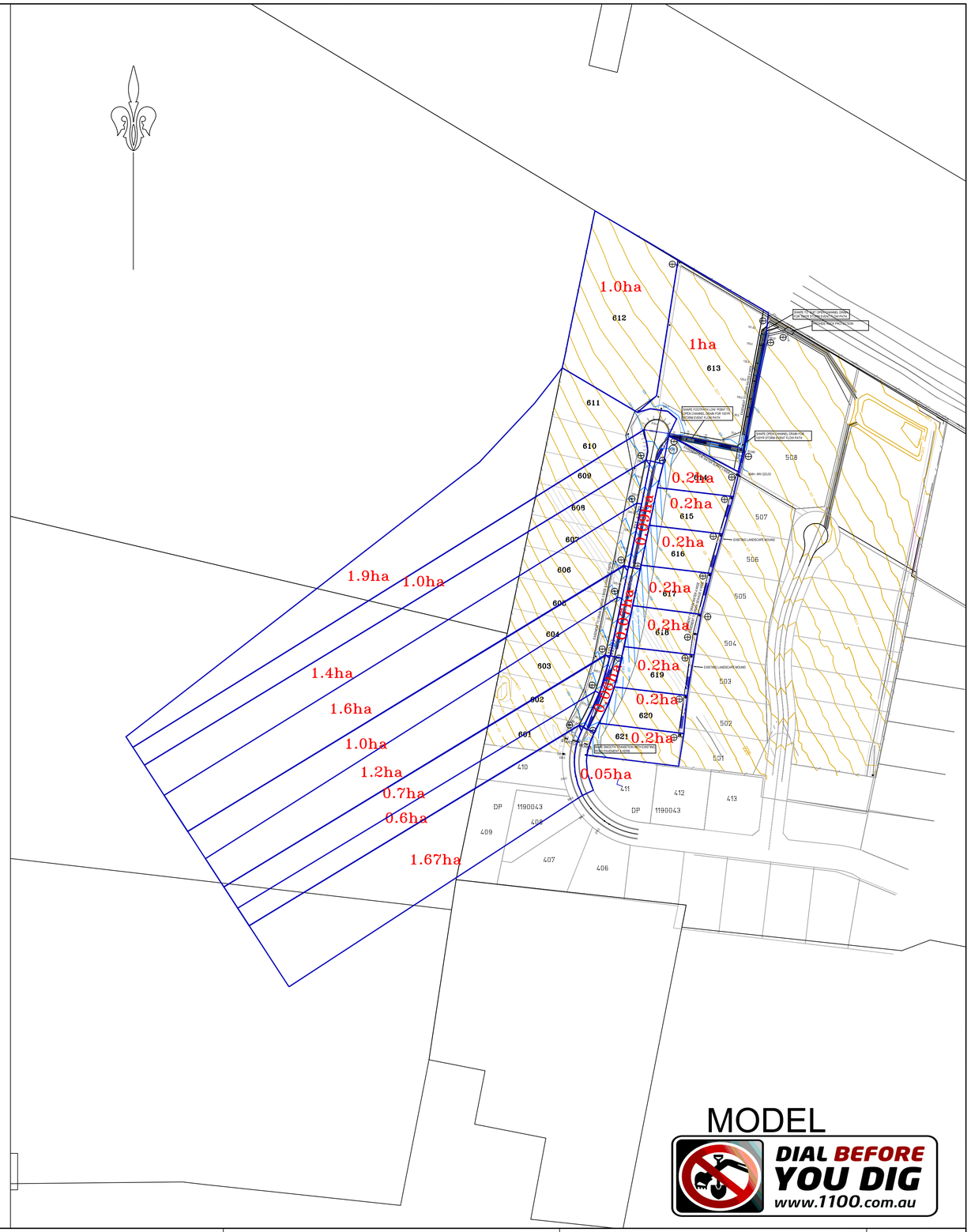
Note: These losses are only for rural use and are **NOT FOR DIRECT USE** in urban areas

Note: As this point is in NSW the advice provided on losses and pre-burst on the NSW Specific Tab of the ARR Data Hub is to be considered. In NSW losses are derived considering a hierarchy of approaches depending on the available loss information. The continuing storm loss information from the ARR Datahub provided below should only be used where relevant under the loss hierarchy (level 5) and where used is to be multiplied by the factor of 0.4.

ID	1819.0
Storm Initial Losses (mm)	34.0
Storm Continuing Losses (mm/h)	1.5 X 0.4 = 0.6mm

TEMPORAL PATTERNS EAST COAST SOUTH

PIT BLOCKING FACTORS SAG 20%
ON GRADE 10%



PLANS PREPARED BY	CLIENT	RAINFALL DATA AND CATCHMENT PLAN STAGE 6 KURRAJONG ESTATE, SATUR	SCALE: H 1:1000 ORIGINAL DRAWING SIZE: A1 LGA: UPPER HUNTER		PLAN ISSUE 07.03.2023
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* Ph: 02 65432475 Email: office@hbsurveys.com.au (PO Box 26), MUSWELLBROOK NSW 2333	McCLOYGROUP	DESIGN: M. COLE, R. JONES DRAWN: M. COLE, R. JONES	FILE:207203_S6_DRAIN SHEET: DRAIN_006	A B C	ISSUE TO COUNCIL STORMWATER UPDATE INTER ALLOTMENT UPDATE REV: C JOB REF: 207203

KURRAJONG ESTATE STAGE 6

PIT / NODE DETAILS Version 15

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down id	Part Full Shock Loss	Inflow Hydrograph	Pit is	Internal Width (mm)	Inflow is Misaligned	Minor Safe Pond Dept (m)	Major Safe Pond Depth (m)
Pit 1-1	OnGrade	Hornsby Cr	Hornsby 3.0 m	lintel	5.9	232.04		0	0.1	4724.063	5252.848	No	12 1 x Ku	No	New		No		
Pit2-1	OnGrade	Hornsby Cr	Hornsby 2.4 m	lintel	1.5	232.04		0	0	4731.146	5249.387	No	11 1 x Ku	No	New		Yes		
Pit3-1	OnGrade	Hornsby Cr	Hornsby 2.4 m	lintel	1.4	230.2		0	0	4753.624	5309.311	No	9 1 x Ku	No	New		No		
Pit4-1	OnGrade	Hornsby Cr	Hornsby 2.4 m	lintel	1.1	228.2		0	0	4768.858	5382.747	No	7 1 x Ku	No	New		No		
Pit5-1	OnGrade	Hornsby Cr	Hornsby 2.4 m	lintel	0.8	225.81		0	0	4787.111	5470.414	No	5 1 x Ku	No	New				
Pit 6-1	Sag	Hornsby Cr	Hornsby 2.	1	1.5	224.975	0.08	0	0	4798.207	5492.047	No	2 1 x Ku	No	New			0.08	0.3
Pit2-7	Sag	Hornsby Cr	Hornsby 2.	1	3.3	224.97	0.08	0	0	4798.443	5494.237	No	12322381 1 x Ku	No	New		No	0.08	0.3
Pit3-7	OnGrade	GRATED PI	900X900		0	223.48		0	0.1	4858.333	5481.742	Yes	6944834 1 x Ku	No	New		Yes		
Pit4-7	OnGrade	GRATED PI	900X900		1.4	222.36		0	0.1	4876.067	5577.644	Yes	6944945 1 x Ku	No	New		No		
HW 9-1a	Node					221.39		0		4891.668	5581.17		6944949	No					
Pit1-4	OnGrade	GRATED PI	900X900		2.3	229.5		0	0	4807.655	5244.74	No	21 1 x Ku	No	New		No		
Pit2-4	OnGrade	GRATED PI	900X900		3.4	228.6		0	0	4812.198	5275.922	No	20 1 x Ku	No	New		No		
Pit3-4	OnGrade	GRATED PI	900X900		3.8	227.8		0	0	4817.103	5309.579	No	19 1 x Ku	No	New		No		
Pit4-4	OnGrade	GRATED PI	900X900		1.7	227.4		0	0	4819.816	5328.197	No	18 1 x Ku	No	New		No		
Pit5-4	OnGrade	GRATED PI	900X900		1.5	227		0	0	4823.651	5343.545	No	17 1 x Ku	No	New		No		
Pit6-4	OnGrade	GRATED PI	900X900		0.9	226.2		0	0	4831.959	5376.798	No	16 1 x Ku	No	New		No		
Pit7-4	OnGrade	GRATED PI	900X900		1.2	225.4		0	0	4841.073	5409.453	No	15 1 x Ku	No	New		No		
Pit8-4	OnGrade	GRATED PI	900X900		0.8	224.6		0	0	4850.059	5440.311	No	14 1 x Ku	No	New		No		
Pit9-4	OnGrade	GRATED PI	900X900		1.2	224.15		0	0	4855.61	5459.371	No	13 1 x Ku	No	New		No		
Pit 7-1	OnGrade	GRATED PI	900X900		0.8	223.49		0	0.1	4860.707	5479.824	Yes	3 1 x Ku	No	New		No		
Pit 8-1	OnGrade	GRATED PI	900X900		1	222.35		0	0.1	4878.46	5575.437	Yes	1 1 x Ku	No	New		No		
HW 9-1	Node					221.39		0		4893.966	5579.034		61	No					
Pit 1-6	OnGrade	GRATED PI	900X900		3.3	222.7		0	0	4805.441	5632.795	No	78 1 x Ku	No	New		No		
HW 2-6	Node					221.4		0		4882.557	5587.856		79	No					
Pit1-7	OnGrade	Hornsby Cr	Hornsby 3.0 m	lintel	5.9	225.38		0	0	4777.935	5496.888	No	6944741 1 x Ku	No	New		No		
Pit2-5	OnGrade	Hornsby Cr	Hornsby 3.0 m	lintel	5	226.83		0	0	4771.893	5436.06	No	52700433 1 x Ku	No	New		No		
Pit1-5	OnGrade	Hornsby Cr	Hornsby 3.0 m	lintel	3.8	225.81		0	0	4779.275	5472.028	No	6 1 x Ku	No	New		No		
Pit2-3	OnGrade	Hornsby Cr	Hornsby 3.0 m	lintel	4.1	228.91		0	0	4755.994	5358.054	No	52700461 1 x Ku	No	New		No		
Pit1-3	OnGrade	Hornsby Cr	Hornsby 3.0 m	lintel	1.5	228.2		0	0	4761.088	5384.359	No	8 1 x Ku	No	New		No		
Pit2-2	OnGrade	Hornsby Cr	Hornsby 3.0 m	lintel	5.9	231.05		0	0	4737.497	5280.823	No	52700495 1 x Ku	No	New		No		
Pit1-2	OnGrade	Hornsby Cr	Hornsby 3.0 m	lintel	2.2	230.2		0	0	4745.854	5310.922	No	10 1 x Ku	No	New		No		
s1	Node					223.49		0		4858.918	5480.414		64626203	No					

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Typ	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Leng	id

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	EIA %	Perv Area %	RIA %	EIA Time (min)	Perv Time (min)	RIA Time (min)	EIA Length (m)	Perv Length (m)	RIA Length (m)	EIA Slope(%)	Perv Slope %	RIA Slope %	EIA Rough	Perv Rough	RIA Rough	Rainfall Multiplier
Cat 1/1	Pit 1-1	1.67	13	75	12	5	22	2										1
Cat2-1	Pit2-1	0.05	40	60	0	5	5	2										1
Cat3-1	Pit3-1	0.06	40	60	0	5	5	2										1
Cat4-1	Pit4-1	0.07	40	60	0	5	5	2										1
Cat5-1	Pit5-1	0.09	40	60	0	5	5	2										1
Cat 6-1	Pit 6-1	1	13	75	12	5	22	2										1
Cat2-7	Pit2-7	0.9	13	75	12	5	22	2										1
Cat1-4	Pit1-4	0.2	30	50	20	5	5	2										1
Cat2-4	Pit2-4	0.2	30	50	20	5	5	2										1
Cat3-4	Pit3-4	0.2	30	50	20	5	5	2										1
Cat5-4	Pit5-4	0.2	30	50	20	5	5	2										1
Cat6-4	Pit6-4	0.2	30	50	20	5	5	2										1
Cat7-4	Pit7-4	0.2	30	50	20	5	5	2										1
Cat8-4	Pit8-4	0.2	30	50	20	5	5	2										1
Cat 9-4	Pit9-4	0.2	30	50	20	5	5	2										1
Cat 1-6	Pit 1-6	1	20	70	10	5	10	5										1
Cat2-6	HW 2-6	1	5	90	5	5	5	2										1
Cat1-7	Pit1-7	1	13	75	12	5	22	2										1
Cat2-5	Pit2-5	1.6	13	75	12	5	22	2										1
Cat1-5	Pit1-5	1.4	13	75	12	5	22	2										1
Cat2-3	Pit2-3	1.2	13	75	12	5	22	2										1
Cat1-3	Pit1-3	1	13	75	12	5	22	2										1
Cat2-2	Pit2-2	0.6	13	75	12	5	22	2										1
Cat1-2	Pit1-2	0.7	13	75	12	5	22	2										1

NOTE: DETENTION BASIN STAGE 5 CC SERVICES STAGE 6 VIA EASMENT TO DRAIN WATER

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	RI (m)	Chg (m)	RL (m)	etc (m)
Pipe1-1	Pit 1-1	Pit2-1	7.1	230.641	230.57	1	Concrete, r	450	450	0.3	New	1	Pit 1-1	0					
Pipe2-1	Pit2-1	Pit3-1	64	230.54	228.73	2.83	Concrete, r	450	450	0.3	New	1	Pit2-1	0					
Pipe3-1	Pit3-1	Pit4-1	74.998	228.7	226.73	2.63	Concrete, r	450	450	0.3	New	1	Pit3-1	0					
Pipe4-1	Pit4-1	Pit5-1	89.547	226.7	224.33	2.65	Concrete, r	450	450	0.3	New	1	Pit4-1	0					
Pipe5-1	Pit5-1	Pit 6-1	24.501	224.3	223.53	3.14	Concrete, r	600	600	0.3	New	1	Pit5-1	0					
PipeXX	Pit 6-1	Pit2-7	3	223.5	223.45	1.67	Concrete, r	600	600	0.3	New	1	Pit 6-1	0					
Pipe 6-1	Pit 6-1	Pit 7-1	63.686	223.5	222.11	2.18	Concrete, r	675	675	0.3	New	1	Pit 6-1	0					
P2-7	Pit2-7	Pit3-7	63.686	223.4	222.11	2.03	Concrete, r	675	675	0.3	New	1	Pit2-7	0					
p3-7	Pit3-7	Pit4-7	97.394	222.08	221.5	0.6	Concrete, r	675	675	0.3	New	1	Pit3-7	0					
P4-7	Pit4-7	HW9-1a	15.929	221.47	221.39	0.5	Concrete, r	675	675	0.3	New	1	Pit4-7	0					
Pipe1-4	Pit1-4	Pit2-4	31.511	228.6	227.73	2.76	uPVC, und	150	154	0.03	New	1	Pit1-4	0					
Pipe2-4	Pit2-4	Pit3-4	34.012	227.7	226.93	2.26	uPVC, und	225	242	0.03	New	1	Pit2-4	0					
Pipe3-4	Pit3-4	Pit4-4	18.814	226.9	226.53	1.97	uPVC, und	300	303	0.03	New	1	Pit3-4	0					
Pipe4-4	Pit4-4	Pit5-4	15.82	226.5	226.13	2.34	uPVC, und	300	303	0.03	New	1	Pit4-4	0					
Pipe5-4	Pit5-4	Pit6-4	34.276	226.1	225.33	2.25	uPVC, und	300	303	0.03	New	1	Pit5-4	0					
Pipe6-4	Pit6-4	Pit7-4	33.903	225.3	224.53	2.27	uPVC, und	375	386	0.03	New	1	Pit6-4	0					
Pipe7-4	Pit7-4	Pit8-4	32.139	224.5	222.95	4.82	uPVC, und	375	386	0.03	New	1	Pit7-4	0					
Pipe8-4	Pit8-4	Pit9-4	19.852	222.909	222.58	1.66	uPVC, und	375	386	0.03	New	1	Pit8-4	0					
Pipe9-4	Pit9-4	Pit 7-1	21	222.575	222.47	0.5	Concrete, r	375	375	0.3	New	1	Pit9-4	0					
Pipe 7-1	Pit 7-1	Pit 8-1	97.394	222.084	221.5	0.6	Concrete, r	675	675	0.3	New	1	Pit 7-1	0					
Pipe 8-1	Pit 8-1	HW 9-1	15.929	221.47	221.39	0.5	Concrete, r	675	675	0.3	New	1	Pit 8-1	0					
PIPE 1-6	Pit 1-6	HW 2-6	90	221.9	221.4	0.56	uPVC, not	300	303	0.03	New	1	Pit 1-6	0					
Pipe1-7	Pit1-7	Pit2-7	20.5	223.84	223.43	2	Concrete, r	600	600	0.3	New	1	Pit1-7	0					
Pip2-5	Pit2-5	Pit1-5	36.75	225.165	224.43	2	Concrete, r	450	450	0.3	New	1	Pit2-5	0					
Pipe1-5	Pit1-5	Pit5-1	7.1	224.401	224.33	1	Concrete, r	450	450	0.3	New	1	Pit1-5	0					
Pipe2-3	Pit2-3	Pit1-3	26.6	227.362	226.83	2	Concrete, r	450	450	0.3	New	1	Pit2-3	0					
Pipe1-3	Pit1-3	Pit4-1	7.1	226.801	226.73	1	Concrete, r	450	450	0.3	New	1	Pit1-3	0					
Pipe2-2	Pit2-2	Pit1-2	30.9	229.448	228.83	2	Concrete, r	450	450	0.3	New	1	Pit2-2	0					
Pipe1-2	Pit1-2	Pit3-1	7.1	228.801	228.73	1	Concrete, r	450	450	0.3	New	1	Pit1-2	0					

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	etc

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Stor (m)	Safe Depth Minor Stor (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %	id	U/S IL	D/S IL	Length (m)
OF1-1	Pit 1-1	Pit2-2	0.2				7.5 m road	0.3	0.15	0.4	3.15	100	52700530	232.04	231.05	31.4
OF2-1	Pit2-1	Pit3-1	0.4				7.5 m road	0.3	0.15	0.4	2.87	0	449	232.04	230.2	64.1
OF3-1	Pit3-1	Pit4-1	0.5				7.5 m road	0.3	0.15	0.4	2.68	0	419	230.2	228.2	74.7
OF4-1	Pit4-1	Pit5-1	0.7				7.5 m road	0.3	0.15	0.4	2.65	0	383	228.2	225.81	90.2
OF5-1	Pit5-1	Pit 6-1	0.2				10 m roadv	0.3	0.15	0.4	3.27	0	348	225.81	224.975	25.5
OFsag	Pit 6-1	Pit2-7	0.1				10 m roadv	0.3	0.15	0.4	1	0	12322495	225	224.97	3
OF6-1	Pit2-7	s1	0.5				kurrajong s	0.3	0.2	0.6	2.52	0	64626206	225.05	223.49	61.9
OF1-4	Pit1-4	Pit2-4	0.2				kurrajong s	0.3	0.2	0.6	2.88	0	317	229.5	228.6	31.3
OF2-4	Pit2-4	Pit3-4	0.3				kurrajong s	0.3	0.2	0.6	2.33	0	315	228.6	227.8	34.3
OF3-4	Pit3-4	Pit4-4	0.2				kurrajong s	0.3	0.2	0.6	2.13	0	298	227.8	227.4	18.8
OF4-4	Pit4-4	Pit5-4	0.1				kurrajong s	0.3	0.2	0.6	2.48	0	287	227.4	227	16.1
OF5-4	Pit5-4	Pit6-4	0.3				kurrajong s	0.3	0.2	0.6	2.36	0	264	227	226.2	33.9
OF6-4	Pit6-4	Pit7-4	0.3				kurrajong s	0.3	0.2	0.6	2.33	0	260	226.2	225.4	34.3
OF7-4	Pit7-4	Pit8-4	0.3				kurrajong s	0.3	0.2	0.6	2.52	0	232	225.4	224.6	31.8
OF8-4	Pit8-4	Pit9-4	0.2				6M SPILL	0.3	0.3	0.4	2.27	0	216	224.6	224.15	19.8
OF97885	Pit9-4	s1	0.2				kurrajong s	0.3	0.2	0.6	3.11	0	64626209	224.15	223.49	21.2
OF 1-6	Pit 1-6	HW 2-6	0.7				overland fl	0.3	0.3	0.6	2	0	91	222.7	221.45	89.3
OF2-6	HW 2-6	HW 9-1	0.3				kurrajong s	0.3	0.2	0.6	0.42	0	94	221.45	221.39	14.2
OF1+-7	Pit1-7	Pit2-7	0.3				7.5 m road	0.3	0.15	0.4	1.22	100	6944971	225.38	224.975	33.1
OF2-5	Pit2-5	Pit1-5	0.3				7.5 m road	0.3	0.15	0.4	2.79	100	52700451	226.83	225.81	36.5
OF1-5	Pit1-5	Pit1-7	0.2				10 m roadv	0.3	0.15	0.4	1.7	100	6944984	225.81	225.38	25.3
OF2-3	Pit2-3	Pit1-3	0.2				7.5 m road	0.3	0.15	0.4	2.67	100	52700477	228.91	228.2	26.6
OF1-3	Pit1-3	Pit2-5	0.4				7.5 m road	0.3	0.15	0.4	2.59	100	52700515	228.2	226.83	52.9
OF2-2	Pit2-2	Pit1-2	0.2				7.5 m road	0.3	0.15	0.4	2.71	100	52700528	231.05	230.2	31.4
OF79678	Pit1-2	Pit2-3	0.3				7.5 m road	0.3	0.15	0.4	2.68	100	52700545	230.2	228.91	48.2
swale over	s1	HW 9-1	1.2				kurrajong s	0.3	0.2	0.6	1.71	0	64626212	223.49	221.5	116.4

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover	Cover (m)
Pipe1-1	Concrete, r	450	0.6	0.91
Pipe2-1	Concrete, r	450	0.6	0.98
Pipe3-1	Concrete, r	450	0.6	0.98
Pipe4-1	Concrete, r	450	0.6	0.99
Pipe5-1	Concrete, r	600	0.6	0.8
PipeXX	Concrete, r	600	0.45	0.83
Pipe 6-1	Concrete, r	675	0.45	0.65
P2-7	Concrete, r	675	0.45	0.64
p3-7	Concrete, r	675	0.45	0.13
P4-7	Concrete, r	675	0.45	-0.73
Pipe1-4	uPVC, und	154	0.5	0.71
Pipe2-4	uPVC, und	242	0.5	0.62
Pipe3-4	uPVC, und	303	0.5	0.56
Pipe4-4	uPVC, und	303	0.5	0.56
Pipe5-4	uPVC, und	303	0.5	0.56
Pipe6-4	uPVC, und	386	0.5	0.48
Pipe7-4	uPVC, und	386	0.5	0.51
Pipe8-4	uPVC, und	386	0.5	1.18
Pipe9-4	Concrete, r	375	0.45	0.61
Pipe 7-1	Concrete, r	675	0.45	0.12
Pipe 8-1	Concrete, r	675	0.45	-0.73
PIPE 1-6	uPVC, not	303	0.3	-0.31
Pipe1-7	Concrete, r	600	0.45	0.89
Pip2-5	Concrete, r	450	0.6	0.89
Pipe1-5	Concrete, r	450	0.6	0.92
Pipe2-3	Concrete, r	450	0.6	0.88
Pipe1-3	Concrete, r	450	0.6	0.91
Pipe2-2	Concrete, r	450	0.6	0.88
Pipe1-2	Concrete, r	450	0.6	0.91

This model has no pipes with non-return valves

PLANS PREPARED BY

MM HYNDES BAILEY & Co.
REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN
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CLIENT

McCLOYGROUP

DRAINS DATA
STAGE 6
KURRAJONG ESTATE, SATUR

DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

SCAL□□
□RI□I□AL DRAWI□□ SI□□□A1
LGA: UPPER HUNTER
FILE:207203_S6_DRAIN
SHEET: DRAIN_007

PLA□ ISS□□ 07□03□2023

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207203

DRAINS results prepared from Version 2022.08.8269.12475
20% ARI
PIT / NODE DETAILS Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow Arrival (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pit1-1	231.04		0.206		1	0.044	Inlet Capacity
Pit2-1	230.81		0.013		1.23	0	None
Pit3-1	229.15		0.015		1.05	0	None
Pit4-1	227.81		0.018		0.39	0	None
Pit5-1	224.9		0.023		0.91	0	None
Pit6-1	224.07	225.06	0.123	0.9	0.9	0.01	Inlet Capacity
Pit2-7	223.96	225.05	0.155	0.9	1.01	0	Inlet Capacity
Pit5-7	222.51		0		0.97		None
Pit4-7	222.07		0		0.29		None
HW9-1a	221.83		0				
Pit1-4	229.27		0.061		0.23	0.001	Inlet Capacity
Pit2-4	228.16		0.086		0.44	0.001	Inlet Capacity
Pit3-4	227.36		0.095		0.44	0.001	Inlet Capacity
Pit4-4	226.8		0.076		0.6	0	None
Pit5-4	226.48		0.093		0.52	0.001	Inlet Capacity
Pit6-4	225.62		0.075		0.58	0.001	Inlet Capacity
Pit7-4	224.88		0.063		0.52	0.001	Inlet Capacity
Pit8-4	224.05		0.066		0.55	0.001	Inlet Capacity
Pit9-4	223.68		0.138		0.47	0.001	Inlet Capacity
Pit7-1	223.04		0		0.45		None
Pit8-1	222.27		0		0.08		None
HW 9-1	221.95		0.355				
Pit1-6	222.69		0.182		0.01	0.014	Inlet Capacity
HW 2-6	221.62		0.257				
Pit1-7	224.17		0.216		1.21	0	None
Pit2-5	225.8		0.173		1.03	0.027	Inlet Capacity
Pit1-5	225.53		0.213		0.28	0.034	Inlet Capacity
Pit2-3	228.14		0.074		0.77	0	None
Pit1-3	227.98		0.07		0.22	0	None
Pit2-2	229.79		0.117		1.26	0	None
Pit1-2	229.3		0.056		0.9	0	None
s1	223.49		0.101				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	EIA Max Q (cu.m/s)	Remaining EIA Max Q (cu.m/s)	Tc (min)	RIA Tc (min)	PA Tc (min)	Due to Storm
Cat 1/1	0.17	0.038	0.133	5	2	22	20% AEP, 1 hour burst, Storm 6
Cat2-1	0.008	0.003	0.005	5	2	5	20% AEP, 45 min burst, Storm 9
Cat3-1	0.009	0.004	0.005	5	2	5	20% AEP, 45 min burst, Storm 9
Cat4-1	0.011	0.004	0.006	5	2	5	20% AEP, 45 min burst, Storm 9
Cat5-1	0.014	0.006	0.008	5	2	5	20% AEP, 45 min burst, Storm 9
Cat 6-1	0.102	0.022	0.08	5	2	22	20% AEP, 1 hour burst, Storm 6
Cat2-7	0.092	0.02	0.072	5	2	22	20% AEP, 1 hour burst, Storm 6
Cat1-4	0.038	0.014	0.026	5	2	5	20% AEP, 30 min burst, Storm 7
Cat2-4	0.038	0.014	0.026	5	2	5	20% AEP, 30 min burst, Storm 7
Cat3-4	0.038	0.014	0.026	5	2	5	20% AEP, 30 min burst, Storm 7
Cat5-4	0.038	0.014	0.026	5	2	5	20% AEP, 30 min burst, Storm 7
Cat6-4	0.038	0.014	0.026	5	2	5	20% AEP, 30 min burst, Storm 7
Cat7-4	0.038	0.014	0.026	5	2	5	20% AEP, 30 min burst, Storm 7
Cat8-4	0.038	0.014	0.026	5	2	5	20% AEP, 30 min burst, Storm 7
Cat 9-4	0.038	0.014	0.026	5	2	5	20% AEP, 30 min burst, Storm 7
Cat 1-6	0.146	0.042	0.123	5	5	10	20% AEP, 45 min burst, Storm 5
Cat2-6	0.151	0.008	0.143	5	2	5	20% AEP, 45 min burst, Storm 9
Cat1-7	0.102	0.022	0.08	5	2	22	20% AEP, 1 hour burst, Storm 6
Cat2-5	0.163	0.036	0.128	5	2	22	20% AEP, 1 hour burst, Storm 6
Cat1-5	0.143	0.031	0.112	5	2	22	20% AEP, 1 hour burst, Storm 6
Cat3-3	0.122	0.027	0.096	5	2	22	20% AEP, 1 hour burst, Storm 6
Cat1-3	0.102	0.022	0.08	5	2	22	20% AEP, 1 hour burst, Storm 6
Cat2-2	0.061	0.013	0.048	5	2	22	20% AEP, 1 hour burst, Storm 6
Cat1-2	0.071	0.016	0.056	5	2	22	20% AEP, 1 hour burst, Storm 6

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
Pipe1-1	0.127	1.44	230.889	230.815	20% AEP, 45 min burst, Storm 8
Pipe2-1	0.132	1.44	230.794	229.145	20% AEP, 45 min burst, Storm 5
Pipe3-1	0.326	2.24	229.088	227.805	20% AEP, 1 hour burst, Storm 6
Pipe4-1	0.552	3.47	227.15	224.901	20% AEP, 1 hour burst, Storm 6
Pipe5-1	0.861	3.21	224.856	224.071	20% AEP, 1 hour burst, Storm 8
PipeXX	0.325	1.38	223.966	223.959	20% AEP, 1 hour burst, Storm 8
Pipe 6-1	0.608	2.2	223.993	223.041	20% AEP, 1 hour burst, Storm 6
P2-7	0.584	2.63	223.883	222.512	20% AEP, 1 hour burst, Storm 6
p3-7	0.556	2.3	222.512	222.071	20% AEP, 1 hour burst, Storm 6
P4-7	0.552	2.2	221.939	221.837	20% AEP, 1 hour burst, Storm 6
Pipe1-4	0.037	1.97	228.827	228.164	20% AEP, 30 min burst, Storm 7
Pipe2-4	0.074	1.73	227.912	227.364	20% AEP, 30 min burst, Storm 7
Pipe3-4	0.111	1.72	227.154	226.805	20% AEP, 30 min burst, Storm 7
Pipe4-4	0.114	1.75	226.756	226.482	20% AEP, 30 min burst, Storm 10
Pipe5-4	0.157	2.25	226.381	225.617	20% AEP, 20 min burst, Storm 6
Pipe6-4	0.183	1.81	225.612	224.878	20% AEP, 30 min burst, Storm 10
Pipe7-4	0.22	2.06	224.831	224.052	20% AEP, 30 min burst, Storm 10
Pipe8-4	0.259	2.22	223.852	223.676	20% AEP, 30 min burst, Storm 10
Pipe9-4	0.298	2.69	223.345	223.041	20% AEP, 30 min burst, Storm 10
Pipe 7-1	0.775	2.17	222.851	222.274	20% AEP, 1 hour burst, Storm 8
Pipe 8-1	0.775	2.45	222.145	221.947	20% AEP, 1 hour burst, Storm 8
PIPE 1-6	0.119	1.81	222.227	221.66	20% AEP, 45 min burst, Storm 4
Pipe1-7	0.123	1.2	224.075	223.959	20% AEP, 1 hour burst, Storm 6
Pip2-5	0.142	0.91	225.594	225.531	20% AEP, 45 min burst, Storm 9
Pipe1-5	0.278	1.75	224.947	224.901	20% AEP, 45 min burst, Storm 8
Pipe2-3	0.122	0.77	228.014	227.98	20% AEP, 1 hour burst, Storm 6
Pipe1-3	0.222	1.4	227.834	227.805	20% AEP, 1 hour burst, Storm 6
Pipe2-2	0.103	1.31	229.671	229.302	20% AEP, 1 hour burst, Storm 6
Pipe1-2	0.174	1.27	229.164	229.145	20% AEP, 1 hour burst, Storm 6

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

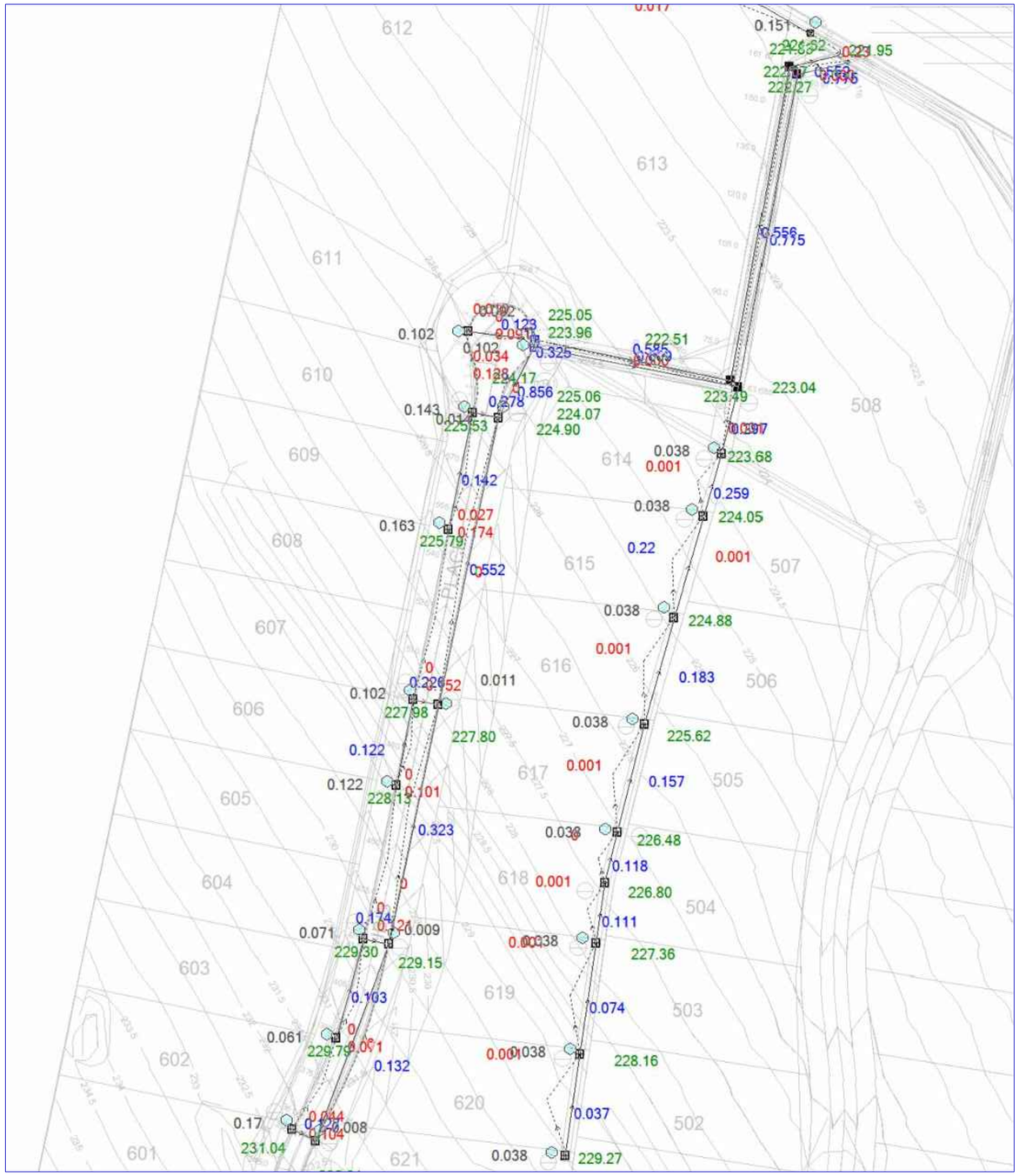
OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DW	Max Width	Max V	Due to Storm
OF1-1	0.044	0.104	0.805	0.088	0.11	2.76	1.43	20% AEP, 1 hour burst, Storm 6
OF2-1	0	0	0.768	0	0	0	0	
OF3-1	0	0	0.742	0	0	0	0	
OF4-1	0	0	0.738	0	0	0	0	
OF5-1	0	0	0.785	0	0	0	0	
Ofsag	0.01	0.01	0.434	0.055	0.01	1.59	0.27	20% AEP, 1 hour burst, Storm 6
OF6-1	0	0	0.767	0	0	0	0	
OF1-4	0.001	0.001	0.82	0.004	0	2.02	0	20% AEP, 45 min burst, Storm 9
OF2-4	0.001	0.001	0.737	0.005	0	2.02	0	20% AEP, 45 min burst, Storm 9
OF3-4	0.001	0.001	0.705	0.005	0	2.02	0.1	20% AEP, 45 min burst, Storm 7
OF4-4	0	0	0.761	0	0	0	0	
OF5-4	0.001	0.001	0.742	0.004	0	2.02	0	20% AEP, 45 min burst, Storm 9
OF6-4	0.001	0.001	0.737	0.004	0	2.02	0	20% AEP, 45 min burst, Storm 9
OF7-4	0.001	0.001	0.767	0.004	0	2.02	0	20% AEP, 45 min burst, Storm 9
OF8-4	0.001	0.001	2.778	0.004	0	6.03	0.08	20% AEP, 45 min burst, Storm 9
OF97885	0.001	0.001	0.852	0.004	0	2.02	0.15	20% AEP, 45 min burst, Storm 7
OF 1-6	0.014	0.011	11.996	0.169	0	19.98	0.11	20% AEP, 45 min burst, Storm 5
OF2-6	0.233	0.233	0.313	0.169	0.1	2.68	0.59	20% AEP, 45 min burst, Storm 5
OF1+-7	0	0.091	0.501	0.084	0.05	2.6	0.63	20% AEP, 1 hour burst, Storm 6
OF2-5	0.027	0.174	0.757	0.099	0.14	3.18	1.52	20% AEP, 1 hour burst, Storm 8
OF1-5	0.034	0.128	0.566	0.099	0.1	3.19	1.16	20% AEP, 1 hour burst, Storm 6
OF2-3	0	0.101	0.741	0.088	0.1	2.78	1.33	20% AEP, 1 hour burst, Storm 6
OF1-3	0	0.152	0.73	0.101	0.13	3.24	1.43	20% AEP, 45 min burst, Storm 7
OF2-2	0	0.071	0.746	0.079	0.08	2.43	1.23	20% AEP, 1 hour burst, Storm 6
OF79678	0	0.121	0.742	0.095	0.11	3.03	1.38	20% AEP, 1 hour burst, Storm 6
swale over	0	0	0.632	0	0	0	0	

DETENTION BASIN DETAILS

Name	Max WL	Max Vol	Max Q, Total	Max Q, Low Level	Max Q, High Level

Run Log for stage 6_A.drn run at 13:40:42 on 22/12/2022 using version 2022.08.8269.12475
No water upwelling from any pit.
Freeboard was less than 0.15m at Pit 1-6 - LARGE OVERLAND FLOW CATCHMENT NOW DOWNSTREAM IMAPACT
Flows were safe in all overflow routes.



PLANS PREPARED BY	CLIENT				
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* P□□02 6□43247□ □□all□□□l□□□ □□□□r□□□□□□□a□ □P□ □□□26□M□SW□LL□R□□□ □SW 2333	McCLOYGROUP	DRAINS RESULTS 20% AEP STAGE 6 KURRAJONG ESTATE, SATUR DESIGN: M. COLE, R. JONES DRAWN: M. COLE, R. JONES	SCAL□□ □□□S□ □RI□I□AL DRAWI□□ SI□□□A1 LGA: UPPER HUNTER FILE:207203_S6_DRAIN SHEET: DRAIN_008	PLA□ ISS□□ A ISS□□ □□ C□□□CIL □ S□□RMWA□□R □PDA□□ C I□□□R ALL□□M□□□ □PDA□□	07□03□2023 R□□□C □□□ R□□□ 207203

DRAINS results prepared from Version 2022.08.8269.12475
1% AEP

PIT / NODE DETAILS — Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow Arrival (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
Pit 1-1	231.05		0.415		0.99	0.256	Inlet Capacity
Pit2-1	230.83		0.031		1.21	0	None
Pit3-1	229.93		0.037		0.27	0	None
Pit4-1	228.29		0.044		0	0.061	Outlet System
Pit5-1	225.66		0.149		0.15	0.014	Inlet Capacity
Pit 6-1	225.07	225.26	0.264	0.9	0	0.014	Outlet System
Pit2-7	225.02	225.26	1.135	0.9	0	0.644	Outlet System
Pit3-7	223.39		0		0.09		None
Pit4-7	222.58		0		0		Outlet System
HW9-1a	221.99		0				
Pit1-4	229.54		0.121		0	0.052	Outlet System
Pit2-4	228.66		0.18		0	0.094	Outlet System
Pit3-4	227.91		0.237		0	0.128	Outlet System
Pit4-4	227.46		0.172		0	0.099	Outlet System
Pit5-4	227.08		0.237		0	0.145	Outlet System
Pit6-4	226.24		0.271		0	0.08	Outlet System
Pit7-4	225.49		0.24		0	0.172	Outlet System
Pit8-4	224.71		0.37		0	0.29	Outlet System
Pit9-4	224.37		0.54		0	0.385	Outlet System
Pit 7-1	224.08		0		0		Outlet System
Pit 8-1	222.71		0		0		Outlet System
HW 9-1	222.01		1.82				
Pit 1-6	222.73		0.44		0	0.207	Outlet System
HW 2-6	221.74		0.836				
Pit1-7	225.41		1.365		0	1.018	Outlet System
Pit2-5	226.84		0.919		0	0.734	Outlet System
Pit1-5	226.02		1.026		0	1.097	Outlet System
Pit2-3	228.77		0.494		0.14	0.348	Inlet Capacity
Pit1-3	228.37		0.54		0	0.623	Outlet System
Pit2-2	230.64		0.363		0.41	0.236	Inlet Capacity
Pit1-2	230.29		0.354		0	0.272	Outlet System
z1	223.72		1.114				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	EIA Max Q (cu.m/s)	Remaining EIA Max Q (cu.m/s)	EIA Tc (min)	RIA Tc (min)	PA Tc (min)	Due to Storm
Cat 1/1	0.382	0.062	0.324	5	2	22	1% AEP, 30 min burst, Storm 6
Cat2-1	0.021	0.009	0.013	5	2	5	1% AEP, 10 min burst, Storm 7
Cat3-1	0.026	0.01	0.015	5	2	5	1% AEP, 10 min burst, Storm 7
Cat4-1	0.03	0.012	0.018	5	2	5	1% AEP, 10 min burst, Storm 7
Cat5-1	0.039	0.015	0.023	5	2	5	1% AEP, 10 min burst, Storm 7
Cat 6-1	0.229	0.037	0.194	5	2	22	1% AEP, 30 min burst, Storm 6
Cat2-7	0.206	0.033	0.174	5	2	22	1% AEP, 30 min burst, Storm 6
Cat1-4	0.086	0.026	0.06	5	2	5	1% AEP, 10 min burst, Storm 7
Cat2-4	0.086	0.026	0.06	5	2	5	1% AEP, 10 min burst, Storm 7
Cat3-4	0.086	0.026	0.06	5	2	5	1% AEP, 10 min burst, Storm 7
Cat5-4	0.086	0.026	0.06	5	2	5	1% AEP, 10 min burst, Storm 7
Cat6-4	0.086	0.026	0.06	5	2	5	1% AEP, 10 min burst, Storm 7
Cat7-4	0.086	0.026	0.06	5	2	5	1% AEP, 10 min burst, Storm 7
Cat8-4	0.086	0.026	0.06	5	2	5	1% AEP, 10 min burst, Storm 7
Cat 9-4	0.086	0.026	0.06	5	2	5	1% AEP, 10 min burst, Storm 7
Cat 1-6	0.329	0.085	0.268	5	5	10	1% AEP, 20 min burst, Storm 4
Cat2-6	0.428	0.021	0.406	5	2	5	1% AEP, 10 min burst, Storm 7
Cat1-7	0.229	0.037	0.194	5	2	22	1% AEP, 30 min burst, Storm 6
Cat2-5	0.366	0.059	0.31	5	2	22	1% AEP, 30 min burst, Storm 6
Cat1-5	0.32	0.052	0.271	5	2	22	1% AEP, 30 min burst, Storm 6
Cat2-3	0.274	0.045	0.233	5	2	22	1% AEP, 30 min burst, Storm 6
Cat1-3	0.229	0.037	0.194	5	2	22	1% AEP, 30 min burst, Storm 6
Cat2-2	0.137	0.022	0.116	5	2	22	1% AEP, 30 min burst, Storm 6
Cat1-2	0.16	0.026	0.136	5	2	22	1% AEP, 30 min burst, Storm 6

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
Pipe1-1	0.127	1.41	230.889	230.832	1% AEP, 2 hour burst, Storm 2
Pipe2-1	0.147	1.49	230.807	229.926	1% AEP, 10 min burst, Storm 7
Pipe3-1	0.433	2.72	229.409	228.292	1% AEP, 10 min burst, Storm 7
Pipe4-1	0.588	3.7	227.676	225.665	1% AEP, 25 min burst, Storm 10
Pipe5-1	0.931	3.29	225.351	225.072	1% AEP, 10 min burst, Storm 4
PipeXX	0.419	1.48	225.024	225.021	1% AEP, 15 min burst, Storm 5
Pipe 6-1	0.966	2.7	224.589	224.081	1% AEP, 25 min burst, Storm 6
P2-7	0.921	2.79	223.986	223.39	1% AEP, 30 min burst, Storm 6
p3-7	0.921	2.57	223.39	222.581	1% AEP, 30 min burst, Storm 6
P4-7	0.921	2.75	222.145	221.986	1% AEP, 30 min burst, Storm 6
Pipe1-4	0.039	2.09	229.187	228.658	1% AEP, 30 min burst, Storm 6
Pipe2-4	0.083	1.79	228.199	227.907	1% AEP, 30 min burst, Storm 7
Pipe3-4	0.13	1.8	227.544	227.456	1% AEP, 30 min burst, Storm 8
Pipe4-4	0.146	2.03	227.198	227.082	1% AEP, 10 min burst, Storm 8
Pipe5-4	0.198	2.74	226.676	226.24	1% AEP, 5 min burst, Storm 1
Pipe6-4	0.318	2.72	225.919	225.489	1% AEP, 10 min burst, Storm 4
Pipe7-4	0.31	2.64	225.081	224.709	1% AEP, 10 min burst, Storm 7
Pipe8-4	0.312	2.67	224.527	224.371	1% AEP, 25 min burst, Storm 7
Pipe9-4	0.379	3.43	224.219	224.081	1% AEP, 10 min burst, Storm 6
Pipe 7-1	1.069	2.99	223.738	222.707	1% AEP, 30 min burst, Storm 1
Pipe 8-1	1.069	3.09	222.214	222.014	1% AEP, 30 min burst, Storm 1
PIPE 1-6	0.117	1.64	222.304	221.74	1% AEP, 20 min burst, Storm 4
Pipe1-7	0.331	1.17	225.057	225.021	1% AEP, 20 min burst, Storm 1
Pipe2-5	0.254	1.6	226.21	226.017	1% AEP, 30 min burst, Storm 1
Pipe1-5	0.326	2.05	225.69	225.665	1% AEP, 20 min burst, Storm 6
Pipe2-3	0.196	1.23	228.454	228.369	1% AEP, 30 min burst, Storm 1
Pipe1-3	0.251	1.58	228.305	228.292	1% AEP, 45 min burst, Storm 8
Pipe2-2	0.157	0.99	230.352	230.288	1% AEP, 30 min burst, Storm 6
Pipe1-2	0.285	1.79	229.968	229.926	1% AEP, 25 min burst, Storm 6

CHANNEL DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Due to Storm

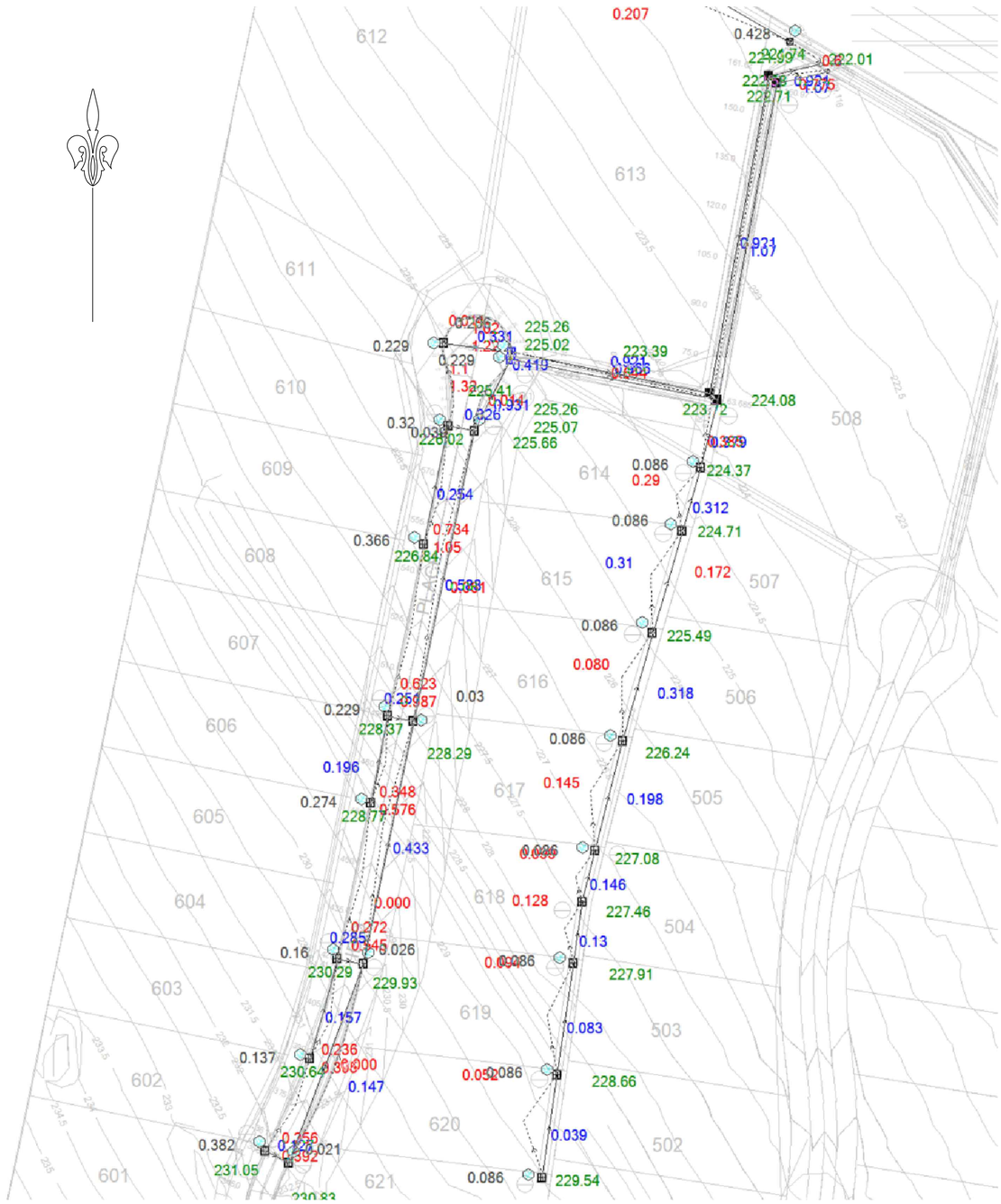
OVERFLOW ROUTE DETAILS

Name	Max Q	U/S Max Q	D/S Q	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
OF1-1	0.256	0.392	1.092	0.121	0.22	4.33	1.8	1% AEP, 30 min burst, Storm 6	
OF2-1	0	0	1.139	0	0	0	0		
OF3-1	0	0	1.149	0	0	0	0		
OF4-1	0.061	0.061	1.143	0.07	0.08	2.11	1.21	1% AEP, 30 min burst, Storm 8	
OF5-1	0.014	0.014	1.205	0.038	0.04	0.96	0.98	1% AEP, 30 min burst, Storm 1	
Ofsag	0.014	0.014	1.682	0.269	0	9.71	0.01	1% AEP, 25 min burst, Storm 10	
OF6-1	0.644	0.643	1.559	0.236	0.27	2.94	1.5	1% AEP, 30 min burst, Storm 6	
OF1-4	0.052	0.052	1.541	0.063	0.03	2.25	0.63	1% AEP, 10 min burst, Storm 9	
OF2-4	0.094	0.094	1.505	0.075	0.04	2.3	0.74	1% AEP, 10 min burst, Storm 4	
OF3-4	0.128	0.128	1.439	0.075	0.06	2.3	0.99	1% AEP, 10 min burst, Storm 4	
OF4-4	0.099	0.099	1.552	0.081	0.05	2.32	0.77	1% AEP, 10 min burst, Storm 4	
OF5-4	0.145	0.145	1.514	0.081	0.07	2.32	1.28	1% AEP, 10 min burst, Storm 4	
OF6-4	0.08	0.08	1.505	0.087	0.04	2.35	0.7	1% AEP, 10 min burst, Storm 4	
OF7-4	0.172	0.172	1.559	0.087	0.08	2.35	1.34	1% AEP, 10 min burst, Storm 4	
OF8-4	0.29	0.29	2.778	0.126	0.05	7.01	0.76	1% AEP, 10 min burst, Storm 4	
OF97885	0.385	0.385	1.533	0.158	0.17	2.63	1.35	1% AEP, 10 min burst, Storm 7	
OF 1-6	0.207	0.203	11.996	0.29	0.01	20.04	0.36	1% AEP, 20 min burst, Storm 4	
OF2-6	0.6	0.6	0.639	0.29	0.23	3.16	0.8	1% AEP, 20 min burst, Storm 4	
OF1=7	1.018	1.224	1.402	0.204	0.34	6.84	1.71	1% AEP, 30 min burst, Storm 1	
OF2-5	0.734	1.053	1.147	0.183	0.34	6.31	2.07	1% AEP, 30 min burst, Storm 1	
OF1-5	1.097	1.325	1.47	0.193	0.37	7.82	1.94	1% AEP, 30 min burst, Storm 1	
OF2-3	0.348	0.576	1.147	0.143	0.25	5.3	1.75	1% AEP, 30 min burst, Storm 1	
OF1-3	0.623	0.987	1.154	0.166	0.36	5.89	2.2	1% AEP, 30 min burst, Storm 1	
OF2-2	0.236	0.395	1.155	0.124	0.21	4.53	1.68	1% AEP, 30 min burst, Storm 6	
OF79678	0.272	0.545	1.149	0.14	0.25	5.22	1.81	1% AEP, 30 min burst, Storm 1	
swale over	0.775	0.775	1.289	0.225	0.32	2.9	1.4	1% AEP, 30 min burst, Storm 1	

DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level

Run Log for stage 6_A.drn run at 16:10:08 on 22/12/2022 using version 2022.08.8269.12475
Upwelling occurred at: Pit7-4, Pit8-4, Pit9-4, Pit1-3, Pit4-1, Pit1-5
Freeboard was less than 0.15m at Pit2-3, Pit2-5, Pit2-7, Pit1-7, Pit 1-6, Pit1-4, Pit2-4, Pit3-4, Pit4-4, Pit5-4, Pit6-4, Pit1-2, Pit5-1, Pit 6-1
Flows were safe in all overflow routes.



PLANS PREPARED BY	CLIENT				
MM HYNDES BAILEY & Co. REGISTERED SURVEYORS - TOWN PLANNING - CIVIL DESIGN *Surveying the Hunter since 1920* P□□02 6□43247□ □□ail□□□□□□ □□□□r□□□□□□□ a□ □P□ □□□26□M□SW□LL□R□□□ □SW 2333	McCLOY GROUP	DRAINS RESULTS 1% AEP STAGE 6 KURRAJONG ESTATE, SATUR	SCAL□□ □□□S□ □RI□I□AL DRAWI□□ SI□□□A1 LGA: UPPER HUNTER FILE:207203_S6_DRAIN SHEET: DRAIN_009	PLA□ ISS□□ A ISS□□ □□ C□□□CIL □ S□□RMWA□□R □PDA□□ C I□□□R ALL□□M□□□ □PDA□□	07□03□2023 R□□□C □□ R□□□ 207203

DESIGN: M. COLE, R. JONES
DRAWN: M. COLE, R. JONES

Appendix B
PHOTOLOG

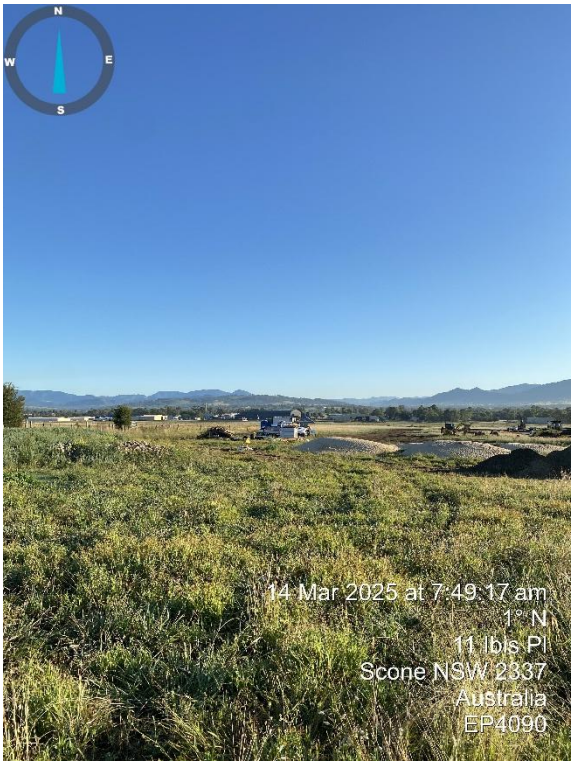
	**Plate 1** **Description:** Site observation, looking towards the north from BH01 **Date: 14/03/2025**
	**Plate 2** **Description:** Site observation, looking towards the east from BH01 **Date: 14/03/2025**

	**Plate 3** **Description:** Soil encountered in BH01 **Date: 14/03/2025**
	**Plate 4** **Description:** Soil encountered in BH02 **Date: 14/03/2025**

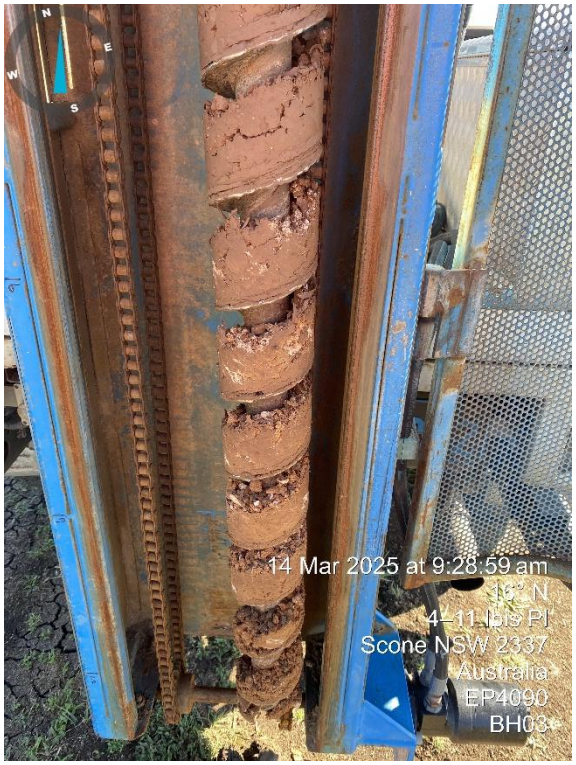
	**Plate 5** **Description:** Soil encountered in BH03 **Date: 14/03/2025**
	**Plate 6** **Description:** Soil encountered in BH04 **Date: 14/03/2025**

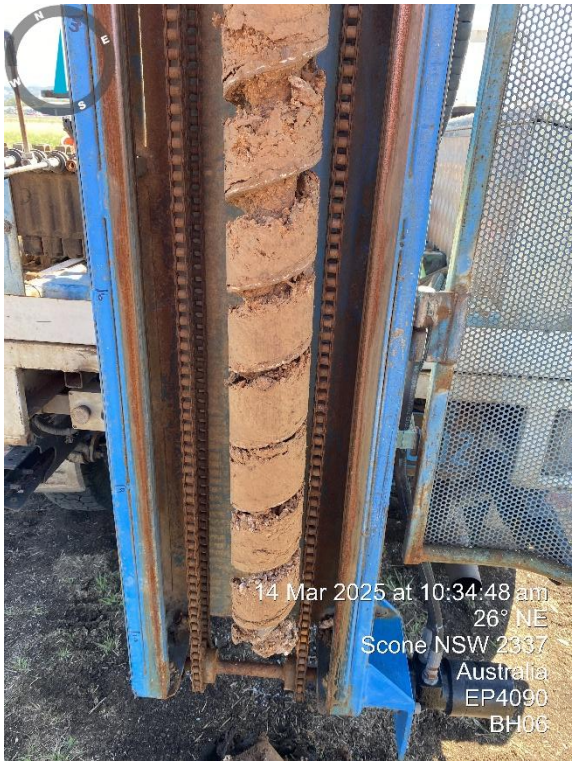
	**Plate 7** **Description:** Soil encountered in BH05 **Date: 14/03/2025**
	**Plate 8** **Description:** Soil encountered in BH06 **Date: 14/03/2025**

	**Plate 9** **Description:** Soil encountered in BH08 **Date: 14/03/2025**
	**Plate 10** **Description:** Soil encountered in BH09 **Date: 14/03/2025**

	**Plate 11** **Description:** Soil encountered in BH10 **Date: 14/03/2025**
	**Plate 12** **Description:** Soil encountered in BH11 **Date: 14/03/2025**

	**Plate 13** **Description:** Site observation, looking towards the east from BH12 **Date: 14/03/2025**
	**Plate 14** **Description:** Site observation, looking towards the south from BH12 **Date: 14/03/2025**

	**Plate 15** **Description:** Site observation, looking towards the west from BH12 **Date: 14/03/2025**
	**Plate 16** **Description:** Site observation, looking towards the north from BH12 **Date: 14/03/2025**

	**Plate 17** **Description:** Soil encountered in BH13 **Date: 19/03/2025**
	**Plate 18** **Description:** Site observation, looking towards the north from BH14 **Date: 19/03/2025**

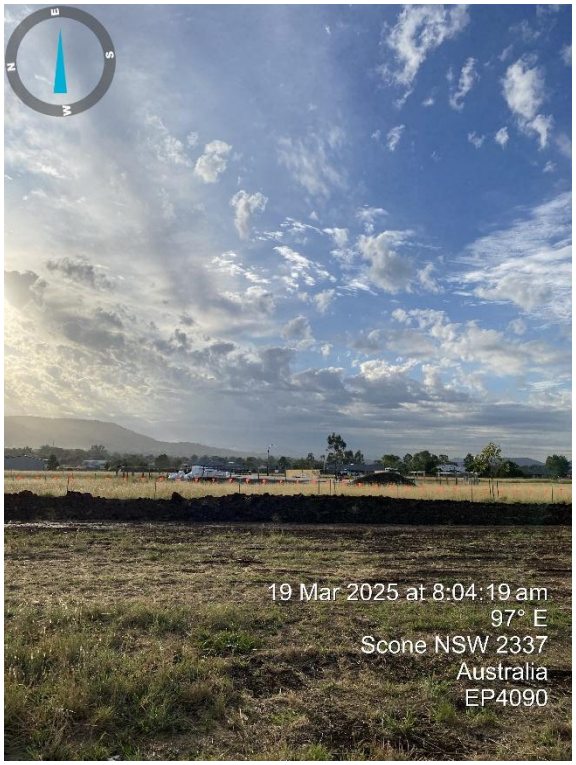
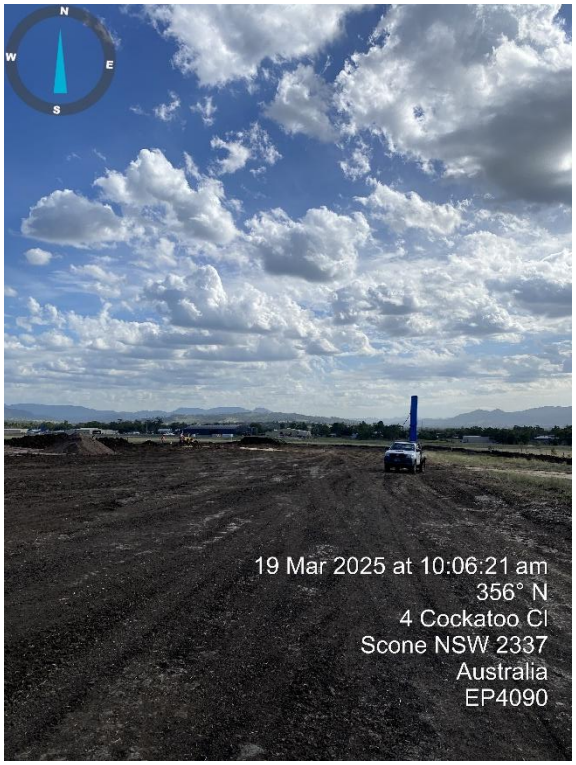
	**Plate 19** **Description:** Site observation, looking towards the east from BH14 **Date: 19/03/2025**
	**Plate 20** **Description:** Site observation, looking towards the south BH14 **Date: 19/03/2025**

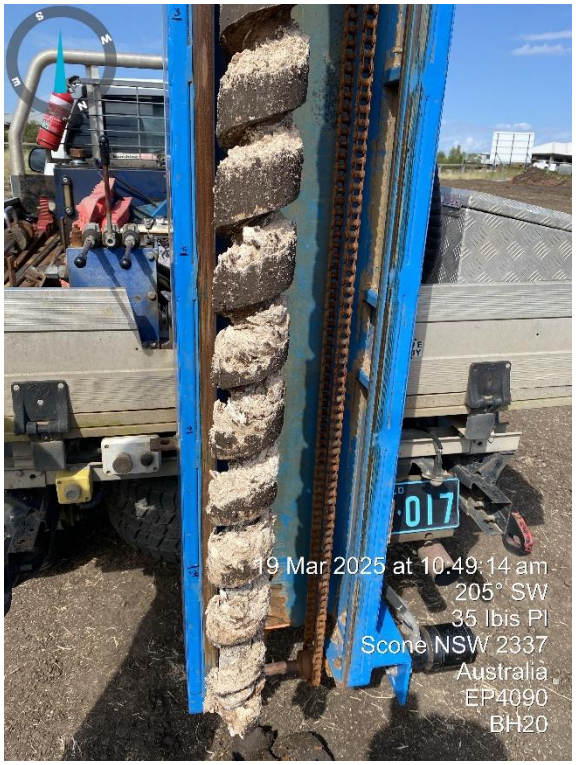
	**Plate 21** **Description:** Site observation, looking towards the west from BH14 **Date: 19/03/2025**
	**Plate 22** **Description:** Soil encountered in BH14 **Date: 19/03/2025**

	**Plate 23** **Description:** Soil encountered in BH15 **Date: 19/03/2025**
	**Plate 24** **Description:** Soil encountered in BH16 **Date: 19/03/2025**

	**Plate 25** **Description:** Soil encountered in BH17 **Date: 19/03/2025**
	**Plate 26** **Description:** Soil encountered in BH18 **Date: 19/03/2025**

	**Plate 27** **Description:** Site observation, looking towards the south from BH19 **Date: 19/03/2025**
	**Plate 28** **Description:** Site observation, looking towards the west from BH19 **Date: 19/03/2025**

	**Plate 29** **Description:** Site observation, looking towards the north from BH19 **Date: 19/03/2025**
	**Plate 30** **Description:** Soil encountered in BH19 **Date: 19/03/2025**

	**Plate 31** **Description:** Soil encountered in BH20 **Date: 19/03/2025**
	**Plate 32** **Description:** Soil encountered in BH21 **Date: 19/03/2025**

Appendix C
GEOTECHNICAL INVESTIGATION LOCATIONS

EP RISK
www.eprisk.com.au

Geotechnical Investigation
Ibis Place, Scone NSW, Australia

Appendix C - Geotechnical Investigation Locations

Job No: EP4090
Date: 12-03-2025
Version: v1

0 50 m 100 m
Approximate Scale Only

Coordinate System: WGS 84
Drawn By: JA Checked By: OP
Scale of regional map not shown

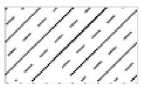
ISO 9001 ISO 45001 ISO 14001

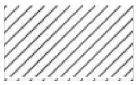
Appendix D
BOREHOLE LOGS

Soil Logging Symbols

CLAYS

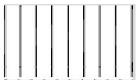

CLAY

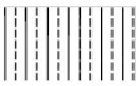

silty CLAY

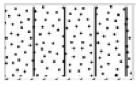

sandy CLAY


gravelly CLAY

SILTS

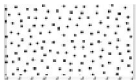

SILT


clayey SILT

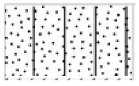

sandy SILT

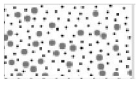

gravelly SILT

SANDS


SAND

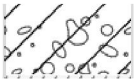

clayey SAND


silty SAND

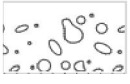

gravelly SAND

GRAVELS


GRAVEL


clayey GRAVEL


silty GRAVEL

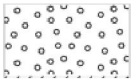

sandy GRAVEL

SEDIMENTARY ROCK

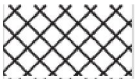

SANDSTONE

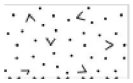

SILTSTONE


SHALE


CONGLOMERATE

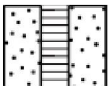
FILL

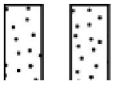

FILL

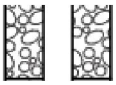

CONCRETE


ASPHALT

GROUNDWATER WELL SYMBOLS


WELL SCREEN


CASING – filter pack


CASING – backfill


CASING – bentonite seal


CASING – grout seal


BACKFILL

OTHER


TOPSOIL – sandy SILT


TOPSOIL – highly organic

Borehole No: BH01

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452684.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295356.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			2 3		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			3 4 3 3 2 2 3 4 5 4 4 4 4		RESIDUAL SOIL
			1			0.60m: Colour change to brown	<PL	F to St			
						1.50m: Colour change to grey and brown, with fine to medium grained sand, fine to medium grained, sub-angular gravel		VSt to H	6 8 6 13		
			2				<<PL				DCP:-HB
			3			Borehole BH01 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH02

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452708.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295352.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered				CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			5 5		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			6 6 6 7 6 5 5 6		RESIDUAL SOIL
			1			0.70m: Colour change to brown	<PL	VSt			
								St to VSt	4 4 5 5 4		
						1.50m: Colour change to brown and white, with fine to medium grained sand, fine to medium grained, sub-angular gravel			8 9 7 9 10		
			2			2.00m: Colour change to grey and brown		VSt	10 10		
							<<PL				
			3			Borehole BH02 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH03

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452738.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295364.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black	<PL	St and VSt	5		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			3		RESIDUAL SOIL
									4		
									5		
									5		
									5		
						0.60m: Colour change to brown			5		
									5		
									5	U50	
			1						4		
									6		
									5		
									4		
									4		
									5		
									5		
									4		
						1.60m: Colour change to brown and white, with fine to medium grained sand, fine grained, sub-angular gravel			5		
									5		
									5		
			2						5		
								VSt	6		
									6		
									7		
									7		
									7		
									7		
			3			Borehole BH03 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH04

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452767.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295381.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black	<PL	F	2		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			2		RESIDUAL SOIL
									2		
									2		
								St to VSt	3		
									3		
									3		
						0.70m: Colour change to brown			4		
									5		
			1						3		
									4		
									5		
									5		
									5		
									5		
									4		
									5		
									4		
									4		
								VSt	6		
			2			2.00m: Colour change to brown and white, with fine to medium grained sand, fine grained, sub-angular gravel			5		
									6		
									6		
									6		
									8		
									10		
									9		
			3			Borehole BH04 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH05

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452784.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295393.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			2 2		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black		F	2 3 2		RESIDUAL SOIL
						0.60m: Colour change to brown		St	3 3 3 4 4 4 4 4 4 4 4		
			1			1.40m: Colour change to brown and white, with fine to medium grained sand, fine grained, sub-angular gravel 1.50m: Colour change to grey and brown	<PL		4 5 4 5 4 5		
			2					St to VSt	6 4 7 9 8		
			3			Borehole BH05 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH06

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452816.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295395.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered				CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			5 3		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			3 3 4		RESIDUAL SOIL
						0.60m: Colour change to brown			4 3 3 4 4	U50	
			1			1.20m: Colour change to brown and white, with fine to medium grained sand, fine grained, sub-angular gravel	<PL	St and VSt	4 5 5 3 3 3 3 3 3 4 4 4 5 5 6 6		
			2								
			3			Borehole BH06 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH07

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452844.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295410.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black		F	2		TOPSOIL
									2		
					CI-CH	Silty CLAY: medium to high plasticity, black			2		RESIDUAL SOIL
									2		
								St and VSt	4		
						0.60m: Colour change to brown			5		
									5		
									6		
									6		
			1						6		
									6		
									6		
									5		
									5		
									5		
							<PL		5		
						1.60m: Colour change to grey and brown			4		
									6		
									5		
			2						4		
									5		
						2.10m: Colour change to grey, brown and white, with fine to medium grianed sand, fine grained, sub-angular gravel			6		
									6		
									5		
									6		
									5		
									9		
			3								
						Borehole BH07 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH08

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452872.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295406.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black		F to St	2		TOPSOIL
									3		
					CI-CH	Silty CLAY: medium to high plasticity, black			2		RESIDUAL SOIL
									3		
								St and VSt	4		
									4		
						0.60m: Colour change to brown			3		
									3		
									4		
			1						3		
									3		
									3		
									3		
									3		
									3		
							<PL		3		
									3		
									3		
									3		
									5		
									5		
			2						4		
						2.10m: Colour change to grey and brown			4		
									7		
									6		
									5		
									6		
									7		
			3								
						Borehole BH08 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH09

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452898.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295410.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black	<PL	St and VSt	3 4		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			5 7 5		RESIDUAL SOIL
									6 5 6 5 5	U50	
			1			0.70m: Colour change to brown and white, with fine to medium grained sand, fine grained, sub-agular gravel			5 5 4 4 3 5 5 5 6 4 5 7 8 7 7 6 7		
			2			2.00m: Colour change to grey and brown					
			3			Borehole BH09 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH10

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452919.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295417.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			4 3		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			3 3 4 3 3 3 4		RESIDUAL SOIL
						0.60m: Colour change to brown		St	4 4 4 4 4 4 4 3 4		
			1			1.50m: Colour change to grey and brown, with fine to medium grained sand, fine grained, sub-angular gravel	<PL		5 7 8 6 6		
								VSt	8 8 8 7 7		
			2								
			3			Borehole BH10 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH11

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6452945.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295420.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			4		TOPSOIL
									3		
					CI-CH	Silty CLAY: medium to high plasticity, black			4		RESIDUAL SOIL
									4		
									4		
									3		
						0.60m: Colour change to brown			4		
									3		
									3		
			1						4		
								St	4		
									4		
									4		
						1.30m: Colour change to brown and white, with fine to medium grained sand			4		
							<PL		4		
									3		
									3		
									4		
									4		
									4		
			2			2.00m: Colour change to grey and brown			3		
									5		
									4		
									4		
								St to VSt	5		
									4		
									6		
			3								
						Borehole BH11 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH12

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	14.3.25	Northing	6453027.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	14.3.25	Easting	295451.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black		St	3 3		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			4		RESIDUAL SOIL
									6 6 5 5 7 6 6		
			1			0.60m: Colour change to brown			6 6 5 6 6	U50	
							<PL	VSt	6 5 5 7 6 6 6 6 7 6 6 6		
			2			2.00m: Colour change to grey and brown					
			3			Borehole BH12 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH13

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	19.3.25	Northing	6452984.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	19.3.25	Easting	295508.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black	<PL	VSt and St	7 4		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			4 3 4 3		RESIDUAL SOIL
						0.60m: Colour change to brown			3 3 4 4 4	U50	
			1			1.20m: Colour change to brown and white, with fine to medium grained sand, fine to medium, sub-rounded to sub-angular gravel			4 4 4 4 4 4 4 4 4 4		
			2			2.10m: Colour change to grey and brown		VSt	5 5 5 5 5		
			3			Borehole BH13 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH14

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	19.3.25	Northing	6452883.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	19.3.25	Easting	295506.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			4		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			2		RESIDUAL SOIL
									3		
								St and F	3		
									3		
									4		
						0.60m: Colour change to brown			4		
									5		
			1						4		
									5		
									4		
									5		
									4		
						1.30m: Colour change to brown and white, with fine to medium grained sand, fine grained, sub-angular gravel			4		
							<PL		5		
								St and VSt	3		
									4		
									4		
									4		
			2						4		
									4		
									4		
									7		
									6		
									10		
											DCP:-HB
			3			Borehole BH14 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH15

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	19.3.25	Northing	6452858.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	19.3.25	Easting	295498.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			6		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			5		RESIDUAL SOIL
									3		
									5		
						0.40m: Colour change to brown			6		
									5		
									5		
									4		
									4		
			1						5		
								VSt and St	5		
									4		
									5		
						1.30m: Colour change to brown and white, with fine grained, sub-angular gravel			3		
							<PL		4		
									3		
						1.60m: with fine to mediumgrained sand			4		
									4		
									4		
									4		
			2						4		
						2.10m: Colour change to grey and brown			7		
									10		
								VSt and H	14		
									8		
									8		
									9		
			3								
						Borehole BH15 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH16

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	19.3.25	Northing	6452827.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	19.3.25	Easting	295490.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black	<PL	St	4		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			4		RESIDUAL SOIL
									4		
									4		
									4		
									4		
						0.60m: Colour change to brown			4		
									4		
									4	U50	
			1						3		
									4		
									4		
						1.30m: Colour change to brown and white			4		
									4		
									4		
									4		
						1.70m: with fine to medium grained sand, fine grained, sub-rounded gravel		VSt	6		
									8		
			2						6		
									5		
									6		
					CL-CI	Sandy CLAY: low to medium plasticity, brown, fine to medium grained sand, with fine to medium grained, sub-rounded to sub-angular gravel		VSt to H	10		
									12		
									10		
									10		
									12		
			3								
						Borehole BH16 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH17

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	19.3.25	Northing	6452798.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	19.3.25	Easting	295458.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black	<PL	St	4		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			4		RESIDUAL SOIL
									4		
									4		
									4		
						0.50m: Colour change to brown and pale brown, with fine to medium grained sand, fine grained, sub-angular gravel			3		
									4		
									3		
									4		
			1						4		
									4		
									4		
									4		
									4		
									4		
									3		
									4		
									4		
						1.80m: Colour change to brown and white			4		
			2					VSt	5		
									5		
									6		
									7		
									6		
									6		
									9		
									8		
			3								
						Borehole BH17 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH18

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	19.3.25	Northing	6452765.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	19.3.25	Easting	295476.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered				CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black		VSt	5		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black		St to F	4		RESIDUAL SOIL
									4		
									3		
									3		
									2		
						0.60m: Colour change to brown			3		
									3		
									2		
			1						3		
						1.10m: Colour change to brown and white, with fine to medium grained sand, fine grained, sub-rounded to sub-angular gravel			3		
									3		
							<PL		3		
									3		
									4		
									4		
									4		
								St to VSt	4		
									4		
			2						5		
									6		
									7		
									8		
									8		
									6		
									7		
									8		
			3								
						Borehole BH18 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH19

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	19.3.25	Northing	6452726.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	19.3.25	Easting	295467.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			10		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			4		RESIDUAL SOIL
									3		
									3		
									4		
									5		
									4		
									5		
						0.80m: Colour change to brown			5	U50	
			1						5		
									5		
									6		
									5		
								VSt and St	5		
									5		
							<PL		4		
						1.60m: Colour change to brown, pale brown and white, with fine to medium grained sand			4		
									5		
									5		
									5		
			2						5		
									6		
									7		
						2.30m: Colour change to grey and brown			6		
									6		
									6		
									7		
			3								
						Borehole BH19 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH20

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	19.3.25	Northing	6452699.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	19.3.25	Easting	295460.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered				CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black		St	3		TOPSOIL
					CI-CH	Silty CLAY: medium to high plasticity, black			2		RESIDUAL SOIL
									2		
									1		
								F	2		
									2		
						0.60m: Colour change to brown			2		
									2		
									4		
			1			1.00m: Colour change to black and white, with fine grained, sub-rounded gravel			3		
									4		
									5		
									6		
									4		
									4		
							<PL		3		
									6		
								St and VSt	7		
									8		
									5		
			2						8		
						2.10m: Colour change to brown and white			8		
									7		
									8		
									8		
									7		
									8		
			3								
						Borehole BH20 Terminated at 3.00 m					Target depth

Remarks:

Borehole No: BH21

Engineering Log - Borehole

SHEET 1 OF 1

Client	McCloy Group Pty Ltd	Project No.	EP4090
Project	Kurrajong Estate Stage 6	Logged By	JA
Location	Ibis Place, Scone NSW 2337	Checked By	OP

Started Drilling	19.3.25	Northing	6452674.00	Slope	90°	Equipment	Ute Drilling Rig
Completed Drilling	19.3.25	Easting	295452.00	Bearing	---	Ground Level	

DRILLING				MATERIAL DESCRIPTION					TESTING, SAMPLING & OTHER INFORMATION		
Method	Water	RL (m)	Depth (m)	Graphic Log	Classification	Description of Soil (soil type: plasticity/grainsize, colour and other components)	Moisture Condition	Consistency	Tests DCP Results (blows/ 100mm)	Samples	Additional Comments (material origin, pocket penetrometer values, investigation observations)
AD/V	Not Encountered		0		CL-CI	TOPSOIL: Silty CLAY: low to medium plasticity, black			4		TOPSOIL
									4		
					CI-CH	Silty CLAY: medium to high plasticity, black			3		RESIDUAL SOIL
									4		
									4		
						0.50m: Colour change to brown			3		
									4		
									4		
									4		
			1						4		
									5		
									4		
									4		
								St and VSt	3		
									3		
							<PL		3		
						1.60m: Colour change to brown and white, with fine grained, sub-rounded gravel			4		
									4		
									4		
									4		
			2						5		
									6		
									5		
									6		
									7		
									7		
									6		
			3								
						Borehole BH21 Terminated at 3.00 m					Target depth

Remarks:

Appendix E
LABORATORY TEST RESULTS

Material Test Report

Report Number: **NEWC25296-1**
Issue Number: 1
Date Issued: 01/04/2025
Client: EP Risk Management
PO Box 57, Lochinvar NSW 2321
Project Number: NEWC25296
Project Name: Kurrajong Estate Stage 6
Project Location: Ibis Place, Scone NSW
Client Reference: EP4090
Work Request: 4466
Dates Tested: 17/03/2025 - 20/03/2025
Location: Kurrajong Estate Stage 6 - Lot Classification

coffey TESTING
Newcastle Laboratory
16 Callistemon Close Warabrook NSW 2304
Phone: 0438 938 932
Email: Newcastle Laboratory

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Raphael Kirby-Faust
Geotechnician
Laboratory Accreditation Number: 431

Shrink Swell Index AS 1289 7.1.1 & 2.1.1					
Sample Number	NEWC4466A	NEWC4466B	NEWC4466C	NEWC4466D	NEWC4466E
Date Sampled	01/04/2025	01/04/2025	01/04/2025	01/04/2025	01/04/2025
Date Tested	17/03/2025	17/03/2025	17/03/2025	17/03/2025	17/03/2025
Material Source	**	**	**	**	**
Sample Location	BH03 (0.6 - 1.10)	BH06 (0.50 - 1.00)	BH09 (0.50 - 1.00)	BH12 (1.00 - 1.50)	BH13 (0.60 - 1.10)
Inert Material Estimate (%)	0	2	0	0	0
Pocket Penetrometer before (kPa)	600+	460	600	600+	600+
Pocket Penetrometer after (kPa)	180	280	200	230	200
Shrinkage Moisture Content (%)	28.8	30.7	26.8	24.7	28.2
Shrinkage (%)	**6.0**	**7.6**	**5.5**	**6.4**	**6.6**
Swell Moisture Content Before (%)	27.2	33.7	28.7	26.6	28.3
Swell Moisture Content After (%)	40.5	40.8	38.9	35.9	35.9
Swell (%)	**7.1**	**5.2**	**7.9**	**8.2**	**5.7**
Shrink Swell Index Iss (%)	**5.3**	**5.7**	**5.2**	**5.8**	**5.3**
Visual Description	Silty CLAY. Some Gravel	Silty CLAY	Silty CLAY with some Gravel	Silty CLAY	Silty CLAY (Brown)
Cracking	SC	MC	SC	SC	SC
Crumbling	No	**	No	**	No
Remarks	**	**	**	Silty CLAY	**

Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

Material Test Report

Report Number: **NEWC25296-1**
Issue Number: 1
Date Issued: 01/04/2025
Client: EP Risk Management
PO Box 57, Lochinvar NSW 2321
Project Number: NEWC25296
Project Name: Kurrajong Estate Stage 6
Project Location: Ibis Place, Scone NSW
Client Reference: EP4090
Work Request: 4466
Dates Tested: 17/03/2025 - 20/03/2025
Location: Kurrajong Estate Stage 6 - Lot Classification

coffey TESTING
Newcastle Laboratory
16 Callistemon Close Warabrook NSW 2304
Phone: 0438 938 932
Email: Newcastle Laboratory

Accredited for compliance with ISO/IEC 17025 - Testing

Approved Signatory: Raphael Kirby-Faust
Geotechnician
Laboratory Accreditation Number: 431

Shrink Swell Index AS 1289 7.1.1 & 2.1.1					
Sample Number	NEWC4466F	NEWC4466G			
Date Sampled	01/04/2025	01/04/2025			
Date Tested	20/03/2025	20/03/2025			
Material Source	**	**			
Sample Location	BH16 (0.60 - 1.10)	BH19 (0.60 - 1.10)			
Inert Material Estimate (%)	0	0			
Pocket Penetrometer before (kPa)	+600	+600			
Pocket Penetrometer after (kPa)	230	240			
Shrinkage Moisture Content (%)	31.2	31.9			
Shrinkage (%)	**6.9**	**6.6**			
Swell Moisture Content Before (%)	30.0	30.8			
Swell Moisture Content After (%)	37.5	39.6			
Swell (%)	**8.9**	**6.0**			
Shrink Swell Index Iss (%)	**6.3**	**5.3**			
Visual Description	Silty CLAY (Brown)	Silty CLAY (Brown)			
Cracking	SC	SC			
Crumbling	No	No			
Remarks	**	**			

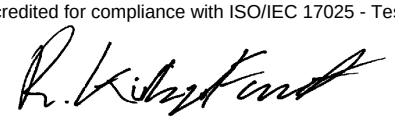
Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

Material Test Report

Report Number: **NEWC25289-1**
Issue Number: 1
Date Issued: 02/04/2025
Client: Lee Lesley (COD ONLY)
155 Queen Street, Muswellbrook NSW 2333
Contact: Le Lesley
Project Number: NEWC25289
Project Name: Lot 607 - Kurrajong Estate
Project Location: Scone NSW
Work Request: 4382
Dates Tested: 24/03/2025 - 24/03/2025
Location: Lot Testing

coffey TESTING
Newcastle Laboratory
16 Callistemon Close Warabrook NSW 2304
Phone: 0438 938 932
Email: Newcastle Laboratory

Accredited for compliance with ISO/IEC 17025 - Testing



Approved Signatory: Raphael Kirby-Faust
Geotechnician
Laboratory Accreditation Number: 431

Shrink Swell Index AS 1289 7.1.1 & 2.1.1					
Sample Number	NEWC4382A				
Date Sampled	25/03/2025				
Date Tested	24/03/2025				
Material Source	**				
Sample Location	Lot 607 - BH1 (0.7 - 1m)				
Inert Material Estimate (%)	0				
Pocket Penetrometer before (kPa)	600+				
Pocket Penetrometer after (kPa)	210				
Shrinkage Moisture Content (%)	28.4				
Shrinkage (%)	**5.1**				
Swell Moisture Content Before (%)	28.9				
Swell Moisture Content After (%)	31.1				
Swell (%)	**6.3**				
Shrink Swell Index Iss (%)	**4.6**				
Visual Description	silty CLAY (brown)				
Cracking	MC				
Crumbling	No				
Remarks	**				

Shrink Swell Index (Iss) reported as the percentage vertical strain per pF change in suction.
Cracking Terminology: UC Uncracked, SC Slightly Cracked, MC Moderately Cracked, HC Highly Cracked, FR Fragmented.
NATA Accreditation does not cover the performance of pocket penetrometer readings.

Appendix F

FOUNDATION MAINTENANCE AND FOOTING PERFORMANCE

Foundation Maintenance and Footing Performance:
A Homeowner's Guide

CSIRO

BTF 18
replaces
Information
Sheet 10/91

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the homeowner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

This Building Technology File is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking in buildings.

Soil Types

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. The table below is Table 2.1 from AS 2870, the Residential Slab and Footing Code.

Causes of Movement

Settlement due to construction
There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction, but has been known to take many years in exceptional cases.

These problems are the province of the builder and should be taken into consideration as part of the preparation of the site for construction. Building Technology File 19 (BTF 19) deals with these problems.

Erosion
All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

Saturation
This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume – particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

Seasonal swelling and shrinkage of soil
All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

Shear failure
This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.
- In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

GENERAL DEFINITIONS OF SITE CLASSES

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites with only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which can experience moderate ground movement from moisture changes
H	Highly reactive clay sites, which can experience high ground movement from moisture changes
E	Extremely reactive sites, which can experience extreme ground movement from moisture changes
A to P	Filled sites
P	Sites which include soft soils, such as soft clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soils subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise

Tree root growth
Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.
- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

Unevenness of Movement

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Swelling gradually reaches the interior soil as absorption continues. Shrinkage usually begins where the sun's heat is greatest.

Effects of Uneven Soil Movement on Structures

Erosion and saturation
Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

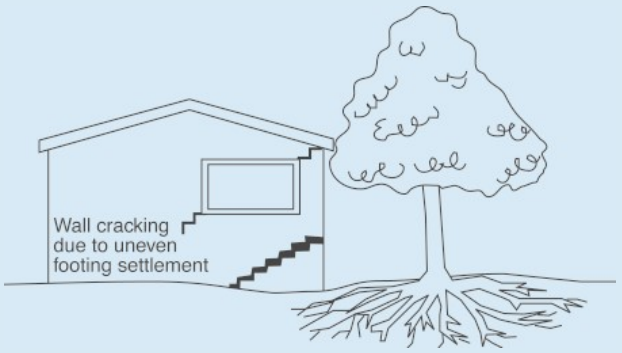
Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

Seasonal swelling/shrinkage in clay
Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

Trees can cause shrinkage and damage



As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

Movement caused by tree roots
In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

Complications caused by the structure itself
Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

Effects on full masonry structures
Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

Effects on framed structures
Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation cause a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

Effects on brick veneer structures
Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

Water Service and Drainage

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem.
Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

Seriousness of Cracking

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. The table below is a reproduction of Table C1 of AS 2870.

AS 2870 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

Prevention/Cure

Plumbing
Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible, and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

Ground drainage
In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject is referred to in BTF 19 and may properly be regarded as an area for an expert consultant.

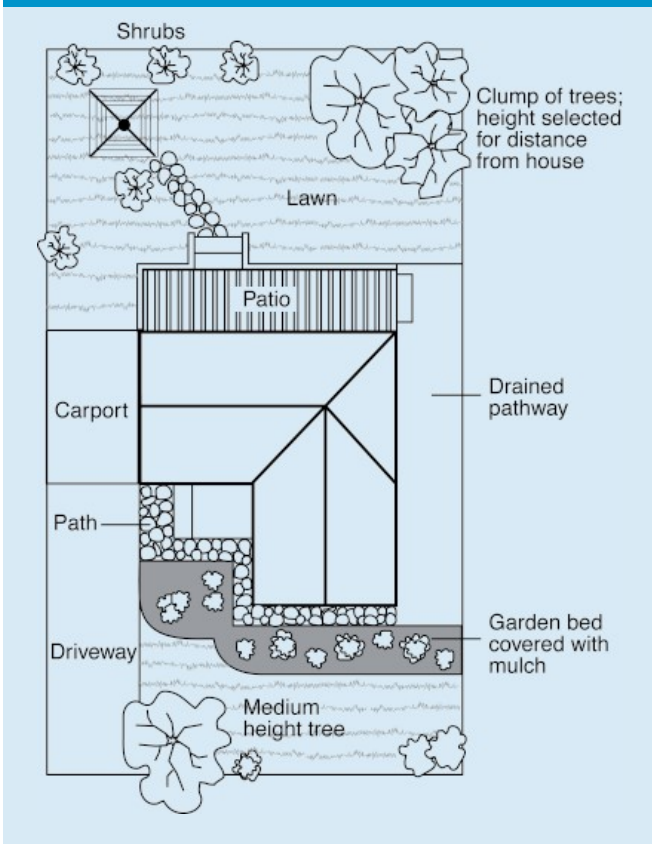
Protection of the building perimeter
It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving

CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS

Description of typical damage and required repair	Approximate crack width limit (see Note 3)	Damage category
Hairline cracks	<0.1 mm	0
Fine cracks which do not need repair	<1 mm	1
Cracks noticeable but easily filled. Doors and windows stick slightly	<5 mm	2
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired	5–15 mm (or a number of cracks 3 mm or more in one group)	3
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted	15–25 mm but also depend on number of cracks	4

Gardens for a reactive site



should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill from it (see BTF 19).

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

Condensation
In buildings with a subfloor void such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

Warning: Although this Building Technology File deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

The garden
The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

Existing trees
Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

Information on trees, plants and shrubs
State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information. For information on plant roots and drains, see Building Technology File 17.

Excavation
Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

Remediation

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the homeowner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

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Distributed by

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