

**KEY**

|                                       |          |
|---------------------------------------|----------|
| FINAL SURFACE CONTOURS                |          |
| STORMWATER PIPELINE                   |          |
| SURFACE INLET PIT                     |          |
| JUNCTION PIT (SEALED)                 |          |
| FUTURE DWELLING STORMWATER CONNECTION |          |
| HEADWALL WITH ENERGY DISSIPATOR       |          |
| SWALE INVERT                          |          |
| RE-ALIGNED DRAINAGE DEPRESSION        |          |
| FLOW DIRECTION                        |          |
| PIT NAME                              | 1A501-03 |
| SITE BOUNDARY                         |          |

ALL WORKS ON APPROVED LOTS 21 & 22 (DP1036400) INCLUDING DRAINAGE AND STORMWATER WORKS IN ACCORDANCE WITH EXISTING DRIVEWAY APPROVAL (CC 0328/14)

EXISTING DRAINAGE DEPRESSION DISCHARGE POINT INTO LOT 2 DP408800. SEE E-500 NOTES FOR HYDRAULIC ANALYSIS RESULTS. SEE E-501 FOR HYDRAULIC MODEL CATCHMENT SUMMARY AND LAYOUT.

# DEVELOPMENT APPLICATION

| REV | DESCRIPTION                                      | DATE       | DRAWN | DESIGNED | CHECKED | APPRVD |
|-----|--|------------|-------|----------|---------|--------|
| D   | FOR DA - ADDRESS COUNCIL LETTER DATED 24/10/2016 | 23/11/2016 | BL    | BL       | GT      | GT     |
| C   | FOR DA SUBMISSION                                | 07/07/2016 | RK    | TH       | TH      | GT     |
| B   | FOR CLIENT REVIEW                                | 03/06/2016 | RK    | TH       | TH      | GT     |
| A   | FOR CLIENT REVIEW                                | 04/03/2016 | RK    | TH       | TH      | GT     |

SCALE

A1 (A3) 1:200 (1:400) METRES

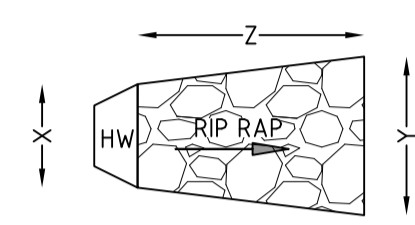
GRID MGA DATUM mAHD PROJECT MANAGER GT CLIENT

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**CARISTE PTY LTD**  
 SUBDIVISION WORKS  
 SUBDIVISION, DRIVEWAY AND DRAINAGE WORKS  
 62 HILLSIDE ROAD, NEWPORT NSW  
 LOT 1 DP408800

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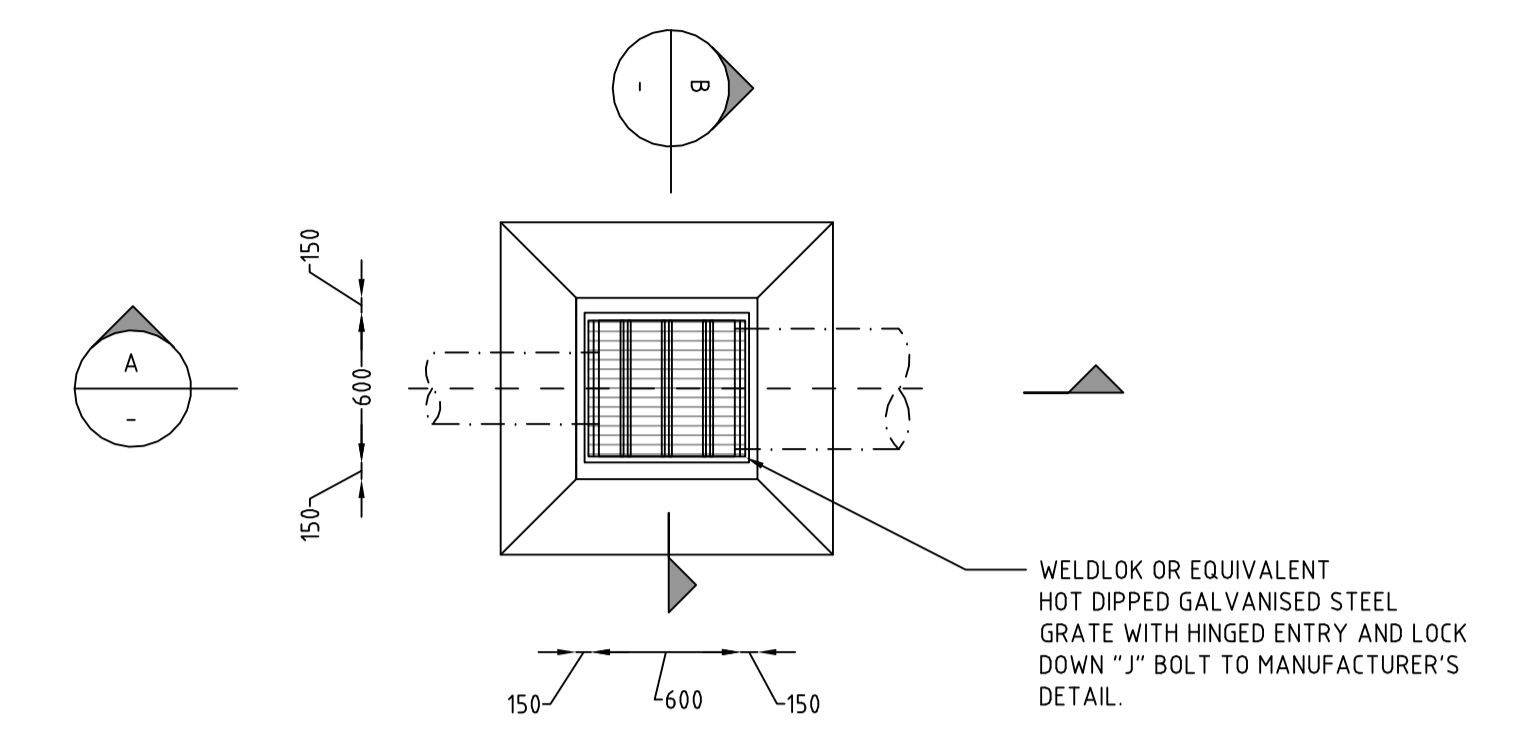
|                           |             |             |             |          |
|---------------------------|-------------|-------------|-------------|----------|
| DRAWING TITLE             |             |             |             |          |
| DRAINAGE PLAN (LAYOUT 01) |             |             |             |          |
| PROJECT NO.               | PLANSET NO. | RELEASE NO. | DRAWING NO. | REVISION |
| P1203617                  | PS02        | R04         | PS02-E200   | D        |



| RIP RAP SIZING | Q10 (L/s) | VELOCITY (m/s) | DIA (mm) | X (mm)                    | Y (mm) | Z (mm) | d50 (mm) | RANGE (mm) | MINIMUM RIP RAP ROCK THICKNESS (mm) |
|----------------|-----------|----------------|----------|---------------------------|--------|--------|----------|------------|-------------------------------------|
| TYPICAL HW     | 34        | 1.93           | 150      | CULVERT APRON WIDTH + TBC | TBC    | TBC    | TBC      | TBC        | TBC                                 |

### TYPICAL RIP RAP SIZING

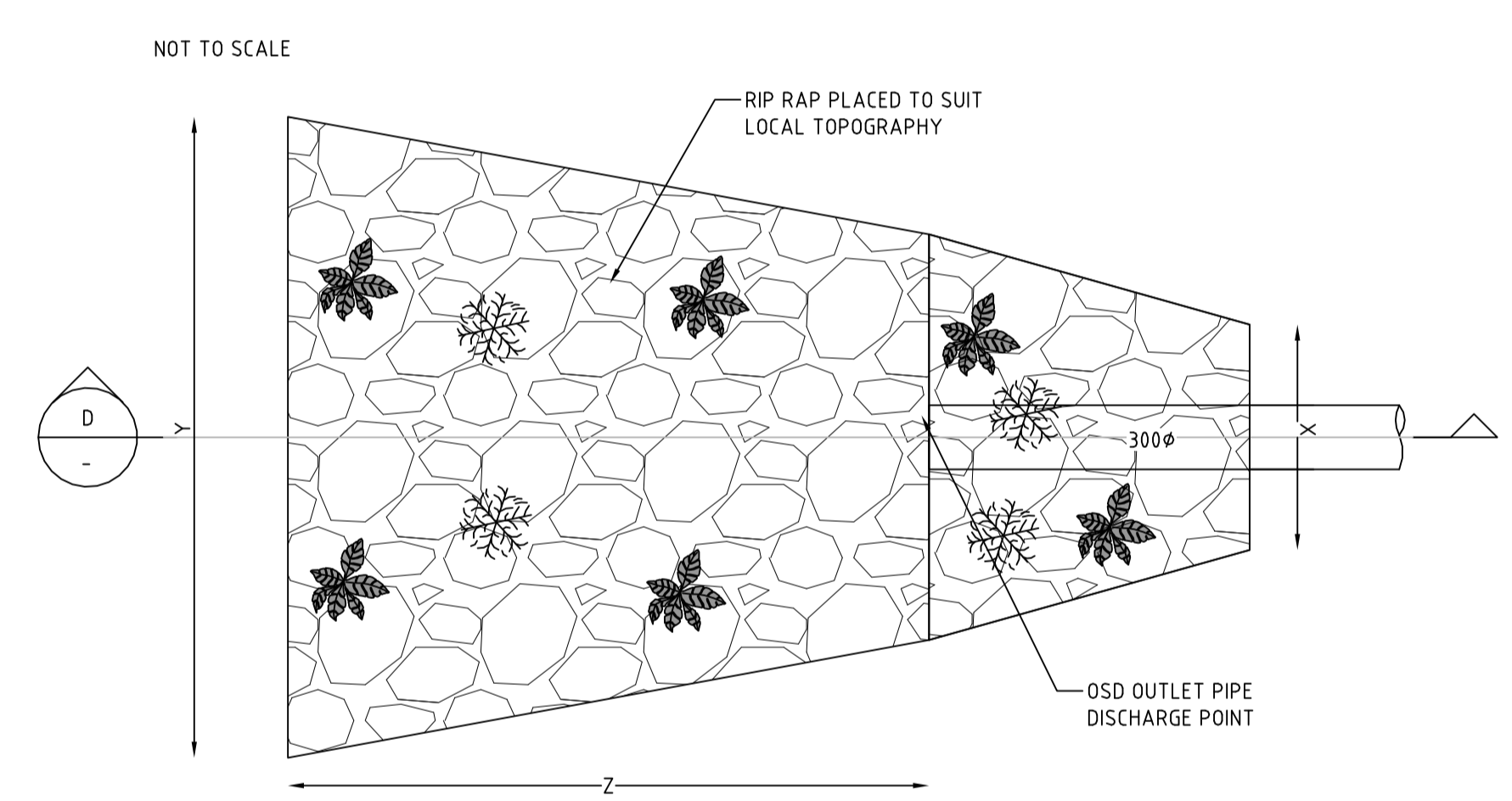
NOTES:  
 RIP RAP GEOMETRY TO BE CONFIRMED AT DETAIL DESIGN STAGE  
 PIPE FLOW RATE BASED ON INDICATIVE 150MM PIPE AT 5% GRADE.  
 FLOW RATE AND VELOCITY TBC AT DETAIL DESIGN STAGE.



### SURFACE INLET PIT

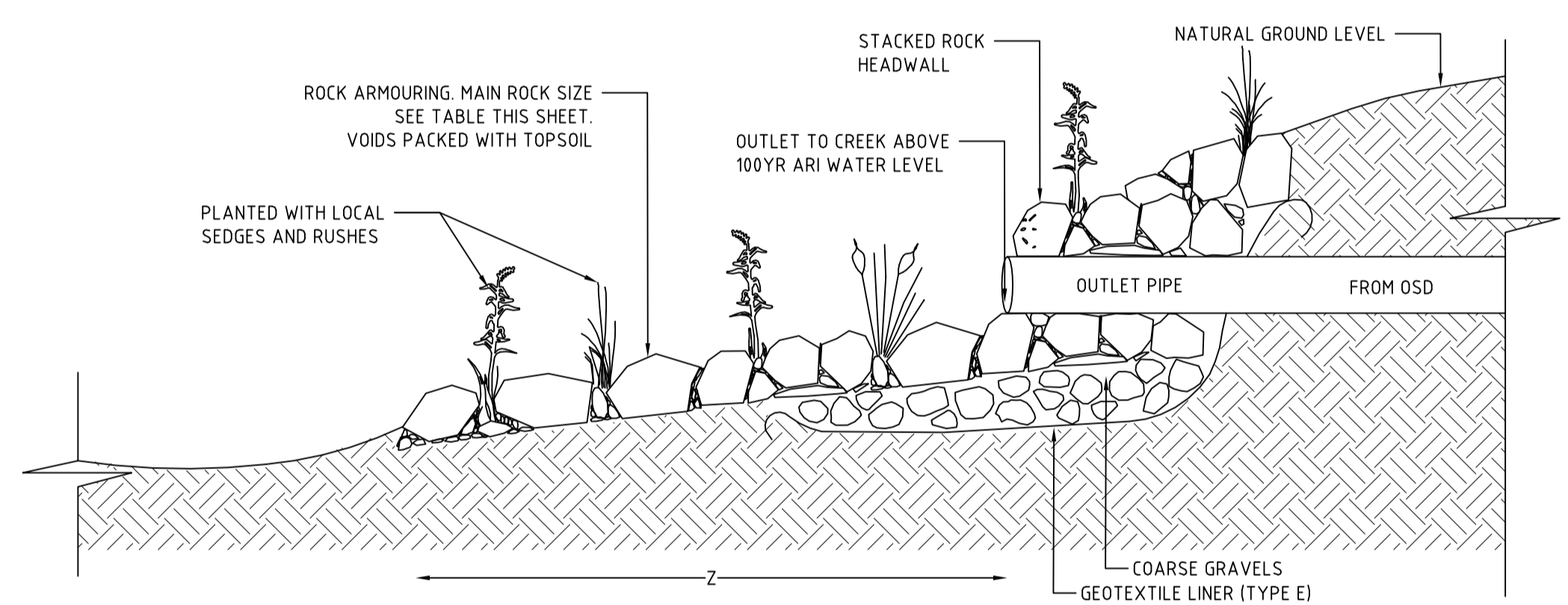
NOT TO SCALE

NOTES:  
 ALL PITS TO BE BENCHED AND STREAMLINED.  
 PROVIDE SL72 REINFORCEMENT AND GALVANISED STEP IRONS IN ALL PITS OVER 1.2m DEEP AS MEASURED FROM THE TOP OF GRATES TO THE INVERT OF THE PIT.



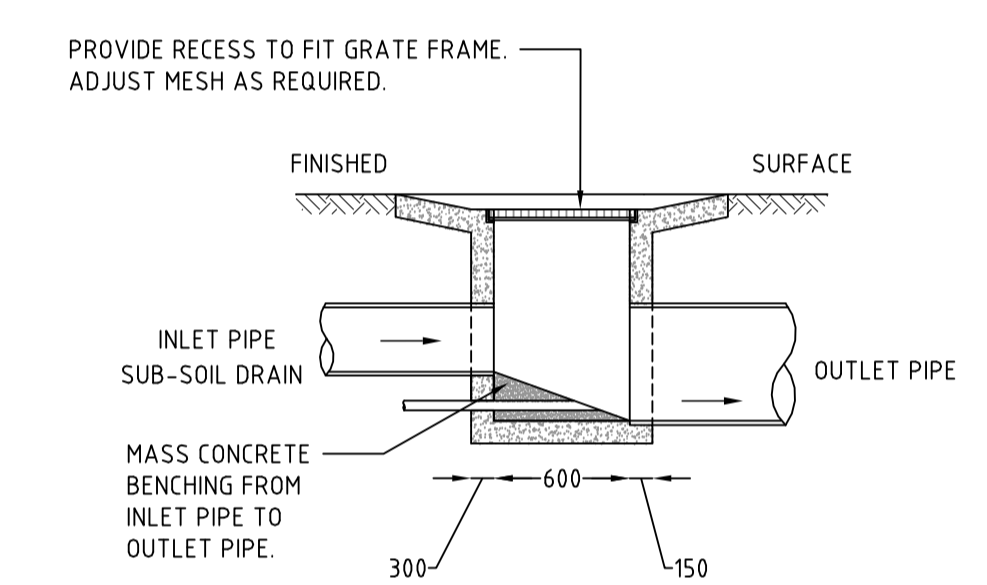
### TYPICAL HEADWALL OUTLET AND RIP RAP PLAN

NOT TO SCALE



### TYPICAL HEADWALL OUTLET AND RIP RAP SECTION D

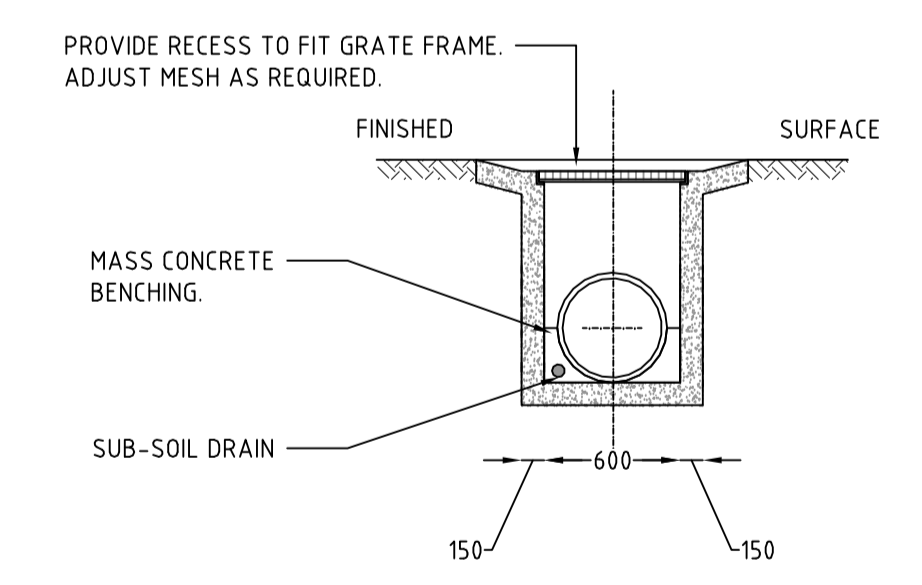
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### SECTION A

GRATED SURFACE INLET PIT (600 x 600 GSIP)

NOT TO SCALE



### SECTION B

600 x 600 GSIP

NOT TO SCALE

- GENERAL NOTES:**  
 NOT FOR CONSTRUCTION - TYPICAL DETAILS ONLY.  
 FINAL ENERGY DISSIPATOR/RIP RAP SIZING AND CHARACTERISTICS TO BE PROVIDED AT DETAILED DESIGN STAGE.  
 1. COMPACT THE SUBGRADE FILL TO THE DENSITY OF THE SURROUNDING UNDISTURBED MATERIAL.  
 2. PREPARE A SMOOTH, EVEN FOUNDATION FOR THE STRUCTURE THAT WILL ENSURE THAT THE CLASS E GEOTEXTILE DOES NOT SUSTAIN SERIOUS DAMAGE WHEN COVERED WITH ROCK.  
 3. SHOULD ANY MINOR DAMAGE TO THE GEOTEXTILE OCCUR, REPAIR IT BEFORE SPREADING ANY AGGREGATE. FOR REPAIRS, PATCH ONE PIECE OF FABRIC OVER THE DAMAGE, WITH ALL JOINTS AND PATCHES OVERLAPPING MINIMUM 300 mm.  
 4. RIP-RAP MEAN SIZE (d50) FROM TABLE PROVIDE AS BLENDED RANGE OF DIAMETERS BEDDED ON 50mm LAYER OF 10-20mm AGGREGATE OVER CLASS E GEOTEXTILE.  
 5. RIP-RAP KEYED INTO BANKS & BED MINIMUM 300mm.

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|-----|--|------------|-------|----------|---------|--------|-------|
| A   | FOR DA - ADDRESS COUNCIL LETTER DATED 24/10/2016 | 23/11/2016 | BL    | BL       | GT      | GT     |       |

| GRID | DATUM | PROJECT MANAGER | CLIENT          |
|------|-------|-----------------|-----------------|
|      |       | GT              | CARISTE PTY LTD |

PROJECT NAME/PLANSET TITLE  
**SUBDIVISION WORKS**  
 SUBDIVISION, DRIVEWAY AND DRAINAGE WORKS  
 62 HILLSIDE ROAD, NEWPORT NSW  
 LOT 1 DP498800

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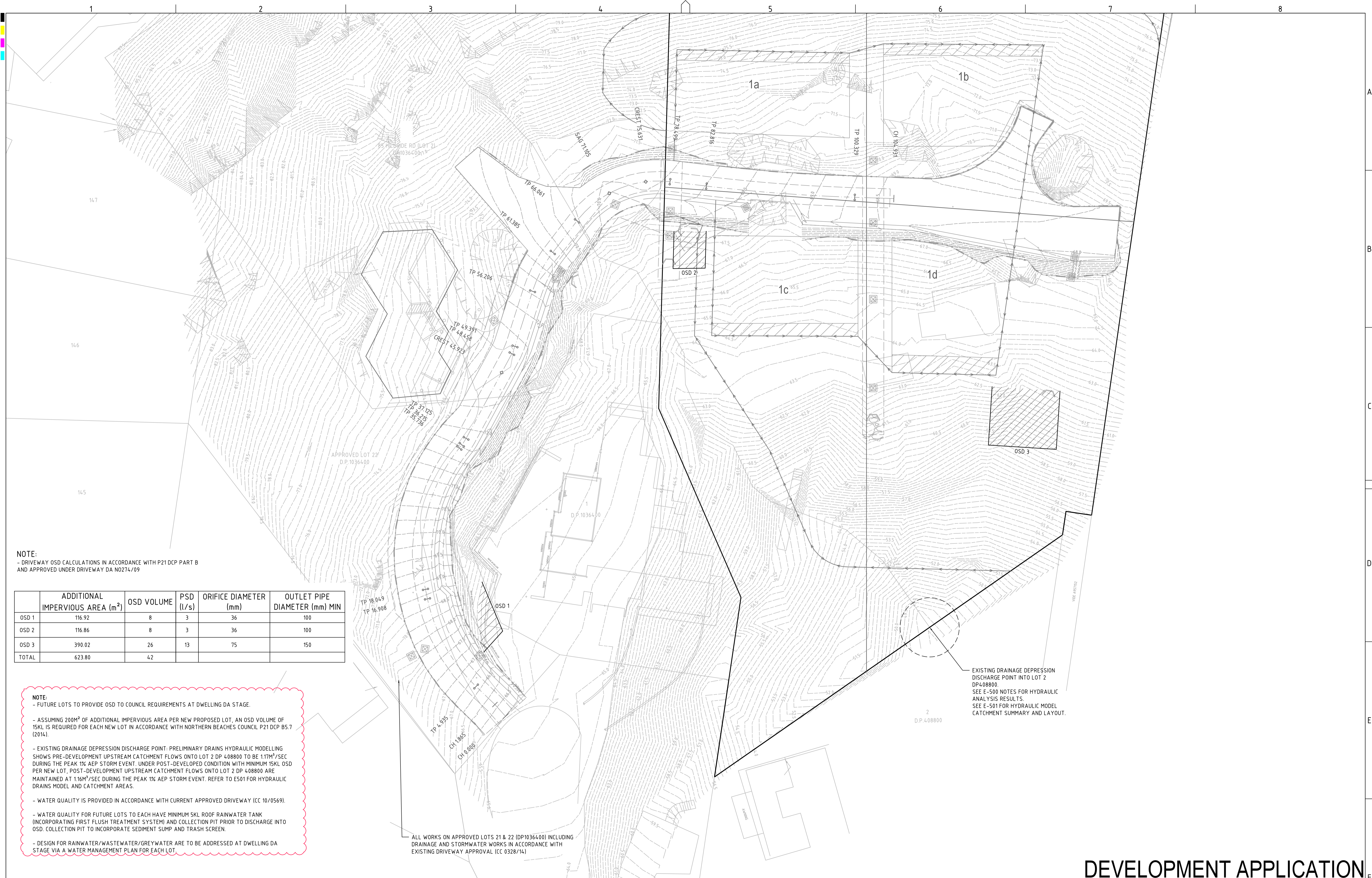
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| DRAWING TITLE                                |             |             |             |          |
|--|-------------|-------------|-------------|----------|
| ENERGY DISSIPATOR/RIP RAP<br>TYPICAL DETAILS |             |             |             |          |
| PROJECT NO.                                  | PLANSET NO. | RELEASE NO. | DRAWING NO. | REVISION |
| P1203617                                     | PS02        | R04         | PS02-E400   | A        |

# DEVELOPMENT APPLICATION

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**NOTE:**  
 - DRIVEWAY OSD CALCULATIONS IN ACCORDANCE WITH P21 DCP PART B AND APPROVED UNDER DRIVEWAY DA N0274/09

|              | ADDITIONAL IMPERVIOUS AREA (m <sup>2</sup> ) | OSD VOLUME | PSD (l/s) | ORIFICE DIAMETER (mm) | OUTLET PIPE DIAMETER (mm) MIN |
|--------------|--|------------|-----------|-----------------------|-------------------------------|
| OSD 1        | 116.92                                       | 8          | 3         | 36                    | 100                           |
| OSD 2        | 116.86                                       | 8          | 3         | 36                    | 100                           |
| OSD 3        | 390.02                                       | 26         | 13        | 75                    | 150                           |
| <b>TOTAL</b> | <b>623.80</b>                                | <b>42</b>  |           |                       |                               |

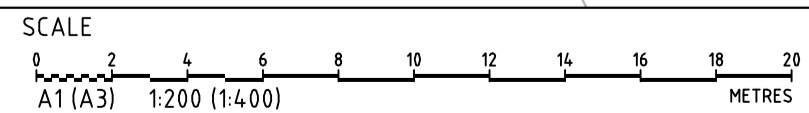
**NOTE:**  
 - FUTURE LOTS TO PROVIDE OSD TO COUNCIL REQUIREMENTS AT DWELLING DA STAGE.  
 - ASSUMING 200M<sup>2</sup> OF ADDITIONAL IMPERVIOUS AREA PER NEW PROPOSED LOT, AN OSD VOLUME OF 15KL IS REQUIRED FOR EACH NEW LOT IN ACCORDANCE WITH NORTHERN BEACHES COUNCIL P21 DCP BS.7 (2014).  
 - EXISTING DRAINAGE DEPRESSION DISCHARGE POINT: PRELIMINARY DRAINS HYDRAULIC MODELLING SHOWS PRE-DEVELOPMENT UPSTREAM CATCHMENT FLOWS ONTO LOT 2 DP 408800 TO BE 1.17M<sup>3</sup>/SEC DURING THE PEAK 1% AEP STORM EVENT. UNDER POST-DEVELOPED CONDITION WITH MINIMUM 15KL OSD PER NEW LOT, POST-DEVELOPMENT UPSTREAM CATCHMENT FLOWS ONTO LOT 2 DP 408800 ARE MAINTAINED AT 1.16M<sup>3</sup>/SEC DURING THE PEAK 1% AEP STORM EVENT. REFER TO E501 FOR HYDRAULIC DRAINS MODEL AND CATCHMENT AREAS.  
 - WATER QUALITY IS PROVIDED IN ACCORDANCE WITH CURRENT APPROVED DRIVEWAY (CC 10/0569).  
 - WATER QUALITY FOR FUTURE LOTS TO EACH HAVE MINIMUM 5KL ROOF RAINWATER TANK (INCORPORATING FIRST FLUSH TREATMENT SYSTEM) AND COLLECTION PIT PRIOR TO DISCHARGE INTO OSD. COLLECTION PIT TO INCORPORATE SEDIMENT SUMP AND TRASH SCREEN.  
 - DESIGN FOR RAINWATER/WASTEWATER/GREY WATER ARE TO BE ADDRESSED AT DWELLING DA STAGE VIA A WATER MANAGEMENT PLAN FOR EACH LOT.

EXISTING DRAINAGE DEPRESSION DISCHARGE POINT INTO LOT 2 DP408800.  
 SEE E-500 NOTES FOR HYDRAULIC ANALYSIS RESULTS.  
 SEE E-501 FOR HYDRAULIC MODEL CATCHMENT SUMMARY AND LAYOUT.

ALL WORKS ON APPROVED LOTS 21 & 22 (DP1036400) INCLUDING DRAINAGE AND STORMWATER WORKS IN ACCORDANCE WITH EXISTING DRIVEWAY APPROVAL (CC 0328/14)

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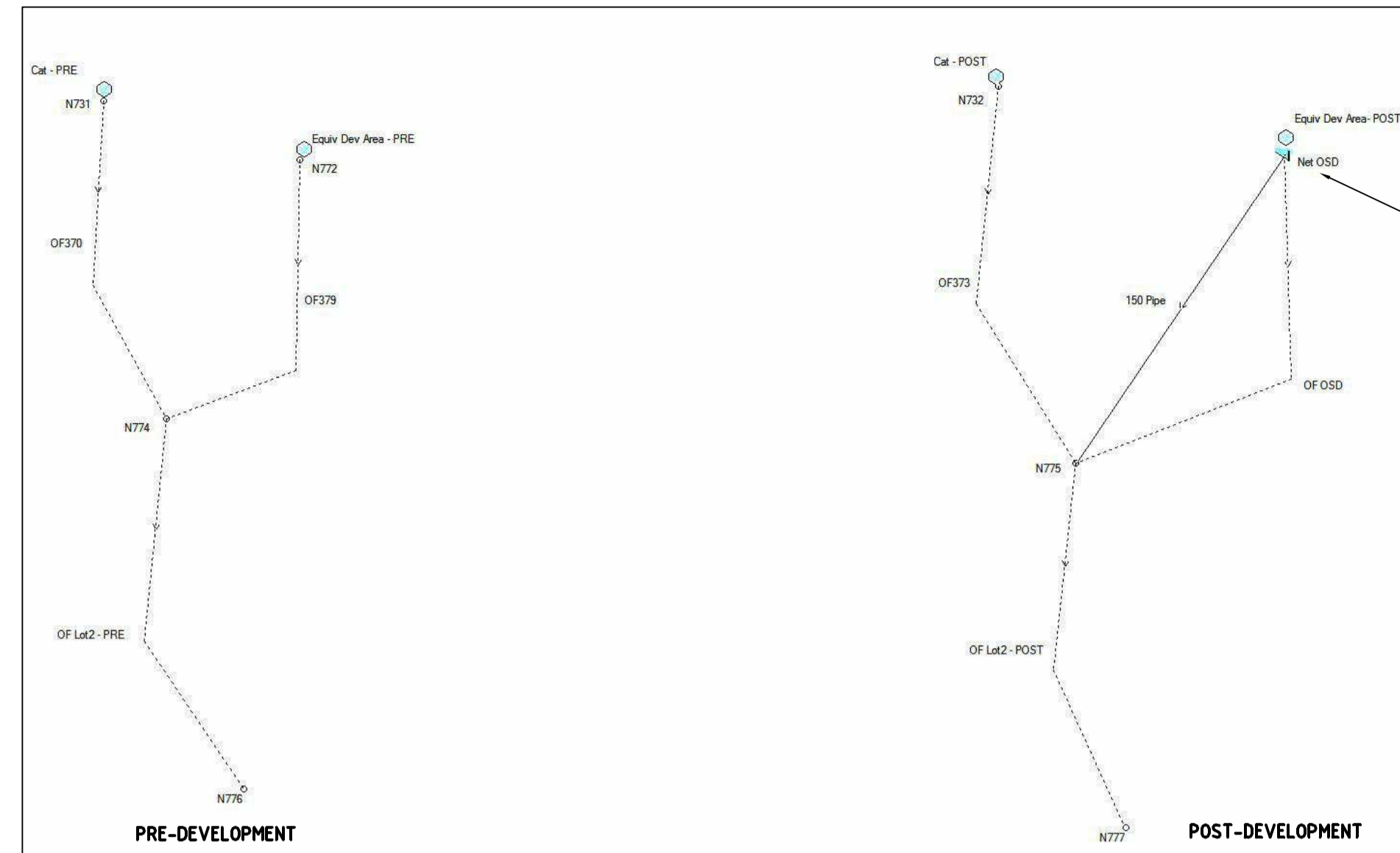
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**CARISTE PTY LTD**  
**SUBDIVISION WORKS**  
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 62 HILLSIDE ROAD, NEWPORT NSW  
 LOT 1 DP408800

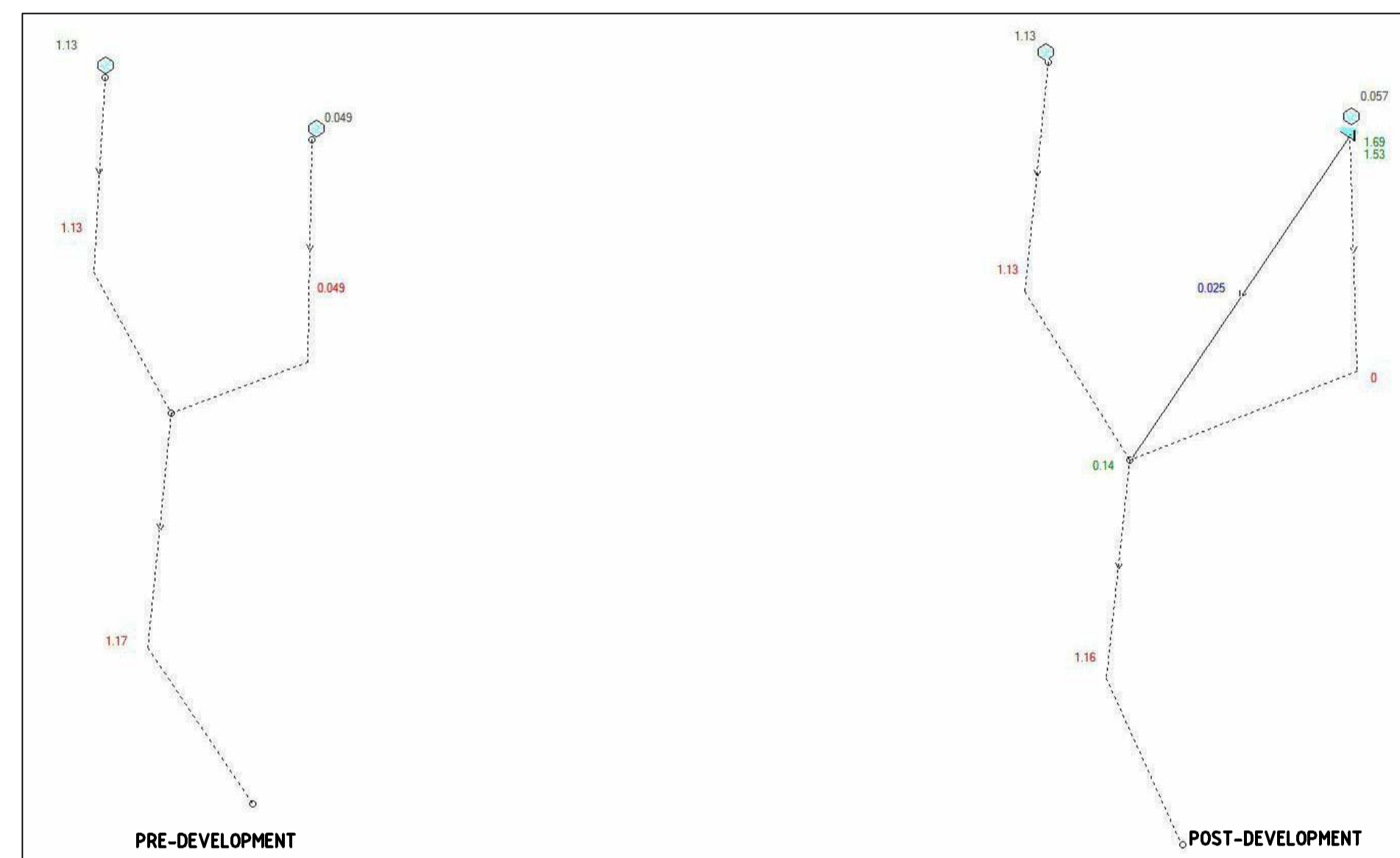


Consulting Engineers  
 Environment Water Geotechnical Civil

| DRAWING TITLE                      |             |             |             |          |
|------------------------------------|-------------|-------------|-------------|----------|
| ON-SITE DETENTION PLAN (LAYOUT 01) |             |             |             |          |
| PROJECT NO.                        | PLANSET NO. | RELEASE NO. | DRAWING NO. | REVISION |
| P1203617                           | PS02        | R04         | PS02-E500   | D        |



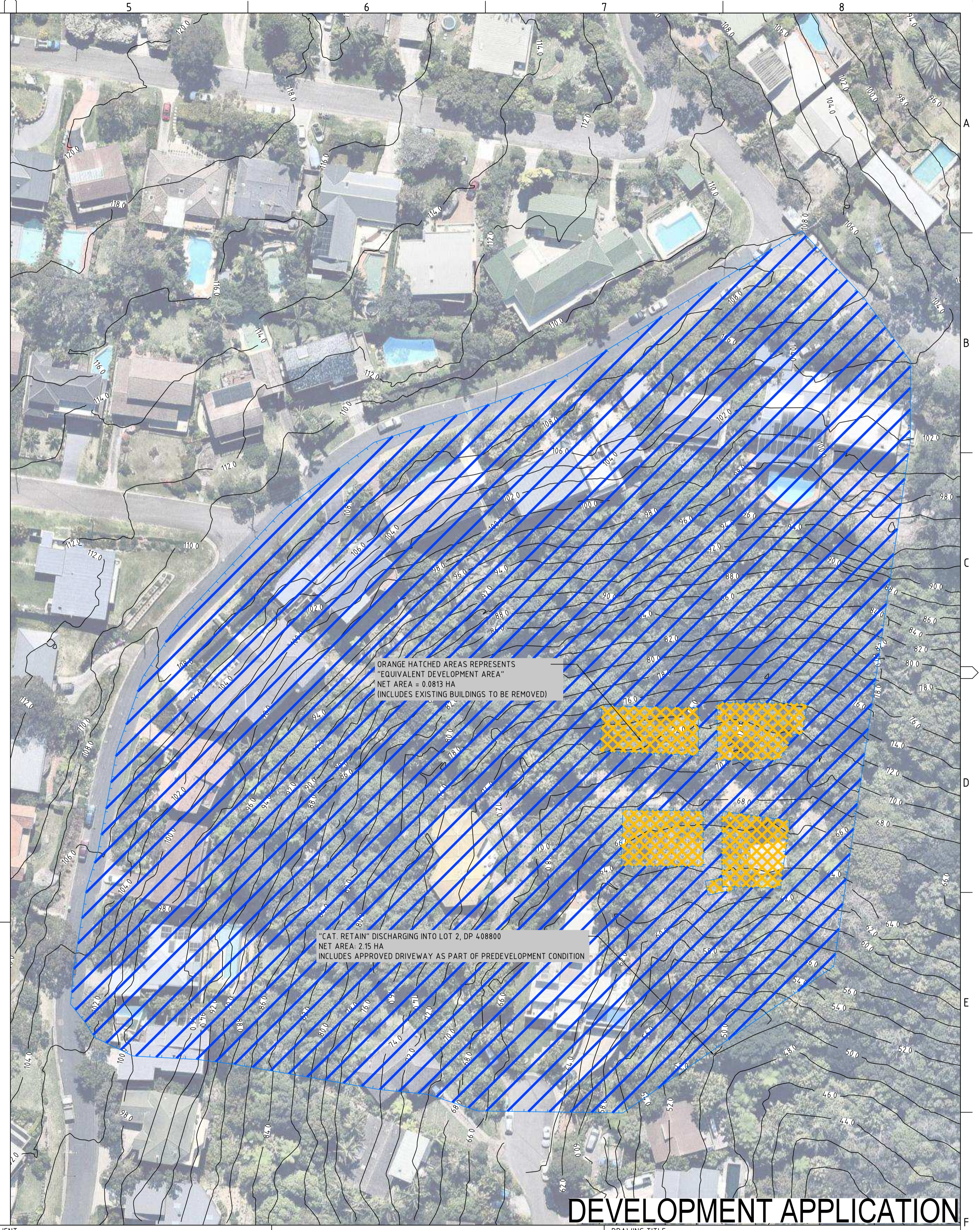
DRAINS MODEL LAYOUT



1% AEP DRAINS MODEL RESULT

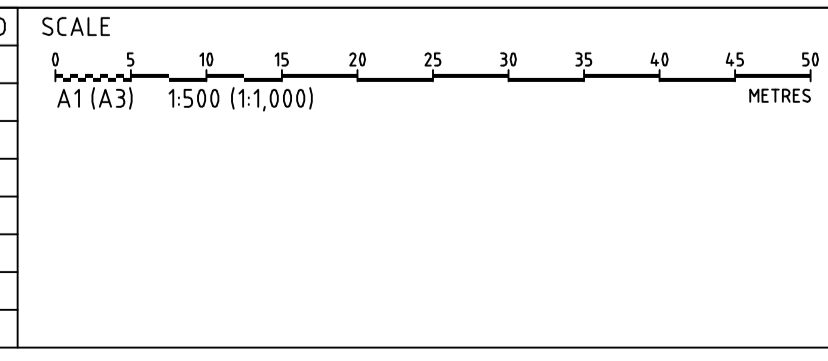
| PROPOSED CATCHMENTS |                     |                              |           |                      |                |                |
|---------------------|---------------------|------------------------------|-----------|----------------------|----------------|----------------|
| KEY                 | DRAINS CAT.         | DESCRIPTION                  | AREA (ha) | % PAVED              | Tc PAVED (min) | Tc GRASS (min) |
|                     | CAT-RETAIN          | RETAINED UPSLOPE CATCHMENT   | 2.15      | 30%                  | 11.25          | 8.75           |
|                     | EQUIV DEV AREA-POST | DEVELOPMENT FOOTPRINT - POST | 0.08      | 98%                  | 1.25           | 5.5            |
|                     |                     | TOTAL AREA                   | 2.23      | = 100% OF TOTAL AREA |                |                |
|                     |                     | TOTAL IMPERVIOUS AREA        | 0.73      | = 33% OF TOTAL AREA  |                |                |
|                     |                     | TOTAL PERVIOUS AREA          | 1.51      | = 67% OF TOTAL AREA  |                |                |

| EXISTING CATCHMENTS |                    |                                  |           |                      |                |                |
|---------------------|--------------------|----------------------------------|-----------|----------------------|----------------|----------------|
| KEY                 | DRAINS CAT.        | DESCRIPTION                      | AREA (ha) | % PAVED              | Tc PAVED (min) | Tc GRASS (min) |
|                     | CAT-RETAIN         | RETAINED UPSLOPE CATCHMENT       | 2.15      | 30%                  | 11.25          | 8.75           |
|                     | EQUIV DEV AREA-PRE | DEVELOPMENT FOOTPRINT - EXISTING | 0.08      | 8%                   | 1.25           | 5.5            |
|                     |                    | TOTAL AREA                       | 2.23      | = 100% OF TOTAL AREA |                |                |
|                     |                    | TOTAL IMPERVIOUS AREA            | 0.66      | = 29% OF TOTAL AREA  |                |                |
|                     |                    | TOTAL PERVIOUS AREA              | 1.58      | = 71% OF TOTAL AREA  |                |                |



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LOT 1 DP408800

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| DRAWING TITLE   |             |             |             |          |
|---|-------------|-------------|-------------|----------|
| OSD DETENTION CATCHMENT PLAN<br>DRAINS MODEL & RESULT |             |             |             |          |
| PROJECT NO.   | PLANSET NO. | RELEASE NO. | DRAWING NO. | REVISION |
| P1203617  | PS02        | R04         | PS02-E501   | A        |