Flood Assessment

Narwee Parklands Care Community

Prepared for Opal HealthCare c/o CYRE Projects / 9 December 2022

221473 CFAA

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Contents

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1.0 Introduction

Taylor Thomson Whitting (NSW) Pty Ltd has been engaged by Opal HealthCare c/o CYRE Projects to prepare a Flood Assessment Report in response to the Secretary's Environmental Assessment Requirements (SEARs), and in support of a State Significant Development (SSD-45024776) for the proposed Senior Housing at 59-67 Karne Street, Narwee NSW 2209 (the site).

The report provides an assessment on flood conditions of the site and summarises the flood modelling results for both existing and proposed site conditions in the 1% AEP and PMF events. The report also provides an impact assessment on neighbouring properties due to the proposed development.

1.1 Project Objectives and Methodology

The objective of this report is to addresses the flooding requirements of the SEARs (key issue 15):

- Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the NSW Floodplain Development Manual.
- Assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required.

15. Flooding Risk • Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the *NSW Floodplain Development Manual*. • Assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required.	• Flood Risk Assessment

Table 1- SEARs Flooding Requirements - SSD-45024776

1.2 Reference Documents

This report has been prepared in accordance with the following guidelines and policies:

- Commonwealth of Australia (Geoscience Australia) (2016), Australian Rainfall and Runoff – A Guide to Flood Estimation.
- NSW Department of Planning and Infrastructure, Planning and Natural Resources (2005), Floodplain Development Manual.
- NSW Department of Planning and Infrastructure, Flood Impact and Risk Assessment (2022).
- Canterbury Local Environmental Plan (LEP, 2012).
- Canterbury Development Control Plan (DCP, 2012).

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1.3 Site

The site is located at 59-67 Karne Street (Lots 2&3 of DP16063, Lot 2 of DP518877 and Lots C&D of DP403467) Narwee NSW 2209 and falls within the Canterbury Bankstown local government area (LGA). The site is bounded to Karne Street to the west, residential properties to the north and east, and Richard Podmore Dog Park to the south.

The site's total area is 7,145m^2 based on the survey data provided by V-Mark Survey Pty Ltd and incorporates two residential buildings, concrete slabs and vegetation including several trees in the existing conditions. The boundaries of the site are illustrated in Figure 1.

Figure 1 The Site Locality (Source: Six Maps)

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2.0 Proposed Development

Architectural drawings prepared by Group GSA indicate that the proposed development involves demolition of the existing buildings onsite and construction of a 3-storey Senior Living complex including a basement.

The proposed architectural plan for ground floor is shown in Figure 2.

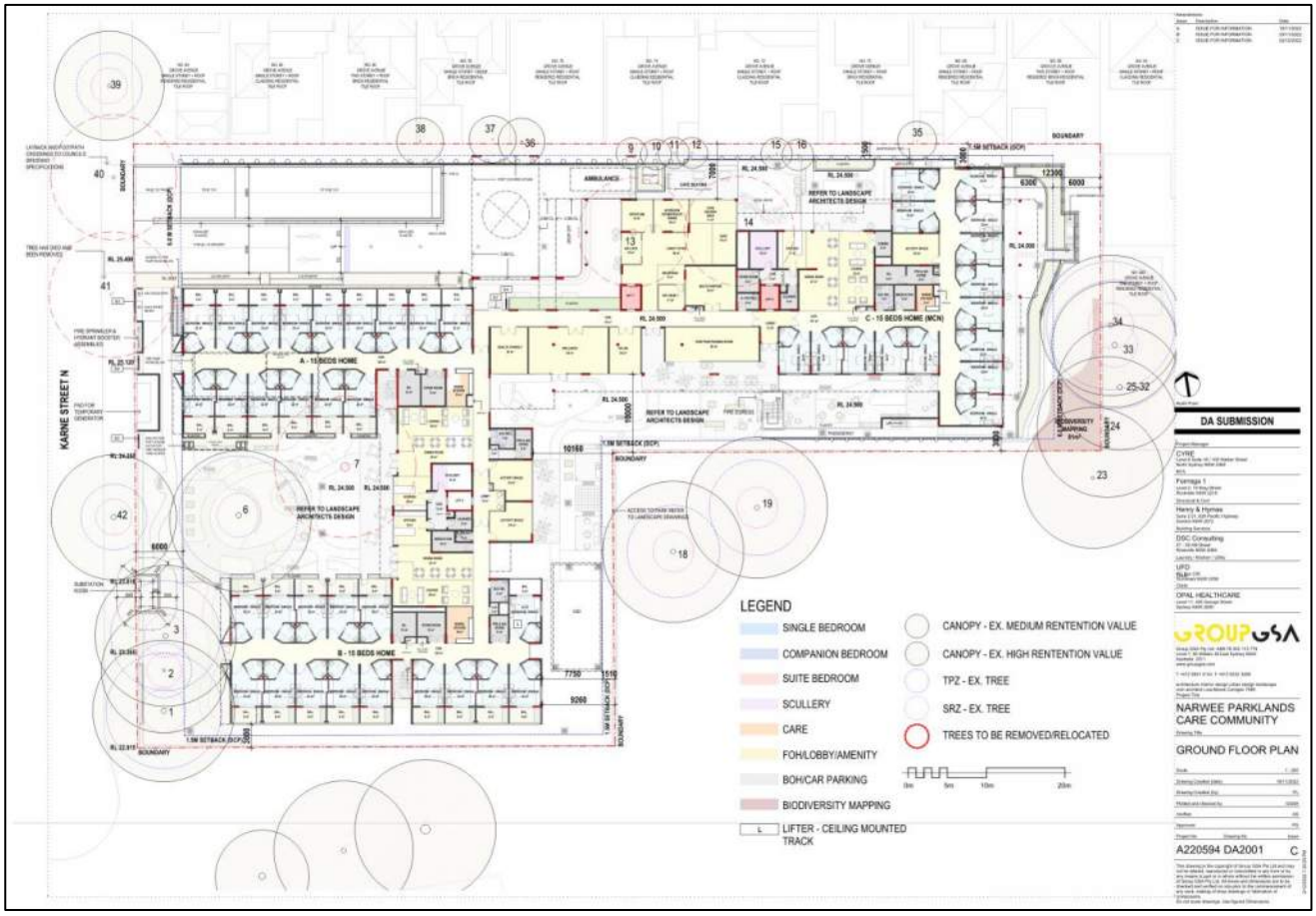

Figure 2. Proposed Architectural Plan (Ground Floor) – Group GSA

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3.0 Available Data

This overland flow study used topographic, and flood related data obtained from a number of sources. The origin and types of information underpinning the assumptions used in this study are presented below.

3.1 Previous Flood Studies

The site is part of Salt Pan Creek catchment which falls within Canterbury Bankstown Local Governmental Area. Cardno has carried out an Overland Flow Study for the Salt Pan Creek Catchment on behalf of Canterbury City Council and summarised the outcomes in the Final Overland Flow Study Canterbury LGA Salt Pan Creek Catchment Report, 2016 (referred to as Council flood study, hereafter).

As part of the study, Cardno has prepared a hydraulic flood model for the catchment which TTW obtained from Council (referred to as Council flood model, hereafter) and used it as a basis to assess the flood conditions of the site in both predevelopment and post development conditions.

3.2 Survey Data

Survey information adopted for this study has been collated from the following sources:

- One metre resolution Digital Elevation Model (DEM), ALS.
- GIS layers of cadastre and satellite imagery provided by the NSW LPI.
- Site survey prepared by V-Mark Survey Pty Ltd.

4.0 Hydraulic Model Structure

The Council's TUFLOW hydraulic model was used to determine flood extents, levels, depths, velocities and hydraulic hazard during the critical 1% AEP and PMF events for the site in the existing and proposed conditions.

The procedure completed to create the site flood model is described in the below steps:

- Refine the TUFLOW model by updating the model data and incorporating additional site-specific data.
- Determine flood extents, levels, depths, velocities and hydraulic hazard during the critical 1% AEP and PMF events for the site in existing conditions.
- Update the TUFLOW model to allow simulation of the proposed site conditions.
- Determine flood extents, levels, depths, velocities and hydraulic hazard during the critical 1% AEP and PMF events for the site in proposed conditions.
- Carry out an offsite impact assessment and prepare a flood impact map for the 1% AEP event.
- Comment on flood characteristics and model outcomes in existing and proposed conditions.
- Undertake a compliance assessment based on the flood planning requirements of Canterbury Bankstown City Council.

4.1 2D Model Domain

The model domain received from Council covers a large area of approximately 600 ha with the site located towards upstream of the catchment. Hence, for the purpose of current flood assessment, the original 2D model domain was modified to an area of 115 ha by placing the downstream model boundary at Bennett Park (approximately 220m downstream of the site). TTW model domain is shown in Figure 2.

Council's model adopted a 2m grid cell size however, grid cell size was reduced to 1m to enable accurate flood simulation for the site.

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4.2 Model Topography

The existing TUFLOW model surface was merged with the available site survey DTM triangles data including parts Karne Street and Gove Avenue to increase the accuracy of the existing model surface at the site proximity.

4.3 Building Footprints

The footprints of buildings surrounding critical overland flow path to the north of the site are modelled as blocked elements within the 2D domain to act as flow blockage.

Building outlines of the existing buildings onsite as well as the nearby buildings were refined based on the site survey and aerial photographs.

4.4 Boundary Conditions

Definition of model inflow and outflow boundaries are explained in below sections:

4.4.1 Inflow boundary

Cardno model inflows are defined as per follows:

- A ‘direct rainfall’ boundary is applied to the entire 2D model domain.
- Additional inflow hydrographs are also applied to the model to account for the lateral catchments draining into the Saltpan Creek Catchment.

The location of discharge flows from lateral catchments are far enough from the site and have no material impact on the flood conditions of the site (refer Figure 2). Therefore, only the direct rainfall boundary was applied to the entire TTW model domain.

4.4.2 Downstream Boundary

Downstream model boundary was defined at allocation approximately 220m downstream of the site. A stage-discharge (water level versus flowrate) curve was adopted as the downstream boundary condition. This stage-discharge relationship was generated by TUFLOW by specifying a downstream boundary slope.

Figure 3 shows the TTW model domain and location of downstream boundaries.

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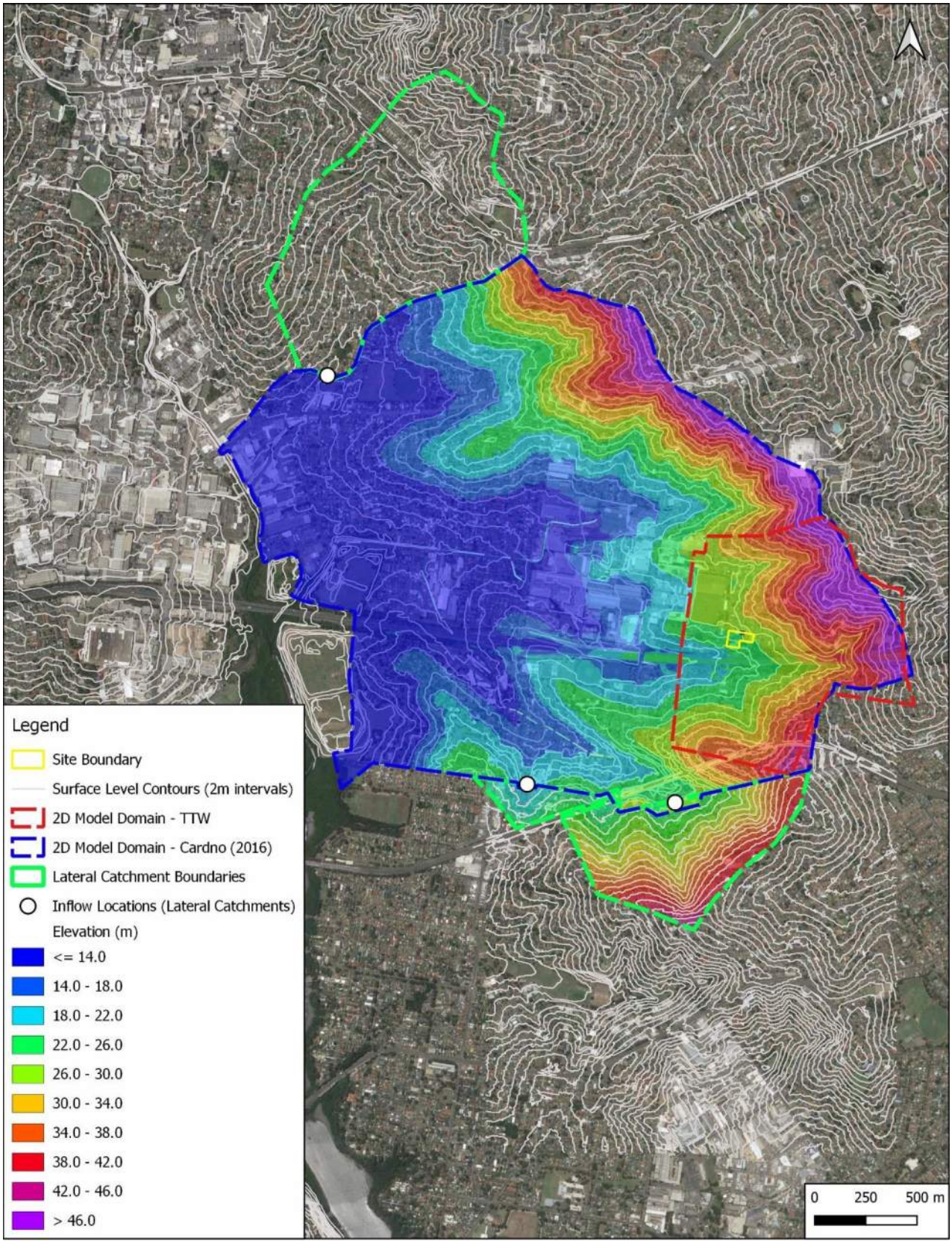

Figure 2 – Inflow locations of Lateral Catchments - Council Model Domain (Cardno, 2016)

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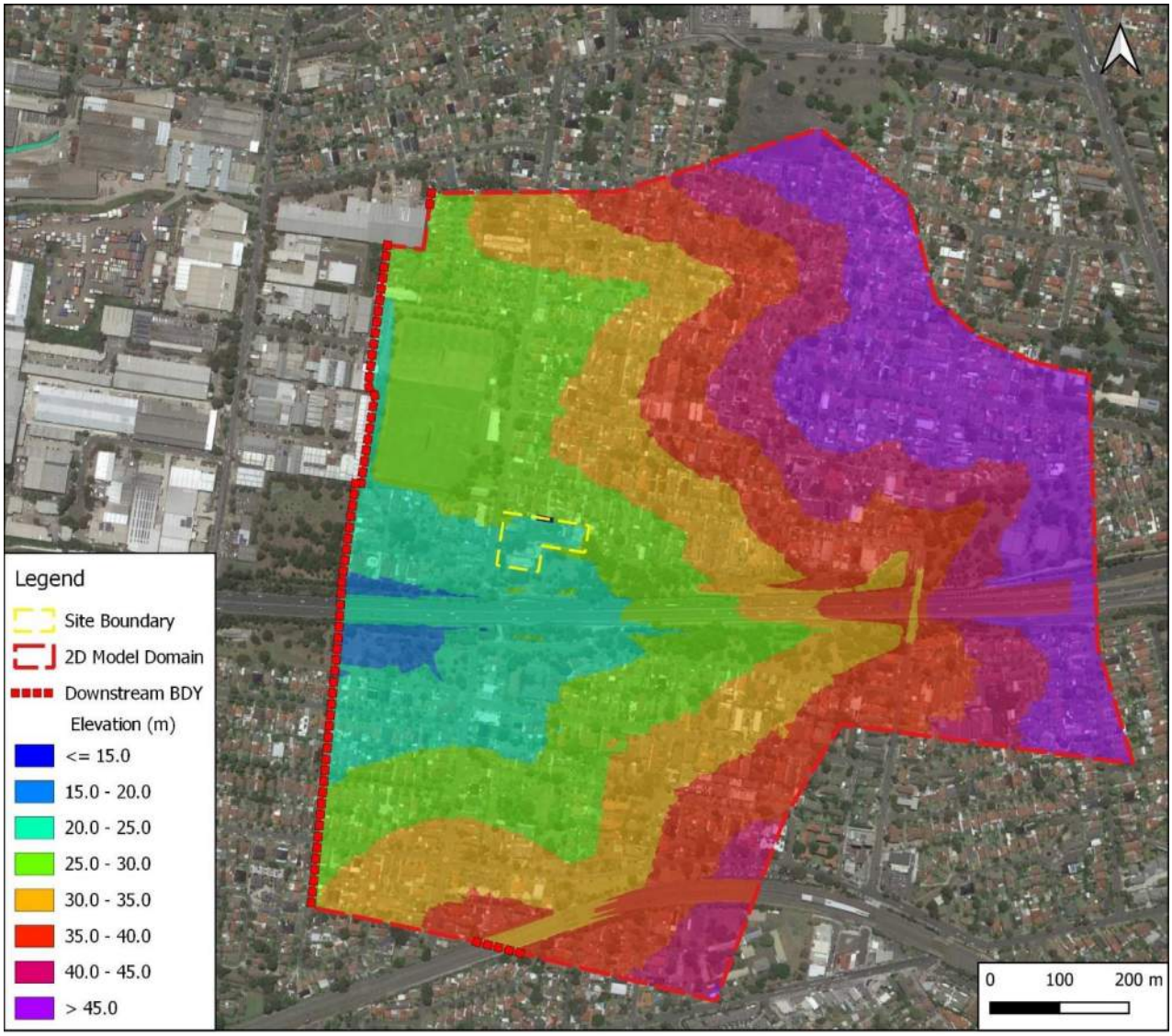

Figure 3 – TTW Model Domain and Location of Downstream Model Boundary

4.5 1D Model Domain

The existing 1D network was retained inside the model, consistent with the Council's model. Pit blockages were also retained consistent with the Council's model.

Existing drainage network through Grove Avenue and Karne Street were updated based on the latest survey and CCTV investigations completed by V-Mark Survey Pty Ltd. Refer to survey maps (Appendix A) for details.

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4.6 Hydraulic Roughness and Rainfall Losses

Cardno has defined the rainfall losses and Manning's values based on various catchment land uses and in accordance with the Australian Rainfall and Runoff Book 2 (Engineers Australia, 1987) as well as typical loss rates for catchments in this region. Adopted Manning's values and rainfall losses are summarised in Table 2.

Table 2 - Adopted Manning's and Rainfall Losses

Land Use	Initial Loss (mm)	Continuing Loss (mm / hour)	Manning's
Roads	0	0	0.02
Paved Ground	0	0	0.03
Open Space/Park/Light Vegetation	15	1.5	0.035
Residential	15	1.5	0.1
Industrial/Commercial	3.75	0.75	0.1

Manning's values and rainfall losses were retained in the model consistent with Council's model.

4.7 Design Storm Events and Rainfall Data

rainfall data used for the Saltpan Creek overland study (Cardno, 2016) is based on the AR&R 87 which has now been superseded and replaced with AR&R 2016. Therefore, the rainfall data in the model was updated with AR&R 2016 IFD and associated temporal patterns.

Model was then run for a range of 1% AEP storm durations from 30 minutes to 180 minutes using 10 temporal patterns to determine the critical storm duration at the site. The critical 1% AEP storm duration was determined to be 45minutes for the site based on the AR&R 2016 rainfall data and 15 minutes for the PMF.

5.0 Model Results

The behaviour of the overland floodwaters across the site and in the vicinity of the site during the critical 1% AEP and PMF events for the existing and proposed site conditions are described in general terms, and offsite flood impacts due to the proposed development are investigated.

5.1 Existing Conditions

The peak flood levels depths, velocities and hazards for the critical duration 1%AEP and PMF events for existing site conditions are shown in Figure 4 to Figure 6 and Figure 7 to Figure 9 respectively.

The results confirm that the site is not affected by the overland flows of Grove Avenue however, the overland flows from private properties to the north of the site enter the site via the northern site boundary and traverse the site towards the southern boundary where eventually discharge to Richard Podmore Dog Park. The peak flow entering from the northern site boundary is up to 190 m^3/s in the 1%AEP event.

There are a few ponding areas over the local trapped-low points within the site in existing conditions which generally are of low hazard.

During the PMF though, Floodwaters over Grove Avenue overtop the kerb onto the private properties along Gove Avenue which are to the north of the site and run south towards the site. The peak flow rate arriving to the site through the northern site boundary is circa 2.3 m^3/s during the PMF event. Flood depths are generally shallow across the site (<0.25m) except for the existing trapped-low points where the flood depths are as high as 0.7m.

Flood velocities are less than 0.5 m/s and of low hazard across the site during the PMF event.

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Figure 4 - 1%AEP Overland Flow Level & Depth – Existing Conditions

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Figure 5 - 1%AEP Overland Flow Velocity – Existing Conditions

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Figure 6 - 1%AEP Overland Flow Hazard – Existing Conditions

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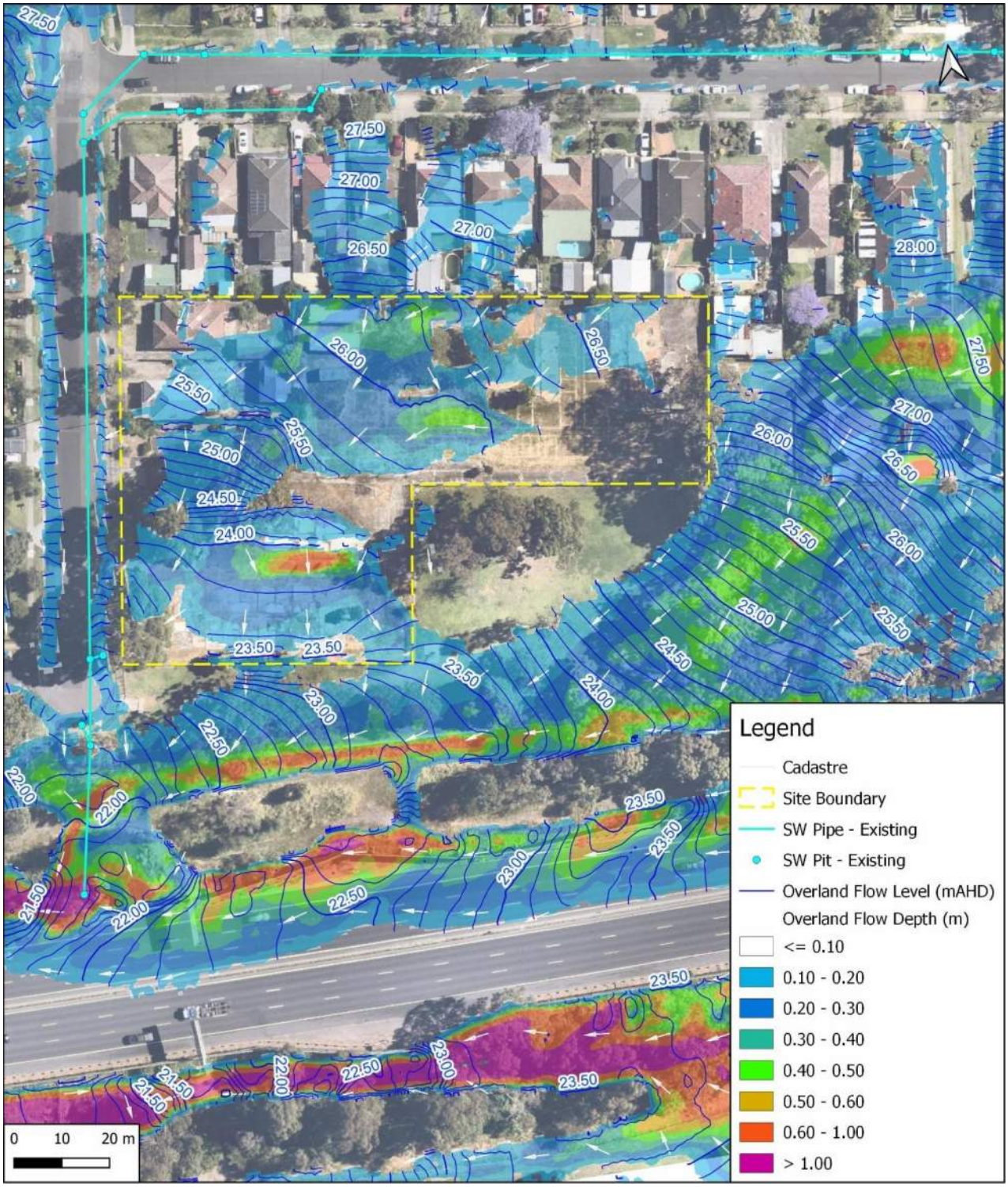

Figure 7 - PMF Level & Depth – Existing Conditions

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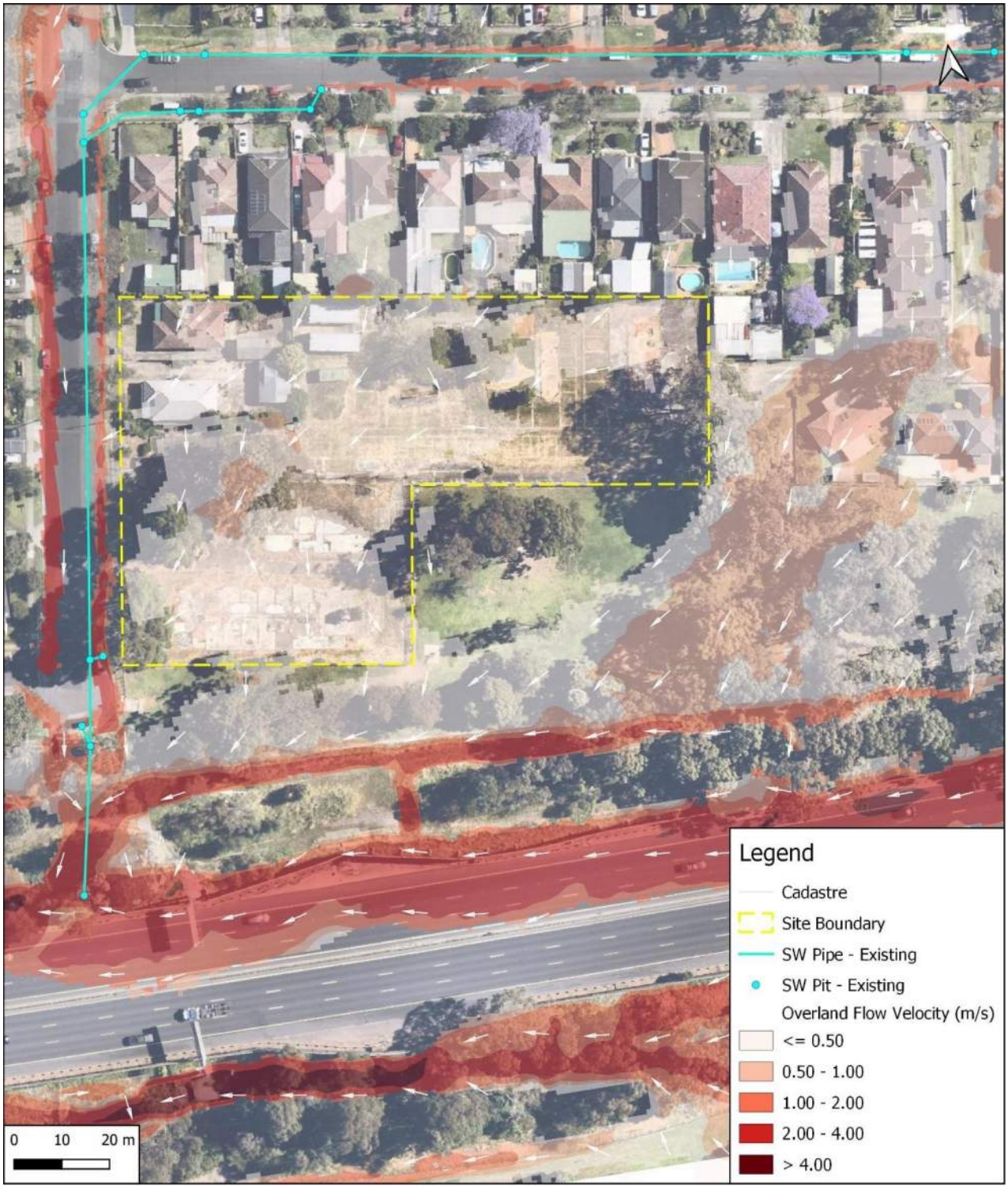

Figure 8 PMF Velocity – Existing Conditions

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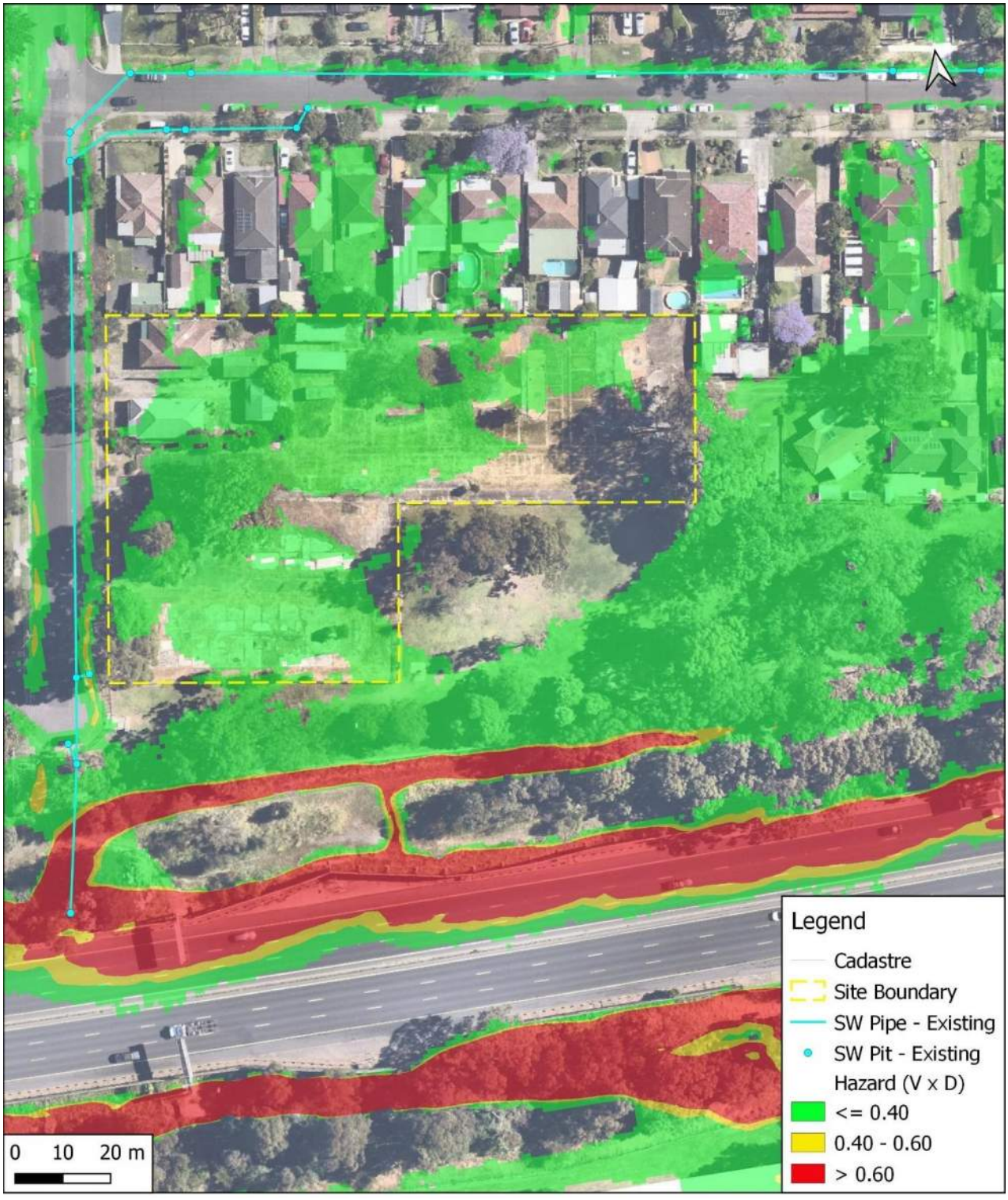

Figure 9 - PMF Hazard – Existing Conditions

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5.2 Proposed Conditions

Model was updated through followings steps in order to enable flood simulation for the proposed site conditions:

- Site elevations were updated by incorporating the proposed surface elevation TIN prepared by Henry & Hymas.
- Existing buildings onsite were removed and replaced with the proposed structures.
- The proposed drainage swale along the northern site boundary was represented in the model.
- The proposed inground drainage pit & pipe system along the northern site boundary was incorporated into the model and a pipe discharge connection was made to the existing 650mm pipe at Karne Avenue based on the stormwater design received from Henry & Hymas.
- Existing roughness Manning's zones were also adjusted to represent the proposed surface in the model.

The flood model was then run for the critical duration 1% AEP and PMF events.

Flood results for the proposed site conditions confirm that the site is effectively flood free during both 1% AEP and PMF events and overland flows arriving from the northern site boundary are effectively redirected to Karne Avenue through the proposed drainage system. Minor local overland flows on the site are generally shallow and of low hazard.

Please note that the ponding areas shown over the site during the PMF event are due to application of direct rainfall in the model and are not considered flooding.

The peak flood levels depths, velocities, and hazards for the critical duration 1%AEP and PMF events for proposed site conditions are shown in Figure 10 to Figure 12 and Figure 13 to Figure 15 respectively.

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Figure 10 - 1%AEP Overland Flow Level & Depth – Proposed Conditions

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Figure 11 - 1%AEP Overland Flow Velocity – Proposed Conditions

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Figure 12 - 1%AEP Overland Flow Hazard – Proposed Conditions

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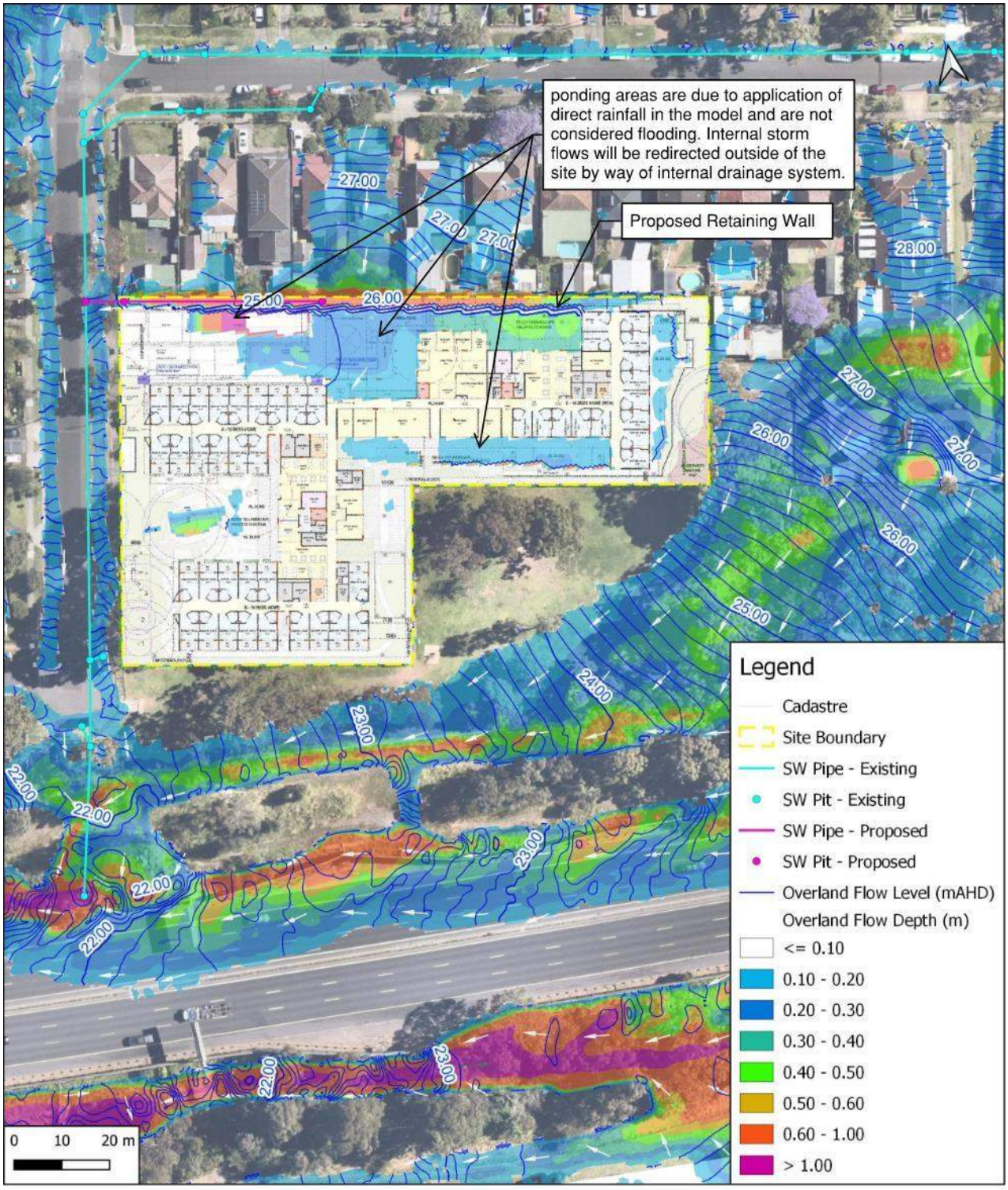

Figure 13 - PMF Level & Depth – Proposed Conditions

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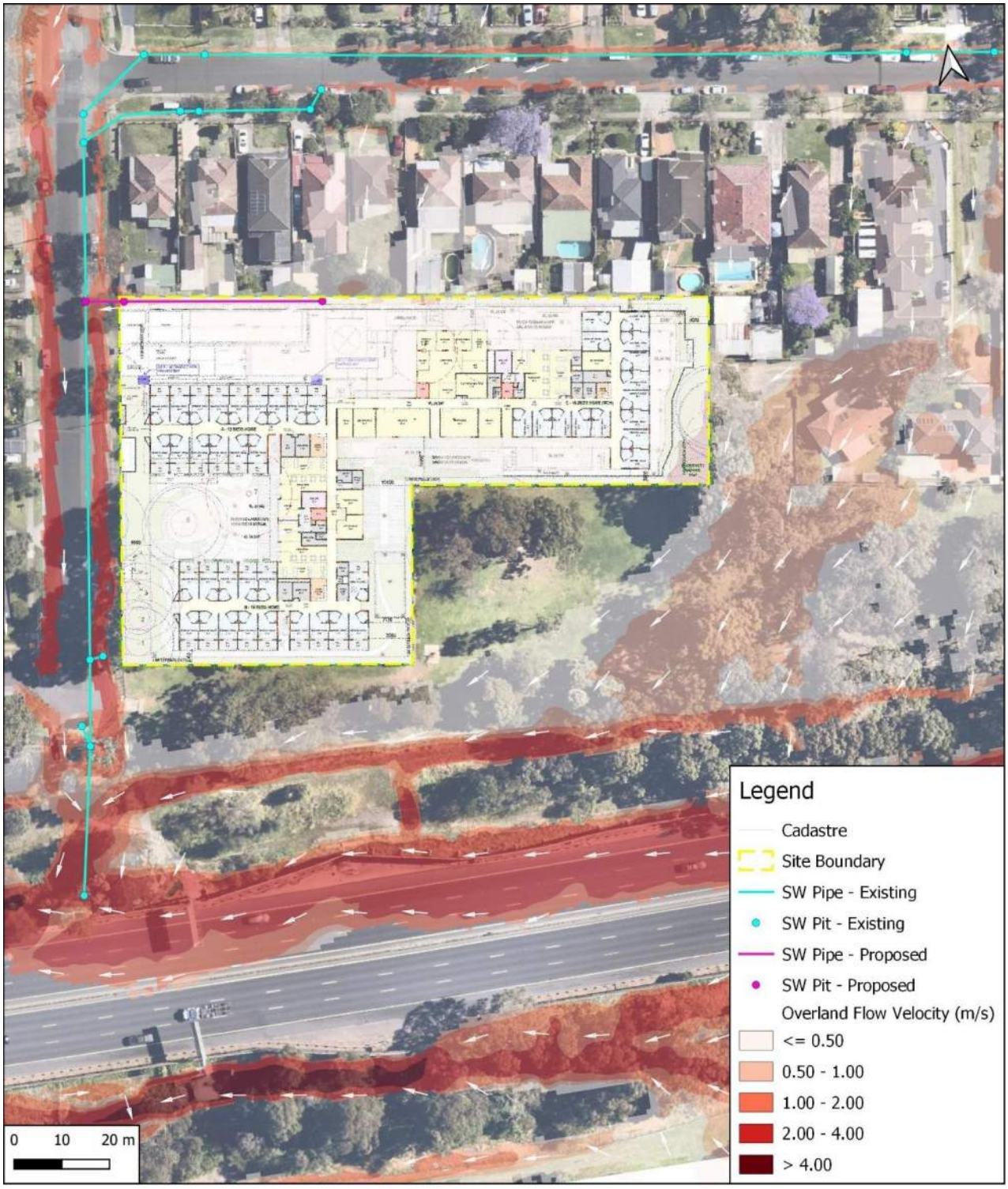

Figure 14 PMF Velocity – Proposed Conditions

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Figure 15 - PMF Hazard – Proposed Conditions

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6.0 Offsite Flood Impacts

Figure 16 illustrates the water level impact of the proposed development in the 1%AEP event. Model results indicate that the proposed development has negligible offsite impacts on the neighbouring properties nor anywhere else in the 1% AEP event.

Figure 16 - 1%AEP Flood Level Impacts– Proposed Conditions

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7.0 Conclusions

A detailed hydraulic model has been developed for the site based on the Salt Plan Creek overland flow model (Cardno, 2016) and sing detailed site survey and proposed design elements to assess local flood characteristics in the 1%AEP and PMF events for both existing and proposed conditions. Modelling concluded that:

- Proposed flood characteristics are largely consistent with existing conditions and impacts due to the proposed development are negligible.
- The proposed development area of the site is flood free in the 1% AEP and PMF events.
- Compliance with Council flood planning level requirements for car park levels will be achieved by virtue of constructing a flood wall and diverting flood water around the building.

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Appendix A

Site Survey

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NOTES

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LINETYPES

WATERMAIN, ELECTRICITY, OVERHEAD ELECTRICITY, TELECOMMUNICATIONS, GAS, GAS (HPOP), SEWER, STORMWATER, NBN LINE, OPTUS LINE, OPTICAL FIBRE LINE, NEXT GEN LINE, FUEL LINE, UNKNOWN, TPG, FIRE, AAPT, COMMS, FENCE

SYMBOLS

- FIRE HOSE REEL
- FX FIRE EXTINGUISHER
- TAP
- WATER METER
- HYDRANT
- VALVE
- GAS METER
- GAS MARKER
- BENCH MARK
- TREE - S12 TO S.H10 (SPREAD TRUNK HEIGHT)

ANNOTATION

DP	- DOWN PIPE	LP	- LIGHT POLE
FHT	- FENCE HEIGHT	MH	- MANHOLE
FL	- FLOOR LEVEL	OBV	- OBVERT
GL	- GROUND LEVEL	PP	- POWER POLE
GY	- GULLY PIT	RR	- ROOF RIDGE
INV	- INVERT	SMH	- SEWER MANHOLE
IO	- INSPECTION OPENING (SEWER)	UTL	- UNABLE TO LIFT
IOS	- INSPECTION OPENING (STORMWATER)	UTT	- UNABLE TO TRACE
		TGUT	- TOP OF GUTTER
KBI	- KERB INVERT	WHT	- WALL HEIGHT
LH	- SEWER LAMPHOLE		

QL-B
-0.65m
INV
GL10.56

SERVICE LOCATED TO QUALITY LEVEL B
0.65m DEPTH TO INVERT
GROUND LEVEL 10.56

QUALITY LEVEL RISK MATRIX

CERTAINTY ⟷ RISK

QL-A	MEASURED DIRECTLY TO UTILITY
QL-B	ELECTRONIC TRACING OF UTILITY
QL-C	ALIGNED TO SURFACE FEATURES
QL-D	ESTIMATED FROM EXISTING DRAWINGS

Rev	Drn	Revision/Issue	Ref. No	Date
D	DJB	STORMWATER EXTENDED	207288	17/11/22
C	CH	STORMWATER ADDED	207192	13/10/22
B	CH	CONTOURS ADDED	206455	06/07/22
A	CH	GENERAL ISSUE	206455	17/05/22
–	CH	PRELIMINARY ISSUE	206455	12/05/22

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ABN : 12 109 067 950

Client Details: CYRE PROJECTS

Project: 59-67 KARNE STREET NARWEE

Drawing Title: DETAIL + LEVEL & UTILITIES SURVEY
SHEET 1 OF 6

Vertical Datum:
DATUM: AHD
BM ADOPTED:SSM 108411
RL: 27.054

Date	Drn	Chk	Pics
MAY 2022	CH	DJB	DJB

Scale	Drawing No.	Rev.
NOT TO SCALE	206455-DL	D

I, Gary Skow, a surveyor registered under the Surveying and Spatial Information Act 2002, certify that:

The boundaries shown in this plan was surveyed in accordance with the Surveying and Spatial Information Regulation 2017, is accurate for the purposes of a development application and the survey was completed on 05/05/22.

Signature:

Dated: 17/05/22
Surveyor Identification No:1985
Surveyor registered under
the Surveying and Spatial Information Act 2002

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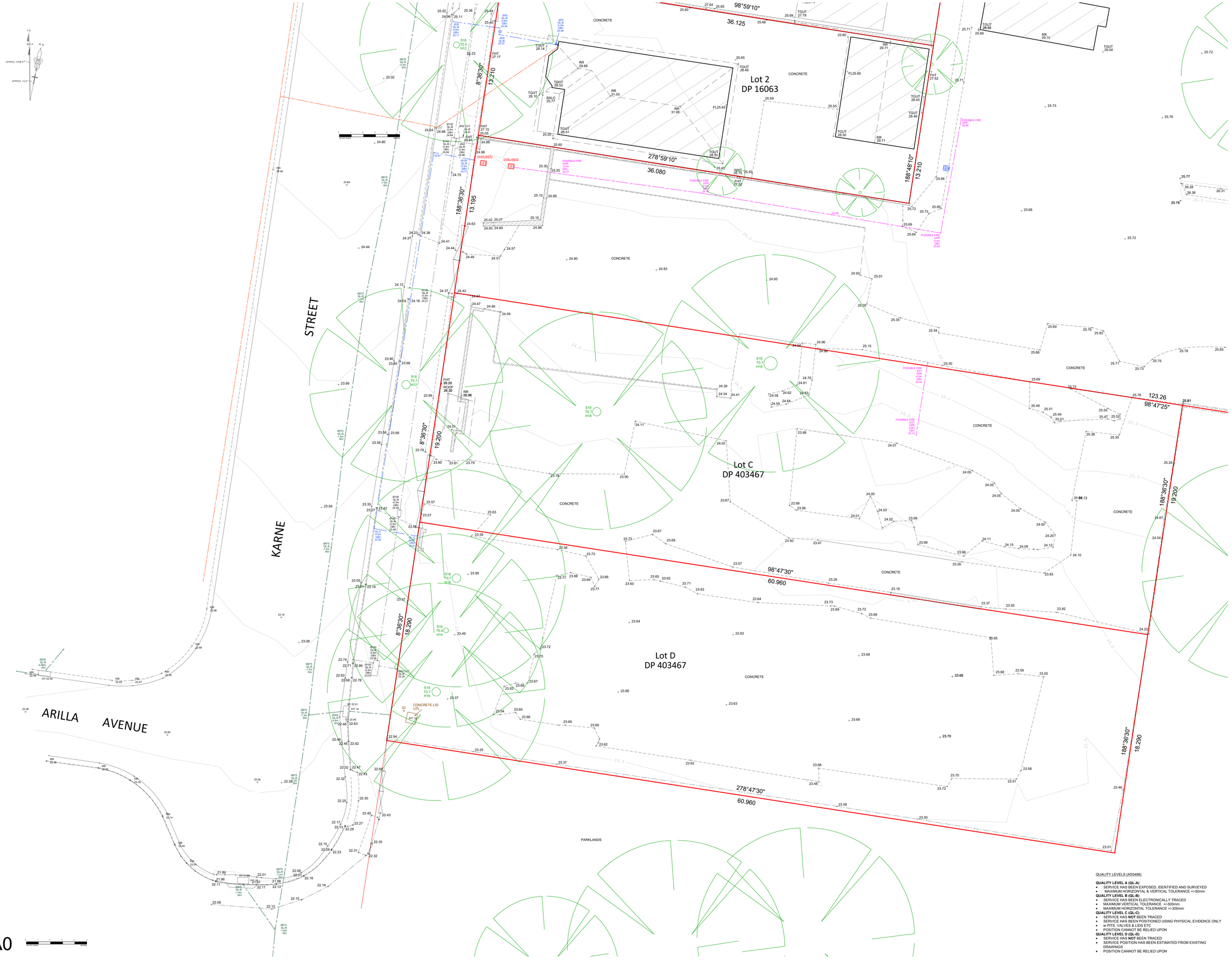

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TELECOMMUNICATIONS
GAS
GAS (HPG)
SEWER
STORMWATER
NBN LINE
OPTUS LINE
OPTICAL FIBRE LINE
NEXT GEN LINE
FUEL LINE
UNKNOWN
TPG
FIRE
AAPT
COMMS
FENCE

SYMBOLS

- FIRE HOSE REEL
- FX FIRE EXTINGUISHER
- TAP
- WATER METER
- HYDRANT
- VALVE
- GAS METER
- GAS MARKER
- BENCH MARK
- TREE - S12 T0.5 H10 (SPREAD TRUNK HEIGHT)

ANNOTATION

DP	- DOWN PIPE	LP	- LIGHT POLE
FHT	- FENCE HEIGHT	MH	- MANHOLE
FL	- FLOOR LEVEL	OBV	- OBVERT
GL	- GROUND LEVEL	PP	- POWER POLE
GY	- GULLY PIT	RR	- ROOF RIDGE
INV	- INVERT	SMH	- SEWER MANHOLE
IO	- INSPECTION OPENING (SEWER)	UTL	- UNABLE TO LIFT
IOS	- INSPECTION OPENING (STORMWATER)	UTT	- UNABLE TO TRACE
KBI	- KERB INVERT	TGUT	- TOP OF GUTTER
LH	- SEWER LAMPHOLE	WHT	- WALL HEIGHT

QL-B -0.65m INV GL10.56 — SERVICE LOCATED TO QUALITY LEVEL B; 0.65m DEPTH TO INVERT; GROUND LEVEL 10.56

QUALITY LEVEL RISK MATRIX

CERTAINTY ⟶ RISK

QL-A	MEASURED DIRECTLY TO UTILITY
QL-B	ELECTRONIC TRACING OF UTILITY
QL-C	ALIGNED TO SURFACE FEATURES
QL-D	ESTIMATED FROM EXISTING DRAWINGS

Rev	Drn	Revision/Issue	Ref No	Date
D	DJB	STORMWATER EXTENDED	207288	17/11/22
C	CH	STORMWATER ADDED	207192	13/10/22
B	CH	CONTOURS ADDED	206455	06/07/22
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V-MARK SURVEY

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18/75 PACIFIC HIGHWAY
WAITARA NSW 2077
PH : 02 9016 4235
EMAIL : dave@vmarksurvey.com.au
ABN : 12 109 067 950

Client Details: CYRE PROJECTS

Project: 59-67 KARNE STREET NARWEE

Drawing Title: DETAIL + LEVEL & UTILITIES SURVEY SHEET 2 OF 6

Vertical Datum: DATUM: AHD
BM ADOPTED:SSM 108411
RL: 27.054

Date	Drn	Chk	Pos
MAY 2022	CH	DJB	DJB

Scale	Drawing No.	Rev.
1:100@A0	206455-DL	D

QUALITY LEVELS (AS5488)

QUALITY LEVEL A (QL-A)
- SERVICE HAS BEEN EXPOSED, IDENTIFIED AND SURVEYED
- MAXIMUM HORIZONTAL & VERTICAL TOLERANCE +/-50mm

QUALITY LEVEL B (QL-B)
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- MAXIMUM VERTICAL TOLERANCE +/-500mm
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- ie PITS, VALVES & LIDS ETC
- POSITION CANNOT BE RELIED UPON

QUALITY LEVEL D (QL-D)
- SERVICE HAS **NOT** BEEN TRACED
- SERVICE POSITION HAS BEEN ESTIMATED FROM EXISTING DRAWINGS
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Lot 2
DP 206925

Lot 7
DP 16063

Lot 8
DP 16063

Lot 9
DP 16063

Lot 1
DP 518877

Lot 11
DP 16063

Lot 12
DP 16063

Lot 13
DP 16063

Lot A
DP 344148

Lot 2
DP 518877
AREA 7,145m² (BY SURVEY)
AREA 7,126m² (BY TITLE)

Lot 13
DP 561652

PARKLANDS

BUILDINGS NOT SURVEYED

CONCRETE

188°48'10" 13.210

278°59'10" 87.245

188°48'10" 13.210

98°47'25" 123.26

188°35'30" 19.200

8°50'00" 39.190

NOTES

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WATERMAIN
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OVERHEAD ELECTRICITY
TELECOMMUNICATIONS
GAS
GAS (HPOP)
SEWER
STORMWATER
NBN LINE
OPTUS LINE
OPTICAL FIBRE LINE
NEXT GEN LINE
FUEL LINE
UNKNOWN
TPG
FIRE
AAPT
COMMS
FENCE

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SHEET 3 OF 6

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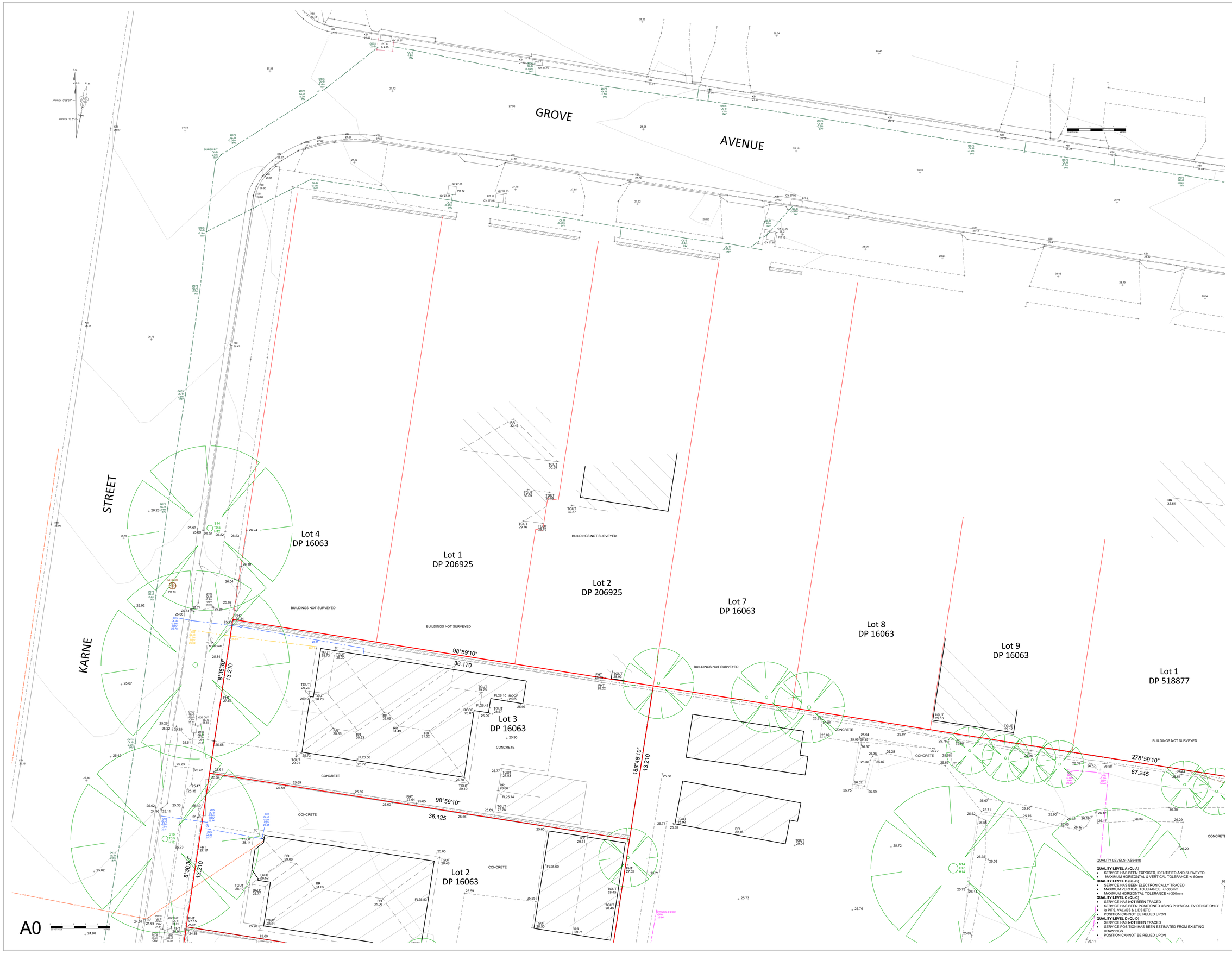

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- GAS
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STORMWATER — SW
NBN LINE — NBN
OPTUS LINE — OP
OPTICAL FIBRE LINE — OF
NEXT GEN LINE — NEXTG
FUEL LINE — FL
UNKNOWN — UNK
TPG — TPG
FIRE — F
AAPT — AAPT
COMMS — C
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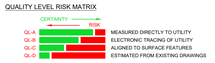

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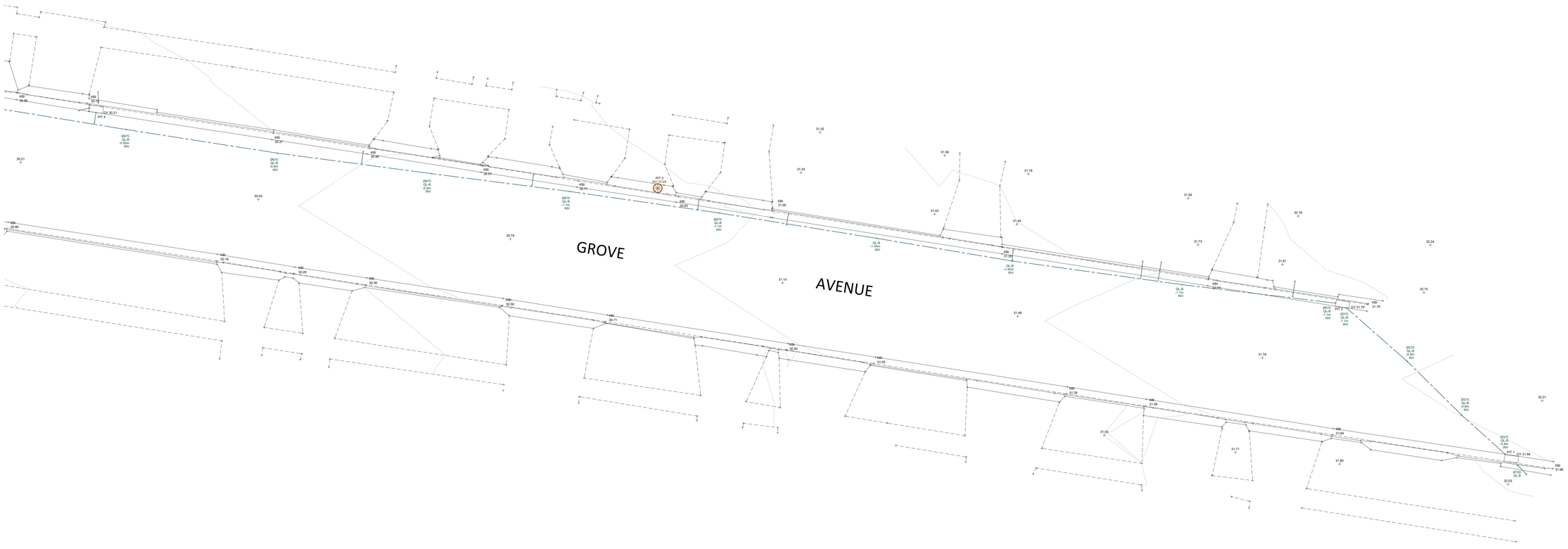

A0

TN
MGA
MN
APPROX 0°58'37"
APPROX 12.5°

NOTES

- BOUNDARIES HAVE BEEN DEFINED BY SURVEY
- WALL TO BOUNDARY DIMENSIONS MUST NOT BE USED FOR CONSTRUCTION
- IF CONSTRUCTION ON OR NEAR BOUNDARIES IS REQUIRED IT IS RECOMMENDED THAT THE BOUNDARIES OF THE LAND BE MARKED.
- TREE SIZES ARE ESTIMATES ONLY.
- THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF **CYRE PROJECTS**.
- RELATIONSHIP OF IMPROVEMENTS TO BOUNDARIES IS DIAGRAMMATIC ONLY. WHERE OFFSETS ARE CRITICAL THEY SHOULD BE CONFIRMED BY FURTHER SURVEY.
- EXCEPT WHERE SHOWN BY DIMENSION LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
- THIS SURVEY IS RELATED TO MGA2020 56 HORIZONTAL GRID AND AHD71 HEIGHT DATUM.
- CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
- THIS PLAN IS ONLY TO BE USED FOR THE PURPOSE OF PLANNING A DEVELOPMENT.
- CONTOURS SHOWN DEPICT THE TOPOGRAPHY. THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.
- CONTOUR INTERVAL - 0.5 metre. - SPOT LEVELS SHOULD BE ADOPTED.
- POSITION OF RIDGE LINES ARE DIAGRAMMATIC ONLY (NOT TO SCALE).
- THE INFORMATION IS ONLY TO BE USED AT A SCALE ACCURACY OF 1:100.
- DO NOT SCALE OFF THIS PLAN / FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED READINGS.
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- NO PART OF THIS SURVEY MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM, WITHOUT THE WRITTEN PERMISSION OF THE COPYRIGHT OWNER EXCEPT AS PERMITTED BY THE COPYRIGHT ACT 1968.
- ANY PERMITTED DOWNLOADING, ELECTRONIC STORAGE, DISPLAY, PRINT, COPY OR REPRODUCTION OF THIS SURVEY SHOULD CONTAIN NO ALTERATION OR ADDITION TO THE ORIGINAL SURVEY.
- THIS DRAWING IS ONLY VALID FOR 28 DAYS AFTER THE DATE OF LOCATING
- UTILITIES HAVE BEEN LOCATED USING ELECTROMAGNETIC LOCATING AND GPR EQUIPMENT
- AS-5488-2022 QUALITY LEVELS HAVE BEEN ADOPTED
- ALL UTILITIES NEED TO BE POTHOLED TO VERIFY LOCATION AND DEPTH BEFORE CARRYING OUT ANY CONSTRUCTION WORKS
- LEVELS OF SURVEYED OBSERVATIONS ARE AT GROUND LEVEL UNLESS NOTED OTHERWISE
- NOTATION "-0.65m INV QL-B" REPRESENTS A QUALITY LEVEL B DEPTH TO THE INVERT OF A SERVICE AS PER AS-5488-2022 AND APPLIES TO THE POINT AND NOT THE LINE
- ALL DEPTHS & QUALITY LEVELS APPLY TO THE POINT AND NOT THE LINE. ACTUAL POSITION OF SERVICES MAY VARY SUBSTANTIALLY BETWEEN SURVEYED POINTS
- DIAMETERS AND MATERIALS HAVE BEEN OBTAINED FROM BYDA DRAWINGS UNLESS QL-A
- UTILITIES HAVE BEEN SURVEYED USING TOTAL STATIONS
- PLEASE REFER TO CCTV/SITE REPORT REPORT FOR FURTHER DETAILS ABOUT SERVICE LOCATION
- THIS SURVEY IS RELATED TO GDA2020 56 HORIZONTAL AND AHD71 HEIGHT DATUM
- THERE MAY BE SOME UNCERTAINTY AROUND SOME OF THE LOCATING AND WE RECOMMEND NON DESTRUCTIVE EXCAVATION
- THIS DRAWING IS DESIGNED TO REDUCE RISK NOT ELIMINATE RISK
- THIS DRAWING DOES NOT REPLACE BYDA INFORMATION AND EACH UTILITY OWNERS DUTY OF CARE NEEDS TO BE CONSULTED BEFORE EXCAVATION
- THESE NOTES MUST NOT BE REMOVED

LINETYPES

WATERMAIN — W
ELECTRICITY — E
OVERHEAD ELECTRICITY — OHE
TELECOMMUNICATIONS — T
GAS — G
GAS (HPGI) — HPG
SEWER — S
STORMWATER — SW
NBN LINE — NBN
OPTUS LINE — OP
OPTICAL FIBRE LINE — OF
NEXT GEN LINE — NEXTG
FUEL LINE — FL
UNKNOWN — UNK
TPG — TPG
FIRE — F
AAPT — AAPT
COMMS — C
FENCE

SYMBOLS

- FIRE HOSE REEL
- FX FIRE EXTINGUISHER
- TAP
- WATER METER
- HYDRANT
- VALVE
- GAS METER
- GAS MARKER
- BENCH MARK
- TREE - S12 T0.5 H10 (SPREAD TRUNK HEIGHT)

ANNOTATION

DP - DOWN PIPE
FHT - FENCE HEIGHT
FL - FLOOR LEVEL
GL - GROUND LEVEL
GY - GULLY PIT
INV - INVERT
IO - INSPECTION OPENING (SEWER)
IOS - INSPECTION OPENING (STORMWATER)
KBI - KERB INVERT
LH - SEWER LAMPHOLE
LP - LIGHT POLE
MH - MANHOLE
OBV - OBVERT
PP - POWER POLE
RR - ROOF RIDGE
SMH - SEWER MANHOLE
UTL - UNABLE TO LIFT
UTT - UNABLE TO TRACE
TGUT - TOP OF GUTTER
WHT - WALL HEIGHT

QL-B
-0.65m
INV
GL10.56
SERVICE LOCATED TO QUALITY LEVEL B
0.65m DEPTH TO INVERT
GROUND LEVEL 10.56

QUALITY LEVEL RISK MATRIX

CERTAINTY → (RISK ←)

- QL-A — MEASURED DIRECTLY TO UTILITY
- QL-B — ELECTRONIC TRACING OF UTILITY
- QL-C — ALIGNED TO SURFACE FEATURES
- QL-D — ESTIMATED FROM EXISTING DRAWINGS

QUALITY LEVELS (AS5488)

QUALITY LEVEL A (QL-A)
- SERVICE HAS BEEN EXPOSED, IDENTIFIED AND SURVEYED
- MAXIMUM HORIZONTAL & VERTICAL TOLERANCE +/-50mm

QUALITY LEVEL B (QL-B)
- SERVICE HAS BEEN ELECTRONICALLY TRACED
- MAXIMUM VERTICAL TOLERANCE +/-500mm
- MAXIMUM HORIZONTAL TOLERANCE +/-300mm

QUALITY LEVEL C (QL-C)
- SERVICE HAS **NOT** BEEN TRACED
- SERVICE HAS BEEN POSITIONED USING PHYSICAL EVIDENCE ONLY
- ie PITS, VALVES & LIDS ETC
- POSITION CANNOT BE RELIED UPON

QUALITY LEVEL D (QL-D)
- SERVICE HAS **NOT** BEEN TRACED
- SERVICE POSITION HAS BEEN ESTIMATED FROM EXISTING DRAWINGS
- POSITION CANNOT BE RELIED UPON

Rev.	Drn.	Revison/Issue	Ref. No	Date
D	DJB	STORMWATER EXTENDED	207288	17/11/22
C	CH	STORMWATER ADDED	207192	13/10/22
B	CH	CONTOURS ADDED	206455	06/07/22
A	CH	GENERAL ISSUE	206455	17/05/22
–	CH	PRELIMINARY ISSUE	206455	12/05/22

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Client Details
CYRE PROJECTS

Project
59-67 KARNE STREET NARWEE

Drawing Title
DETAIL + LEVEL & UTILITIES SURVEY
SHEET 1 OF 6

Vertical Datum
DATUM: AHD
BM ADOPTED:SSM 108411
RL: 27.054

Date	Drn	Chk	Pos
MAY 2022	CH	DJB	DJB

Scale	Drawing No.	Rev.
1:100@A0	206455-DL	D