



FLOOD ASSESSMENT

**RESIDENTIAL DEVELOPMENT AT
1 ROBYN STREET AND 17-19 PANK PDE,
BLACKTOWN NSW 2148**

**PREPARED FOR
HOMES NSW**

**IN COORDINATION WITH
STANTON DAHL ARCHITECTS**

DATE: 2ND DECEMBER 2024

OUR REFERENCE: 220152

BY: ANDY WIERSMA

Author	Andy Wiersma	
Approved by	Alistair McKerron	
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1 INTRODUCTION

1.1 GENERAL

Greenview Consulting has been engaged by the client to undertake a review of flooding at the subject site. This report must be read in conjunction with the other Development Application documents and other relevant information, including:

- Stanton Dahl Project No. BGYPY Drawings below dated 15/11/2024:
 - No. A0271 Site & External Works Plan,
 - No. A0301 Elevations (Sheet 1 of 2)
 - No. A0302 Elevations (Sheet 2 of 2)
- Blacktown City Council WSUD Developer Guidelines [2020]

This purpose of this report is to:

- Undertake hydrologic DRAINS modelling to determine flowrates for the hydraulic model.
- Undertake hydraulic TUFLOW modelling of the existing and proposed cases in order to demonstrate compliance with typical flood risk mitigation objectives.

2 EXISTING CONDITIONS & DATASETS

2.1 SITE DESCRIPTION

The subject site, 1 Robyn Street and 17-19 Pank Parade Blacktown, is situated on the corner of Pank Pde and Robyn St, refer **Figure 2.1**. The site comprises Lots 197, 198 & 199 DP 32163 with an approximate total area of 1885m². With respect to the survey provided by YSCO Geomatics dated 14/02/2022, the site grades from around +45.0 mAHD (SW corner) to +43.7 (NE corner) – refer Appendix C for survey. As per utility plan carried out by Durkin Construction Pty Ltd, Drawing Number D24222-UT-01 (refer Appendix C), the site contains a triple barrel d1200mm pipe within an easement and the local area is subject to shallow overland flows; the main overland flowpath follows Leonard St to the east. The overland flowpath (as shown in Appendix A Figure A1.1) eventually drains into Breakfast Creek, a tributary of Eastern Creek and the Hawkesbury River. The site currently contains 3 residential dwellings.



Figure 2.1: Site Location

The proposed development consists of new Senior Living development. A section of the dwellings will be elevated to allow the free passage of floodwaters under, habitable floor levels of Blocks A & B have been set to the PMF level which is above Blacktown Council's Flood Planning Level (100yr + 0.5m). Additionally, the board walk adjoining Blocks A & B will be set at or above the 100yr + 500mm minimum level and external carparking only allowed with H1 hazard areas (1%AEP event).

2.2 DATASETS

Hydrologic model inputs and all mapping presented in this report were undertaken using the GIS programs QGIS and Global Mapper. These are geographical database systems that allows detailed cadastral, topological and flood data to be displayed and manipulated. Statistics were generated using inbuilt GIS functions and exported directly to the hydraulic model.

The datasets used to construct the models included:

- Aerial photography (circa 2018) LPI 6Viewer.
- Survey 3D TIN (YSCO Geomatic surveyors, February 2022).
- Aerial Laser Survey (ALS) 1m DEM from LPI for areas outside of the survey (fly date 2019).
- Council's pipe sizes in GIS format as obtained from Council's GIS department.

The MGA56 coordinate system was used for datasets wherever possible.

We note that we do not have formal survey of most of the surrounding pit/pipe network and have relied on Council's GIS mapping and our site inspections. Formal survey has been undertaken by Durkin Construction Pty Ltd of the pipe through the subject site easement, and this has been determined to be a 3 x d1200mm RCP piped culvert.

2.3 LIMITATIONS

All data, observations and opinions contained in this report pertain to hydraulic assessment of flood flows at or in the vicinity of the site. This report neither purports to be nor is an investigation into any other aspect of flooding within the site or surrounding catchment.

This report and the results contained within are only as accurate as the survey information provided. Greenview Consulting Pty Ltd takes no responsibility or liability for incorrect survey information. The report is only valid for the development as proposed and detailed in this report and is not valid for any other design, layout or development.

2.4 EXISTING FLOOD STUDIES

At the time of commencement of this site-specific flood study (late 2022) Blacktown Council did not have any formally adopted flood studies of the subject site. However, we understand that Council have subsequently undertaken an Overland Flow study and the updated flood certificates for the 3 lots reflect information that is contained within the Overland Flow Study (2023). We have undertaken a brief comparison of our results and Council's overland flow study and highlight that:

- A. The flood advice letters issued by Blacktown Council for 17 & 19 Pank Parade, dated 2 September 2024 (attached), do not reference any riverine or overland flood planning controls that apply to these Lots. As a result, it is also noted that no flood levels have been provided in Council's Flood Advice Letter.
- B. The only flood certificate with flood levels is the 1 Robyn St flood certificate dated 2 September 2024 (attached), which notes:
 - a. 1%AEP flood levels varying from RL +43.84 to +43.95 mAHD. In comparison, our 1%AEP flood levels on 1 Robyn St vary from +44.05 to +44.15 mAHD, around 200mm higher than Council's levels.
 - b. PMF flood levels varying from RL +44.74 to +45.27 mAHD. In comparison, our PMF flood levels on 1 Robyn St vary from +44.45 to +44.85 mAHD, around 300-400mm lower than Council's levels.
- C. At this point in time, without Council's flood model or more detailed results we cannot comment on the reasons for the flood level discrepancies.
- D. We note that Council's model is fit-for-purpose, that is, identifying flood control lots and approximate flood levels on those lots over the entire catchment.
- E. Similarly, we believe our model is fit-for-purpose, that is, providing a detailed flood analysis of the subject site and immediate surrounds, to a high degree of accuracy, and with the impacts of the proposed case considered. Our flood is more accurate at the subject site noting the following:
 - a. Site survey is not incorporated into Council's model; we have compared the 2019 ALS dataset with the site survey and note differences in surface levels of typically around +50mm but up to +200mm in some locations.
 - b. Our grid cell resolution (0.5m) is very fine, and much finer than Council's model (most likely 2-3m in cell size).
 - c. Council's model does not include the impact of the proposed development.
 - d. It is probable that Council's model includes a single d1200mm pipeline as opposed to the 3 x d1200mm pipes identified in recent survey.

2.5 REPORT REVISIONS

This is version #6 of our report; the following changes were made:

- We have made reference to Council's Overland Flood Study 2023.
- We have increased the easement pipe from a single d1200mm to 3 x d1200mm as formal survey indicates the underground pipe is a 3-cell system.
- We have increased the blockage of the easement pipe from 33% to 50%.
- We have swapped our hydrologic model from WBNM to DRAINS as requested by Council, the total inflows into our 2D model as a result of this were slightly less than our WBNM model. We note that our PMF modelling retains the WBNM inflows, as there is no ready way to automatically model the PMF event in DRAINS. While Council's WSUD Developer Guidelines [2020] allow for the PMF event to be estimated as 3.5x the 1%AEP event, we note our calculations indicate that the PMF outflows (57 m³/s) are around 5.2x higher than the 1%AEP outflows (10.8 m³/s) and adoption of Council's basic method would significantly underestimate the true PMF water levels at the subject site.
- As requested by Council we have reduced our model grid cell size from 1m to 0.5m; this did not result in any discernible difference in the calculated water levels / depths / velocities / hazards.

In version #2 of our report:

The primary updates in this revision were minor architectural changes, the modelling of the PMF event and discussion of evacuation procedures.

3 HYDROLOGIC ANALYSIS (DRAINS / WBNM MODEL)

3.1 CATCHMENT EXTENTS

The catchment draining towards the subject site is narrow in shape and mostly low-density residential development, refer **Figure 3.1** and the subareal statistics in **Table A** below. We note the railway line bisects the catchment and will cause significant ponding behind Subarea Sub01D; we have therefore modelled this storage explicitly in DRAINS as an storage structure.

Table A: Subarea Statistics

Sub ID	Area [ha]	Impervious% [a]
Sub01A	17.86	80
Sub01B	21.77	80
Sub01C	10.82	80
Sub01D	26.62	80
Sub01E	12.76	80

[a] we estimate the actual impervious% of each subarea to be 55-65%, however we understand that BCC typically request 80% for low-density residential areas to accommodate future development.

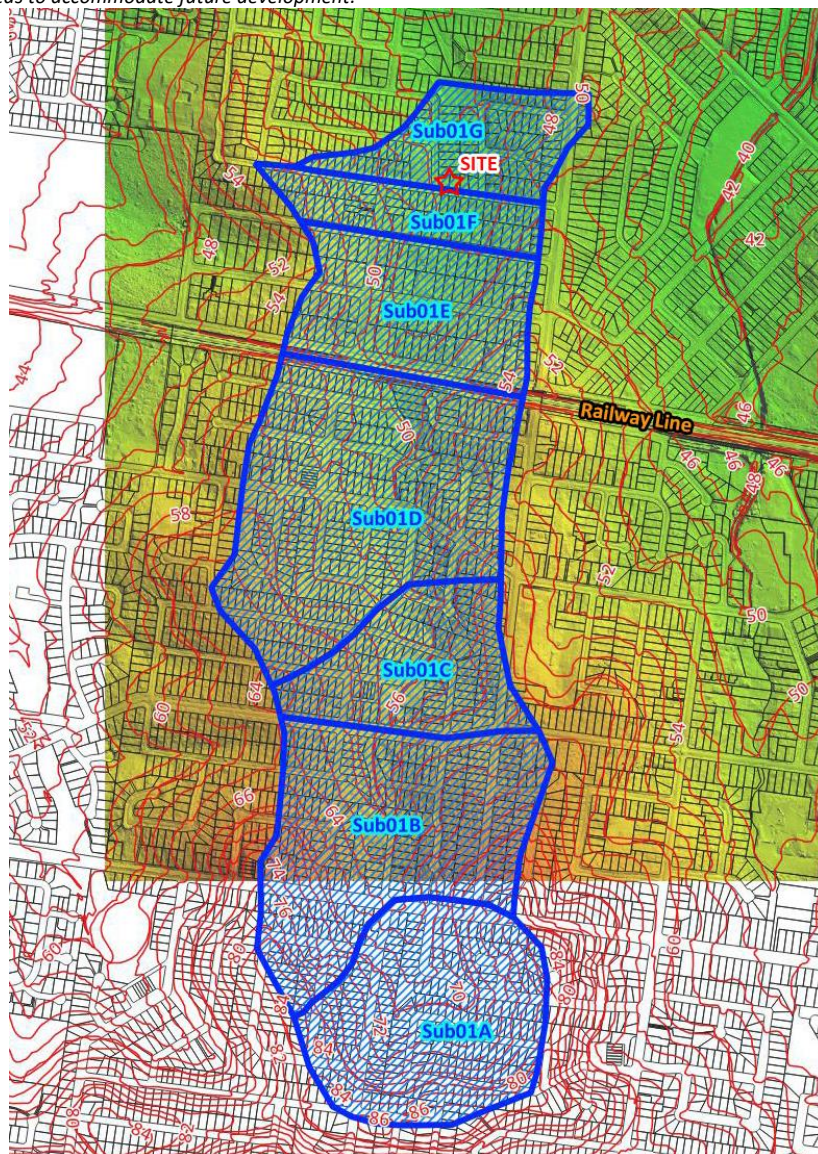


Figure 3.1: Catchment Extents

Hydraulic analysis was undertaken in DRAINS. DRAINS is a stormwater drainage system design and analysis program. It is a successor to the ILSAX model and provides hydraulic grade line analysis of urban piped networks and overflow paths. DRAINS allows the user to select from various rainfall-runoff models and permits ready checking of the capacities and limitations of the analysed pipe system.

A summary of the adopted modelling parameters is provided below.

- Initial Loss: 0 [mm] (to account for antecedent rainfall)
- Continuing Loss Rate: 0.76 [mm/hr] (1.9 mm/hr factored by 0.4)
- Raingauges: Blacktown #1 (1 total, IFD 2019)

The DRAINS hydrographs were then used as inputs for the TUFLOW model. We highlight that we attempted to run DRAINS Premium (i.e. full routing in all overflow paths) but did not obtain realistic values in some overland flowpaths. We have therefore defaulted to the Lite model, which does not undertake any routing in overland flowpaths. Hence, our model results will be conservative.

As aforementioned, the railway line bisects the catchment and the railway embankment may or will cause significant ponding to occur behind the railway line during a large storm event. We have estimated the ponding volumes using the 2019 1m ALS dataset (from LPI) and input these together with the main outlet pipe (being a d1200mm, BCC GIS records) into DRAINS as a storage structure. We have assumed the pipe is “unblocked” noting that the application of a blockage factor will increase the attenuation of flows (that is, cause them to reduce due to additional storage being activated).

Australian Rainfall Runoff (ARR) 2019

We have adopted the ARR2019 procedure for hydrograph estimation for the 100yr ARI (1% AEP) event, noting that ARR2019 specifies that an ensemble of 10 patterns be run for every duration, with the design peak flow taken as the average of the 10 patterns. With respect to input hydrographs, it is recommended that the pattern with a peak flow just above the mean be adopted.

ARR2019 data is available on the associated Datahub website; we have adopted loss rates from the datahub (refer appendices for complete ARR2019 datahub outputs) and factored by 0.4 as recommended on the datahub. IFD2019 depth data was also used (taken from the BOM website).

Table B: DRAINS 1%AEP Peak Flowrates [m³/s]

Subarea	10min	15min	20min	30min	45min	60min
Sub01A	7.79	7.12	6.57	5.9	4.84	4.4
Sub01B	11.2	12.5	12.7	11.4	10	9.18
Sub01C	11.4	13.2	13.9	13.4	12	10.6
Sub01D	4.19	4.38	4.48	4.56	4.68	4.7
Sub01E	8.09	7.94	7.65	6.97	6.86	6.72
Sub01F [b]	2.7	2.54	2.33	1.98	1.77	1.45
Sub01G [b]	3.63	3.42	3.14	2.69	2.38	1.98

[a] all flowrates are the median of the 10 patterns run

[b] local flows from the subarea

DRAINS Results & Critical Duration

DRAINS results are summarised in **Table B** above, we note the flowrates reduce at Sub01D due to the effect of the railway storage attenuating flowrates. The duration with the highest peak flowrate in DRAINS was the 10-minute storm. As a check, the following 1%AEP durations were run in a preliminary hydraulic model: 10 / 20 / 30 / 60 minutes. These checks indicated the 30-minute produced the highest water level near the subject site, noting that there was minimal difference in flood heights between the durations modelled. We have therefore adopted the 30-minute duration storm for hydraulic modelling for the 1%AEP event.

We have also modelled the PMF event in WBNM and determined that the 60minute duration storm was critical for this event.

4 HYDRAULIC (TUFLOW) ANALYSIS

4.1 MODEL SETUP

TUFLOW is a 1D / 2D grid model that performs hydro-dynamic analysis in river and floodplain systems. TUFLOW allows the user to model a range of structures common in urban environments. The 64-bit double precision version of TUFLOW (2013 AC) was used as the hydraulic model for this report.

TUFLOW model parameters were as follows:

- Grid cell size: 0.5m
- 2D Timestep: 0.25s
- 1D Timestep: 0.1s

Additional parameters were generally left at the recommended default values.

Material zones and roughness values are summarised in **Table 4.1**. The model extents are depicted in **Figure 4.2** at the end of this chapter. TUFLOW was allowed to calculate the downstream water level at the model boundary.

Table 4.1: Material Zones / Roughness Values

Material	Manning's n
Roads / pavements	0.025
Urban yards	0.065
Short grass / light vegetation	0.050
Buildings	Raised
Trees / dense vegetation	0.080

The following scenarios were modelled:

1. Existing
2. Proposed:
 - a. All proposed buildings 100% solid obstructions.

Blacktown City Council WSUD Developer Guidelines [2020] typically require that all sections of open subfloor be blocked; we believe this has little technical merit and is excessively conservative. We still recommend that a section of open subfloor be used (refer discussion following), but to avoid confusion, all results presented in this report are for the 100% obstructed case (i.e. all buildings were modelled as solid, even if open subfloor is proposed).

Pit / Pipe Blockages

Blacktown City Council WSUD Developer Guidelines [2020] typically allows sag pits to be blocked 50% and on-grade pits to be blocked 20%. We have conservatively used 50% inlet blockage for all pits within the model domain.

Blacktown City Council WSUD Developer Guidelines [2020] also mandates that the main pipe near a site be blocked. We have blocked the easement pipe 50% as per Council requests and used this blockage factor for all existing and proposed model runs.

4.2 MODEL RESULTS

Full model results are contained in the appendices, and we highlight the following:

- The site itself is subject to shallow inundation during the 1%AEP flood event with typical depths around 100-300mm and around half of the site being flooded during the 1%AEP event.
- Flow velocities are typically around 0.3-0.7 m/s through the subject site.
- Flood hazards are low, refer also Section 4.5 following.
- PMF flood levels in the vicinity of the proposed northern dwelling block vary to +44.7 mAHD.
- PMF flood levels in the vicinity of the proposed southern dwelling block vary to +45.15 mAHD.

4.3 CONVEYANCE IMPACTS

Under proposed conditions (solid obstruction, buildings all-blocked) the maximum offsite impact on the adjacent property to the east is +17 mm.

This is acceptable with respect to BCC guidelines which typically mandate that offsite conveyance impacts are less than 20mm.

4.4 FLOOD STORAGE IMPACTS

Loss of floodplain storage can affect hydrograph routing such that there is a corresponding loss of flood attenuation. That is, flowrates downstream may increase due to the loss of storage. Hence Council's requirement to demonstrate no loss of storage within the floodplain.

The subject site is only inundated to a very shallow depth during the 1%AEP event and we do not believe that flood storage loss is a significant issue for this particular development.

We have calculated onsite flood storage volumes for the existing and proposed cases for the 1%AEP event in Global Mapper, with the results as follows:

- Existing 1%AEP flood storage volumes: 119m³
- Proposed 1%AEP flood storage volumes: 107m³

There is a small reduction in post-development flood storage volumes. We highlight that our TUFLOW model is fully hydro-dynamic, that is, includes time-varying hydrographs modelled over the full event duration, and as such, any loss of hydrograph attenuation is modelled and any impacts on downstream water levels captured in the results. We have compared output hydrographs at the downstream model boundary and there is no measurable difference between the existing and proposed cases, nor is there any corresponding increase in water levels greater than 1mm. We therefore conclude that the very minor loss of storage does not result in any measurable change to the hydrographs or water levels within the model domain and will not impact negatively upon adjacent lots.

4.5 FLOOD HAZARD ASSESSMENT

ARR2019 provides updated Hazard curves as described in Table 6.7.3 and 6.7.4 of ARR2019 Chapter 6. We have provided mapping of the 6 hazard categories, with the definitions as follows:

H1: Generally safe for vehicles, people and buildings.

H2: Unsafe for small vehicles.

H3: Unsafe for vehicles, children and the elderly.

H4: Unsafe for vehicles and people.

H5: Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.

H6: Unsafe for vehicles and people. All building types considered vulnerable to failure.

The site (and proposed carparking area) are almost entirely H1 hazard in the 1%AEP event with a few grid-cells at H2.

4.6 PRACTICAL CONSIDERATIONS

With respect to the proposed design, we note the following [refer **Figure 4.3** for further details]:

- A. Habitable floors with 500mm of freeboard should be set as shown in **Figure 4.3**.
 - a. We note as per Council's Flood Advice Letter 300mm minimum freeboard was adopted.
- B. All fencing (internal and perimeter) should be open-style with gaps to allow the free passage of floodwaters.
- C. We recommend the yellow highlighted section should be elevated to allow the free passage of floodwaters under. However, in the model, this has been ignored and assumed to be completely blocked.

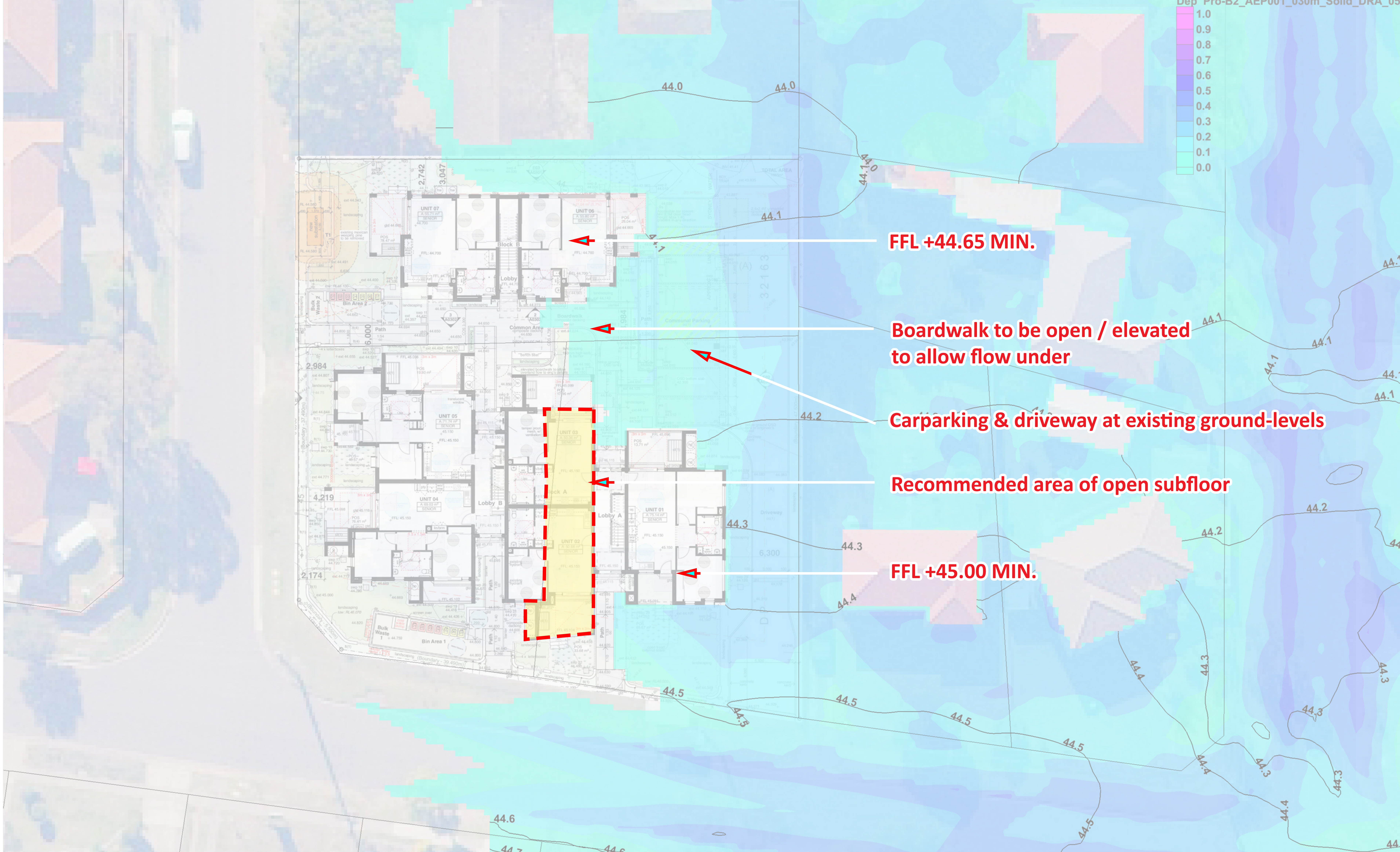


Figure 4.1: Model Material Zones [Existing]

[grey = road reserve, light green = short grass, dark green = trees, bright green = urban yards, red hatch = buildings]



Figure 4.2: TUFLOW Model Extents & SA Polygons & 1D pipe network
[pipe network shown in blue dash, pipe diameter in metres]



5 EVACUATION

Evacuation Planning

This is discussed in greater detail in the paragraph following. We note that the site has excellent rising access to the west along Pank Pde, and all upper levels will be well above the PMF levels. We estimate that the proposed ground floor levels will (just) flood free during the PMF event.

Effective Flood Access

The subject site has excellent rising access to the west along Pank Parade, noting that the intersection of Pank Pde and Robyn St (i.e. the south-west corner of the subject site) is flood free in the PMF. Should onsite residents choose to do so, offsite evacuation may be undertaken well before the peak of a large flood event. Occupants should move directly west on Pank Pde.

Rate of Rise of Floodwaters / Warning Time & Duration of Flooding

The rate of rise of floodwaters in relatively small / urbanised catchments is typically fast (that is, flash flooding), and may limit the effective warning time and prevent safe evacuation or other appropriate activities to be undertaken. For the critical duration PMF event (60 min) the peak flood level will be reached some 30-45 minutes following the onset of the storm burst.

With respect to the subject site, we highlight that all first-floor levels will be well above the PMF event, and good rising access exists to flood free areas to the west. We therefore believe that, provided residents at the subject site are aware of the evacuation procedure documented in this report, it is unlikely that the fast rate of rise of floodwaters will endanger lives or impact on the ability of occupants to move to a flood free area.

Correspondingly, the rate of fall of floodwaters in small urban catchments is fast, thus resulting in a short overall duration of flooding. This rapid receding of the floodwaters limits the possible impacts associated with long-duration flooding such as food and water shortages or health and hygiene issues. We estimate that the critical duration PMF event (60min) will remain within 300mm of its peak for around 60 minutes.

Flood Readiness

New owners of the proposed dwellings may be unaware of the flooding issues at the subject site and/or the proposed evacuation plan. Although flood refuges are available onsite for the dwelling, it is important that all site occupants are made aware of the flood issues and flood evacuation procedures for the site. We recommend that:

- All dwellings be provided with a copy of this flood report.
- Evacuation signage be fixed internally (e.g. an A4 laminated page) advising of the proposed evacuation measures.

Evacuation Procedures

With respect to flood evacuation, we note that:

- A. Any flood evacuation should be undertaken under supervision of the SES and/or other emergency personnel who will be responsible for the safe and timely evacuation of residents during a large flood event.
- B. Onsite (shelter-in-place) evacuation is contingent on the structural engineer being able to certify that the proposed dwellings can withstand the forces of floodwaters up to the PMF level, including uplift forces (buoyancy), debris impact, and flow forces. We believe this should be achievable noting that the PMF level is only slightly higher than the 1%AEP+500mm level, however this should be verified. No structural adequacy checks have been undertaken as part of this report.
- C. Offsite evacuation should only be undertaken well before the storm event begins, noting that the SES strongly advise against wading or travelling through floodwaters of any depth, and floodwaters may or will rise rapidly.

During periods of heavy or protracted rainfall, site occupants should carefully monitor information from the Bureau of Meteorology and pay close attention to behaviour of flood waters in the local vicinity, particularly along the eastern edge of the site.

Site occupants should prepare for evacuation; activities may include:

- Moving any cars along Pank Pde to the west.
- Ensuring there are no objects within the site yard areas that might be mobilized by flood waters and cause an obstruction or become a hazard.

In the event of a large flood being predicted site occupants should:

- A. Ideally, well prior to the peak of the flood event (noting warning times may be limited) evacuate offsite via Pank Pde (in a westerly direction only).
- B. As a last resort, evacuate via shelter-in-place and remain within their dwellings.

With respect to evacuation timing, we suggest that once floodwaters have inundated the eastern parking area (approaching RL +44.0 mAHD) then all residents should immediately move into their dwellings and shelter-in-place.

Residents should then wait for flood waters to recede to a safe level and/or for instructions from the SES or other emergency personnel.

6 CONCLUSIONS

We conclude that:

- The site is subject to relatively shallow inundation during the 1%AEP flood event and is subject to low hydraulic hazard during this event.
- The development as proposed does not have any significant impact on the conveyance ability / capacity of the local floodplain provided the recommendations of this report are adhered to.
- Floor levels should be set as recommended in this report.
- Flood evacuation should be undertaken under guidance of the SES as recommended in the relevant section of this report.

Yours faithfully,
For & on behalf of Greenview,



Andrew Wiersma
BE (Hons) MEng MIEAust CPENG (NPER)
Senior Design Engineer



Alistair McKerron
BE MIEAust CPENG (NPER)
Senior Project Engineer
NPER no. 2220277

Appendix A: COUNCIL FLOOD ADVICE LETTERS



File number: 153221

2 September 2024

Homes NSW

Dear Howard Taylor

Flood advice: 1 Robyn Street Blacktown being Lot 197 in DP 32163

I refer to your request for flood advice on 31/07/2024 and provide the following flood information for the above property.

Do flood planning controls currently apply?

- | | |
|---|-----|
| 1. Flood planning area controls – Riverine | No |
| 2. Flood planning area controls – Overland | Yes |
| 3. State Environmental Planning Policy controls | No |

What other considerations may apply?

- | | |
|--------------------------------|-----|
| 4. Special flood consideration | Yes |
| 5. Drainage constraints | Yes |

What this means for your property

If we have answered 'Yes' to any of the Flood planning controls at 1, 2 or 3 above, a flood study will be required for development.

If we have answered 'Yes' at 4 above, a flood study will be required if your development is considered sensitive or hazardous and is located within any part of the floodplain.

If we have answered 'Yes' at 5 above, a flood study may be required.

Where to find more information

The following pages set out more detailed information on the above where it relates to your property, along with other relevant flood related information. If you have any queries on this, please contact one of our Floodplain Officers by phoning 02 9839 6350 or emailing floodadvice@blacktown.nsw.gov.au

If you have any queries on development of your land, please contact one of our Planners by phoning 02 5300 6000, or emailing gateway.team@blacktown.nsw.gov.au.

Yours faithfully



Naomi Harris
Coordinator Floodplain and Stormwater

Attachments

1. Details on our flood information for your property
2. Flood modelling and floor levels
3. General flood information, including definitions
4. Flood maps

Disclaimer

The information contained in this letter is only valid on the date of issue. This letter has been prepared with all due care and in good faith using the best information available to us.

We provide no warranties in relation to the completeness or accuracy of the information contained in this letter, and do not accept liability for any loss or damage resulting from, or in connection with, its contents or its use.

There may be other non-flood related matters that might impact on the use of the land.

We strongly recommend that, in all cases, you seek independent professional advice to supplement your enquiries. A more detailed assessment at development application stage may result in modifications and/or additions to these comments. This advice is not a guarantee of approval.

We can supply additional information, such as ALS/Lidar data for a fee. Contact floodadvice@blacktown.nsw.gov.au for this information.

From the 3 July 2024, our flood risk precincts in this area were updated to reflect new information in the Blacktown Overland Flow Flood Study. Further information can be found here: <https://www.blacktown.nsw.gov.au/Our-environment/Waterways/Flooding-in-the-Blacktown-local-government-area/Flood-studies>. We may have draft information about other flood studies that has not been included in this letter.

Attachment 1: Details on our flood information for your property

1. Flood planning area controls – Riverine

This property is not identified as being in any of the flood precincts of the Breakfast Creek floodplain.

2. Flood planning area controls – Overland flow

This property is identified as being in the Overland Flow Medium Flood Risk Precinct. Maps showing the extent of adopted overland flow flooding are at attachment 4.

The flood planning level for this property is 44.25 mAHD

The flood information in the table below details the maximum and minimum flood values (within the model grid) identified across the property. Definitions of the various elements within the table are at attachment 3.

	1% AEP Flood	PMF
Maximum flood level (metres AHD)	43.95	45.27
Minimum flood level (metres AHD)	43.84	44.74
Maximum flood depth (metres)	0.24	1.33
Minimum flood depth (metres)	0.00	0.18
Maximum velocity (metres/second)	0.97	1.72
Minimum velocity (metres/second)	0.00	0.16
Maximum hazard (H1 to H6)	H1	H5
Minimum hazard (H1 to H6)	H1	H1

The flood maps attached are based on the results of Engineering Flood Studies commissioned by NSW Government authorities and Blacktown City Council. These maps indicate that the subject land lies partly or wholly within the Local Overland Flooding extents.

As a Flood Control Lot, it does not meet the criteria of an exempt or complying development as detailed by the [State Environmental Planning Policy \(Exempt and Complying Development Codes\) 2008 – Section 3.36C](#).

General requirements for use of this land are in the [Blacktown Development Control Plan 2015 – Chapter 9 ‘Development on Flood Prone Land’](#). The property must meet the controls set out prior to approval of development.

Where proposed development extends into the Local Overland Flooding Area a flood study may be required to ensure no adverse impacts occur.

Flood modelling requirements are detailed in our Water Sensitive Urban Design Developer Handbook. Further details are in the NSW Government Floodplain Risk Management Manual.

We do not warrant that information provided or made available to you is complete. We strongly recommend that, in all cases, you seek independent professional advice to supplement your enquiries.

3. Flood planning area controls - State Environmental Planning Policy

This property is not located within an area identified as being part of the State Environmental Planning Policy (Sydney Region Growth Centres) 2006, known as the SEPP, flood mapping for the rezoning and redevelopment of the area.

The flood maps attached are based on the results of Engineering Flood Studies commissioned by NSW Government authorities and Blacktown City Council. These maps indicate that the subject land lies partly or wholly within the SEPP Mapping Area provided by the Department of Planning, Housing and Infrastructure.

The SEPP Mapping Area is the area of land situated below the Flood Planning Level, which is defined as the 1% AEP.

As a Flood Control Lot, it does not meet the criteria of an exempt or complying development as detailed by the [State Environmental Planning Policy \(Exempt and Complying Development Codes\) 2008 – Section 3.36C.](#)

General requirements for the use of this land are outlined in the [Blacktown City Council Priority Precincts Development Control Plan](#) as prepared by the Department of Planning, Housing and Infrastructure. The property must meet the controls set out prior to approval of development.

Where proposed development extends into the SEPP Mapping Area, a flood study may be required to ensure no adverse impacts occur.

Flood modelling requirements are detailed in our [Water Sensitive Urban Design Developer Handbook](#). Further details are in the [NSW Government Floodplain Risk Management Manual](#).

4. Special flood consideration

Special flood considerations apply to certain types of development that have been identified as having a higher risk to life and warranting the consideration of the impacts of rarer flood events on land located outside the flood planning area.

Controls apply to the following sensitive or hazardous development being undertaken on any part of the floodplain.

Hospitals, telecommunication towers, large power supply stations, emergency services facilities (police, ambulance and fire stations, centre-based child care, early education and care facilities, correctional centres, educational establishments, residential care facilities, respite day-care centres, seniors housing, group homes.

5. Drainage constraints

	Present on property	Details
Pipes	Yes	Ø1200mm diameter pipe
Drainage easements	Yes	6.1 metre (20ft) wide easement to drain water
Waterways or channels	No	N/A

Attachment 2: Flood modelling and floor level requirements

Flood studies must comply with general requirements for flood modelling

These are outlined in:

- Blacktown Development Control Plan 2015, Part A, Chapter 9.
This document is published on our website:
https://www.blacktown.nsw.gov.au/files/assets/public/v/2/building-and-planning/dcps-amp-lap/part-a-introduction-and-general-guidelines_waste.pdf
- General requirements for Flood Modelling are outlined in our Water sensitive urban design developer handbook. Chapter 15.3: Design Standards outlines a number of different developments, and states minimum requirements with regards to flooding.
This document is published on our website:
<https://www.blacktown.nsw.gov.au/Plan-build/Stage-2-plans-and-guidelines/Developers-toolkit-for-water-sensitive-urban-design-WSUD/MUSIC-modelling>

In addition to a flood study

A preliminary minimum floor level would be required to be the higher of:

- a minimum of 225 mm above finished ground levels, or
- the highest adjacent 1% Annual Exceedance Probability (AEP)
 - riverine flow level plus 500 mm, or
 - overland flow level plus 300 mm.

A development application must provide a detail survey to Australian Height Datum and be certified (signed) by a registered surveyor. The survey is to include:

- sufficient spot levels with contours
- any existing floor levels
- the origin and level of the benchmark used and a local benchmark on top of kerb installed for use during construction.

Any future development within the 1% AEP flood area would have to prove that it does not increase the flood risk to life or the surrounding area and it must maintain an appropriate overland flow path.

We will not allow the importing of any fill within the 1% AEP flood area.

You must submit a copy of this Flood Advice Letter, the Flood Study Report and electronic files of the Flood Model with any development application for the site.

Attachment 3: General flood information

Definitions

AEP	stands for 'Annual Exceedance Probability'. This is the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. A 1% AEP flood has a 1% chance of occurring in any given year.
PMF	stands for 'Probable Maximum Flood' The PMF is the largest flood that could conceivably be expected to occur at a given location. The PMF defines the maximum extent of flood prone land, that is, the floodplain.
Flood level	is the elevation of the flood surface above Australian Height Datum (AHD). Australian Height Datum is the official national vertical datum for Australia which is a plane of level corresponding approximately to mean sea level.
Flood depth	is calculated by subtracting the Flood Level from the ground elevations defined by 2018 LiDAR aerial survey data
Velocity	is the speed of the flowing flood water
Hazard	is defined in Figure 6.7.9 Book 6 Chapter 7 of Australian Rainfall and Runoff 2019 and identifies the potential risk that floodwaters pose to people, property and vehicles. A copy of Figure 6.7.9 is below.
Freeboard	is a factor of safety expressed in metres above a flood level for purposes of floodplain management

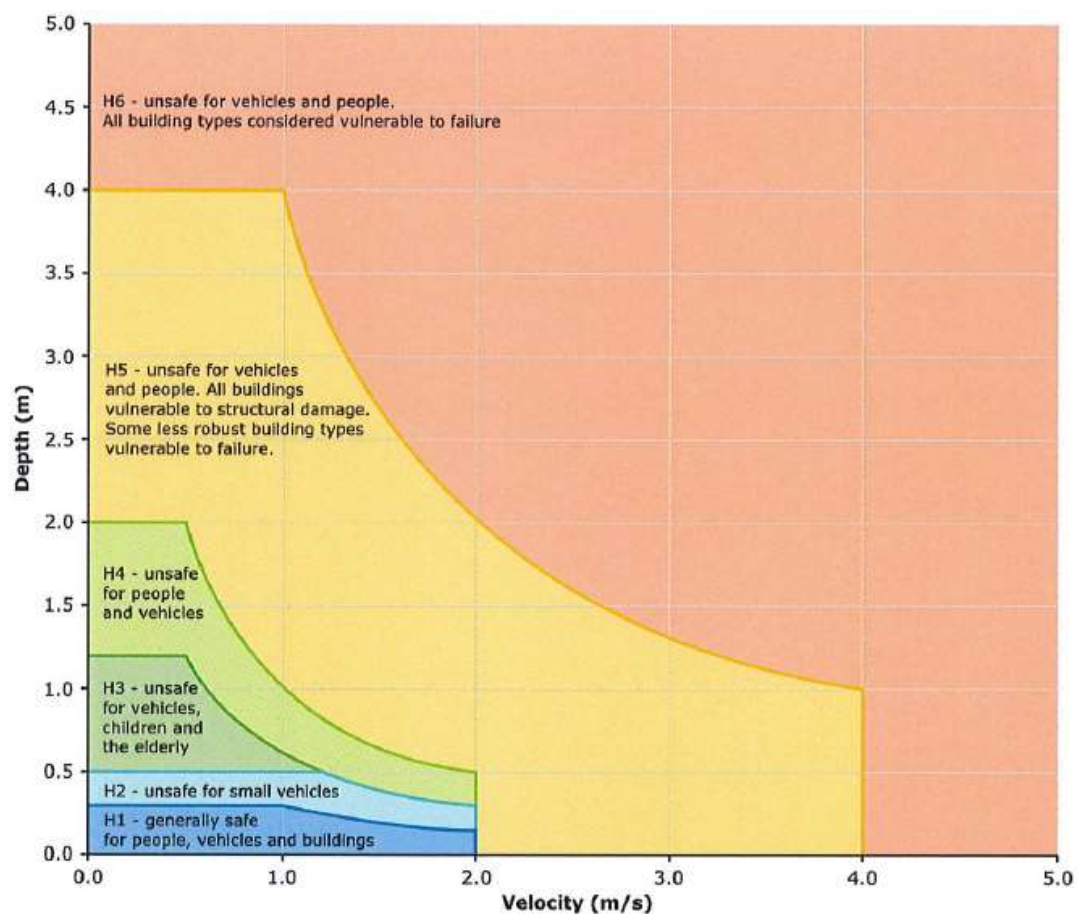


Figure 6.7.9. Combined Flood Hazard Curves (Smith et al., 2014)

The flood levels supplied are for the pre-developed existing conditions	The flood levels supplied do not take climate change into consideration. These flood levels should not be used to set floor levels or to identify the extent of flooding over the property as our current flood models may not have included blockage factors nor changes in land-use and landform since the date of the study.
Flood Planning Area	Land which lies below the Flood Planning Level. Properties that lie either partially or wholly within the extent of the Flood Planning Area are subject to a s10.7 certificate flood affectation notification, and as such are subject to the flood related development controls set out in the Blacktown Local Environmental Plan 2015 and the Development Control Plan relevant to the property.
Flood Planning Level	The Flood Planning Level for Blacktown City is a combination of defined flood event and freeboard. We use 1% AEP for the defined flood event, and include a freeboard appropriate for the land use. For residential properties in Blacktown City, this is 500mm metres for riverine flooding and 300mm for overland flow.
Flood risk precincts	Precincts have been defined based on hydraulic and survey information available to Council for both local overland and riverine flooding. In many cases a more definitive indication of flood risk precinct extents can be determined by relating surveyed ground levels at AHD to the relevant hydraulic and/or flood level criteria. The Low Flood Risk Precinct is equivalent to the floodplain and flood prone land. This includes all land that is flood affected by flooding in some capacity, up to and including the PMF, except for areas that have already been identified as being within the high or medium flood risk precinct. The Medium Flood Risk Precinct is equivalent to the flood planning area, except for areas that have already been identified as being within the high flood risk The High Flood Risk Precinct includes areas of the floodplain which convey a significant discharge of water during floods. They often align with naturally defined channels and are equivalent to the floodway or high hazard areas.

‘Development on Flood Prone Land’ guidelines

Our guidelines can be found in Blacktown Development Control Plan 2015 Part A.

This document is on our website [Blacktown Development Control Plan 2015 – Chapter 9 ‘Development on Flood Prone Land’](#) This publication is currently under review in respect of floodplain planning issues.

Council’s flood mapping is available on our website

To start, click Discover Blacktown tab on the home page and then select Maps Online and follow the instructions.

Our flood mapping only covers the areas where we have information.

A property that is not identified does not mean that there are no flood issues.

It is the responsibility of the person enquiring to check the natural fall of the land and to ensure that the subject property is not affected by local stormwater overland flows that might affect existing or future development on this land.

State Environmental Planning Policy (SEPP) flood mapping

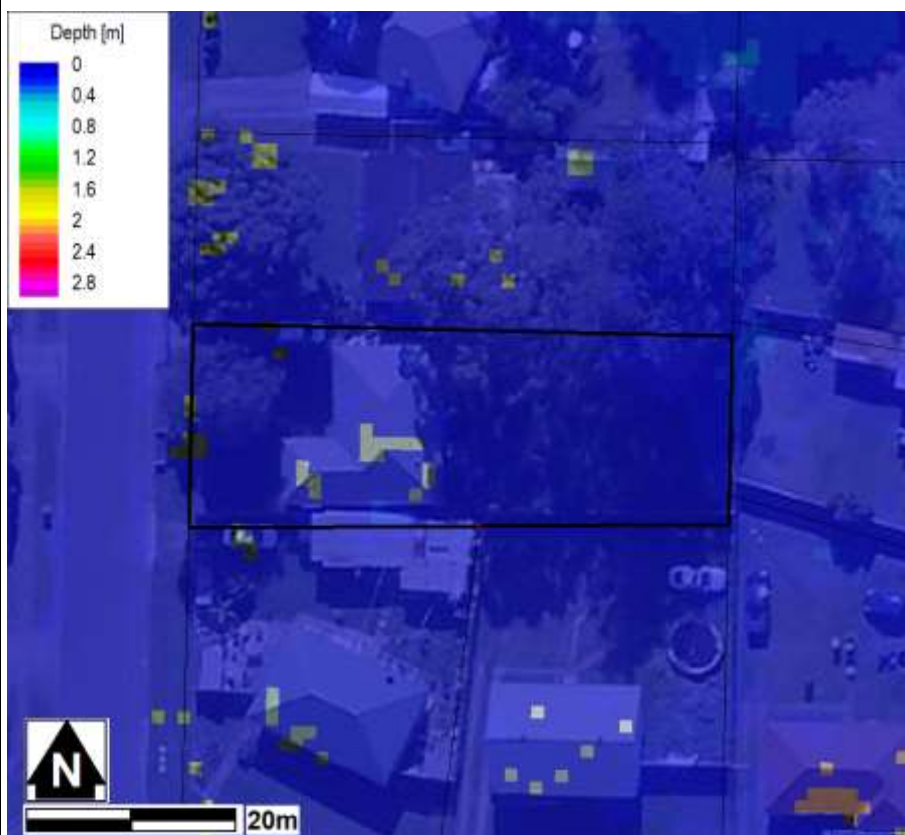
The property is subject to *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*. It is identified on the Development Control Map as ‘Flood Prone and Major Creeks Land’.

Clause 19 of the Growth Centres SEPP provides heads of consideration when a development application is lodged on land affected by ‘Flood Prone and Major Creeks Land’.

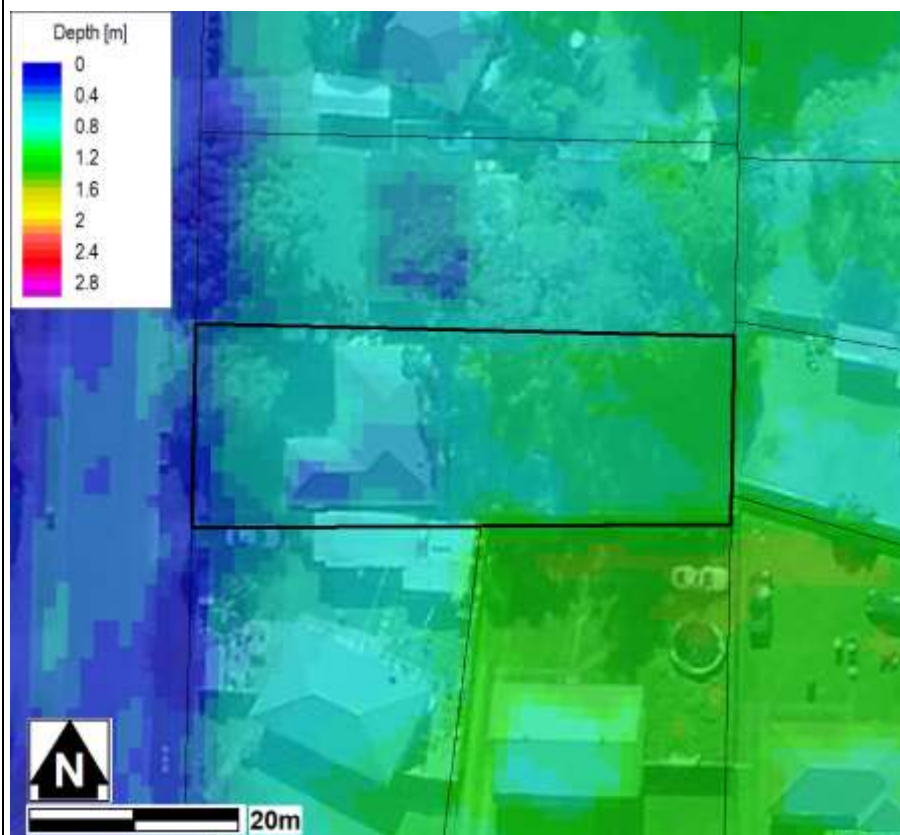
The SEPP maps (shown as light blue hatching) indicate the extent of flood prone land based on existing conditions at the time of preparing the precinct planning. Therefore, they may not include any changes resulting from subsequent development or infrastructure works.

Attachment 4: Flood maps

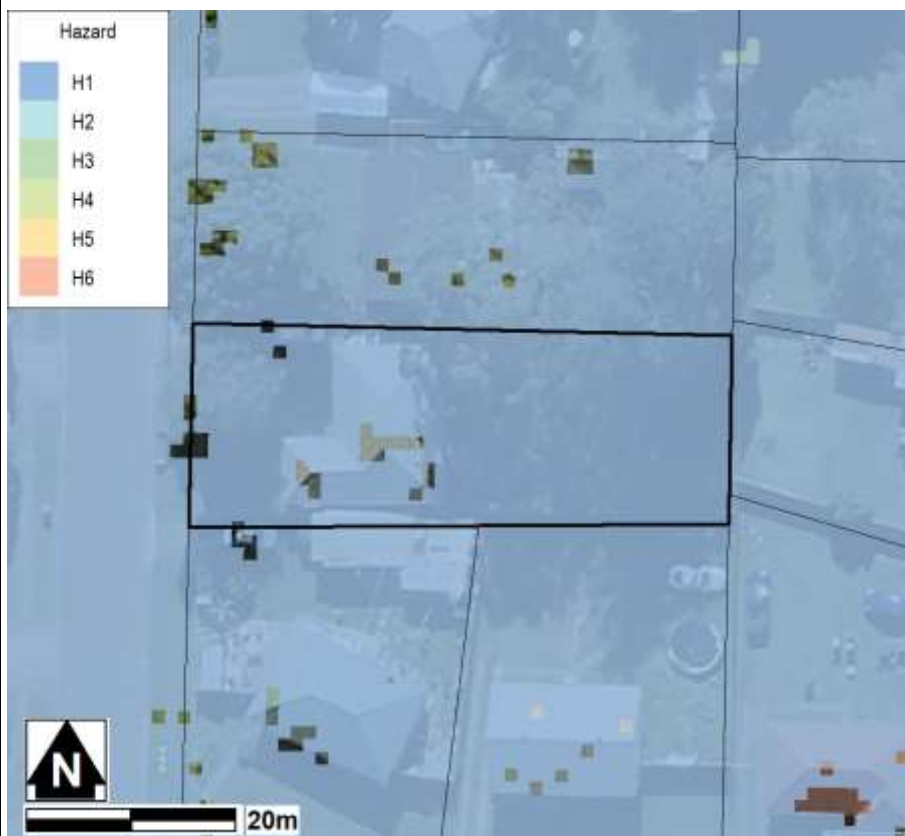
1% AEP Overland Flow Flood Depths



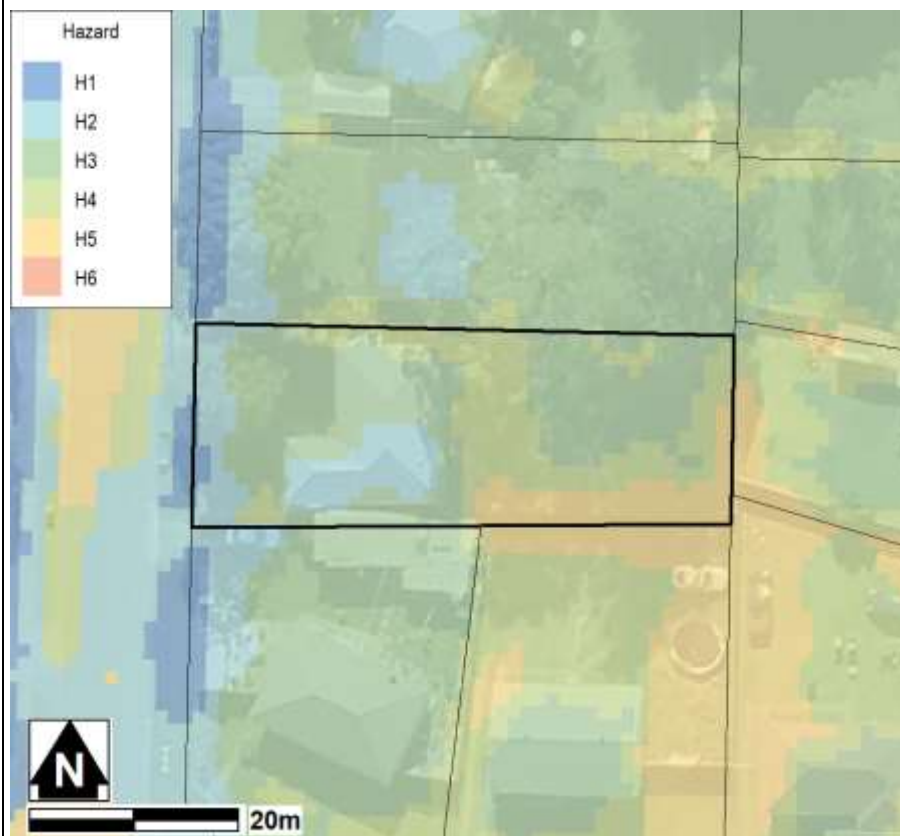
PMF Overland Flow Flood Depths

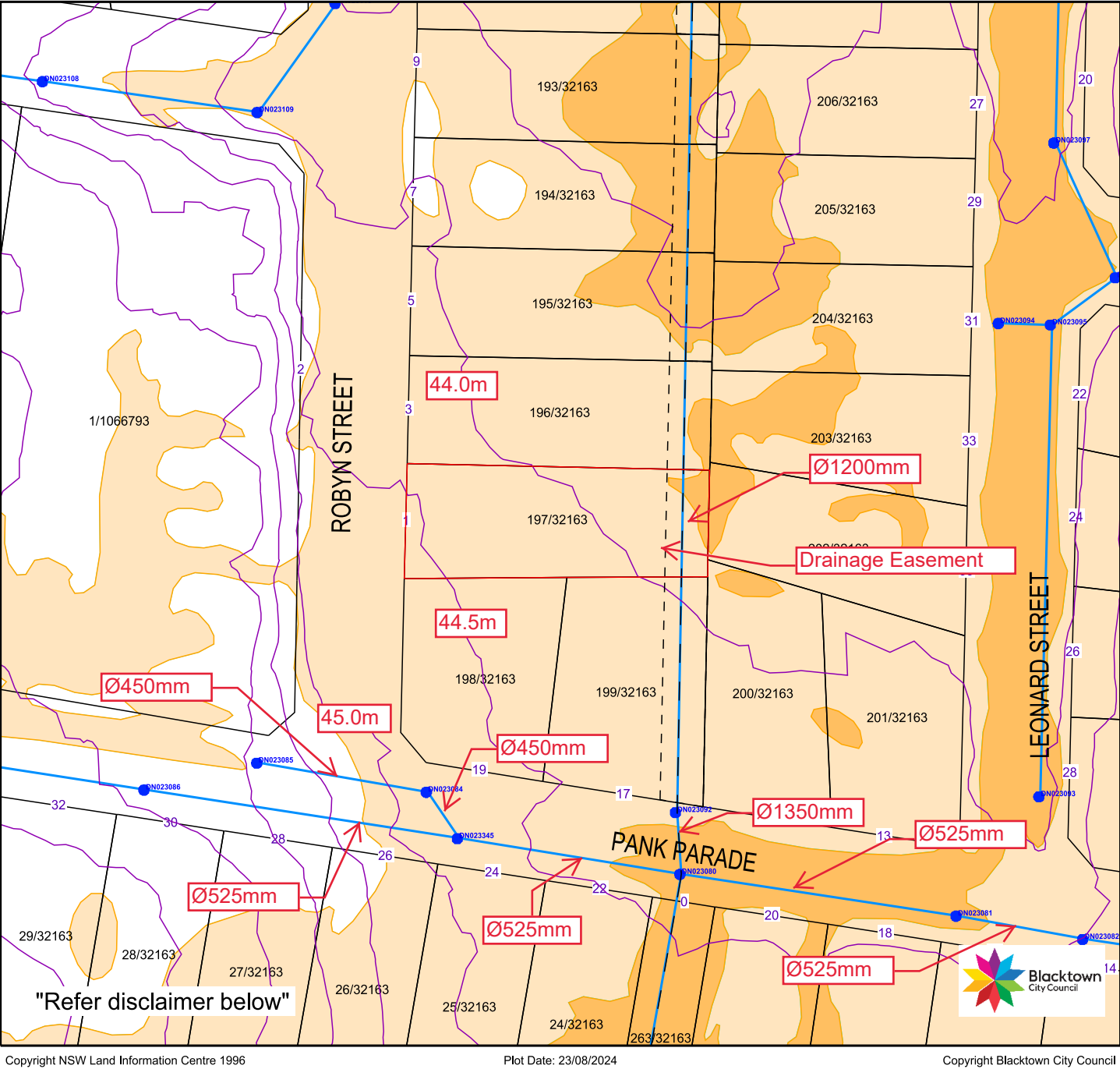


1% AEP Overland Flow Flood Hazard



PMF Overland Flow Flood Hazard





File number: 153219

2 September 2024

Homes NSW

Dear Howard Taylor

Flood advice: 17 Pank Parade Blacktown being Lot 199 in DP 32163

I refer to your request for flood advice on 31/07/2024 and provide the following flood information for the above property.

Do flood planning controls currently apply?

- | | |
|---|----|
| 1. Flood planning area controls – Riverine | No |
| 2. Flood planning area controls – Overland | No |
| 3. State Environmental Planning Policy controls | No |

What other considerations may apply?

- | | |
|--------------------------------|-----|
| 4. Special flood consideration | Yes |
| 5. Drainage constraints | Yes |

What this means for your property

If we have answered 'Yes' to any of the Flood planning controls at 1, 2 or 3 above, a flood study will be required for development.

If we have answered 'Yes' at 4 above, a flood study will be required if your development is considered sensitive or hazardous and is located within any part of the floodplain.

If we have answered 'Yes' at 5 above, a flood study may be required.

Where to find more information

The following pages set out more detailed information on the above where it relates to your property, along with other relevant flood related information. If you have any queries on this, please contact one of our Floodplain Officers by phoning 02 9839 6350 or emailing floodadvice@blacktown.nsw.gov.au

If you have any queries on development of your land, please contact one of our Planners by phoning 02 5300 6000, or emailing gateway.team@blacktown.nsw.gov.au.

Yours faithfully



Naomi Harris
Coordinator Floodplain and Stormwater

Attachments

1. Details on our flood information for your property
2. Flood modelling and floor levels
3. General flood information, including definitions
4. Flood maps

Disclaimer

The information contained in this letter is only valid on the date of issue. This letter has been prepared with all due care and in good faith using the best information available to us.

We provide no warranties in relation to the completeness or accuracy of the information contained in this letter, and do not accept liability for any loss or damage resulting from, or in connection with, its contents or its use.

There may be other non-flood related matters that might impact on the use of the land.

We strongly recommend that, in all cases, you seek independent professional advice to supplement your enquiries. A more detailed assessment at development application stage may result in modifications and/or additions to these comments. This advice is not a guarantee of approval.

We can supply additional information, such as ALS/Lidar data for a fee. Contact floodadvice@blacktown.nsw.gov.au for this information.

From the 3 July 2024, our flood risk precincts in this area were updated to reflect new information in the Blacktown Overland Flow Flood Study. Further information can be found here: <https://www.blacktown.nsw.gov.au/Our-environment/Waterways/Flooding-in-the-Blacktown-local-government-area/Flood-studies>. We may have draft information about other flood studies that has not been included in this letter.

Attachment 1: Details on our flood information for your property

1. Flood planning area controls – Riverine

This property is not identified as being in any of the flood precincts of the Breakfast Creek floodplain.

2. Flood planning area controls – Overland flow

This property is identified as being in the Overland Flow Low Flood Risk Precinct. Maps showing the extent of adopted overland flow flooding are at attachment 4.

3. Flood planning area controls - State Environmental Planning Policy

This property is not located within an area identified as being part of the State Environmental Planning Policy (Sydney Region Growth Centres) 2006, known as the SEPP, flood mapping for the rezoning and redevelopment of the area.

4. Special flood consideration

Special flood considerations apply to certain types of development that have been identified as having a higher risk to life and warranting the consideration of the impacts of rarer flood events on land located outside the flood planning area.

Controls apply to the following sensitive or hazardous development being undertaken on any part of the floodplain.

Hospitals, telecommunication towers, large power supply stations, emergency services facilities (police, ambulance and fire stations, centre-based child care, early education and care facilities, correctional centres, educational establishments, residential care facilities, respite day-care centres, seniors housing, group homes.

5. Drainage constraints

	Present on property	Details
Pipes	Yes	Ø1200mm diameter pipe
Drainage easements	Yes	6.1metre (20ft) wide easement to drain water
Waterways or channels	No	N/A

Attachment 2: Flood modelling and floor level requirements

Flood studies must comply with general requirements for flood modelling

These are outlined in:

- Blacktown Development Control Plan 2015, Part A, Chapter 9.
This document is published on our website:
https://www.blacktown.nsw.gov.au/files/assets/public/v/2/building-and-planning/dcps-amp-lap/part-a-introduction-and-general-guidelines_waste.pdf
- General requirements for Flood Modelling are outlined in our Water sensitive urban design developer handbook. Chapter 15.3: Design Standards outlines a number of different developments, and states minimum requirements with regards to flooding.
This document is published on our website:
<https://www.blacktown.nsw.gov.au/Plan-build/Stage-2-plans-and-guidelines/Developers-toolkit-for-water-sensitive-urban-design-WSUD/MUSIC-modelling>

In addition to a flood study

A preliminary minimum floor level would be required to be the higher of:

- a minimum of 225 mm above finished ground levels, or
- the highest adjacent 1% Annual Exceedance Probability (AEP)
 - riverine flow level plus 500 mm, or
 - overland flow level plus 300 mm.

A development application must provide a detail survey to Australian Height Datum and be certified (signed) by a registered surveyor. The survey is to include:

- sufficient spot levels with contours
- any existing floor levels
- the origin and level of the benchmark used and a local benchmark on top of kerb installed for use during construction.

Any future development within the 1% AEP flood area would have to prove that it does not increase the flood risk to life or the surrounding area and it must maintain an appropriate overland flow path.

We will not allow the importing of any fill within the 1% AEP flood area.

You must submit a copy of this Flood Advice Letter, the Flood Study Report and electronic files of the Flood Model with any development application for the site.

Attachment 3: General flood information

Definitions

AEP	stands for 'Annual Exceedance Probability'. This is the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. A 1% AEP flood has a 1% chance of occurring in any given year.
PMF	stands for 'Probable Maximum Flood' The PMF is the largest flood that could conceivably be expected to occur at a given location. The PMF defines the maximum extent of flood prone land, that is, the floodplain.
Flood level	is the elevation of the flood surface above Australian Height Datum (AHD). Australian Height Datum is the official national vertical datum for Australia which is a plane of level corresponding approximately to mean sea level.
Flood depth	is calculated by subtracting the Flood Level from the ground elevations defined by 2018 LiDAR aerial survey data
Velocity	is the speed of the flowing flood water
Hazard	is defined in Figure 6.7.9 Book 6 Chapter 7 of Australian Rainfall and Runoff 2019 and identifies the potential risk that floodwaters pose to people, property and vehicles. A copy of Figure 6.7.9 is below.
Freeboard	is a factor of safety expressed in metres above a flood level for purposes of floodplain management

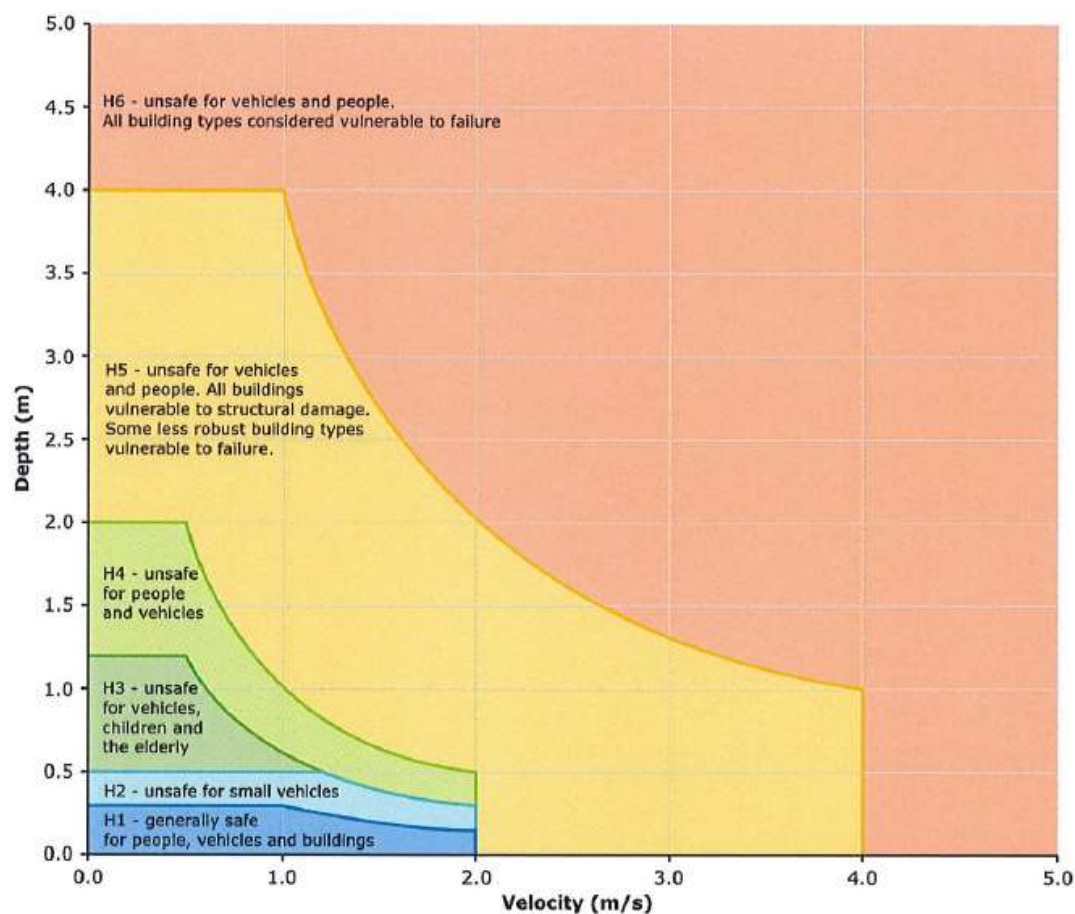


Figure 6.7.9. Combined Flood Hazard Curves (Smith et al., 2014)

The flood levels supplied are for the pre-developed existing conditions

The flood levels supplied do not take climate change into consideration. These flood levels should not be used to set floor levels or to identify the extent of flooding over the property as our current flood models may not have included blockage factors nor changes in land-use and landform since the date of the study.

Flood Planning Area

Land which lies below the Flood Planning Level.

Properties that lie either partially or wholly within the extent of the Flood Planning Area are subject to a s10.7 certificate flood affectation notification, and as such are subject to the flood related development controls set out in the Blacktown Local Environmental Plan 2015 and the Development Control Plan relevant to the property.

Flood Planning Level

The Flood Planning Level for Blacktown City is a combination of defined flood event and freeboard.

We use 1% AEP for the defined flood event, and include a freeboard appropriate for the land use. For residential properties in Blacktown City, this is 500mm metres for riverine flooding and 300mm for overland flow.

Flood risk precincts

Precincts have been defined based on hydraulic and survey information available to Council for both local overland and riverine flooding. In many cases a more definitive indication of flood risk precinct extents can be determined by relating surveyed ground levels at AHD to the relevant hydraulic and/or flood level criteria.

The Low Flood Risk Precinct is equivalent to the floodplain and flood prone land. This includes all land that is flood affected by flooding in some capacity, up to and including the PMF, except for areas that have already been identified as being within the high or medium flood risk precinct.

The Medium Flood Risk Precinct is equivalent to the flood planning area, except for areas that have already been identified as being within the high flood risk

The High Flood Risk Precinct includes areas of the floodplain which convey a significant discharge of water during floods. They often align with naturally defined channels and are equivalent to the floodway or high hazard areas.

‘Development on Flood Prone Land’ guidelines

Our guidelines can be found in Blacktown Development Control Plan 2015 Part A.

This document is on our website [Blacktown Development Control Plan 2015 – Chapter 9 ‘Development on Flood Prone Land’](#) This publication is currently under review in respect of floodplain planning issues.

Council’s flood mapping is available on our website

To start, click Discover Blacktown tab on the home page and then select Maps Online and follow the instructions.

Our flood mapping only covers the areas where we have information.

A property that is not identified does not mean that there are no flood issues.

It is the responsibility of the person enquiring to check the natural fall of the land and to ensure that the subject property is not affected by local stormwater overland flows that might affect existing or future development on this land.

State Environmental Planning Policy (SEPP) flood mapping

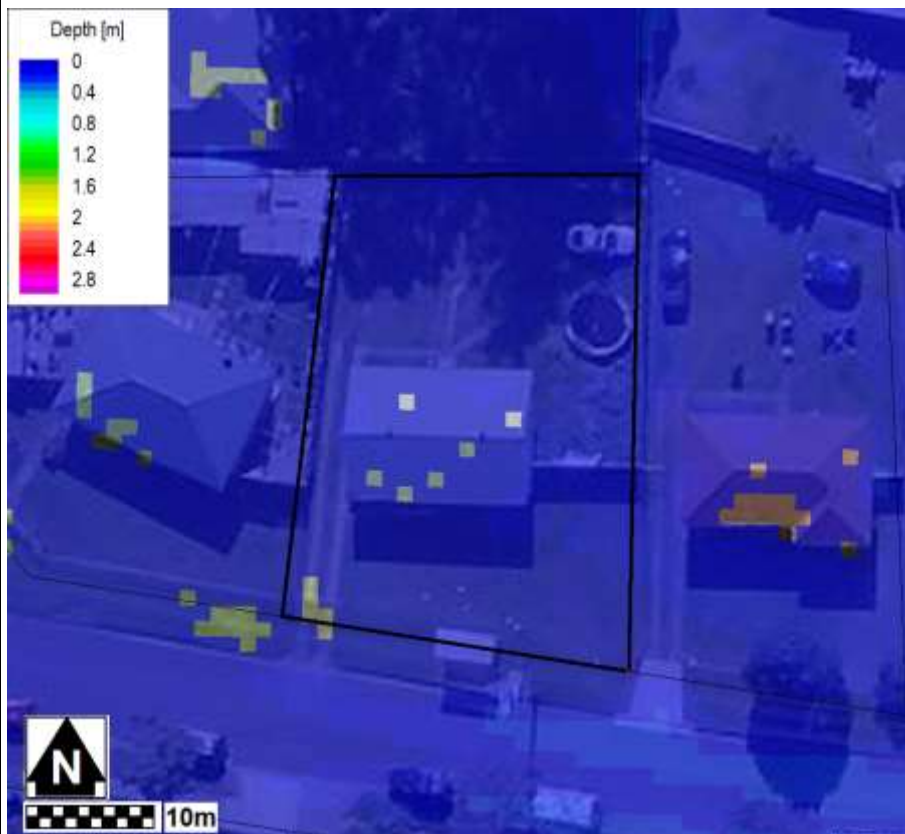
The property is subject to *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*. It is identified on the Development Control Map as ‘Flood Prone and Major Creeks Land’.

Clause 19 of the Growth Centres SEPP provides heads of consideration when a development application is lodged on land affected by ‘Flood Prone and Major Creeks Land’.

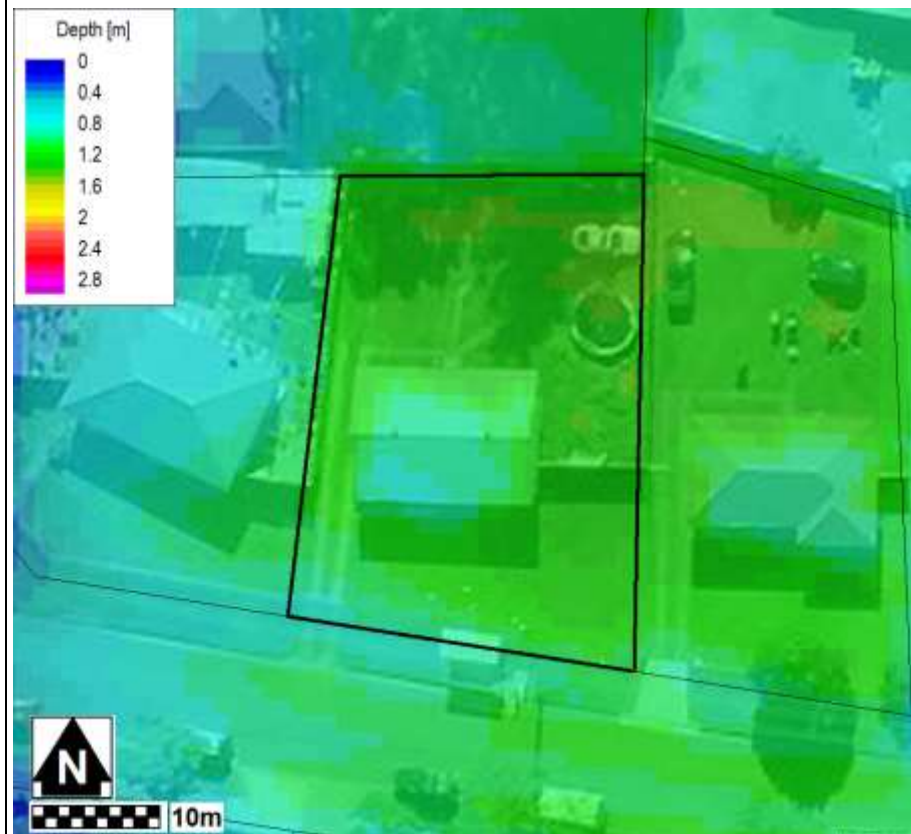
The SEPP maps (shown as light blue hatching) indicate the extent of flood prone land based on existing conditions at the time of preparing the precinct planning. Therefore, they may not include any changes resulting from subsequent development or infrastructure works.

Attachment 4: Flood maps

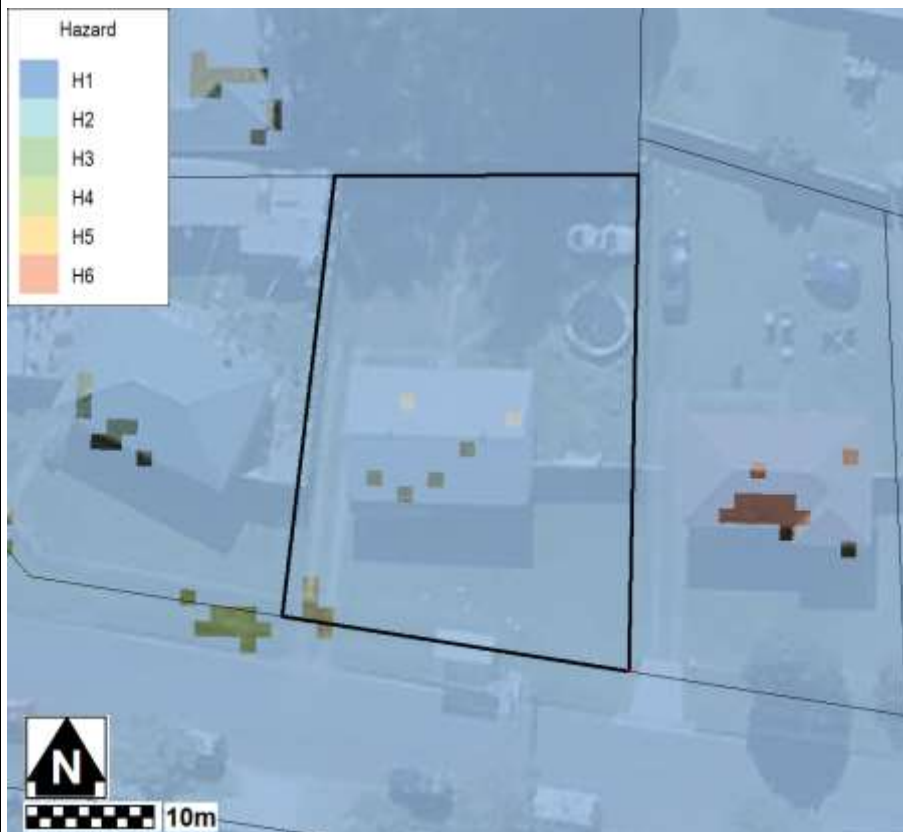
1% AEP Overland Flow Flood Depths



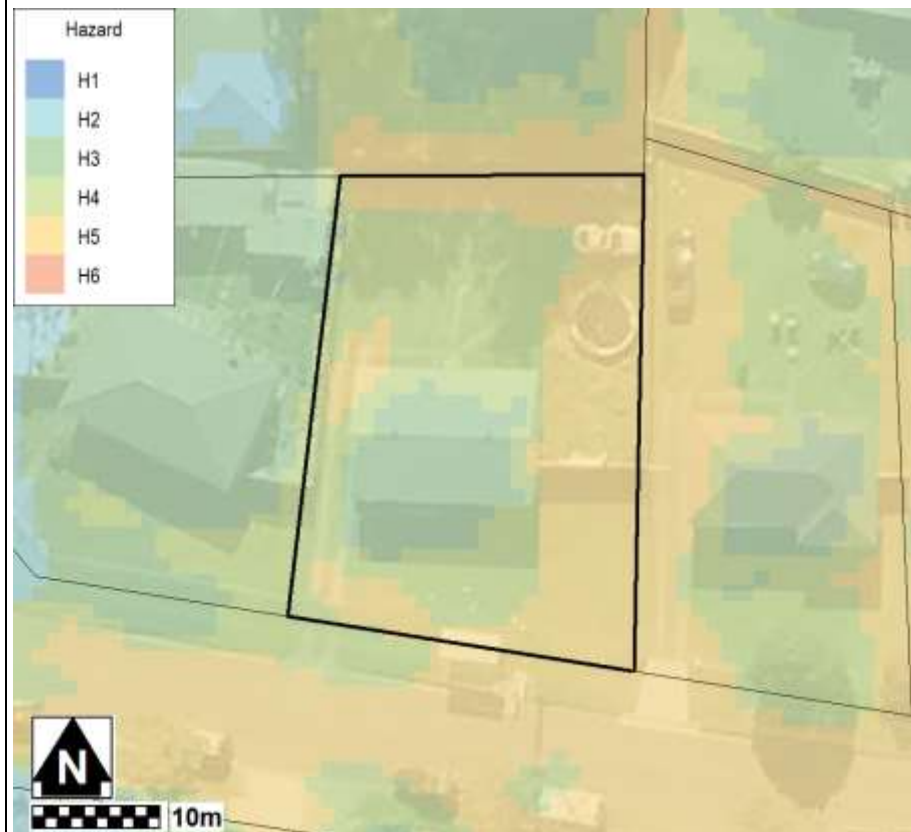
PMF Overland Flow Flood Depths

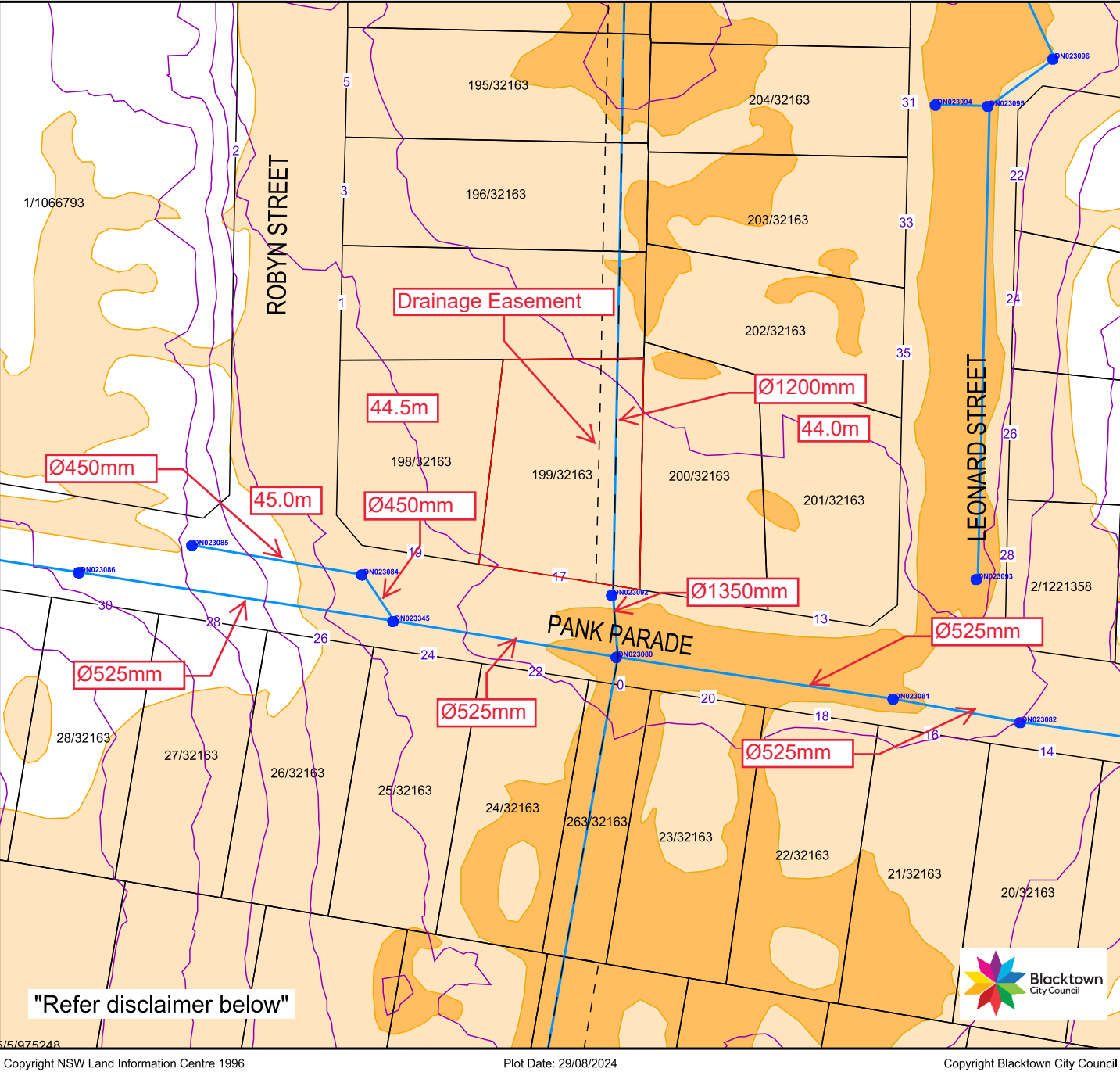


1% AEP Overland Flow Flood Hazard



PMF Overland Flow Flood Hazard



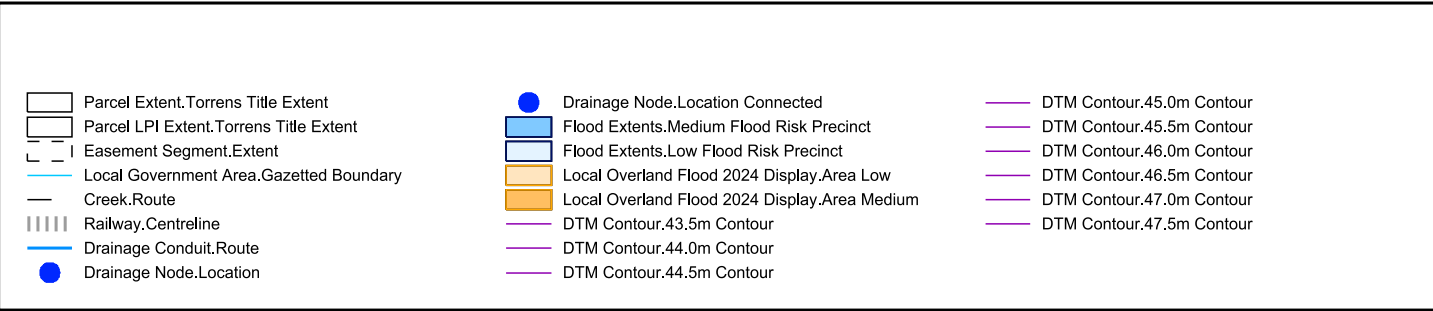


BLACKTOWN CITY COUNCIL
Flood Risk Map

DISCLAIMER: The flood risk precincts shown are based on information available to Council and should be regarded as an indicative guide only. A more accurate indication of the extent of the respective flood risk precincts can be determined by relating surveyed ground levels at Australian Height Datum (AHD) to the hydraulic and/or flood level criteria determining flood risk precinct boundaries. This information may be obtained by a written request to Council accompanied by a ground level survey to AHD prepared by a Registered Surveyor. Should flood risk precinct extents be required for the purpose of a financial transaction of any nature, then the parties to that transaction should apply to Council for formal certification and/or seek independent legal or professional advice.



Scale 1:1000



File Number: 153220

2 September 2024

Homes NSW

Dear Howard Taylor

Flood advice: 19 Pank Parade Blacktown being Lot 198 in DP 32163

I refer to your request for flood advice on 31/07/2024 and provide the following flood information for the above property.

Do flood planning controls currently apply?

- | | |
|---|----|
| 1. Flood planning area controls – Riverine | No |
| 2. Flood planning area controls – Overland | No |
| 3. State Environmental Planning Policy controls | No |

What other considerations may apply?

- | | |
|--------------------------------|-----|
| 4. Special flood consideration | Yes |
| 5. Drainage constraints | No |

What this means for your property

If we have answered 'Yes' to any of the Flood planning controls at 1, 2 or 3 above, a flood study will be required for development.

If we have answered 'Yes' at 4 above, a flood study will be required if your development is considered sensitive or hazardous and is located within any part of the floodplain.

If we have answered 'Yes' at 5 above, a flood study may be required.

Where to find more information

The following pages set out more detailed information on the above where it relates to your property, along with other relevant flood related information. If you have any queries on this, please contact one of our Floodplain Officers by phoning 02 9839 6350 or emailing floodadvice@blacktown.nsw.gov.au

If you have any queries on development of your land, please contact one of our Planners by phoning 02 5300 6000, or emailing gateway.team@blacktown.nsw.gov.au.

Yours faithfully



Naomi Harris

Coordinator Floodplain and Stormwater

Attachments

1. Details on our flood information for your property
2. Flood modelling and floor levels
3. General flood information, including definitions
4. Flood maps

Disclaimer

The information contained in this letter is only valid on the date of issue. This letter has been prepared with all due care and in good faith using the best information available to us.

We provide no warranties in relation to the completeness or accuracy of the information contained in this letter, and do not accept liability for any loss or damage resulting from, or in connection with, its contents or its use.

There may be other non-flood related matters that might impact on the use of the land.

We strongly recommend that, in all cases, you seek independent professional advice to supplement your enquiries. A more detailed assessment at development application stage may result in modifications and/or additions to these comments. This advice is not a guarantee of approval.

We can supply additional information, such as ALS/Lidar data for a fee. Contact floodadvice@blacktown.nsw.gov.au for this information.

From the 3 July 2024, our flood risk precincts in this area were updated to reflect new information in the Blacktown Overland Flow Flood Study. Further information can be found here: <https://www.blacktown.nsw.gov.au/Our-environment/Waterways/Flooding-in-the-Blacktown-local-government-area/Flood-studies>. We may have draft information about other flood studies that has not been included in this letter.

Attachment 1: Details on our flood information for your property

1. Flood planning area controls – Riverine

This property is identified as being in the Low flood precincts of the Breakfast Creek floodplain. Maps showing the extent of adopted riverine flooding are at attachment 4.

2. Flood planning area controls – Overland flow

This property is identified as being in the Overland Flow Low Flood Risk Precinct. Maps showing the extent of adopted overland flow flooding are at attachment 4.

3. Flood planning area controls - State Environmental Planning Policy

This property is not located within an area identified as being part of the State Environmental Planning Policy (Sydney Region Growth Centres) 2006, known as the SEPP, flood mapping for the rezoning and redevelopment of the area.

4. Special flood consideration

Special flood considerations apply to certain types of development that have been identified as having a higher risk to life and warranting the consideration of the impacts of rarer flood events on land located outside the flood planning area.

Controls apply to the following sensitive or hazardous development being undertaken on any part of the floodplain.

Hospitals, telecommunication towers, large power supply stations, emergency services facilities (police, ambulance and fire stations, centre-based child care, early education and care facilities, correctional centres, educational establishments, residential care facilities, respite day-care centres, seniors housing, group homes.

5. Drainage constraints

	Present on property	Details
Pipes	No	N/A
Drainage easements	No	N/A
Waterways or channels	No	N/A

Attachment 2: Flood modelling and floor level requirements

Flood studies must comply with general requirements for flood modelling

These are outlined in:

- Blacktown Development Control Plan 2015, Part A, Chapter 9.
This document is published on our website:
https://www.blacktown.nsw.gov.au/files/assets/public/v/2/building-and-planning/dcps-amp-lap/part-a-introduction-and-general-guidelines_waste.pdf
- General requirements for Flood Modelling are outlined in our Water sensitive urban design developer handbook. Chapter 15.3: Design Standards outlines a number of different developments, and states minimum requirements with regards to flooding.
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<https://www.blacktown.nsw.gov.au/Plan-build/Stage-2-plans-and-guidelines/Developers-toolkit-for-water-sensitive-urban-design-WSUD/MUSIC-modelling>

In addition to a flood study

A preliminary minimum floor level would be required to be the higher of:

- a minimum of 225 mm above finished ground levels, or
- the highest adjacent 1% Annual Exceedance Probability (AEP)
 - riverine flow level plus 500 mm, or
 - overland flow level plus 300 mm.

A development application must provide a detail survey to Australian Height Datum and be certified (signed) by a registered surveyor. The survey is to include:

- sufficient spot levels with contours
- any existing floor levels
- the origin and level of the benchmark used and a local benchmark on top of kerb installed for use during construction.

Any future development within the 1% AEP flood area would have to prove that it does not increase the flood risk to life or the surrounding area and it must maintain an appropriate overland flow path.

We will not allow the importing of any fill within the 1% AEP flood area.

You must submit a copy of this Flood Advice Letter, the Flood Study Report and electronic files of the Flood Model with any development application for the site.

Attachment 3: General flood information

Definitions

AEP	stands for 'Annual Exceedance Probability'. This is the chance of a flood of a given or larger size occurring in any one year, usually expressed as a percentage. A 1% AEP flood has a 1% chance of occurring in any given year.
PMF	stands for 'Probable Maximum Flood' The PMF is the largest flood that could conceivably be expected to occur at a given location. The PMF defines the maximum extent of flood prone land, that is, the floodplain.
Flood level	is the elevation of the flood surface above Australian Height Datum (AHD). Australian Height Datum is the official national vertical datum for Australia which is a plane of level corresponding approximately to mean sea level.
Flood depth	is calculated by subtracting the Flood Level from the ground elevations defined by 2018 LiDAR aerial survey data
Velocity	is the speed of the flowing flood water
Hazard	is defined in Figure 6.7.9 Book 6 Chapter 7 of Australian Rainfall and Runoff 2019 and identifies the potential risk that floodwaters pose to people, property and vehicles. A copy of Figure 6.7.9 is below.
Freeboard	is a factor of safety expressed in metres above a flood level for purposes of floodplain management

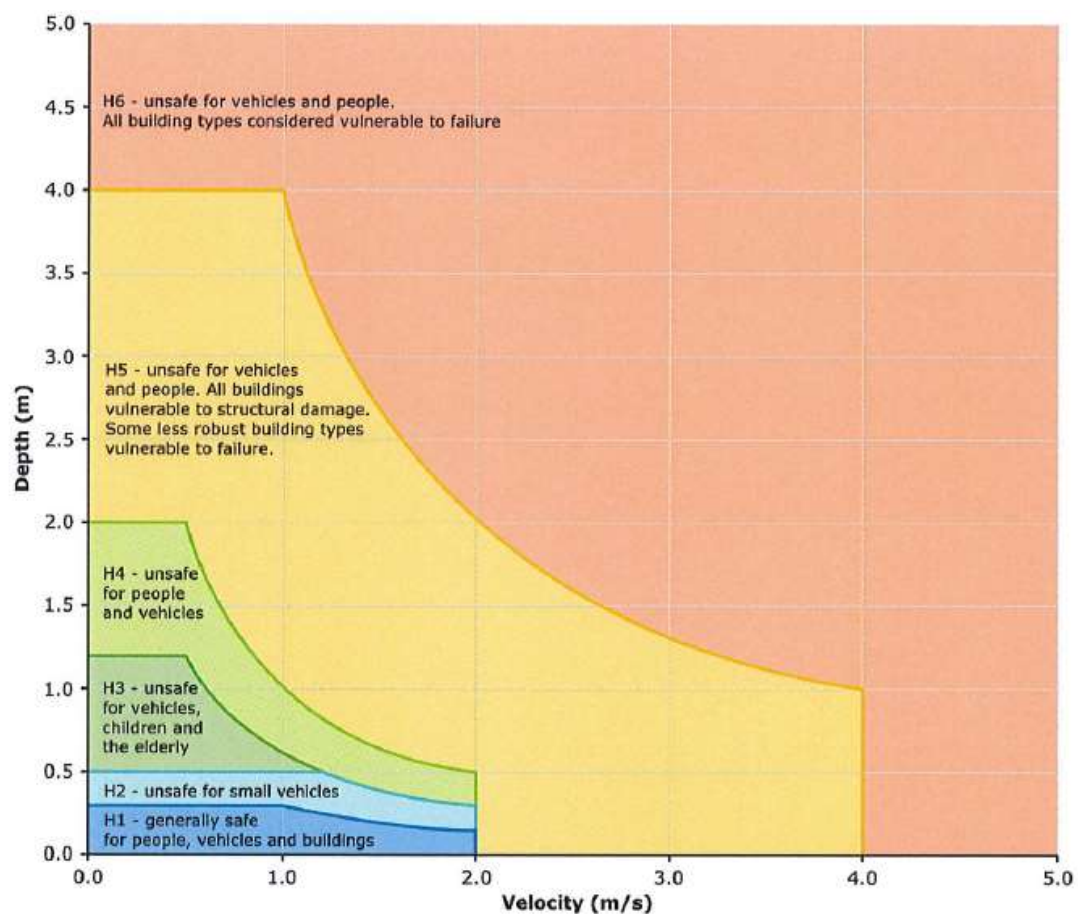


Figure 6.7.9. Combined Flood Hazard Curves (Smith et al., 2014)

The flood levels supplied are for the pre-developed existing conditions	The flood levels supplied do not take climate change into consideration. These flood levels should not be used to set floor levels or to identify the extent of flooding over the property as our current flood models may not have included blockage factors nor changes in land-use and landform since the date of the study.
Flood Planning Area	Land which lies below the Flood Planning Level. Properties that lie either partially or wholly within the extent of the Flood Planning Area are subject to a s10.7 certificate flood affectation notification, and as such are subject to the flood related development controls set out in the Blacktown Local Environmental Plan 2015 and the Development Control Plan relevant to the property.
Flood Planning Level	The Flood Planning Level for Blacktown City is a combination of defined flood event and freeboard. We use 1% AEP for the defined flood event, and include a freeboard appropriate for the land use. For residential properties in Blacktown City, this is 500mm metres for riverine flooding and 300mm for overland flow.
Flood risk precincts	Precincts have been defined based on hydraulic and survey information available to Council for both local overland and riverine flooding. In many cases a more definitive indication of flood risk precinct extents can be determined by relating surveyed ground levels at AHD to the relevant hydraulic and/or flood level criteria. The Low Flood Risk Precinct is equivalent to the floodplain and flood prone land. This includes all land that is flood affected by flooding in some capacity, up to and including the PMF, except for areas that have already been identified as being within the high or medium flood risk precinct. The Medium Flood Risk Precinct is equivalent to the flood planning area, except for areas that have already been identified as being within the high flood risk The High Flood Risk Precinct includes areas of the floodplain which convey a significant discharge of water during floods. They often align with naturally defined channels and are equivalent to the floodway or high hazard areas.

‘Development on Flood Prone Land’ guidelines

Our guidelines can be found in Blacktown Development Control Plan 2015 Part A.

This document is on our website [Blacktown Development Control Plan 2015 – Chapter 9 ‘Development on Flood Prone Land’](#) This publication is currently under review in respect of floodplain planning issues.

Council’s flood mapping is available on our website

To start, click Discover Blacktown tab on the home page and then select Maps Online and follow the instructions.

Our flood mapping only covers the areas where we have information.

A property that is not identified does not mean that there are no flood issues.

It is the responsibility of the person enquiring to check the natural fall of the land and to ensure that the subject property is not affected by local stormwater overland flows that might affect existing or future development on this land.

State Environmental Planning Policy (SEPP) flood mapping

The property is subject to *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*. It is identified on the Development Control Map as ‘Flood Prone and Major Creeks Land’.

Clause 19 of the Growth Centres SEPP provides heads of consideration when a development application is lodged on land affected by ‘Flood Prone and Major Creeks Land’.

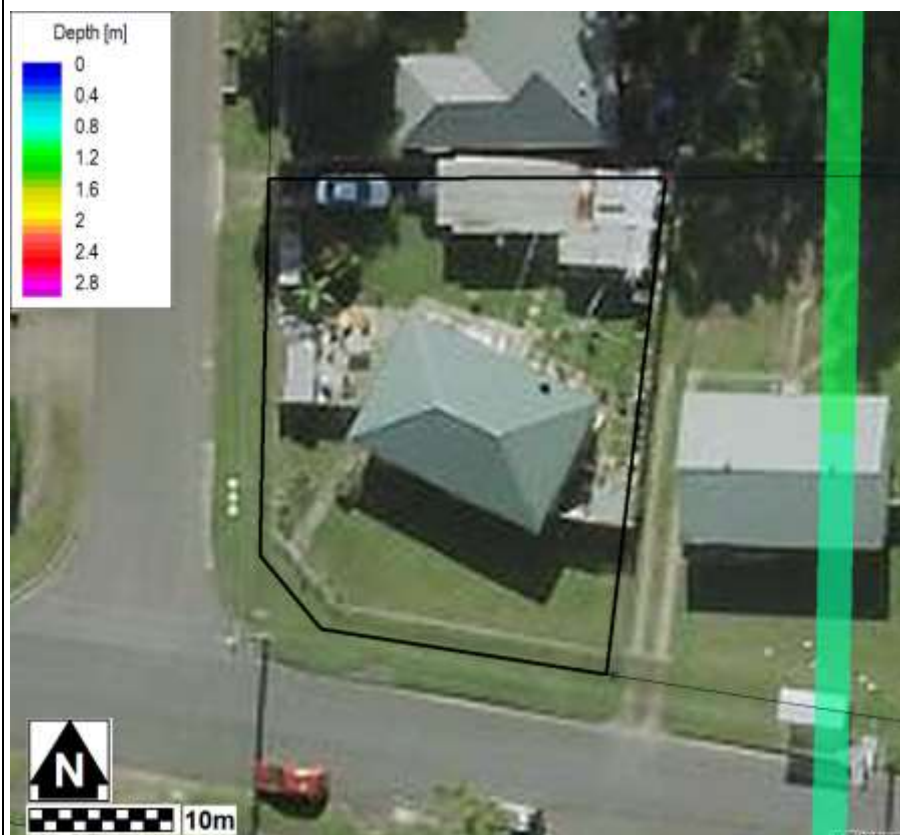
The SEPP maps (shown as light blue hatching) indicate the extent of flood prone land based on existing conditions at the time of preparing the precinct planning. Therefore, they may not include any changes resulting from subsequent development or infrastructure works.

Attachment 4: Flood maps

1% AEP Riverine Flood Depths



PMF Riverine Flood Depths



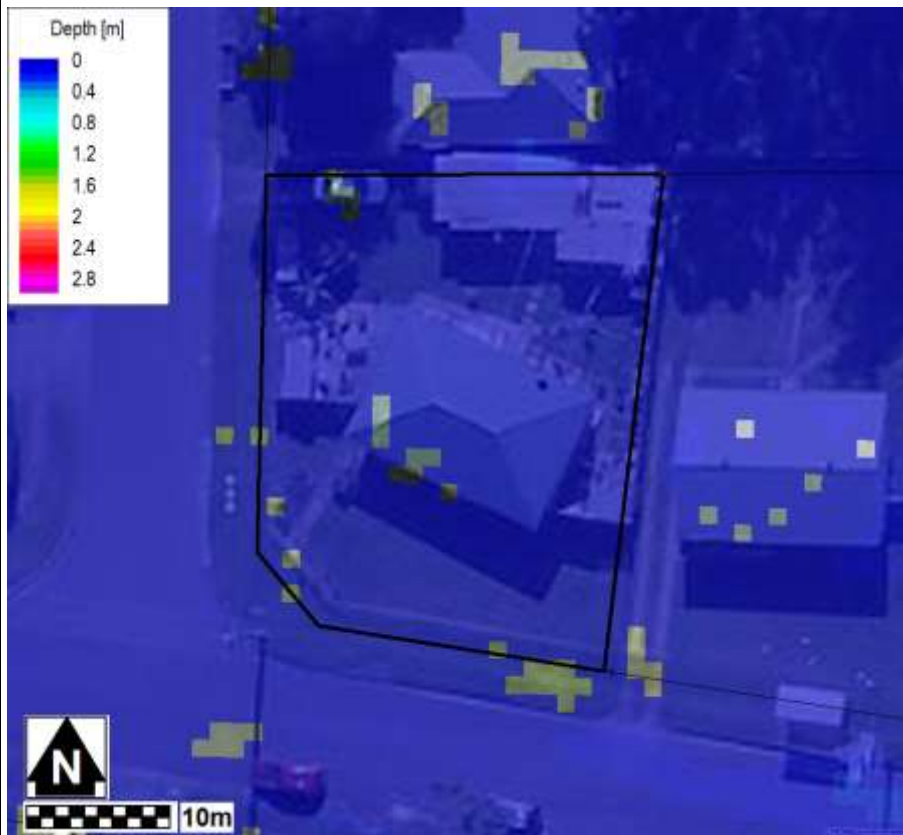
1% AEP Riverine Flood Hazard



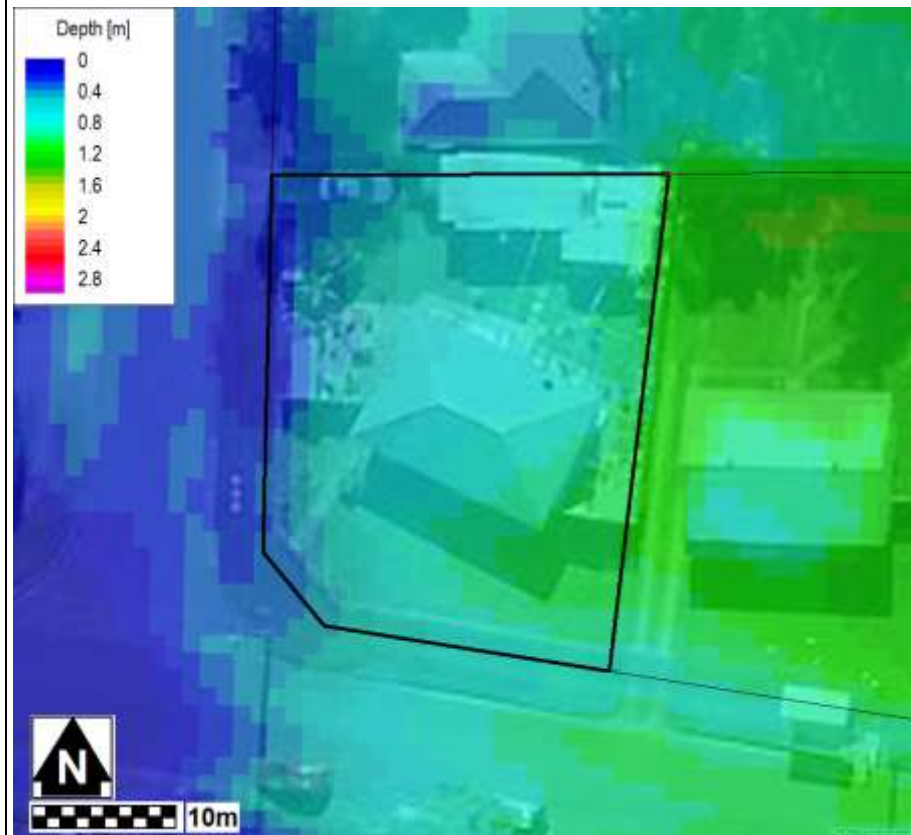
PMF Riverine Flood Hazard



1% AEP Overland Flow Flood Depths



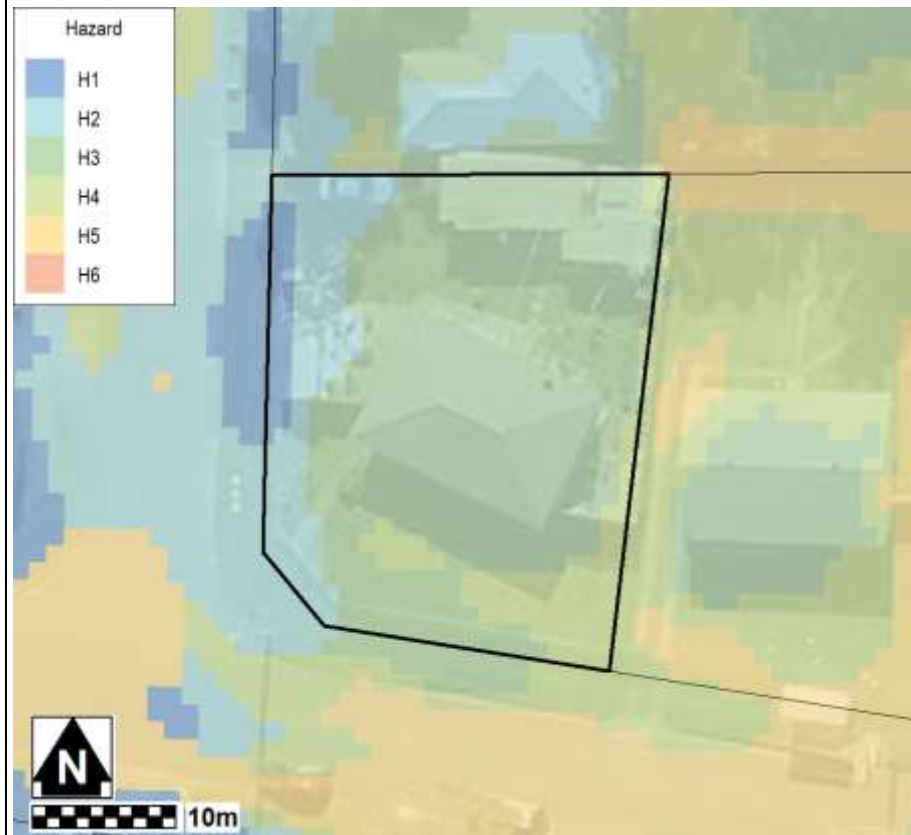
PMF Overland Flow Flood Depths

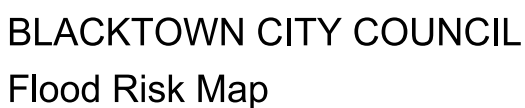


1% AEP Overland Flow Flood Hazard



PMF Overland Flow Flood Hazard





Appendix B: EXISTING TUFLOW MODEL RESULTS



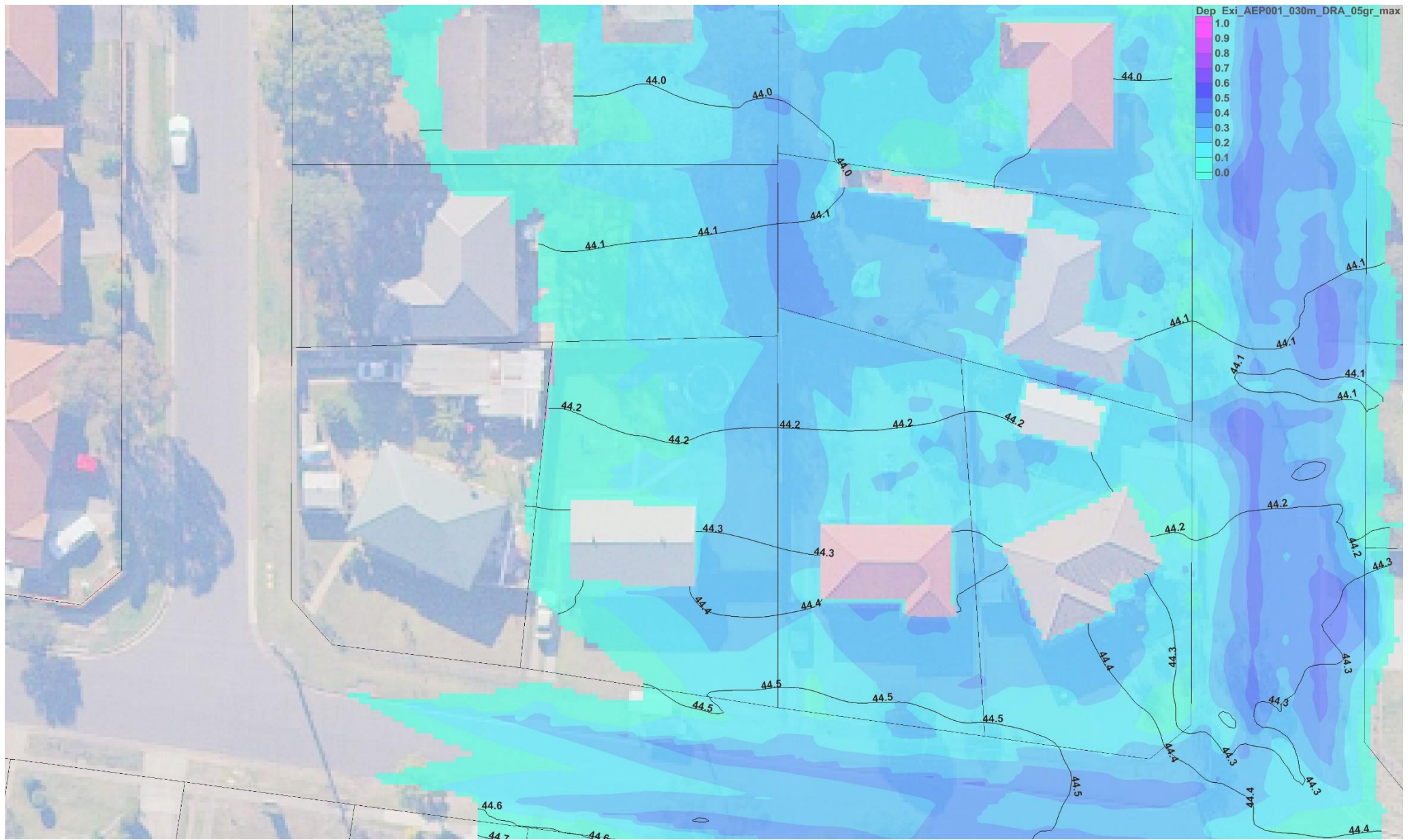


Figure A1.1: Existing 1%AEP 30min Depths [m] & Levels [mAHD]

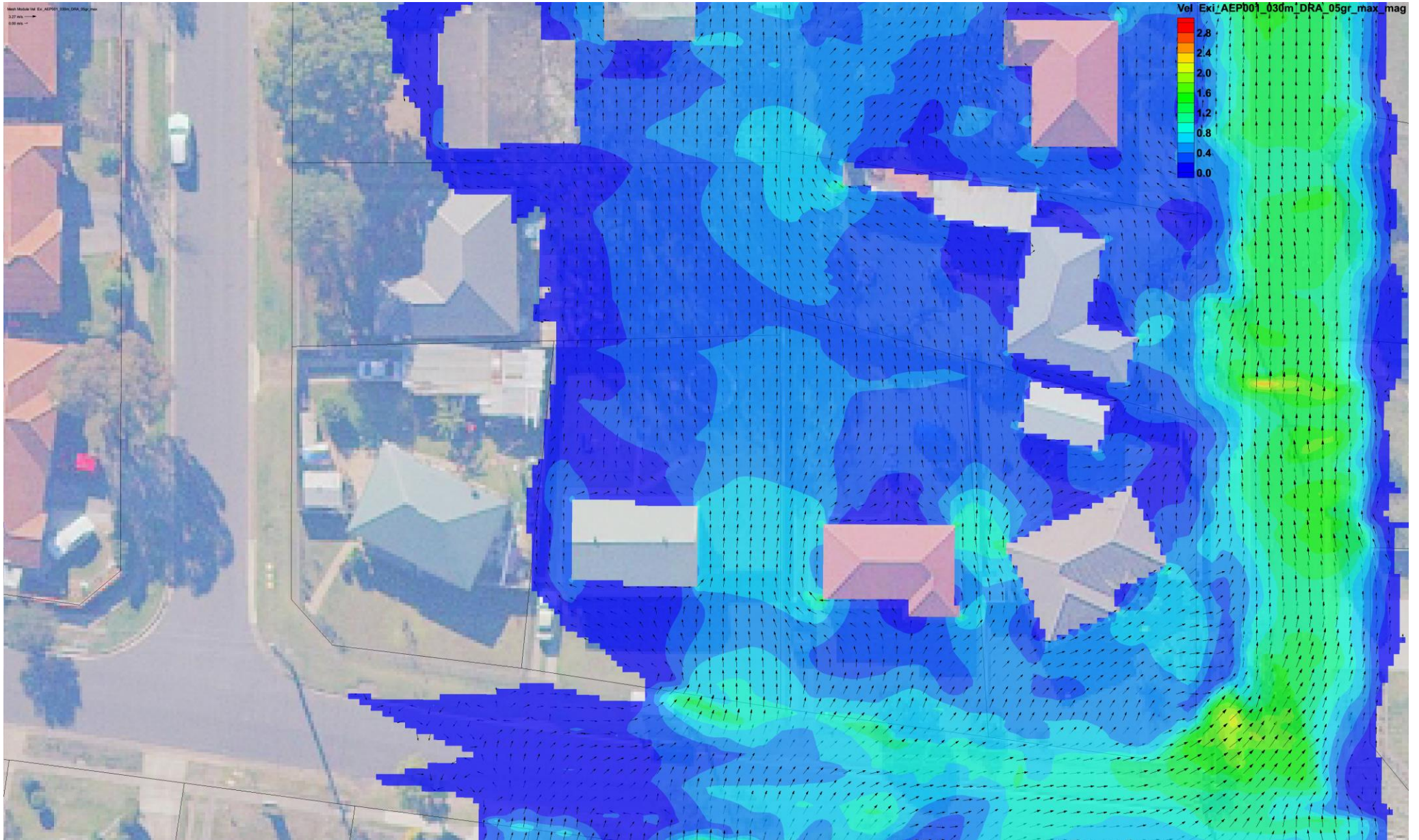


Figure A1.2: Existing 1%AEP 30min Velocities [m/s]

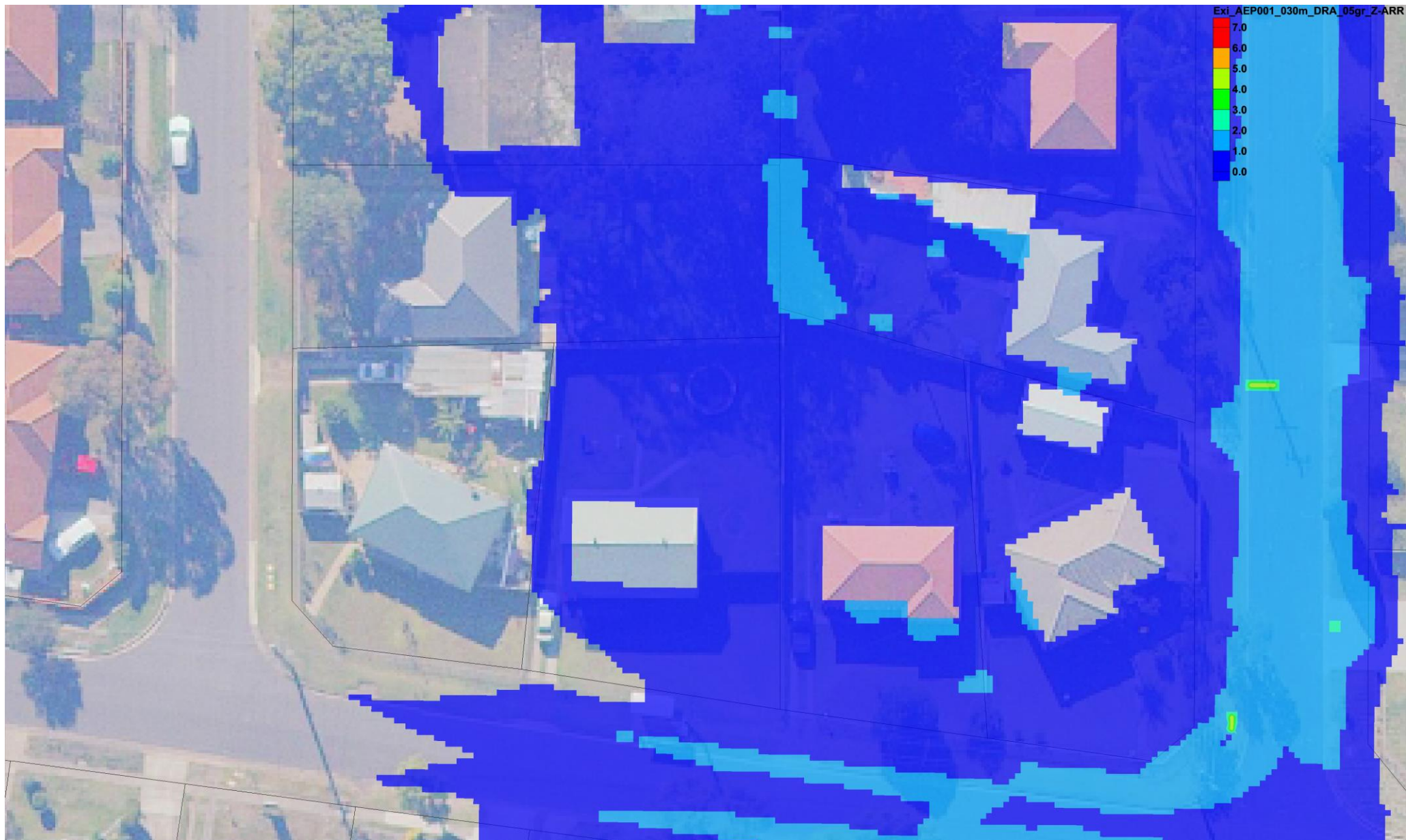


Figure A1.3: Existing 1%AEP 30min ARR2019 Hazard
H1-H6 blue-red gradient

Appendix C: PROPOSED TUFLOW MODEL RESULTS



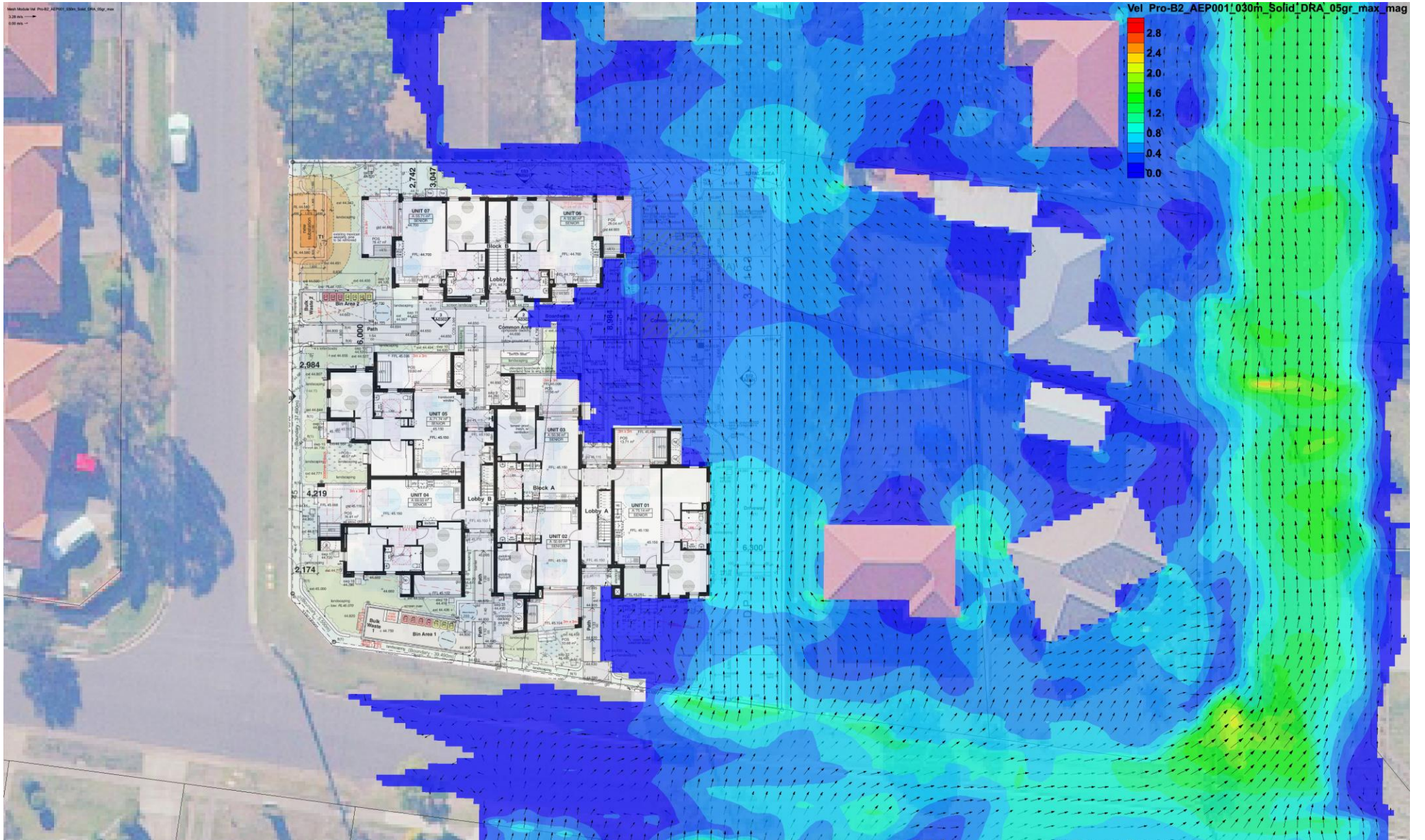


Figure B1.2: Proposed 1%AEP 30min Velocities [m/s]
Buildings all solid

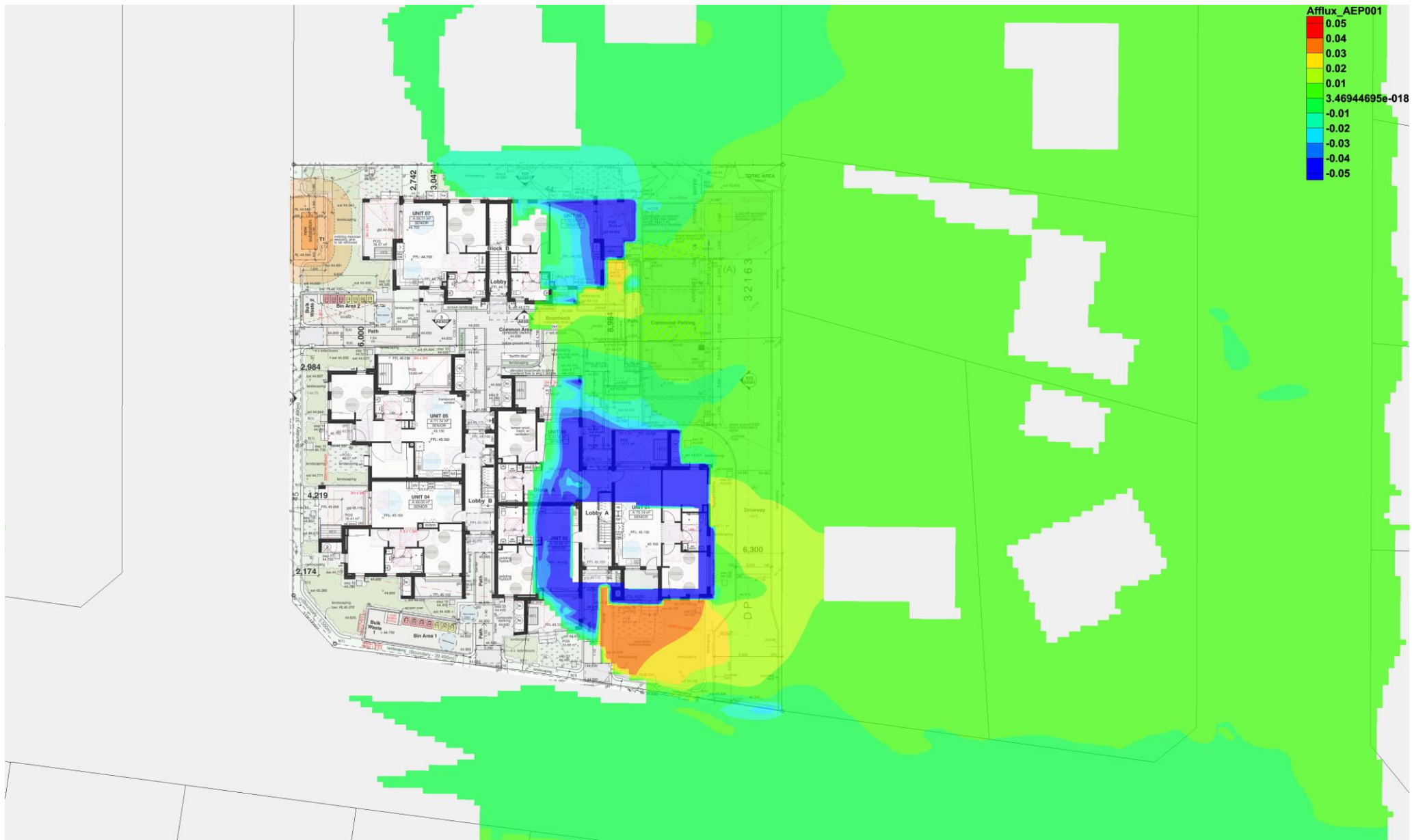


Figure B1.4: Proposed 1%AEP Afflux [m]

*Buildings all solid
Proposed – Existing surfaces*

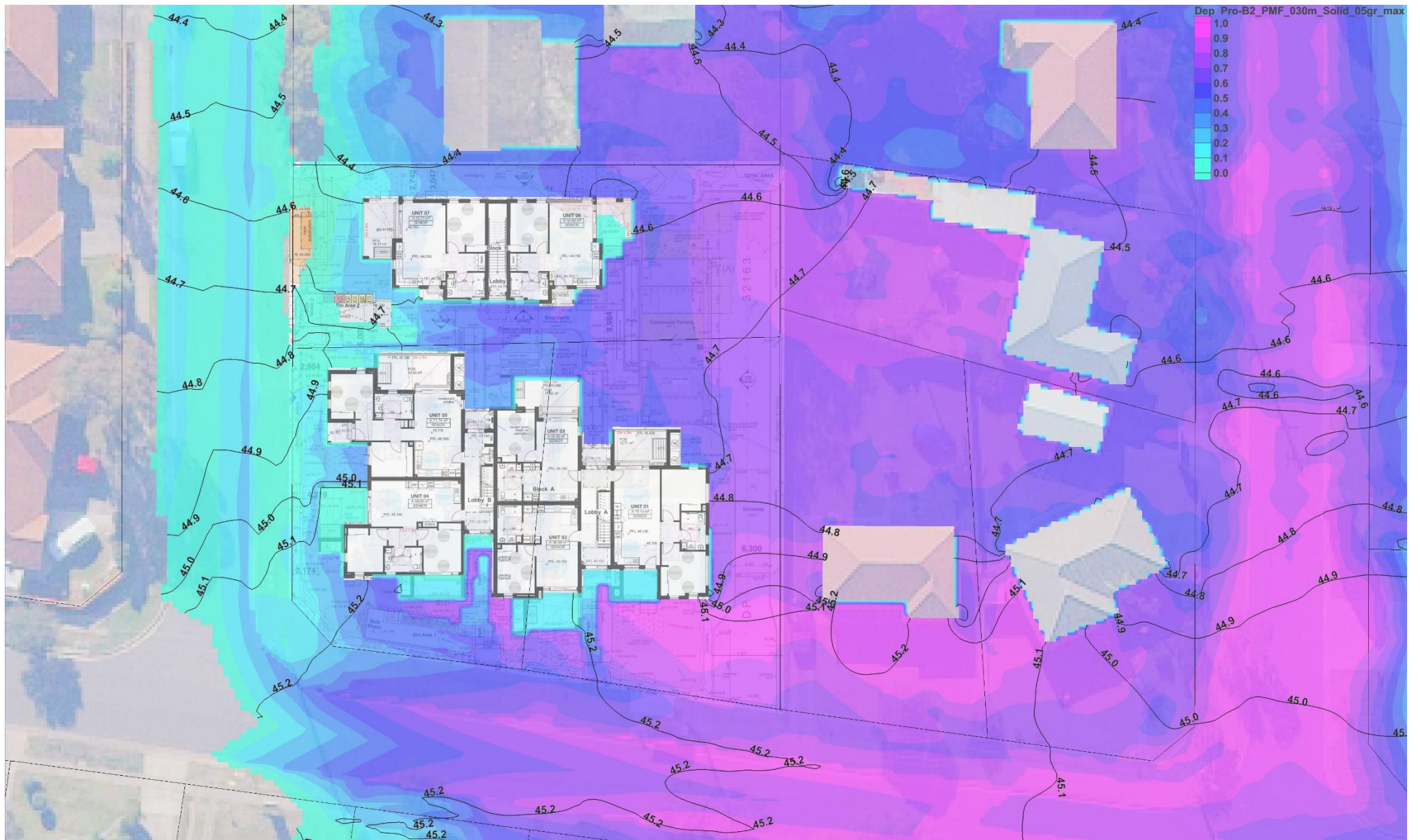
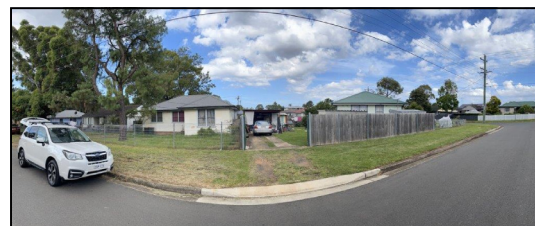


Figure B1.5: Proposed PMF 60min Depths [m] & Levels [mASL]
Buildings all solid

Appendix D: SURVEYS



L.G.A. OF BLACKTOWN



NOTES

1. SPOT LEVELS SHOWN THUS: 
2. CONTOURS SHOWN THUS:  36.15
3. CONTOUR INTERVAL 0.5 METRE 
4. SIGNIFICANT TREES SHOWN THUS: 

THE SPREAD OF EACH TREE IS INDICATIVE ONLY AND CANNOT BE SHOWN ACCURATELY WITHOUT VERY DETAILED FURTHER SURVEY. THE SHAPE AND SIZE OF SPREAD OF THE TREE MAY VARY DUE TO LACK OF UNIFORMITY OF THE BRANCHES, TRUNK AND OTHER REASONS

5. VISIBLE SERVICES ONLY HAVE BEEN LOCATED BY SURVEY.
6. BOUNDARY INFORMATION HAS BEEN COMPILED FROM INFORMATION SHOWN ON PLANS ON PUBLIC RECORD AT OFFICE OF LAND AND PROPERTY INFORMATION.
7. BOUNDARIES PLOTTED ARE ACCURATE FOR D.A. PURPOSES. BOUNDARIES SHOULD BE MARKED ON THE GROUND PRIOR TO ANY FURTHER DEVELOPMENT OF THE LAND.
8. SERVICING INFORMATION OBTAINED FROM INFORMATION PROVIDED BY SERVICES AUTHORITIES (TELSTRA/SYDNEY WATER).
9. MANHOLES HAVE NOT BEEN LOCATED BY SURVEY.

① DENOTES PHOTO NO. & DIRECTION

(A) EASEMENT FOR DRAINAGE 6.095 WIDE J513496

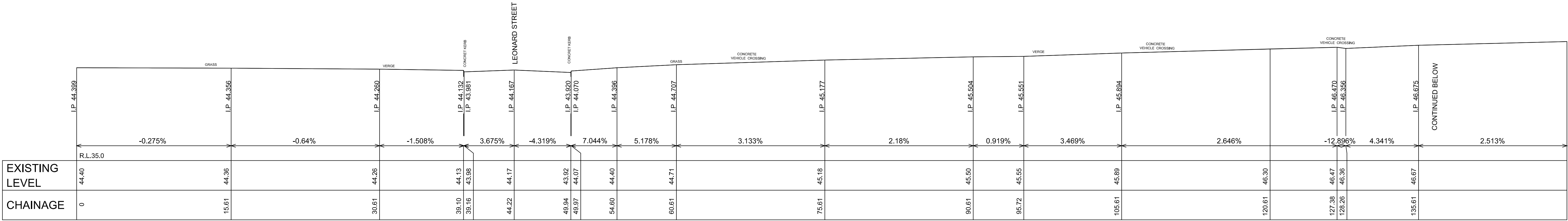
No.	DATE	NOTATION/AMENDMENT	No.	DATE	NOTATION/AMENDMENT	CONTOUR INTERVAL: 0.5m DATUM: AHD ORIGIN OF DATUM: SSM 153461 100 YEAR FLOOD RL: N/A RECOMMENDED MINIMUM FLOOR RL: SOURCE OF FLOOD INFO:	LEGEND OF COMMONLY USED SYMBOLS WATER SEWER ELECTRICITY TELECOM GAS DRAINAGE - Common BENCH MARK Survey Control Mark PM SSM <th rowspan="5"> REDUCTION RATIO 1 : 200 @ A1 0 2 4 6 8 10 12 14 16 18 20 LAND TITLE INFORMATION LOTS 197, 198, 199 PLAN NOS : DP 32169 OTHER: AREA: 1885m² </th> <th rowspan="5"> DATE OF SURVEY: 14 / 02 / 2022 SURVEY CONSULTANT: YSCO GEOMATICS SUITE 4, 114 HAMPODEN ROAD, ARTARMON PH. (02) 94199222 Registered Surveyor SURVEYORS REF : 0022 </th> <th rowspan="5"> NSW GOVERNMENT Planning, Industry & Environment HOUSING AND PROPERTY GROUP - Land & Housing Corporation DRAWING TITLE PLAN SHOWING DETAIL AND LEVELS </th> <th colspan="2">LOCATION</th>	REDUCTION RATIO 1 : 200 @ A1 0 2 4 6 8 10 12 14 16 18 20 LAND TITLE INFORMATION LOTS 197, 198, 199 PLAN NOS : DP 32169 OTHER: AREA: 1885m²	DATE OF SURVEY: 14 / 02 / 2022 SURVEY CONSULTANT: YSCO GEOMATICS SUITE 4, 114 HAMPODEN ROAD, ARTARMON PH. (02) 94199222 Registered Surveyor SURVEYORS REF : 0022	NSW GOVERNMENT Planning, Industry & Environment HOUSING AND PROPERTY GROUP - Land & Housing Corporation DRAWING TITLE PLAN SHOWING DETAIL AND LEVELS	LOCATION	
BLACKTOWN												
STREET ADDRESS	TYPE											
1 ROBYN STREET & 17-19 PANK PARADE	S											
SITE LAYOUT JOB	SHT. 1											
BGYPY / 001 / 03	OF 3											

L.G.A. OF BLACKTOWN



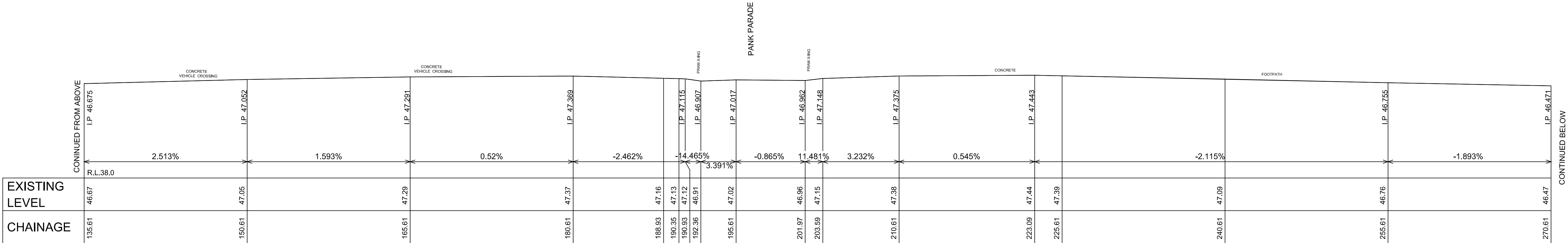
No.	DATE	NOTATION/AMENDMENT	No.	DATE	NOTATION/AMENDMENT
2	14/03/22	EASEMENT NOTATION ADDED			
3	15/03/22	EXTENDED BUS ROUTE ADDED			
			CONTOUR INTERVAL: 0.5m DATUM: AHD ORIGIN OF DATUM: SSM 153461 100 YEAR FLOOD RL: N/A RECOMMENDED MINIMUM FLOOR RL: SOURCE OF FLOOD INFO:		
			LEGEND OF COMMONLY USED SYMBOLS		
			REDUCTION RATIO 1 : 400 @ A1 LAND TITLE INFORMATION LOTS 197, 198, 199 PLAN NOS : DP 32169 OTHER: AREA: 1885m²		
			DATE OF SURVEY: 14 / 02 / 2022 SURVEY CONSULTANT: YSOC GEOMATICS SUITE 4, 114 HAMPDEN ROAD, ARTARMON PH: (02) 94198222 NSW GOVERNMENT HOUSING AND PROPERTY GROUP - Land & Housing Corporation PLANNING, INDUSTRY & ENVIRONMENT DRAWING TITLE BUS ROUTE (PLAN VIEW) SURVEYORS REF : 0022 Registered Surveyor		
			LOCATION BLACKTOWN STREET ADDRESS 1 ROBYN STREET & 17-19 PANK PARADE TYPE S		
			SITE LAYOUT JOB SHT. 2 BGYPY / 001 / 03 OF 3		

L.G.A. OF BLACKTOWN



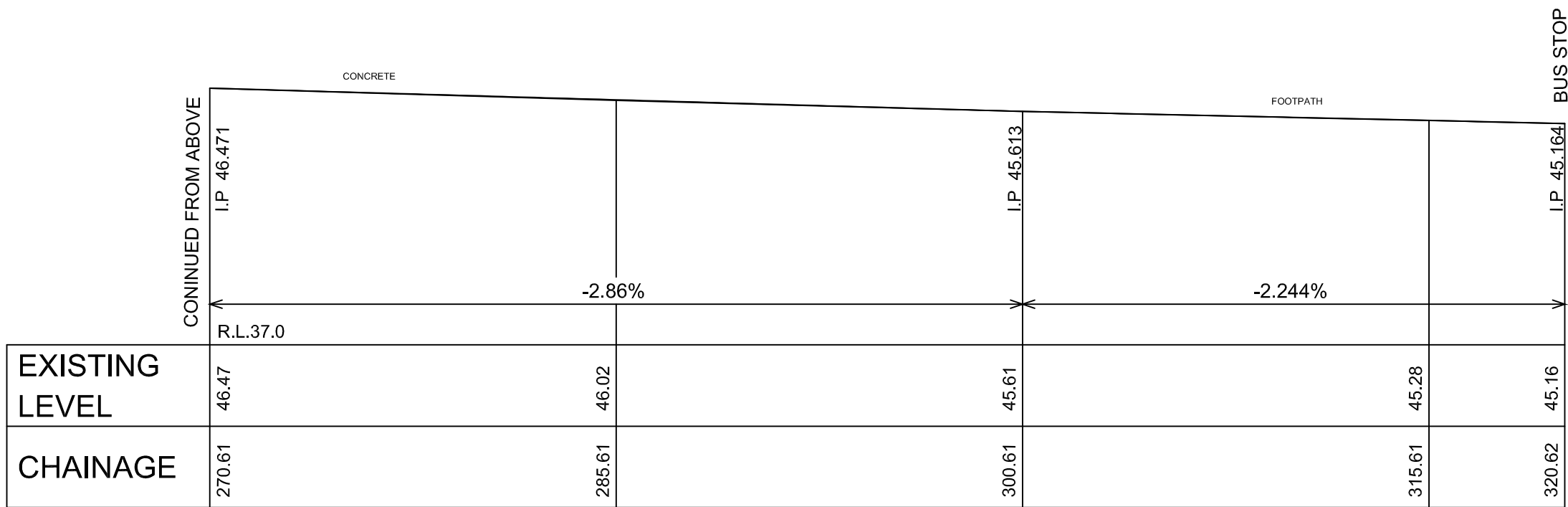
LONGITUDINAL SECTION TO BUS STOP

H=1:200 V=1:200



LONGITUDINAL SECTION TO BUS STOP

H=1:200 V=1:200



LONGITUDINAL SECTION TO BUS STOP

H=1:200 V=1:200

No. DATE NOTATION/AMENDMENT

2 14/03/22 EASEMENT NOTATION ADDED

3 15/03/22 EXTENDED BUS ROUTE ADDED

No. DATE NOTATION/AMENDMENT

FILE FILE SIZE (MB) CHECKED BY

CONTOUR INTERVAL: 0.5m

DATUM: AHD

ORIGIN OF DATUM: SSM 153461

100 YEAR FLOOD RL: N/A

RECOMMENDED MINIMUM FLOOR RL:

SOURCE OF FLOOD INFO:

LEGEND OF COMMONLY USED SYMBOLS

WATER

SEWER

ELECTRICITY

TELECOM

GAS

DRAINAGE - Common

BENCH MARK

Survey Control Mark

PM SSM

REDUCTION RATIO 1 : 200.@A1

0 1 2 3 4 5 6 7 8 9 10

LAND TITLE INFORMATION

LOTS 197, 198, 199

PLAN NOS : DP 32169

OTHER:

AREA: 1885m²

DATE OF SURVEY: 14 / 02 /2022

SURVEY CONSULTANT:

YSCO GEOMATICS

SUITE 4, 114 HAMPTDEN ROAD, ARTARMON

PH: (02) 94198222

SURVEYORS

REF : ..0322....

NSW GOVERNMENT

HOUSING AND PROPERTY GROUP - Land & Housing Corporation

Planning, Industry & Environment

BUS STOP LONGITUDINAL SECTIONS

LOCATION

BLACKTOWN

STREET ADDRESS

1 ROBYN STREET & 17-19 PANK PARADE

SITE LAYOUT JOB

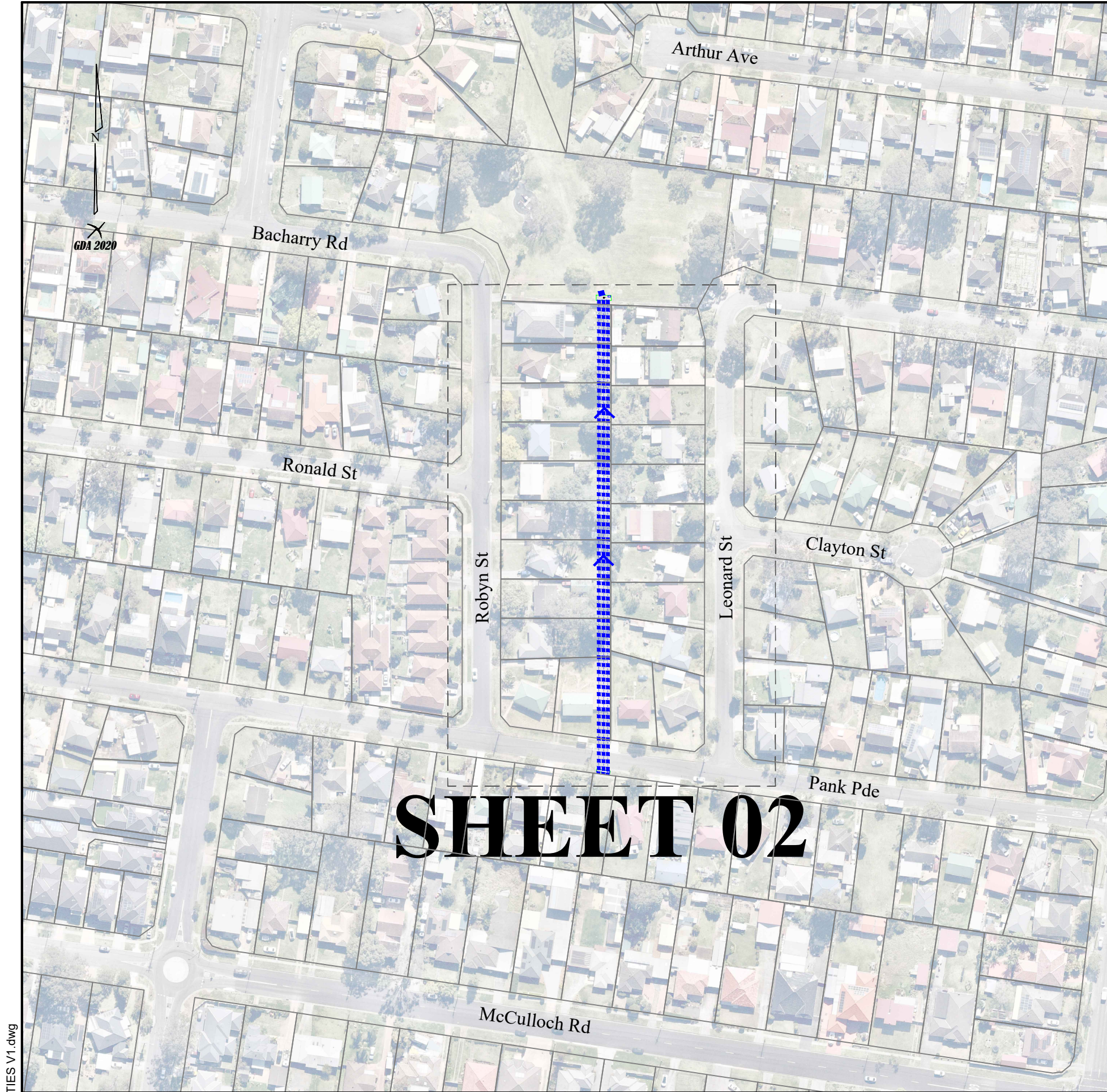
BGYPY / 001 / 03

TYPE

S

SHT. 3

OF 3



Electronic Subsurface Utility Information (SUI) detection techniques such as EM & GPR are influenced by Sub-Surface Utility (SSU) type & ground conditions. Best practice detection rates are 80-90% and depth accuracy ranges between +/- 300mm for 90% of readings with significant outliers for the remainder.

Quality levels (as per AS-5488-2019) are mentioned for each point. Please note that Quality Levels may vary for different points of a string. Please see the definitions of the Quality Levels for more information.

Telstra depths are indicative and to be used for design purposes only.
Telstra Guidelines regarding potholing must be followed prior to any construction works.
Telstra pipes, conduits and banks may contain optical fibres from other asset owners (e.g. Optus).

Electricity cables are not necessarily enclosed in conduits and are not necessarily covered with markers, tape or other indicators of their presence.

In some cases, depth and location of some pipe inside large chambers could not be measured accurately due to the shape of the chambers. In these cases, those specific points are marked as QL-B.

Storm Water assets are QL-A at SW Pits unless the pipes have not been accessible (pits full of dirt, rusted gatic lids, etc.) and QL-C between pits. Storm Water pipes have been shown where the judgment could be made based on the location of the SW surface features. In some areas, it's impossible to work out the alignments as the SW pipes bend and change directions. If the exact route of the SW pipes is needed for design purposes, a comprehensive drainage survey using CCTV techniques is required to confirm the alignments and connectivity.

“Measurements of all drainage and sewer pipes are to Invert Level, unless otherwise stated”.
Not all of kerb outlets are shown in this drawing.

All diameters are in millimetres(mm) unless otherwise specified.
Potholing is recommended to confirm the depth & position of all utilities located.

DURKIN Utility location use BEFORE YOU DIG AUSTRALIA as one source if information only when locating utilities.

It remains the responsibility of the company and or individual conducting physical works to ensure an up to date version of BEFORE YOU DIG AUSTRALIA plans is consulted and available on site. Physical works may include, but not limited to, excavating, boring (horizontal or vertical) and drilling.

This plan shows a representation of a 3d utility model: UTIL D24222 UTILITIES V1 that should be viewed in a CADD Environment to interpret the 3d information.

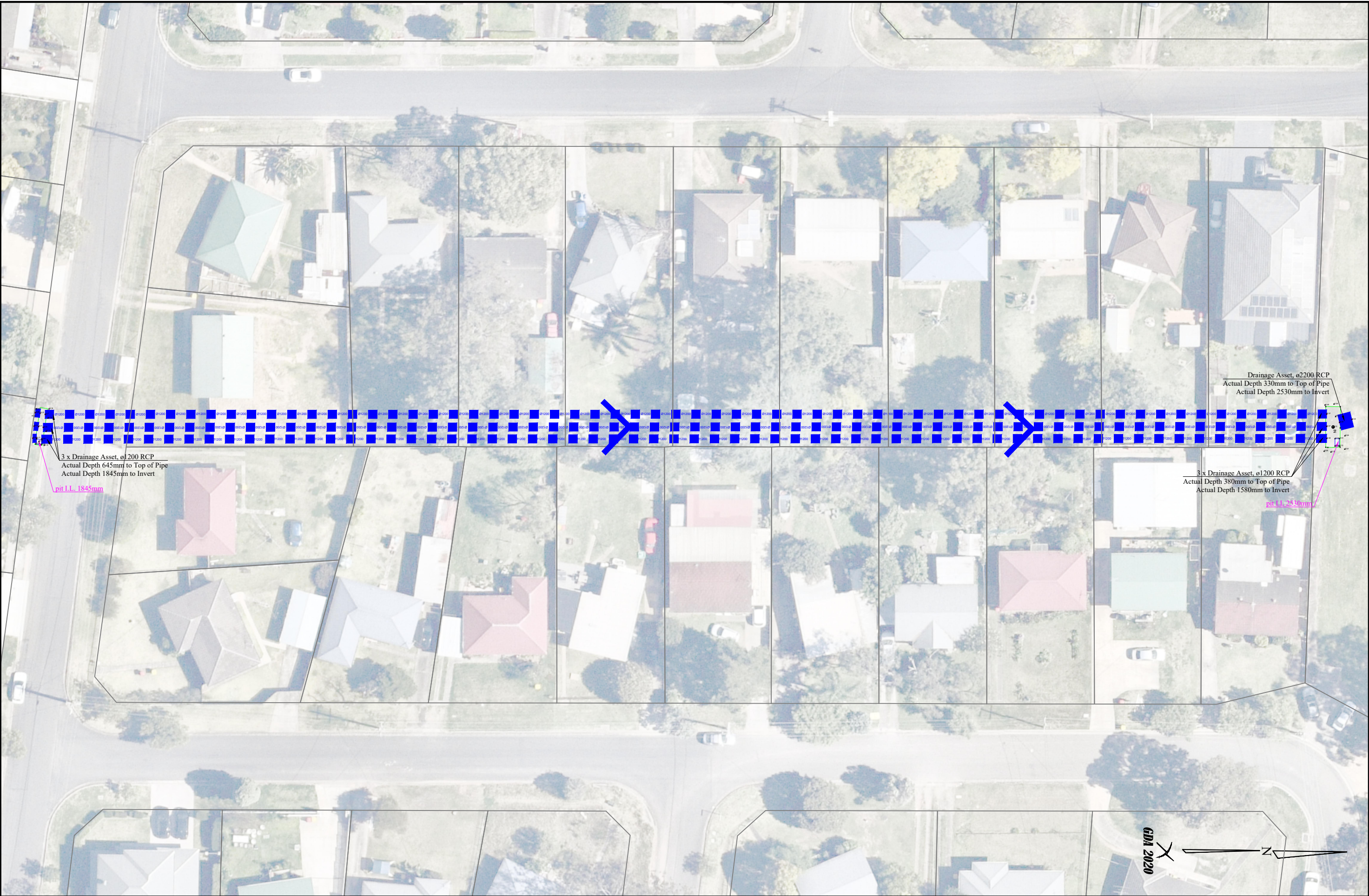
This utility map has been generated for design purposes only. It needs to be printed in colour and at the specific page size noted in table on bottom of the page. Failure to do this will void all information indicated for this job.

Some utilities are shown outside of scope and these are shown as reference only. Other utilities may exist outside of scope and are not shown on this plan.

UTIL D24222 UTILITIES V1.dwg

DRAWING NUMBER	STATUS	VERSION	DATE	SPATIAL DATA PROCESSOR	AMENDMENT	NOT TO SCALE		DURKIN DURKIN Construction Pty Ltd 350-52 Derby Street Silverwater NSW 2128 Ph (02) 9712 0308 www.durkinconstruction.com.au Fax (02) 9712 0308	DISCLAIMER: THIS PLAN INCLUDES INFORMATION DESCRIBING THE LOCATION OF SUBTERRANEAN FEATURES WHICH WERE PURPORTED TO EXIST AT THE TIME OF SURVEY. THIS INFORMATION WAS COMPILED FROM A COMBINATION OF FIELD TECHNIQUES AND AVAILABLE DATA FROM COOPERATING UTILITY AUTHORITIES. WHILST ALL CARE HAS BEEN TAKEN IN THE PREPARATION OF THIS PLAN OF SURVEY, DURKIN CANNOT GUARANTEE THAT THE PLAN IS WITHOUT FLAW OF ANY KIND. THEREFORE DURKIN EXPRESSLY DISCLAIMS ALL LIABILITY FOR ERRORS OR OMISSIONS OF ANY KIND WHATSOEVER OR FROM ANY LOSS, DAMAGE OR OTHER CONSEQUENCES WHICH MAY ARISE FROM ANY PERSON RELYING ON ANY THING STATED ON THIS PLAN. IN PARTICULAR, IT IS RECOMMENDED THAT USERS SATISFY THEMSELVES AS TO THE LOCATION OF SUBTERRANEAN FEATURES SUCH AS UTILITIES WHICH MAY OR MAY NOT BE SHOWN ON THE PLAN.	Greenview Consulting Pty Ltd	No. of SHEETS	
D24222-UT-01	FINAL	V1	2024/09/11	CC	-	CO-ORDINATE SYSTEM: GDA 2020 (MGA Zone 56)		UTILITIES: JR/FT	DATE: 10-SEP-24	17-19 Pank Pde, Blacktown, NSW 2148	02	
						HEIGHT DATUM: AHD 71		SURVEYED: MM	DATE: 10-SEP-24			
						FILE NAME: UTIL D24222 UTILITIES V1		COMPILED: CC	DATE: 11-SEP-24	UTILITY PLAN	01	
						DBYD ENQUIRY: BYDA		DATE: --		DRAWING NUMBER: D24222-UT-01		
						APPROVED: VA		DATE: 11-SEP-24	REVIEWED: JR/FT	DATE: 11-SEP-24		DRAWING STATUS: FINAL
NOT FOR CONSTRUCTION												

UTIL D24222 UTILITIES V1.dwg



DRAWING NUMBER	STATUS	VERSION	DATE	SPATIAL DATA PROCESSOR	AMENDMENT	A3 SCALES		 DURKIN Construction Pty Ltd 3/50-52 Derby Street Silverwater NSW 2128 Ph (02) 9712 0308 www.durkinconstruction.com.au Fax (02) 9712 0308	DISCLAIMER: THIS PLAN INCLUDES INFORMATION DESCRIBING THE LOCATION OF SUBTERRANEAN FEATURES WHICH WERE PURPORTED TO EXIST AT THE TIME OF SURVEY. THIS INFORMATION WAS COMPILED FROM A COMBINATION OF FIELD TECHNIQUES AND AVAILABLE DATA FROM COOPERATING UTILITY AUTHORITIES. WHILST ALL CARE HAS BEEN TAKEN IN THE PREPARATION OF THIS PLAN OF SURVEY, DURKIN CANNOT GUARANTEE THAT THE PLAN IS WITHOUT FLAW OF ANY KIND. THEREFORE DURKIN EXPRESSLY DISCLAIMS ALL LIABILITY FOR ERRORS OR OMISSIONS OF ANY KIND WHATSOEVER OR FROM ANY LOSS, DAMAGE OR OTHER CONSEQUENCES WHICH MAY ARISE FROM ANY PERSON RELYING ON ANYTHING STATED ON THIS PLAN. IN PARTICULAR, IT IS RECOMMENDED THAT USERS SATISFY THEMSELVES AS TO THE LOCATION OF SUBTERRANEAN FEATURES SUCH AS UTILITIES WHICH MAY OR MAY NOT BE SHOWN ON THE PLAN.	Greenview Consulting Pty Ltd		No. of SHEETS
D24222-UT-01	FINAL	V1	2024/09/11	CC	-	 SCALE 1:500m					17-19 Pank Pde, Blacktown, NSW 2148	02
						CO-ORDINATE SYSTEM: GDA 2020 (MGA Zone 56)		UTILITIES: JR/FT	DATE: 10-SEP-24	UTILITY PLAN		SHEET No.
						HEIGHT DATUM: AHD 71		SURVEYED: MM	DATE: 10-SEP-24			02
						FILE NAME: UTIL D24222 UTILITIES V1		COMPILED: CC	DATE: 11-SEP-24	DRAWING NUMBER: D24222-UT-01		
						DBYD ENQUIRY: BYDA DATE: --		REVIEWED: JR/FT	DATE: 11-SEP-24	DRAWING STATUS: FINAL		
						APPROVED: VA DATE: 11-SEP-24				VERSION: V1		
NOT FOR CONSTRUCTION												

Durkin Legend

COMMUNICATIONS

—ITS—	ITS Cable (IT)
—OU—	Optic Fibre (OU)
—OZ—	Optic Fibre - Digitised (OZ)
—TH—	Telephone Line - House Connection (TY)
—T —	Telephone Line (TN)
—TZ —	Telephone Line - Digitised (TZ)
□	Telephone Sump (TS)
▣	Telstra Single Concrete Pit (PTSP)
▤	Telstra Twin Concrete Pit (PTTP)
▥	Telstra Triple Concrete Pit (PT3P)
⊙ ^{TDP}	Telstra Distribution Pillar (PTDP)
□ ^{OPF}	Optic Fibre Pit (POFP)

ELECTRICITY

—EH—	Electric House Connection (EY)
—EU—	Electric Line Underground (EU)
—EZ— —	Electric Line Underground - Digitised (EZ)
□	Electric Main Sump (EN)
⊙ ^{EMH}	Electricity Cable Manhole (PEMH)
☀	Street Light Pole (PLPL)
⊙	Power & Street Light Pole (PPLP)
□ ^{EJB}	Electrical Junction Box (PEJB)
▣	Transformer Cabinet Centre (PETC)
⊙ ^{EP}	Electric Power Pole (PPPL)
⊙ ^{EC}	Electric Cable Marker (PECM)
⊙	Power Service Pillar - Underground (PEUP)
⌋	Electric Light with Outreach (LI)
□	Electric Transformer Cabinet (EC)
□ ^{EPF}	Electric Distribution Fuse Point (PEFP)

TCS

⊙	Traffic Control Signal (PSGL)
□ ^{TSC}	Traffic Signal Controller (PSCL)
⊠	Traffic Signal Junction Box (PSJX)
⊙ ^{TSO}	Traffic Signal Detector (PSDR)
⌋	Traffic Light with Outreach (TO)

SEWER

—SH—	Sewer House Connection (SY)
—S —	Sewer Main (SM)
—SZ — —	Sewer Main - Digitised (SZ)
⊗	Sewer Manhole Cover (PSMH)
⊙ ^{SLH}	Sewer Lamphole (PSLH)
⊙ ^{SVP}	Sewer Vent Pipe (PSVP)

GAS

—GH—	Gas House Connection (DG)
—GZ—	Gas Main Digitised (ZG)
—HG—	Gas Main High Pressure Pipeline (HG)
—LG—	Gas Main Low Pressure Pipeline (LG)
□ ^{GMH}	Gas Manhole Cover (PGHL)
⊞	Gas Valve Box (PGAS)
⊙ ^{HP}	High Pressure Gas Marker (PGHM)
⊙ ^{GP}	Gas Marker (PGPM)
⊞	Gas Meter (PGMR)

WATER

—W —	Water Main (WM)
—WH—	Water House Connection (WY)
—WR—	Water Main - Recycled (RM)
—WZ— —	Water Main - Digitised (WZ)
Δ	Water Stop Valve (PWSV)
⊙ ^{WF}	Water Fire Hydrant (PWFB)
□ ^{WH}	Water Hydrant (PWHY)
⊙	Water Tap (PWTP)
⌋	Water Meter (PWMR)

DRAINAGE

—?H—	Box Culvert - Unspecified High (UB)
—150H—	Box Culvert - 150 High (B0)
—225H—	Box Culvert - 225 High (B1)
— —	Headwall Top (HW)
—Ø?—	Drainage Pipe - ØUnspecified (UU)
—DZ— —	Drainage - Digitised (DZ)
—Ø225—	Drainage Pipe - Ø225 (U1)
—Ø300—	Drainage Pipe - Ø300 (U2)
—Ø375—	Drainage Pipe - Ø375 (U3)
—Ø450—	Drainage Pipe - Ø450 (U4)
—Ø525—	Drainage Pipe - Ø525 (U5)
—Ø600—	Drainage Pipe - Ø600 (U6)
—Ø750—	Drainage Pipe - Ø750 (U7)
—Ø900—	Drainage Pipe - Ø900 (U9)
—Ø1050—	Drainage Pipe - Ø1050 (V1)
—Ø1200—	Drainage Pipe - Ø1200 (V2)
—Ø1350—	Drainage Pipe - Ø1350 (V3)
—Ø1500—	Drainage Pipe - Ø1500 (V5)
—Ø1650—	Drainage Pipe - Ø1650 (V6)
—Ø1800—	Drainage Pipe - Ø1800 (V8)
□	Drainage Pit (DP)
□	Gully Pit (IP)
⌋	Gully Pit Point (PGUL)
⊠	Kerb Inlet (KI)

MISC

⊙ ^{BH}	Bore Hole (PBHX)
□ ^{GAT}	Gatic Cover Lid
—HO—	High Pressure Oil Pipeline (HO)
⊙ ^{HPO}	High Pressure Oil Pipeline Mark (POHM)
□ [?]	Unknown Surface Feature (PUSR)
—?P—	Unidentified Pipeline (UP)
— —	Miscellaneous Structure (OM)

DURKIN Definition & Abbreviation

⊙ ⁶⁰⁰	Quality Level (as per AS-5488-2019) & Depth
UTT	Unable To Trace
UTL	Unable To Locate
UTO	Unable to Open
FOD / FOW	Full of Dirt/ Full of Water
EOT	End Of Trace
NGMV	No Gas Meter Visible at Locating Time
NWMV	No Water Meter Visible at Locating Time
PN	Property Number
DBYD	Dial Before You Dig
<	Flow Direction
□	Extent of Potholing Trench
----	Approx. Extent of Utility Investigation

PIPE MATERIAL

CICL	Cast Iron Cement Lined
PVC	Polyvinylchloride
SGW	Salt Glazed Ware
VC	Vitrified Clay
DICL	Ductile Iron Cement (mortar) Lined
SCL	Steel Cement (mortar) Lined
oPVC	Polyvinylchloride - Oriented
uPVC	Polyvinylchloride - Unplasticised
EW	Earthenware
AC	Asbestos Cement
RCP	Reinforced Concrete Pipe
GI	Galvanised Iron
SCL IBL	Steel Cement Lined Internal Bitumen Lined
NB GI	Nominal Bore Galvanised Iron
PE	Polyethylene
HD PVC	High Density Polyvinylchloride
FC	Ferro Cement
NY	Nylon
ST	Steel
GRP	Glass Reinforced Plastics
DB	Direct Buried
A	Asbestos
CE	Concrete Encased
C	Concrete

Quality Levels of Sub-Surface Utility Investigation (SUI) AS 5488-2019
(Reproduced with permission from SAI Global under licence number 1610-c097)

This Standard provides a framework for the classification of subsurface utility location and attributes information in terms of specified quality levels. The objective of this Standard is to provide utility owners, operators and locators with a framework for the consistent classification of information concerning subsurface utilities. Project risks related to underground utilities can then be properly managed.

A quality level describes the amount and accuracy of information that is collected or held on a subsurface utility.

There are four quality levels D, C, B and A.

Quality Level D (QL-D) is the lowest of the four quality levels. The attribute information and metadata of a subsurface utility can be compiled from any, or a combination of, the following:

- (a) Existing records.
- (b) Cursory site inspection.
- (c) Anecdotal evidence.

Quality Level-X (QL-X) Electronically located with Ground Penetrating Radar or other electronic locating techniques not compliant with AS5488. Estimated positional tolerance is +/-300mm in plan, +/-500mm in depth (high confidence level).

Quality Level Y(QL-Y) Electronically located but with reduced confidence in plan position/depth (medium confidence level).

Quality Level Z (QL-Z) Electronically located with low confidence level in plan position/depth (low confidence level).

Quality Level C (QL-C) is described as a surface feature correlation or an interpretation of the approximate location and attributes of a subsurface utility asset using a combination of existing records (and/or anecdotal evidence) and a site survey of visible evidence, and/or methods to indicate the existence of an undefined entity. The minimum requirement for quality level C is relative spatial position. Information is collected by correlating the survey of visible utility surface features such as marker plates or water hydrants and acquired dial-before-you-dig plans to “draw”a string which shows the approximate position of services.

Horizontal Tolerance of Surface Features: -/+ 300 mm

Quality Level B (QL-B) provides relative subsurface feature location in three dimensions. The minimum requirement for quality level B is relative spatial position. Information is collected by designating the horizontal and vertical location of underground utilities by using electromagnetic pipe and cable locators, sondes or flexi-trace, ground penetrating radar and acoustic pulse equipment.

Horizontal Tolerance: -/+ 300 mm

Vertical Tolerance: -/+ 500 mm

Quality Level A (QL-A) is the highest quality level and consists of the positive identification of the attribute and location of a subsurface utility at a point to an absolute spatial position in three dimensions. It is the only quality level that defines a subsurface utility as ‘validated’. Where the whole line segment cannot be verified by line of sight, quality level A shall not be attributed to the line segment between validated points. The vertical information for this locating method is to the top or shallowest part of the located service.

Horizontal and Vertical Tolerance: -/+ 50mm

DRAWING NUMBER	STATUS	VERSION	DATE	SPATIAL DATA PROCESSOR	AMENDMENT	DURKIN DURKIN Construction Pty Ltd 350-32 Derby Street Silverwater NSW 2128 Ph (02) 9712 0308 Fax (02) 9712 0308 www.durkinconstruction.com.au		DISCLAIMER: THIS PLAN INCLUDES INFORMATION DESCRIBING THE LOCATION OF SUBTERRANEAN FEATURES WHICH WERE PURPORTED TO EXIST AT THE TIME OF SURVEY. THIS INFORMATION WAS COMPILED FROM A COMBINATION OF FIELD TECHNIQUES AND AVAILABLE DATA FROM COOPERATING UTILITY AUTHORITIES. WHILST ALL CARE HAS BEEN TAKEN IN THE PREPARATION OF THIS PLAN OF SURVEY, DURKIN CANNOT GUARANTEE THAT THE PLAN IS WITHOUT FLAW OF ANY KIND. THEREFORE, DURKIN EXPRESSLY DISCLAIMS ALL LIABILITY FOR ERRORS OR OMISSIONS OF ANY KIND WHATSOEVER OR FROM ANY LOSS, DAMAGE OR OTHER CONSEQUENCES WHICH MAY ARISE FROM ANY PERSON RELYING ON ANY THING STATED ON THIS PLAN. IN PARTICULAR, IT IS RECOMMENDED THAT USERS SATISFY THEMSELVES AS TO THE LOCATION OF SUBTERRANEAN FEATURES SUCH AS UTILITIES WHICH MAY OR MAY NOT BE SHOWN ON THE PLAN.	Greenview Consulting Pty Ltd		No. of SHEETS
D24222-UT-01	FINAL	V1	2024/09/11	CC	-	CO-ORDINATE SYSTEM: GDA 2020 (MGA Zone 56)	UTILITIES: JR/FT	DATE: 10-SEP-24	17-19 Pank Pde, Blacktown, NSW 2148		02
						HEIGHT DATUM: AHD 71	SURVEYED: MM	DATE: 10-SEP-24	UTILITY PLAN		SHEET No.
						FILE NAME: UTIL D24222 UTILITIES V1	COMPILED: CC	DATE: 11-SEP-24	DRAWING NUMBER: D24222-UT-01		-
						DBYD ENQUIRY: BYDA DATE: --	REVIEWED: JR/FT	DATE: 11-SEP-24	DRAWING STATUS: FINAL		VERSION: V1
						APPROVED: VA DATE: 11-SEP-24			NOT FOR CONSTRUCTION		