

Table 2: Drainage Network across Existing Pathway

Catchment	Area	Associated Drainage Network
Cat_1	27.226	Line 7
Cat_2	7.759	Line 5
Cat3	1.702	Line 6
Cat_4	0.079	Overflow to Parramatta River
Cat_5	0.064	Line 3
Cat_6	0.219	Overflow to Parramatta River
Cat_7	0.117	Overflow to Parramatta River
Cat_8	0.006	Line 1

A DRAINS model was developed to represent the existing drainage network configuration shown in Figure 2 with the layout presented in Figure 7 below.

- **Drainage Network – Line 2:**

Line 2 captures a negligible catchment area and therefore has minimal contribution to the overall stormwater conveyance.

- **Drainage Network – Line 3:**

This line captures runoff from an upstream catchment area of approximately 640 m². The drainage network effectively conveys this runoff across the existing shared pathway towards the Parramatta River during the 20-year ARI event.

- **Drainage Network – Line 4:**

Line 4 captures a negligible catchment area and therefore has minimal contribution to the overall stormwater conveyance.

- **Drainage Network - Line 5, Line 6, and Line 7:**

These drainage lines collect stormwater runoff from upstream catchments and convey it towards the Parramatta River. The analysis, which excludes tailwater effects, indicates that these lines can effectively manage flows during the 20-year ARI storm event.

- **Direct Overflow to Parramatta River:**

Catchments 4, and 6 discharge directly to the Parramatta River, flowing across the existing shared cycleway. Given the short flow path and immediate discharge locations, these overland flows do not pose a significant hazard to pedestrians or cyclists under current conditions.

2.2 Proposed Stormwater Drainage Network

As part of the proposed development, modification and upgrades have been undertaken to improve the existing drainage system. These improvements include the installation of new stormwater pits and pipes, along with the connection of downpipes from the roof of 25 Pike Street to the existing drainage network.

1. Pit 3\1 is converted to junction pit and additional surface inlet pit has been proposed upstream of Pit 3\1 to capture upstream catchment.
2. Two additional 600x600mm stormwater pits (Pit 1\1 and 2\1) have been installed within the proposed concrete cycleway. These pits are connected to Pit 3\1 via a class 4 Ø300 RCP.
3. Pit 4\1 has been converted into a junction pit. Catchment 6, which represents roof runoff from 25 Pike Street, will now be collected via newly installed downpipes and directed to this junction pit.
4. Pit 1\3 has also been removed, and an additional upstream pit has been introduced to improve capture of upstream runoff.
5. Pit 1\2 has been removed, and additional surface inlet pit has been proposed upstream of Pit 1\2.

The DRAINS model layout for proposed scenario is presented in Figure 9 below.

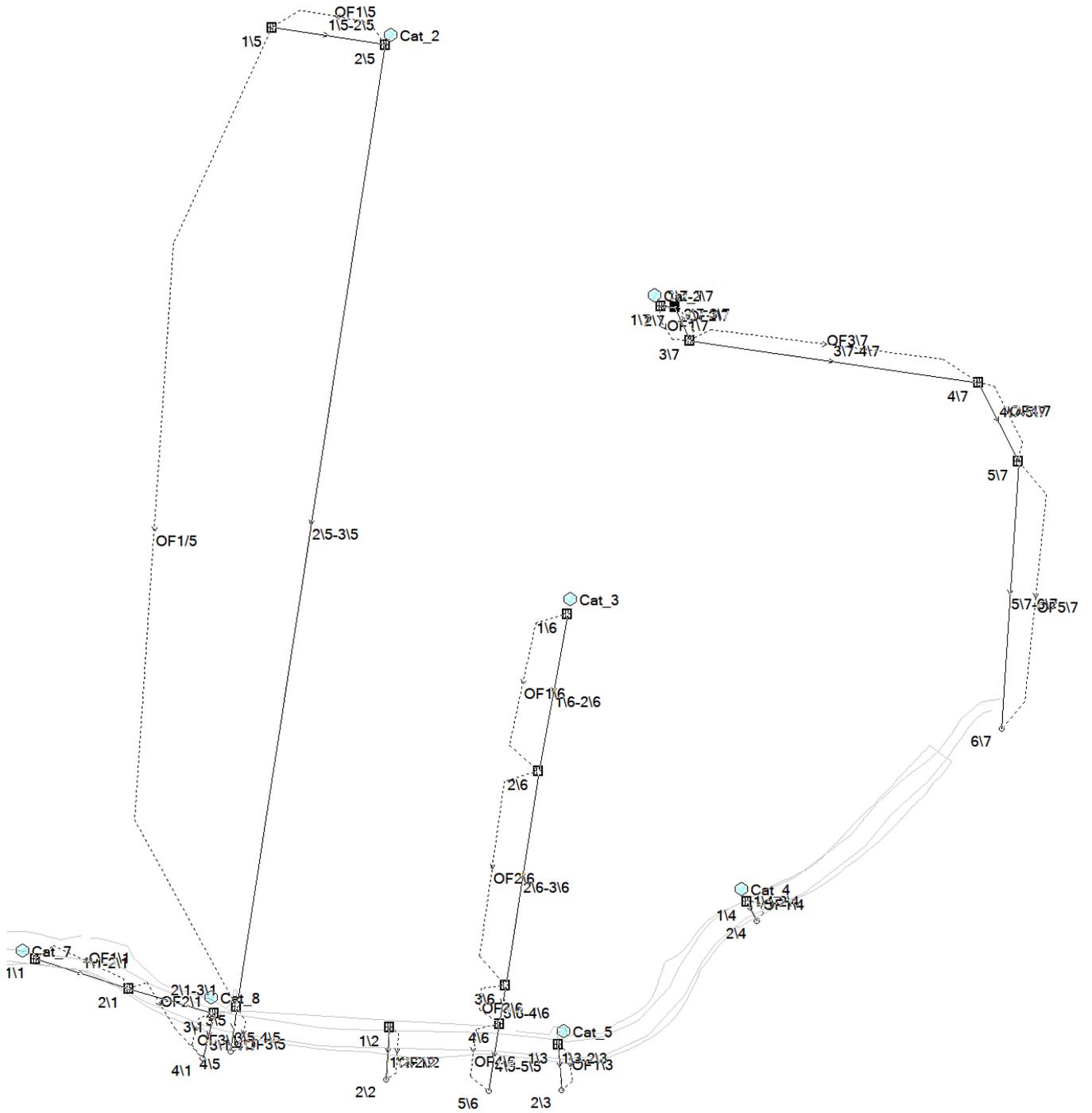


Figure 9: DRAINS Model Layout - Proposed Scenario

The results from DRAINS model for 20-year ARI event is shown in Figure 10 below.

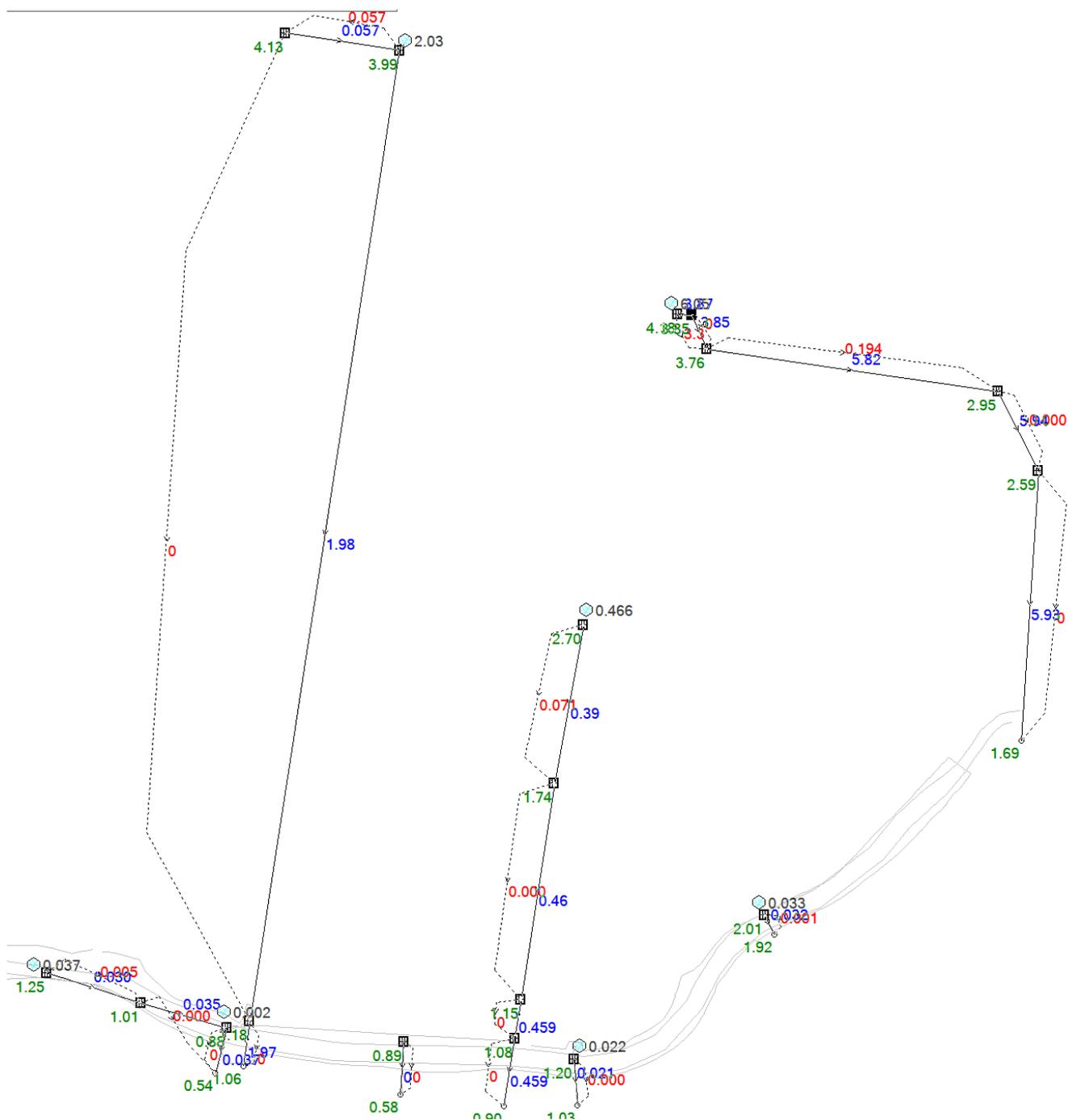


Figure 10: 5% AEP (20-year ARI) DRAINS Results - Proposed Scenario

Key Outcomes from the DRAINS model for the existing scenario are summarised below:

- **Drainage Network - Line 1:**

Stormwater runoff from Catchment 7, which currently generates surface flow of 37 L/s across the footpath during a 20-year ARI event, will be effectively intercepted by two newly installed 600 mm x 600 mm stormwater pits. Flow will be conveyed to Pit 3\1 via a Ø300 mm pipe and directed across the proposed shared pathway to the Parramatta River.

- **Drainage Network – Line 2:**

Line 2 continues to capture a negligible catchment area and is proposed to be retained to accommodate potential future drainage connections if required.

- **Drainage Network – Line 3:**

The addition of a new upstream pit effectively captures runoff from the contributing upstream catchment during the 20-year ARI event.

- **Drainage Network – Line 4:**

Pit 1\4 has been upgraded to a junction pit. The two previously unmanaged downpipes from the roof of 25 Pike Street are now proposed to be connected to this pit through a new pipe network. This arrangement ensures efficient conveyance of roof runoff and eliminates the risk of surface overflow onto the proposed footpath, thereby improving safety for pedestrians and cyclists.

- **Drainage Network - Line 5, Line 6, and Line 7:**

As in the existing scenario, these drainage lines will continue to collect runoff from upstream catchments and discharge it towards the Parramatta River. The system performs effectively during a 20-year ARI storm event.

2.3 TUFLOW Model

TUFLOW Model has been used to simulate the prevailing flooding issue and to analyse impact of the proposed development on the flooding issues. The flood investigation has been carried out using TUFLOW flood modelling software (Build 2020-10-AA). The flood model for Parramatta River Flood Study supplied by STANTEC to City of Parramatta Council has been used for this analysis.

2.3.1 Overview of Hydrological and Hydraulic Analysis in the Parramatta River Flood Study (PRFS)

The Parramatta River Flood Study encompasses a comprehensive hydrological and hydraulic analysis of a 51km² area, utilising advanced modelling techniques to assess flood behaviour and risks. Due to the study area size, a staged approach was adopted for developing TUFLOW hydraulic model divided into the following stages:

- Stage 1 – Mainstream Parramatta River and Toongabbie Creek
- Stage 2 – Tributary Models
- Stage 3 – Overland Flow

The different stages of TUFLOW Model are shown in Table 3 below.

Table 3: Stages of TUFLOW Model

Stage	TUFLOW Model
Mainstream	Model 1 – Parramatta River and Toongabbie Creek

Stage	TUFLOW Model
Tributary and Overland Flow	Model 2 – Clay Cliff Creek
	Model 3 - Darling Mills, The Ponds, Subiaco, Vineyard and Brickfield Creeks
	Model 4 – Finlaysons, Coopers and Milsons Creeks
	Model 5 – Pendle Hill and Greystanes Creek
	Model 6 – Quarry Branch Creek
	Model 7 – Terrys and Devlins Creek

The study area highlighting Parramatta River and its tributaries is shown in Figure 11 below.

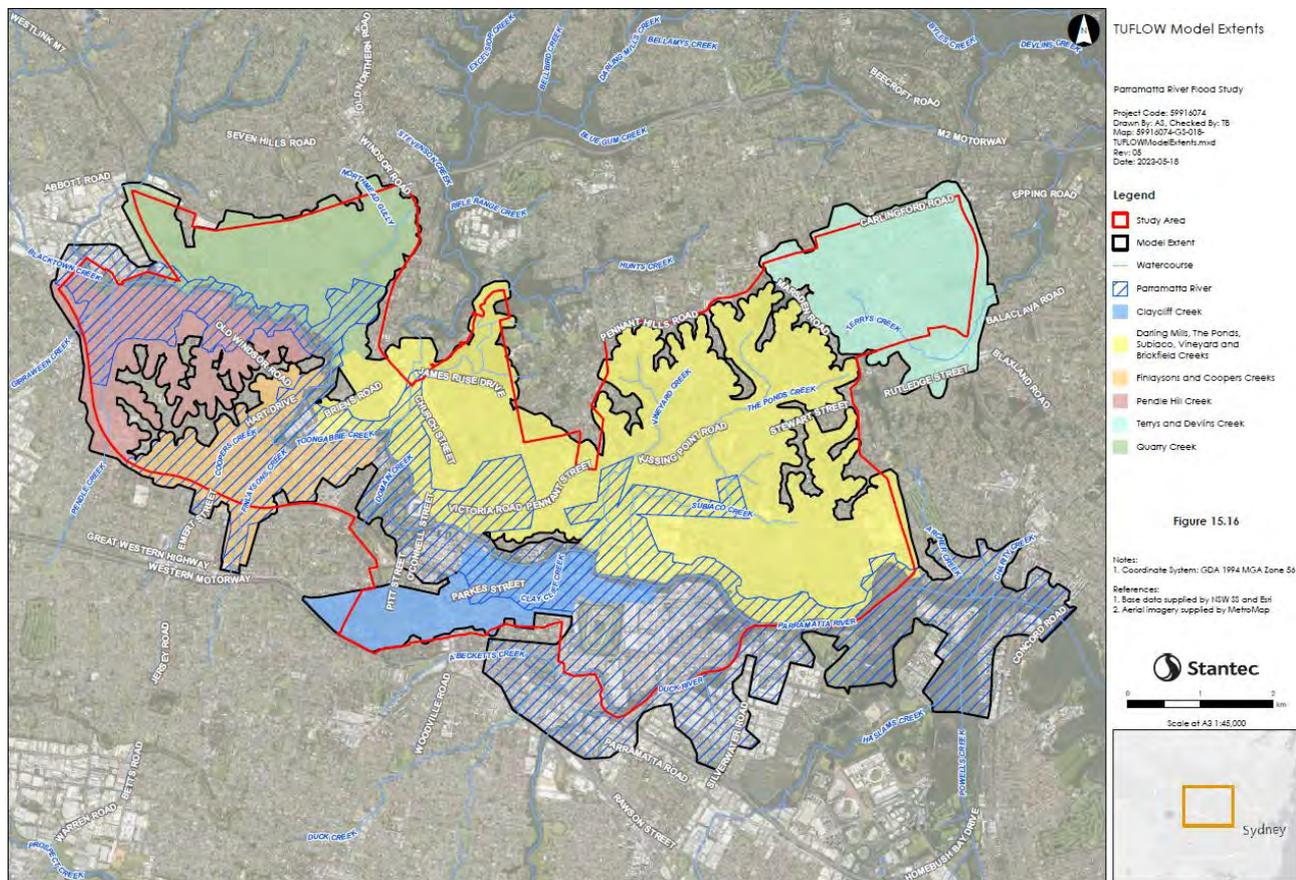


Figure 11: Parramatta River and Tributaries Study Area Extent

The sub-catchment associate with Parramatta River and Tributaries TUFLOW Model shown in Figure 11 is presented in Figure 12 below.

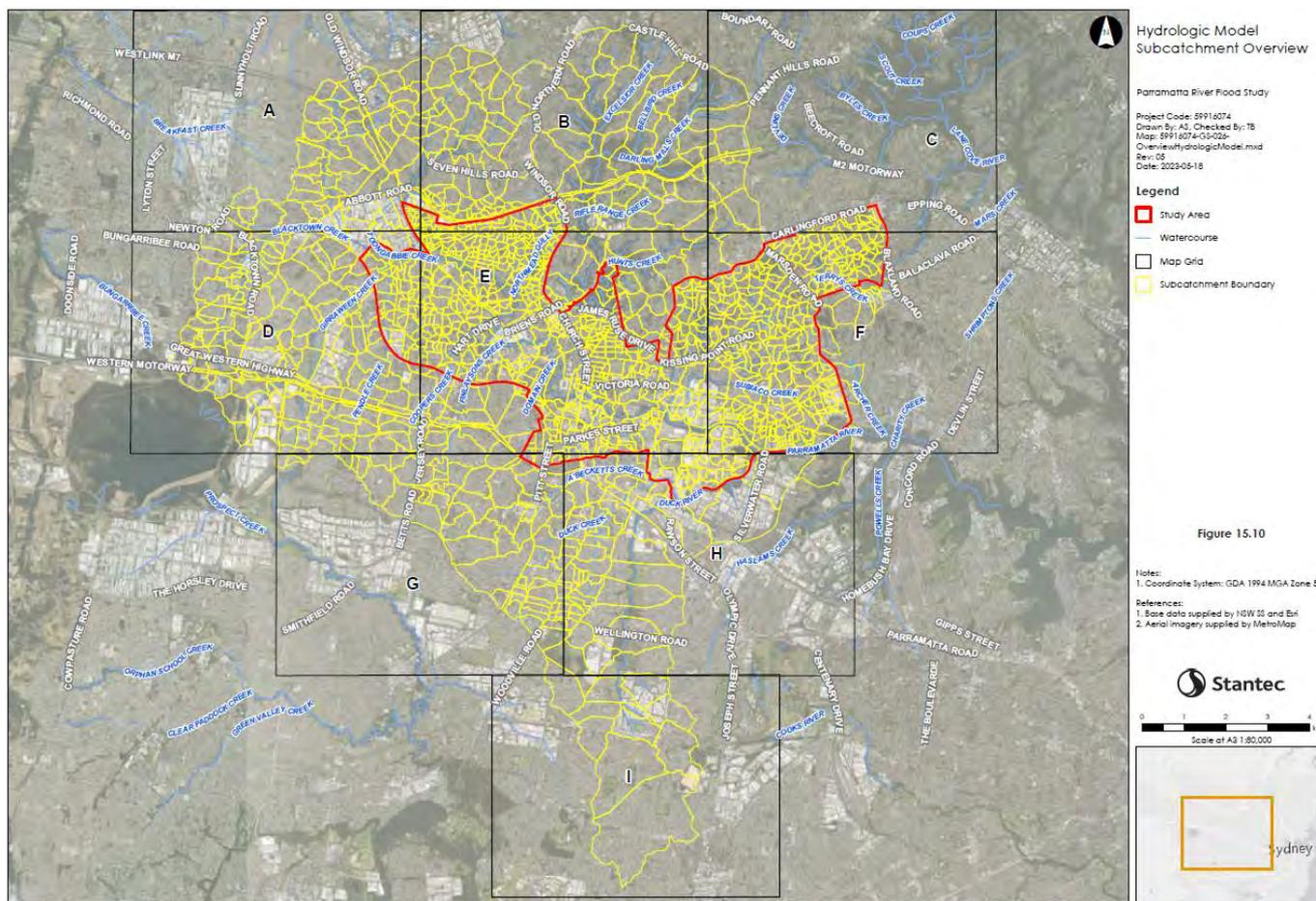


Figure 12: Sub-catchment Overview for the Parramatta River Flood Study

2.3.2 Methodology

As part of the Parramatta River Flood Study (PRFS), Stantec developed a hydrologic and hydraulic model using XPRAFTS and TUFLOW Model. For this assessment, a hydrological XPRAFTS model and TUFLOW model (Model 1) supplied by Stantec is used to estimate flood levels, depths, and velocities along Parramatta River and Toongabbie Creek and its associated catchments.

2.3.2.1 Model setup and Inputs

The TUFLOW model used in Model 1 of original PRFS was utilised to assess the impact of the proposed development. The data inputs used for flood modelling are listed below.

2.3.2.1.1 Topographic Data

Initial topographic data supplied with TUFLOW Model 1 of PRFS has been used without any modification. In addition to the initial topographic data, survey terrain was read into the model for the development site proximity. Furthermore, for the developed scenario, the design surface for the shared pedestrian and cyclist pathway and associated infrastructures were modelled in Civil Site Design and was extracted as DEM to be read into the model over initial topographic data and survey data.

2.3.2.1.2 Building Footprint

The footprint of the building in the original Model 1 of PRFS has been used without modification. In the model building footprints were digitised and removed from the active domain to prevent floodwater entering buildings and so represent the flow characteristics.

2.3.2.1.3 Hydraulic Structures

The hydraulic structures used in Model 1 of the Parramatta River flood study is used as it is for the analysis of the existing and proposed scenarios without any modification provided.

The Model 1 of PRFS contains stormwater drainage network that are Ø600mm or greater. The proposed pipes have not been modelled for the proposed scenario as this is less than Ø600mm. The parameters used for 1d network in TUFLOW are listed below.

- Pit inlets are modelled as 1D nodes with rectangular inlets, using dimensions from Council's stormwater pit and pipe database or field survey.
- Pits are linked to culverts, modelled as 1D elements, using 0.5 entry loss and 1.0 exit loss.
- A Manning's 'n' value of 0.015 has been assigned to all pipes.

2.3.2.1.4 Fences

Fences that cross major flow paths or influence flooding as presented in Model 1 (PRFS) have been included in the model as 2D Layered Flow Constraint Shapes (2D_lfcsh), with 80% blockage.

2.3.2.1.5 Surface Roughness

Manning's 'n' values have been assigned based on the original TUFLOW Model 1 (PRFS) as shown in Table 4.

Table 4: TUFLOW Materials Roughness

TUFLOW Material Type	Manning's 'n'	Material Description	Corresponding Council LEP Zoning
1	0.02	Watercourse	-
2	0.08	Low Density Industrial	General Industrial IN1
3	0.1	Moderate Density Industrial, substantial building with little permeability	General Industrial IN2
4	0.2	High Density Industrial, substantial building with almost no permeability	General Industrial IN3
5	0.06	Channel banks, moderate vegetation	-
6	0.08	Channel banks, dense vegetation	-
7	0.04	Low Density Residential	Low Density Residential R2
8	0.04	Medium Density Residential	Medium Density Residential R3
9	0.04	High Density Residential	High Density Residential R4
10	0.1	High Density Development	Neighbouring Centre B1
11	0.1	High Density Development	Local Centre B3
12	0.1	High Density Development	No Description B3
13	0.1	High Density Development	Mixed Use B4
14	0.1	High Density Development	Business Development B5
15	0.1	High Density Development	Enterprise Corridor B6
16	0.04	Parks, Grass and Some Trees	Public Recreation RE1 and RE2
17	0.015	Concrete Channel	-
18	0.1	High Density Development	Special Activities SP1
19	0.1	High Density Development	Infrastructures SP2
22	0.02	Road	-
23	0.03	Smooth Paved Ground, Carparks	-
24	0.1	Industrial Site – Paved Ground with Low Density Structures	-
25	0.045	Grass with medium density trees	-
26	0.035	Grass Only	-
27	0.07	Dense Trees with under brushes	-

2.3.2.1.6 Boundary Conditions

2.3.2.1.6.1 Inflows

Hydrological modelling was undertaken in XPRAFTS model and hydrographs have been extracted to be used in TUFLOW which was supplied by Stantec. As in the original Model 1 of PRFS hydrologic sub-catchment delineation methodology has been used for the analysis.

Inflow hydrographs were extracted from the hydrologic model and applied in the hydraulic model as inflow polygons. This approach assumes that runoff from a sub-catchment is concentrated into a small area with the sub-catchment, typically at the catchment outlets. In general, flows are applied at the downstream low points of each sub-catchment, except for the most upstream sub-catchments where a flow is applied at the centroid of the sub-catchment along the main drainage line. At the upstream boundaries, flows are input as a total flow from the hydrologic model derived for the upstream catchments. These are input as either a 1d inflow for 1d channels or as a rectangular 2d_SA polygon and lines for 2d areas to distribute flow behaviour. For sub-catchments within a model, a local flow from that sub-catchment is applied to the hydraulic model. The inflows applied for this analysis is shown in Figure 13

In areas where the Mainstream and Tributary models overlap, inflow locations were adjusted to maintain hydraulic consistency and avoid artificial flow anomalies.

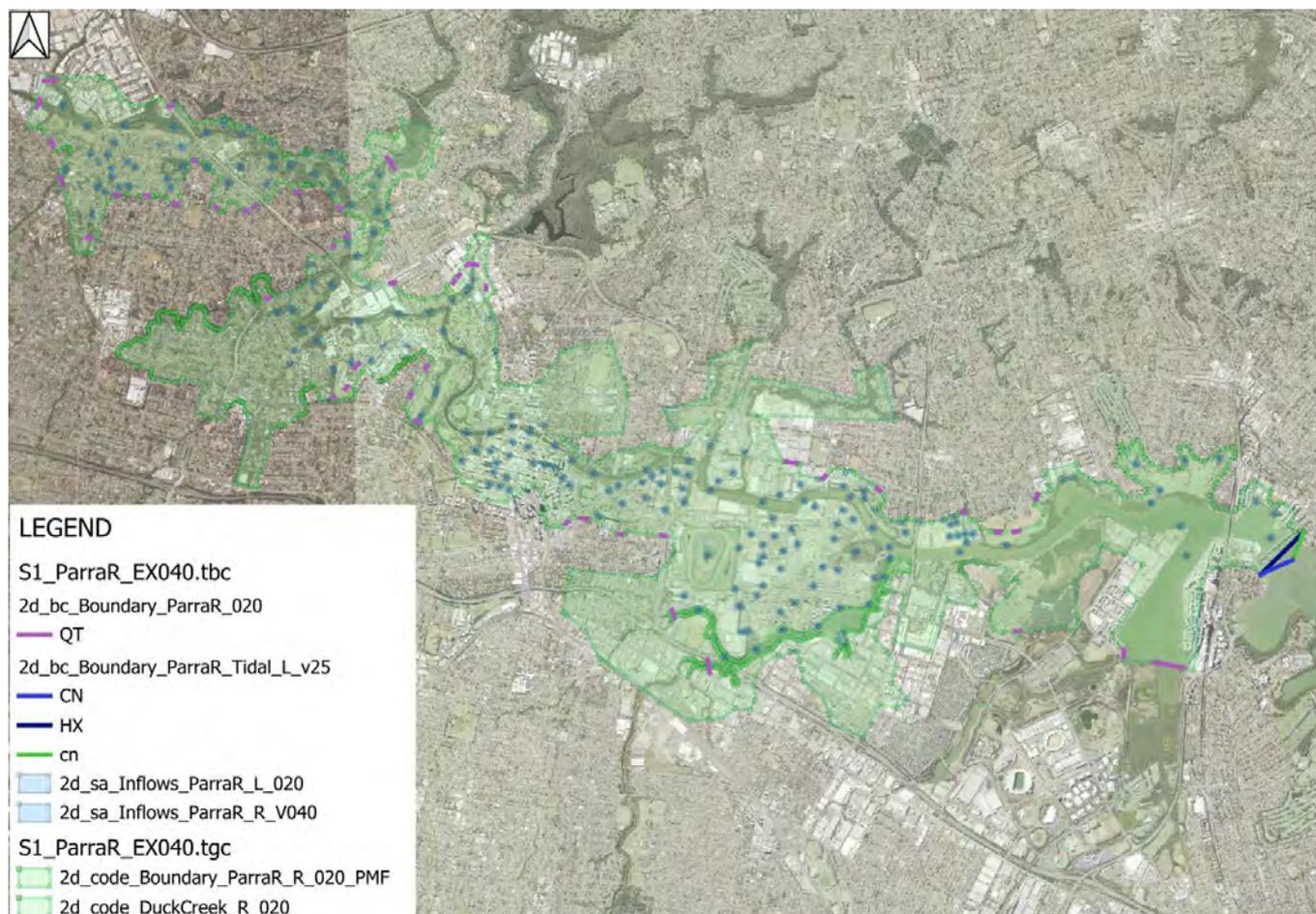


Figure 13: Boundary Conditions and Study Area

2.3.2.1.6.2 Downstream Boundary and Tailwater Conditions

The downstream boundary condition is listed as Tidal Constant represented by 2d_bc_Boundary_ParraR_Tidal_L_v25 in Figure 13 is used for this analysis.

2.4 Flood Events Simulations

TUFLOW model was run for the 5% AEP (20-year ARI) and 1% AEP (100-year ARI) event. Accordingly, flood maps were generated.

2.5 Flood Impact Analysis

After generating flood maps, the changes in water were analysed for 1% AEP flood events to assess any potential adverse impacts caused by the proposed development.

2.6 Flood Hazard Classification

The flood hazard also known as product of flood depth velocity generally provides baseline information for floodplain assessment study. In such a preliminary assessment of risks or as part of a constraint’s analysis for strategic land use planning, a combined set of hazard vulnerability curves presented in Figure 14, Figure 15 and Table 5 can be used as general classification of flood hazard on site.

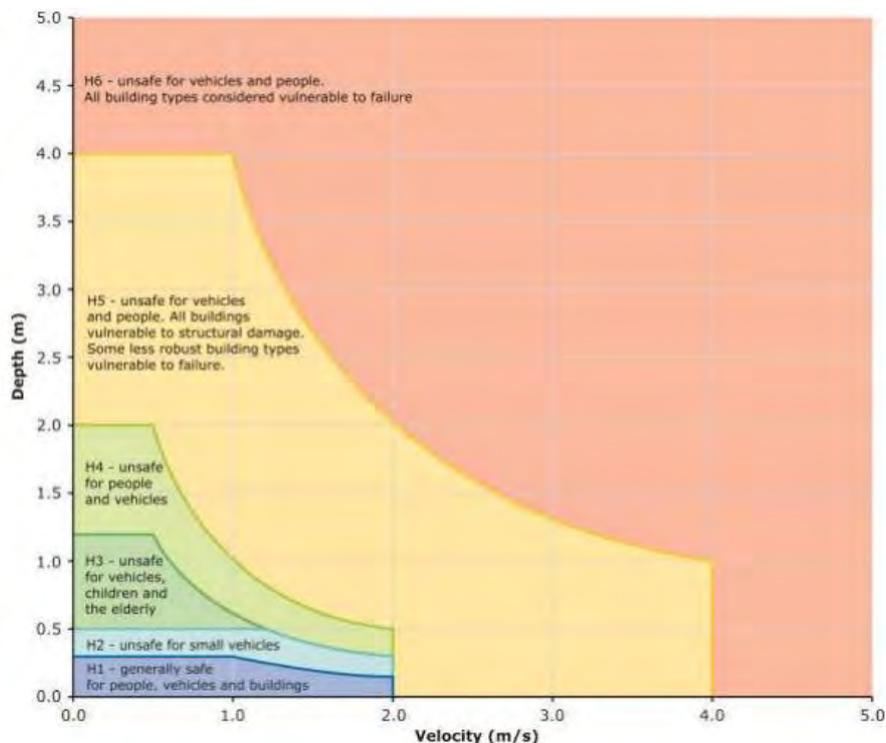


Figure 14: Flood Hazard Curve as per ARR Guideline

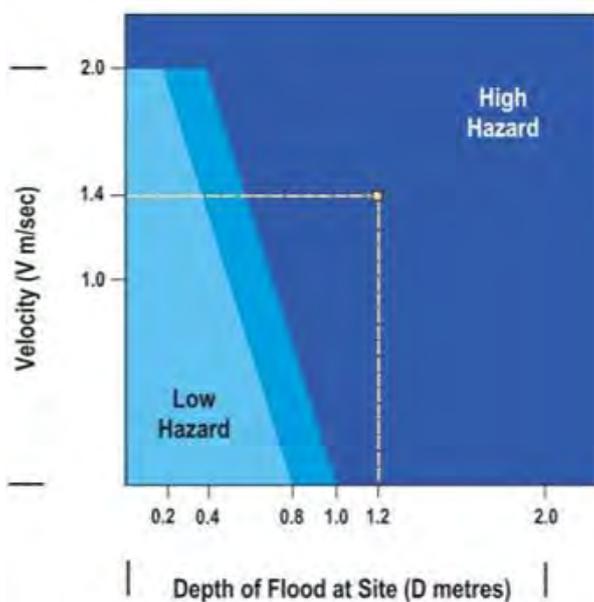


Figure 15: Flood Hazard Curve by Floodplain Development Manual (FDM)

The combined flood hazard curves presented in Figure 14 and Figure 15 sets hazard thresholds that relate to the vulnerability to the community when interacting with flood waters. Table 5 below shows the limits for the classifications provided in Figure 14.

Table 5: Combined Hazard Curves - Vulnerability thresholds classification limits

Hazard Vulnerability Classification	Classification limit (D and V in combination) m^2/s	Limiting still water depth (D) m	Limiting velocity (V) m/s
H1	$D*V \leq 0.3$	0.3	2.0
H2	$D*V \leq 0.6$	0.5	2.0
H3	$D*V \leq 0.6$	1.2	2.0
H4	$D*V \leq 1.0$	2.0	2.0
H5	$D*V \leq 4.0$	4.0	4.0
H6	$D*V > 4.0$	-	-

3 Flood Modelling Outcome

TUFLOW model provides information on water level, depth, velocity and hazard that will occur from stormwater runoff. The results for 20-year and 100-year ARI event have been extracted and presented as flood maps in Appendix A.

3.1 Pre-Development Peak Flood Depth, Velocity, and Hazard Classification

The flood map shows that most of the proposed development location is located outside 20% AEP flood extent from Parramatta River.

The flood maps presented in Figures A1 to A4 (Appendix A) illustrate the existing flood conditions for the 20-year ARI event, including flood extent, levels, depths, velocities, and hazard classification. Figure A1 indicates that the project site is subject to maximum flood level of 3.40m AHD. Figure A1 also shows that existing pathway will be affected by flood depth of up to 240mm at deepest portion, and at other flood affected area the depth of flooding is less than 50mm. Figure A2 indicates that the maximum flood velocity reaches 0.55 m/s along the existing shared pathway. Figure A3 demonstrates that the depth-velocity product in the project vicinity along the existing pathway remains below 0.2 m²/s. Figure A4 shows that the site vicinity falls within Flood Hazard Category H1.

The flood maps presented in Figures A5 to A8 (Appendix A) illustrate the existing flood conditions for the 100-year ARI event, including flood extent, levels, depths, velocities, and hazard classification. Figure A5 indicates that the project site is subject to maximum flood level of 3.44m AHD. Figure A5 also shows that existing pathway will be affected by flood depth of up to 1.41m. Figure A6 indicates that the maximum flood velocity reaches 0.99 m/s along the existing shared path. Figure A7 demonstrates that the depth-velocity product in the project vicinity along the existing pathway exceed 1 m²/s. Figure A8 shows that the site vicinity falls within Flood Hazard Category H4.

3.2 Post -Development Peak Flood Depth, Velocity, and Hazard Classification

Figures A9 to A12 in Appendix A present the proposed flood conditions for the 100-year ARI event, corresponding to the same parameters adopted for the existing scenario with only addition of design surface to the existing model. Across most of the study area, flood characteristics in the proposed scenario remain unchanged from the existing conditions, including levels, velocities, and hazard categories.

3.3 Flood Impact Assessment

3.3.1 Impact on Peak Flood Levels

Figure A13 illustrate the predicted changes in peak flood levels along the vicinity of the proposed development due to construction of proposed development and associated civil infrastructure for the 1% AEP events. The model results indicate that there will not be any negative impact to the neighbouring properties due to construction of proposed shared pedestrian walkway.

3.3.2 Comparison Between Existing and Proposed Scenario

To determine the effect of the proposed development on the existing flooding scenario, the parameters of flood have been abstracted at comparison points shown in Figure 16. Table 6 show comparison of parameters (Water Surface Elevation, Depth, Velocity and Hazard) at these points during the existing and proposed scenarios.

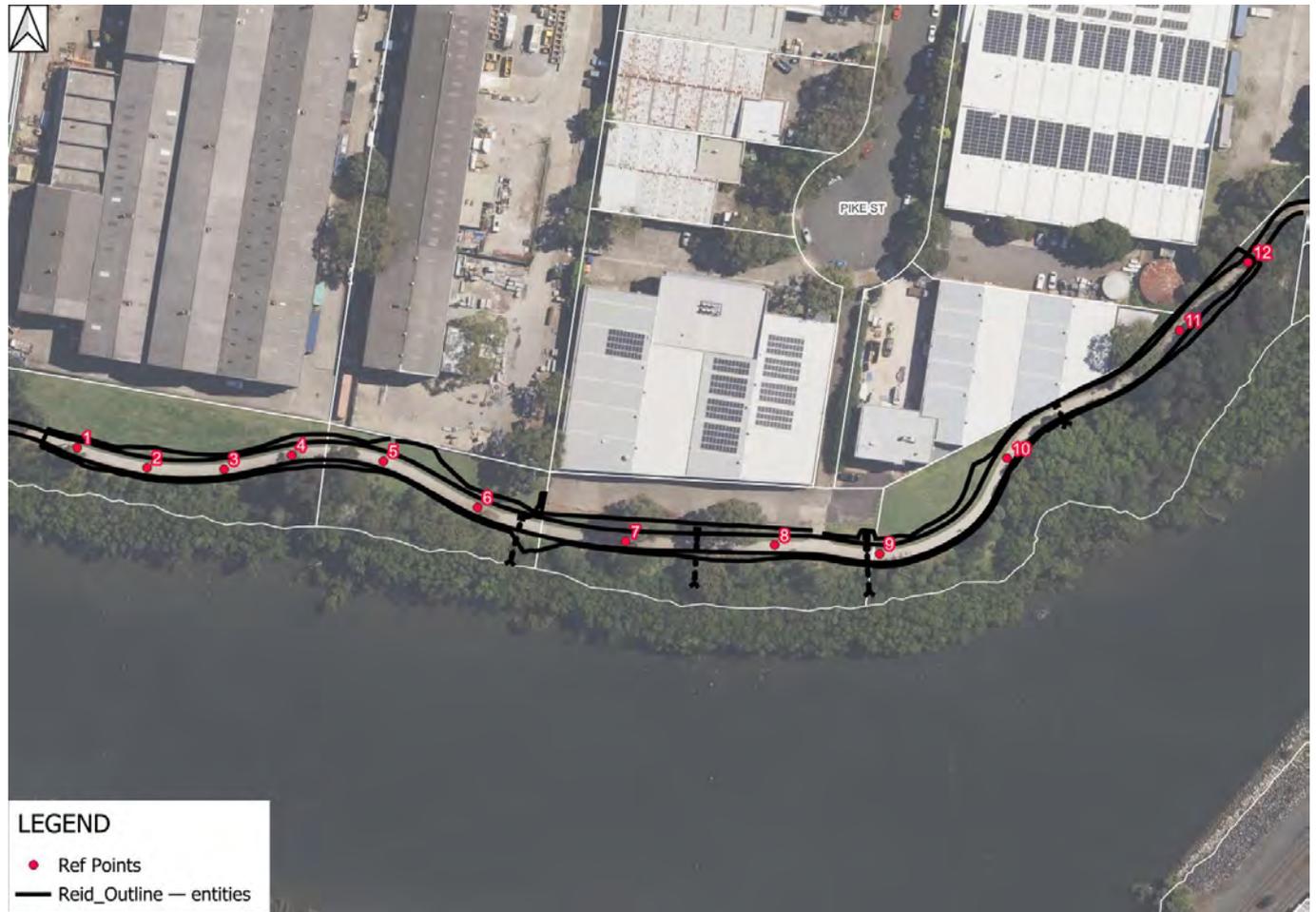


Figure 16: Comparison Points for Flooding Parameters

Table 6: Comparison Table for 20-year ARI Storm Event

Points	Plan	W.S. Elev (m)	Depth (m)	Velocity (m/s)	Hazard (D x V)	Hazard Category (FDM)	Hazard Category (ARR Guidelines 2016)
1	Existing	3.09	0.61	0.21	0.1281	LOW	H3
1	Proposed	3.09	0.58	0.21	0.1218	LOW	H3
2	Existing	3.09	0.72	0.12	0.0864	LOW	H3
2	Proposed	3.09	0.69	0.11	0.0759	LOW	H3
3	Existing	3.09	0.58	0.26	0.1508	LOW	H3
3	Proposed	3.08	0.54	0.24	0.1296	LOW	H3
4	Existing	3.08	0.55	0.15	0.0825	LOW	H3
4	Proposed	3.08	0.56	0.12	0.0672	LOW	H3
5	Existing	3.08	1.22	0.21	0.2562	HIGH	H4
5	Proposed	3.08	1.21	0.21	0.2541	HIGH	H4
6	Existing	3.08	1.41	0.82	1.1562	HIGH	H4
6	Proposed	3.07	1.37	0.89	1.2193	HIGH	H4
7	Existing	3.06	1.33	0.55	0.7315	HIGH	H4
7	Proposed	3.06	1.28	0.51	0.6528	HIGH	H4
8	Existing	3.04	1.24	0.68	0.8432	HIGH	H4
8	Proposed	3.04	1.24	0.65	0.806	HIGH	H4
9	Existing	2.99	1.02	0.99	1.0098	HIGH	H4
9	Proposed	2.98	0.95	0.94	0.893	HIGH	H4
10	Existing	2.87	0.08	0.04	0.0032	LOW	H1
10	Proposed	2.85	0.07	0.02	0.0014	LOW	H1
11	Existing	3.35	0.04	0.15	0.006	LOW	H1
11	Proposed	3.27	0.04	0.20	0.008	LOW	H1
12	Existing	3.44	0.08	0.64	0.0512	LOW	H1
12	Proposed	3.43	0.08	0.64	0.0512	LOW	H1

The comparison in Table 6 above illustrate that the flood level will remain same or reduced for all the points which is positive outcome. However, it is seen that the flood depth varies from the existing scenario which is due to change level in design surface of the pedestrian shared pathway.

4 Conclusion

The hydrological and hydraulic analysis demonstrates that the proposed shared pedestrian and cycleway design and associated drainage works, do not adversely impact runoff management across the study area. The flood impact assessment for the 100-year ARI event indicates that flood characteristics remain largely unchanged throughout the catchment, with no negative impacts identified within private property boundaries.

The drainage assessment, supported by DRAINS modelling confirms that the proposed upgrades significantly enhance the performance, capacity, and reliability of the stormwater network compared to existing conditions. The targeted infrastructure improvements – including new stormwater pits, and pipe connections proposed drainage improvements address these issues through targeted infrastructure upgrades, including the installation of new stormwater pits, and pipe connections – ensure effective capture and conveyance of stormwater runoff, mitigating surface flows across the shared cycleway and improving safety for users. The system demonstrates satisfactory performance under 20-years ARI event, with improved conveyance and reduced surface ponding.

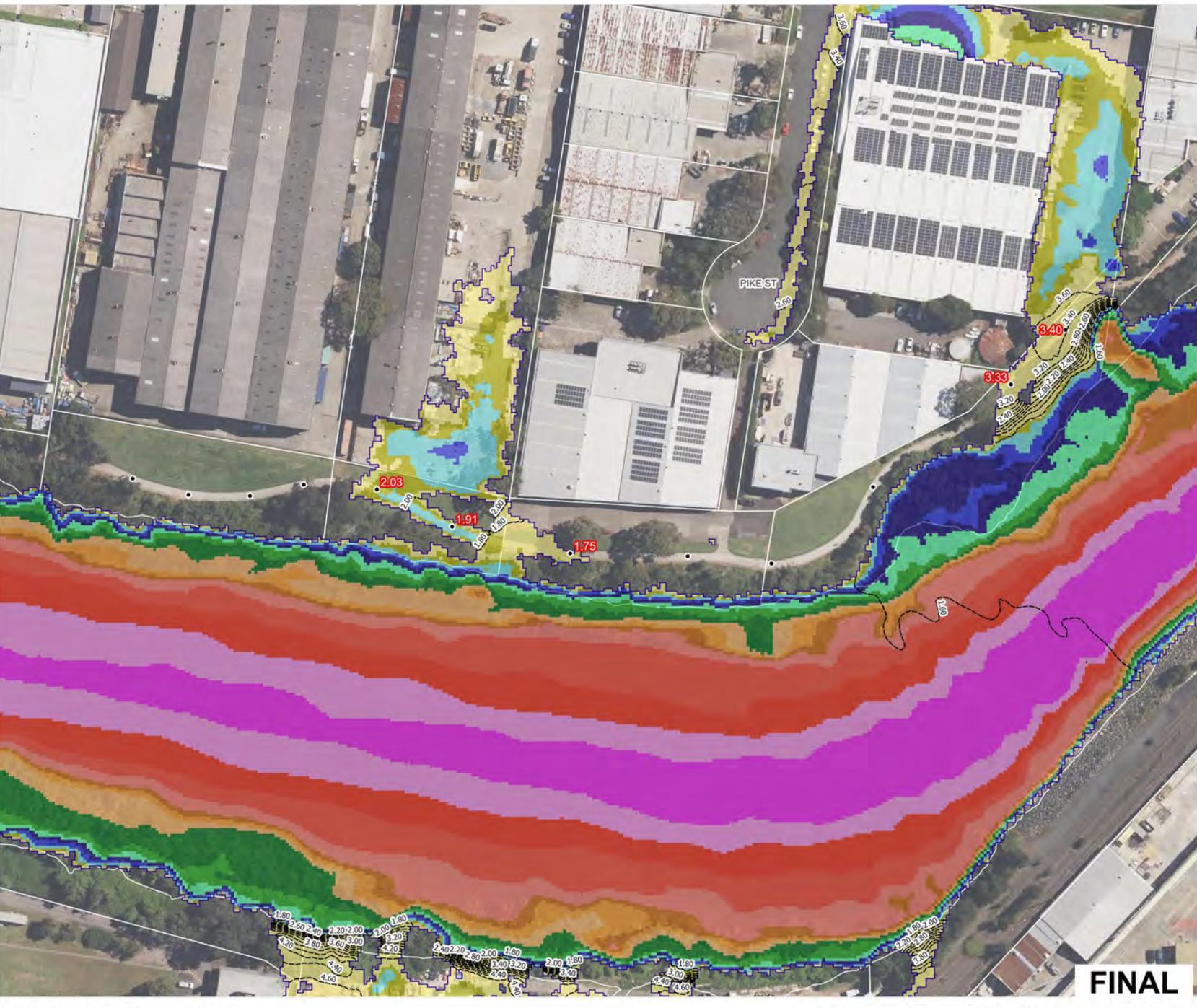
Based on this investigation, the following recommendations are provided for implementation:

1. Pit 3\1 Conversion and Upstream Capture:
Pit 3\1 has been converted into a junction pit. An additional surface inlet pit is to be installed upstream of Pit 3\1 to capture runoff from the upstream catchment. This will ensure more efficient interception of overland flow and reduce potential surface ponding.
2. New Pits in Cycleway:
Two 600 mm x 600 mm stormwater pits are to be installed within the concrete cycleway and connected to Pit 3\1 via a Class 4 Ø300 mm reinforced concrete pipe (RCP). These pits are intended to improve surface runoff capture and conveyance, minimising the risk of surface runoff along the shared cycleway.
3. Pit 4\1 Upgrade and Roof Runoff Management:
Pit 4\1 which does not receive upstream catchment flow, has been converted into a junction pit. Roof runoff from 25 Pike Street – previously discharging from a significant height directly onto the cycleway – is now to be collected via new downpipes and conveyed into the drainage network. This mitigates the risk of concentrated, high-velocity surface flow on the shared pathway, improving safety for pedestrians and cyclist.
4. Pit 1\3 and 1\2 removal and Upstream Pit Addition:
The existing pits 1\3 and 1\2 located along the proposed shared cycleway has been removed. An additional upstream pit is to be introduced to better capture runoff from the contributing upstream area, enhancing the drainage system's capacity and responsiveness.

In conclusion, the proposed drainage modifications present a well-integrated and future-resilient solution. They not only improve hydraulic performance and public safety but also align with contemporary stormwater management practices and support the functionality of the upgraded shared pedestrian and cycleway.

APPENDIX A 5% AEP (20-YEAR ARI) and 1% AEP (100-YEAR ARI) FLOOD MAPS

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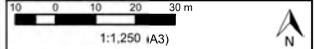
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- 20pc_Existing_Max_Fld_Lvl
- 20pc_Existing_Fld_Extnt

20pc_4.5hr_Existing_Fld_Depth_Max
Band 1

- ≤ 0.10
- 0.10 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.20
- 1.20 - 1.40
- 1.40 - 1.60
- 1.60 - 1.80
- 1.80 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- > 4.00

NOTES:
1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

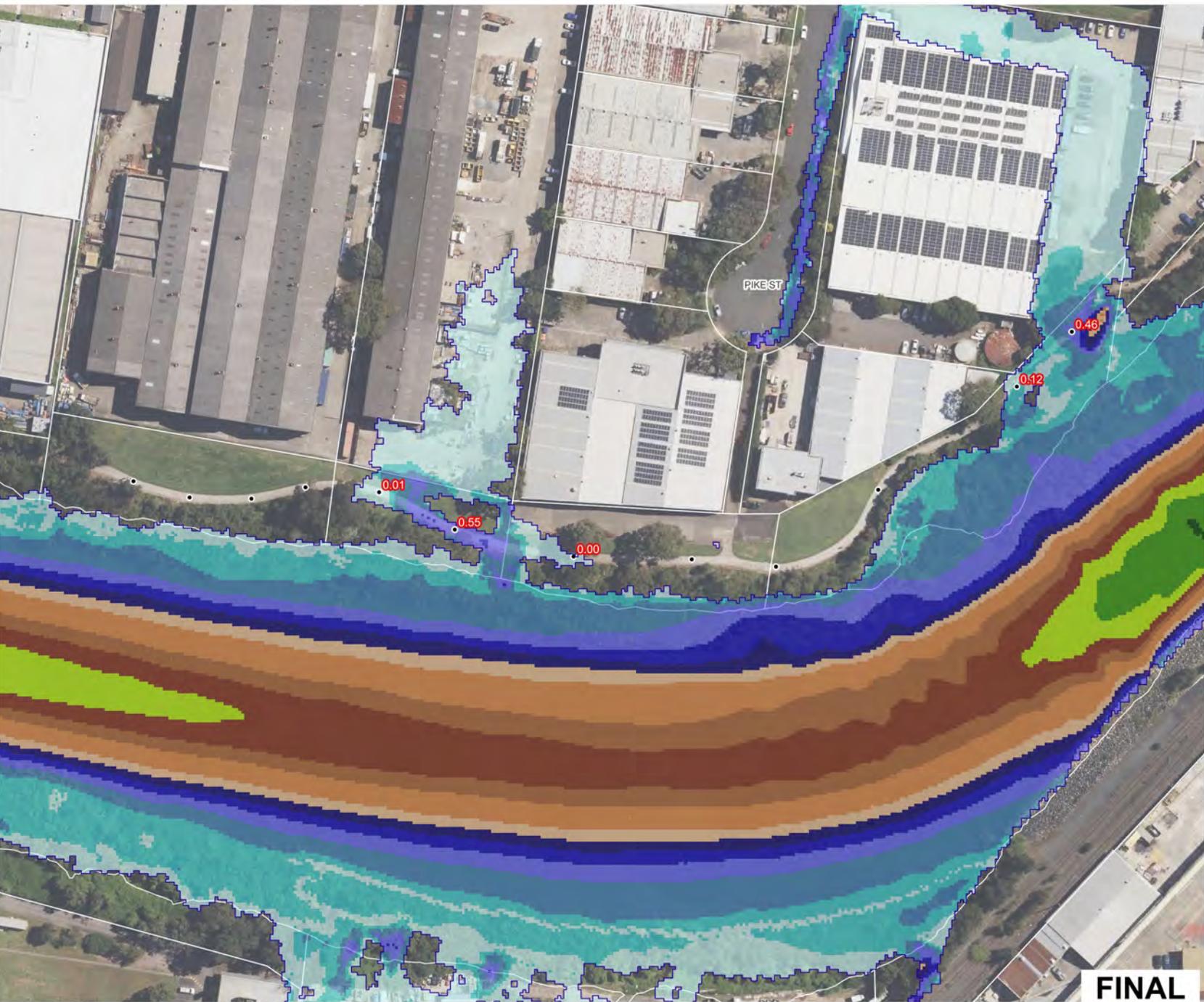
DRAWING TITLE:
**EXISTING SCENARIO
5YR ARI STORM EVENT
MAXIMUM FLOOD DEPTH**

FIGURE: **A1** ISSUE: **A**

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

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LEGEND

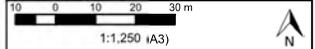
- 20pc_Existing_Fld_Extent
- 20pc_Existing_Max_Fld_Velocity

20pc_4.5hr_Existing_Velocity_Max
Band 1

- <= 0.10
- 0.10 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.20
- 1.20 - 1.60
- 1.60 - 1.80
- 1.80 - 2.00
- 2.00 - 2.20
- 2.20 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 5.00
- > 5.00

NOTES:
 1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
 REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

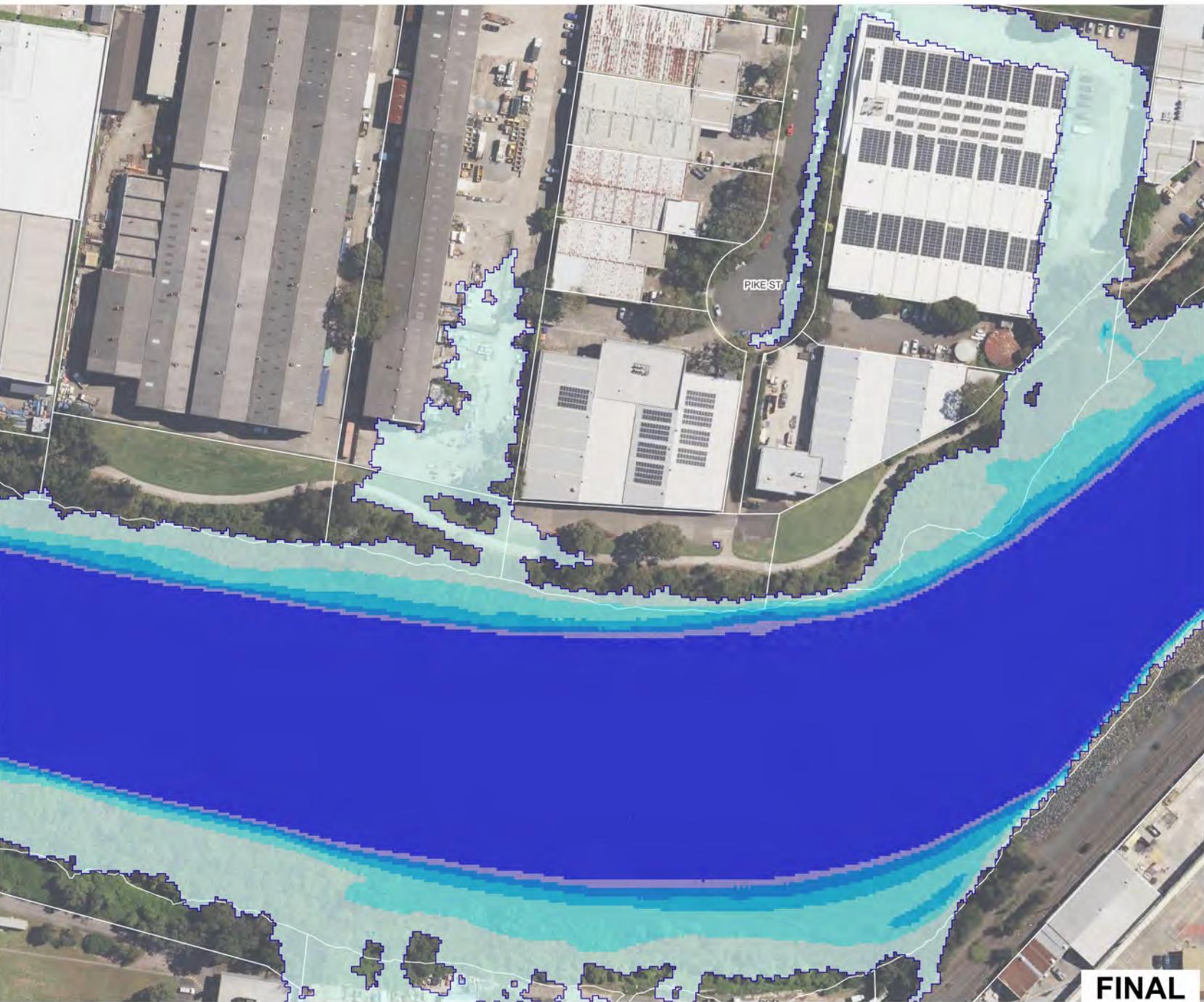
DRAWING TITLE:
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 5YR ARI STORM EVENT
 MAXIMUM FLOOD VELOCITY

FIGURE: A2 **ISSUE:** A

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSMENTS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, LOSSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGE) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

20pc_Existing_Fld_Extent

20pc_4.5hr_Existing_Fld_DxV_Max

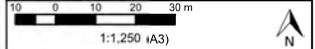
Band 1

- 0.0-0.2
- 0.2-0.4
- 0.4-0.6
- 0.6-0.8
- 0.8-1.0
- >1

NOTES:

1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

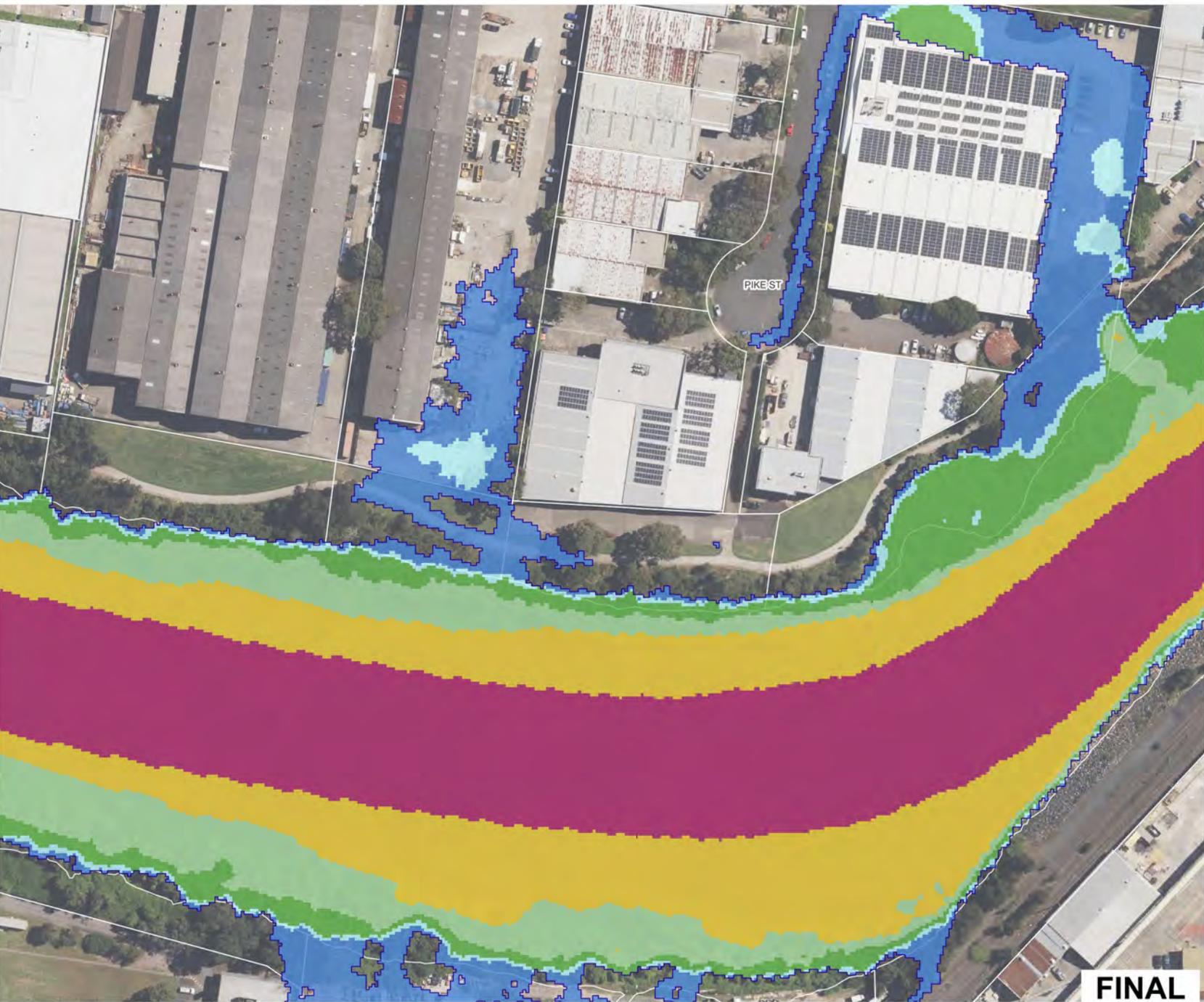
DRAWING TITLE:
**EXISTING SCENARIO
 5YR ARI STORM EVENT
 MAXIMUM FLOOD DEPTH-VELOCITY**

FIGURE: A3 **ISSUE:** A

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSORS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, LOSSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGE) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

20pc_Existing_Fld_Extent

20pc_4.5hr_Existing_Max_Fld_Hazard

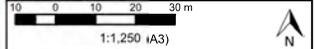
Band 1

- H1
- H2
- H3
- H4
- H5
- H6

NOTES:

1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

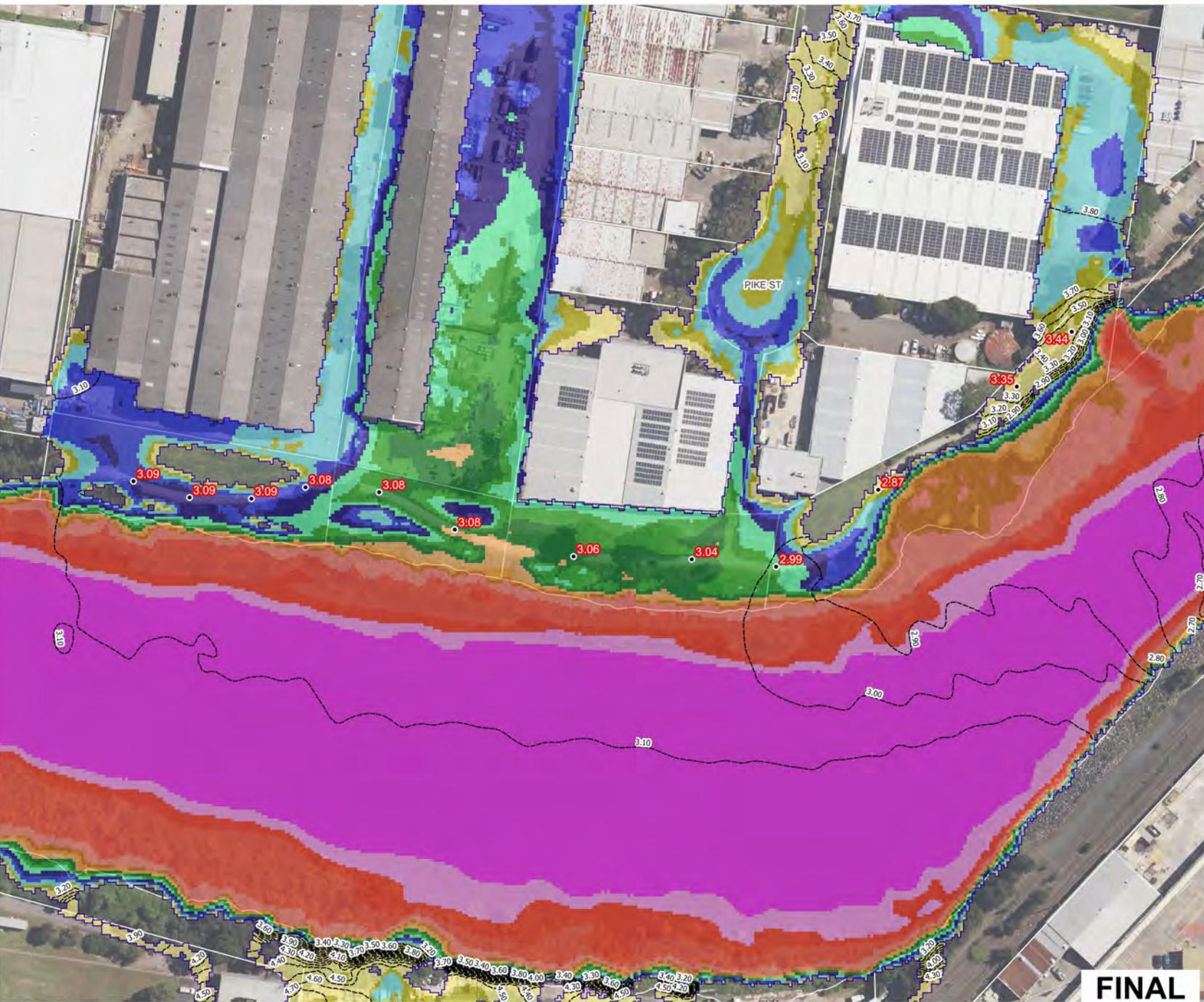
CLIENT:

DRAWING TITLE:
**EXISTING SCENARIO
 5YR ARI STORM EVENT
 MAXIMUM FLOOD HAZARD**

FIGURE: **A4** **ISSUE:** **A**

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSORS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY FOR ALL EXPENSES, LOSSES, DAMAGES INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGE) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

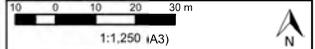
- FFA_1pc_12hr_Max_Fld_Extnt
- FFA_1pc_12hr_Max_Fld_Mv_Points
- FFA_1pc_12hr_Max_Fld_Mv_Cntour

FFA_1pc_12hr_Max_Fld_Depth
Band 1

- ≤ 0.10
- 0.10 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.20
- 1.20 - 1.40
- 1.40 - 1.60
- 1.60 - 1.80
- 1.80 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- > 4.00

NOTES:
1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

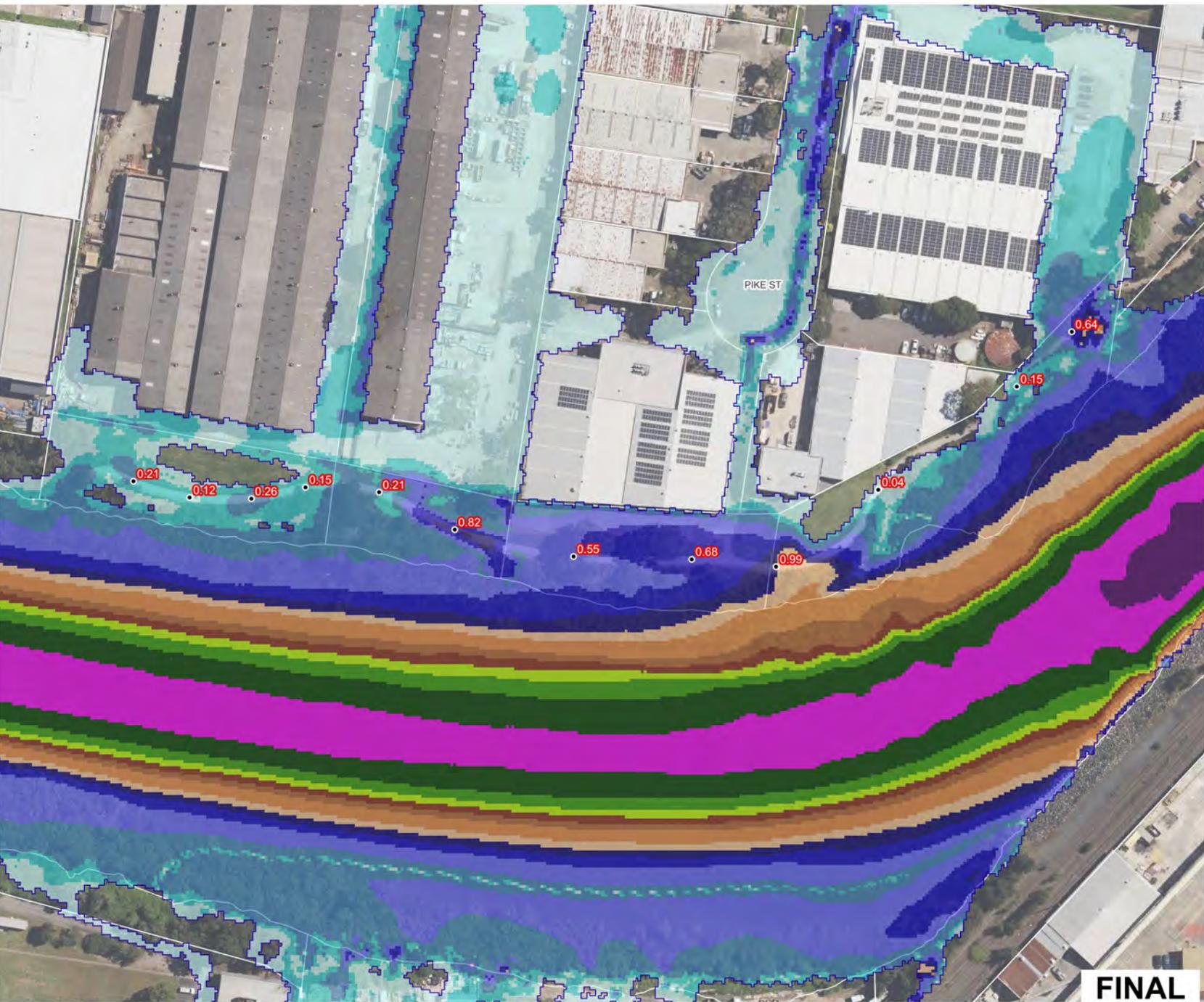
DRAWING TITLE:
**EXISTING SCENARIO
FFA_100YR ARI STORM EVENT
MAXIMUM FLOOD DEPTH**

FIGURE: **A5** ISSUE: **A**

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSORS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, LOSSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGE) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

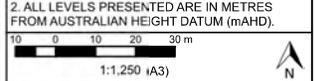
- FFA_1pc_12hr_Max_Fld_Extent
- FFA_1pc_12hr_Max_Fld_Velocity_Points

FFA_1pc_12hr_Max_Fld_Velocity Band 1

- <= 0.10
- 0.10 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.20
- 1.20 - 1.60
- 1.60 - 1.80
- 1.80 - 2.00
- 2.00 - 2.20
- 2.20 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 5.00
- > 5.00

NOTES:

- REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.
- ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
 REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

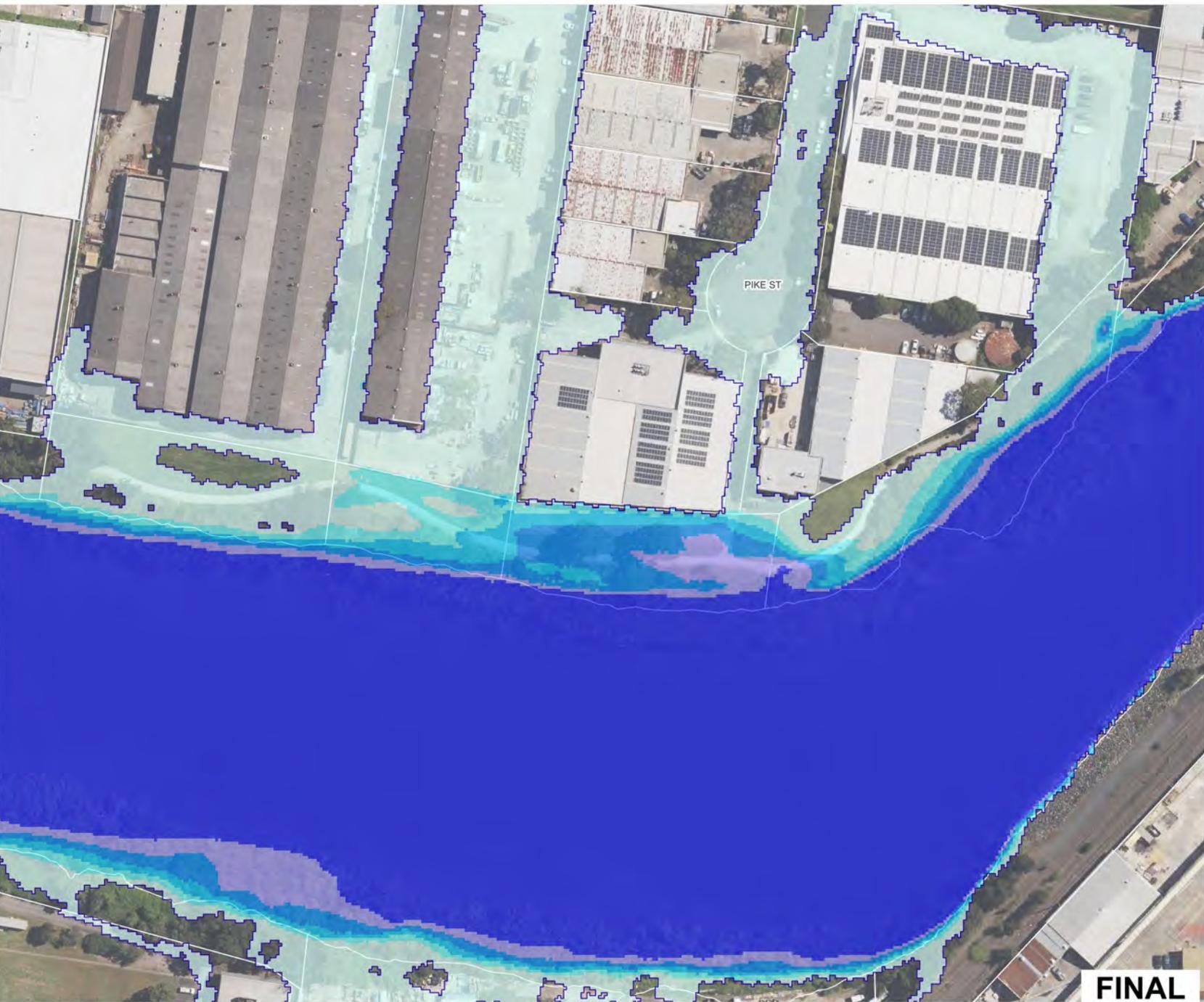
DRAWING TITLE:
 EXISTING SCENARIO
 FFA_100YR ARI STORM EVENT
 MAXIMUM FLOOD VELOCITY

FIGURE: A6 **ISSUE:** A

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSORS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, LOSSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGES) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

FFA_1pc_12hr_Max_Fld_Extent

FFA_1pc_12hr_Max_Fld_DxV

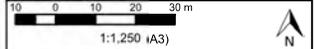
Band 1

- 0.0-0.2
- 0.2-0.4
- 0.4-0.6
- 0.6-0.8
- 0.8-1.0
- >1

NOTES:

1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

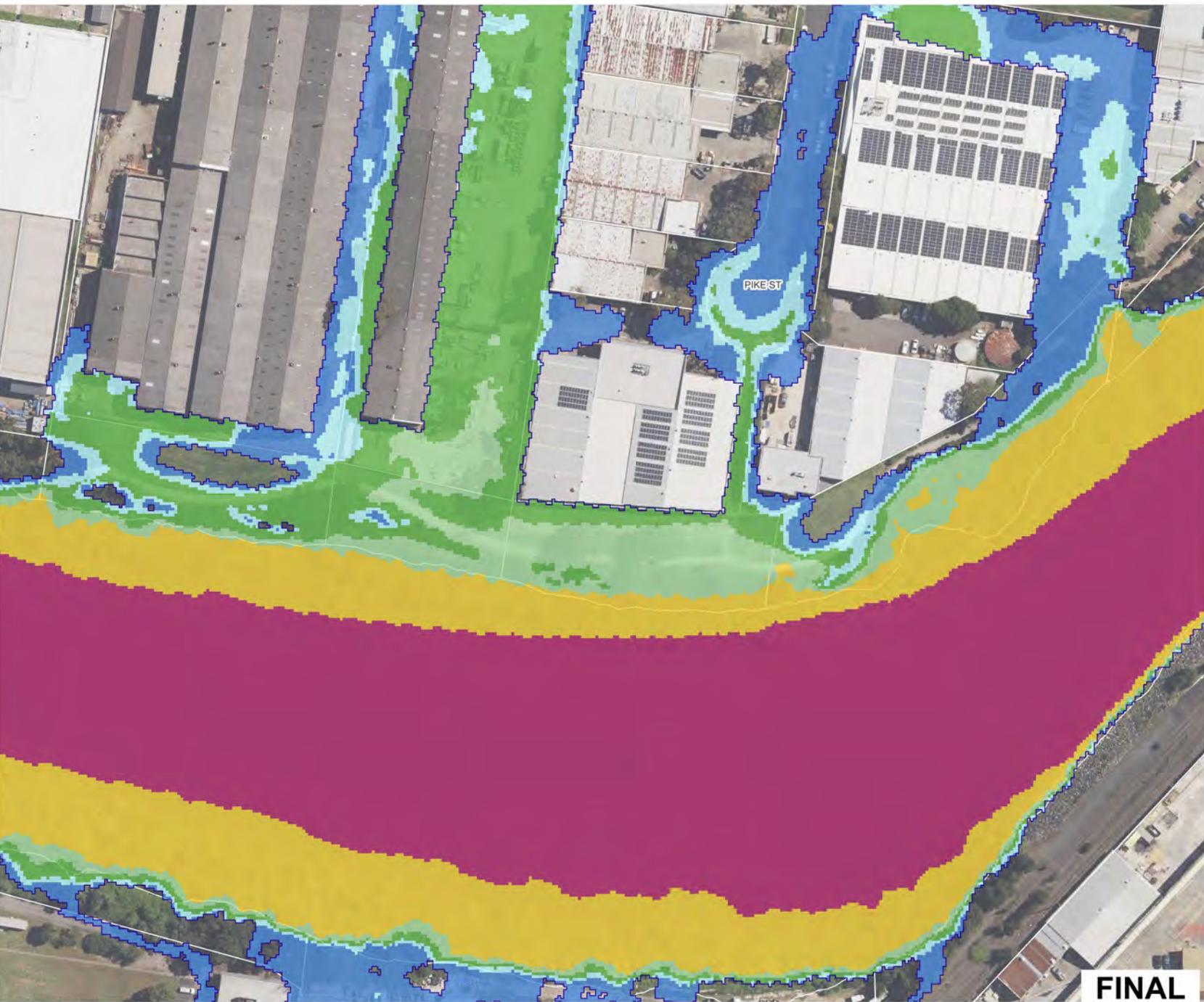
DRAWING TITLE:
**EXISTING SCENARIO
FFA_100YR ARI STORM EVENT
MAXIMUM FLOOD DEPTH-VELOCITY**

FIGURE: **A7** ISSUE: **A**

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSMENTS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGES) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

FFA_1pc_12hr_Max_Fld_Extent

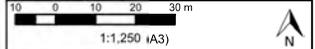
FFA_1pc_12hr_Max_Fld_Hazard
Band 1

- H1
- H2
- H3
- H4
- H5
- H6

NOTES:

1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

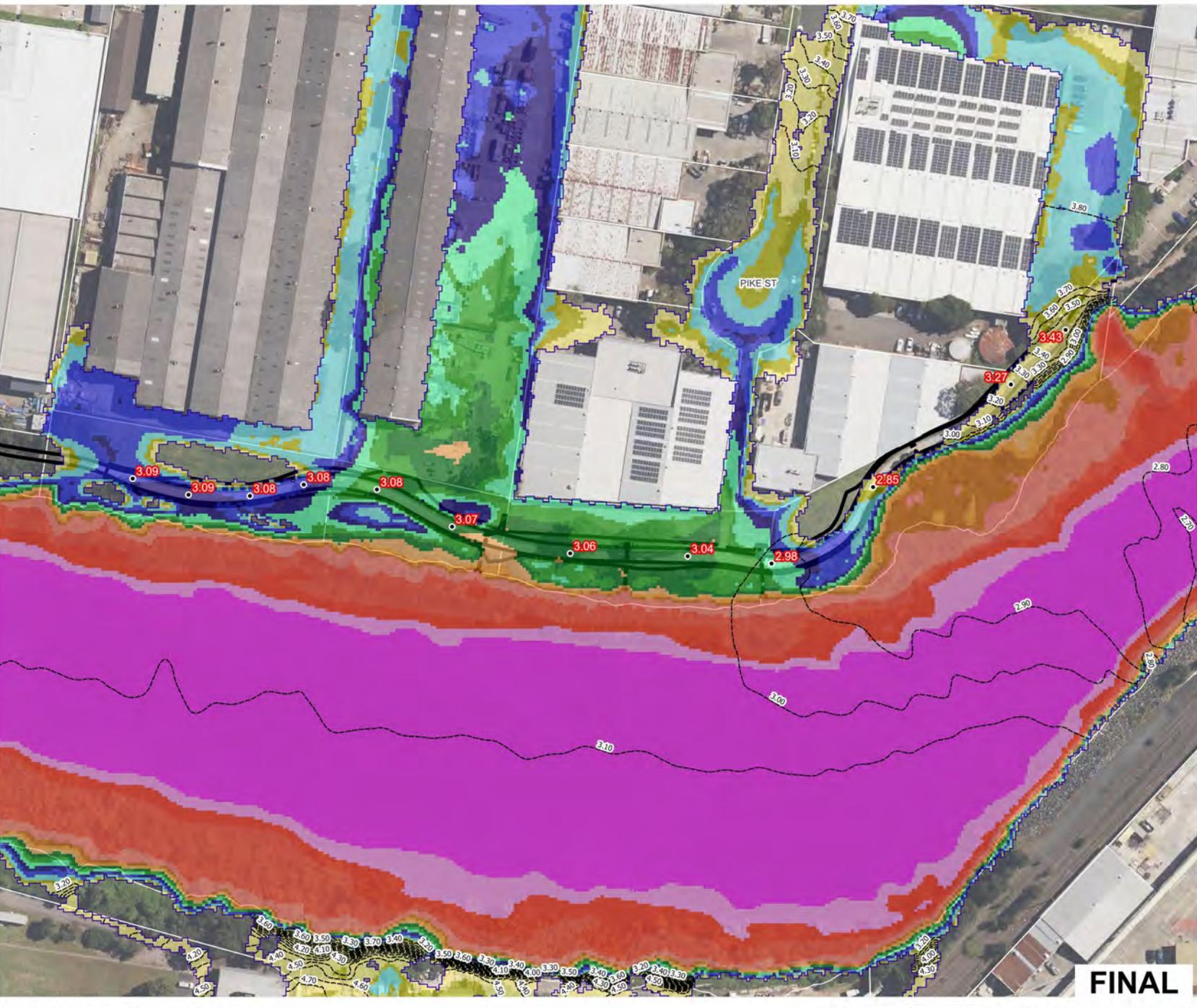
DRAWING TITLE:
EXISTING SCENARIO
FFA_100YR ARI STORM EVENT
MAXIMUM FLOOD HAZARD

FIGURE: A8 **ISSUE:** A

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSORS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGES) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

Developed

- FFA_1pc_12hr_Max_Fld_Extnt
- FFA_1pc_12hr_Max_Fld_Lvl_Points
- FFA_1pc_12hr_Max_Fld_Lvl_Contour

FFA_1pc_12hr_Max_Fld_Depth

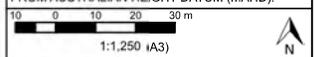
Band 1

- <= 0.10
- 0.10 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.20
- 1.20 - 1.40
- 1.40 - 1.60
- 1.60 - 1.80
- 1.80 - 2.00
- 2.00 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- > 4.00

NOTES:

1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

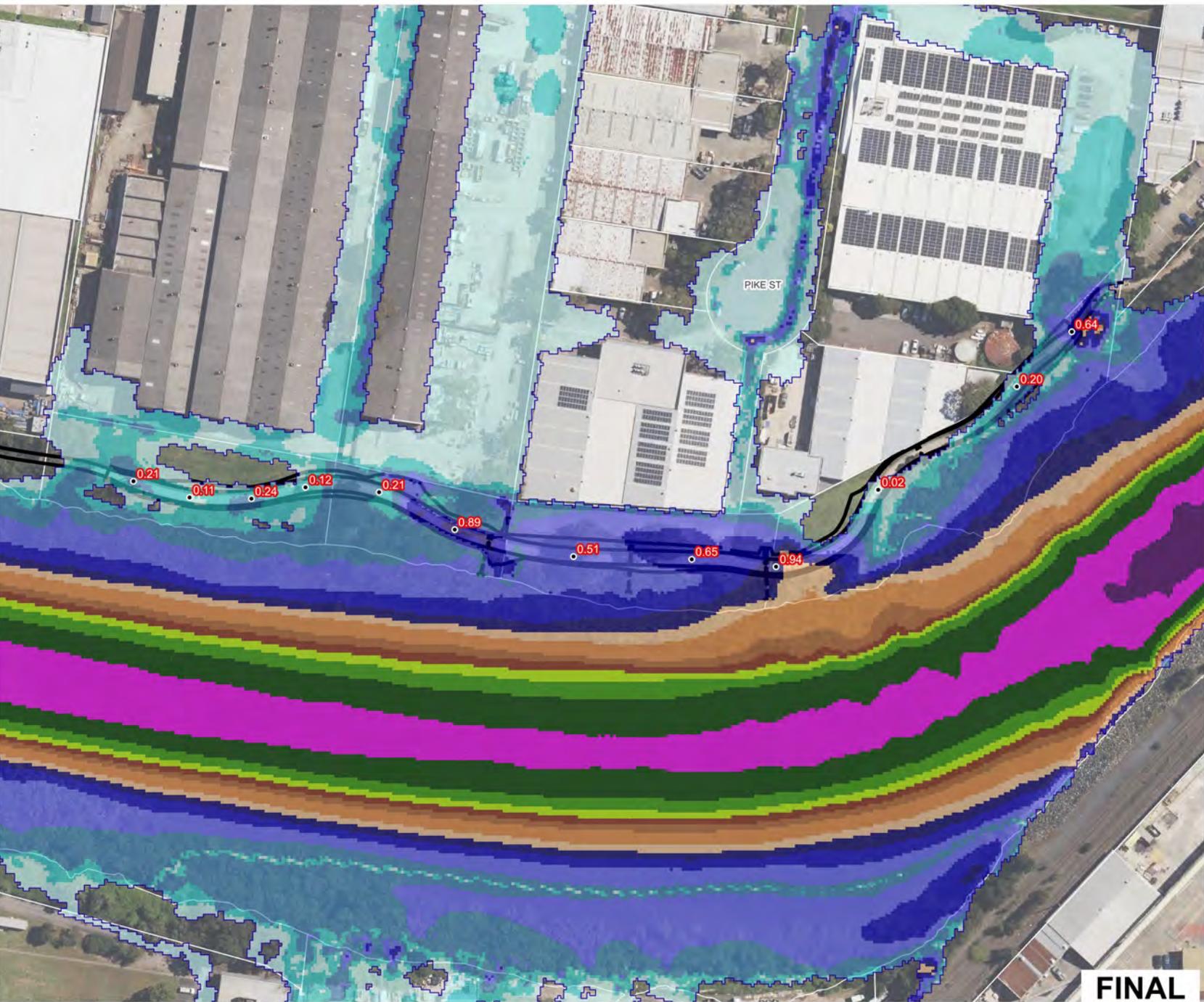
DRAWING TITLE:
DEVELOPED SCENARIO FFA_100YR ARI STORM EVENT MAXIMUM FLOOD DEPTH

FIGURE: **A9** ISSUE: **A**

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSORS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, LOSSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGES) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

Developed

- FFA_1pc_12hr_Max_Fld_Extent
- FFA_1pc_12hr_Max_Fld_Velocity_Points

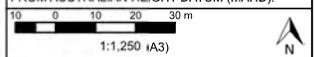
FFA_1pc_12hr_Max_Fld_Velocity

Band 1

- <= 0.10
- 0.10 - 0.20
- 0.20 - 0.40
- 0.40 - 0.60
- 0.60 - 0.80
- 0.80 - 1.00
- 1.00 - 1.20
- 1.20 - 1.60
- 1.60 - 1.80
- 1.80 - 2.00
- 2.00 - 2.20
- 2.20 - 2.50
- 2.50 - 3.00
- 3.00 - 3.50
- 3.50 - 4.00
- 4.00 - 5.00
- > 5.00

NOTES:

- REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.
- ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
 REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

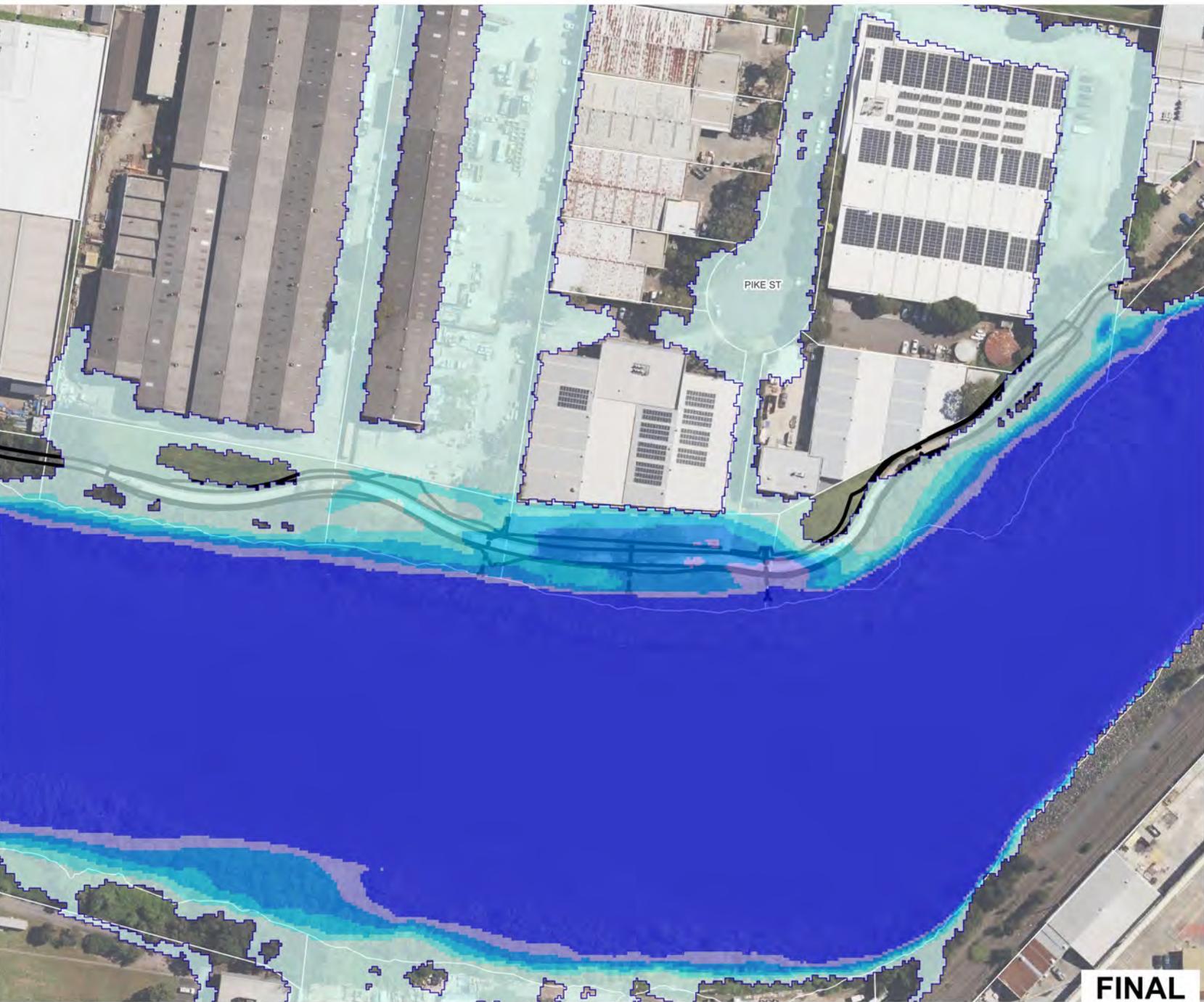
DRAWING TITLE:
 DEVELOPED SCENARIO
 FFA_100YR ARI STORM EVENT
 MAXIMUM FLOOD VELOCITY

FIGURE: A10 **ISSUE:** A

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSORS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, LOSSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGES) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

Developed

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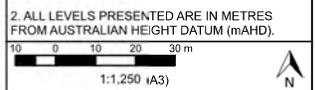
FFA_1pc_12hr_Max_Fld_DxV
Band 1

0.0-0.2
0.2-0.4
0.4-0.6
0.6-0.8
0.8-1.0
>1

NOTES:

1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

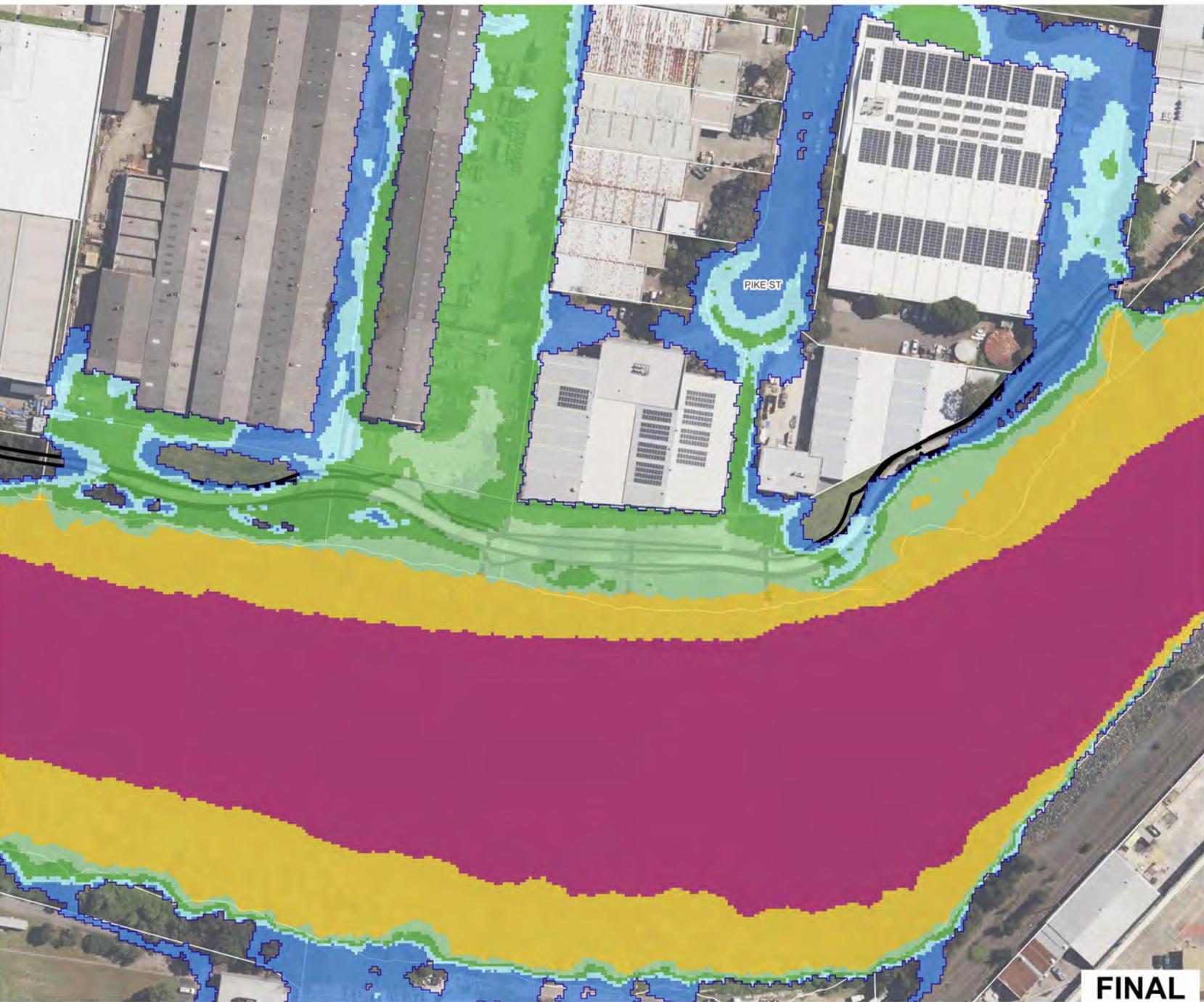
DRAWING TITLE:
**DEVELOPED SCENARIO
FFA_100YR ARI STORM EVENT
MAXIMUM FLOOD DEPTH-VELOCITY**

FIGURE: **A11** ISSUE: **A**

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSORS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGES) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

Developed

FFA_1pc_12hr_Max_Fld_Extent

FFA_1pc_12hr_Max_Fld_Hazard

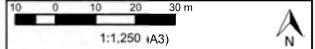
Band 1

H1
H2
H3
H4
H5
H6

NOTES:

1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

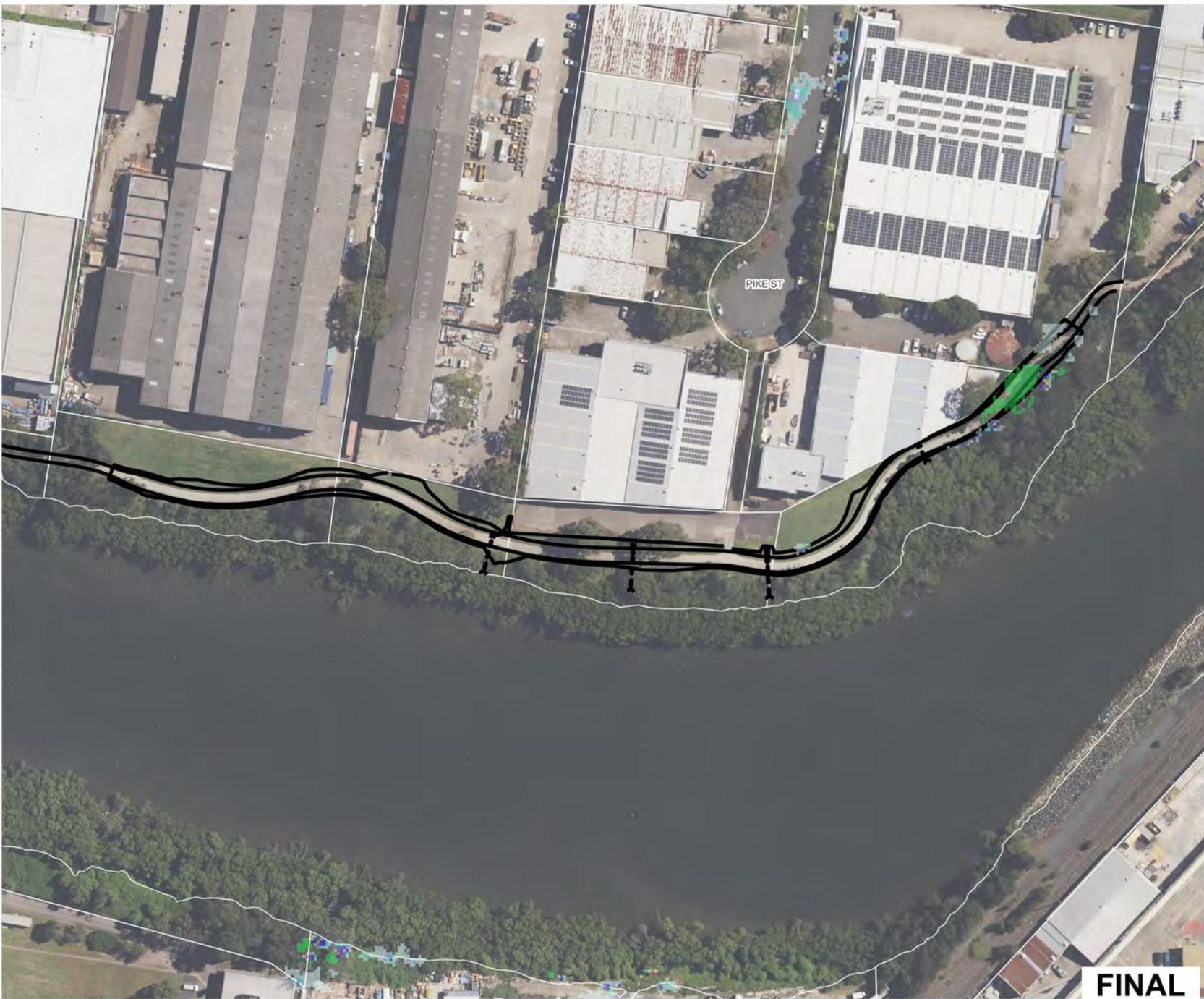
DRAWING TITLE:
**DEVELOPED SCENARIO
FFA_100YR ARI STORM EVENT
MAXIMUM FLOOD HAZARD**

FIGURE: **A12** ISSUE: **A**

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

FINAL

WHILE EVERY CARE IS TAKEN TO ENSURE THE ACCURACY OF DATA SOURCED THROUGH THIRD PARTIES, CITY ASSESSMENTS AND ENVIRONMENT UNIT MAKES NO REPRESENTATIONS OR WARRANTIES ABOUT ITS ACCURACY, RELIABILITY, COMPLETENESS OR SUITABILITY FOR ANY PARTICULAR PURPOSE AND DISCLAIMS ALL LIABILITY (INCLUDING WITHOUT LIMITATION LIABILITY IN NEGLIGENCE) FOR ALL EXPENSES, LOSSES, DAMAGES (INCLUDING INDIRECT OR CONSEQUENTIAL DAMAGE) AND COSTS WHICH MIGHT BE INCURRED AS A RESULT OF THE DATA BEING INACCURATE OR INCOMPLETE IN ANY WAY AND FOR ANY REASON.



LEGEND

Impact

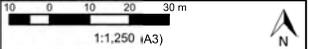
1pc_Impact

Band 1

- <= -0.01
- 0.01 - 0.002
- 0.002 - 0.01
- 0.01 - 0.015
- 0.015 - 0.020
- 0.020 - 0.030
- 0.030 - 0.040
- 0.040 - 0.050
- 0.050 - 0.060
- 0.060 - 0.080
- 0.080 - 0.100
- 0.100 - 0.120
- 0.120 - 0.140
- 0.140 - 0.165

NOTES:
 1. REFER TO REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY FLOOD IMPACT ASSESSMENT REPORT BY CITY OF PARRAMATTA COUNCIL.

2. ALL LEVELS PRESENTED ARE IN METRES FROM AUSTRALIAN HEIGHT DATUM (mAHD).



PROJECT:
REID PARK SHARED PEDESTRIAN AND CYCLIST PATHWAY

CLIENT:

DRAWING TITLE:
**DEVELOPED SCENARIO
 FFA_100YR ARI STORM EVENT
 MAXIMUM FLOOD IMPACT**

FIGURE: **A13** ISSUE: **A**

ISS	BY	CHK	DATE	DETAILS
A	DM		23.06.25	FINAL
B				
C				
D				
E				

Contact Us

CITY OF PARRAMATTA COUNCIL

316 Victoria Road, Rydalmere, NSW 2116
PO Box 32, Parramatta, NSW 2124



**Report on Detailed Site (Contamination)
Investigation**

Proposed Pedestrian and Cycleway

Reid Park Valley, Rydalmere NSW

Prepared for City of Parramatta Council

Project 231248.01

16 January 2025

Document History

Details

Project No.	231248.01
Document Title	Report on Detailed Site (Contamination) Investigation
Site Address	Reid Park Valley, Rydalmere NSW
Report Prepared For	City of Parramatta Council
Filename	231248.01.R.001.Rev0

Status and Review

Status	Prepared by	Reviewed by	Date issued
Revision 0	Michael Le	Paul Gorman	16 January 2025

Distribution of Copies

Status	Issued to
Revision 0	City of Parramatta Council

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

Signature

Date

Author

16 January 2025

Reviewer

16 January 2025

Executive Summary

Douglas Partners Pty Ltd (Douglas) has been engaged by City of Parramatta Council (CoP) to prepare this Detailed Site (Contamination) Investigation (DSI) report for a proposed pedestrian and cycleway at Reid Park Valley, Rydalmere NSW (the site).

It is understood that the proposed pedestrian and cycleway includes five linked sites spanning from Parramatta to Ermington, however the contamination investigation is only required at three of the sites, as listed in Section 2. Separate DSI reports have been prepared for the Rangihou Reserve and Royal Shores sites. A geotechnical investigation was undertaken concurrently by Douglas for the five linked sites, and these have also been reported separately.

In accordance with the project brief, the objective of the DSI is to:

- Inform the design development of the potential works (Civil, Structural and Electrical) as indicated in the draft landscape concept plans; and
- Determine the presence, type and extent of ground contamination (if any) to inform preparation of a Remediation Action Plan (RAP), Work Health and Safety (WHS) contamination site management procedures and to inform costs associated with bulk earthworks including the disposal off site of any contaminated site material during construction works.

The investigation included a review of site and historical information including soil landscape, geological, topographical, acid sulfate soil (ASS) and hydrogeological published information, review of publicly available government held records including NSW Environment Protection Authority (EPA) contaminated land property records and environmental protection licence databases, completion of a site walkover, collection of soil samples from 11 boreholes (BH301 to BH311), dispatch and analysis of samples for Contaminants of Potential Concern (CoPC) listed in Section 3 to a National Association of Testing Authorities (NATA) accredited laboratory, and preparation of this DSI report with a preliminary waste classification assessment.

The site history information suggests that the site was used for commercial and/or heavy industrial purposes from *circa* the 1940s to the late 1970s, with the east portion of the site formerly part of a James Hardie site (refer to Section 7.3.5). Following the 1970s, the site was cleared and remained as a vacant grassed area until 2011 when a walking track was constructed along the site alignment.

Concentrations of benzo(a)pyrene, toluene, ethylbenzene and xylene (BTEX), phenols, organochlorine pesticides (OCP), organophosphate pesticides (OPP), and polychlorinated biphenyls (PCB) in all samples tested were below the practical quantitation limit (PQL). Concentration of metals, PAH, and TRH were reported above the PQL but within the adopted site assessment criteria (SAC), corresponding to land use category 'C', public open space such as parks, playgrounds, playing fields, secondary schools and footpaths.

Bonded asbestos and/or Asbestos Fines/Friable Asbestos (AF/FA) was recorded in fill at test locations BH302, BH303, and BH305 to BH311 from the current investigation and BH14, BH17, TP111 to TP114 and TP116 to TP117 from EIS (2010), of which, AF/FA was detected above the SAC at BH305, and BH309 to BH311.

Preliminary *in situ* waste classification has been provided in Section 13.4.

Based on the results of the DSI, it is considered that exposure risks associated with identified (and unknown) asbestos in soils at the site can be managed subject to implementation of the following recommendations:

- A RAP is prepared in accordance with NSW EPA (2020) to address:
 - o WHS management protocols during construction works;
 - o Remediation strategy for fill impacted with asbestos;
 - o Protocols for the validation of site remediation;
 - o Protocols for waste classification of any materials requiring off-site disposal, and protocols for material import, including check-sampling, where appropriate; and
 - o Other general requirements for RAPs under NSW EPA (2020).

The concurrent geotechnical investigation report concludes that Actual Acid Sulfate Soils (AASS) / Potential Acid Sulfate Soils (PASS) are likely present at the site within the alluvial sediments below the water table in proximity to Parramatta River, at depths ranging from approximately 0.9 m. As such AASS is expected to be encountered during piling and possibly during bulk excavation works. On this basis, management of ASS for the proposed development is required through an ASS management plan.

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Report on Detailed Site (Contamination) Investigation Proposed Pedestrian and Cycleway Reid Park Valley, Rydalmere NSW

1. Introduction

Douglas Partners Pty Ltd (Douglas) has been engaged by City of Parramatta Council (CoP) to prepare this Detailed Site (Contamination) Investigation (DSI) report for a proposed pedestrian and cycleway at Reid Park Valley, Rydalmere NSW (the site). It is understood that the proposed pedestrian and cycleway includes five linked sites spanning from Parramatta to Ermington, however the contamination investigation is only required at three of the sites, as listed in Section 2. Separate DSI reports have been prepared for the Rangihou Reserve and Royal Shores sites. A geotechnical investigation was undertaken concurrently by Douglas for the five linked sites, and these have also been reported separately.

The investigation was undertaken in accordance with Douglas' proposal 231248.00.P.001.Rev0 dated 22 August 2024.

In accordance with the project brief, the objective of the DSI is to:

- Inform the design development of the potential works (Civil, Structural and Electrical) as indicated in the draft landscape concept plans; and
- Determine the presence, type and extent of ground contamination (if any) to inform preparation of a RAP, WHS contamination site management procedures and to inform costs associated with bulk earthworks including the disposal off site of any contaminated site material during construction works.

The project brief limits the investigations to the sampling and testing of soils only.

This report must be read in conjunction with all appendices including the notes provided in Appendix A.

The following key guidelines were consulted in the preparation of this report:

- NEPC *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]* (NEPC, 2013); and
- NSW EPA *Guidelines for Consultants Reporting on Contaminated Land* (NSW EPA, 2020).

2. Proposed development

It is understood that CoP requires environmental investigation and assessment for the following locations:

1. Rangihou Reserve, Parramatta
2. Reid Park Valley, Rydalmere
3. Royal Shores, Ermington

The investigations are being undertaken as part of the Eastern Parramatta River project to support civil, landscaping and structural design of proposed upgrades for each site, broadly including new light poles, new pedestrian and cyclist counters, drainage upgrades, modifications and upgrades to landscaping, upgrading the existing 3 m shared path to a 5 m dedicated cycle way / pedestrian footpath, low height sandstone block retaining walls, new bridge crossings and new raised pedestrian boardwalks. Refer to the Concept Design Drawings (Rev A, dated June 2024) included in Appendix A for further information on each specific site.

This DSI is for the Reid Park Valley site only.

3. Scope of work

The scope of works comprised:

- A review of development plans, previous reports (if made available) and documentation provided by the client;
- A review of geological, topographic, soil, acid sulfate soil and registered groundwater bores to assess and document the site's environmental setting;
- A review of readily available site history information, comprising:
 - o Historical aerial photographs;
 - o NSW EPA public registers for notices and licences issued under the *Contaminated Land Management Act 1997* (CLM Act) and the *Protection of the Environment Operations Act 1997* (POEO Act);
 - o Council records obtained through an informal Government Information Public Access (GIPA) request.
- Conduct a site walkover to observe signs or indicators of potential contamination;
- Preparation of Field Work Safety and Environment Plan (FWSEP) and Safe Work Method Statements (SWMS);
- Collection of soil samples at regular depth intervals, changes in strata, or upon signs of contamination (e.g. staining, odours) from the 11 boreholes (BH301 to BH311) drilled to varying depths;
- Field testing comprising screening of soil samples using a photo-ionisation detector (PID) to screen for volatile organic compounds (VOC);
- Dispatch of selected soil samples to a NATA accredited laboratory for combination of CoPC as below:
 - o Heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
 - o Polycyclic aromatic hydrocarbons (PAHs);
 - o Total recoverable hydrocarbons (TRH);
 - o BTEX;
 - o OCP;
 - o OPP;
 - o PCBs;

- o Asbestos;
- o Toxicity Characteristic Leaching Procedure (TCLP) of PAHs, and metals (if required);
- o Collect and analysis of QA / QC samples including 5% intra-laboratory duplicates, 5% inter-laboratory duplicate, and trip spikes and trip blanks;
- Preparation of this DSI report for the site in accordance with NSW EPA (2020) *Guidelines for Consultants Reporting on Contaminated land* which includes the results of the desktop investigation, outlines the methods and results of the investigation, test location plan, the borehole logs, results of the laboratory analysis, and responds to the objective of the DSI; and
- A preliminary waste classification assessment is also included as part of this DSI report.

4. Site information

Site address	Reid Park Valley, Rydalmere NSW
Legal description	Reid Park Valley, Rydalmere
Area	Approximately 950 m ²
Zoning	Zone RE1 Public recreation
Local Council Area	Parramatta City Council
Current use	Recreational walkway
Surrounding uses	North – Commercial / industrial premises East – Recreational walkway (continuing east) South – Parramatta River West – Recreational walkway (continuing west)

The site boundary is shown on Figure 1.



Figure 1: Site location in red shape

5. Environmental setting

Regional topography	Reference to NSW 10 m Elevation Contours indicates the site is located on the north side of a valley which slopes downwards towards the south to Parramatta River.
Site topography	Reference to NSW 2 m Elevation Contours indicates topography in the area is generally flat and slopes towards Parramatta River. The ground surface of the site is relatively flat at approximately 2 m Australian Height Datum (AHD).
Soil landscape	Reference to Sydney 1:100 000 soil mapping indicates that the site is within Lucas Heights residual soils described as gently undulating crest and ridges on plateau surfaces of the Mittagong formation (alternating bands of shale and fine-grained sandstones). Local relief to 30 m, slopes <10%. Rock outcrop is absent. Extensively or completely cleared, dry sclerophyll low forest and woodland.
Geology	Reference to Sydney 1:100 000 Series Seamless Geology Sheet indicates that the site is underlain by anthropogenic deposits which is described as Anthropocene deposits varying from large manmade clasts (concrete blocks to building demolition rubble) to quarried natural boulders with interstitial sand-sized to clay matrix. The site is located adjacent to estuarine channel deposits to the south described as fine – to medium grained lithic-carbonate-quartz sand (marine-deposited), silt, clay, shell, grave and Hawkesbury sandstone to the west which is described as medium to coarse grained quartz sandstone with some shale and laminite bands or lenses.

<p>Acid sulfate soils</p>	<p>Reference to published NSW ASS mapping indicates that the site is located in an area with high probability of occurrence in the west and central portion of the site and the north-east portion is located in an area of low probability of occurrence.</p> <p>The Acid Sulfate Soils Map of Parramatta Local Environmental Plan (LEP) 2023 indicates that the site is classified as Class 2 where development consent is required for works below the natural ground surface or works by which the water table is likely to be lowered. The following areas were identified adjacent to the site:</p> <ul style="list-style-type: none"> • Class 1 land to the south whereby consent condition is required for any works; and • Class 5 land to the north where development consent is required for works within 500 metres of adjacent Class 1, 2, 3 or 4 land that is below 5 metres AHD and by which the water table is likely to be lowered below 1 metre AHD on adjacent Class 1, 2, 3 or 4 land. <p>The ASS assessment has been conducted as part of the geotechnical investigation (Douglas, 2025). The assessment results are also summarised in Section 13.3 of this report.</p>
<p>Surface water</p>	<p>Parramatta River is situated adjacent to the site to the south. Rainfall at the site is anticipated to infiltrate into unpaved ground or runoff into the nearby Parramatta River system.</p>
<p>Groundwater</p>	<p>Based on the regional topography and the inferred flow direction of nearby water courses, the anticipated flow direction of groundwater beneath the site is to the south, towards Parramatta River, the likely receiving surface water body for the groundwater flow path. Given the ground surface relative level (RL), it is anticipated that groundwater may be within 2 m from the ground surface at the site.</p> <p>A search of the groundwater bore database maintained by the Department of Primary Industry was undertaken on the 4 December 2024. Review of the records indicates that there are 29 groundwater wells within a 500 m radius of the site, of which, 25 are located on the other side of Parramatta River and are considered to be cross gradient. Four wells located up-gradient to the site to the west and north-west (ranging from 250 m to 490 m). All wells were used as monitoring wells except for two wells on the other side of Parramatta River (GW063660 – Eng. Invest and GW107659 – industrial). Standing groundwater levels were not recorded in the wells except for GW107659 (490 m south-west of the site at 18.6 m below ground level (bgl)). The 29 groundwater bores identified within a 500 m radius are included in Appendix C1.</p>

6. Summary of previous investigations

6.1 Previous reports

The following previous report is relevant to the current investigation:

- Environmental Investigation Services (EIS), *Report to Parramatta City Council on Preliminary Environmental Site Screening for proposed cycleway development at Reid Park Valley, Rydalmere*, ref E23649K.rpt, dated February 2010 (EIS, 2010).

6.1.1 EIS (2010) – Preliminary environmental site screening

A preliminary environmental site screening investigation was conducted by EIS to assess the likelihood of contamination of the subsurface soils for a proposed cycleway development at Reid Park Valley, Rydalmere. The investigation included drilling 21 boreholes with a drill rig and 20 test pits with an excavator to depths between 0.4 m to 12 m bgl. Of the 21 boreholes and 20 test pits, eight boreholes (BH9 to BH15 and BH17) and eight test pits (TP109 to TP114 and TP116 and TP117) were located within the current site (Refer to EIS drawing attached in Appendix A). Douglas notes that EIS had samples from boreholes analysed for chemical analytes whereas samples from both boreholes and test pits were analysed for asbestos identification.

All concentrations of CoPC analysed in sampling locations relevant to the site were reported below the adopted Site Assessment Criteria (SAC) except for heavy metals such as copper and zinc. Trace petroleum hydrocarbons (TPH) and PAH were detected in some samples. Asbestos was detected in two out of eight boreholes and six out of eight test pits within the site boundary (i.e. BH14, BH17, TP111 to TP114 and TP116 to TP117 which were located across the entire site from east to west – refer to the EIS drawing attached in Appendix A). It was further noted that asbestos was observed sporadically across the majority of the site surface.

7. Site history

7.1 Site aerial photography

A number of historical aerial photographs were obtained from public databases. Extracts of the aerial photographs are included in Appendix C2. A summary of key features observed for the site and surrounding land is presented in Table 1.

Table 1: Summary of historical aerial photographs

Year	Site	Surrounding land use
1930	The aerial photograph is of low quality; however, the site appeared to be located in an open grassed area close to the north foreshore of Parramatta River.	The aerial photograph is of low quality; however, the surrounding land-use consists of predominantly open grassed areas with one structure to the north-west of the site.
1943	Significant development occurred in the west and central portion of the site, with new buildings and stored material apparent across the site, being part of significant industrial	Significant development was apparent in areas surrounding the site, with new buildings and large scale storage apparent to the north and west of the site.

Year	Site	Surrounding land use
	<p>development to the north. The east end of the site remained in apparent vacant land.</p> <p>There is apparent access to Parramatta River through several ramps in the west part of the site.</p>	
1951	<p>No significant changes were apparent when compared to the previous photograph except for the demolition of a small building in the central-east portion of the site and the extension of a building in the central-west.</p>	<p>Industrial development appeared to be expanding to the west of the site and some distance to the north-east of the site.</p>
1961	<p>It appears that the previously observed active activities in the central part of the site (extending north) have expanded further east, partially occupying the eastern part of the site. New buildings were constructed along the alignment of the site in the west portion of the site.</p>	<p>New structures are apparent north-west of the site, with earth works observed in the same direction which is likely associated with the construction of the structure. Some buildings to the north were replaced with a larger building.</p>
1970	<p>The building in the west portion of the site was extended, covering the west portion of the site. Vegetation was cleared in the east portion for use of the area for storage. All development at the site extends virtually to the Parramatta River foreshore.</p>	<p>Some buildings to the north of the site were replaced with one long building, with the building to the north-west under construction. The area to the north-west had vegetation cleared which was then used as a storage area.</p>
1978	<p>The majority of buildings previous observed along the site have now been removed, and the large scale storage operations along the majority of the site (and further north) appear to have ceased.</p>	<p>Some buildings to the north of the site were demolished and replaced with one singular building. Construction of the building to the north-west was complete. The area used as a storage area to the north of the site was cleared and was no longer used as a storage area.</p>
1986	<p>The site route now appears to be part of a Parramatta River foreshore park / open space, which is vacant and grass covered.</p>	<p>New warehouse structures are apparent to the north of the site. Major earth works were identified to the west of the site. The Pike Street alignment was observed to the north of the site.</p>
1991	<p>No significant changes are apparent when compared to the previous photograph.</p>	<p>New warehouse structures were constructed to the north-west and west of the site. Some earth works were observed to the north-east of the site.</p>
1998	<p>No significant changes are apparent when compared to the previous photograph except for the area to the central east of the site which was cleared and used as a parking area.</p>	<p>No significant changes are apparent when compared to the previous photograph except for construction of warehousing to the north-east and further development of the industrial area to the south.</p>

Year	Site	Surrounding land use
2000	No significant changes are apparent when compared to the previous photograph.	No significant changes are apparent when compared to the previous photograph.
2007	No significant changes are apparent when compared to the previous photograph except the central-east portion of the site which was used as a storage area (potentially shipping crates).	No significant changes are apparent when compared to the previous photograph except for earth works observed west of the site.
2009	No significant changes are apparent when compared to the previous photograph.	No significant changes are apparent when compared to the previous photograph except for the construction of warehouse structures to the west of the site.
2011	A concrete walking track was constructed through the site from east to west along Parramatta River. Stored material identified in previous aerials is no longer apparent in the central-east portion of the site. The concrete area located north-west of the site was replaced with a grassed area.	No significant changes are apparent when compared to the previous photograph except for the concrete walking track constructed from the east to the west along Parramatta River.
2018	No significant changes are apparent when compared to the previous photograph except for the replacement of parking area located in the central-east portion of the site with a grassed area.	The walking track alignment was extended further west. The embankment to the south-east of the site was filled in with material.
2024	No significant changes are apparent when compared to the previous photograph.	No significant changes are apparent when compared to the previous photograph.

7.2 Public registers and planning records

EPA Notices available under Section 58 of the Contaminated Land Management Act (CLM Act)

Database searched 17 December 2024

There was no record of notices identified for the site. Record of former notices identified for the below property located within 500 m of the site:

- Rheem Australia Pty Ltd – 1 Alan Street, Rydalmere (360 m west of the site, cross-gradient to the site) – 5 former notices:
 - o Declaration no. 21072 – declaration of remediation site – issued on 15 February 2005.

The NSW EPA declared that the site was contaminated with hydrocarbons and asbestos in fill in the south portion of the property whereby hydrocarbons had potential to migrate offsite to the Parramatta River as a result of commercial activities on the site.
 - o Site Audit Statement (SAS) No. 3201 – issued on 5 April 2012.

	<p>A SAS was submitted NSW EPA accredited site Auditor Chris Jewell whereby the Auditor stated that the remedial works completed onsite had satisfied the objectives of the voluntary remediation proposal (VRP) for the site.</p> <p>It is noted that numerous sites with current and former notices were identified in Camellia which are within 500 m of the site. However, given the presence of a hydraulic barrier (Parramatta River) between the site and Camellia, the potential for the site to be impacted by the properties is low.</p> <p>Given that the majority of the contaminated sites are located on the south (opposite) side of Parramatta River (with the exception of the Rheem property which is located on the other side of a valley between the property and the site), it is considered that the potential for the site to be impacted by the properties is low.</p>
<p>Sites notified to EPA under Section 60 of the CLM Act</p> <p>Database searched 17 December 2024</p>	<p>The site was not listed as a notified contaminated site. However, the following properties in the vicinity of the site were listed as a notified contaminated property:</p> <ul style="list-style-type: none"> Rheem Australia Pty Ltd – 1 Alan Street, Rydalmere (360 m west of the site, cross-gradient to the site) – contamination formerly regulated under the CLM Act. <p>It is noted that numerous sites which were notified to the EPA were identified in Camellia which are within 500 m of the site. However, given the presence of a hydraulic barrier (Parramatta River) between the site and Camellia, the potential for the site to be impacted by the properties is low.</p> <p>Given that the majority of the contaminated sites are located on the south (opposite) side of Parramatta River (with the exception of the Rheem property which is located on the other side of a valley between the property and the site), it is considered that the potential for the site to be impacted by the properties is low.</p>
<p>Licences listed under Section 308 of the Protection of the Environment Operations Act 1997 (POEO Act)</p> <p>Database searched 17 December 2024</p>	<p>There were no licenses issued to the site. There were multiple licenses issued to the nearby properties as follows:</p> <ul style="list-style-type: none"> Polytrade Pty Ltd – 32 South Street, Rydalmere (230 m north-east of the site – upgradient) – resource recovery and waste storage – license surrendered 11 May 2021; Rheem Australia Pty Limited – 55 Brodie Street, Rydalmere (385 m west of the site – upgradient) – metal processing and metal waste generation; Siegwerk Australia Pty Ltd - 11 South Street, Rydalmere (400 m north-west of the site – upgradient) – Hazardous, Industrial or Group A Waste Generation or Storage – license surrendered 19 December 2003; Wika Australia Pty. Ltd. – 10-16 South Street, Rydalmere (350 m north-west of the site – upgradient) - Hazardous, Industrial or

	<p>Group A Waste Generation or Storage – license surrendered 6 April 2006.</p> <p>It is noted that numerous sites which were issued licenses were identified in Camellia which are within 500 m of the site. However, given the presence of a hydraulic barrier (Parramatta River) between the site and Camellia, the potential for the site to be impacted by the properties is low.</p>
<p>PFAS Investigation Sites listed on the EPA website</p>	<p>The site was not listed or adjacent to the site listed under:</p> <ul style="list-style-type: none"> • NSW EPA PFAS Investigation Program; • Defence PFAS Investigation Program; • Defence PFAS Management Program; and • Airservices Australia National PFAS Management Program.

7.3 Council records search

Based on review of council records received on 20 November 2024 as provided in Appendix C3, the council has no record of neighbour complaints, or notices such as clean up or compliance for the site.

Council provided several records in relation to the site as follows.

7.3.1 EIS (2011) – Preliminary Environmental Site Assessment

A preliminary site assessment was conducted by EIS to assess the potential risk for contamination at the property at 1 Park Road, Rydalmere as part of a feasibility study for the proposed Reid Park cycleway extension in 2010. The assessment area of the report is located outside of the current site boundary approximately 260 m east of the site. Two boreholes were drilled (BH1 to BH2) from 2.6 m to 3.7 m bgl. All concentrations of CoPC analysed in sampling locations relevant to the assessed site were reported below the adopted SAC.

7.3.2 EIS – Reid Park Valley Cycleway Soil Management

An email dated 9 February 2010 by EIS indicated that soil from the Reid Park Valley Cycleway development was to be excavated. The email further noted that the soil may be capped on-site or disposed off-site to a landfill.

7.3.3 EIS – Asbestos Management Plan Outline

An asbestos management plan (AMP) outline by EIS in an email form in relation to the Rydalmere proposed cycleway on 31 May 2010 was provided. The email detailed different requirements for the management of asbestos for the Rydalmere proposed cycleway including documentation, on-site management, health and safety precautions, dust suppression, protocols in the event that air monitoring results were greater than 0.01 fibres/ml, stockpiling requirements, waste classification and a capping system which consisted of conducted an emu bob of remaining areas followed by covering areas with fresh topsoil and sown with grass.

7.3.4 SLR – Asbestos Air Monitoring Report

An asbestos air monitoring report was completed by SLR on behalf of EIS. Asbestos air monitoring was completed on 25 August 2010 which indicated that the concentration of all samples was <0.01 fibres/ml. The job location on the report indicates Reid Park Valley but Douglas notes that no exact site location was provided with the air monitoring report.

7.3.5 Site diagrams relating to James Hardie Site 28

Figures were provided in relation to James Hardie site 28. An investigation was completed by the NSW EPA (2010) whereby Pike Street was identified as former James Hardie site (site 28). An inspection was undertaken by NSW EPA where the NSW EPA summarised that the asbestos does not pose a significant harm to the human health and the environment if left undisturbed. Douglas notes the figures indicate that the east portion of the current site was formerly a part of the James Hardie site.

7.4 Site history integrity assessment

The information used to establish the history of the site was sourced from reputable and reliable reference documents, many of which were official records held by government departments / agencies. The databases maintained by various government agencies potentially can contain high quality information, but some of these do not contain any data at all.

In particular, aerial photographs can provide high quality information that is generally independent of memory or documentation. They are only available at intervals of several years, so some gaps exist in the information from this source. The observed site features are open to different interpretations and can be affected by the time of day and / or year at which they were taken, as well as specific events, such as flooding. Care has been taken to consider different possible interpretations of aerial photographs and to consider them in conjunction with other lines of evidence.

7.5 Summary of site history

The site history information suggests that the site was used for commercial and / or heavy industrial purposes from *circa* the 1940s to the late 1970s, with the east portion of the site formerly part of a James Hardie site (refer to Section 7.3.5). Following the 1970s, the site was cleared and remained as a vacant grassed area until 2011 when a walking track was constructed along the site alignment.

8. Site walkover

8.1 Observations

A site walkover was undertaken by an environmental engineer on 21 November 2024. The general site topography was consistent with that described in Section 5.

The following key site features pertinent to the investigation were observed (refer to photographs in Appendix C4):

- Parramatta River was observed to the south of the site and significant commercial/industrial properties were observed to the north of the site (photograph 1);
- The majority of the site comprised open-grassed areas with a concrete footpath observed along the site alignment (photograph 2); and
- Raised grass mounds were apparent in the east (photograph 2) and west (photograph 3) portion of the site, to the north of the footpath, suggesting the potential for filling processes occurring within the general area.

9. Preliminary conceptual site model

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources, receptors and exposure pathways between those sources and receptors. The CSM provides the framework for identifying how the site became contaminated and how potential receptors may be exposed to contamination either in the present or the future i.e. it enables an assessment of the potential source – pathway – receptor linkages (complete pathways).

Based on the site history information reviewed and the site walkover, the following potential sources of contamination and associated CoPC have been identified and summarised in Table 2.

Table 2: Summary of potential sources

Potential sources and associated CoPC
On-site sources
S1: Fill: Associated with levelling, demolition of former buildings on the site: CoPC include metals, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos
S2: Former buildings CoPC include asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB
S3: General heavy industrial use (former) CoPC include metals, TRH, BTEX, PAH, PCB, OCP, VOC, phenols and asbestos
Off-site sources
S4: General industrial use (former / current), north and west of the site (including James Hardie) CoPC include metals, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos

The following potential human and environmental receptors, along with relevant potential pathways, have been identified and summarised in Table 3.

Table 3: Summary of potential receptors and pathways

Potential human receptors
<p>HR1: Current users [public park users] HR2: Construction and maintenance workers HR3: End users [public park users] HR4: Adjacent site users [commercial / industrial properties]</p>
Potential environmental receptors
<p>ER1: Surface water [Parramatta River] ER2: Groundwater ER3: Terrestrial ecosystems</p>
Potential pathways to human receptors
<p>HP1: Ingestion and dermal contact HP2: Inhalation of dust and/or vapours</p>
Potential pathways to environmental receptors
<p>EP1: Surface water run-off EP2: Leaching of contaminants and vertical migration into groundwater EP3: Lateral migration of groundwater providing base flow to water bodies EP4: Inhalation, ingestion and absorption</p>

Summary of potentially complete exposure pathways

A ‘source–pathway–receptor’ approach has been used to assess the potential risks of harm being caused to human or environmental receptors from contamination sources on or in the vicinity of the site, via exposure pathways (potential complete pathways). As stated in Section 1, the focus and objective of this DSI is the soils within the site, and associated contamination exposure risks. As such, the CSM has been development to assess only those risks. Potential risks from groundwater, seepage water and /or soil vapour are not addressed as part of the DSI, in accordance with the project brief.

The possible pathways between the above sources (S1 to S4) and receptors, in relation to soil contamination, are provided in below Table 4.

Table 4: Summary of potentially complete exposure pathways

Source and CoPC	Exposure pathway	Receptor	Risk management action
<p>S1: Fill: metals, PFAS, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos</p> <p>S2: Former buildings: asbestos, synthetic mineral fibres (SMF), lead (in paint) and PCB</p> <p>S3: Former industrial uses: metals, TRH, BTEX, PAH, PCB, OCP, VOC, phenols and asbestos</p> <p>S4: General industrial use (former / current), north and west of the site: metals, TRH, BTEX, PAH, PCB, OCP, phenols and asbestos</p>	<p>HP1: Ingestion and dermal contact</p> <p>HP2: Inhalation of dust and/or vapours</p>	<p>HR1: Current users [public park users]</p> <p>HR2: Construction and maintenance workers</p> <p>HR3: End users [public park users]</p>	<p>An intrusive investigation is recommended (and has been undertaken and reported herein) to assess possible contamination in soils at the site.</p>
	<p>HP2: Inhalation of dust and/or vapours</p>	<p>HR4: Adjacent site users [commercial/industrial properties]</p>	
	<p>EP1: Surface water run-off</p> <p>EP3: Lateral migration of groundwater providing base flow to water bodies</p>	<p>ER1: Surface water</p>	
	<p>EP2: Leaching of contaminants and vertical migration into groundwater</p>	<p>ER2: Groundwater</p>	
	<p>EP4: Inhalation, ingestion and absorption</p>	<p>ER3: Terrestrial ecosystems</p>	

10. Sampling and analysis plan

10.1 Data quality objectives

The DSI was devised with reference to the seven-step data quality objectives (DQO) process which is provided in Appendix B Schedule B2, NEPC (2013). The data quality objective process is outlined in Appendix D.

10.2 Soil sampling rationale

Based on the CSM and data quality objectives (DQO) the following sampling rationale was adopted.

A systematic sampling strategy based on NSW EPA *Contaminated Sites, Sampling Design Guidelines* (NSW EPA, 2022) to determine borehole locations which was adapted based on areas of access. Borehole locations are shown on Drawing 2, in Appendix A.

NSW EPA (2022) recommends a minimum of 11 systematic grid-based sampling locations to characterise a site of up to 0.4 ha. The diameter of the hotspot that can be detected within 95% confidence is approximately 22.5 m. A total of 11 borehole locations (BH301 to BH311) were therefore positioned along the site route.

Soil samples were collected from each borehole at depths of approximately the surface and then every 0.5 m thereafter, and changes in lithology or signs of contamination.

The general sampling methods are described in the field work methodology, included in Appendix E.

10.3 Sample analysis rationale

At least one fill sample from each borehole was analysed for the CoPC associated with imported fill, former buildings and general industrial use, with more samples analysed from boreholes where deeper fill was encountered, or where signs of contamination were observed (such as staining, odours and potential asbestos containing material (PACM)).

Although a detailed asbestos assessment was not carried out, at least one soil sample from each borehole was collected for the analysis of AF/FA and / asbestos identification (AS4964) to provide an indication of whether asbestos was present in the soil.

The potential for VOC in soil samples was assessed through field screening with the PID.

11. Site assessment criteria

The SAC applied in the current investigation are informed by the CSM (Section9) which identified human and environmental receptors to potential contamination on the site. Analytical results are assessed (as a Tier 1 assessment) against the SAC comprising primarily the investigation and screening levels of Schedule B1 of NEPC (2013).

The investigation and screening levels applied in the current investigation comprise levels adopted for a generic recreational land use scenario. The derivation of the SAC is included in Appendix F and the adopted SAC are listed on the summary analytical results tables in Appendix G.

12. Results

12.1 Field work results

The boreholes were augered to depths of between 0 m and 2.0 m bgl, with a number of boreholes meeting auger refusal in fill.

The borehole logs for this assessment are attached in Appendix H. The logs recorded the following general sub-surface profile:

Fill / Sandy Gravel / Sand:	Brown, pale grey and dark grey sand, fine to coarse grained, with medium to coarse gravel, trace silt in all test locations up to depths of 1.8 m bgl;
Fill / Sandy Clay / Silty Clay	Brown / black, pale grey and dark grey, medium to high plasticity clay, trace sand, silt, brick, and fine to coarse gravel in BH301 to BH303 and BH307 to BH308 to depths of between 0 m and 1.8 m bgl;

Fill / Sandy Silt	Pale grey, non-plastic with fine sand at BH310 to depths of between 0.3 to 1.8 m bgl, underlain by clay fill to a depth of 2.0 m bgl;
Sandy Clay	Dark grey, low to medium plasticity alluvial clay, in BH301 to depths of between 0.7 to 2.0 m bgl;
Clay	Black and grey, low plasticity alluvial clay with sand, in BH302 and BH307 to depths of between 1.8 to 2.0 m bgl; and
Sandy Silt / Silty Sand:	Dark grey, with low to medium plasticity alluvial mottled brown clay, in BH304, BH306 and BH307 to depths of between 0.6 m and 2.0 m bgl.

Anthropogenic material (e.g. concrete, brick, charcoal, general building rubble concrete) was observed in all borehole locations. No visual or olfactory evidence (e.g. staining, odours, free phase product) was observed during the investigation to suggest the presence of contamination within the soils at the site except for potential asbestos fragments identified in fill at BH305, BH310, and BH311. Two fragments of potential asbestos were collected from BH305 and were submitted for laboratory analysis which detected chrysotile, amosite and crocidolite asbestos (samples BH305/0.1-0.2 and BH305/0.4-0.5). An additional fragment was identified during additional testing of soil samples for geotechnical purposes from BH303 which was submitted for laboratory analysis and identified chrysotile asbestos (BH303/0.2-0.4).

A geofabric layer was found at BH308 at a depth of 0.2 m bgl, between the clayey fill and the overlying clayey sand fill.

The PID screening recorded that the sub-surface conditions were generally absent of VOC with all recorded values of less than 5 ppm. It is noted that no PID readings were undertaken for BH309.

A slight sulfur odour (sometimes an indicator of ASS) was reported at a depth of 1.8 m in natural alluvial clay in BH302. An ammonia odour identified at BH306 in natural silty sand from 1.6 m bgl.

No free groundwater was observed during drilling of boreholes.

12.2 Laboratory analytical results

The results of laboratory analysis are summarised in the following tables in Appendix G

- Table A1: Summary of results of soil analysis; and
- Table A2: Summary of results of preliminary waste classification.

The laboratory certificates of analysis together with the chain of custody and sample receipt information are provided in Appendix I.

13. Discussion

13.1 Data quality assurance and quality control

The data quality assurance and quality control (QA / QC) results are included in Appendix J. Based on the results of the field QA and field and laboratory QC, and evaluation against the data quality indicators (DQI) it is concluded that the field and laboratory test data obtained are reliable and useable for this assessment.

13.2 Soils

As shown in Table A1, the concentrations of BTEX, phenols, OCP, OPP, and PCB in all samples tested were below the practical quantitation limit (PQL). Concentration of metals, PAH, and TRH were reported above the PQL but within the adopted SAC (NEPM (2013), corresponding to land use category 'C', public open space such as parks, playgrounds, playing fields, secondary schools and footpaths.

Bonded and / or AF/FA was recorded in fill at test locations BH302, BH303, and BH305 to BH311 as well as in BH14, BH17, TP111 to TP114 and TP116 to TP117 from EIS (2010). A summary of asbestos results, including where the SAC was exceeded, are as shown in Table 5 below.

Table 5: Summary of asbestos in soil results that exceeded the site assessment criteria

Analyte (SAC)	Location	Depth (m)	Result	Exceeded AF/FA SAC Yes/No
Current investigation				
Asbestos (0.001% w/w [AF/FA])	BH302	0-0.1	Bonded asbestos detected	N/A
	BH303	0.1-0.2	AF/FA detected at concentration of less than 0.001% w/w	No
	BH303	0.4-0.5	Bonded asbestos detected	N/A
	BH305	0.1-0.2	AF/FA detected at concentration of 0.0968% w/w. Bonded asbestos also detected	Yes
	BH306	0.1-0.2	Bonded asbestos detected	N/A
	BH306	0.4-0.5	Bonded asbestos detected	N/A
	BH307	0.1-0.2	Bonded asbestos detected	N/A
	BH308	0.4-0.5	Bonded asbestos detected	N/A
	BH309	0.1-0.2	AF/FA detected at concentration of 0.0169% w/w.	Yes
	BH310	0-0.1	AF/FA detected at concentration of 0.0076% w/w.	Yes
	BH311	0-0.1	AF/FA detected at concentration of 0.0052% w/w.	Yes

Analyte (SAC)	Location	Depth (m)	Result	Exceeded AF/FA SAC Yes/No
	BH311	0.9-1	AF/FA detected at concentration of 0.0766% w/w. Bonded asbestos was also identified.	Yes
EIS (2010) Investigation				
Asbestos (0.001% w/w [AF/FA])	BH14	0.1-0.2	Bonded asbestos detected	*
	BH17	0.1-0.2	Bonded asbestos detected	*
	TP111	0-0.05	Bonded asbestos detected	*
	TP111	0.6-0.7	Bonded asbestos detected	*
	TP112	0-0.05	Bonded asbestos detected	*
	TP113	0-0.1	Bonded asbestos detected	*
	TP113	0.3-0.4	Bonded asbestos detected	*
	TP114	0-0.1	Bonded asbestos detected	*
	TP114	0.2-0.3	Bonded asbestos detected	*
	TP116	0-0.05	Bonded asbestos detected	*
TP117	0-0.05	Bonded asbestos detected	*	

Note:

N/A – The concentration of the bonded asbestos cannot be calculated as 10 L bulk samples were not part of the scope

* - The EIS (2010) investigation did not collect 500 ml NEPM samples, therefore, concentration of asbestos cannot be calculated.

13.3 Acid sulfate soils

The geotechnical investigation (Douglas, 2025) concludes that AASS / PASS is likely present at the site within the alluvial sediments below the water table in proximity to Parramatta River at depths ranging from approximately 0.9 m. As such AASS / PASS is expected to be encountered possibly during piling and possibly during bulk excavation.

On this basis, management of ASS for the proposed development is required.

13.4 Preliminary waste classification

13.4.1 Fill

NSW EPA (2014) contains a six-step procedure for determining the type of waste and the waste classification. Part of the procedure, for materials not classified as special waste or pre-classified waste, is a comparison of analytical data initially against contaminant threshold (CT) values specific to a waste category. Alternatively, the data can be assessed against specific contaminant concentration (SCC) thresholds when used in conjunction with toxicity characteristic leaching procedure (TCLP) thresholds.

The CT, SCC, and TCLP values relevant to this preliminary waste classification are shown in attached Table A2.

The following Table 6 presents the results of the six-step procedure outlined in EPA (2014) for determining the type of waste and the waste classification. This process applies to the fill at the site.

Table 6: Six step classification

Step	Comments	Rationale
1. Is it special waste?	Yes (At test locations BH302, BH303 and BH305 to BH311 for the current investigation and in BH14, BH17, TP111 to TP114 and TP116 to TP117 from EIS (2010))	Bonded asbestos and AF/FA were detected in fill at the test locations listed. Refer Table A2. Given the prevalence of anthropogenic material in the fill, there is also a high probability of asbestos being found in fill between sampled locations.
2. Is it liquid waste?	No	Materials composed of a soil matrix.
3. Is the waste “pre-classified”?	No	Filling and natural material did not fall into one of the pre-classified categories
4. Does the Waste have hazardous waste characteristics	No	Waste not observed to / or considered at risk to contain explosives, gases, flammable solids, oxidising agents, organic peroxides, toxic substances or corrosive substances, substances liable to spontaneous combustion.
5. Chemical Assessment	Conducted	Refer to attached Table A2
6. Is the Waste Putrescible?	No	All observed components of filling composed of materials pre-classified as non-putrescible (i.e. soil).

As shown in attached Table A2 all contaminant concentrations for the analysed fill samples were within the contaminant thresholds (CTIs) for general solid waste (GSW) except for the following:

- Nickel in the following samples (CTI = 40 mg/kg):
 - o BH303/0.1-0.2 at 55 mg/kg and the duplicate sample of BD2/20241125 at 63 mg/kg;
 - o BH303/0.4-0.5 at 56 mg/kg;
 - o BH307/0.1-0.2 at 84 mg/kg and the laboratory triplicate of 89 mg/kg; and
 - o BH308/0.1-0.2 at 60 mg/kg.
- TCLP was conducted for nickel in samples BH303/0.1-0.2, BH303/0.4-0.5, BH307/0.1-0.2 and BH308/0.1-0.2 and results were within the TCLP1 and SCC1 criteria for general solid waste;

- Lead in the following samples (CTI = 100 mg/kg):
 - o Sample BD2/20241125 (duplicate sample of BH303/0.1-0.2) at 130 mg/kg; and
 - o Sample BD5/20241125 (duplicate sample of BH306/0.1-0.2) at 110mg/kg.
- TCLP was conducted for lead in samples BH303/0.1-0.2 and BH306/0.1-0.2 and results were within the TCLP1 and SCC1 criteria for general solid waste.

Analytical results indicate that bonded asbestos and / or AF/FA was detected in test locations BH302, BH303 and BH305 to BH311. Therefore, it is considered that asbestos is highly likely to be present in fill throughout the site.

Based on the field observations and the above analytical results, the fill at the site is considered to have a preliminary waste classification of Special Waste Asbestos – General Solid Waste in accordance with NSW EPA (2014). Sampling from small diameter boreholes is not ideal for the assessment of asbestos in soils. As such, if there is an appetite to review the waste classification between the reported asbestos finds, a more detailed assessment of asbestos risk is recommended.

13.4.2 Natural soils

The following Table 7 presents the results of the assessment of natural soils at the site with reference to the Virgin Excavated Natural Material (VENM) definition in the POEO Act and the EPA¹ website.

Table 7: VENM classification procedure

Step	Comments	Rationale
1. Is the material natural?	Yes	Natural soil logged in the boreholes as alluvial sand or clay. These materials underlie the fill at the site. Refer attached Table A2.
2. Are manufactured chemicals or process residues present?	No	There were no visual or olfactory indicators of chemical contamination of the materials in the boreholes. Concentrations of contaminants were considered to be typical of background concentrations (Table A2).
3. Are sulfidic ores or soils present?	Yes	AASS at test locations BH301/0.9-1.0 m, BH307-1.4-1.5 m and BH307/1.9-2.0 m. Refer to the Douglas (2025) geotechnical report.
4. Are there current or previous land uses that have (or may have) contaminated the materials?	Yes Imported fill	Imported fill on site may have impacted natural materials; however, soil analytical results indicate that this is unlikely.

¹ <https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/virgin-excavated-natural-material>

Step	Comments	Rationale
	No – remaining natural soils	Analytical results suggest that current and previous land uses are unlikely to have impacted remaining natural soils.

Based on the results presented in Table A2, the classification of natural soils at the site, within the depth of investigation, is subject to confirmation or otherwise of ASS conditions.

14. Revised conceptual site model

The data collected for this DSI has generally confirmed that certain potential contaminant sources outlined in the CSM outlined in Section 9 pose a potentially complete pathway to the identified receptors whilst others do not, in relation to soils. This is summarised in Table 8.

Table 8: Updated summary of potentially complete exposure pathways (proposed land use)

Source and CoPC	Exposure pathway	Receptor	Risk management action
SI: Fill: Asbestos (bonded and/or friable) in fill at BH302, BH303 and BH305 to BH311 from the current investigation and in BH14, BH17, TP111 to TP114 and TP116 to TP117 from EIS (2010) and possibly more widespread given the presence of traces of construction rubble in the fill	HP2: Inhalation of dust and/or vapours	HR1: Current users [public park users] HR2: Construction and maintenance workers HR3: End users [public park users] HR4: Adjacent site users [commercial/industrial properties]	Controls should be in place in the event that fill within the site is disturbed during construction. Options for the management of ACM impacted fill which exceed the relevant land use criteria include cap and contain, remediation of impacted soil and off-site disposal. A RAP is recommended to outline the preferred approach.

15. Conclusions and recommendations

The DSI comprised a site walkover, a desktop study, and intrusive soil investigation to address the investigation objectives outlined in Section 1.

Concentrations of BTEX, phenols, OCP, OPP, and PCB in all samples tested were below the practical quantitation limit (PQL). Concentration of metals, PAH, and TRH were reported above the PQL but within the adopted SAC (NEPM (2013), corresponding to land use category 'C', public open space such as parks, playgrounds, playing fields, secondary schools and footpaths.

Bonded and / or AF/FA was recorded in fill at test locations BH302, BH303, and BH305 to BH311 from the current investigation and BH14, BH17, TP111 to TP114 and TP116 to TP117 from EIS (2010), of which, AF/FA was detected above the SAC at BH305, and BH309 to BH311.

Preliminary *in situ* waste classification has been provided in Section 13.4.

Based on the results of the DSI, it is considered that exposure risks associated with identified (and unknown) asbestos in soils at the site can be managed subject to implementation of the following recommendations:

- A RAP is prepared in accordance with NSW EPA (2020) to address:
 - o WHS management protocols during construction works;
 - o Remediation strategy for fill impacted with asbestos;
 - o Protocols for the validation of site remediation;
 - o Protocols for waste classification of any materials requiring off-site disposal, and protocols for material import, including check-sampling, where appropriate;
 - o Other general requirements for RAPs under NSW EPA (2020); and
- Douglas (2025) concludes that AASS is likely present at the site within the alluvial sediments below the water table in proximity to Parramatta River, at depths ranging from approximately 0.9 m. As such AASS is expected to be encountered during piling and possibly during bulk excavation works. On this basis, management of ASS for the proposed development is required through an ASS management plan.

16. References

Douglas. (2025). *Report on Geotechnical Investigation Report, Proposed Pedestrian and Cycleway, Reid Park , Rydalmere NSW*. Ref 231248.00.R.003.Rev0: Douglas Partners Pty Ltd.

EIS. (2010). *Report to Parramatta City Council on Preliminary Environmental Site Screening for proposed cycleway development at Reid Park Valley, Rydalmere*. ref E23649K.rpt: Environmental Investigation Services.

EIS. (2011). *Report to Parramatta City Council on Preliminary Environmental Site Assessment for Proposed Cycleway Development - Reid Park Extension at No. 1 Park Road, Rydalmere*. Ref E25326K.rpt: Environmental Investigation Services.

NEPC. (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013) [NEPM]*. Australian Government Publishing Services Canberra: National Environment Protection Council.

NSW EPA. (2010). *Regulation Project, James Hardie Asbestos waste Contamination Legacy, Summary Project Report*. Ref EPA 2012/0919 : NSW EPA.

NSW EPA. (2020). *Guidelines for Consultants Reporting on Contaminated Land*. Contaminated Land Guidelines: NSW Environment Protection Authority.

NSW EPA. (2022). *Contaminated Sites, Sampling Design Guidelines*. NSW Environment Protection Authority.

17. Limitations

Douglas Partners Pty Ltd (Douglas) has prepared this report (or services) for this project at Reid Park Valley, Rydalmere NSW in line with Douglas' proposal dated 22 August 2024 and acceptance received from Shane Lauger of City of Parramatta Council. The work was carried out under the Contract of Services (non-construction) dated November 2024. This report is provided for the exclusive use of City of Parramatta Council for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of Douglas, does so entirely at its own risk and without recourse to Douglas for any loss or damage. In preparing this report Douglas has necessarily relied upon information provided by the client and / or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and / or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after Douglas' field testing has been completed.

Douglas' advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by Douglas in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and / or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the environmental components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

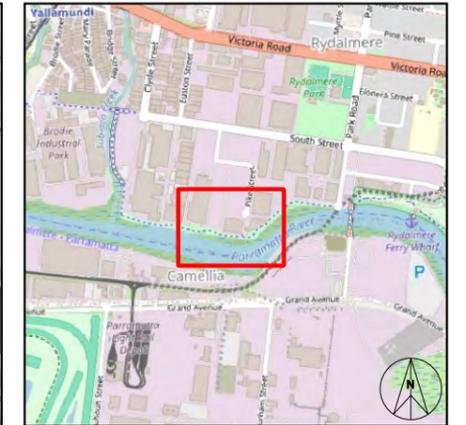
Asbestos has been detected by laboratory analysis, in filling materials at the selected test locations sampled and analysed. Although the sampling plan adopted for this investigation is considered appropriate to achieve the stated project objectives, there are necessarily parts of the site that have not been sampled and analysed. This is either due to undetected variations in ground conditions or to parts of the site being inaccessible and not available for inspection / sampling and reasonable access. It is therefore considered possible that HBM, including asbestos, may be present in unobserved or untested parts of the site, between and beyond sampling locations, and hence no warranty can be given that asbestos is not present.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. Douglas cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by Douglas. This is because this report has been written as advice and opinion rather than instructions for construction.

Appendix A

Drawings

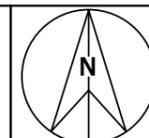


SITE LOCATION

LEGEND

 Site boundary

0 10 20 30 40 50 m



PROJECT: 231248.00

DRAWING No: A

REVISION: 0

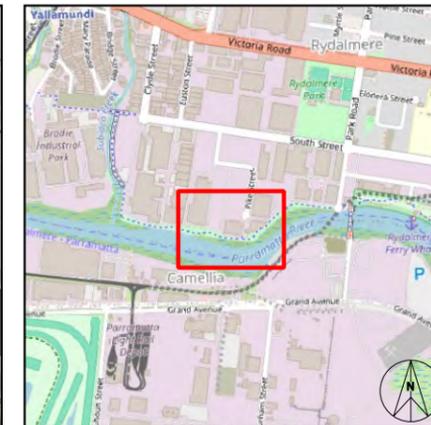
NOTE:

1. Drawing projection in GDA2020 / MGA zone 56,
2. Basemap from Metromap (Dated 02.09.2024), and base plan from client supplied drawing.
3. Test locations are approximate only and were located using differential GPS typically accurate to ± 0.1 m depending on satellite coverage



CLIENT: Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:1250 @A3	DATE: 17/12/2024

TITLE: **Site location**
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere, NSW



SITE LOCATION

LEGEND

Site boundary

Borehole locations

0 10 20 30 40 50 m

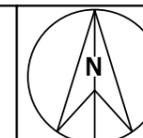


- NOTE:
1. Drawing projection in GDA2020 / MGA zone 56,
 2. Basemap from Metromap (Dated 02.09.2024), and base plan from client supplied drawing.
 3. Test locations are approximate only and were located using differential GPS typically accurate to ± 0.1 m depending on satellite coverage

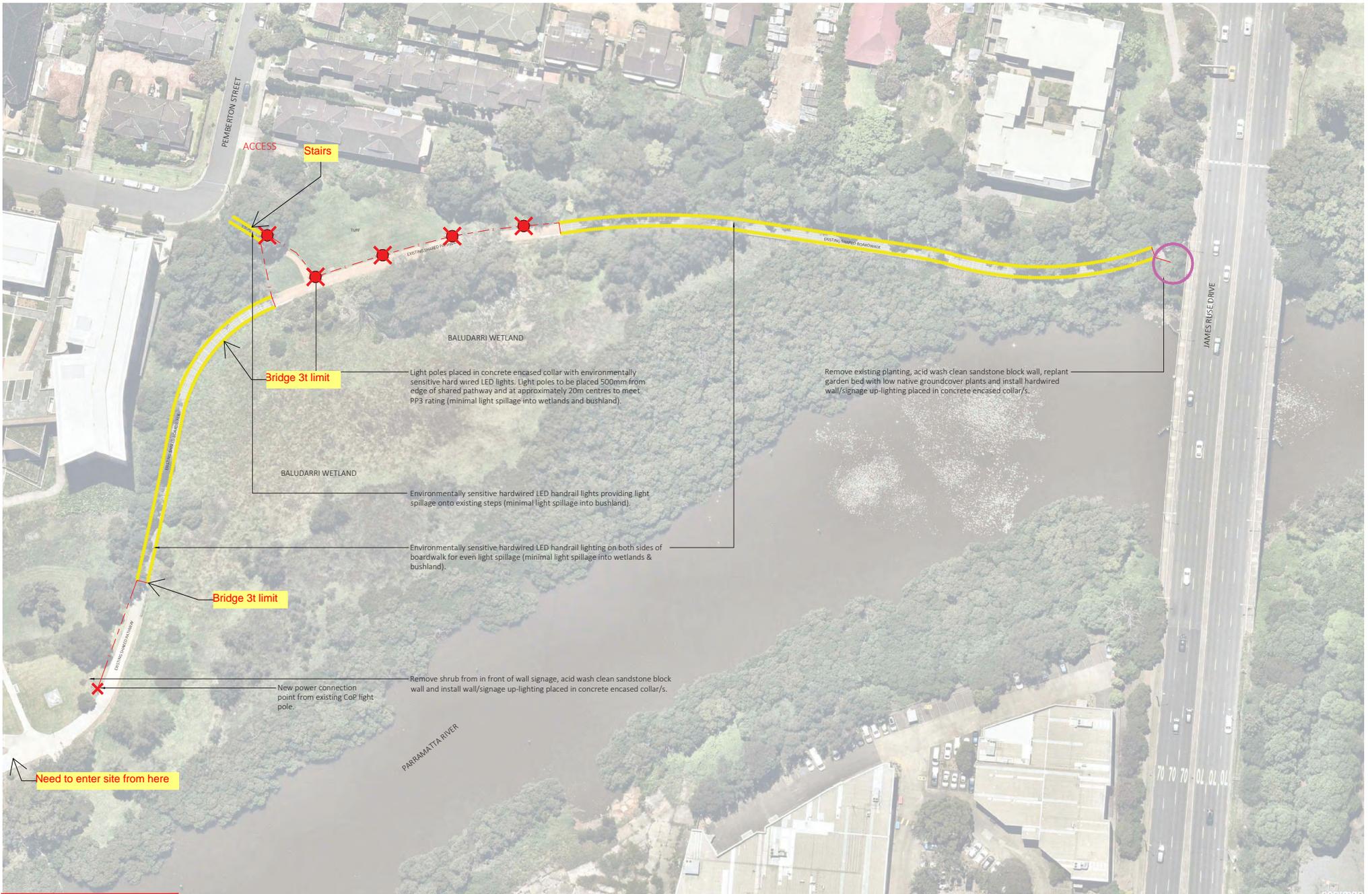


CLIENT: Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:1250 @A3	DATE: 17/12/2024

TITLE: **Test location plan
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere, NSW**



PROJECT:	231248.00
DRAWING No:	B
REVISION:	0



BOREHOLE LOCATIONS

Date: June 2024
 Drawing Status: REVISION A - CONCEPT
 * Subject to consultation & further investigative works



BALUDARRI WETLAND PARRAMATTA

SHARED PATHWAY ENVIRONMENTALLY SENSITIVE LIGHTING



CITY OF PARRAMATTA



Proposed pedestrian and cyclist pathway

Retain existing 3m wide bi-directional cyclist path

Demolish and remove existing concrete slab, shelter, seat and bike rack.

Extend pedestrian pavement to include existing seating and relocate existing water maintenance tap behind seat.

Proposed 2.0m wide colour through concrete pedestrian pathway.

Native tree planting placed 4m from edge of pathway.

Minimum 1.0m wide turf median between pedestrian pathway and cyclist pathway.

Replace damaged sections of existing concrete pathway

Demolish and remove existing concrete slab, shelter, seat and bike rack.

Match pedestrian pathway into existing

X BOREHOLE LOCATIONS

Date: June 2024

Drawing Status: REVISION B - CONCEPT

** Subject to consultation & further investigative works*

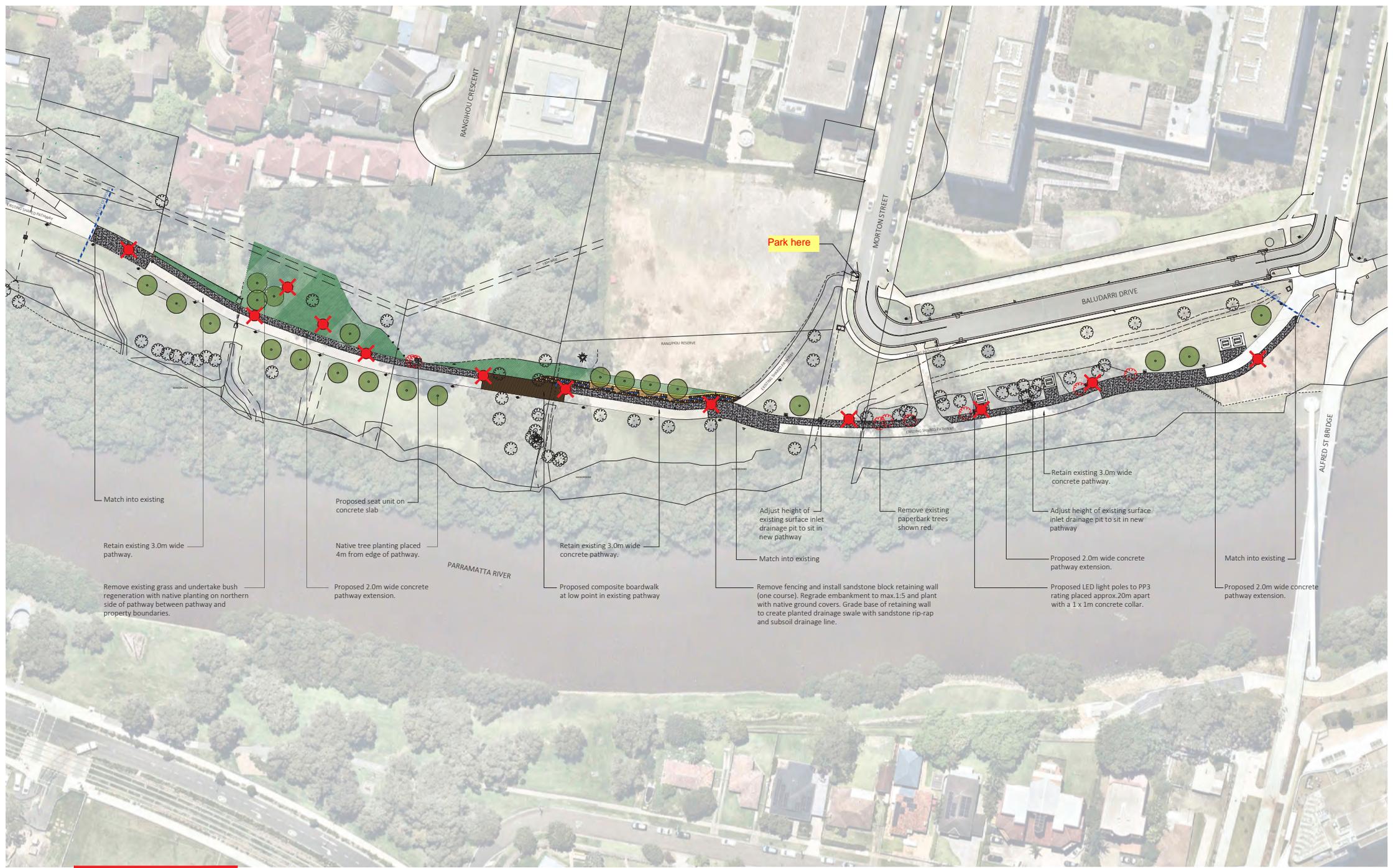


GEORGE KENDALL RIVERSIDE PARK ERIMINGTON

PEDESTRIAN AND CYCLIST PATHWAYS



CITY OF PARRAMATTA



BOREHOLE LOCATIONS

Date: June 2024

Drawing Status: REVISION B - CONCEPT

* Subject to consultation & further investigative works



RANGIHOU RESERVE PARRAMATTA

PEDESTRIAN AND CYCLIST PATHWAYS



CITY OF PARRAMATTA



Match into existing.
Proposed shared path

500 x 500mm sandstone block retaining wall
Retain existing 3.0m wide concrete cyclist pathway

Proposed 2.0m wide colour through concrete pedestrian pathway
500 x 500mm sandstone block retaining wall

Adjust existing surface inlet drainage pits and set new grates flush into new pedestrian pavement

Retain existing 3.0m wide cyclist pathway

Pedestrian pathway narrows to 1.65m along property boundary edge for 10m

Remove existing shrubs/small trees shown red
Proposed shared path
Match into existing

BOREHOLE LOCATIONS

Date: June 2024

Drawing Status: REVISION B - CONCEPT
* Subject to consultation & further investigative works



REID PARK RYDALMERE PEDESTRIAN AND CYCLIST PATHWAYS



**CITY OF
PARRAMATTA**



ERIC PRIMROSE RESERVE

SILVERWATER ROAD

ALLAMBI ST

PARRAMATTA RIVER

Bridge - assume 3t limit

Proposed shared path

Match into existing

500 x 500mm sandstone block retaining wall

Proposed 2.5m wide concrete cyclist pathway

Proposed 2.0m wide concrete pathway extension

Proposed 2.5m wide concrete pedestrian pathway with coloured surface treatment.

New 5.0m wide bridge

Realign proposed 5m wide pedestrian and cyclist pathway to provide large turfed informal play area

Remove existing trees shown red to allow for proposed pathway works.

Proposed 2.5m wide coloured pedestrian pathway and 2.5m wide cyclist pathway.

Native tree planting placed 4m from edge of pathway.

Proposed shared path

Retain existing 4.0m wide timber bridge.

Proposed shared path

Proposed 1m wide concrete pedestrian pathway extension.

Proposed 5m wide concrete pathway with 2m wide coloured surface treatment to pedestrian pathway and 3.0m wide shared pathway.

BOREHOLE LOCATIONS

Date: June 2024
 Drawing Status: REVISION B - CONCEPT
 * Subject to consultation & further investigative works



ROYAL SHORES ERIMINGTON - SHEET 1

PEDESTRIAN AND CYCLIST PATHWAYS



CITY OF PARRAMATTA

SHEET JOIN



SHEET JOIN

SHEET JOIN

BOREHOLE LOCATIONS

Date: June 2024
 Drawing Status: REVISION B - CONCEPT
 * Subject to consultation & further investigative works



ROYAL SHORES ERIMINGTON - SHEET 2

SEPARATED CYCLEWAY & PEDESTRIAN PATHWAY / SHARED PATHWAY



CITY OF PARRAMATTA



Proposed native garden bed to replace existing pathway and reduce small turf mowing areas.

Select removal of existing trees and construction of new 5m wide grated boardwalk over structural root zone to improve user sight lines and grades for pathway users

Proposed 2.5m wide concrete cyclist pathway with adjusted levels to improve grades

Match into existing

Proposed 2.5m wide concrete pedestrian pathway with coloured surface treatment and sandstone retaining wall.

SHEET JOIN

 BOREHOLE LOCATIONS

Date: June 2024
 Drawing Status: REVISION B - CONCEPT
 * Subject to consultation & further investigative works



ROYAL SHORES ERIMINGTON - SHEET 3

SEPARATED CYCLEWAY & PEDESTRIAN PATHWAY / SHARED PATHWAY



CITY OF PARRAMATTA

Appendix B

About This Report

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at

the time of construction as are indicated in the report; and

- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

continued next page

About this Report

Site Anomalies

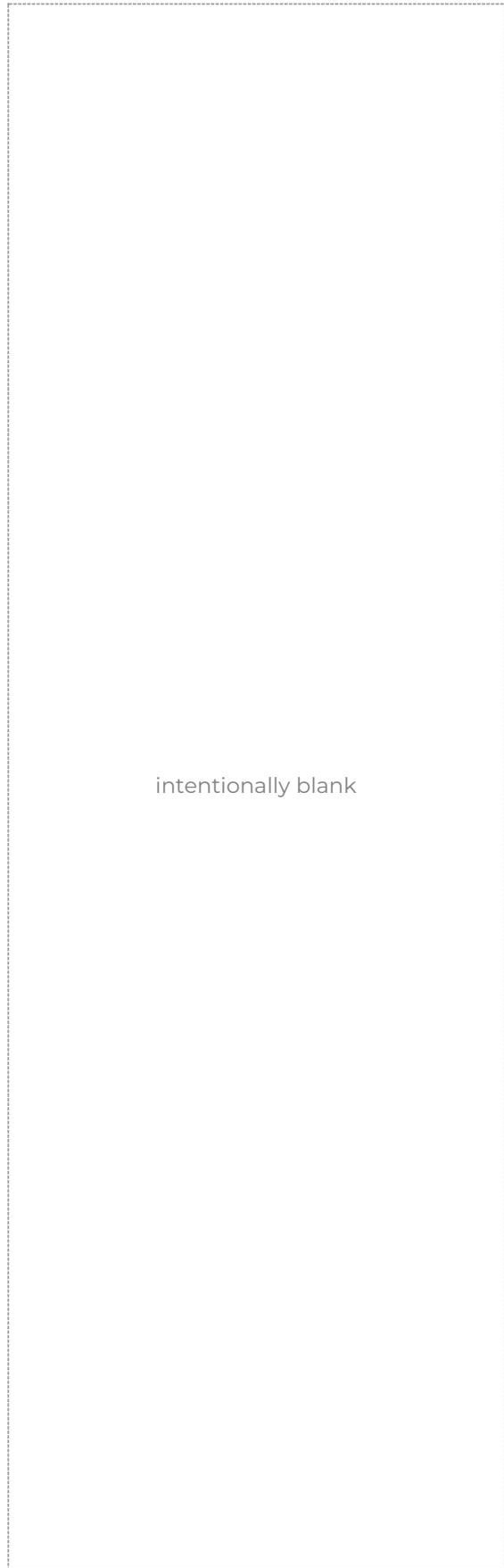
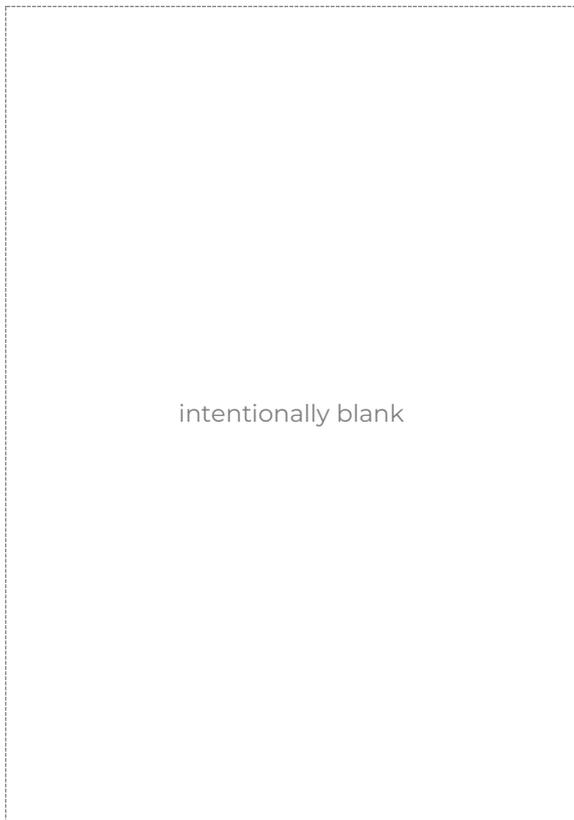
In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.



Appendix C

Site History Information

Appendix C1

Waterbore NSW Search

WaterNSW

Work Summary

GW112158

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 08/05/2002

Final Depth: 5.30 m
Drilled Depth: 5.30 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
FIELD OF

Cadastre
2//1126501

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256557.000
Easting: 317677.000

Latitude: 33°48'55.8"S
Longitude: 151°01'48.3"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated status, drill method & drilled depth.

*** End of GW112158 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW115123

Licence: 10BL605114

Licence Status: ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Solid

Owner Type: Private

Commenced Date:
Completion Date: 19/03/2012

Final Depth: 9.00 m
Drilled Depth: 9.00 m

Contractor Name: EPOCA ENVIRONMENTAL

Driller: Daniel Giles Fox

Assistant Driller:

Property: PERPETUAL TRUSTEE COMPANY
LTD 2-8 South St RYDALEMERE
2116 NSW

Standing Water Level
(m):

GWMA: -
GW Zone: -

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

Form A:	County	Parish	Cadastre
CUMBERLAND	CUMBERLAND	FIELD OF MARS	3/877755
Licensed:	CUMBERLAND	FIELD OF MARS	Whole Lot 3/877755

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256515.000
Easting: 317804.000

Latitude: 33°48'57.2"S
Longitude: 151°01'53.2"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	9.00	115			Auger - Solid Flight
1		Annulus	Crushed Aggregate	4.00	9.00				
1	1	Casing	Pvc Class 18	0.00	4.50	50	44		Seated on Bottom
1	1	Opening	Slots - Horizontal	0.00	4.50	50		0	Casing - Machine Slotted, PVC Class 18, Screwed, SL: 40.0mm, A: 5.00mm

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.30	2.30	FILL, CLAY SOFT BLACK SILTY	Fill	
2.30	4.90	2.60	CLAY SOFT BROWN, GRAVEL PIECES	Clay Loam	
4.90	6.80	1.90	SANDSTONE / IRONSTONE	Sandstone	
6.80	8.00	1.20	DECREASING IRONSTONE	Ironstone	
8.00	9.00	1.00	SANDSTONE WEATHERED ORANGE M/GRAINED	Sandstone	

Remarks

19/03/2012: Form A Remarks:
Coordinates provided on file.

***** End of GW115123 *****

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW112156

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:

Completion Date: 09/05/2002

Final Depth: 4.30 m

Drilled Depth: 4.30 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
FIELD OF

Cadastre
2//1126501

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256471.000
Easting: 317748.000

Latitude: 33°48'58.6"S
Longitude: 151°01'51.0"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

17/07/2014: Nat Carling, 17-July-2014; Updated status, drill method & drilled depth.

*** End of GW112156 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW Work Summary

GW115124

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method: Auger - Solid

Owner Type: Private

Commenced Date:
Completion Date: 19/03/2012

Final Depth: 9.50 m
Drilled Depth: 9.50 m

Contractor Name: EPOCA ENVIRONMENTAL

Driller: Daniel Giles Fox

Assistant Driller:

Property:

Standing Water Level (m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

Form A: CUMBERLAND
Licensed:

County: CUMBERLAND
Parish: FIELD OF
Cadastre: 3/877755

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256334.000
Easting: 317822.000

Latitude: 33°49'03.1"S
Longitude: 151°01'53.8"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	9.50	115			Auger - Solid Flight
1		Annulus	Crushed Aggregate	1.50	9.50				
1	1	Casing	Pvc Class 18	0.00	2.00	50	44		Seated on Bottom
1	1	Opening	Slots - Horizontal	2.00	9.50	50		0	Casing - Machine Slotted, PVC Class 18, Screwed, SL: 40.0mm, A: 5.00mm

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	3.50	3.50	SILTY CLAY SOFT BROWN	Silty Clay	
3.50	4.30	0.80	SANDSTONE BLOCKS AND CONCRETE	Sandstone	
4.30	6.80	2.50	CLAY SOFT BROWN	Clay Loam	
6.80	7.50	0.70	SANDSTONE WEATHERED	Sandstone	
7.50	9.50	2.00	SANDSTONE WEATHERED ORANGE, IRONSTONE BANDS	Sandstone	

Remarks

19/03/2012: Coordinates provided on file. 19/10/2015

***** End of GW115124 *****

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WaterNSW Work Summary

GW109868

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Well

Work Status:

Construct.Method: Auger - Solid

Owner Type: Local Govt

Commenced Date:
Completion Date: 26/07/2006

Final Depth: 12.00 m
Drilled Depth: 12.00 m

Contractor Name: Terratest Pty Ltd
Driller: Unkown Unknown
Assistant Driller:

Property:

Standing Water Level (m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

Form A: CUMBERLAND **County:** CUMBERLAND **Parish:** ST JOHN **Cadastre:** 3//1072478
Licensed:

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256234.000
Easting: 317683.000

Latitude: 33°49'06.3"S
Longitude: 151°01'48.3"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	12.00	180			Auger - Solid Flight

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.00	2.00	FILL,BLUE METAL, CONCRETE, SANDSTONE, LIGHT TO DARK SANDY SOIL	Fill	
2.00	3.00	1.00	DARK RED CLAYEY SAND, DRY NO ODOUR	Dacite(Tonalite)	
3.00	6.50	3.50	SANDSTONE, CLAYEY SAND, REDISH PINK SILTY CLAYEY SAND, SATURATED	Sandstone	
6.50	7.50	1.00	SATURATED PINKISH GREY SANDY CLAY	Sand	
7.50	8.50	1.00	SATURATED SILTY SAND, CARAMEL IN COLOUR	Sand	
8.50	9.50	1.00	STIFF SANDY CLAY, RED MOTTLED GREY AND BROWN, WET WITH NO ODOUR	Sand	
9.50	11.50	2.00	SATURATED CLAYEY SAND, LIGHT BROWN TO PALE PINK	Sand	

11.50	12.00	0.50	GREY AND YELLOW CLAY,VERY STIFF AND MOIST	Greenstone	
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*** End of GW109868 ***

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WaterNSW

Work Summary

GW109869

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Well

Work Status:

Construct.Method: Auger - Solid

Owner Type: Local Govt

Commenced Date:
Completion Date: 25/07/2006

Final Depth: 6.00 m
Drilled Depth: 6.00 m

Contractor Name: Terratest Pty Ltd
Driller: Unkown Unknown
Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

Form A: CUMBERLAND
Licensed:

County: CUMBERLAND
Parish: ST JOHN
Cadastre: 3//1072478

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256234.000
Easting: 317689.000

Latitude: 33°49'06.3"S
Longitude: 151°01'48.6"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	6.00	180			Auger - Solid Flight

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.00	2.00	FILL, CONCRETE, RUBBLE, BRICKS, BLUE METAL IN A DRY RED SANDY MATRIX	Fill	
2.00	6.00	4.00	BROWN SAND AND GRAVELS, HARD DRY CLAYEYSAND, GREY/RED SAND	Breccia	

***** End of GW109869 *****

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WaterNSW Work Summary

GW109870

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Well

Work Status:

Construct.Method: Auger - Solid

Owner Type: Local Govt

Commenced Date:
Completion Date: 25/07/2006

Final Depth: 5.50 m
Drilled Depth: 5.50 m

Contractor Name: Terratest Pty Ltd
Driller: Unkown Unknown
Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

Form A: CUMBERLAND **County:** CUMBERLAND **Parish:** ST JOHN **Cadastre:** 3//1072478
Licensed:

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256193.000
Easting: 317848.000

Latitude: 33°49'07.7"S
Longitude: 151°01'54.7"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	5.50	180			Auger - Solid Flight

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.20	2.20	CLAY FILL,BUE METAL PIECES,SANDY CLAY,SHALE FRAGMENTS	Clay Loam	
2.20	3.00	0.80	WET TO SATURATED LIGHT AND DARK BROWN CLAY	Unknown	
3.00	5.50	2.50	SATURATED LIGHT BROWN SILTY SAND	Sand	

***** End of GW109870 *****

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WaterNSW Work Summary

GW116821

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Spear

Work Status: Supply Obtained

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 22/04/2018

Final Depth: 8.10 m
Drilled Depth: 14.20 m

Contractor Name: Geosense Drilling
Driller: Christopher Manser
Assistant Driller: James Zhao

Property:

Standing Water Level (m):
Salinity Description:
Yield (L/s): 0.850

GWMA:
GW Zone:

Site Details

Site Chosen By: Client

County: CUMBERLAND
Parish: ST JOHN
Cadastre:

Region: - (Not set)
River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone: **Scale:**

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256150.000
Easting: 317874.000

Latitude: 33°49'09.1"S
Longitude: 151°01'55.7"E

GS Map: -

MGA Zone: 56

Coordinate Source: GPS - Global

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	11.20	120			Rotary Mud
1		Hole	Hole	11.20	14.20	80			Rotary - Coring
1		Annulus	Bentonite/Grout	0.00	5.00				PL:Poored/Shovelled
1		Annulus	Waterworn/Rounded	5.00	8.10				Graded
1		Backfill	Bentonite	8.10	9.00				
1		Backfill	Sand	9.00	14.20				
1	0	Opening	Slots - Horizontal	0.00	0.00			0	
1	1	Opening	Perforations,Screen - Gauze/Me	0.00	5.10	50	44	0	Casing - Machine Slotted, Screwed, A: 0.40mm
1	1	Casing	Pvc Class 18	8.10	5.10	50	44		Seated on Backfill

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
5.80	6.00	0.20	Unknown			0.85			

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	3.70	3.70	Silty: Gravel	Silty Clay	
3.70	10.20	6.50	Silty: Clay	Silty Clay	
10.20	10.90	0.70	Sandstone: Grey: Brown	Sandstone	
10.90	14.20	3.30	Sandstone	Sandstone	

Remarks

22/04/2018: Entered By: CS 03/06/2020
Coordinates location not consistent.

*** End of GW116821 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW113397

Licence: 10BL603851

Licence Status: ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 21/05/2010

Final Depth: 4.70 m
Drilled Depth: 4.70 m

Contractor Name: Terratest
Driller: Pritpal Singh
Assistant Driller:

Property: TRANSPORT FOR NSW 6 GRAND
 AVE CAMELLIA 2142 NSW
GWMA: -
GW Zone: -

Standing Water Level
 (m):
Salinity Description:
 Yield (L/s):

Site Details

Site Chosen By:

County	Parish	Cadastre
Form A: CUMBERLAND	ST JOHN	3//843591
Licensed: CUMBERLAND	ST JOHN	Whole Lot 3//843591

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255937.000
Easting: 317799.000

Latitude: 33°49'16.0"S
Longitude: 151°01'52.6"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

30/07/2014: Nat Carling, 30-July-2014; Added status, drill method, depth & updated work type.

*** End of GW113397 ***

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW113398

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 21/05/2010

Final Depth: 10.20 m
Drilled Depth: 10.20 m

Contractor Name: Terratest
Driller: Pritpal Singh
Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
3//843591

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255933.000
Easting: 317850.000

Latitude: 33°49'16.1"S
Longitude: 151°01'54.6"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

30/07/2014: Nat Carling, 30-July-2014; Added status, drill method, depth & updated work type.

*** End of GW113398 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW112242

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 02/02/2009

Final Depth: 9.50 m
Drilled Depth: 9.50 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
3//843591

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255925.000
Easting: 317872.000

Latitude: 33°49'16.4"S
Longitude: 151°01'55.4"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

18/07/2014: Nat Carling, 18-July-2014; Added status, drill method & drilled depth.

*** End of GW112242 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW112242

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 02/02/2009

Final Depth: 9.50 m
Drilled Depth: 9.50 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
3//843591

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255925.000
Easting: 317872.000

Latitude: 33°49'16.4"S
Longitude: 151°01'55.4"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

18/07/2014: Nat Carling, 18-July-2014; Added status, drill method & drilled depth.

*** End of GW112242 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW112232

Licence: 10BL602917

Licence Status: ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:

Completion Date: 02/02/2009

Final Depth: 10.50 m

Drilled Depth: 10.50 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property: TRANSPORT FOR NSW 4 GRAND
 AVE ROSEHILL 2142 NSW

GWMA: -

GW Zone: -

Standing Water Level

(m):

Salinity Description:

Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed: CUMBERLAND

Parish
 ST JOHN
 ST JOHN

Cadastre
 3//843591
 Whole Lot 3//843591

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255865.000
Easting: 317922.000

Latitude: 33°49'18.4"S
Longitude: 151°01'57.3"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

18/07/2014: Nat Carling, 18-July-2014; Added status, drill method & drilled depth.

*** End of GW112232 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW113399

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 20/05/2010

Final Depth: 5.30 m
Drilled Depth: 5.30 m

Contractor Name: Terratest
Driller: Pritpal Singh

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
3//843591

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255928.000
Easting: 317906.000

Latitude: 33°49'16.3"S
Longitude: 151°01'56.8"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

30/07/2014: Nat Carling, 30-July-2014; Added status, drill method, depth & updated work type.

*** End of GW113399 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW113401

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 14/04/2010

Final Depth: 6.40 m
Drilled Depth: 6.40 m

Contractor Name: Terratest
Driller: Pritpal Singh
Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
3//843591

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255871.000
Easting: 317957.000

Latitude: 33°49'18.2"S
Longitude: 151°01'58.7"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

30/07/2014: Nat Carling, 30-July-2014; Added status, drill method, depth & updated work type.

*** End of GW113401 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW113400

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 20/05/2010

Final Depth: 10.50 m
Drilled Depth: 10.50 m

Contractor Name: Terratest
Driller: Pritpal Singh

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
3//843591

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255923.000
Easting: 317958.000

Latitude: 33°49'16.5"S
Longitude: 151°01'58.8"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

30/07/2014: Nat Carling, 30-July-2014; Added status, drill method, depth & updated work type.

*** End of GW113400 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW111528

Licence: 10BL601325

Licence Status: ACTIVE

Authorised Purpose(s): MONITORING BORE
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:

Completion Date: 03/11/2006

Final Depth: 3.56 m

Drilled Depth: 3.56 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property: PATRICKS LOGISTICS 39 Grand
Ave CAMELLIA 2142 NSW

GWMA: -

GW Zone: -

Standing Water Level

(m):

Salinity Description:

Yield (L/s):

Site Details

Site Chosen By:

County	Parish	Cadastre
Form A: CUMBERLAND	ST JOHN	E//33553
Licensed: CUMBERLAND	ST JOHN	Whole Lot E//33553

Region: 10 - Sydney South Coast

River Basin: - Unknown

Area/District:

CMA Map:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)

Elevation Source: Unknown

Northing: 6256020.000

Easting: 318180.000

Latitude: 33°49'13.5"S

Longitude: 151°02'07.5"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

*** End of GW111528 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW111529

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:

Completion Date: 03/11/2006

Final Depth: 3.70 m

Drilled Depth: 3.70 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
E//33553

Region: 10 - Sydney South Coast

River Basin: - Unknown

Area/District:

CMA Map:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256022.000
Easting: 318245.000

Latitude: 33°49'13.5"S
Longitude: 151°02'10.0"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

*** End of GW111529 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW Work Summary

GW063660

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): ENG.INVEST.

Work Type: Bore

Work Status: Test Hole

Construct.Method: Rotary

Owner Type: Private

Commenced Date:
Completion Date: 01/04/1977

Final Depth: 19.00 m
Drilled Depth: 19.00 m

Contractor Name: (None)
Driller: Lionel Bevan Simpson
Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County: CUMBERLAND
Parish: ST JOHN
Cadastre: RD ADJ 23//793243
Form A: Licensed:

Region: 10 - Sydney South Coast
River Basin: 213 - SYDNEY COAST - GEORGES RIVER
Area/District:

CMA Map: 9130-3N
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255999.000
Easting: 318378.000

Latitude: 33°49'14.3"S
Longitude: 151°02'15.2"E

GS Map: -

MGA Zone: 56

Coordinate Source: GD.,ACC.MAP

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1	1	Casing		0.00	6.80				

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
5.00	5.00	0.00	(Unknown)						

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	0.30	0.30	Topsoil	Topsoil	
0.30	0.90	0.60	Clay Dark Grey Silty	Clay	
0.90	2.10	1.20	Clay Black Stiff	Clay	
2.10	3.00	0.90	Clay Black Light Grey Red Very Stiff Fine, Some Ironstone	Clay	

3.00	7.00	4.00	Clay Black Grey Sandy Stiff Silty, Some Ironstone	Clay	
7.00	8.80	1.80	Sand Grey Silty Medium Dense Clayey	Sand	
8.80	9.70	0.90	Clay Grey Sandy Fine	Clay	
9.70	18.30	8.60	Clay Grey Sandy Very Stiff, Ironstone Red Soft	Clay	
18.30	19.01	0.71	Sandstone Grey	Sandstone	

Remarks

12/08/1991: 33 GRAND AVENUE CAMELLIA.

12/08/1991: DETAILS OF MANY SHALLOWER TEST HOLES ON FILE.

22/11/2012: Nat Carling, 22-Nov-2012; Removed duplicate rows from driller's log & updated cadastre (taken from ArcGIS).

***** End of GW063660 *****

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW112214

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 13/08/1991

Final Depth: 7.50 m
Drilled Depth: 7.50 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
101//1168951

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255955.000
Easting: 318429.000

Latitude: 33°49'15.8"S
Longitude: 151°02'17.1"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

18/07/2014: Nat Carling, 18-July-2014; Adjusted work type, added status, drill method & drilled depth.

*** End of GW112214 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW112212

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 14/08/1991

Final Depth: 6.50 m
Drilled Depth: 6.50 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
100//1168951

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255809.000
Easting: 318526.000

Latitude: 33°49'20.6"S
Longitude: 151°02'20.8"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

18/07/2014: Nat Carling, 18-July-2014; Adjusted work type, added status, drill method & drilled depth.

*** End of GW112212 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW112211

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:

Completion Date: 14/08/1991

Final Depth: 9.50 m

Drilled Depth: 9.50 m

Contractor Name: (None)

Driller: Unkown Unknown

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:

Salinity Description:

GW Zone:

Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
100//1168951

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6255929.000
Easting: 318590.000

Latitude: 33°49'16.7"S
Longitude: 151°02'23.4"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

18/07/2014: Nat Carling, 18-July-2014; Adjusted work type, added status, drill method & drilled depth.

*** End of GW112211 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW114360

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Bore

Work Status: Equipped

Construct.Method:

Owner Type: Private

Commenced Date:
Completion Date: 31/01/2012

Final Depth: 1.90 m
Drilled Depth: 1.90 m

Contractor Name: Terratest

Driller: Patrick Tapper

Assistant Driller:

Property:

Standing Water Level
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County
Form A: CUMBERLAND
Licensed:

Parish
ST JOHN

Cadastre
1 539890

Region: 10 - Sydney South Coast

River Basin: - Unknown
Area/District:

CMA Map:
Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256241.000
Easting: 318868.000

Latitude: 33°49'06.8"S
Longitude: 151°02'34.4"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Remarks

11/08/2014: Nat Carling, 11-Aug-2014; Added status, drill method & depth, updated work type.

*** End of GW114360 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW Work Summary

GW110716

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Piezometer

Work Status:

Construct.Method: Other

Owner Type: Private

Commenced Date:
Completion Date: 22/08/2009

Final Depth: 4.90 m
Drilled Depth: 4.90 m

Contractor Name: Terratest Pty Ltd

Driller: Pritpal Singh

Assistant Driller:

Property:

Standing Water Level 2.600
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County: CUMBERLAND
Parish: ST JOHN
Cadastre: 1 539890

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256231.000
Easting: 318869.000

Latitude: 33°49'07.1"S
Longitude: 151°02'34.4"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	4.90	40			Other
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded
1	1	Casing	P.V.C.	0.00	4.50	25			Seated on Bottom, Glued
1	1	Opening	Screen	4.50	4.90	25		0	PVC, Glued, A: 0.40mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
2.80	4.90	2.10	Unknown	2.60					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.60	2.60	FILL	Fill	
2.60	2.80	0.20	PEAT	Peat	
2.80	3.10	0.30	SAND	Sand	
3.10	4.10	1.00	SILT	Silt	

4.10	4.90	0.80	SILTY SAND	Sand	
------	------	------	------------	------	--

***** End of GW110716 *****

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW110717

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Piezometer

Work Status:

Construct.Method: Other

Owner Type: Private

Commenced Date:
Completion Date: 22/10/2009

Final Depth: 6.00 m
Drilled Depth: 6.00 m

Contractor Name: Terratest Pty Ltd

Driller: Pritpal Singh

Assistant Driller:

Property:

Standing Water Level 2.600
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County: CUMBERLAND
Parish: ST JOHN
Cadastre: 1//539890
Form A: CUMBERLAND
Licensed:

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256230.000
Easting: 318868.000

Latitude: 33°49'07.1"S
Longitude: 151°02'34.4"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	6.00	40			Other
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded
1	1	Casing	P.V.C.	-0.40	5.00	25			Seated on Bottom, Glued
1	1	Opening	Screen	5.00	6.00	25		0	PVC, Glued, A: 0.40mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
3.00	6.00	3.00	Unknown	2.60					12600.00

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.60	2.60	FILL	Fill	
2.60	2.80	0.20	PEAT	Peat	
2.80	3.10	0.30	SAND	Sand	
3.10	4.10	1.00	SILT	Silt	

4.10	4.90	0.80	SAND SILTY	Sand Grains (Lithic)	
4.90	6.00	1.10	SAND	Sand	

***** End of GW110717 *****

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW Work Summary

GW110715

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Well

Work Status:

Construct.Method: Auger - Solid

Owner Type: Private

Commenced Date:
Completion Date: 22/08/2009

Final Depth: 2.60 m
Drilled Depth: 2.60 m

Contractor Name: Terratest Pty Ltd

Driller: Pritpal Singh

Assistant Driller:

Property:

Standing Water Level 2.000 (m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County: CUMBERLAND
Parish: ST JOHN
Cadastre: 1 539890

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256230.000
Easting: 318867.000

Latitude: 33°49'07.1"S
Longitude: 151°02'34.3"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	2.60	40			Auger - Solid Flight
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded
1	1	Casing	P.V.C.	-0.40	2.20	25			Seated on Bottom, Glued
1	1	Opening	Screen	2.20	2.60	25		0	PVC, Screwed, A: 0.40mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
2.30	2.60	0.30	Unknown	2.00					2000.00

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.60	2.60	FILL	Fill	

***** End of GW110715 *****

Warning To Clients: This raw data has been supplied to the WaterNSW by drillers, licensees and other sources. WaterNSW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW Work Summary

GW110719

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Piezometer

Work Status:

Construct.Method: Other

Owner Type: Private

Commenced Date:
Completion Date: 22/08/2009

Final Depth: 10.00 m
Drilled Depth: 10.10 m

Contractor Name: Terratest Pty Ltd

Driller: Pritpal Singh

Assistant Driller:

Property:

Standing Water Level 3.000
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County: CUMBERLAND
Parish: ST JOHN
Cadastre: 1//539890

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256229.000
Easting: 318867.000

Latitude: 33°49'07.1"S
Longitude: 151°02'34.3"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	10.00	40			Other
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded
1	1	Casing	P.V.C.	0.00	8.50	40			Seated on Bottom, Glued
1	1	Opening	Screen	8.50	9.50	25		0	PVC, Glued, A: 0.40mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
3.00	6.00	3.00	Unknown	3.00					14400.00

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.60	2.60	FILL	Fill	
2.60	2.80	0.20	PEAT	Peat	
2.80	3.10	0.30	SAND	Sand	
3.10	4.10	1.00	SILT	Silt	

4.10	4.90	0.80	SAND SILTY	Sand Grains (Lithic)	
4.90	6.00	1.10	SAND	Sand	
6.00	7.50	1.50	SILT	Silt	
7.50	7.65	0.15	SAND	Sand	
7.65	10.00	2.35	SAND CLAYEY	Sand Grains (Lithic)	
10.00	10.10	0.10	SANDSTONE	Sandstone	

***** End of GW110719 *****

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW

Work Summary

GW110714

Licence:

Licence Status:

Authorised Purpose(s):
Intended Purpose(s): MONITORING BORE

Work Type: Well

Work Status:

Construct.Method: Auger - Solid

Owner Type: Private

Commenced Date:
Completion Date: 22/08/2009

Final Depth: 10.50 m
Drilled Depth: 10.50 m

Contractor Name: Terratest Pty Ltd

Driller: Pritpal Singh

Assistant Driller:

Property:

Standing Water Level 3.320
(m):

GWMA:
GW Zone:

Salinity Description:
Yield (L/s):

Site Details

Site Chosen By:

County: CUMBERLAND
Parish: ST JOHN
Cadastre: 1/539890
Form A: CUMBERLAND
Licensed:

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256213.000
Easting: 318866.000

Latitude: 33°49'07.7"S
Longitude: 151°02'34.3"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	10.50	180			Auger - Solid Flight
1		Annulus	Waterworn/Rounded	0.00	0.00				Graded
1	1	Casing	Pvc Class 18	0.00	8.00	60			Seated on Bottom, Screwed
1	1	Opening	Screen	8.00	9.50	60		0	PVC, Screwed, A: 0.40mm

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
4.80	5.20	0.40	Unknown	3.32					
5.80	10.50	4.70	Unknown	3.32					

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments
0.00	2.60	2.60	FILL	Fill	
2.60	3.00	0.40	SAND	Sand	
3.00	3.75	0.75	SILT	Silt	

3.75	4.20	0.45	PEAT	Peat	
4.20	4.40	0.20	CLAY	Clay	
4.40	10.00	5.60	SAND CLAYEY	Sand Grains (Lithic)	
10.00	10.50	0.50	SANDSTONE	Sandstone	

***** End of GW110714 *****

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

WaterNSW Work Summary

GW107659

Licence: 10WA109569

Licence Status: CURRENT

Authorised Purpose(s): INDUSTRIAL
Intended Purpose(s): INDUSTRIAL

Work Type: Bore

Work Status:

Construct.Method: Rotary

Owner Type:

Commenced Date:
Completion Date: 13/02/2006

Final Depth: 145.30 m
Drilled Depth: 145.30 m

Contractor Name: INTERTEC DRILLING SERVICES

Driller: William Crump

Assistant Driller:

Property: HAMBEAR PTY LTD 14 Thackeray
St CAMELLIA 2142 NSW

Standing Water Level 18.600
(m):

GWMA: -
GW Zone: -

Salinity Description:
Yield (L/s): 3.850

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A: CUMBERLAND	ST JOHN	ST JOHN	4 856266
Licensed: CUMBERLAND	ST JOHN		Whole Lot 4//856266

Region: 10 - Sydney South Coast

CMA Map:

River Basin: - Unknown
Area/District:

Grid Zone:

Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown

Northing: 6256088.000
Easting: 318840.000

Latitude: 33°49'11.7"S
Longitude: 151°02'33.2"E

GS Map: -

MGA Zone: 56

Coordinate Source: Unknown

Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details
1		Hole	Hole	0.00	17.50	228			Rotary Air
1		Hole	Hole	17.50	72.00	158			Down Hole Hammer
1		Hole	Hole	72.00	145.30	115			Down Hole Hammer
1	1	Casing	Steel	-0.40	72.00	127			Seated on Bottom, Welded
1	1	Casing	Steel	-0.15	17.60	115	105		Driven into Hole, Welded

Water Bearing Zones

From (m)	To (m)	Thickness (m)	WBZ Type	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
23.00	23.30	0.30	Unknown	18.60		1.50	24.00		10000.00
23.50	25.60	2.10	Unknown			7.00	30.00		10000.00
97.50	97.70	0.20	Unknown			0.15	102.00		2530.00
145.20	145.30	0.10	Unknown			3.85	144.00		3340.00

Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	Comments

0.00	0.30	0.30	CONCRETE / FILL	Invalid Code	
0.30	6.00	5.70	BLACK SANDY ROCKY CLAY	Invalid Code	
6.00	8.50	2.50	CLAY GREY	Clay	
8.50	14.50	6.00	CLAY, DARK GREY	Clay	
14.50	15.00	0.50	IRONSTONE FRACTURED	Ironstone Gravel	
15.00	16.00	1.00	CLAY BROWN	Clay	
16.00	17.00	1.00	SANDSTONE WEATHERED	Sandstone	
17.00	18.50	1.50	SANDSTONE GREY	Sandstone	
18.50	18.70	0.20	SANDSTONE FINE/QUARTZ	Sandstone	
18.70	23.00	4.30	SANDSTONE GREY	Sandstone	
23.00	23.30	0.30	SANDSTONE SOFT	Sandstone	
23.30	25.50	2.20	SANDSTONE GREY	Sandstone	
25.50	25.60	0.10	SANDSTONE FRACTURED	Sandstone	
25.60	57.00	31.40	SANDSTONE GREY	Sandstone	
57.00	57.50	0.50	SHALE	Shale	
57.50	62.00	4.50	SANDSTONE GREY	Sandstone	
62.00	63.00	1.00	SANDSTONE AND SHALE BEDDING	Sandstone	
63.00	64.00	1.00	SANDSTONE GREY	Sandstone	
64.00	65.00	1.00	SANDSTONE AND SHALE BEDDING	Sandstone	
65.00	97.50	32.50	SANDSTONE GREY	Sandstone	
97.50	97.70	0.20	SILT AND QUARTZ	Silt	
97.70	114.00	16.30	SANDSTONE GREY	Sandstone	
114.00	116.00	2.00	SILTSTONE	Siltstone	
116.00	139.00	23.00	SANDSTONE GREY	Sandstone	
139.00	140.00	1.00	SANDSTONE FINE QUARTZ	Sandstone	
140.00	145.20	5.20	SANDSTONE GREY	Sandstone	
145.20	145.30	0.10	SANDSTONE FRACTURED	Sandstone	

Remarks

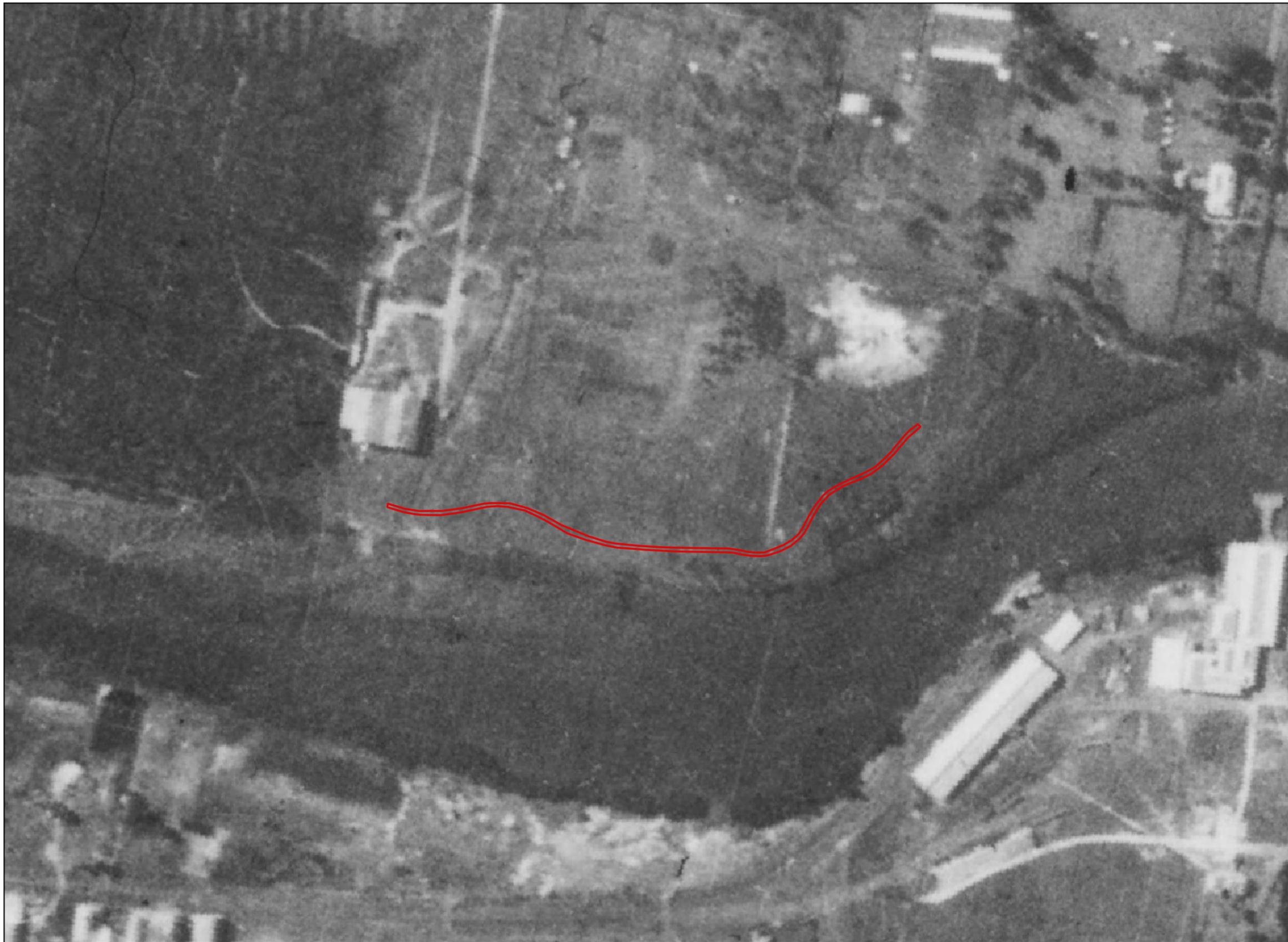
17/11/2009: Previous Lic No: 10BL600036

*** End of GW107659 ***

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

Appendix C2

Historical Aerial Photography



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

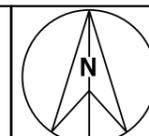


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery

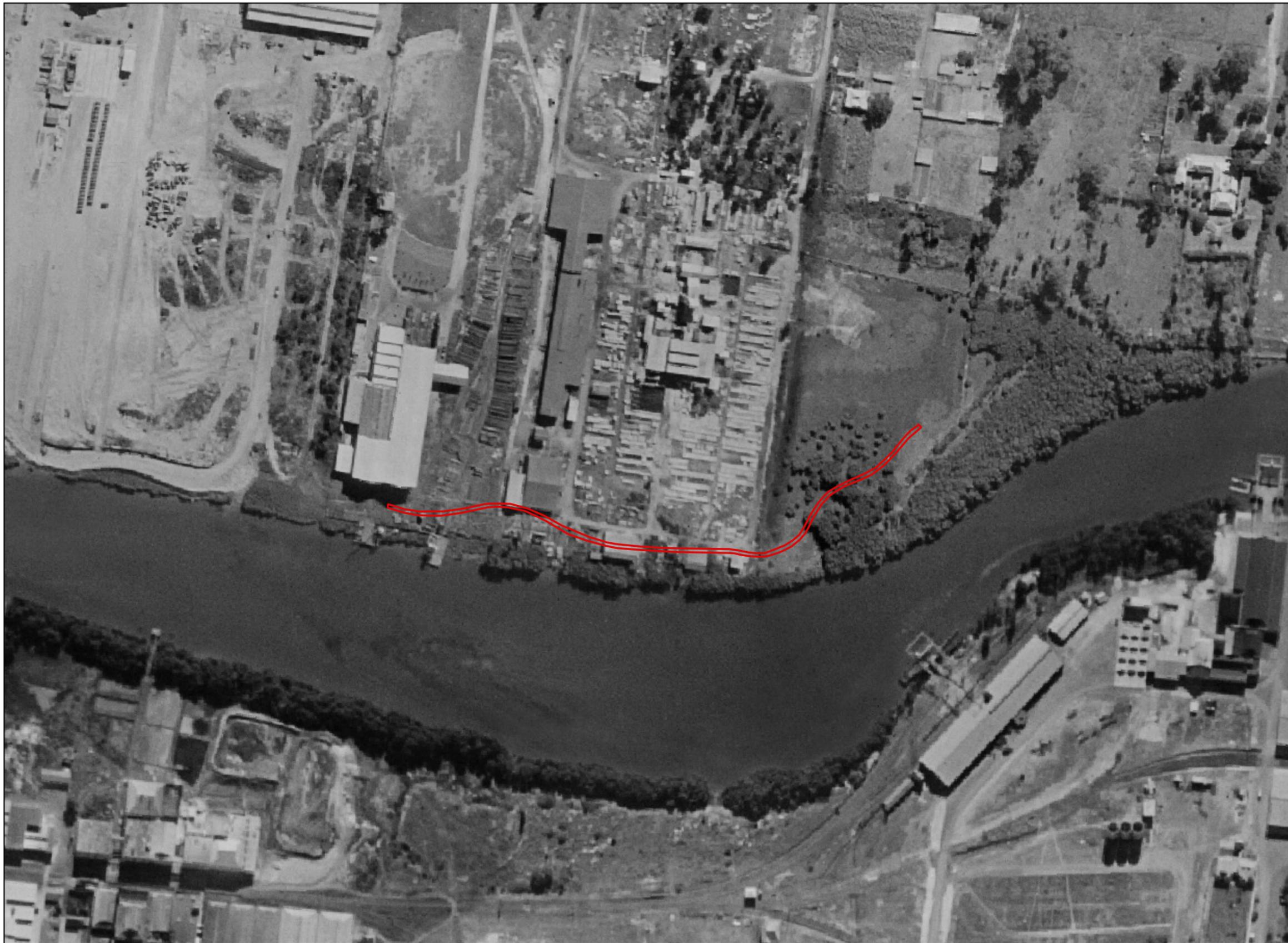


CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **1930 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	A
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

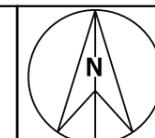


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery

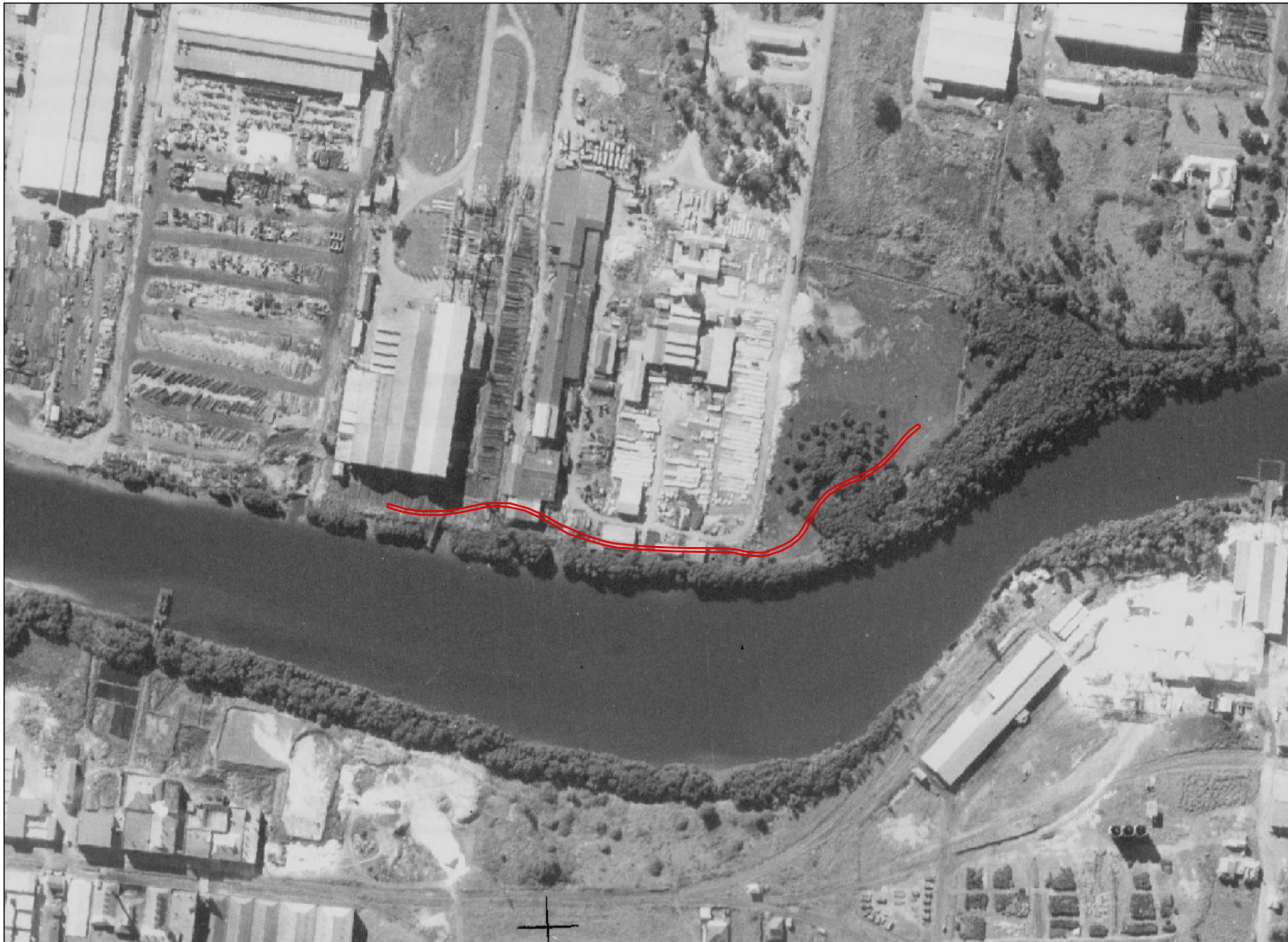


CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **1943 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	B
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

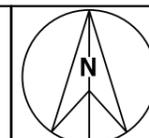


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery

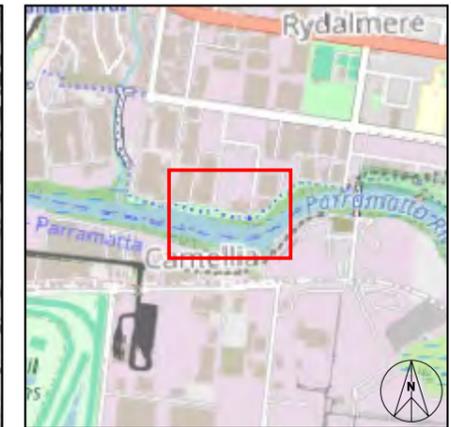
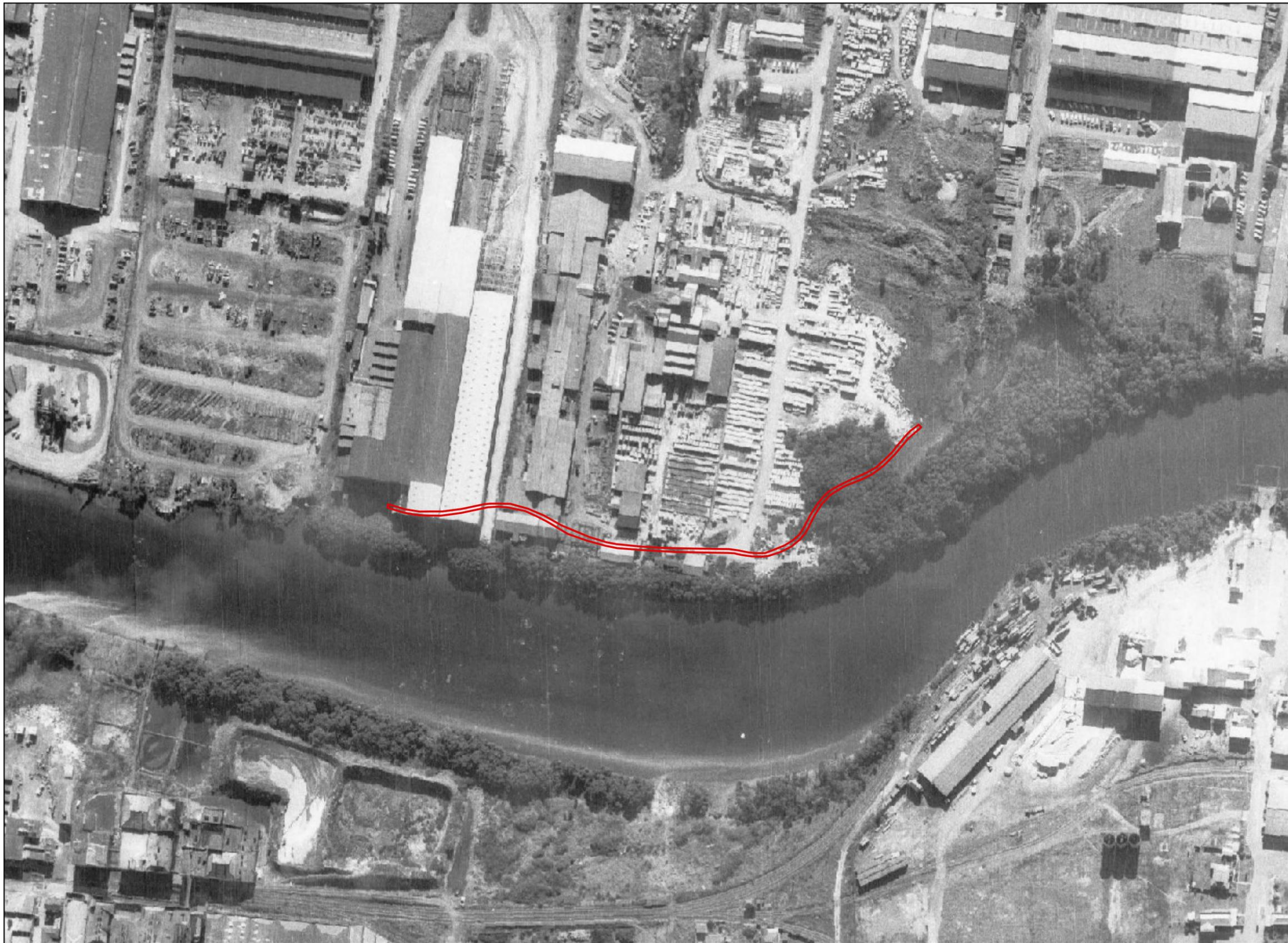


CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **1951 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	C
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

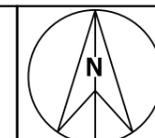


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery

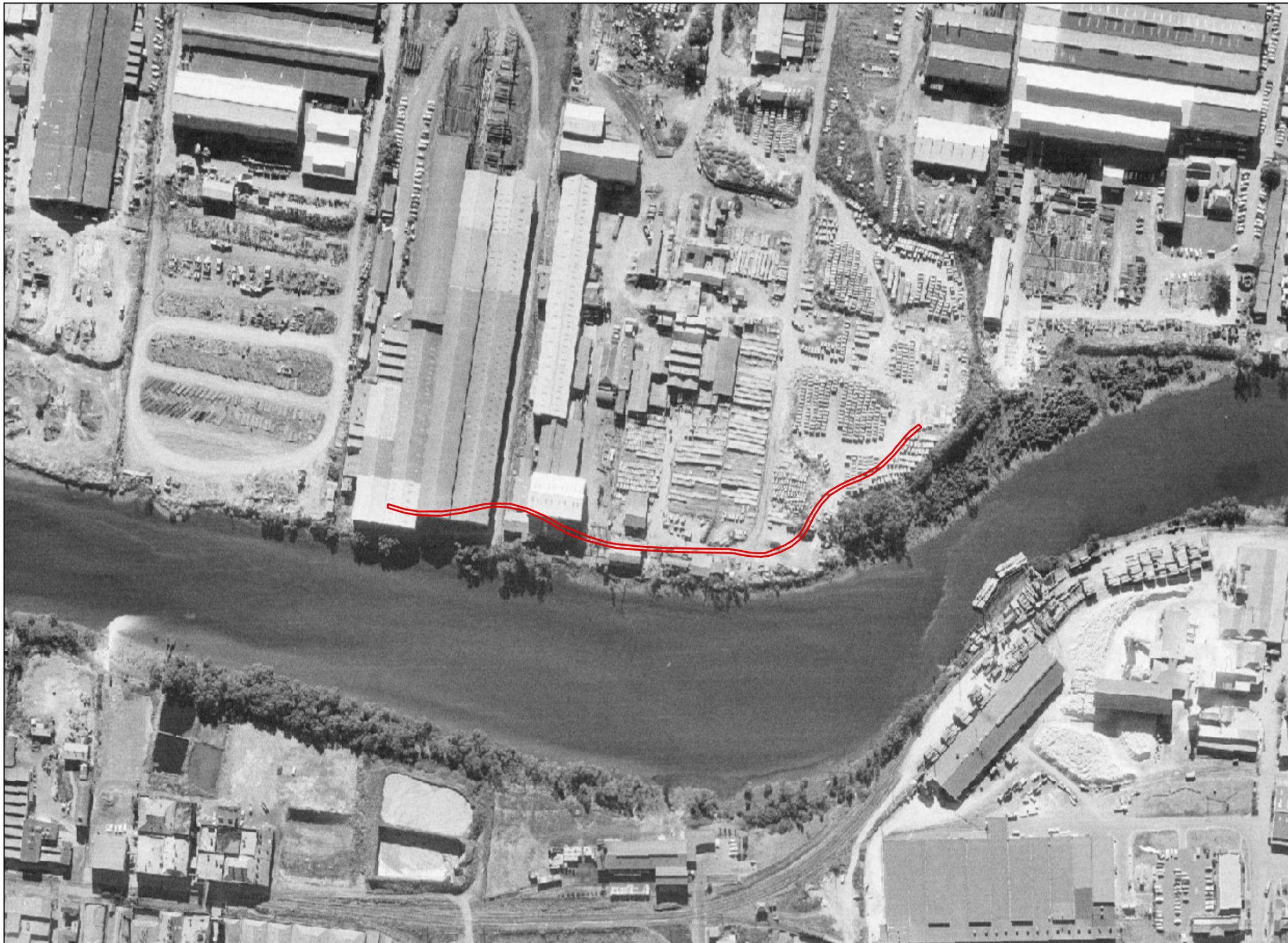


CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **1961 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	D
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

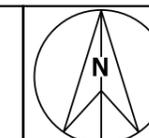


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery

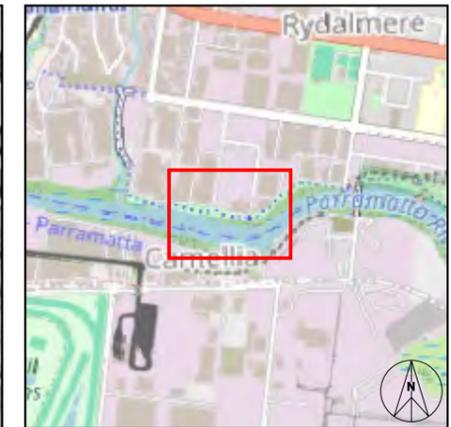
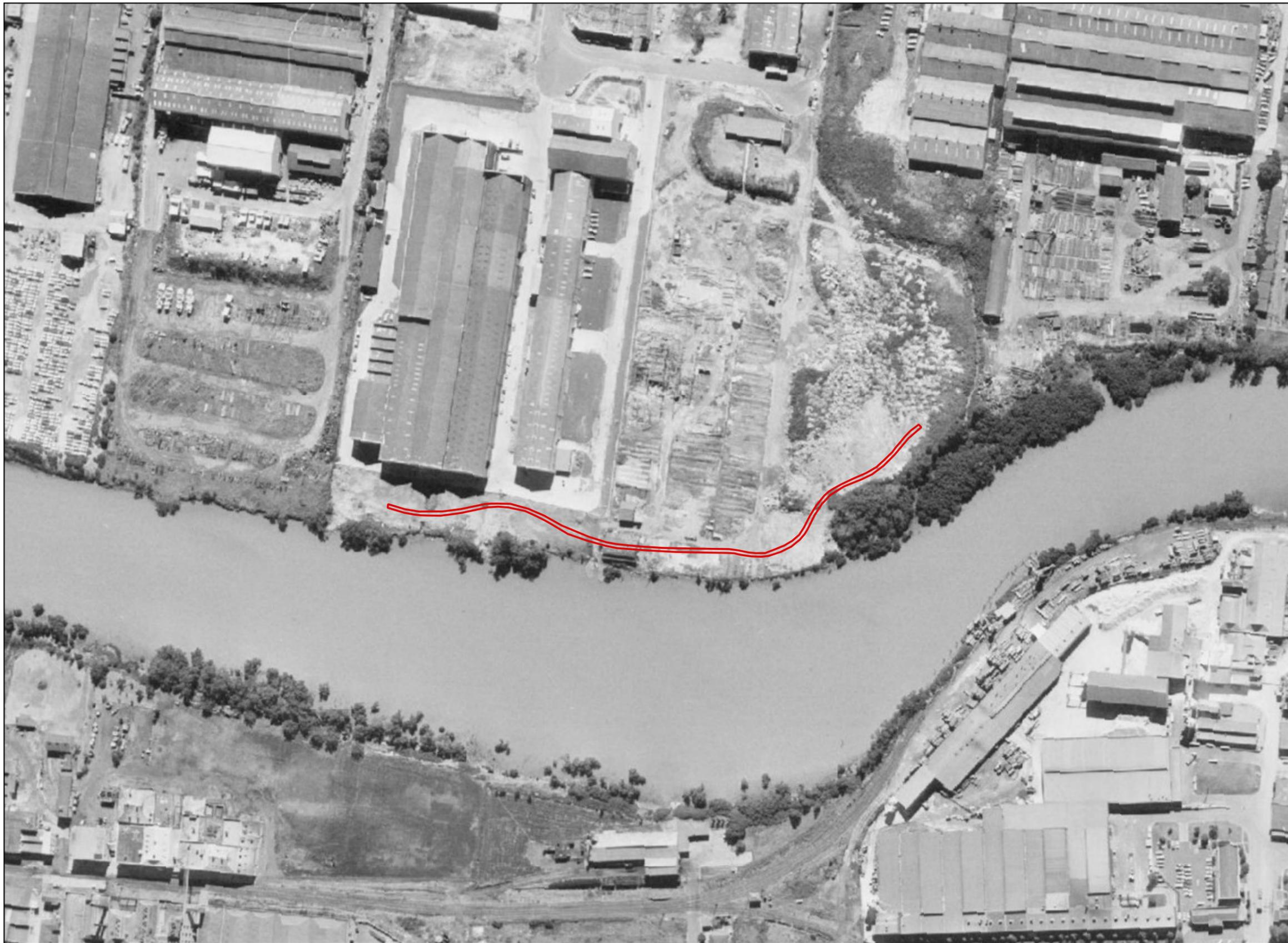


CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **1970 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	E
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

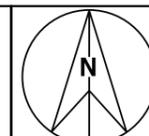


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery

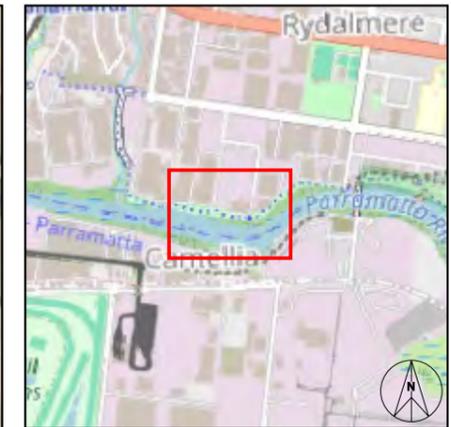


CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **1978 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	F
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

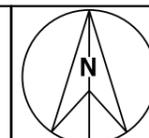


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery



CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **1986 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	G
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

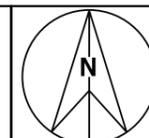


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery



CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **1991 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	H
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

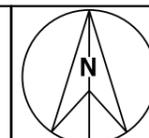


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery

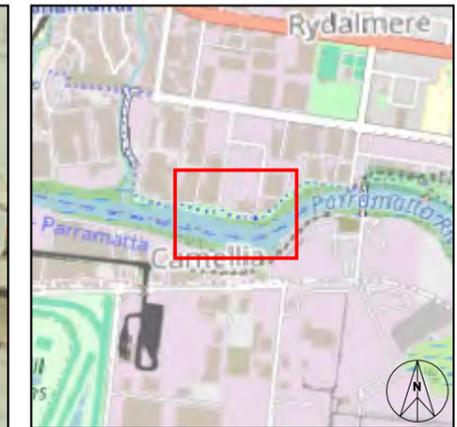


CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **1998 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	I
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

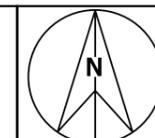


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery



CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **2000 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	J
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

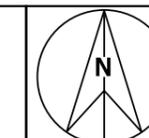


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery

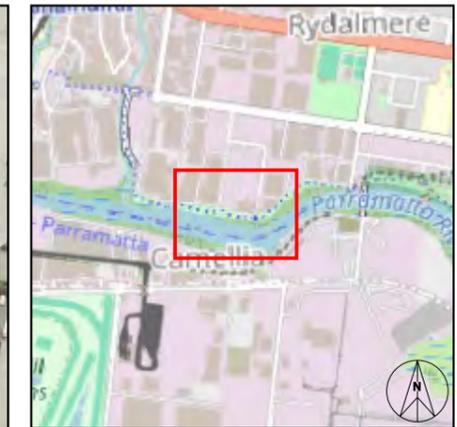


CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **2007 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	K
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

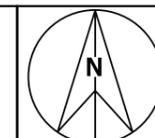


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery

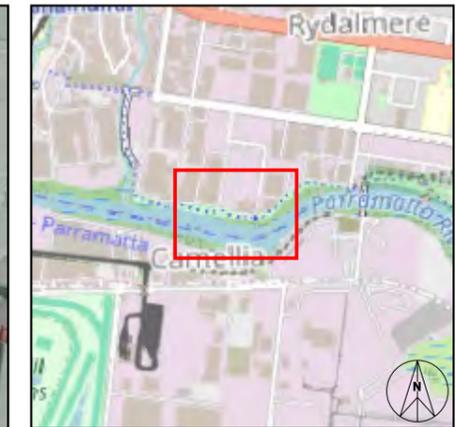


CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **2009 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	L
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

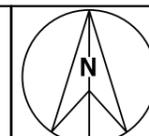


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery



CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **2011 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	M
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

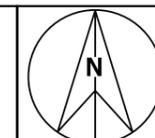


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery



CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **2018 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	N
REVISION:	0



SITE LOCATION

LEGEND

 Site boundary

0 20 40 60 80 100 m

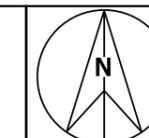


NOTE:
1. Drawing projection in GDA2020 / MGA zone 56, adapted from publically available aerial imagery



CLIENT: City of Parramatta Council	
OFFICE: Sydney	DRAWN BY: ML
SCALE: 1:2300 @A3	DATE: 08.January.2025

TITLE: **2024 Historical Aerial Imagery
Detailed Site (Contamination) Investigation
Reid Park Valley, Rydalmere NSW**



PROJECT:	231248.01
DRAWING No:	0
REVISION:	0

Appendix C3

Council Records Summary

Michael Le

From: GIPA <gipa@cityofparramatta.nsw.gov.au>
Sent: Wednesday, 20 November 2024 11:12 AM
To: Sam Ferguson
Cc: Cathy Li
Subject: Response - Informal Request - GIPA493.24 - Reid Park, Rydalmere - Douglas Partners
Attachments: Documents Released - Reid Park, Rydalmere.zip

Dear Mr Ferguson,

Following on from my previous email dated 19 November 2024, I have now reviewed Council's files for the Reid Park cycleway and have located the following documents:

- D01758375 ASBESTOS 10-8936 Airborne Asbestos Monitoring Report for 23 and 25 Aug 2010 - Reid Valley Cycleway Rydalmere.pdf
- D01987553 CEO Memo regarding signing NBPP 258 (Reid Park Cycleway) Final Report.pdf
- D01996910 Environmental assessment - Reid park Valley Cycleway - additinoal sampling.pdf
- D01996911 Rydalmere proposed cycleway - asbestos management plan outline.pdf
- D01998054 RE Missing link in Pmatta Valley Cycleway network through Reid Park - Park Rd to Subiaco Creek Rydalmere - Regional Cyclways Project 200910 .pdf
- D02192710 EIS Env Screenign Final Report.pdf
- D09086167 Site 28 - Reid Park - Documents relating to Jame Hardie site 28.pdf

Council, as the property owner, is releasing these records under a public interest consideration.

Please refer to the attached ZIP file of documents in relation to your request.

I trust that this information is of assistance.

Regards

Chris Curtis

GIPA Officer | Governance – Finance & Information

(02) 9806 5533

City of Parramatta

9 Wentworth Street, Parramatta NSW 2150

PO Box 32, Parramatta NSW 2124

ccurtis1@cityofparramatta.nsw.gov.au

cityofparramatta.nsw.gov.au



I acknowledge the Traditional Owners of the land I work on, the Dharug Peoples, and pay my respects to their Elders past and present.

From: Chris Curtis

Sent: Tuesday, 19 November 2024 7:12 PM

To: Sam.Ferguson@douglaspartners.com.au

Subject: Acknowledgment - Informal Requests - GIPA468.24 - Council searches for Eastern Parramatta River & CBD Precinct Cycleway

Dear Mr Ferguson,

Thank you for your email and for taking my call today to discuss your three informal GIPA applications which you have recently submitted.

These are requesting for:

“Available council records on Rangihou reserve, especially in relation to contamination and history

Multiple lots are in Rangihou Reserve - Lot 1, DP587055. Lot 15, DP27317. Lot 155, DP128846. Lot C, DP162815. Lot 3, DP1215559.

Rangihou Reserve, Macarthur Street, Parramatta

Development determination/consent

Pre 1994, 1994-2003 and 2004- present”

“Available council records on Reid Park especially in relation to contamination and history

Multiple Lots in Reid Park: Lot 1, DP864245. Lot 22, DP253646. Lot 19, DP253646. Lot 48, DP260535, Lot 18, DP253646

Reid Park, Park Road, Rydalmere

Development determination/consent

Pre 1994, 1994-2003 and 2004- present”

“Available council records on Royal Shores, Ermington foreshore walk area especially in relation to contamination and history

Multiple Lots: Lot 1007, DP1048512. Lot 1008, DP1066557. Lot 1006, DP1040571.

2B Broadoaks Street, Ermington

Development determination/consent

Pre 1994, 1994-2003 and 2004- present”

As we discussed, the broad range of information requested in your applications would normally require the submission of a Formal GIPA application for each of these requests, however, you have narrowed the scope of these to simply the history and contamination related documentation for these.

It was noted that the first item was previously prior to redevelopment part of the former Parramatta City Council depot site, the second item was a foreshore cycleway redevelopment and the Foreshore walk is located at the site of the former Ermington Naval Stores redevelopment.

We will therefore process these individually as information applications and will respond in due course for each.

If you have any questions, please contact me here at Council on the number shown below.

Chris Curtis

GIPA Officer | Governance – Finance & Information

(02) 9806 5533

City of Parramatta

9 Wentworth Street, Parramatta NSW 2150

PO Box 32, Parramatta NSW 2124

ccurtis1@cityofparramatta.nsw.gov.au

cityofparramatta.nsw.gov.au



I acknowledge the Traditional Owners of the land I work on, the Dharug Peoples, and pay my respects to their Elders past and present.

From: Sam Ferguson <Sam.Ferguson@douglaspartners.com.au>

Sent: Tuesday, 12 November 2024 11:25 AM

To: PCC Council <council@cityofparramatta.nsw.gov.au>

Cc: Cathy Li <Cathy.Li@douglaspartners.com.au>

Subject: Council searches for Eastern Parramatta River & CBD Precinct Cycleway

*****[EXTERNAL EMAIL]** Stop and think before opening attachments, clicking on links or responding. *******

Hello,

Could I please get an informal search of council records for Rangihou reserve, Reid Park, and Royal Shores (aka. Ermington foreshore walk), requests attached.

Thank you,

Sam Ferguson | Environmental Scientist

02 9809 0666

+61 457 163 659

Sam.Ferguson@douglaspartners.com.au



www.douglaspartners.com.au



96 Hermitage Road, West Ryde
NSW 2114 | Wallumedegal Country
PO Box 472, West Ryde, NSW 1685



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Chris Curtis

From: Cameron Hollands <chollands@jkggroup.net.au>
Sent: Monday, 28 November 2011 3:40 PM
To: Gary Williams
Subject: Final Rydalmere report
Attachments: E25326Krpt Rydalmere.pdf

EIS

ENVIRONMENTAL INVESTIGATION SERVICES

A division of Jeffery & Katauskas Pty Ltd
ABN 17 003 550 801

Gary,

Final Rydalmere report.

Regards,
For and on behalf of
ENVIRONMENTAL INVESTIGATION SERVICES

Cameron Hollands
Environmental Scientist

115 Wicks Road, Macquarie Park, NSW, 2113
PO Box 976, North Ryde BC, NSW, 1670
Tel: 02 9888 5000
Fax: 02 9888 5004
email: chollands@jkggroup.net.au
Web: www.jkggroup.net.au

* * * IMPORTANT * * *

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ENVIRONMENTAL INVESTIGATION SERVICES

REPORT

TO

PARRAMATTA CITY COUNCIL

ON

**PRELIMINARY ENVIRONMENTAL
SITE ASSESSMENT**

FOR

**PROPOSED CYCLEWAY DEVELOPMENT - REID
PARK EXTENSION**

AT

NO. 1 PARK ROAD, RYDALMERE

NOVEMBER 2011

REF: E25326Krpt



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Abbreviations

Important Information About Your Environmental Site Assessment



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Table B:	Summary of Laboratory Test Data – Soil Characterisation Assessment
Table C:	Summary of Laboratory Test Data – Soil: TCLP

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Figure 2:	Borehole Location Plan
Figure 3:	Borehole and Test Pit Location Plan (Previous EIS Environmental Assessment - Reid Park South)

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Appendix A:	Borehole Logs BH1, BH2 and Geotechnical Explanatory Notes
Appendix B:	Laboratory Reports and Chain of Custody Documents
Appendix C:	Site History Assessment Documents
Appendix D:	Feasibility Study Plan - Proposed Cycleway Route Options
Appendix E:	Sampling Protocols and QA/QC Definitions



1 INTRODUCTION

Parramatta City Council commissioned Environmental Investigation Services (EIS), a division of Jeffery & Katauskas Pty Ltd (J&K), to undertake a preliminary environmental site assessment for the proposed cycleway development at No. 1 Park Road, Rydalmere.

The site is identified as Lot 1 and Lot 681 in DP 575 846 and at the time of this investigation was occupied by a commercial/industrial property. The site location is shown on Figure 1 and the proposed development area is shown on Figure 2.

The screening was undertaken generally in accordance with an EIS proposal (Ref: EP5948K.2) of 24 October 2011 and written acceptance from Parramatta City Council of 26 October 2011 (P.O. P00020881, dated 27 October 2011).

This report has been prepared to support a feasibility study for the proposed Reid Park cycleway extension.

1.1 Proposed Development Details

The proposed development includes a change of land use from commercial/industrial to parks/recreational open space.

EIS understand that the preliminary environmental assessment will be used as part of an ongoing feasibility study for the proposed Reid Park cycleway extension.

Based on the documents provided by Parramatta City Council, the proposed development includes construction of an on grade cycleway in order to link the existing cycleway paths that extend westwards (Reid Park Path) and eastwards (Eric Primrose Reserve Path) from Park Street. The feasibility study outlined three options. Option 1 traverses Lot 681 and consists of an on grade concrete path that incorporates the existing rear lane. Option 2 traverses Lot 1 and Lot 681 and consists of an on grade concrete path, boardwalk structure and sea wall. Option 3 runs parallel with Parramatta River via Lot 1 and consists of an on grade concrete path, boardwalk structure and sea wall. The plan included in Appendix D indicates the proposed route for each option.

1.2 References to the State Body for Environmental Regulation

Over the past few years the environmental regulatory body has undergone a number of name changes, including:



- Environmental Protection Authority (EPA);
- Department of Environment and Conservation (DEC);
- Department of Environment and Climate Change (DECC); and
- Department of Environment, Climate Change and Water (DECCW).

The department is currently known as the Office of Environment and Heritage (OEH).

2 OBJECTIVES AND SCOPE OF WORK

2.1 Objectives

The primary objective of the assessment was to investigate the potential risk for significant, widespread soil contamination at the site.

The general framework of the assessment has been designed with reference to the NSW OEH endorsed guidelines under the *NSW Contaminated Land Management (CLM) Act* (1997¹) framework.

EIS understand that the assessment outlined in this proposal will be used as part of a feasibility study for the proposed Reid Park cycleway extension.

2.2 Background

EIS have previously undertaken an environmental assessment for the off-road cycleway located to the west of the site, referred to as Reid Park. This document is referenced as: "*Report to Parramatta City Council on Preliminary Environmental Site Screening for Proposed Cycleway Development at Reid Park Valley, Rydalmere*", Ref: E23649K-rpt, dated February 2010 (EIS 2009).

Information from the EIS Reid Park report was used to discuss the potential subsurface conditions that may be encountered at the site. A review of the relevant information obtained from these reports is included in Section 4 of this report.

Due to site access restrictions soil sampling was undertaken at the public footpath situated adjacent to the western site boundary.

2.3 Scope of Work

The scope of work undertaken to achieve the objective included:

- Review of available geological data;

¹ *Contaminated Land Management Act*, NSW Government Legislation, 1997 (CLM Act 1997)



- Review of acid sulfate soil (ASS) risk map for the site;
- Review of the findings of the EIS reports prepared for the assessment of the adjacent Cycleway;
- Walkover inspection of the site to identify potential on-site and nearby off-site contamination sources;
- Review of historical aerial photographs;
- Review of historical land title records;
- Search of the NSW OEH notices for the site under Section 58 of the CLM Act (1997);
- Search of the NSW OEH public register (POEO) for licences, applications or notices for the site;
- Search of the register for contaminated sites notified to the OEH under Section 60 of the CLM Amendment Act;
- Soil sampling from 2 boreholes drilled adjacent to the west site boundary, within the public footpath;
- Laboratory analysis of selected soil samples; and
- Preparation of a report presenting the results of the assessment and comments/discussion on the potential for significant soil contamination.

Field work for this investigation including drilling, soil sampling and inspection of the site and surrounding areas was undertaken on 2 November 2011.

3 SITE INFORMATION

3.1 Site Description

The site was located on the northern bank of the Parramatta River on the east side of Park Road. Regional topography is dominated by the Parramatta River basin which is flanked by moderately undulating slopes with a gradual elevation that decrease eastwards. The section of the river adjacent to the site is orientated approximately east to west.

At the time of the investigation the site was used for commercial/industrial purposes. The property was inaccessible at the time of the inspection, however, the majority of the site was visible through boundary cyclone fences. The site was occupied by a single level building situated to the north and open-air yard area to the south of the building. The yard area was partially covered with concrete pavement that surrounded the building, the remaining areas were covered with gravel and grass. Numerous vehicles, equipment, machinery, stored materials and a shipping container were located in the yard area of the site.



The site was bound by industrial and commercial properties to the north, a public lane way/footpath to the east, Park Road to the west and Parramatta River to the south.

The presence of up approximately 2.5m of exposed fill material on the south site boundary (the north bank of Parramatta River) suggested that land reclamation and or earthworks had taken place in the area. At several locations along the length of the site exposed clayey fill with inclusions of fibre cement (fibro), bricks, glass, plastic, metal, timber, concrete and slag was visible. This is considered indicative of the material used to raise levels across the south section of the site.

3.2 Regional Geology

The geological map of Sydney (1983²) indicates the site to be underlain by Hawkesbury Sandstone, which typically consists of medium to coarse grained quartz sandstone with minor shale and laminite lenses.

3.3 Acid Sulfate Soils

The Prospect/Parramatta River ASS risk map for the Rydalmere area prepared by Department of Land and Soil Conservation (1997³) indicates that the site is located within an area of "disturbed terrain" to depths of approximately 2m.

The "disturbed terrain" classification is adopted in large scale filled areas which often occur during reclamation of low lying swamps for urban development, in areas which may have been mined or dredged or have undergone heavy ground disturbance through general urban development or the construction of dams and levees. The majority of landforms within these areas are not expected to encounter acid sulfate soil materials; however, localised occurrences may be found at depth. Disturbance of these materials will result in a risk that will vary with elevation and depth of disturbance. Soil investigation is required to assess these areas for acid sulfate soil potential.

4 ENVIRONMENTAL ASSESSMENT OF ADJACENT CYCLEWAY

The EIS 2009 Reid Park environmental assessment was commissioned by Parramatta City Council and the field work was undertaken on 7 and 8 January 2010.

² 1:100,000 Geological Map of Sydney (Series 9130), Department of Mineral Resources (1983)

³ 1:25,000 Acid Sulfate Soil Risk Map (Series 9130N3, Ed 2), Department of Land and Soil Conservation (December 1997)



The assessment included a detailed site inspection, drilling 21 boreholes and excavating 20 test pits along the length (approximately 750m) of the site and laboratory analysis of selected soil samples.

Significant volumes of fill were encountered at the Reid Park site including up to 4 meters in one section of the site. The fill was evident along several sections of the river bank indicating previous land reclamation works. The fill generally consisted of clayey soils containing various gravels, cobbles and boulders, metal, glass, brick, concrete, ash, slag and asbestos cement debris.

The results of the laboratory tests on soils samples covered a range of contaminants commonly encountered in the Sydney region. The assessment identified three principal issues associated with contamination:

- Concentrations of heavy metals above the Provisional Phyto-toxicity Investigation Levels (PPILs) which are associated with plant toxicity;
- Blue/green soil contained phosphorus concentrations above the health investigation level; and
- Significant volumes of asbestos including materials considered friable.

EIS recommended that the site may be developed as a public cycleway provided that the contamination is isolated and managed. At present, the contaminated soils at the site are capped beneath the concrete cycleway path and grass/landscaped cover. Significantly contaminated areas were buried beneath a clay capping layer.

5 SITE HISTORY ASSESSMENT

5.1 Aerial Photographs

Aerial photographs of the site taken in 1930, 1951, 1961, 1972, 1978, 1986, 1994 and 2005 were obtained from the Department of Lands and were reviewed as part of the assessment of the site history. EIS has also reviewed the 1943 historical aerial photograph available for the site on the NSW Department of Lands SIX Viewer⁴. The information obtained from the photographs are summarised in the following table:

⁴ <https://six.maps.nsw.gov.au/wps/portal/SIXViewer>, visited on



Year	Details
1930	<p>The site appeared to be cleared and vacant. The north section of the site appeared grassed, the south section of the site retained larger vegetation flanking Parramatta River.</p> <p>The immediate surrounding properties generally appeared to be cleared and unoccupied with the exception of dense vegetation flanking Parramatta River. An unsealed road consistent with the existing Park Road bounded the west side of the site. A small unsealed road consistent with the existing access lane bounded the east side of the site.</p>
1943	<p>The site generally appeared similar to the 1930 aerial photograph.</p> <p>The immediate surrounding properties generally appeared similar to the 1930 aerial photograph with the exception of a footbridge across the Parramatta River that linked the unsealed road on the east site boundary with the south bank of the river.</p>
1951	<p>The site generally appeared similar to the 1943 aerial photograph.</p> <p>The immediate surrounding properties were generally similar to the 1943 aerial photograph with the exception of a large warehouse building situated to the west of Park Road. The building appeared generally similar to the current existing building on this property.</p>
1961	<p>The site generally appeared similar to the 1951 aerial photograph with the exception that the south section of the site appeared to have undergone minor land reclamation/filling works. The reclamation works partially extended over the previously existing dense vegetation flanking the Parramatta River.</p> <p>The property immediately to the north of the site was occupied by a two bayed sawtooth roof warehouse building similar to the current existing building. Properties further north were also occupied by commercial/industrial warehouses. The properties to the east and west generally appeared similar to the 1951 aerial photograph.</p>
1972	<p>The north section of the site was occupied by a building that generally appeared consistent with the existing site building. The building was surrounded by pavement to the east, south and west sides which was used for the storage of materials/equipment. The south section of the site appeared to be unsealed and used to store numerous materials/equipment. Adjacent to the south site boundary a wall appeared to have been constructed. The wall appeared generally consistent with the current existing sea wall. The south-east section of site appeared to have undergone land reclamation/filling works to accommodate the paved area to the south-east of the building.</p> <p>The immediate surrounding properties generally appeared similar to 1961 aerial photograph and were similar to the existing configuration.</p>



1978	<p>The north section of the site generally appeared similar to the 1972 aerial photograph. The south section of the site appeared to have undergone additional minor land reclamation/filling works and slight realignment of the east section of the sea wall. An additional building structure was located at the central-south section of the site.</p> <p>The surrounding properties generally appeared similar to 1972 aerial photograph and similar to the existing configuration.</p>
1986	<p>The site and surrounding properties generally appeared similar to the 1978 aerial photograph.</p>
1994	<p>The site and surrounding properties generally appeared similar to 1986 aerial photograph. The existing Eric Primrose Reserve off-road cycleway had been constructed in the park to the east of the site.</p>
2005	<p>The site generally appeared similar to 1994 aerial photograph with the exception of the removal of the building structure on the south-central section of the site. The original building remained at the north section of the site and the site generally appeared similar to the current configuration.</p> <p>The surrounding properties generally appeared similar to 1994 aerial photograph.</p>

5.2 Land Title Search

A limited historical land title search was performed on our behalf by Advanced Legal Search Pty Ltd. Copies of the title records are presented in Appendix C and a summary of the relevant information is outlined below.

The site is currently joint owned by Z.L. Milewski and T. Milewski since 2010 and has been leased to Ziggy's Cranes Pty Ltd from 2011.

Title information for the north section of the site, Lot 681, indicates this section of the site was owned or occupied by a mix of commercial/industrial entities, individual and joint owners since at least 1911.

Title information for the south section of the site, Lot 1, indicates this section of the site was owned or occupied by a mix of commercial/industrial entities, individual and joint owners since at least 1975. From 1910 to 1975 the south section of the site was owned by The Sydney Harbour Trust Commissioners and The Maritime Services Board of NSW. Various commercial leases were recorded during this time.

The 1974 map of the site obtained from the Land Titles Office states that the south section of the site, Lot 1, is *reclaimed land*.



These records indicate potential land uses that may have resulted in contamination of the soil and groundwater at the site.

5.3 NSW OEH Records

A search of the NSW OEH on-line database⁵ did not indicate the existence of any notices for the site under section 58 of the CLM Act 1997.

A search of the list⁶ of contaminated sites notified to the NSW OEH did not indicate that the site had been notified.

A search of the NSW OEH public register (POEO)⁷ did not indicate the existence of any notices, applications and licenses for the site.

The register did, however, indicate the existence of a licence that is no longer in force for the Eric Primrose Reserve which is located directly east of the site. The licence was for waste activities including hazardous, industrial or Group A waste generation or storage. The exact nature of activities within the reserve was not listed on the licence. The 1961 aerial photograph indicates the reserve was cleared and vacant. The 1972 aerial photograph indicates that a sea wall had been constructed along the reserve shoreline and significant land reclamation and filling earthworks had been undertaken. EIS are of the opinion that the POEO licence may be associated with the acceptance of fill material onto the reserve.

5.4 Assessment of Historical Information Integrity

The site history assessment has generally been obtained from government records including the NSW Land Titles Office, on-line NSW OEH data and historical aerial photographs. The veracity of the information from these sources is considered to be high, however, given the age of the development, the gap of up to 13 years between aerial photographs and the lack of information available on activities prior to 1910, a certain degree of information loss is to be expected.

Non verifiable anecdotal information has not been relied upon during assessment of historical site use. Therefore, there is considered to be a high level of integrity associated with information obtained with respect to historical use of the site.

⁵ <http://www.environment.nsw.gov.au/prclmapp/searchregister.aspx>, visited on 17 November 2011

⁶ <http://www.environment.nsw.gov.au/clm/publiclist.htm>, visited on 17 November 2011

⁷ <http://www.environment.nsw.gov.au/prpoeoapp/searchregister.aspx>, visited on 17 November 2011



5.5 Summary of Historical Site Use

The search of historical information has indicated the following:

- There are no recorded notices for the site listed on the on-line NSW OEH CLM or POEO register;
- Historical aerial photographs indicate that the site was cleared and unoccupied from at least 1930 to around the early 1970's;
- The existing commercial/industrial building has occupied the site since at least 1970;
- Land reclamation/filling works were undertaken on the south part of the site between the early 1960's and late 1970's;
- A building formerly occupied the site to the south of the existing building from approximately 1978 and was demolished by at least 2005; and
- The site's commercial/industrial history dates back to 1910/1911 prior to occupation of the site. This information is associated with title ownership and possible use of the south section of the site to moor marine vessels.

In addition, on the on-line NSW OEH POEO register indicated that the public reserve located to the east of the site (Eric Primrose Reserve) once retained a licence for the generation or storage of hazardous or industrial Group A waste as indicated on the POEO licence. The waste may be associated with the importation of fill material for land reclamation and filling earthworks.

6 POTENTIAL CONTAMINATION SOURCES

Based on the scope of work undertaken for the assessment, the following potential contamination sources or potentially contaminating activities have been identified at the site:

- Historical commercial/industrial activities;
- Potentially contaminated, imported fill material associated with land reclamation/filling works;
- Demolition of the former building;

6.1 Potential Off-Site Contamination

Based on the scope of work undertaken for the assessment, the following potential contamination sources have been identified adjacent to the site:

- Potentially contaminated groundwater migrating onto the site from the adjacent properties to the north (commercial/industrial occupation) and north-east (Eric Primrose Reserve).



6.2 Site Specific Contaminants of Concern

6.2.1 Site Specific Soil Contaminants of Concern

The assessment has identified a number of potential soil contaminants of concern that may be associated with the potential contamination sources and/or potentially contaminating activities. The potential soil contaminants of concern are listed below:

- Heavy Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)
- Total Petroleum Hydrocarbons (TPHs)
- Monocyclic Aromatic Hydrocarbons (BTEX compounds)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Organochlorine and Organophosphorus pesticides (OCPs and OPPs)
- Polychlorinated Biphenyls (PCBs)
- Asbestos

6.3 Contaminant Laydown and Transport Mechanisms

At this site, mobile contaminants would be expected to move via seepage directly into Parramatta River.

7 ASSESSMENT CRITERIA DEVELOPMENT

7.1 Regulatory Background

In 1997 the NSW Government introduced the CLM Act. This Act has been amended by the *Contaminated Land Management Amendment Act (2008⁸)*.

The CLM Act 1997, associated regulations, SEPP55 and NSW OEH guidelines, were designed to provide uniform state-wide control of the management, investigation and remediation of contaminated land.

Prior to granting consent for any proposed rezoning or development, SEPP55 requires the consent authority to:

- Consider whether the land is contaminated;
- Consider whether the site is suitable, or if contaminated, can be made suitable by remediation, for the proposed land use; and
- Be satisfied that remediation works will be undertaken prior to use of the site for the proposed use.

⁸ *Contaminated Land Management Amendment Act*, NSW Government Legislation, 2008 (CLM Amendment Act 2008)



Should the assessment indicate that the site poses a risk to human health or the environment, remediation of the site may be required prior to occupation of the proposed development. SEPP55 requires that the relevant local council be notified of all remediation works, whether or not development consent is required. Where development consent is not required, 30 days written notice of the proposed works must be provided to council. Details of validation of remediation work must also be submitted to Council within one month of completion of remediation works.

The consent authority may request that a site audit be undertaken during, or following the completion of the site assessment process. Under the terms of the CLM Act 1997 the NSW OEH Site Auditor Scheme was developed to provide a system of independent review for assessment reports. An accredited Contaminated Site Auditor is engaged to review reports prepared by suitably qualified consultants to ensure that the investigation has been undertaken in accordance with the guidelines and confirm that the sites are suitable for their intended use.

Section 59(2) of the CLM Act 1997 states that specific notation relating to contaminated land issues must be included on Section 149 (s149) planning certificates prepared by Council where the land to which the certificate relates is:

- Within an investigation or remediation area;
- Subject to an investigation or remediation order by the OEH;
- The subject of a voluntary investigation or remediation proposal; and/or
- The subject of a site audit statement.

Submission of contaminated site investigation and validation reports to council as part of rezoning or development application submissions may also result in notation of actual or potential site contamination on future s149 certificates prepared for the site.

Section 60 of the CLM Amendment Act 2008 sets out a positive duty on a land owner, or person whose activities have caused contamination, to notify the OEH if they are or become aware that contamination exists on a site that generally poses "*an unacceptable risk to human health or the environment, given the site's current or approved use*". This duty to report is based on trigger values, above which notification is required.

Off-site disposal of fill, contaminated material and excess soil/rock excavated as part of the proposed development works is regulated by the provisions of the *Protection of the Environment Operations Act (1997⁹)* and associated regulations and guidelines

⁹ *Protection of Environment Operations Act*, NSW Government, 1997 (POEO Act 1997)



including the *NSW DECC Waste Classification Guidelines - Part 1: Classifying Waste* (2009¹⁰). All materials should be classified in accordance with these guidelines prior to disposal.

Section 143 of the POEO Act 1997 states that if waste is transported to a place that cannot lawfully be used as a waste facility for that waste, then the transporter and owner of the waste are each guilty of an offence. The transporter and owner of the waste have a duty to ensure that the waste is disposed of in an appropriate manner.

7.2 Soil Contaminant Threshold Concentrations

The soil investigation levels adopted for this investigation are derived from the NSW DEC document *Guidelines for the NSW Site Auditor Scheme, 2nd Edition* (2006¹¹) and the National Environmental Protection Council document *National Environmental Protection (Assessment of Site Contamination) Measure* (1999¹²). The contaminant thresholds listed below are levels at which further investigation and evaluation is required to assess whether the site is considered suitable for the proposed urban land use.

To accommodate the range of human and ecological exposure settings, a number of generic settings are used on which the Health based Investigation Levels (HILs) can be based. Four categories of HILs are adopted for urban site assessments. Contaminant levels for a standard residential site with gardens and accessible soil (Column A) are based on protection of a young child resident at the site. The remaining categories (Columns D to F) present alternative exposure settings where there is reduced access to soil or reduced exposure time. These categories include residential land use with limited soil access, recreational and public open space and commercial/industrial use. Where the proposed land use will include more than one land use category (eg. mixed residential/commercial development) the exposure setting of the most "sensitive" land use is adopted for the site.

Threshold concentrations for petroleum hydrocarbon contaminants including total TPH and BTEX compounds have previously been established in the *NSW EPA Contaminated Sites: Guidelines for Assessing Service Station Sites* (1994¹³) publication and this document is referenced in the Site Auditor Guidelines 2006. Heavy fraction petroleum

¹⁰ *Waste Classification Guidelines, Part 1: Classifying Waste*, NSW DECC, 2009 (Waste Classification Guidelines 2009)

¹¹ *Guidelines for the NSW Site Auditor Scheme, 2nd ed.*, NSW DEC, 2006 (Site Auditor Guidelines 2006)

¹² *National Environmental Protection (Assessment of Site Contamination) Measure*, National Environment Protection Council (NEPC), 1999 (NEPM 1999)

¹³ *Guidelines for Assessing Service Station Sites*, NSW EPA, 1994 (Service Station Guidelines 1994)



hydrocarbon aliphatic/aromatic component threshold concentrations have also been introduced in NEPM 1999¹⁴.

Soil samples for this investigation have been analysed for total recoverable hydrocarbons (TRH) rather than TPH. TRH analysis is undertaken without a preliminary silica gel clean-up of the sample. Consequently the TRH result may include other compounds such as phthalates, humic acids, fatty acids and sterols (if present).

7.2.1 Provisional Phyto-toxicity Investigation Levels (PPILs)

The Provisional Phyto-toxicity Investigation Levels (PPILs) are generic values based on phytotoxicity data for plant response to specific contaminants in a sandy loam matrix and are included in the contaminated site assessment where the proposed land use includes gardens or accessible soils. The PPILs are listed in the Site Auditor Guidelines 2006. The PPILs are identical to the Ecological Investigation Levels (EILs) originally specified in NEPM 1999.

7.2.2 Asbestos in Soil

NEPM 1999 does not provide numeric guidelines for the assessment of asbestos in soil. NSW OEH advice (2006) has indicated that consultants should use their 'professional judgement' regarding determination of appropriate investigation and remediation levels for asbestos in soils; however the NSW OEH have not published numerical guidelines for the assessment of asbestos in subsurface soils.

The WorkCover publication *Working with Asbestos Guide* (2008¹⁵) states that, where buried asbestos is encountered, "A competent occupational hygienist should assess the site to determine:

- If asbestos material is bonded or friable
- The extent of asbestos contamination
- Safe work procedures for the remediation of the site"

"Any asbestos cement products that have been subjected to weathering, or damaged by hail, fire or water blasting are considered to be friable asbestos and an asbestos removal contractor with a WorkCover license for friable asbestos removal is required for its removal". Under the NSW Occupational Health and Safety (OHS) Regulations

¹⁴ *Guideline on Laboratory Analysis of Potentially Contaminated Soils*, Schedule B(3), NEPM, 1999 (Schedule B(3))

¹⁵ *Working with Asbestos Guide*, NSW WorkCover, 2008 (WorkCover Working with Asbestos Guide 2008)



2001¹⁶ and WorkCover requirements all necessary disturbance works associated with friable asbestos containing materials must be conducted by a licensed AS-1 Asbestos Removal Contractor.

7.2.3 Site Assessment Criteria (SAC) for Soil Contaminants

The 'parks/recreational open spaces' (Column E) exposure setting has been adopted for this assessment and the appropriate soil criteria are listed in the following table:

¹⁶ *Occupational Health and Safety Regulation*, NSW Government, 2001 (NSW OH&S Regulation 2001)



Contaminant	SAC - HILs Column E (mg/kg)	PPILs (mg/kg)
Heavy Metals		
Arsenic (total)	200	20
Cadmium	40	3
Chromium (III)	24%	400
Copper	2000	100
Lead	600	600
Mercury (inorganic)	30	1
Nickel	600	60
Zinc	14000	200
Petroleum Hydrocarbons		
TPH (C ₆ -C ₉)	65 ^a	-
TPH (C ₁₀ -C ₃₆)	1000 ^a	-
Benzene	1 ^a	-
Toluene	1.4 ^a	-
Ethylbenzene	3.1 ^a	-
Total Xylenes	14 ^a	-
PAHs		
Total PAHs	40	-
Benzo(a)pyrene	2	-
Pesticides (OCPs & OPPs)		
Aldrin + Dieldrin	20	-
Chlordane	100	-
DDT + DDD + DDE	400	-
Heptachlor	20	-
Total OPPs	0.1 ^b	-
Others		
PCBs (Total)	20	-
Asbestos	NDLR ^c	-

Note:

^a Service Station Guidelines 1994

^b Due to the absence of locally endorsed guideline criteria, the laboratory practical quantitation limit (PQL) has been adopted.

^c Not Detected at Limit of Reporting (NDLR)



7.2.4 Waste Classification Assessment Criteria

For the purpose of off-site disposal, the classification of soil into 'General Solid Waste (non-putrescible)', 'Restricted Solid Waste (non-putrescible)' and 'Hazardous Waste (non-putrescible)' categories is defined by chemical contaminant criteria outlined in the Waste Classification Guidelines 2009. The contaminant criteria are summarised in Table A-2.

7.3 Evaluation of Soil Analysis Data and Contaminant Threshold Concentrations

Assessment of the soil analytical data using the soil contaminant threshold concentrations has been undertaken in accordance with the methodology outlined in the NEPM 1999 Schedule 7(a).

The following criteria have been adopted for assessment of the analytical data:

- For a site to be considered suitable for the proposed land use each individual contaminant concentration should be less than the SAC; and
- Where the concentration of each contaminant is less than the SAC in all samples, the suitability of the site for the proposed use may be assessed based solely on individual analytical results.

Where contamination results exceed the SAC, a method of remediating the site is to physically and selectively remove the contamination hotspots from the site. This process should be continued until statistical analysis of the data meets the SAC. Validation of the remediated site is generally required to demonstrate that the site is suitable for the proposed land use.

8 ASSESSMENT PLAN

8.1 Soil Sampling

Samples were obtained from two sampling locations for this investigation. The sampling locations included two boreholes within the public footpath along the west site boundary. Sampling was not undertaken within site boundaries as access was not possible during the field investigation.

8.2 Data Quality Indicators (DQIs) and Quality Assurance

The validation involves a technical review of the data using defined QA Assessment Criteria. The success of the DQIs is based on assessment of the data set as a whole and not on individual acceptance or exceedance within the data set.



Review of QA criteria was based on laboratory data including surrogate recovery, repeat analysis, laboratory control sample (LCS) and method blanks.

9 INVESTIGATION PROCEDURE

9.1 Soil Sampling Methods

Due to the risk of encountering underground services within the footpath the first 1.1m each borehole was drilled using hand equipment. The hand equipment was decontaminated using a scrubbing brush, potable water and Decon 90 solution (phosphate free detergent) followed by rinsing with potable water after each sampling event. Details of the decontamination procedure adopted during sampling are presented in Appendix E

Following the use of hand equipment, the remaining depth of the borehole was drilled using drill rig mounted hydraulical push tube. Soil samples were obtained from disposable polyethylene push tube samplers.

Soil samples were obtained at various depths, based on observations made during the field investigation. During sampling, soil at selected depths was split into initial and duplicate samples for QA/QC assessment.

All samples were placed in glass jars with plastic caps and teflon seals with minimal headspace. Samples for asbestos analysis were placed in zip-lock plastic bags. Sampling personnel used disposable nitrile gloves during sampling activities.

During the investigation, soil samples were preserved by immediate storage in an insulated sample container with ice in accordance with AS 4482.1-2005¹⁷ and AS 4482.2-1999¹⁸ as summarised in the following table:

¹⁷ *Guide to the Investigation and Sampling of sites with Potentially Contaminated Soil*, Standards Australia, 2005 (AS 2005)

¹⁸ *Guide to the Sampling and Investigation of Potentially Contaminated Soil Part2: Volatile Substances*, Standards Australia, 1999 (AS 1999)



Analyte	Preservation	Storage
Heavy metals	Unpreserved glass jar with Teflon lined lid	Store at <4o, analysis within 28 days (mercury and Cr[VI]) and 180 days (other metals).
VOCs (TPH/BTEX)		Store at <4o, nil headspace, extract within 14 days, analysis within forty days
PAHs, OCP, OPP & PCBs		
Asbestos	Sealed plastic bag	None

The samples were labelled with the job number, sampling location, sampling depth and date. All samples were recorded on the borehole logs presented in Appendix A and on the laboratory chain of custody (COC) record presented in Appendix B.

On completion of the fieldwork, the samples were delivered in the insulated sample container to a NATA registered laboratory for analysis under standard COC procedures. Detailed EIS field sampling protocols are included in Appendix E.

9.2 Photoionisation Detector (PID) Screening

A portable PID was used in this investigation to assist with selection of samples for laboratory hydrocarbon (TPH/BTEX) analysis.

The sensitivity of the PID is dependent on the organic compound and varies for different mixtures of hydrocarbons. Some compounds give relatively high readings and some can be undetectable even though present in identical concentrations. The portable PID is best used semi-quantitatively to compare samples contaminated by the same hydrocarbon source.

The PID is calibrated before use by measurement of an isobutylene standard gas. All the PID measurements are quoted as parts per million (ppm) isobutylene equivalents.

PID screening of detectable volatile organic compounds (VOCs) was undertaken on soil samples using the soil sample headspace method. VOC data was obtained from partly filled zip-lock plastic bags following equilibration of the headspace gases. The PID headspace data is presented on the COC documents and borehole logs.

9.3 Laboratory Analysis

Laboratory analysis was undertaken by Envirolab Services Pty Ltd (NATA Accreditation No. 2901).



9.3.1 Soil Samples

Soil samples were analysed using the following analytical methods detailed in Schedule B(3) of NEPM (1999):

- Heavy metals – Nitric acid digestion. Analysis by ICP/AES;
- Low level mercury – cold vapour AAS;
- OC and OP pesticides and PCBs – Extracted with dichloromethane/acetone. Analysis by GC/ECD;
- PAHs – Soil extracted with dichloromethane/acetone. Analysis by GC/MS;
- TPH (volatile) – Soil extracted with methanol. Analysis by P&T GC/MS;
- TPH – Soil extracted with dichloromethane/acetone. Analysis by GC/FID;
- BTEX – Soil extracted with methanol. Analysis by P&T GC/MS; and
- Asbestos – Polarizing light microscopy.

Toxicity characteristic leaching procedure (TCLP) leachates were prepared by rotating soil samples in a mild acid solution for 18 hours (NSW EPA WD-3 Method). Leachates were analysed using the analytical procedures outlined above.

10 RESULTS OF INVESTIGATION

10.1 Subsurface Conditions

Borehole locations are shown on Figure 2. For details of the subsurface soil profile reference should be made to the borehole logs in Appendix A. A summary of the subsurface conditions encountered in the boreholes is presented below:

Fill

Silty sand was encountered from the near surface to approximately 0.5m depth below ground level at each borehole location. Clayey silt and silty clay was encountered beneath the silty sand at borehole BH1 and BH2 respectively. A total fill depth of 0.8m and 1.2m was encountered in boreholes BH1 and BH2 respectively, indicating that the fill depth generally increased towards Parramatta River. Inspection of the site also indicated the presence of deep fill on the south section of the site. The fill material encountered in the boreholes contained igneous gravel, ceramic, concrete, ash and slag. Inspection of the exposed fill on the south site boundary identified inclusions of fibre cement (fibro), bricks, glass, plastic, metal, timber, concrete and slag.

Natural Soils

Silty clay was encountered beneath the fill at each borehole location. The silty clay was generally light brown or grey mottled red brown with a trace of



ironstone gravel. Within borehole BH2 yellow brown coloured silty sand was encountered at a depth of approximately 3.4m below ground level.

Groundwater

Groundwater was not encountered during drilling works at the site. Seepage was encountered at borehole BH2 at a depth of approximately 3m below the existing site level. The seepage may indicate localised perched water intersecting Parramatta River. Long term groundwater monitoring was not undertaken.

10.2 Laboratory Results

The laboratory reports are presented in Appendix B. The results have been assessed against the SAC adopted for this investigation.

10.2.1 Soil Samples

The soil laboratory results are presented in Table B and Table C. The results of the analyses are summarised below.

Heavy Metals

One natural soil and three fill samples were analysed for heavy metals. The results of the analyses were below the SAC.

Elevated concentrations of cadmium and nickel above the PPILs were encountered in three fill samples. The results obtained from samples BH1 (0.3-0.5m) and BH2 (0.4-0.5m) contained nickel concentrations of 61mg/kg and 120mg respectively which were above the PPIL of 60mg/kg. A cadmium result of 8.9mg/kg was obtained from sample BH2 (0.4-0.5m) which was above the PPIL of 3mg/kg.

Waste Classification:

The results of the nickel analysis obtained from samples BH1 (0.3-0.5m) and BH2 (0.4-0.5m) were above the CT1 criterion of 40mg/kg and below the SCC1 criterion of 1,050mg/kg outlined in the Waste Classification Guidelines 2009. TCLP leachates were prepared from the two samples and analysed for nickel. The results were less than the TCLP1 criteria.

The results of all remaining analyses were less than the CT1 criteria outlined in the Waste Classification Guidelines 2009.



Petroleum Hydrocarbons (TPH) and Monocyclic Aromatic Hydrocarbons (BTEX)

PID soil sample headspace readings were all zero ppm equivalent isobutylene. These results indicate a lack of PID detectable volatile organic contaminants.

One natural soil and three fill samples were analysed for TPH and BTEX compounds. The results of the analyses were below the SAC.

Waste Classification:

The results of all analyses were less than the relevant CT1 and SCC1 criteria outlined in the Waste Classification Guidelines 2009.

Polycyclic Aromatic Hydrocarbons (PAHs)

One natural soil and three fill samples were analysed for a range of PAHs including Benzo(a)pyrene. The results of the analyses were below the laboratory practical quantitation limit (PQL) and less than the SAC.

Waste Classification:

The results of all analyses were less than the relevant CT1 and SCC1 criteria outlined in the Waste Classification Guidelines 2009.

Organochlorine (OCPs) and Organophosphorous (OPPs) Pesticides

One natural soil and three fill samples were analysed for a range of OCPs and OPPs. The results of the analyses were below the laboratory PQL and less than the SAC.

Waste Classification:

The results of all analyses were less than the SCC1 criteria outlined in the Waste Classification Guidelines 2009.

Polychlorinated Biphenyls (PCBs)

One natural soil and three fill samples were analysed for a range of PCBs. The results of the analyses were below the laboratory PQL and less than the SAC.

Waste Classification:

The results of all analyses were less than the SCC1 criteria outlined in the Waste Classification Guidelines 2009.



Asbestos

One natural soil and three fill samples were screened for the presence of asbestos fibres. The results of the analyses indicated that asbestos fibres were not encountered within the samples and no respirable fibres were detected.

EIS note that fibre cement sheet fragments were observed within the fill material situated on the south section of the site. Samples were not obtained of this material, however, the material potentially contains asbestos fibres.

10.3 Assessment of Analytical QA/QC

The laboratory reports for this investigation have been checked and issued as final by Envirolab Services Pty Ltd, NATA Accreditation No. 2901, Report numbers: 64292 and 64292-A.

A review of the laboratory data including surrogate recovery, repeat analysis, laboratory control sample (LCS) and method blanks indicate that the sample data was reliable.

11 DISCUSSION

The preliminary environmental assessment undertaken for the proposed cycleway development was designed to assess the potential risk for significant, widespread soil contamination at the site.

The historical assessment was undertaken for the site, however the soil assessment was undertaken on samples obtained adjacent to the site. The site inspection was incomplete due to inaccessibility of the site during the field work. As such, assessment of the site for the potential risk of contamination was based on our interpretation of these results and the results of a 2009 assessment of the adjacent Reid Park cycleway.

11.1 Summary of Environmental Assessment of Adjacent Cycleway (Reid Park)

The EIS 2009 Reid Park environmental assessment identified significant volumes of fill along the Parramatta River foreshore to the west of the site. The fill was up to 4m depth in one area and generally contained various gravels, cobbles and boulders, metal, glass, brick, concrete, ash, slag and asbestos cement debris.



Laboratory analysis of soil samples identified heavy metal contamination above the PPIs, blue/green soil containing elevated phosphorus concentrations and significant volumes of asbestos including friable material.

11.2 Site Inspection

Inspection of the site and surrounding properties identified that the site is located within a commercial/industrial area.

The inspection identified up to approximately 2.5m of fill soil on the south boundary of the site which formed the north bank of Parramatta River. The fill contained fibre cement (fibro), bricks, glass, plastic, metal, timber, concrete and slag.

11.3 Summary of Site History Assessment

The site is located within "disturbed terrain" area as indicated on the Prospect/Parramatta River ASS risk map. The proximity of the site to Parramatta River suggests that the fill material at the site may include dredged acid sulfate soil.

The existing building has occupied the since at least 1970 and has been used for commercial/industrial purposes.

Land reclamation/filling works have been undertaken at the site, particularly the south section forming the Parramatta River bank.

Building demolition works have previously been undertaken at the site.

The on-line NSW OEH POEO register indicated that the Eric Primrose Reserve once retained a licence for the generation or storage of hazardous or industrial Group A waste possibly associated with the importation of fill material.

11.4 Summary of Soil Contamination Conditions

11.4.1 Site Assessment Criteria (SAC)

Soil samples were obtained from two boreholes located outside of the site boundary and within the public footpath situated directly to the west of the site. Soil samples obtained for the investigation were analysed for the potential contaminants of concern identified at the site.



Elevated concentrations of contaminants were not encountered in the soil samples analysed for the investigation. All results were below the site assessment criteria (SAC).

11.4.2 PPILs

Two fill samples obtained from the area adjacent to the site contained elevated concentrations of cadmium and nickel above the PPILs.

The PPIL criteria are principally concerned with phytotoxicity (i.e. adverse effects on plant growth in established and proposed areas of landscaping). Heavy metal elevations should be taken into consideration for this site as EIS understand that the proposed development includes landscaped areas and therefore elevated contaminant levels in these areas may influence plant growth.

11.4.3 Waste Classification

Fill Soil

The fill material adjacent to the site was classified as 'General Solid Waste (non-putrescible)' according to the criteria outlined in Waste Classification Guidelines 2009.

It should be noted that if the fill material is found to contain fragments of asbestos containing material the waste classification will be 'General Solid Waste (non-putrescible) containing asbestos'.

Natural Soil

The natural silty clay and silty sand adjacent to the site was classified as virgin excavated natural material (VENM).

12 CONCLUSIONS

The limited sampling undertaken for this study did not encounter any significant contamination issues. However, based on the history of the site/surrounding areas and the results of the EIS 2009 assessment, EIS consider there to be a moderate to high risk for significant widespread soil contamination at the site itself.

EIS consider that the following additional work is should be undertaken in order to provide a more detailed understanding of contamination conditions at the site:

- A detailed inspection of the site including inside the existing building;



- A detailed Stage 2 assessment should be undertaken at the site in order to address SEPP55 requirements. The Stage 2 assessment should include an additional six boreholes drilled within the site in order to meet the minimum sampling density in accordance the EPA Sampling Design Guidelines 1995;
- Soil samples obtained during the Stage 2 assessment should be screened for the contaminants of concern identified in Section 6.2.1 this assessment;
- Soil samples obtained from the site should also be screening for acid sulfate soil conditions;
- The results of the Stage 2 assessment are used to prepare a scope for the management of the site during the proposed development. The scope at this stage is not possible to determine until the Stage 2 assessment had been completed. The scope may include a Remedial Action Plan (RAP), acid sulfate soil management plan, construction management plan and validation assessment; and
- Depending on which cycleway development option is selected some more detailed inspection/sampling of the exposed river bank would be warranted.

13 LIMITATIONS

The boreholes drilled for the investigation have enabled an assessment to be made of the existence of significant, large quantities of contaminated soils of the property adjacent to the site. EIS adopts no responsibility whatsoever for any problems such as underground storage tanks, buried items or contaminated material that may be encountered at the site. The proposed construction activities at the site should be planned on this basis, and any unexpected problem areas that are encountered between boreholes should be immediately inspected by experienced environmental personnel. This should ensure that such problems are dealt with in an appropriate manner, with minimal disruption to the project timetable and budget.

The conclusions developed in this report are based on site conditions which existed at the time of the site assessment and the scope of work outlined previously in this report. They are based on investigation of conditions at specific locations, chosen to be as representative as possible under the given circumstances, and visual observations of the site and vicinity, together with the interpretation of available historical information and documents reviewed as described in this report.

The investigation for this assessment and preparation of this report have been undertaken in accordance with accepted practice for environmental consultants, with reference to applicable environmental regulatory authority and industry standards, guidelines and the assessment criteria outlined previously in this report.



Where information has been provided by third parties, EIS has not undertaken any verification process, except where specifically stated.

EIS has not undertaken any assessment of off-site areas that may be potential contamination sources or may have been impacted by site contamination.

Subsurface conditions encountered between investigation locations may be found to be different from those expected.

Previous use of this site may have involved excavation for the foundations of buildings, services, and similar facilities. In addition, unrecorded excavation and burial of material may have occurred on the site. Backfilling of excavations could have been undertaken with potentially contaminated material that may be discovered in discrete, isolated locations across the site during construction work.

EIS accept no responsibility for potentially asbestos containing materials that may exist at the site. These materials may be associated with demolition of pre-1990 constructed buildings or fill material at the site.

EIS have not and will not make any determination regarding finances associated with the site.

Changes in the proposed or current site use may result in remediation or further investigation being required at the site.

During construction at the site, soil, fill and any unsuspected materials that are encountered should be monitored by qualified environmental and geotechnical engineers to confirm assumptions made on the basis of the limited investigation data, and possible changes in site level and other conditions since the investigation. Soil materials considered to be suitable from a geotechnical point of view may be unsatisfactory from a soil contamination viewpoint, and vice versa.

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Should you require any further information regarding the above, please do not hesitate to contact us.

Yours faithfully

For and on behalf of

ENVIRONMENTAL INVESTIGATION SERVICES

A handwritten signature in black ink, appearing to read 'C Hollands', with a horizontal line underneath.

Cameron Hollands
Environmental Scientist

A handwritten signature in black ink, appearing to read 'A Kingswell', with a horizontal line underneath.

Adrian Kingswell
Senior Associate



ABBREVIATIONS

AAS	Atomic Absorption Spectrometry
AGST	Above Ground Storage Tank
AHD	Australian Height Datum
ANZECC	Australian and New Zealand Environment Conservation Council
ASS	Acid Sulfate Soil
B(a)P	Benzo(a)pyrene
BH	Borehole
BTEX	Benzene, Toluene, Ethyl benzene, Xylene
COC	Chain of Custody documentation
CLM	Contaminated Land Management
DECCW	Department of Environment, Climate Change and Water (formerly DECC, DEC and EPA)
DNR	NSW Department of Natural Resources (now split between DWE and DECCW)
DWE	NSW Department of Water and Energy
DP	Deposited Plan
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA NSW	Environment Protection Authority, New South Wales (now part of DECCW)
GC-ECD	Gas Chromatograph-Electron Capture Detector
GC-FID	Gas Chromatograph-Flame Ionisation Detector
GC-MS	Gas Chromatograph-Mass Spectrometer
HIL	Health Based Investigation Level
HM	Heavy Metals
ICP-AES	Inductively Couple Plasma – Atomic Emission Spectra
NATA	National Association of Testing Authorities, Australia
NEPC	National Environmental Protection Council
NHMRC	National Health and Medical Research Council
OEH	Office of Environment and Heritage
OCPs	Organochlorine Pesticides
OHS (OH&S)	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PID	Photo-ionisation Detector
PPIL	Provisional Phyto-toxicity Investigation Levels
PQL	Practical Quantitation Limit
P&T	Purge & Trap
RAP	Remedial Action Plan
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
SAC	Site Assessment Criteria
SEPP	State Environmental Planning Policy
sPOCAS	suspension Peroxide Oxidation Combined Acidity and Sulfate
SPT	Standard Penetration Test
SWL	Standing Water Level
TCLP	Toxicity Characteristic Leaching Procedure
TP	Test Pit
TPH	Total Petroleum Hydrocarbons
USEPA	United States Environmental Protection Agency
UCL	Upper Confidence Limit
UST	Underground Storage Tank
VOC	Volatile Organic Compounds



IMPORTANT INFORMATION ABOUT THE SITE ASSESSMENT REPORT

These notes have been prepared by EIS to assist with the assessment and interpretation of this report.

An Environmental Assessment Report is Based on a Unique Set of Project Specific Factors:

This report has been prepared in response to specific project requirements as stated in the EIS proposal document which may have been limited by instructions from the client. This report should be reviewed, and if necessary, revised if any of the following occur:

- the proposed land use is altered;
- the defined subject site is increased or sub-divided;
- the proposed development details including size, configuration, location, orientation of the structures are modified;
- the proposed development levels are altered, eg addition of basement levels;
or
- ownership of the site changes.

EIS/J&K will not accept any responsibility whatsoever for situations where one or more of the above factors have changed since completion of the assessment. If the subject site is sold, ownership of the assessment report should be transferred by EIS to the new site owners who will be informed of the conditions and limitations under which the assessment was undertaken. No person should apply an assessment for any purpose other than that originally intended without first conferring with the consultant.

Changes in Subsurface Conditions

Subsurface conditions are influenced by natural geological and hydrogeological process and human activities. Groundwater conditions are likely to vary over time with changes in climatic conditions and human activities within the catchment (eg. water extraction for irrigation or industrial uses, subsurface waste water disposal, construction related dewatering). Soil and groundwater contaminant concentrations may also vary over time through contaminant migration, natural attenuation of organic contaminants, ongoing contaminating activities and placement or removal of fill material. The conclusions of an assessment report may have been affected by the above factors if a significant period of time has elapsed prior to commencement of the proposed development.



This Assessment is Based on Professional Interpretations of Factual Data

Site assessments identify actual subsurface conditions at the actual sampling locations at the time of the investigation. Data obtained from the sampling and subsequent laboratory analyses, available site history information and published regional information is interpreted by geologists, engineers or environmental scientists and opinions are drawn about the overall subsurface conditions, the nature and extent of contamination, the likely impact on the proposed development and appropriate remediation measures.

Actual conditions may differ from those inferred, because no professional, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from predictions. Nothing can be done to prevent the unanticipated, but steps can be taken to help minimise the impact. For this reason, site owners should retain the services of their consultants throughout the development stage of the project, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.

Environmental Site Assessment Limitations

Although information provided by an environmental site assessment can reduce exposure to the risk of the presence of contamination, no environmental site assessment can eliminate the risk. Even a rigorous professional assessment may not detect all contamination on a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which showed no signs of contamination when sampled. Contaminant analysis cannot possibly cover every type of contaminant which may occur; only the most likely contaminants are screened.

Misinterpretation of Environmental Site Assessments by Design Professionals

Costly problems can occur when other design professionals develop plans based on misinterpretation of an environmental assessment report. To minimise problems associated with misinterpretations, the environmental consultant should be retained to work with appropriate professionals to explain relevant findings and to review the adequacy of plans and specifications relevant to contamination issues.

Logs Should not be Separated from the Environmental Assessment Report

Borehole and test pit logs are prepared by environmental scientists, engineers or geologists based upon interpretation of field conditions and laboratory evaluation of field samples. Logs are normally provided in our reports and these should not be re-drawn for inclusion in site remediation or other design drawings, as subtle but



significant drafting errors or omissions may occur in the transfer process. Photographic reproduction can eliminate this problems, however contractors can still misinterpret the logs during bid preparation if separated from the text of the assessment. If this occurs, delays, disputes and unanticipated costs may result. In all cases it is necessary to refer to the text of the report to obtain a proper understanding of the assessment. Please note that logs with the 'Environmental Log' header are not suitable for geotechnical purposes as they have not been peer reviewed by a Senior Geotechnical Engineer.

To reduce the likelihood of borehole and test pit log misinterpretation, the complete assessment should be available to persons or organisations involved in the project, such as contractors, for their use. Denial of such access and disclaiming responsibility for the accuracy of subsurface information does not insulate an owner from the attendant liability. It is critical that the site owner provides all available site information to persons and organisations such as contractors.

Read Responsibility Clauses Closely

Because an environmental site assessment is based extensively on judgement and opinion, it is necessarily less exact than other disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, model clauses have been developed for use in written transmittals. These are definitive clauses designed to indicate consultant responsibility. Their use helps all parties involved recognise individual responsibilities and formulate appropriate action. Some of these definitive clauses are likely to appear in the environmental site assessment, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to any questions.

TABLE A - 2
CHEMICAL CONTAMINANT CRITERIA FOR WASTE CLASSIFICATION
Waste Classification Guidelines. Part 1: Classifying Waste DECC (now OEH) NSW July 2009

GENERAL SOLID WASTE	RESTRICTED SOLID WASTE	HAZARDOUS WASTE
IF $SCC \leq CT1$, TCLP NOT NEEDED TO CLASSIFY AS GENERAL SOLID WASTE	IF $SCC \leq CT2$, TCLP NOT NEEDED TO CLASSIFY AS RESTRICTED SOLID WASTE	IF $SCC > CT2$, TCLP NOT NEEDED TO CLASSIFY AS HAZARDOUS WASTE
IF $TCLP \leq TCLP1$ AND $SCC \leq SCC1$ TREAT AS GENERAL SOLID WASTE	IF $TCLP \leq TCLP2$ AND $SCC \leq SCC2$ TREAT AS RESTRICTED SOLID WASTE	IF $TCLP > TCLP2$ AND/OR $SCC > SCC2$ TREAT AS HAZARDOUS WASTE

CONTAMINANT	GENERAL SOLID WASTE			RESTRICTED SOLID WASTE		
	CT1 (mg/kg)	TCLP1 (mg/L)	SCC1 (mg/kg)	CT2 (mg/kg)	TCLP2 (mg/L)	SCC2 (mg/kg)
Arsenic	100	5	500	400	20	2,000
Beryllium	20	1.0	100	80	4	400
Cadmium	20	1.0	100	80	4	400
Chromium VI	100	5	1,900	400	20	7,600
Cyanide (total)	320	16	5,900	1280	64	23,600
Cyanide (Amenable)	70	3.5	300	280	14	1,200
Fluoride	3,000	150	10,000	12,000	600	40,000
Lead	100	5	1,500	400	20	6,000
Mercury	4	0.2	50	16	0.8	200
Molybdenum	100	5	1,000	400	20	4,000
Nickel	40	2	1,050	160	8	4,200
Selenium	20	1	50	80	4	200
Silver	100	5.0	180	400	20	720
Benzene	10	0.5	18	40	2	72
Toluene	288	14.4	518	1,152	57.6	2,073
Ethylbenzene	600	30	1,080	2,400	120	4,320
Total xylenes	1,000	50	1,800	4,000	200	7,200
Total petroleum hydrocarbons (C6-C9)	-	-	650	-	-	2,600
Total petroleum hydrocarbons (C10-C36) (C10-C14, C15-C28, C29-C36)	-	-	10,000	-	-	40,000
Benzo(a)pyrene	0.8	0.04	10	3.2	0.16	23
Polycyclic aromatic hydrocarbons (Total)	-	-	200	-	-	800
Polychlorinated biphenyls	-	-	<50	-	-	<50
Phenol (nonhalogenated)	288	14.4	518	1,152	57.6	2,073
Scheduled chemicals	-	-	<50	-	-	<50

NOTE:

SCC – Specific Contaminant Concentration

CT – Contaminant Threshold

TCLP – Toxicity Characteristics Leaching Procedure

TABLE B
SUMMARY OF LABORATORY RESULTS
SOIL ASSESSMENT
All data in mg/kg unless stated otherwise

ANALYTE	HEAVY METALS								PAHs		ORGANOCHLORINE PESTICIDES				OP PESTICIDES	PCBs	PETROLEUM HYDROCARBONS										PID VALUES	ASBESTOS FIBRES		
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Total PAHs	B(a)P	Aldrin & Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor			Petroleum Hydrocarbons					Benzene	Toluene	Ethyl benzene	Total Xylenes					
	C ₆ -C ₉	C ₁₀ -C ₁₄	C ₁₅ -C ₂₈	C ₂₉ -C ₃₆	C ₁₀ -C ₃₆																									
PQL - Envirolab Services	4	0.5	1	1	1	0.1	1	1	-	0.05	0.1	0.1	0.1	0.1	0.1	0.1	25	50	100	100	250	0.5	0.5	1	3	100				
Site Assessment Criteria ^	200 *	40 *	24% *	2000 *	600 *	30 *	600 *	14000 *	40 *	2 *	20 *	100 *	400 *	20 *	0.1 ^^	20 *	65 #	nsi	nsi	nsi	1000 #	1 #	1.4 #	3.1 #	14 #	100^^				
PPILs	20 **	3 **	400 **	100 **	600 **	1 **	60 **	200 **	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	nsi	-				
General Solid Waste CT1†	100	20	100	nsi	100	4	40	nsi	nsi	0.8	nsi				nsi	nsi	nsi			nsi	10	288	600	1000	-	-				
Sample Reference	Sample Depth (m)	Sample Description	LPQL	0.7	22	27	17	LPQL	61	32	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	LPQL	
BH1	0.3-0.5	Fill	4	LPQL	21	5	17	LPQL	7	5	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	LPQL	
BH2	0.4-0.5	Fill	LPQL	8.9	19	51	31	LPQL	120	58	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	LPQL	
BH2	1.2-1.3	Silty clay	LPQL	LPQL	11	6	9	LPQL	5	9	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	LPQL	0	LPQL	
Total Number of samples			4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Maximum Value			4	8.9	22	51	31	0	120	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	nc

EXPLANATION:
 ^ Site Assessment Criteria: Guideline concentrations adopted for the investigation as outlined below:
 * National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPC Guidelines)
 Health Investigation Levels (HIL) - Column E, Parks, recreational open space
 ** Provisional Phyto-toxicity Investigation Levels (PPILs)
 # NSW DECC Guidelines for Assessing Service Station Sites (1994)
 ^^ In the absence of Australian guidelines, the laboratory PQL has been adopted as the site assessment criteria
 † NSW DECCW Waste Classification Guidelines (2009)

Concentration above the Site Assessment Criteria **VALUE**
 Concentration above PPILs **VALUE**

ABBREVIATIONS:
 PAHs: Polycyclic Aromatic Hydrocarbons
 B(a)P: Benzo(a)pyrene na: Not Analysed
 PQL: Practical Quantitation Limit nc: Not Calculated
 LPQL: Less than PQL nsl: No Set Limit
 OP: Organophosphorus Pesticides
 PID: Photoionisation Detector
 PCBs: Polychlorinated Biphenyls



TABLE C
 SUMMARY OF LABORATORY RESULTS
 TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)
 All data in mg/L unless stated otherwise

ANALYTE		Nickel
PQL - Envirolab Services		0.02
TCLP1 - General Solid Waste *		2
Sample Reference	Sample Depth (m)	
BH1	0.3-0.5	0.07
BH2	0.4-0.5	0.1
Total Number of samples		2
Maximum Value		0.1

EXPLANATION:

* NSW DECCW Waste Classification Guidelines (2009)

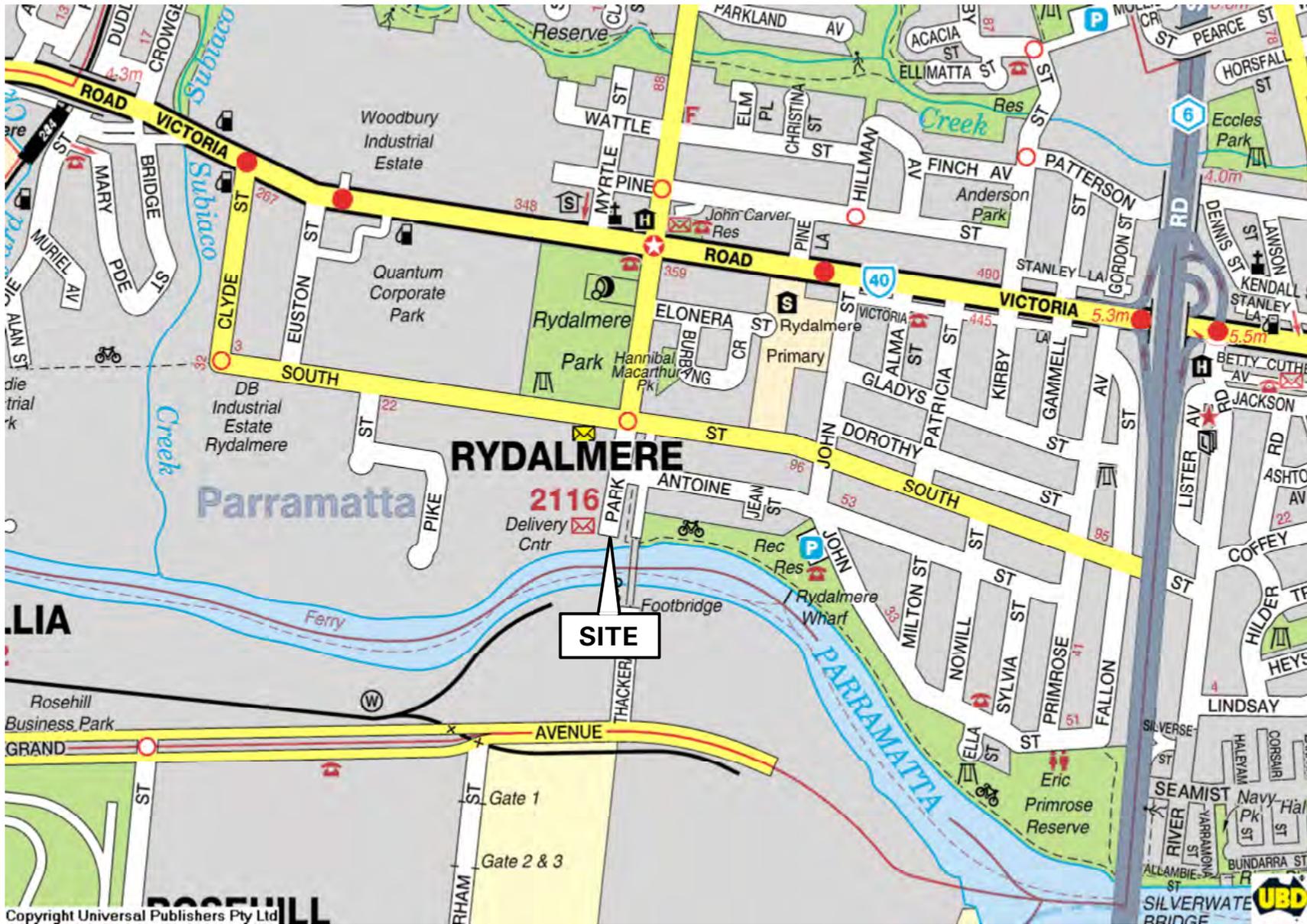
Concentration above the General Solid Waste value **100**

Concentration above the Restricted Solid Waste value 100

ABBREVIATIONS:

PQL: Practical Quantitation Limit

LPQL: Less than PQL

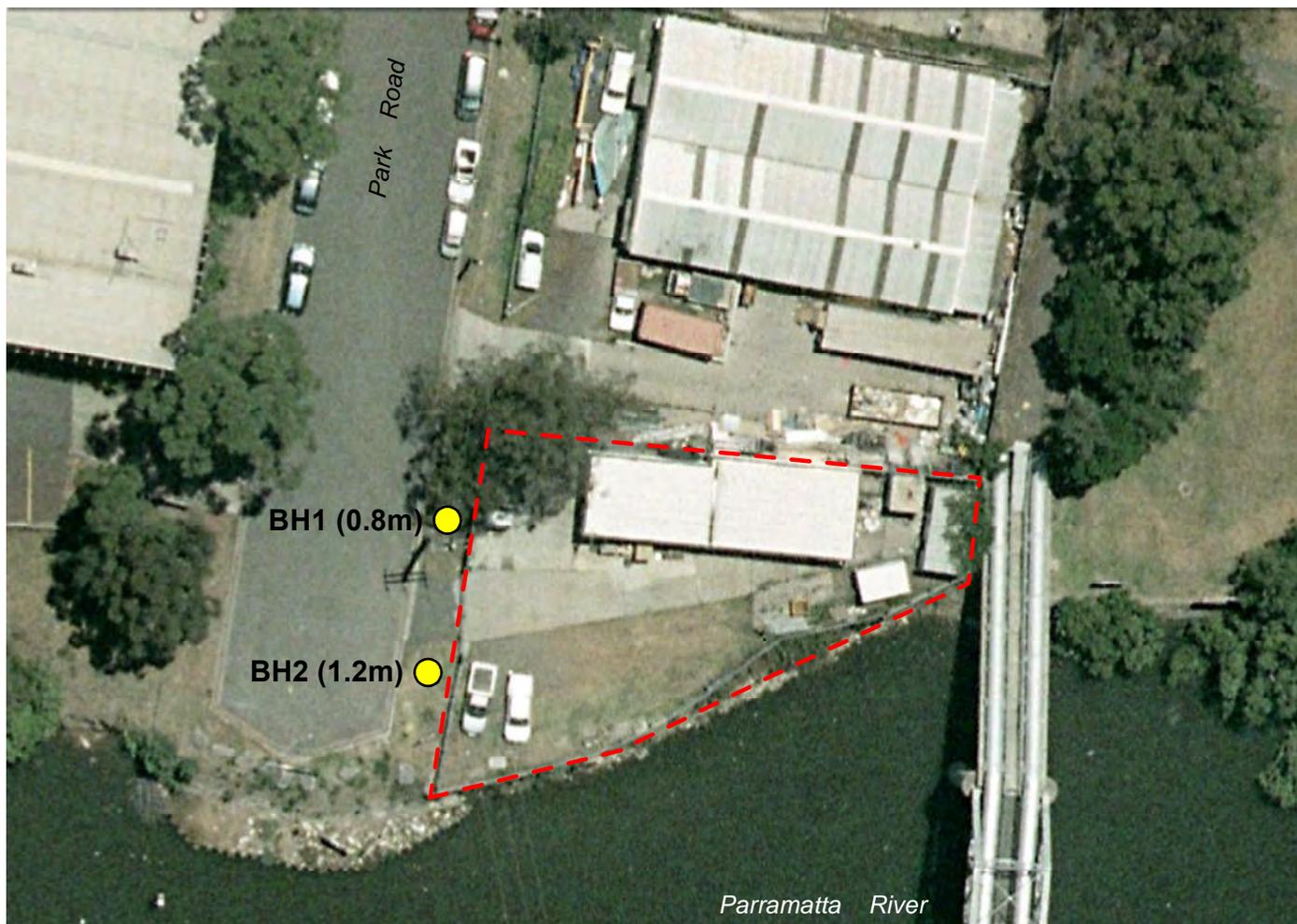


NOTES:
 Figure 1 has been recreated from UBD on disc (version 5.0). Figure is not to scale.

UBD Map ref: 212 B4

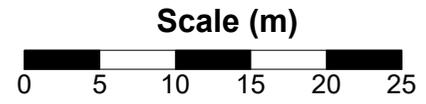
Reference should be made to the report text for a full understanding of this plan.

	Project Number: E25326K	Title: SITE LOCATION PLAN
	Figure: 1	Address: 1 PARK ROAD RYDALMERE, NSW, 2116



KEY

- BH1 (0.8m) Borehole location, number and depth of fill
- Approximate site boundary

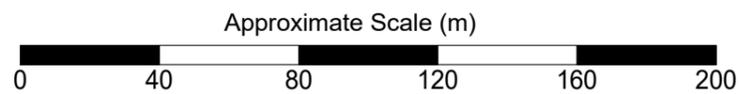


NOTES:
Figure 2 has been recreated from Google Earth Pro

The borehole locations presented on this plan have been established from site measurements only and should not be construed as survey points.

Reference should be made to the report text for a full understanding of this plan.

	Project Number: E25326K	Title: BOREHOLE LOCATION PLAN
	Figure: 2	Address: 1 PARK ROAD RYDALMERE, NSW, 2116



Note: Reference should be made to EIS report E23649K for a full understanding of this plan

Base image courtesy of Google Earth Pro

LEGEND:	
	BH1 BOREHOLE LOCATION AND NUMBER
	TP101 TEST PIT LOCATION AND NUMBER
	APPROXIMATE SITE BOUNDARY

Borehole and Test Pit Location Plan (Previous EIS Environmental Assessment - Reid Park South)



ENVIRONMENTAL
INVESTIGATION
SERVICES

Job No: E25326K
Figure: 3



APPENDIX A

(Borehole Logs and Geotechnical Explanatory Notes)



Borehole No.

1

1/1

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Client: PARRAMATTA CITY COUNCIL
Project: PROPOSED CYCLEWAY DEVELOPMENT - REID PARK EXTENSION
Location: 1 PARK ROAD, RYDALMERE

Job No. E25326K **Method:** GEOPROBE-DIRECT PUSH TUBE **R.L. Surface:** N/A
Date: 2-11-11 **Datum:**
Logged/Checked by: C.H. / *[Signature]*

Groundwater Record	SAMPLES			Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
	ES	ASS	ASB									
DRY ON COMPLETION	[Pattern]	[Pattern]	[Pattern]	[Pattern]	0	[Cross-hatch]		FILL: Silty sand, fine to medium grained, brown, with root fibres and igneous gravel.	D			GRASS COVER HAND AUGER TO 1.1m DEPTH
					1	[Diagonal lines]	CL	FILL: Clayey silt, medium plasticity, light brown, with igneous and slag gravel. SILTY CLAY: medium plasticity, light brown mottled red brown, trace of ironstone gravel.	MC < PL MC < PL			
					2	[Diagonal lines]						
					3			END OF BOREHOLE AT 2.6m				
					4							
					5							
					6							
					7							



Borehole No.

2

1/1

ENVIRONMENTAL LOG

Environmental logs are not to be used for geotechnical purposes

Client: PARRAMATTA CITY COUNCIL
Project: PROPOSED CYCLEWAY DEVELOPMENT - REID PARK EXTENSION
Location: 1 PARK ROAD, RYDALMERE

Job No. E25326K **Method:** GEOPROBE-DIRECT PUSH TUBE **R.L. Surface:** N/A
Date: 2-11-11 **Datum:**
Logged/Checked by: C.H. / *[Signature]*

Groundwater Record	ES ASS ASB SAL	Field Tests	Depth (m)	Graphic Log	Unified Classification	DESCRIPTION	Moisture Condition/Weathering	Strength/Rel. Density	Hand Penetrometer Readings (kPa.)	Remarks
			0			FILL: Silty sand, fine to medium grained, dark brown, with igneous gravel, ceramic, concrete fragments.	D			IGNEOUS GRAVEL COVER
			1			FILL: Silty clay, medium plasticity, brown mottled red brown, with igneous and concrete gravel, trace of ash.	MC > PL			HAND AUGER TO 1.1m DEPTH
			2		CL	SILTY CLAY: medium plasticity, grey mottled red brown, trace of ironstone gravel.	MC > PL			
			3		SM	SILTY SAND: fine to medium grained, yellow brown.	M			
			4			END OF BOREHOLE AT 3.7m				
			5							
			6							
			7							



REPORT EXPLANATION NOTES

INTRODUCTION

These notes have been provided to amplify the geotechnical report in regard to classification methods, field procedures and certain matters relating to the Comments and Recommendations section. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited facts about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such facts obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, the SAA Site Investigation Code. In general, descriptions cover the following properties – soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the grading of other particles present (eg sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silt	0.002 to 0.06mm
Sand	0.06 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density, generally from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very loose	less than 4
Loose	4 – 10
Medium dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 – 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 – 400
Hard	Greater than 400
Friable	Strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc. Where relevant, further information regarding rock classification is given in the text of the report. In the Sydney Basin, 'Shale' is used to describe thinly bedded to laminated siltstone.

SAMPLING

Sampling is carried out during drilling or from other excavations to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon the degree of disturbance, some information on strength and structure. Bulk samples are similar but of greater volume required for some test procedures.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application. All except test pits, hand auger drilling and portable dynamic cone penetrometers require the use of a mechanical drilling rig which is commonly mounted on a truck chassis.



Test Pits: These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to about 3m for a backhoe and up to 6m for an excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling: A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as hard clay, gravel or ironstone, and does not necessarily indicate rock level.

Continuous Spiral Flight Augers: The borehole is advanced using 75mm to 115mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights, but they can be very disturbed and layers may become mixed. Information from the auger sampling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively lower reliability due to mixing or softening of samples by groundwater, or uncertainties as to the original depth of the samples. Augering below the groundwater table is of even lesser reliability than augering above the water table.

Rock Augering: Use can be made of a Tungsten Carbide (TC) bit for auger drilling into rock to indicate rock quality and continuity by variation in drilling resistance and from examination of recovered rock fragments. This method of investigation is quick and relatively inexpensive but provides only an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is usually advanced by a rotary bit, with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration.

Mud Stabilised Drilling: Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilise the borehole. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from intermittent intact sampling (eg from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. Provided full core recovery is achieved (which is not always possible in very low strength rocks and granular soils), this technique provides a very reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel, which gives a core of about 50mm diameter, is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The location of losses are determined on site by the supervising engineer; where the location is uncertain, the loss is placed at the top end of the drill run.

Standard Penetration Tests: Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils as a means of indicating density or strength and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposes" – Test F3.1.

The test is carried out in a borehole by driving a 50mm diameter split sample tube with a tapered shoe, under the impact of a 63kg hammer with a free fall of 760mm. It is normal for the tube to be driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense sands, very hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of, say, 4, 6 and 7 blows, as
$$N = 13$$
$$4, 6, 7$$
- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as
$$N > 30$$
$$15, 30/40\text{mm}$$

The results of the test can be related empirically to the engineering properties of the soil.

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, the test results are shown on the borehole logs in brackets.

A modification to the SPT test is where the same driving system is used with a solid 60° tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid Cone Penetration Test (SCPT) are shown as "N_c" on the borehole logs, together with the number of blows per 150mm penetration.



Static Cone Penetrometer Testing and Interpretation:

Cone penetrometer testing (sometimes referred to as a Dutch Cone) described in this report has been carried out using an Electronic Friction Cone Penetrometer (EFCP). The test is described in Australian Standard 1289, Test F5.1.

In the tests, a 35mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a specially designed truck or rig which is fitted with an hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the frictional resistance on a separate 134mm long sleeve, immediately behind the cone. Transducers in the tip of the assembly are electrically connected by wires passing through the centre of the push rods to an amplifier and recorder unit mounted on the control truck.

As penetration occurs (at a rate of approximately 20mm per second) the information is output as incremental digital records every 10mm. The results given in this report have been plotted from the digital data.

The information provided on the charts comprise:

- Cone resistance – the actual end bearing force divided by the cross sectional area of the cone – expressed in MPa.
- Sleeve friction – the frictional force on the sleeve divided by the surface area – expressed in kPa.
- Friction ratio – the ratio of sleeve friction to cone resistance, expressed as a percentage.

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and occasionally very soft clays, rising to 4% to 10% in stiff clays and peats. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Correlations between EFCP and SPT values can be developed for both sands and clays but may be site specific.

Interpretation of EFCP values can be made to empirically derive modulus or compressibility values to allow calculation of foundation settlements.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive. The test method provides a continuous profile of engineering properties but, where precise information on soil classification is required, direct drilling and sampling may be preferable.

Portable Dynamic Cone Penetrometers: Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a sliding hammer and counting the blows for successive 100mm increments of penetration.

Two relatively similar tests are used:

- Cone penetrometer (commonly known as the Scala Penetrometer) – a 16mm rod with a 20mm diameter cone end is driven with a 9kg hammer dropping 510mm (AS1289, Test F3.2). The test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various Road Authorities.
- Perth sand penetrometer – a 16mm diameter flat ended rod is driven with a 9kg hammer, dropping 600mm (AS1289, Test F3.3). This test was developed for testing the density of sands (originating in Perth) and is mainly used in granular soils and filling.

LOGS

The borehole or test pit logs presented herein are an engineering and/or geological interpretation of the sub-surface conditions, and their reliability will depend to some extent on the frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will enable the most reliable assessment, but is not always practicable or possible to justify on economic grounds. In any case, the boreholes or test pits represent only a very small sample of the total subsurface conditions.

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than “straight line” variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

Where groundwater levels are measured in boreholes, there are several potential problems:

- Although groundwater may be present, in low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must be washed out of the hole or ‘reverted’ chemically if water observations are to be made.



If these occur, the company will be pleased to assist with investigation or advice to resolve any problems occurring.

More reliable measurements can be made by installing standpipes which are read after stabilising at intervals ranging from several days to perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (eg bricks, steel etc) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is of importance to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 *'Methods of Testing Soil for Engineering Purposes'*. Details of the test procedure used are given on the individual report forms.

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal (eg. a three storey building) the information and interpretation may not be relevant if the design proposal is changed (eg to a twenty storey building). If this happens, the company will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical aspects and recommendations or suggestions for design and construction. However, the Company cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions – the potential for this will be partially dependent on borehole spacing and sampling frequency as well as investigation technique.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of persons or contractors responding to commercial pressures.

SITE ANOMALIES

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, the company requests that it immediately be notified. Most problems are much more readily resolved when conditions are exposed that at some later stage, well after the event.

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document *'Guidelines for the Provision of Geotechnical Information in Tender Documents'*, published by the Institution of Engineers, Australia. Where information obtained from this investigation is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. The company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Copyright in all documents (such as drawings, borehole or test pit logs, reports and specifications) provided by the Company shall remain the property of Jeffery and Katauskas Pty Ltd. Subject to the payment of all fees due, the Client alone shall have a licence to use the documents provided for the sole purpose of completing the project to which they relate. License to use the documents may be revoked without notice if the Client is in breach of any objection to make a payment to us.

REVIEW OF DESIGN

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/ constraints are quite complex, it is prudent to have a joint design review which involves a senior geotechnical engineer.

SITE INSPECTION

The company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

Requirements could range from:

- i) a site visit to confirm that conditions exposed are no worse than those interpreted, to
- ii) a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or
- iii) full time engineering presence on site.

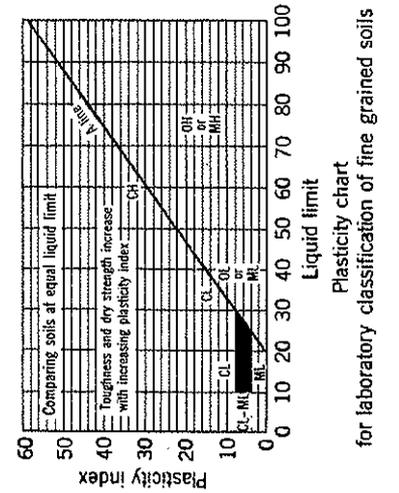
GRAPHIC LOG SYMBOLS FOR SOILS AND ROCKS

SOIL		ROCK		DEFECTS AND INCLUSIONS	
	FILL		CONGLOMERATE		CLAY SEAM
	TOPSOIL		SANDSTONE		SHEARED OR CRUSHED SEAM
	CLAY (CL, CH)		SHALE		BRECCIATED OR SHATTERED SEAM/ZONE
	SILT (ML, MH)		SILTSTONE, MUDSTONE, CLAYSTONE		IRONSTONE GRAVEL
	SAND (SP, SW)		LIMESTONE		ORGANIC MATERIAL
	GRAVEL (GP, GW)		PHYLLITE, SCHIST	OTHER MATERIALS	
	SANDY CLAY (CL, CH)		TUFF		CONCRETE
	SILTY CLAY (CL, CH)		GRANITE, GABBRO		BITUMINOUS CONCRETE, COAL
	CLAYEY SAND (SC)		DOLERITE, DIORITE		COLLUVIUM
	SILTY SAND (SM)		BASALT, ANDESITE		
	GRAVELLY CLAY (CL, CH)		QUARTZITE		
	CLAYEY GRAVEL (GC)				
	SANDY SILT (ML)				
	PEAT AND ORGANIC SOILS				



UNIFIED SOIL CLASSIFICATION TABLE

Field Identification Procedures (Excluding particles larger than 75 µm and basing fractions on estimated weights)		Group Symbols	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Gravels More than half of coarse fraction is larger than 4 mm sieve size	Clean gravels (little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses	$C_u = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for GP
	Gravels with appreciable amount of fines				
Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures	For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: Silty sand, gravelly; about 20% hard, angular gravel particles 12 mm maximum size; rounded and subangular sand grains coarse to fine, about 15% non-plastic fines with low dry strength; well compacted and moist in place; alluvial sand; (SM)	$C_u = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for SW
	Sands with appreciable amount of fines				
Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	SW	Well graded sands, gravelly sands, little or no fines	Depending on percentage of fines (fraction smaller than 75 µm sieve size) coarse grained soils are classified as follows: Less than 5% GW, GP, SM, SP More than 5% to 12% GM, GC, SW, SC 5% to 12% with increasing use of dual symbols	Determine percentages of gravel and sand from grain size curve Use grain size curve in identifying the fractions as given under field identification
	Sands with appreciable amount of fines				
Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	SM	Silty sands, poorly graded sand-silt mixtures	Depending on percentage of fines (fraction smaller than 75 µm sieve size) coarse grained soils are classified as follows: Less than 5% GW, GP, SM, SP More than 5% to 12% GM, GC, SW, SC 5% to 12% with increasing use of dual symbols	Determine percentages of gravel and sand from grain size curve Use grain size curve in identifying the fractions as given under field identification
	Sands with appreciable amount of fines				
Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey, fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: Clayey silt, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (ML)	Determine percentages of gravel and sand from grain size curve Use grain size curve in identifying the fractions as given under field identification
	Sands with appreciable amount of fines				
Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	OL	Organic silts and organic silts of low plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: Clayey silt, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (ML)	Determine percentages of gravel and sand from grain size curve Use grain size curve in identifying the fractions as given under field identification
	Sands with appreciable amount of fines				
Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	CH	Inorganic clays of high plasticity, fat clays	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: Clayey silt, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (ML)	Determine percentages of gravel and sand from grain size curve Use grain size curve in identifying the fractions as given under field identification
	Sands with appreciable amount of fines				
Sands More than half of coarse fraction is smaller than 4 mm sieve size	Clean sands (little or no fines)	PT	Peat and other highly organic soils	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; colour in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remoulded states, moisture and drainage conditions Example: Clayey silt, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (ML)	Determine percentages of gravel and sand from grain size curve Use grain size curve in identifying the fractions as given under field identification
	Sands with appreciable amount of fines				



NOTE: 1) Soils possessing characteristics of two groups are designated by combinations of group symbols (e.g. GW-GC, well graded gravel-sand mixture with clay fines).

2) Soils with liquid limits of the order of 35 to 50 may be visually classified as being of medium plasticity.

Jeffery and Katauskas Pty Ltd

CONSULTING GEOTECHNICAL AND ENVIRONMENTAL ENGINEERS

A.B.N. 17 003 550 801

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LOG SYMBOLS

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely weathered rock	XW	Rock is weathered to such an extent that it has "soil" properties, ie it either disintegrates or can be remoulded, in water.
Distinctly weathered rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by ironstaining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Slightly weathered rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh rock	FR	Rock shows no sign of decomposition or staining.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Journal of Rock Mechanics, Mining, Science and Geomechanics. Abstract Volume 22, No 2, 1985.

TERM	SYMBOL	Is (50) MPa	FIELD GUIDE
Extremely Low:	EL	0.03	Easily remoulded by hand to a material with soil properties.
Very Low:	VL	0.1	May be crumbled in the hand. Sandstone is "sugary" and friable.
Low:	L	0.3	A piece of core 150mm long x 50mm dia. may be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.
Medium Strength:	M	1	A piece of core 150mm long x 50mm dia. can be broken by hand with difficulty. Readily scored with knife.
High:	H	3	A piece of core 150mm long x 50mm dia. core cannot be broken by hand, can be slightly scratched or scored with knife; rock rings under hammer.
Very High:	VH	10	A piece of core 150mm long x 50mm dia. may be broken with hand-held pick after more than one blow. Cannot be scratched with pen knife; rock rings under hammer.
Extremely High:	EH		A piece of core 150mm long x 50mm dia. is very difficult to break with hand-held hammer. Rings when struck with a hammer.

ABBREVIATIONS USED IN DEFECT DESCRIPTION

ABBREVIATION	DESCRIPTION	NOTES
Be	Bedding Plane Parting	Defect orientations measured relative to the normal to the long core axis (ie relative to horizontal for vertical holes)
CS	Clay Seam	
J	Joint	
P	Planar	
Un	Undulating	
S	Smooth	
R	Rough	
IS	Ironstained	
XWS	Extremely Weathered Seam	
Cr	Crushed Seam	
60t	Thickness of defect in millimetres	

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LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION	
Groundwater Record		Standing water level. Time delay following completion of drilling may be shown.	
		Extent of borehole collapse shortly after drilling.	
		Groundwater seepage into borehole or excavation noted during drilling or excavation.	
Samples	ES	Soil sample taken over depth indicated, for environmental analysis.	
	U50	Undisturbed 50mm diameter tube sample taken over depth indicated.	
	DB	Bulk disturbed sample taken over depth indicated.	
	DS	Small disturbed bag sample taken over depth indicated.	
Field Tests	N = 17 4, 7, 10	Standard Penetration Test (SPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration. 'R' as noted below.	
	N _c =	5	Solid Cone Penetration Test (SCPT) performed between depths indicated by lines. Individual figures show blows per 150mm penetration for 60 degree solid cone driven by SPT hammer. 'R' refers to apparent hammer refusal within the corresponding 150mm depth increment.
		7	
		3R	
VNS = 25 PID = 100	Vane shear reading in kPa of Undrained Shear Strength. Photoionisation detector reading in ppm (Soil sample headspace test).		
Moisture Condition (Cohesive Soils) (Cohesionless Soils)	MC > PL	Moisture content estimated to be greater than plastic limit.	
	MC ≈ PL	Moisture content estimated to be approximately equal to plastic limit.	
	MC < PL	Moisture content estimated to be less than plastic limit.	
	D	DRY - runs freely through fingers.	
	M	MOIST - does not run freely but no free water visible on soil surface.	
	W	WET - free water visible on soil surface.	
	()	Bracketed symbol indicates estimated consistency based on tactile examination or other tests.	
Strength (Consistency) Cohesive Soils	VS	VERY SOFT - Unconfined compressive strength less than 25kPa	
	S	SOFT - Unconfined compressive strength 25-50kPa	
	F	FIRM - Unconfined compressive strength 50-100kPa	
	St	STIFF - Unconfined compressive strength 100-200kPa	
	VSt	VERY STIFF - Unconfined compressive strength 200-400kPa	
	H	HARD - Unconfined compressive strength greater than 400kPa	
	()	Bracketed symbol indicates estimated consistency based on tactile examination or other tests.	
Density Index/ Relative Density (Cohesionless Soils)		Density Index (I_d) Range (%) SPT 'N' Value Range (Blows/300mm)	
	VL	Very Loose < 15 0-4	
	L	Loose 15-35 4-10	
	MD	Medium Dense 35-65 10-30	
	D	Dense 65-85 30-50	
	VD	Very Dense > 85 > 50	
	()	Bracketed symbol indicates estimated density based on ease of drilling or other tests.	
Hand Penetrometer Readings	300	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.	
	250		
Remarks	'V' bit	Hardened steel 'V' shaped bit.	
	'TC' bit	Tungsten carbide wing bit.	
	T 60	Penetration of auger string in mm under static load of rig applied by drill head hydraulics without rotation of augers.	



APPENDIX B
(Laboratory Reports and Chain of Custody Documents)



Envirolab Services Pty Ltd
ABN 37 112 535 645
12 Ashley St Chatswood NSW 2067
ph 02 9910 6200 fax 02 9910 6201
enquiries@envirolabservices.com.au
www.envirolabservices.com.au

CERTIFICATE OF ANALYSIS

64292

Client:

Environmental Investigation Services
PO Box 976
North Ryde BC
NSW 1670

Attention: Cameron Hollands

Sample log in details:

Your Reference: **E25326K, Proposed Cycleway Rydalmere**
No. of samples: 13 Soils
Date samples received / completed instructions received 2/11/2011 / 2/11/2011

Analysis Details:

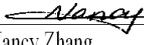
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last page of this report for any comments relating to the results.

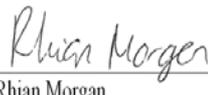
Report Details:

Date results requested by: / Issue Date: 9/11/11 / 7/11/11
Date of Preliminary Report: Not issued
NATA accreditation number 2901. This document shall not be reproduced except in full.
Accredited for compliance with ISO/IEC 17025. **Tests not covered by NATA are denoted with *.**

Results Approved By:


Jacinta Hurst
Laboratory Manager


Nancy Zhang
Chemist


Rhian Morgan
Reporting Supervisor


Hinoko Miyazaki
Chemist


Lulu Guo
Approved Signatory

Envirolab Reference: 64292
Revision No: R 00



vTRH & BTEX in Soil		64292-1	64292-2	64292-8	64292-11
Our Reference:	UNITS	BH1	BH1	BH2	BH2
Your Reference:	-----	BH1	BH1	BH2	BH2
Depth	-----	0.3-0.5	0.6-0.8	0.4-0.5	1.2-1.3
Date Sampled		2/11/2011	2/11/2011	2/11/2011	2/11/2011
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011
Date analysed	-	05/11/2011	05/11/2011	05/11/2011	05/11/2011
vTRHC ₆ - C ₉	mg/kg	<25	<25	<25	<25
Benzene	mg/kg	<0.2	<0.2	<0.2	<0.2
Toluene	mg/kg	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	mg/kg	<1	<1	<1	<1
m+p-xylene	mg/kg	<2	<2	<2	<2
o-Xylene	mg/kg	<1	<1	<1	<1
Surrogate aaa-Trifluorotoluene	%	96	107	108	107

sTRH in Soil (C10-C36)	UNITS	64292-1	64292-2	64292-8	64292-11
Our Reference:	-----	BH1	BH1	BH2	BH2
Your Reference	-----	0.3-0.5	0.6-0.8	0.4-0.5	1.2-1.3
Depth					
Date Sampled		2/11/2011	2/11/2011	2/11/2011	2/11/2011
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011
Date analysed	-	04/11/2011	04/11/2011	04/11/2011	04/11/2011
TRHC ₁₀ - C ₁₄	mg/kg	<50	<50	<50	<50
TRHC ₁₅ - C ₂₈	mg/kg	<100	<100	<100	<100
TRHC ₂₉ - C ₃₆	mg/kg	<100	<100	<100	<100
Surrogate o-Terphenyl	%	103	104	103	98

PAHs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	64292-1 BH1 0.3-0.5 2/11/2011 Soil	64292-2 BH1 0.6-0.8 2/11/2011 Soil	64292-8 BH2 0.4-0.5 2/11/2011 Soil	64292-11 BH2 1.2-1.3 2/11/2011 Soil
Date extracted	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011
Date analysed	-	04/11/2011	04/11/2011	04/11/2011	04/11/2011
Naphthalene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(b+k)fluoranthene	mg/kg	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	mg/kg	<0.05	<0.05	<0.05	<0.05
Indeno(1,2,3-c,d)pyrene	mg/kg	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	mg/kg	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-d ₁₄	%	120	116	119	123

Organochlorine Pesticides in soil					
Our Reference:	UNITS	64292-1	64292-2	64292-8	64292-11
Your Reference	-----	BH1	BH1	BH2	BH2
Depth	-----	0.3-0.5	0.6-0.8	0.4-0.5	1.2-1.3
Date Sampled		2/11/2011	2/11/2011	2/11/2011	2/11/2011
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011
Date analysed	-	05/11/2011	05/11/2011	05/11/2011	05/11/2011
HCB	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
beta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor	mg/kg	<0.1	<0.1	<0.1	<0.1
delta-BHC	mg/kg	<0.1	<0.1	<0.1	<0.1
Aldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Heptachlor Epoxide	mg/kg	<0.1	<0.1	<0.1	<0.1
gamma-Chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
alpha-chlordane	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan I	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDE	mg/kg	<0.1	<0.1	<0.1	<0.1
Dieldrin	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDD	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan II	mg/kg	<0.1	<0.1	<0.1	<0.1
pp-DDT	mg/kg	<0.1	<0.1	<0.1	<0.1
Endrin Aldehyde	mg/kg	<0.1	<0.1	<0.1	<0.1
Endosulfan Sulphate	mg/kg	<0.1	<0.1	<0.1	<0.1
Methoxychlor	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	103	103	99	99

Organophosphorus Pesticides	UNITS	64292-1	64292-2	64292-8	64292-11
Our Reference:		64292-1	64292-2	64292-8	64292-11
Your Reference	-----	BH1	BH1	BH2	BH2
Depth	-----	0.3-0.5	0.6-0.8	0.4-0.5	1.2-1.3
Date Sampled		2/11/2011	2/11/2011	2/11/2011	2/11/2011
Type of sample		Soil	Soil	Soil	Soil
Date extracted	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011
Date analysed	-	05/11/2011	05/11/2011	05/11/2011	05/11/2011
Diazinon	mg/kg	<0.1	<0.1	<0.1	<0.1
Dimethoate	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos-methyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ronnel	mg/kg	<0.1	<0.1	<0.1	<0.1
Chlorpyriphos	mg/kg	<0.1	<0.1	<0.1	<0.1
Fenitrothion	mg/kg	<0.1	<0.1	<0.1	<0.1
Bromophos-ethyl	mg/kg	<0.1	<0.1	<0.1	<0.1
Ethion	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	103	103	99	99

PCBs in Soil Our Reference: Your Reference Depth Date Sampled Type of sample	UNITS ----- -----	64292-1 BH1 0.3-0.5 2/11/2011 Soil	64292-2 BH1 0.6-0.8 2/11/2011 Soil	64292-8 BH2 0.4-0.5 2/11/2011 Soil	64292-11 BH2 1.2-1.3 2/11/2011 Soil
Date extracted	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011
Date analysed	-	05/11/2011	05/11/2011	05/11/2011	05/11/2011
Arochlor 1016	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1221*	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1232	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1242	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1248	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1254	mg/kg	<0.1	<0.1	<0.1	<0.1
Arochlor 1260	mg/kg	<0.1	<0.1	<0.1	<0.1
Surrogate TCLMX	%	103	103	99	99

Acid Extractable metals in soil					
Our Reference:	UNITS	64292-1	64292-2	64292-8	64292-11
Your Reference	-----	BH1	BH1	BH2	BH2
Depth	-----	0.3-0.5	0.6-0.8	0.4-0.5	1.2-1.3
Date Sampled		2/11/2011	2/11/2011	2/11/2011	2/11/2011
Type of sample		Soil	Soil	Soil	Soil
Date digested	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011
Date analysed	-	03/11/2011	03/11/2011	03/11/2011	03/11/2011
Arsenic	mg/kg	<4	4	<4	<4
Cadmium	mg/kg	0.7	<0.5	8.9	<0.5
Chromium	mg/kg	22	21	19	11
Copper	mg/kg	27	5	51	6
Lead	mg/kg	17	17	31	9
Mercury	mg/kg	<0.1	<0.1	<0.1	<0.1
Nickel	mg/kg	61	7	120	5
Zinc	mg/kg	32	5	58	9