

ELECTROLYSIS RISK REPORT

88 WATERLOO ROAD, MACQUARIE PARK NSW 2113

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DATE: 9 February 2026



PURPOSE AND SCOPE

This document was developed to address the following requirements:

- To outline the methodology Corrosion Control Engineering employees followed during the inspection.
- Present and discuss the results of the inspection.
- Provide recommendations based on our findings

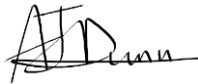
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Royce Lucero

Email: royce.lucero@billbergia.com.au

Phone: 0422 124 959

TECHNICAL REVIEW

CONSULTED PERSON	POSITION/CERTIFICATION	SIGNATURE
Andrew Chapman	Corrosion Engineer NACE Cathodic Protection Technologist #202222	
Adam Dunn	Corrosion Engineer NACE Cathodic Protection Technologist (#200553)	

DOCUMENT CONTROL

REVISION	DATE	REASON FOR ISSUE	PREPARED	QUALITY CHECK	TECHNICAL APPROVAL
0	27/03/2024	First Issue	A. Chapman	R. Shrestha	D. Sunjaya
A	03/07/2024	Revised entity name	A. Chapman	A. Chapman	A. Chapman
B	09/02/2026	Updated drawings and entity name	A. Dunn	A. Dunn	A. Dunn

UPDATES SINCE LAST REVISION

New document

Executive Summary

This electrolysis risk report has been prepared by Corrosion Control Engineering (Holdings) Pty Ltd (CCE) to accompany a State Significant Development Application (SSDA) and concurrent Rezoning Proposal – SSD-94006708 for a mixed-use development identified at 15-21 Cottonwood Crescent, Macquarie Park (the site).

The proposal includes provision for the demolition of existing buildings and construction of a residential development comprising two residential flat buildings above a common basement car park / sleaved podium incorporating residential, car parking, and a retail component within the Waterloo Road frontage and provision of 10% affordable housing.

The legal description of the site is outlined in Table 1 below.

Property Address	Title Description
15 Cottonwood Crescent, Macquarie Park	SP8144
17 Cottonwood Crescent, Macquarie Park	SP7630
19 Cottonwood Crescent, Macquarie Park	SP7892
21 Cottonwood Crescent, Macquarie Park	SP7984

Note: for the purposes of reporting and branding of the proposal, we will also refer to the site as '88 Waterloo Road, Macquarie Park'.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-94006708).

This report concludes that the proposed development is suitable and warrants approval subject to the implementation of the following planned management and mitigation measures:

1. The installation of heavy plastic membrane (e.g. Fortecon) under (or behind) all reinforced concrete slabs, permanent retaining walls, permanent anchors, piers/piles, and metallic posts/bollards to electrically isolate from soil and stray currents. *Note, this may not always be possible/practical at piers/piles or when friction is relied upon for structural purposes.*
2. Ensure the high strength (minimum 32 MPa), high cover (minimum 50 mm) concrete is used to effectively prevent/limit soil moisture penetrating through to the steel/metal.
3. The use of plastic, rather than metallic, in-ground pipework and tanks. In the event buried metallic pipework and/or cables are installed within the site, installation within sealed non-metallic conduit is recommended. Where this is not possible (for example at metal water main feeds), insulating flanges/fittings/unions at the property boundary/meter can be used to electrically isolate the property piping.
4. In order to comply with TfNSW standard 'THRCI 12051 ST: Development Near Railway Tunnels, Version 2.0, section 9.2.1' and Sydney Metro Guideline 'Sydney Metro Underground Corridor Protection Technical Guidelines, Version 3, section 8.9, provision shall be made for future electrolysis testing of the basement rebar post-construction. CCE recommend installation of 2-off electrolysis test points for each basement level (Appendix B).

Following the implementation of the above management measures / mitigation measures, the remaining impacts are considered negligible and appropriate.

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1. Introduction

Corrosion Control Engineering (Holdings) Pty Ltd (CCE) was engaged to assess the electrolysis risk at 15-21 Cottonwood Crescent Macquarie Park, prior to the construction of the proposed development. As requested, on Monday 4th and Tuesday 5th March 2024, CCE conducted testing on site to measure the stray traction currents due to the railway system of the Metro North West Line.

This report has been prepared in support of a State Significant Development Application (SSDA) and concurrent Rezoning Proposal – SSD-94006708 – at 15-21 Cottonwood Crescent, Macquarie Park (AKA. 88 Waterloo Road).

The application seeks development consent for the redevelopment of the site for a mixed-use development comprising residential accommodation and retail uses.

Specifically, this application seeks approval for the following:

- Demolition of all existing four-storey residential flat buildings on the site
- Site preparation works including:
 - Excavation of the site to a maximum depth of six (6) basement levels
- Construction of two mixed-use buildings comprising a 60 and 52 storey building respectively, which will accommodate:
 - 858 Residential apartments inclusion 10% affordable housing of the uplift being sought
- Six (6) levels of basement with 825 car parking spaces, bicycle parking, services.
 - A two-level commercial podium containing:
 - Retail spaces
 - Four townhouses
 - Residential lobbies
 - Waste Storages
 - Residential and visitor Parking spaces
 - Bicycle Parking spaces
- Communal Open Space and residential amenities on level four (4).
- Rooftop Terrace on Level 52 of Cottonwood Crescent Tower and level 60 of Waterloo Road Tower.

The proposal includes provision to amend Clauses 4.3 and 4.4 of the Ryde Local Environmental Plan 2014 (RLEP2014) by virtue of the concurrent rezoning process. This includes the following amendments:

- Clause 4.3 – Height of Buildings:
 - Amend the current 65m maximum building height to 205.5m
- Clause 4.4 – FSR:
 - Amend the current FSR of 4.5:1 to 17:8:1

2. The Site

The site is at 15-21 Cottonwood Crescent; Macquarie Park is located within the Ryde Local Government Area (LGA). The site occupies a prominent and highly accessible position within the Macquarie Park precinct, benefitting from dual street frontages to Waterloo Road along the north-eastern boundary and Cottonwood Crescent along the south-eastern boundary. These street interfaces provide strong address, visibility and access opportunities for the proposed development.

The western boundary adjoins Elouera Reserve, providing a high-amenity interface with publicly accessible open space, mature vegetation and a landscaped green corridor. This relationship enhances the site's environmental quality and outlook and provides opportunities for sensitive integration of the proposed development with the adjoining parkland.

The south-western boundary adjoins existing residential properties at 13 Cottonwood Crescent and 12-14 Lachlan Avenue, which represent the primary low-rise residential interface for the site.

The approximate boundary dimensions are as follows:

52.45 metres to Waterloo Road

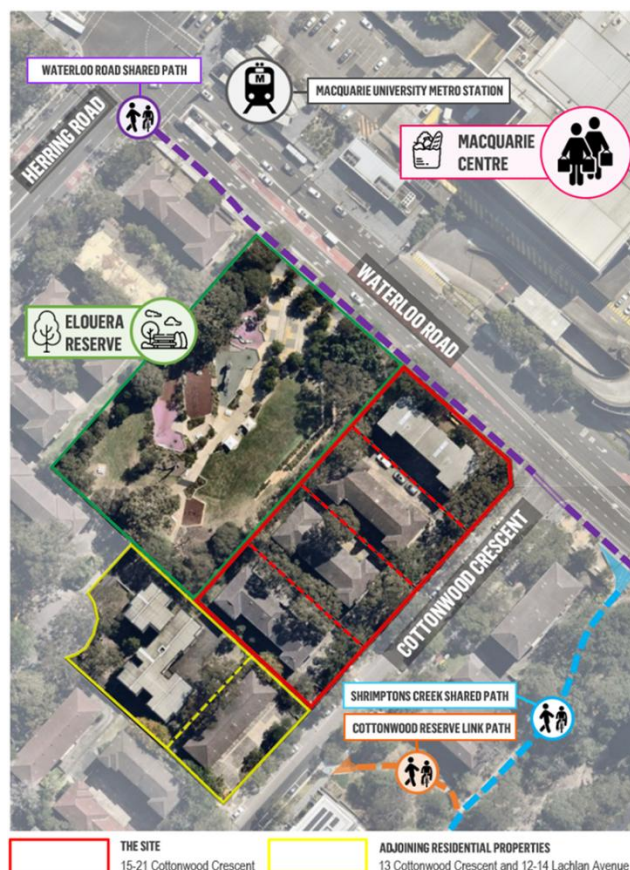
97.35 metres to Cottonwood Crescent

50.6 metres to adjoining residential properties

100.9 metres to Elouera Reserve

The site is fully serviced, with existing connections to water, sewer, electricity, gas and telecommunications, and is therefore capable of supporting redevelopment without the need for major external servicing upgrades

Figure 1 - Aerial Photo



3. The Electrolysis Problem

Most of the DC current to power the electric trains (trains, metro, and light rail) returns to the railway substations via the rail lines. However, some leaks to ground (stray traction current) and in returning to the substation via this path can be picked up (and discharged) from buried metallic structures, leading to possible electrolysis type corrosion problems. This corrosion of the metal occurs at the discharge point.

The problems can be significant if:

- The metallic structures are sufficiently large or long enough and close to the electrified railway lines.
- The stray traction current leakages to soil are of sufficient frequency and magnitude.

4. Test Method

The in-ground stray traction, causing voltage fluctuations on the development site, was monitored by data logging voltage gradients and potentials with reference to Cu/CuSO₄ as follows:

1. Data logging voltage gradients between steel earth stakes parallel to the rail. The earth stakes were approximately 41 metres apart.
2. Data logging voltage gradients between steel earth stakes perpendicular to the rail. The earth stakes were approximately 43 metres apart.
3. Data logging the potential of a water tap pipe in the North-West corner of 19 Cottonwood Crescent.
4. Data logging the potential of the property boundary fence perpendicular to the rail.

Note, TfNSW standard 'THRCI 12051 ST: Development Near Rail Tunnels, Version 2.0', and Sydney Metro Guideline 'Sydney Metro Underground Corridor Protection Technical Guidelines, Version 2.0', does not provide any acceptance criteria for stray current effects. The NSW Electrolysis Committee adopts acceptance criteria (low risk) of 20 mV anodic and 100 mV cathodic time weighted average shift over a period of up to 24 hours. Given there are no specified mitigation methods, the conclusions and recommendations in this report are based on CCE's experience in this field.

5. Test Results

A summary of the test results is presented in the following table. The corresponding data logger charts are presented in Appendix A.

Test Number	Data Logging Test Performed	Test Duration	Observed Fluctuations
1	Data logging voltage gradients between steel earth stakes parallel to the railway. The earth stakes were approximately 41 metres apart.	22-hours	Most fluctuations within 50 mV. Maximum fluctuation of 700 mV.
2	Data logging voltage gradients between steel earth stakes perpendicular to the railway. The earth stakes were approximately 43 metres apart.	22-hours	Most fluctuations within 30 mV. Maximum fluctuation of 1060 mV.
3	Data logging the potential of a water tap pipe in the North West corner of 19 Cottonwood Crescent.	22-hours	Most fluctuations within 50 mV. Maximum fluctuation of 900 mV.
4	Data logging the potential of the property boundary fence perpendicular to the rail.	22-hours	Most fluctuations within 20 mV. Maximum fluctuation of 150 mV.

6. Discussion

The test results show that all test locations recorded stray current effects that exceed acceptable limits.

1. The logger chart for the steel earth stakes parallel to the rail shows stray current that are mostly within acceptable limits but at times exceed acceptable limits.
2. The logger chart for the steel earth stakes perpendicular to the rail shows stray current are mostly within acceptable limits but at times exceed acceptable limits.
3. The logger chart for the potential recording of the water tap pipe shows stray current effects that are mostly within acceptable limits, but at times exceed acceptable limits.
4. The logger chart for the potential recording of the property boundary fence perpendicular to the railway shows stray current effects that are mostly within acceptable limits, but at times exceed acceptable limits.

7. Drawings & Documents Reviewed

The relevant drawings and documents provided to and reviewed by CCE are detailed below.

7.1 Architectural Drawings by AJC Architects

- Project Title: 88 Waterloo Development Application
- Project No.: 23024
- Date Drawings Received by CCE: 04/02/2026

Drawing Name	Drawing No.	Rev	Date
Basement 6	DA2001	11	30/01/2026
Basement 5	DA2002	11	30/01/2026
Basement 4	DA2001	11	30/01/2026
Basement 3	DA2004	11	30/01/2026
Basement 2	DA2005	11	30/01/2026
Basement 1	DA2006	11	30/01/2026
Lower Ground	DA2007	11	30/01/2026
Upper Ground	DA2008	11	30/01/2026
North Elevation Cottonwood Tower	DA3104	3	30/01/2026
South Elevation Waterloo Tower	DA3106	3	30/01/2026
Sections 1	DA3201	6	30/01/2026
Sections 2	DA3202	6	30/01/2026
Sections 3	DA3203	6	30/01/2026

8. Conclusion

The test results show that the present stray current effects at the site exceed acceptable limits based on maximum voltage fluctuation, and therefore present a corrosion risk to on-ground and in-ground metallic structures.

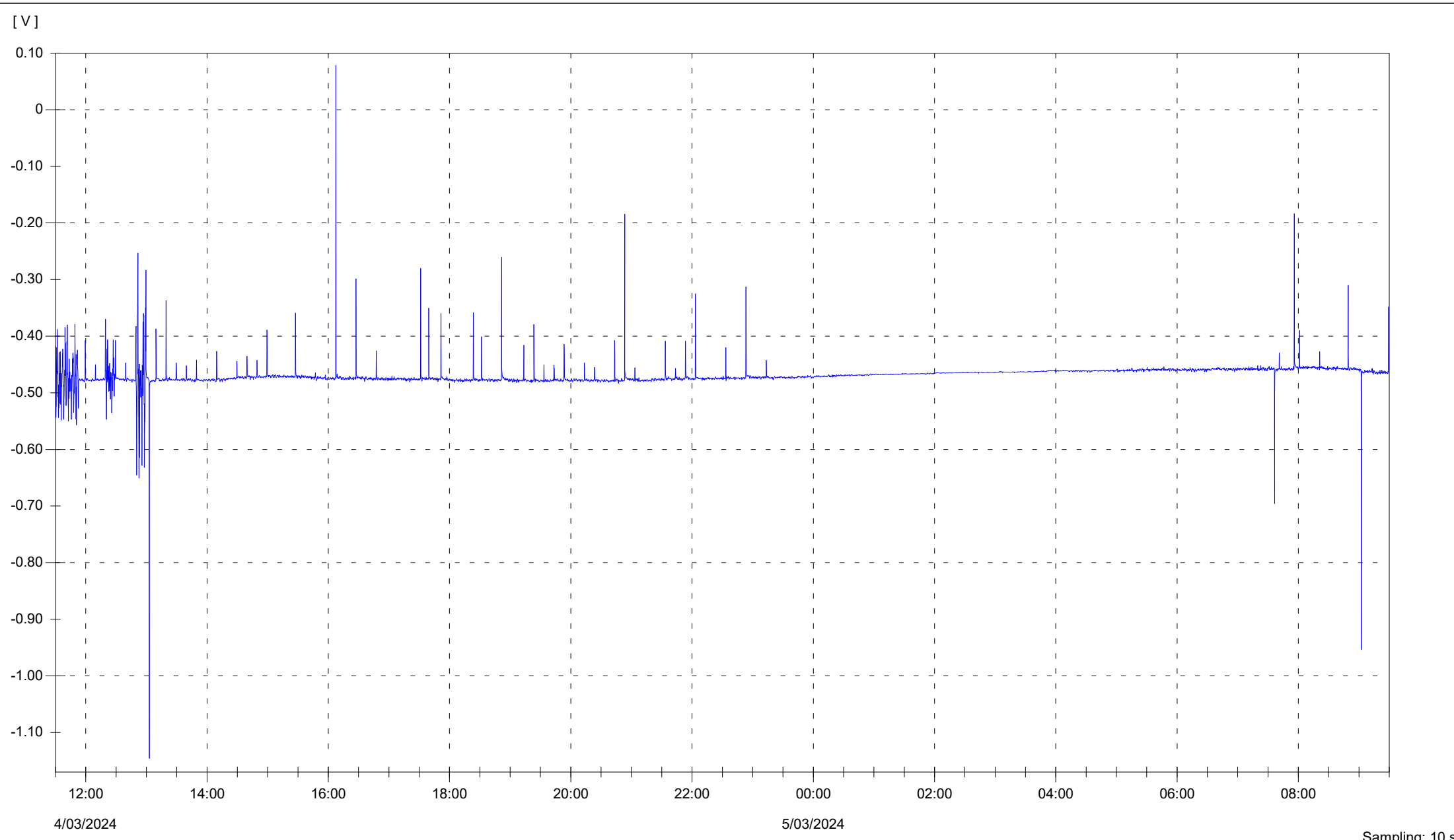
The below recommendations should be adopted into the design to mitigate stray current effects as part of any future developments.

9. Recommendations

Based on the site testing and review of the available development drawings/documents, CCE recommend the following protective measures, where possible/practical, to mitigate against long-term stray current corrosion at on-ground and in-ground metallic structures:

1. The installation of heavy plastic membrane (e.g. Fortecon) under (or behind) all reinforced concrete slabs, permanent retaining walls, permanent anchors, piers/piles, and metallic posts/bollards to electrically isolate from soil and stray currents. *Note, this may not always be possible/practical at piers/piles or when friction is relied upon for structural purposes.*
2. Ensure the high strength (minimum 32 MPa), high cover (minimum 50 mm) concrete is used to effectively prevent/limit soil moisture penetrating through to the steel/metal.
3. The use of plastic, rather than metallic, in-ground pipework and tanks. In the event buried metallic pipework and/or cables are installed within the site, installation within sealed non-metallic conduit is recommended. Where this is not possible (for example at metal water main feeds), insulating flanges/fittings/unions at the property boundary/meter can be used to electrically isolate the property piping.
4. In order to comply with TfNSW standard 'THRCI 12051 ST: Development Near Railway Tunnels, Version 2.0, section 9.2.1' and Sydney Metro Guideline 'Sydney Metro Underground Corridor Protection Technical Guidelines, Version 3, section 8.9, provision shall be made for future electrolysis testing of the basement rebar post-construction. CCE recommend installation of 2-off electrolysis test points for each basement level (Appendix B).

Appendix A: Data Logger Charts



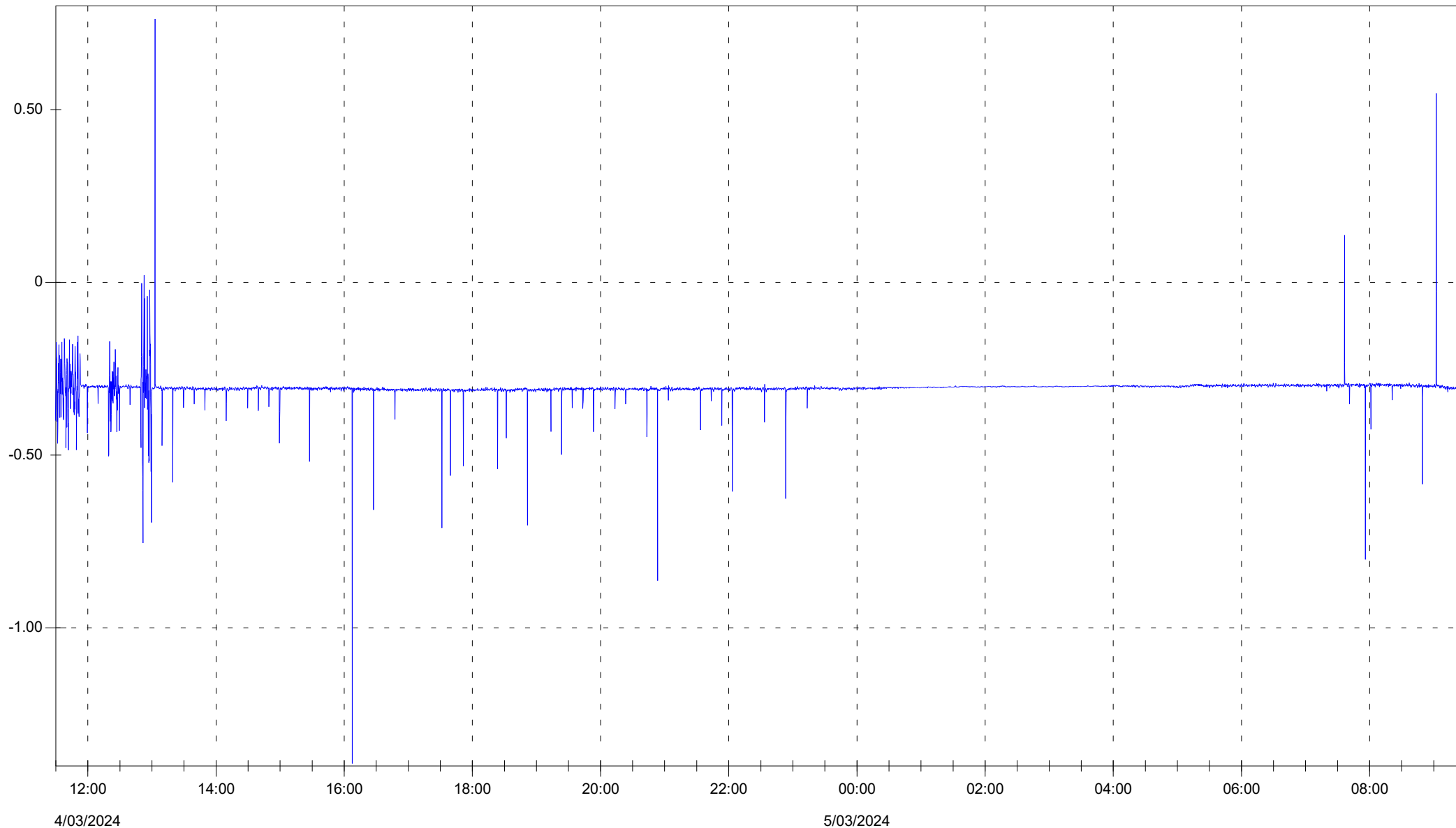
— : Volts vs Cu/CuSO4

	Min	Max	Average	Std. dev.
DC 2	-1.146 V	0.079 V	-0.469 V	0.019 V

Electrolysis Risk Testing
15-19 Cottonwood Crescent, Macquarie Park NSW 2113
Data Logger Number : 2749
Parallel to Railway



[V]



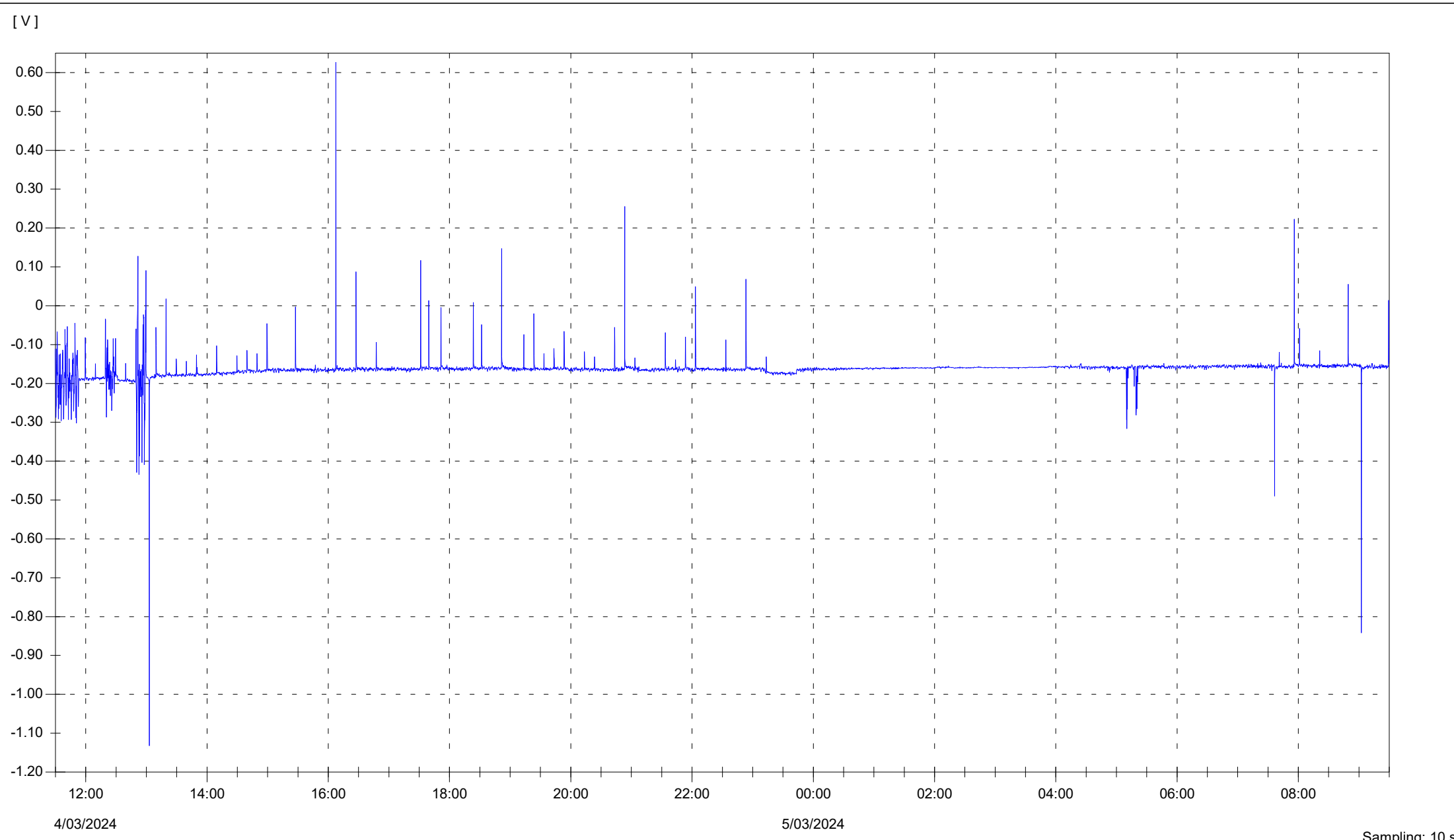
Sampling: 10 s

— : Volts vs Cu/CuSO4

	Min	Max	Average	Std. dev.
DC 1	-1.393 V	0.762 V	-0.306 V	0.032 V

Electrolysis Risk Testing
15-19 Cottonwood Crescent, Macquarie Park NSW 2113
Data Logger Number : 2749
Perpendicular to Railway



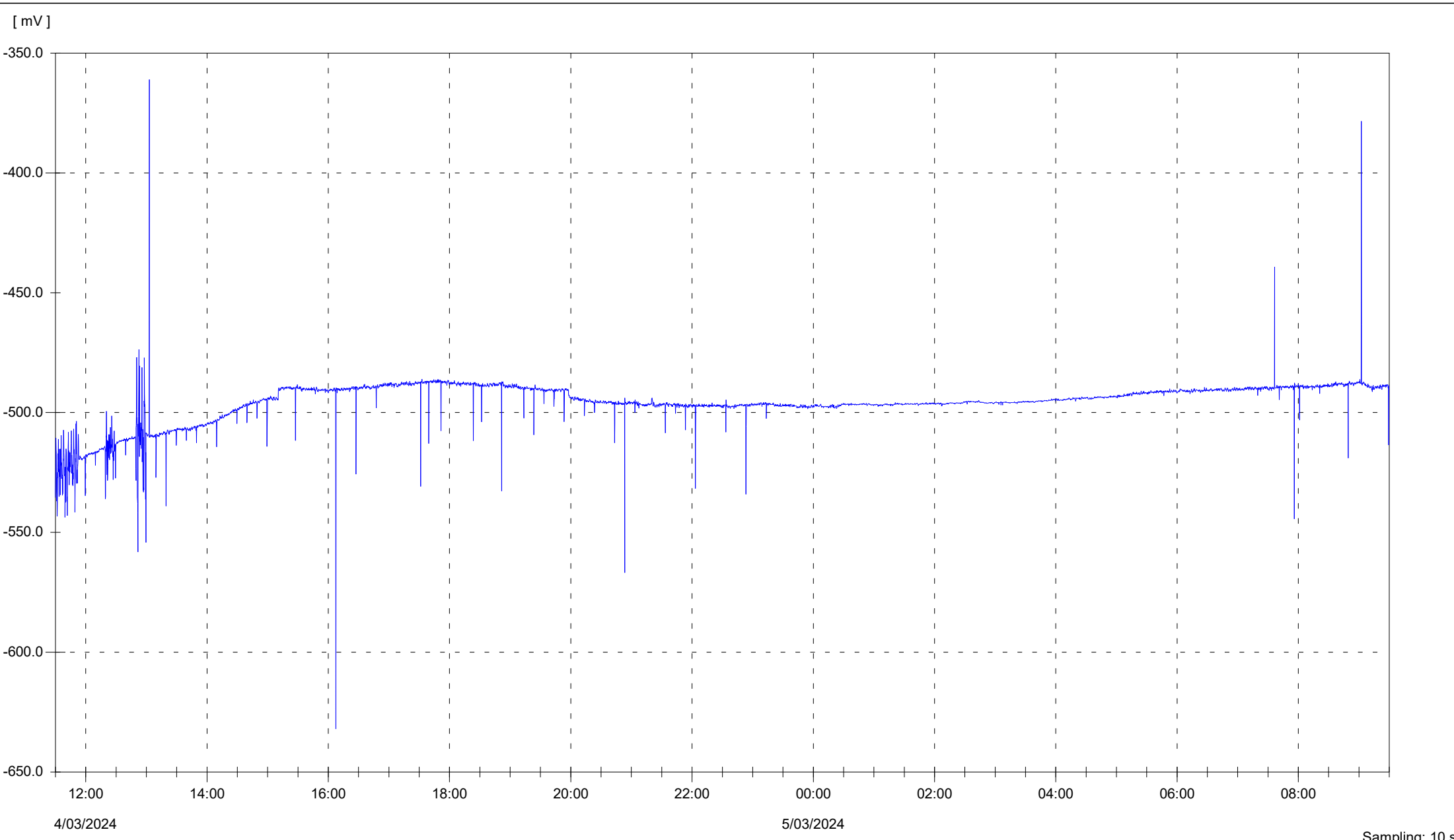


— : Volts vs Cu/CuSO4

	Min	Max	Average	Std. dev.
DC 1	-1.133 V	0.627 V	-0.164 V	0.026 V

Electrolysis Risk Testing
15-19 Cottonwood Crescent, Macquarie Park NSW 2113
Data Logger Number : 2731
Water Pipe





— : Volts vs Cu/CuSO4

MiniLog2

	Min	Max	Average	Std. dev.
DC 2	-0.632 V	-0.361 V	-0.495 V	0.008 V

Electrolysis Risk Testing
15-19 Cottonwood Crescent, Macquarie Park NSW 2113
Data Logger Number : 2731
Fence



CORROSION
CONTROL
ENGINEERING

Appendix B: Electrolysis Test Point Drawing

A
B
C
D
E
F
G
H

1 REFERENCE ELECTRODE
- INSTALLATION DETAIL
N.T.S

ITEM	DESCRIPTION	QTY	SUPPLIER/CODE
1	THREADED BAR	1	M12 316 S/STEEL ROD/BAR
2	JUNCTION BOX	1	200x200x150 APPROX. POLYCARBONATE/PVC OR FIBREGLASS
3	REFERENCE ELECTRODE	1	BORIN STELTH 6 - Ag/AgCl MODEL SRE-020-SCB

ALL DIMENSIONS mm UNLESS OTHERWISE NOTED

										 CORROSION CONTROL ENGINEERING Sydney Melbourne Brisbane Perth Adelaide Townsville Auckland New Plymouth	(C) Copyright: This document remains the property of Corrosion Control Engineering (Holdings) Pty. Ltd. No information contained within this document or copies of this document in part of full may be used for any purposes apart from this contracted project without the written consent of Corrosion Control Engineering (Holdings) Pty. Ltd.	CORROSION CONTROL ENGINEERING							
												STANDARD DRAWING							
												TYPICAL ELECTROLYSIS MONITORING BOX							
												INSTALLATION DETAILS							
		A	20/06/2023	ISSUED FOR CONSTRUCTION	DS	AH	AC	DS	Phone: 1300 COR ENG Email: contact@cceng.com.au www.cceng.com.au		CLIENT DRAWING No.		DRAWING No. CSD-DES-08-001		SCALE N.T.S	SIZE A3	REV A		
REF DWG No.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	DESIGNED	DRAWN	CHECKED	APPROVED											
REFERENCES		REVISION HISTORY																	