CORROSION
CONTROL
ENGINEERING

ELECTROLYSIS RISK ASSESSMENT REPORT
ARADA
2 FISHBURN CRES, CASTLE HILL NSW 2154

DOCUMENT NUMBER:	N-002051
CCE PROJECT NUMBER:	NSW-P100685
REVISION:	1
DATE:	23 April 2026



PURPOSE AND SCOPE

This document was developed to address the following requirements:

- To outline the methodology Corrosion Control Engineering employees followed during the survey
- Present and discuss the results of the survey
- Provide recommendations

DISTRIBUTION

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TECHNICAL REVIEW

CONSULTED PERSON	POSITION/CERTIFICATION	SIGNATURE
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DOCUMENT CONTROL

REVISION	DATE	ISSUE	PREPARED	QUALITY CHECK	TECHNICAL APPROVAL
0	25/02/2026	First Issue	Leon Lee	Sheilana Buhora	Dilipkumar Seran
1	23/04/2026	Second Issue	Leon Lee	Sheilana Buhora	Dilipkumar Seran

UPDATES SINCE LAST REVISION

Updated

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Appendices

1. Introduction

Corrosion Control Engineering (Holdings) Pty Ltd was engaged to assess the electrolysis risk at 2 Fishburn Cres, Castle Hill NSW 2154 prior to the construction of the proposed development. As requested, on Tuesday, the 17th of February 2026 and Wednesday, the 18th of February 2026, CCE conducted testing on site to measure the stray traction currents due to Metro Northwest & Bankstown Line (M1).

2. 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.

3. 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 $Cu/CuSO_4$ as follows:

1. Data logging voltage gradients between steel earth stakes parallel to the metro line and running adjacent to Carrington Road. The earth stakes were approximately 77m apart.

2. Data logging voltage gradients between steel earth stakes perpendicular to the metro line and running adjacent to Sexton Avenue. The earth stakes were approximately 116m apart.

3. Data logging voltage gradients between steel earth stakes parallel to the metro line and running adjacent to Fishburn Crescent. The earth stakes were approximately 79m apart.

4. Data logging voltage gradients between steel earth stakes perpendicular to the metro line and running adjacent to Middleton Avenue. The earth stakes were approximately 118m apart.

5. Data logging voltage gradients between a steel earth stake and the gas pipe.

6. Data logging voltage gradients between a steel earth stake and the water pipe.

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.

4. 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 metro line and running adjacent to Carrington Road.	22-hours	Most fluctuations within 8 mV. Maximum fluctuation of 22 mv.
2	Data logging voltage gradients between steel earth stakes perpendicular to the metro line and running adjacent to Sexton Avenue.	22-hours	Most fluctuations within 7 mV. Maximum fluctuation of 19 mv.
3	Data logging voltage gradients between steel earth stakes parallel to the metro line and running adjacent to Fishburn Crescent.	22-hours	Most fluctuations within 6 mV. Maximum fluctuation of 14 mv.
4	Data logging voltage gradients between steel earth stakes perpendicular to the metro line and running adjacent to Middleton Avenue.	22-hours	Most fluctuations within 7 mV. Maximum fluctuation of 21 mv.
5	Data logging voltage gradients between a steel earth stake and the gas pipe.	20-hours	Most fluctuations within 1 mV.
6	Data logging voltage gradients between a steel earth stake and the water pipe.	20-hours	Most fluctuations within 1 mV.

5. Discussion

The test results show that all tested locations recorded stray current effects that are within acceptable limits.

1. Data logging voltage gradients between steel earth stakes parallel to the metro line and running adjacent to Carrington Road shows stray current effects that are within acceptable limits.

2. Data logging voltage gradients between steel earth stakes perpendicular to the metro line and running adjacent to Sexton Avenue shows stray current effects that are within acceptable limits.

3. Data logging voltage gradients between steel earth stakes parallel to the metro line and running adjacent to Fishburn Crescent shows stray current effects that are within acceptable limits.

4. Data logging voltage gradients between steel earth stakes perpendicular to the metro line and running adjacent to Middleton Avenue shows stray current effects that are within acceptable limits.

5. Data logging voltage gradients between a steel earth stake and the gas pipe shows stray current effects that are within acceptable limits.

6. Data logging voltage gradients between a steel earth stake and the water pipe shows stray current effects that are within acceptable limits.

6. Drawings & Documents Reviewed

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

6.1 Architectural Drawings by Turner Studio

- Project Number : 23104
- Project Title : Carrington Road 2 Fishburn Crescent Castle Hill NSW 2154
- Client : Arada

Table 1: Architectural Drawings

Document Name	Drawing Number	Revision	Date
GA Plans Basement 01	DA-110-006	F	17/04/2026
GA Plans Lower Ground	DA-110-007	F	17/04/2026
GA Plans Ground Level	DA-110-008	F	17/04/2026
GA Plans Upper Ground Level	DA-110-009	F	17/04/2026
GA Plans Level 01	DA-110-010	E	17/04/2026
GA Plans Level 02	DA-110-011	E	17/04/2026
GA Plans Level 03	DA-110-012	E	17/04/2026
GA Plans Level 04	DA-110-013	E	17/04/2026
GA Plans Level 05	DA-110-014	E	17/04/2026
GA Plans Level 06	DA-110-015	E	17/04/2026
GA Plans Level 07	DA-110-016	E	17/04/2026
GA Plans Level 08	DA-110-017	E	17/04/2026
GA Plans Level 09	DA-110-018	E	17/04/2026
GA Plans Level 10	DA-110-019	E	17/04/2026
GA Plans Level 11	DA-110-020	E	17/04/2026
GA Plans Level 12	DA-110-021	E	17/04/2026
GA Plans Level 13	DA-110-022	F	17/04/2026
GA Plans Level 14	DA-110-023	F	17/04/2026
GA Plans Level 15	DA-110-024	F	17/04/2026
GA Plans Level 16	DA-110-025	E	17/04/2026
GA Plans Level 17	DA-110-026	E	17/04/2026
GA Plans Level 18	DA-110-027	E	17/04/2026
GA Plans Level 19	DA-110-029	E	17/04/2026

Document Name	Drawing Number	Revision	Date
GA Plans Level 20	DA-110-030	E	17/04/2026
GA Plans Level 21	DA-110-031	E	17/04/2026
GA Plans Level 22	DA-110-032	E	17/04/2026
GA Plans Level 23	DA-110-033	E	17/04/2026
GA Plans Roof Level	DA-110-034	B	17/04/2026

7. Conclusion

The test results show that the present stray current effects at the site are within the acceptable limits. Hence, there is currently no corrosion risk to on-ground and in-ground metallic structures. However, stray current activity can change with time and may become a higher corrosion risk.

Recommendations should be adopted to minimise stray current effects as part of any future developments.

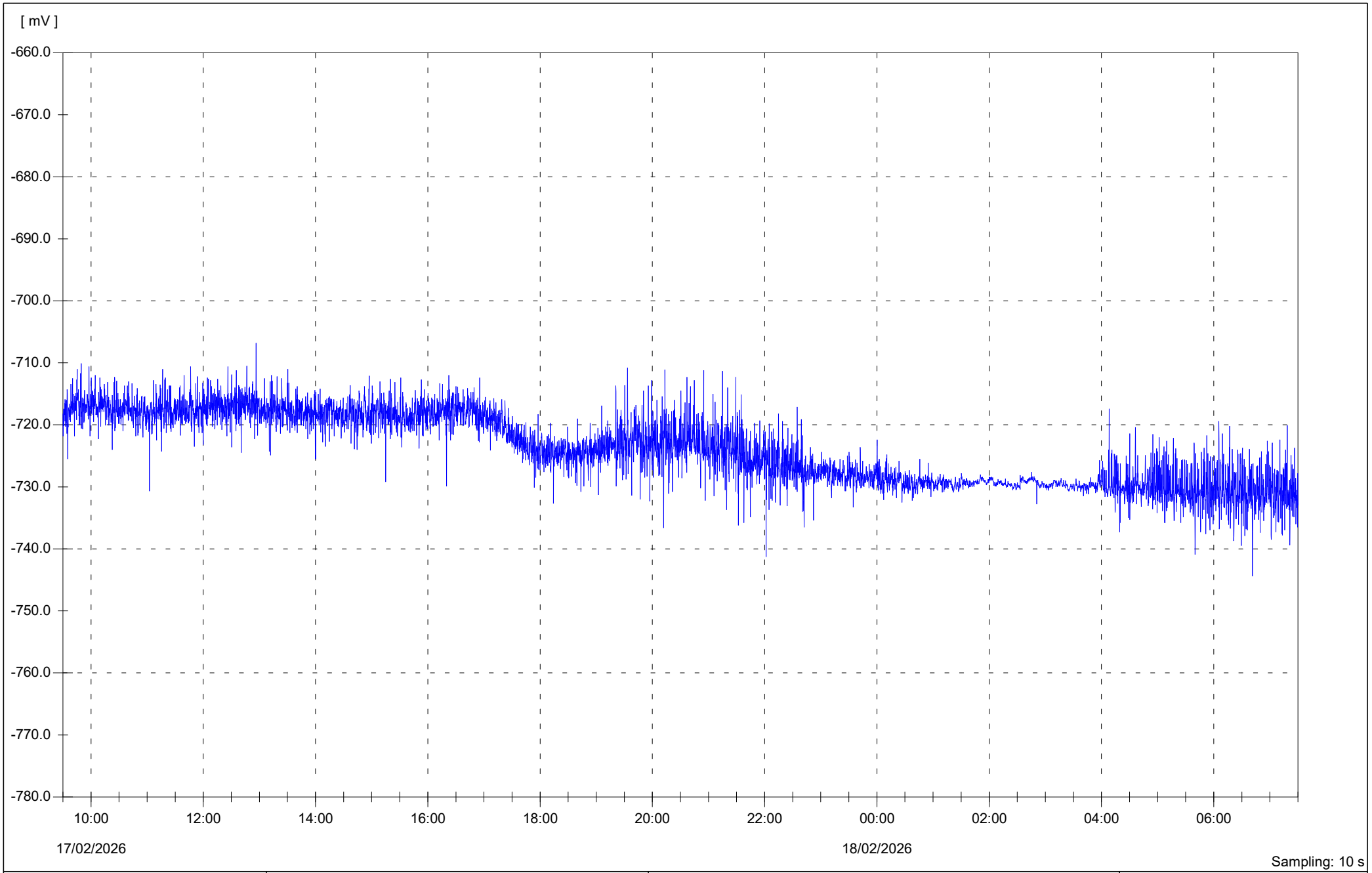
8. Recommendations

Based on the site testing and review of the available development drawings/documents, CCE recommend the following conservative 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. A minimum of two (2-off) electrolysis test points, such as an Erico Earthbridge DB12CS701, in conjunction with an Ag/AgCl permanent reference electrode installed close to the reinforcing steel, shall be provided at every at/below ground level. This is to assist with potential (stray current) monitoring (See Appendix B for details).

In order to comply with the TfNSW standard 'THRCI 12051 ST: Development Near Rail Tunnel Version 2.0, section 9.2.1' and Sydney Metro Guideline 'Sydney Metro Underground Corridor Protection Technical Guidelines, Version 2, section 9.4', CCE recommend installation of basement rebar test points to allow for future electrolysis testing of the basement rebar post-construction. This can be achieved via SS316 welded test studs that protrude from the basement walls, at approximately knee-high level. CCE recommends 2-off rebar test points be installed for each basement level, with one at each end of the basement level. Note, these welded studs can be installed relatively flush with or recessed in the concrete surface, allowing sufficient space (minimum 10 mm) for a temporary electrical connection (e.g. via alligator clip or similar). Alternatively, the Erico Earthbridge DB12CS701 can be installed for test points.

APPENDIX A: DATA LOGGER CHARTS



Sampling: 10 s

— : Volts vs Cu/CuSO4

	Min	Max	Average	Std. dev.
DC 1	-0.744 V	-0.707 V	-0.724 V	0.006 V

Electrolysis Risk Testing

2 Fishburn Crescent, Castle Hill NSW 2154

Data Logger: 6685
Parallel to the metro line and running adjacent to Carrington Road

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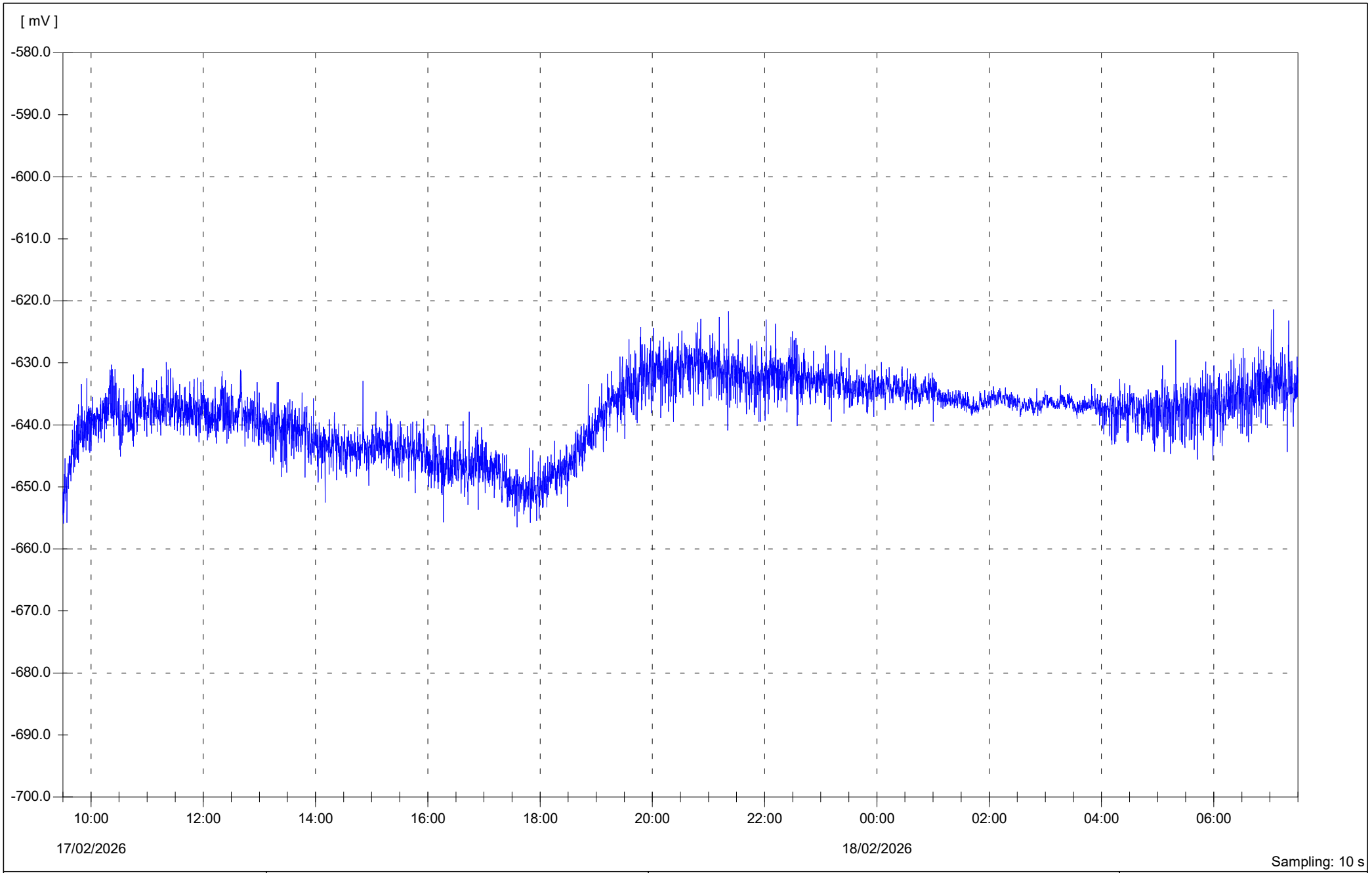
MiniLog2



Sampling: 10 s

: Volts vs Cu/CuSO4

	Min	Max	Average	Std. dev.
DC 1	-0.657 V	-0.621 V	-0.638 V	0.006 V

Electrolysis Risk Testing

2 Fishburn Crescent, Castle Hill NSW 2154

Data Logger: 6212
Perpendicular to the metro line and running adjacent to Sexton Avenue

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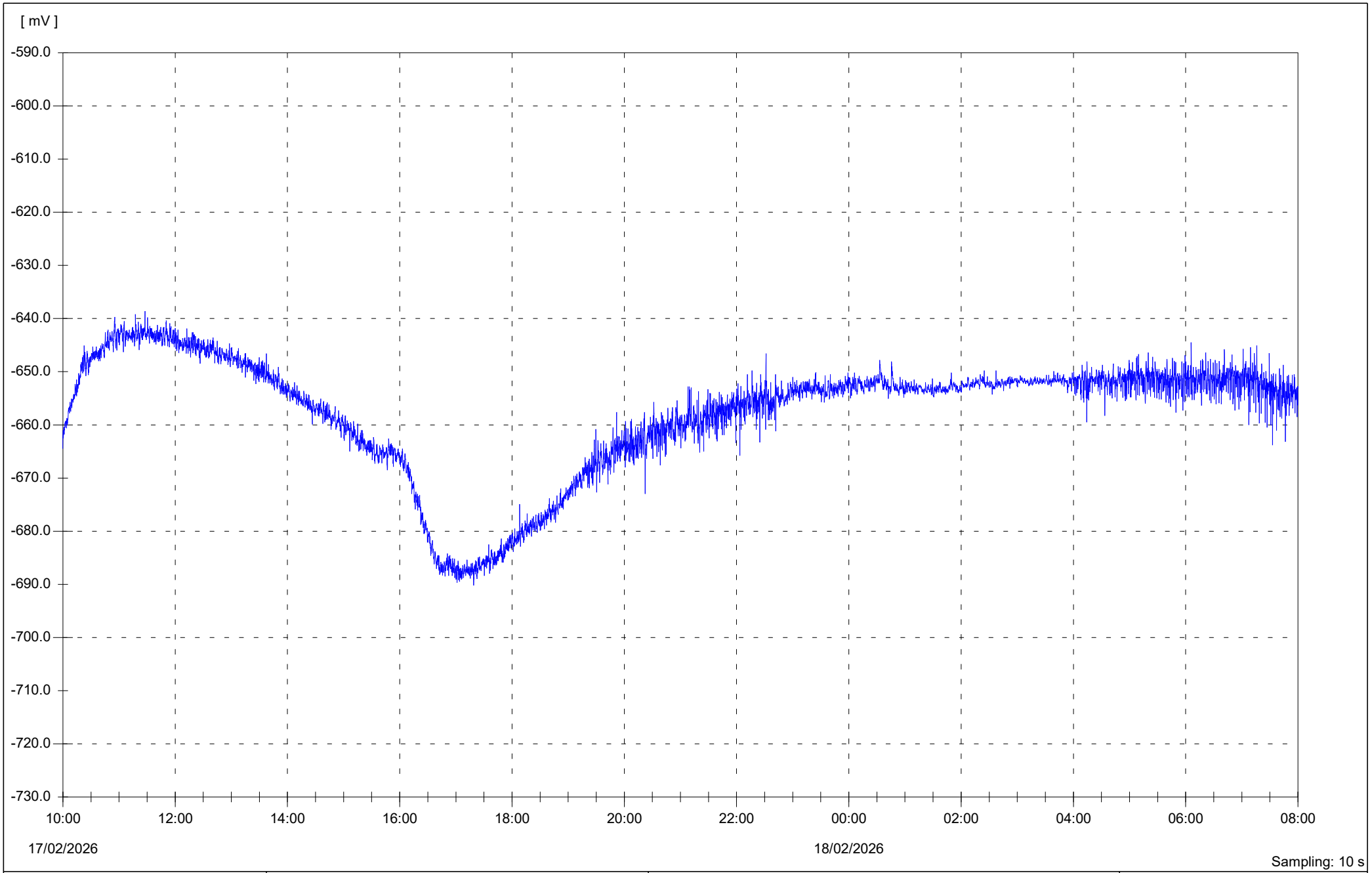
MiniLog2



: Volts vs Cu/CuSO4

	Min	Max	Average	Std. dev.
DC 1	-0.690 V	-0.639 V	-0.657 V	0.011 V

Electrolysis Risk Testing

2 Fishburn Crescent, Castle Hill NSW 2154

Data Logger: 6220
Parallel to the metro line and running adjacent to Fishburn Cres

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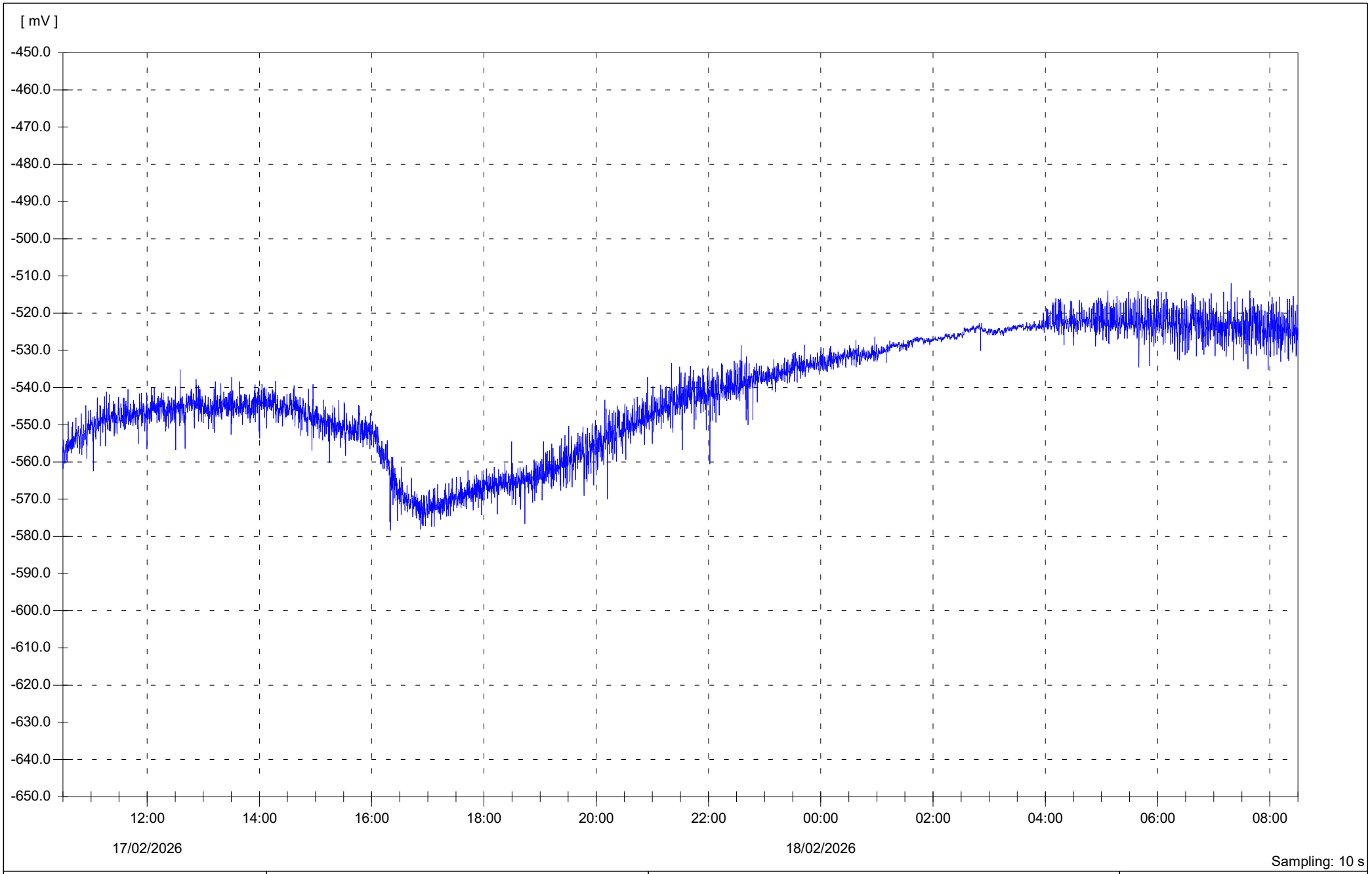
MiniLog2



Sampling: 10 s

— : Volts vs Cu/CuSO4

	Min	Max	Average	Std. dev.
DC 1	-0.578 V	-0.512 V	-0.541 V	0.015 V

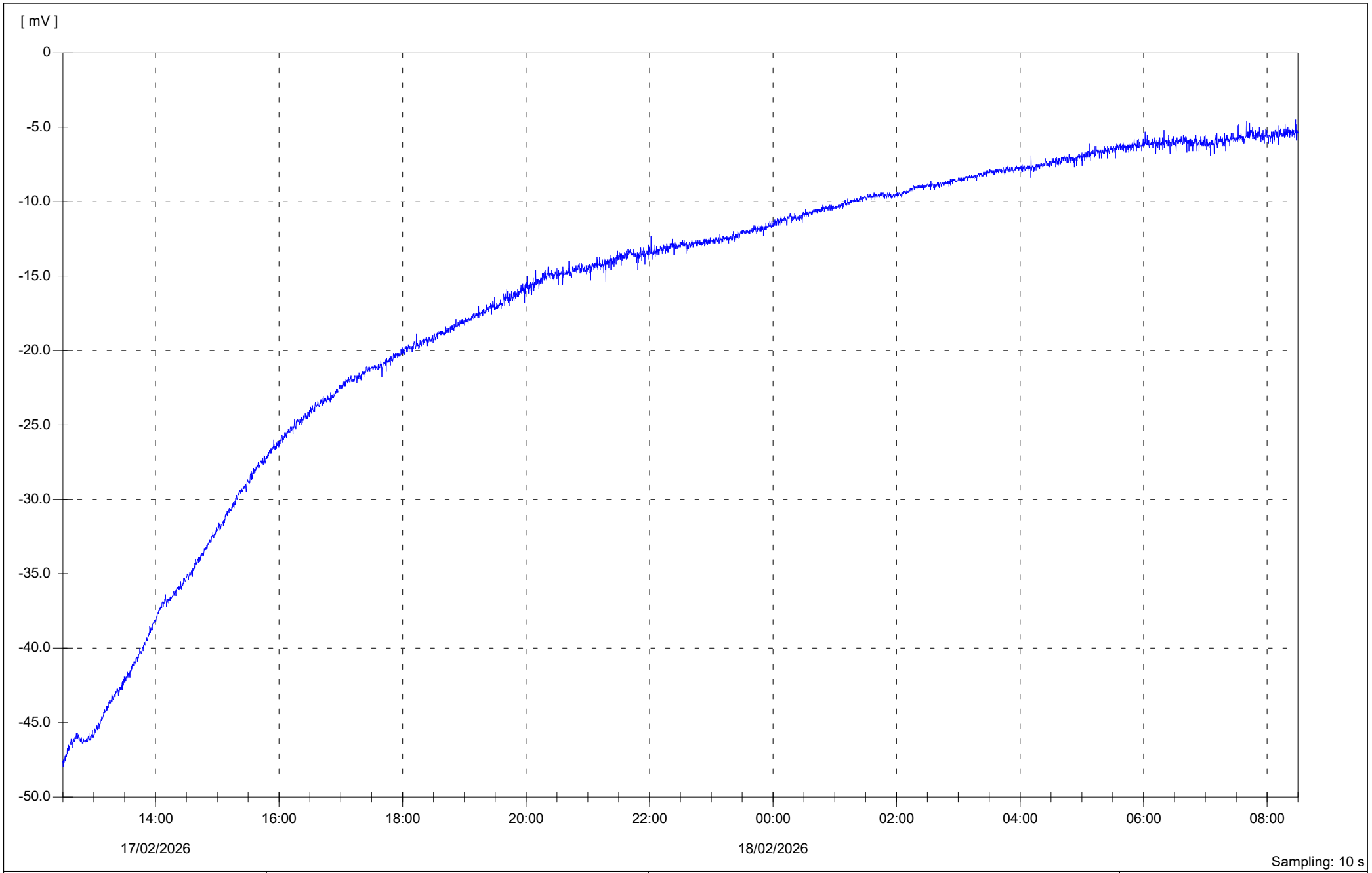
Electrolysis Risk Testing

2 Fishburn Crescent, Castle Hill NSW 2154

Data Logger: 6211
Perpendicular to the metro line and running adjacent to Middleton Ave

CORROSION CONTROL ENGINEERING

MiniLog2



Sampling: 10 s

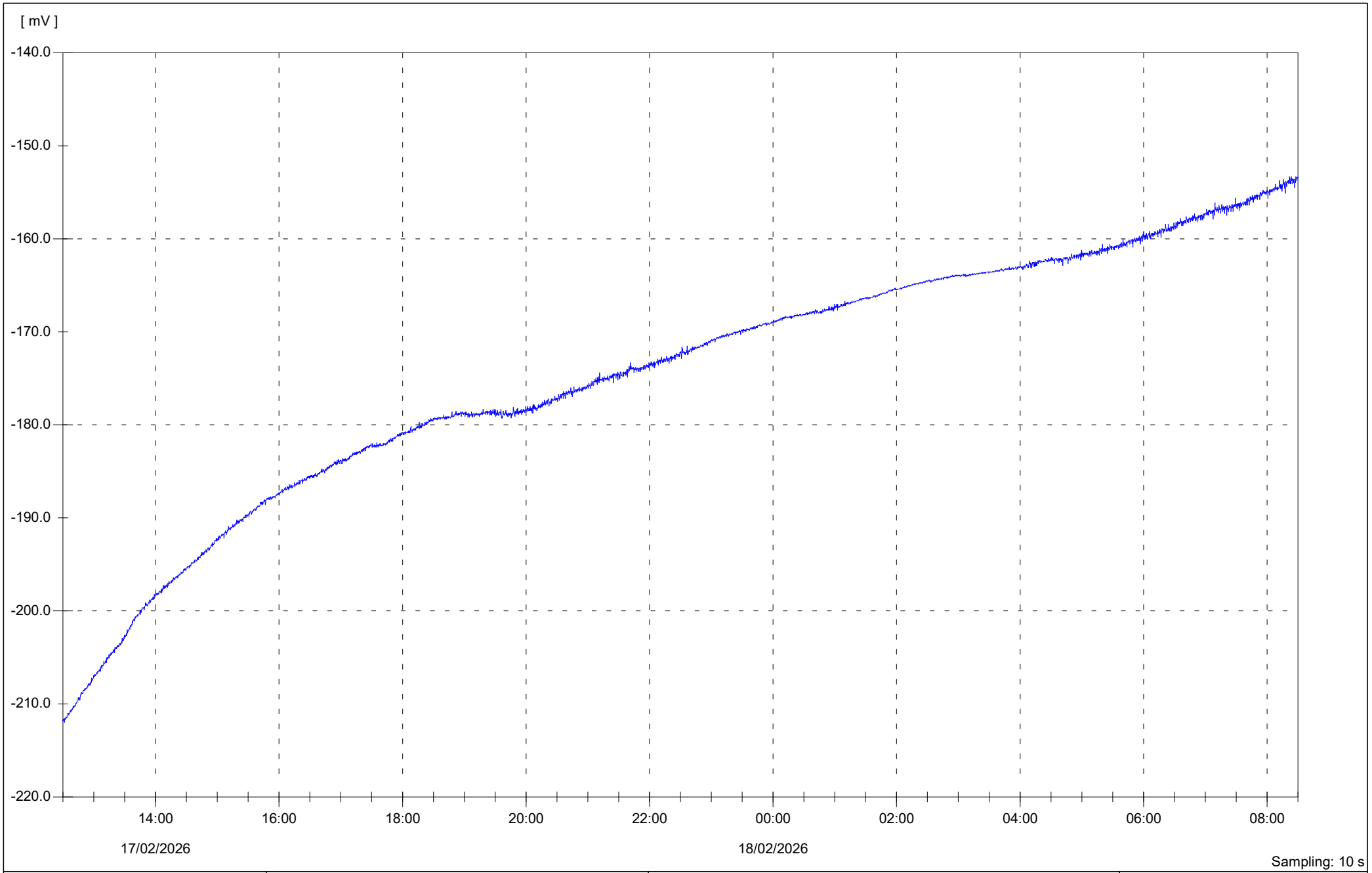
— : Volts vs Cu/CuSO4

	Min	Max	Average	Std. dev.
DC 1	-48.0 mV	-4.5 mV	-16.6 mV	11.0 mV

Electrolysis Risk Testing
2 Fishburn Crescent, Castle Hill NSW 2154
Data Logger: 6224
Gas pipe

CORROSION CONTROL ENGINEERING

MiniLog2



Sampling: 10 s

: Volts vs Cu/CuSO4

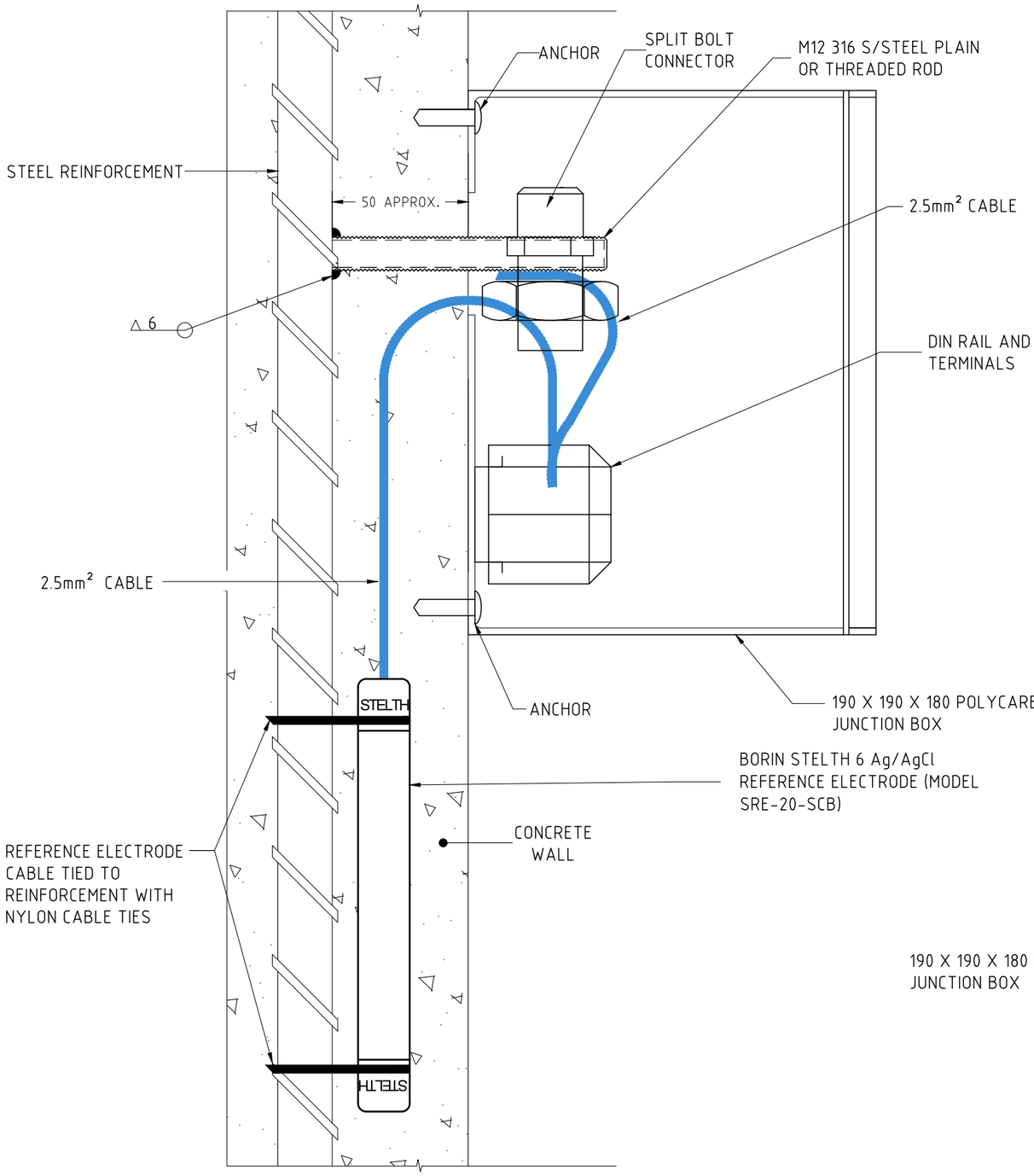
	Min	Max	Average	Std. dev.
DC 1	-212.0 mV	-153.3 mV	-174.5 mV	13.8 mV

Electrolysis Risk Testing
2 Fishburn Crescent, Castle Hill NSW 2154
Data Logger: 6223
Water pipe

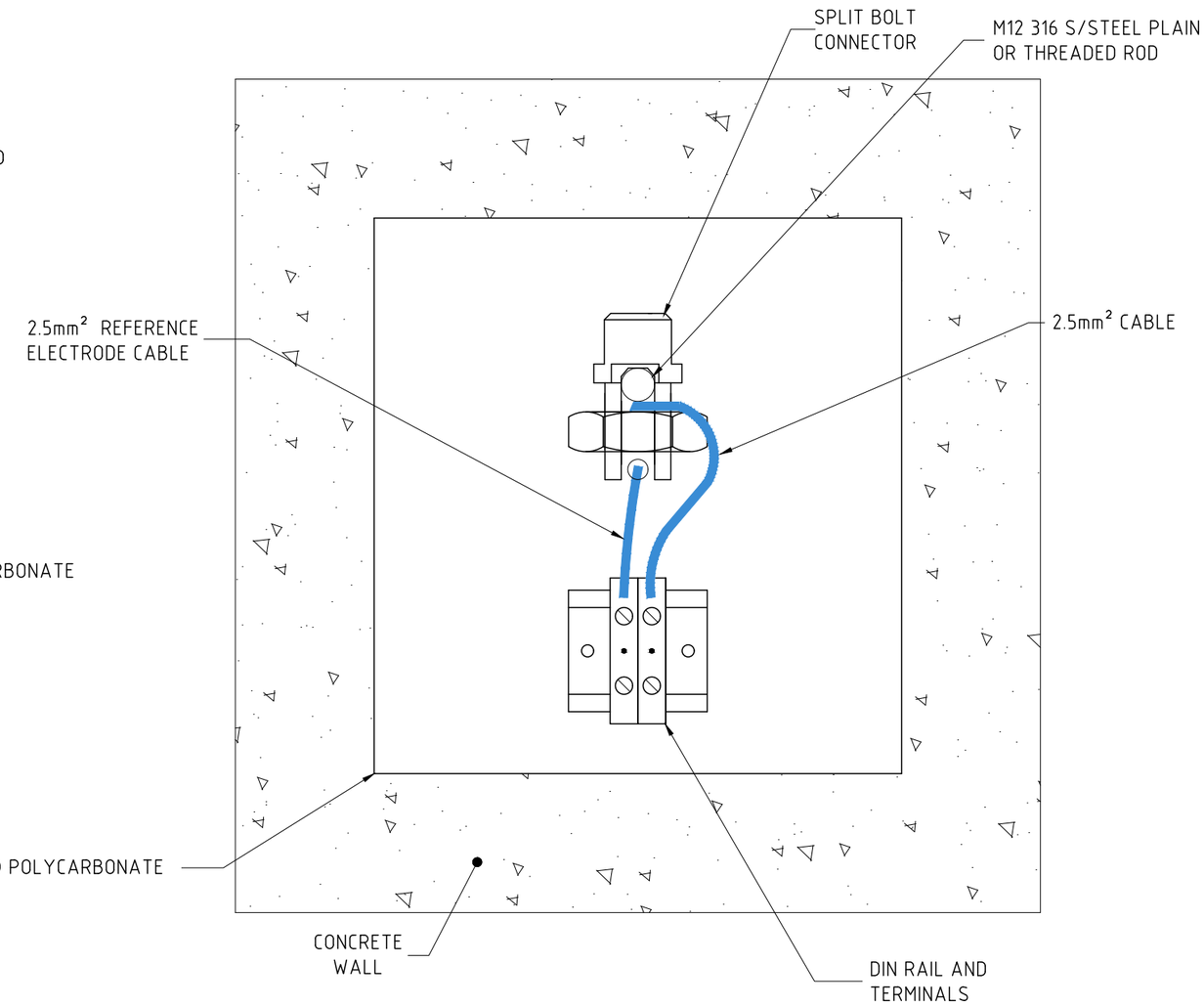
CORROSION CONTROL ENGINEERING

MiniLog2

APPENDIX B: ELECTROLYSIS TEST POINT DRAWING



1 - REFERENCE ELECTRODE INSTALLATION DETAIL
N.T.S



ALL DIMENSIONS mm UNLESS OTHERWISE NOTED

REF DWG No.	REFERENCE DRAWING TITLE	REV	DATE	REVISION DESCRIPTION	DESIGNED	DRAWN	CHECKED	APPROVED
		A	02/04/2025	ISSUED FOR REVIEW	AC	RL	AD	AC

REFERENCES | REVISION HISTORY

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ELECTROLYSIS MONITORING TEST POINT
INSTALLATION DETAILS

CLIENT DRAWING No.	DRAWING No.	SCALE	SIZE	REV
		N.T.S	A3	A