NSW GOVERNMENT

Manly Hydraulics Laboratory

NSW ESTUARY AND RIVER WATER LEVELS ANNUAL SUMMARY 2022–23

Report MHL2994
May 2024

Prepared for:

NSW Department of Climate Change, Energy, the Environment and Water - Biodiversity and Conservation

Cover photograph: Wyee Point, Lake Macquarie

NSW ESTUARY AND RIVER WATER LEVELS ANNUAL SUMMARY 2022–23

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Draft	V Jiang	S Dakin	A Joyner	1/11/2023
Final	V Jiang	S Young, DCCEEW BC	M Galloway	3/05/2024

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Report No. MHL2994

ISSN: 2205-5533 (Online)

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Foreword

Manly Hydraulics Laboratory (MHL) is a business unit within the Water Group of the NSW Department of Climate Change, Energy, the Environment and Water. The NSW water level database has been developed to support a number of programs associated with coastal, floodplain and estuary management for the NSW Department of Climate Change, Energy, the Environment and Water - Biodiversity and Conservation. The monitoring service is available to NSW Government and other organisations across Australia.

This annual summary presents water level measurements captured by automatic water level recording stations along the coastal estuaries and rivers of NSW from 1 July 2022 to 30 June 2023. MHL maintains the automatic recording stations and catalogues the data collected.

Requests to access the data and further information should be directed to:

Manager Environmental Data	email	:	data-request@mhl.nsw.gov.au
Manly Hydraulics Laboratory	WWW	:	http://www.mhl.nsw.gov.au/
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Executive summary

The *NSW Estuary and River Water Level Annual Summary 2022–23* presents the results of water level monitoring obtained by the automatic recording stations along the coastal estuaries and rivers of New South Wales over the period 1 July 2022 to 30 June 2023.

During this period, the overall data capture across the network, excluding missing data and data outside of desired quality tolerances, was 97.7%. The target recovery rate of 95% is achieved for the 2022–23 reporting period.

This report contains:

- a brief description of the estuary and river water level measurement program
- guidelines of how to use this report and how to access the database
- a list of all stations for which MHL collected water level data in 2022–23 (**Table 4-2**)
- maps of station locations and the annual data summaries for each site
- **Appendix A**, which details the water level digitised continuous data and discrete historical data
- **Appendix B**, a glossary of terms
- **Appendix C**, a list of other publications which may be of interest
- **Appendix D**, data quality control process.

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1 Water level monitoring program

The network of automatic recorders and the associated analysis routines enable efficient delivery of water level data. As well as near-real time water level information at over 220 stations in NSW, extracts from the historical database of water levels can be made available on request (refer to **Appendix A**).

The present program is based on a network of automatic water level recording stations installed at various coastal sites (see **Table 4-2** for station location maps). This network consists of over 220 permanent stations funded by the NSW Department of Climate Change, Energy, the Environment and Water - Biodiversity and Conservation (DCCEEW BC). All water level stations in this report are owned by DCCEEW BC with the exception of Ocean Street Bridge, Dee Why, Curl Curl, Riverview Parade and Queenscliff Bridge, which are owned by Northern Beaches Council.

The network features four distinctive systems of data capture: gas purge pressure system, solid state floatwell, submersible pressure transducer and ultrasonic/radar distance measuring units. The logging systems consist of data loggers which generally record water levels every 15 minutes, while some stations record at a 1-minute logging interval.

MHL's public website shows each station metadata with instrument and survey details, station characteristics and frequency distribution analysis result.

Data is transferred to the NSW Government Data Centre and to MHL's data server using a variety of telemetry techniques including internet protocol via cellular network and Event-reporting Radio Telemetry System (ERTS). The incoming raw data is then available to external users to view online in tables or plots.

Data is stored in a database and subject to a quality assurance process which involves several control steps to maintain data quality as well as assignment of data quality codes. Computer programs are used to further format and analyse data.

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2 How to use this report and access the data

2.1 How to use this report

The NSW coastal zone is divided into geographic regions based on river systems to present water monitoring information. Location maps display the station locations and the annual plots confirm the availability and suitability of data for the particular period of interest.

All the data appearing in this report are recorded in Australian Eastern Standard Time (AEST). Allowance for daylight saving time has not been made.

A list of water level data collected and stored is included in **Appendix A**. Digitised continuous water level data is tabulated in **Table A1**, whilst discrete historical water level data (mainly from staff gauge readers) is tabulated in **Table A2**.

Once a choice has been made of the period for which information is required, data and services can be obtained in a variety of formats, according to their intended use.

2.2 Data provision and access

MHL provides a full online data access service via the internet for its clients, and a limited access service for the general public at http://www.mhl.nsw.gov.au.

Typically, the last seven days of data are available online in a non-quality controlled form to aid the fastest possible access to raw data records. The online service for clients can provide access to all data catalogued in **Appendix A**.

Quality controlled data may be ordered via the MHL web page (http://www.mhl.nsw.gov.au), by emailing data-request@mhl.nsw.gov.au, or via customised decision support tools that can be provided on request.

Water level data is provided to the public on behalf of DCCEEW BC through the following methods:

- the public webpages of MHL, DCCEEW BC and Bureau of Meteorology (BoM), providing near real-time access to a limited sample of data
- a web-based data request system where electronic requests can be submitted via MHL's homepage at http://www.mhl.nsw.gov.au under the *Data Request* menu
- a web-based self-serve portal has been developed to allow specific users to download data or access a web services application for automated data self-service. Contact MHL to obtain a user name and password, visit https://www.mhl.nsw.gov.au/MHLFIT for more information.

Water level data is provided to DCCEEW BC and the NSW State Emergency Service (SES) through the following methods:

- DCCEEW BC and SES officer access to a password-protected customised MHL web portal, providing near-real time environmental data and the 'quality assured' historical database
- SES officers receive automated notifications for flood warning systems.

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Data access continues to assist the BoM, Crown Lands, local government authorities, SES, NSW Police, WaterNSW, NSW Surf Life Saving Association, universities, the NSW court system, private consultancies and Transport for NSW.

Please note, all water level data is available in Australian Height Datum (AHD) via the DCCEEW BC password-protected customised MHL web portal and the MHL public web page, with the exception of local water resource datum and assumed datum stations.

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3 Significant events

Most of the Bureau of Meteorology (BoM) issued 2022-23 NSW coast flood warnings were due to heavy rain in July 2022.

In July 2022, flood warnings were issued by the BoM from the north coast to south coast of NSW. A major flood warning was issued to Hawkesbury River. Minor to moderate flood warnings were issued to Manning River, Hunter and Williams River, and Georges River. Minor flood warnings were issued to Bellinger River, Camden Haven River, Hastings River, Myall River, Tuggerah Lakes, Shoalhaven River, St George Basin, and Sussex Inlet. In September 2022, minor flood warnings were issued to Bellinger River and Clarence River. In October-November 2022, minor flood warnings were issued to Hunter River, Williams River, and Paterson River.

Table 3-1 lists the 2022–23 flood warnings as described by the SES's NSW flood classification system.

Table 3-1 2022–23 flood warnings

River/estuary system	Date	NSW SES classification
Bellinger River	Jul 2022	Minor
	Sep 2022	Minor
Camden Haven River	Jul 2022	Minor
Hastings River	Jul 2022	Minor
Manning River	Jul 2022	Minor to Moderate
Myall River	Jul 2022	Minor
Hunter and Williams River	Jul 2022	Minor to Moderate
	Oct-Nov 2022	Minor
Paterson River	Oct-Nov 2022	Minor
Tuggerah Lakes	Jul 2022	Minor
Hawkesbury River	Jul 2022	Major
Georges River	Jul 2022	Minor to Moderate
Shoalhaven	Jul 2022	Minor
St Georges Basin and Sussex Inlet	Jul 2022	Minor
Clarence River	Sep 2022	Minor

The SES determines flood warning classifications based on the following definitions:

Minor flooding: Causes inconvenience. Low-lying areas next to watercourses are inundated, which may require the removal of stock and equipment. Minor roads may be closed and low-level bridges submerged.

Moderate flooding: In addition to the above, the evacuation of some houses may be required. Main traffic routes may be covered. The area of inundation is substantial in rural

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areas, requiring the removal of stock.

Major flooding: In addition to the above, extensive rural areas and/or urban areas are inundated. Properties and towns are likely to be isolated and major traffic routes likely to be closed. Evacuation of people from flood-affected areas may be required.

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4 Water level monitoring summary

4.1 Data capture performance

Water level data presented by MHL is collected and analysed through a quality assurance process in accordance with MHL's internal standards and work instructions, as described in **Appendix D**. This process results in a quality code which is assigned to all water level data, as described in **Table 4-1**. Access to site and time specific station records, with quality codes is described in **Section 2**.

During 2022–23, the overall data capture across the network, for data with a quality code of 162 or better, was 97.7%. **Table 4-2 Index of figures** provides data capture percentages for each river and estuary network. Missing data or data where the indication of measurement uncertainty is greater than ±0.05 metres can result in gaps in the data record. This can be caused by a range of reasons, such as sensor or equipment damage or failure, power failure, or site specific environmental issues such as siltation or collapse of waterway banks at monitoring stations.

Automatic recorded water level data is typically recorded to a resolution that is higher than the overall measurement uncertainty. A sensor may record data to three decimal places (measured in metres). However, due to combined measurement uncertainties involved in the collection of the data and environment influences, overall measurement uncertainty is typically to two decimal places (measured in metres). These uncertainties are accounted for through quality control and quality assurance processes.

Table 4-1 DCCEEW BC data quality code descriptions

Quality code		Water level*
55	Records processed to	±0.02 m
100	Data from previous MHL database, processed to	±0.02 m
105	Records processed to	±0.05 m
150	Uncoded – data not yet quality controlled	Raw data from the instrument with only preliminary quality checks performed
161, 162	Dry sensor	Sensor out of water with flow/with no flow
208	Records processed to greater than	>±0.05 m
1, 204, 205, 206, 207, 255	Data loss/data missing	

* A quality code is assigned based on infield status verification checks, survey and instrument calibrations including *an indication* of measurement uncertainty. Site specific measurement uncertainty estimates with defined confidence limits can be quantified using statistical techniques on request.

4.2 Interpretation of data

There are various factors which can influence water level data in the extensive network of automated water level recorders operated and maintained by MHL. Differences between sites can be attributed to the characteristics of the overall water body being analysed, and also characteristics specific to the station locality and design.

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Report MHL2100 *Water Level Frequency Distribution Analysis* (March 2014) provides a statistical analysis and frequency distribution analysis of available water level information for the majority of water level stations. Stations are classified into one of three station types:

1. Ocean tide stations ('O', dominated by a semi-diurnal tide).
2. Estuary stations ('E', particularly intermittently closed and open lakes and lagoons (ICOLLs), generally having a reduced tidal influence, and may experience both flood conditions and static water levels, governed by entrance morphology).
3. Flood stations ('F', characterised by their position along the river and the effect rainfall has on the river conditions. These stations can be tidally influenced or non-tidal such as sites upstream of a weir or floodgate).

It is recommended the reader reviews this report and becomes familiar with relevant environmental conditions for the station of interest to assist interpretation of water level data.

Refer to report MHL2995 *NSW Ocean and River Entrance Tidal Levels and Air Pressure Annual Summary 2022–23*, for annual water level data at ocean tide classified sites.

4.3 Water level monitoring summary

This section documents locality maps and quality assured water level monitoring summaries for each station. **Table 4-2** provides an index to the figures presented.

Table 4-2 Index of figures

River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Tweed River Region						99.3	**4-1**
Broadwater	Cobaki	201448	56	549344	6883128	AHD		**4-2**
Terranora Inlet	Dry Dock	201428	56	550715	6881235	AHD		**4-3**
Terranora Inlet	Terranora	201447	56	548955	6880384	AHD		**4-4**
Tweed River	Tweed Entrance South	201472	56	554109	6883772			*
Tweed River	Letitia 2A	201429	56	554309	6882407	AHD		**4-5**
Tweed River	Barneys Point	201426	56	554110	6877710	AHD		**4-6**
Tweed River	Tumbulgum	201432	56	545172	6871999	AHD		**4-7**
Tweed River	North Murwillumbah	201420	56	539329	6866467	AHD		**4-8**
Tweed River	Bray Park Weir	201455	56	536209	6864484	AHD		**4-9**
Tweed River	Murwillumbah Bridge	201465	56	539219	6866353	AHD		**4-10**
Rous River	Kynnumboon	201422	56	538179	6867895	AHD		**4-11**
Cudgen Lake	Bogangar	202416	56	554698	6866441	AHD		**4-12**
Cudgen Creek	Kingscliff Upstream	202434	56	557030	6873280	AHD		**4-13**

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Brunswick River Region						99.2	4-14
Mooball Creek	Mooball Creek	202435	56	555495	6859252	AHD		4-15
Marshalls Creek	Orana Bridge	202475	56	553611	6845534	AHD		4-16
Marshalls Creek	Billinudgel	202400	56	551554	6847116	AHD		4-17
Brunswick River	Brunswick Heads	202403	56	554078	6843182			*
Brunswick River	Mullumbimby	202402	56	548580	6841766	AHD		4-18
Station Locality Map	Richmond River Region						98.2	4-19
Lennox Head	Lake Ainsworth	203455	56	557863	6816160	AHD		4-20
Richmond River	Ballina Breakwall	203425	56	556992	6805681			*
Richmond River	Missingham Bridge	203465	56	556161	6806420	AHD		4-21
Richmond River	Byrnes Point	203461	56	551362	6805886	AHD		4-22
Richmond River	Wardell	203468	56	545282	6797087	AHD		4-23
Richmond River	Woodburn	203412	56	533496	6784089	AHD		4-24
Evans River	Evans River Fishing Co-op	203462	56	542250	6778375	AHD		4-25
Evans River	Iron Gates	203475	56	539700	6778241	AHD		4-26
Tucombil Canal	Tucombil Highway Bridge	203480	56	532949	6782596	AHD		4-27
Rocky Mouth Creek	Rocky Mouth Creek	203432	56	531748	6781331	AHD		4-28
Richmond River	Bungawalbin	203450	56	527031	6788276	AHD		4-29
Bungawalbin Creek	Bungawalbin Creek	2034133	56	516561	6776508	AHD		4-30
Richmond River	Coraki	203403	56	527981	6793775	AHD		4-31
Wilsons River	East Gundurimba	203427	56	526034	6809079	AHD		4-32
Leycester Creek	Tuncester	203443	56	523441	6814619	AHD		4-33
Wilsons River	Woodlawn College	203402	56	529528	6815751	AHD		4-34
Station Locality Map	Clarence River Region						95.1	4-35
Clarence River	Yamba	204454	56	535118	6744433			*
Tasman Sea	Lord Howe Island	240402	57	505521	6512362			*
Clarence River	Oyster Channel	204451	56	530468	6744254	AHD		4-36
Clarence River	Maclean	204410	56	518999	6741473	AHD		4-37
Clarence River	Lawrence	204453	56	510259	6736948	AHD		4-38
Clarence River	Tyndale	204465	56	512580	6729227	AHD		4-39

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Clarence River	The Avenue Upstream	204475	56	507150	6714123	AHD		**4-40**
Clarence River	The Avenue Downstream	204476	56	507174	6714140	AHD		**4-41**
Clarence River	Brushgrove	204406	56	507508	6729089	AHD		**4-42**
Clarence River	Ulmarra	204480	56	502596	6722105	AHD		**4-43**
Clarence River	Grafton	204400	56	493388	6715141	AHD		**4-44**
Clarence River	Rogans Bridge	204414	56	488813	6723401	AHD		**4-45**
Palmers Channel	Palmers Island Bridge	204426	56	525780	6744108	AHD		**4-46**
Lake Wooloweyah	Lake Wooloweyah	204485	56	533141	6739053	AHD		**4-47**
Station Locality Map	Woolgoolga Region						99.8	**4-48**
Wooli River	Wooli Entrance	205462	56	525680	6693338	AHD		**4-49**
Wooli River	Wooli Caravan Park	205463	56	524551	6697797	AHD		**4-50**
Corindi River	Red Rock	205450	56	521919	6683065	AHD		**4-51**
Woolgoolga Lake	Woolgoolga Lake	205455	56	519091	6669486	AHD		**4-52**
Woolgoolga Creek	Woolgoolga	205441	56	515783	6668247	CTF		**4-53**
Moonee Creek	Moonee Creek	205435	56	514953	6658959	AHD		**4-54**
Station Locality Map	Coffs Harbour Region						100.0	**4-55**
Tasman Sea	Coffs Harbour	205470	56	514052	6647645			*
Coffs Creek	Coffs Creek Highway Bridge	205439	56	511160	6648716	AHD		**4-56**
Newports Creek	Newports Creek	205460	56	510016	6645652	AHD		**4-57**
Boambee Creek	Boambee	205438	56	507834	6643805	AHD		**4-58**
Boambee Creek	Boambee Entrance	205475	56	509896	6642068	AHD		**4-59**
Station Locality Map	Bellinger River Region						81.4	**4-60**
Bonville Creek	Bonville	205480	56	503975	6640378	AHD		**4-61**
Bellinger River	Repton	205403	56	502358	6632218	AHD		**4-62**
Bellinger River	Bellingen Bridge	205442	56	490336	6631224	AHD		**4-63**
Kalang River	Urunga	205407	56	501233	6626813	AHD		**4-64**
Kalang River	Upstream Newry Island	205458	56	497966	6625223	AHD		**4-65**
Kalang River	Kooroowi	205440	56	482967	6629647	AD		**4-66**
Station Locality Map	Nambucca River Region						99.7	**4-67**
Deep Creek	Deep Creek	205485	56	500253	6613431	AHD		**4-68**
Nambucca River	Stuarts Island Downstream	205466	56	499519	6608564	AHD		**4-69**
Nambucca River	Macksville	205416	56	492382	6602967	AHD		**4-70**

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Taylors Arm	Utungun	205414	56	485800	6600344	AHD		**4-71**
Nambucca River	Bowraville Downstream	205425	56	486768	6608695	AHD		**4-72**
Warrell Creek	Warrell Creek	205490	56	491986	6600076	AHD		**4-73**
Station Locality Map	Macleay River Region						99.7	**4-74**
Boringalla Creek	Boringalla Creek	206450	56	496445	6586064	AHD		**4-75**
Macleay River	South West Rocks	206456	56	501638	6582579	AHD		**4-76**
Korogoro Creek	Hat Head	206465	56	505462	6563993	AHD		**4-77**
Saltwater Lagoon	Saltwater Lagoon	206460	56	506119	6582610	AHD		**4-78**
Macleay River	Smithtown	206406	56	494960	6568643	AHD		**4-79**
Macleay River	Kempsey	206402	56	485137	6561355	AHD		**4-80**
Macleay River	Aldavilla Downstream	206459	56	479318	6561231	AHD		**4-81**
Killick Creek	Crescent Head	207452	56	497704	6549628	AHD		**4-82**
Station Locality Map	Hastings River Region						98.6	**4-83**
Maria River	Green Valley	207406	56	486416	6540068	AHD		**4-84**
Wilson River	Telegraph Point	207415	56	481082	6534512	AHD		**4-85**
Port Macquarie	Port Macquarie	207420	56	491554	6523090			*
Hastings River	Settlement Point	207418	56	490636	6525312	AHD		**4-86**
Hastings River	Dennis Bridge Downstream	207444	56	482995	6525235	AHD		**4-87**
Hastings River	Wauchope Railway Bridge	207401	56	474995	6520192	AHD		**4-88**
Station Locality Map	Camden Haven Region						100.0	**4-89**
Lake Cathie	Lake Cathie	207441	56	486162	6509679	AHD		**4-90**
Camden Haven River	North Haven	207423	56	483134	6499413	AHD		**4-91**
Stingray Creek	West Haven	207437	56	480664	6499768	AHD		**4-92**
Camden Haven River	Laurieton	207425	56	480923	6497744	AHD		**4-93**
Camden Haven River	Logans Crossing	207428	56	470913	6502295	LWRD		**4-94**
Queens Lake	Lakewood	207475	56	477455	6500578	AHD		**4-95**
Watson Taylors Lake	Watson Taylors Lake	207480	56	475578	6491082	AHD		**4-96**
Station Locality Map	Manning River Region						100.0	**4-97**
Tasman Sea	Crowdy Head Boat Harbour	208471	56	476348	6477414			*
Manning River	Harrington	208425	56	470255	6473391	AHD		**4-98**
Manning River	Croki	208404	56	461589	6473115	AHD		**4-99**
Manning River	Dumaresq Island	208430	56	454329	6470475	AHD		**4-100**
Manning River	Taree	208410	56	448687	6468633	AHD		**4-101**

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Manning River	Wingham	208400	56	440559	6473212	AHD		**4-102**
Manning River	Mount George	208440	56	419229	6472262	LWRD		**4-103**
Dingo Creek	Ashlea Bridge Downstream	208436	56	433875	6476673	AD		**4-104**
Manning River	Farquhar Inlet	208415	56	461745	6466021	AHD		**4-105**
Station Locality Map	Great Lakes Region						95.4	**4-106**
Wallis Lake Entrance	Forster	209402	56	453635	6440173			*
Wallamba River	Tuncurry Downstream	209401D	56	450568	6442279	AHD		**4-107**
Wallamba River	Nabiac	209404	56	436831	6446432	AHD		**4-108**
Wallis Lake	Pacific Palms Wharf	209406	56	455401	6422551	AHD		**4-109**
Smiths Lake	Tarbuck Bay	209465	56	451548	6417906	AHD		**4-110**
Myall River	Bulahdelah	209460	56	425442	6413407	AHD		**4-111**
Myall River	Bombah Point	209475	56	434682	6403309	AHD		**4-112**
Station Locality Map	Port Stephens Region						100.0	**4-113**
Myall River	Tea Gardens	209480	56	421723	6385111	AHD		**4-114**
Karuah River	Karuah	209485	56	403411	6386503	AHD		**4-115**
Port Stephens	Mallabula Point	209461	56	407770	6379228	AHD		**4-116**
Port Stephens	Shoal Bay	209474	56	422749	6379489			*
Station Locality Map	Hunter River Region						99.9	**4-117**
Hunter River	Stockton Bridge	210456	56	386238	6360819	AHD		**4-118**
Hunter River	Hexham Bridge	210448	56	376568	6368156	AHD		**4-119**
Williams River	Raymond Terrace	210452	56	382357	6375355	AHD		**4-120**
Williams River	Seaham	210462	56	381130	6385316	AHD		**4-121**
Hunter River	Green Rocks	210432	56	377459	6378142	AHD		**4-122**
Hunter River	Morpeth	210430	56	371590	6378484	AHD		**4-123**
Hunter River	McKimms Corner	210455	56	368191	6378929	AHD		**4-124**
Hunter River	Belmore Bridge	210458	56	364492	6377780	AHD		**4-125**
Hunter River	Bolwarra Downstream	210451	56	365591	6380224	AHD		**4-126**
Hunter River	Oakhampton Railway Bridge	210475	56	365866	6381600	AHD		**4-127**
Station Locality Map	Paterson River Region						99.5	**4-128**
Paterson River	Hinton Bridge	210410	56	373306	6379619	AHD		**4-129**
Paterson River	Dunmore	210409	56	369277	6383252	AHD		**4-130**
Paterson River	Paterson Railway Bridge	210406	56	370303	6392399	AHD		**4-131**
Paterson River	Gostwyck	210402	56	369088	6396074	AHD		**4-132**

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Wallis Creek Region						100.0	4-133
Wallis Creek	Wallis Creek Upstream	210428	56	366420	6376950	AHD		4-134
Wallis Creek	Wallis Creek Downstream	210457	56	366440	6376997	AHD		4-135
Wallis Creek	Louth Park	210453	56	363251	6373693	AHD		4-136
Station Locality Map	Lake Macquarie Region						100.0	4-137
Lake Macquarie	Marmong Point	211460	56	370992	6350370	AHD		4-138
Cockle Creek	Cockle Railway Station	211455	56	371189	6354213	AHD		4-139
Cockle Creek	Barnsley Vale	211450	56	369036	6354808	AHD		4-140
Lake Macquarie	Belmont	211461	56	374287	6343446	AHD		4-141
Lake Macquarie	Swansea Channel	211462	56	373155	6338270	AHD		4-142
Dora Creek	Kalang Road	211475	56	358900	6338978	AHD		4-143
Dora Creek	Cooranbong	211470	56	355446	6339055	AHD		4-144
Stockton Creek	Morisset	211480	56	357710	6336566	AHD		4-145
Lake Macquarie	Wyee Point	2114112	56	362703	6330958	AHD		4-146
Station Locality Map	Tuggerah Lakes Region						100.0	4-147
Wallarah Creek	Wallarah Creek Bridge	211420	56	360913	6323587	AHD		4-148
Tuggerah Lake	Toukley	211401	56	362599	6318531	AHD		4-149
Wyong River	Wyong Weir Upstream	211417	56	351596	6316778	AHD		4-150
Ourimbah Creek	Lees Bridge	211425	56	353684	6311538	AHD		4-151
Tuggerah Lake	Long Jetty	211418	56	358757	6308079	AHD		4-152
Tumbi Umbi Creek	Tumbi Umbi	211419	56	355321	6307480	AHD		4-153
Station Locality Map	Brisbane Water Region						96.7	4-154
Narara Creek	Manns Road	211435	56	345890	6302955	AHD		4-155
Wamberal Lagoon	Wamberal Lagoon	212450	56	355526	6300283	AHD		4-156
Terrigal Lagoon	Terrigal Bridge	212455	56	355079	6298683	AHD		4-157
Avoca Lagoon	Avoca Lagoon	212452	56	354079	6296162	AHD		4-158
Cockrone Lake	Cockrone Lake	212453	56	353841	6292959	AHD		4-159
Worthing Ave Creek	Erina	212436	56	350150	6299610	AHD		4-160
Erina Creek	Punt Bridge	212433	56	347514	6298928	AHD		4-161
Brisbane Water	Ettalong	212423	56	346015	6290156	AHD		4-162

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Brisbane Water	Koolewong 2	2124301	56	344294	6294668	AHD		**4-163**
Station Locality Map	Hawkesbury River Region						90.8	**4-164**
Hawkesbury River	Patonga	212440	56	339822	6286295			*
Hawkesbury River	Spencer	212431	56	327772	6296497	AHD		**4-165**
Hawkesbury River	Gunderman Caravan Park	212429	56	319440	6298151	AHD		**4-166**
Hawkesbury River	Wisemans Ferry	212460	56	312963	6304569	AHD		**4-167**
Hawkesbury River	Webbs Creek	212408	56	312331	6303939	AHD		**4-168**
Hawkesbury River	Colo Junction	212407	56	303217	6298185	AHD		**4-169**
Hawkesbury River	Sackville	212406	56	303203	6292012	AHD		**4-170**
Hawkesbury River	Ebenezer	212427	56	304388	6286030	AHD		**4-171**
Hawkesbury River	Windsor	212426	56	297588	6279514	AHD		**4-172**
Hawkesbury River	Freemans Reach	212410	56	294009	6283328	AHD		**4-173**
Nepean River	Castlereagh	212404	56	284495	6275964	AHD		**4-174**
Station Locality Map	Sydney North Region						100.0	**4-175**
Narrabeen Lagoon	Ocean Street Bridge	213408D	56	342897	6269396	AHD		**4-176**
Narrabeen Lagoon	Narrabeen Bridge	213422	56	342174	6268454	AHD		**4-177**
Dee Why Lagoon	Dee Why	213424	56	342725	6264718	AHD		**4-178**
Curl Curl Lagoon	Curl Curl	213426	56	342098	6262458	AHD		**4-179**
Manly Lagoon	Riverview Parade	213413	56	340504	6260456	AHD		**4-180**
Manly Lagoon	Queenscliff Bridge	213414	56	340963	6260561	AHD		**4-181**
Lane Cove River	Fullers Bridge	213476	56	329370	6259278	AHD		**4-182**
Port Jackson	Sydney	213470	56	338842	6255833			*
Station Locality Map	Parramatta River and Cooks River Region						74.8	**4-183**
Parramatta River	Silverwater Bridge	213435	56	319683	6255592	AHD		**4-184**
Cooks River	Canterbury Road	213411	56	325944	6245849	AHD		**4-185**
Cooks River	Illawarra Road Bridge	213420	56	328303	6244862	AHD		**4-186**
Cooks River	Tempe Bridge	213415	56	329694	6244231	AHD		**4-187**

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Georges River Region						97.8	4-188
Georges River	Picnic Point Downstream	213410D	56	315269	6237999	AHD		4-189
Georges River	Como Bridge	213425	56	321829	6236499	AHD		4-190
Georges River	Milperra	213405	56	313222	6244042	AHD		4-191
Prospect Creek	Lansdowne Bridge	213402	56	312039	6248143	AHD		4-192
Georges River	Lansvale	213401	56	311150	6247099	AHD		4-193
Cabramatta Creek	Irelands Bridge	213407	56	309832	6246486	AHD		4-194
Georges River	Scrivener Street	213404	56	309137	6244541	AHD		4-195
Georges River	Liverpool Weir	213400	56	308514	6244022	AHD		4-196
Port Hacking	Bundeena	214452	56	329394	6227133			*
Station Locality Map	Wollongong Region						99.1	4-197
Hewitts Creek	Hewitts Creek Upstream	214410	56	308179	6200428	AHD		4-198
Hewitts Creek	Hewitts Creek Downstream	214411	56	308183	6200410	AHD		4-199
Hewitts Creek	Hewitts Creek Entrance	214408	56	308991	6199982	AHD		4-200
Cabbage Tree Creek	Balgownie Road	214409	56	305367	6192700	AHD		4-201
Bellambi Lake	Bellambi	214488	56	308719	6194185	AHD		4-202
Towradgi Creek	Towradgi Creek Upstream	214477	56	307607	6193622	AHD		4-203
Towradgi Creek	Towradgi Creek Downstream	214475	56	307626	6193606	AHD		4-204
Cabbage Tree Creek	Cabbage Tree Creek Upstream	214405	56	306254	6191850	AHD		4-205
Cabbage Tree Creek	Cabbage Tree Creek Downstream	214406	56	306275	6191832	AHD		4-206
Fairy Creek	Fairy Creek Upstream	214403	56	306315	6189983	AHD		4-207
Fairy Creek	Fairy Creek Downstream	214404	56	306351	6189967	AHD		4-208
Byarong Creek	Byarong Creek	214420	56	303773	6186987	AHD		4-209
Byarong Creek	Koloona Avenue Upstream	214425	56	302909	6189424	AHD		4-210
Byarong Creek	Koloona Avenue Downstream	214426	56	302926	6189412	AHD		4-211
American Creek	Blackmans Parade Upstream	214430	56	301022	6185316	AHD		4-212
American Creek	Blackmans Parade Downstream	214431	56	301043	6185312	AHD		4-213
Station Locality Map	Lake Illawarra Region						99.5	4-214
Mullet Creek	Mullet Creek	214400	56	298397	6182420	AHD		4-215

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Lake Illawarra	Koonawarra Bay	214440	56	300464	6179788	AHD		**4-216**
Lake Illawarra	Cudgeree Bay 2	2144101	56	303859	6176981	AHD		**4-217**
Lake Illawarra	Lake Illawarra Entrance	214417	56	304579	6176195	AHD		**4-218**
Lake Illawarra	Lake Illawarra Windang Bridge	2144107	56	304347	6176526	AHD		**4-219**
Macquarie Rivulet	Princes Highway	214402	56	296808	6174979	AHD		**4-220**
Little Lake	Little Lake Entrance	214467	56	304250	6173571	AHD		**4-221**
Station Locality Map	Kiama Region						100.0	**4-222**
Minnamurra River	Minnamurra	214442	56	303031	6167146	AHD		**4-223**
Werri Lagoon	Werri Lagoon	214445	56	301988	6155052	AHD		**4-224**
Crooked River	Gerroa	215410	56	299419	6150158	AHD		**4-225**
Station Locality Map	Shoalhaven River Region						100.0	**4-226**
Shoalhaven River	Shoalhaven Heads	215470	56	293877	6140761	AHD		**4-227**
Shoalhaven River	Hay Street	215415	56	292468	6140163	AHD		**4-228**
Shoalhaven River	Terara	215420	56	283258	6139535	AHD		**4-229**
Shoalhaven River	Nowra Bridge	215411	56	280834	6139287	AHD		**4-230**
Shoalhaven River	Grady's Caravan Park	215430	56	268094	6138339	AHD		**4-231**
Crookhaven River	Crookhaven Heads	215408	56	295288	6135163			*
Crookhaven River	Greenwell Point	215417	56	293199	6134901	AHD		**4-232**
Wollumboola Lake	Wollumboola	215454	56	295853	6131507	AHD		**4-233**
Station Locality Map	Jervis Bay Region						100.0	**4-234**
Currarong Creek	Currarong Creek	216405	56	301142	6122850	AHD		**4-235**
Jervis Bay	Jervis Bay	216470	56	291092	6111027			*
St Georges Basin	Island Point	216415	56	280748	6113511	AHD		**4-236**
Sussex Inlet	Sussex Inlet	216412	56	280903	6105512	AHD		**4-237**
Swan Lake	Swan Lake	216425	56	277905	6102577	AHD		**4-238**
Station Locality Map	Ulladulla Region						100.0	**4-239**
Lake Conjola	Lake Conjola Downstream	216420D	56	272620	6094240	AHD		**4-240**
Narrawallee Inlet	Narrawallee	216430	56	269839	6090673	AHD		**4-241**
Tasman Sea	Ulladulla Boat Harbour	216471	56	270711	6084368			*

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Burrill Lake	Burrill Lake Bridge	216435	56	267949	6080931	AHD		**4-242**
Tabourie Lake	Lake Tabourie	216440	56	264310	6074957	AHD		**4-243**
Station Locality Map	Batemans Bay Region						100.0	**4-244**
Durras Lake	Durras Lake	216445	56	255304	6052185	AHD		**4-245**
Clyde River	Nelligen	216453	56	241369	6050944	AHD		**4-246**
Clyde River	Princess Jetty	216410	56	244664	6045231			*
Station Locality Map	Moruya River Region						100.0	**4-247**
Tomaga River	George Bass Drive	216455	56	245110	6031671	AHD		**4-248**
Moruya River	Moruya Bridge	217410	56	236703	6022317	AHD		**4-249**
Moruya River	Moruya Hospital	217402	56	235673	6022790	AHD		**4-250**
Station Locality Map	Coila and Tuross Lakes						93.3	**4-251**
Coila Lake	Coila Lake	218405	56	242279	6006865	AHD		**4-252**
Tuross River	Tuross Head	218410	56	240898	6005120	AHD		**4-253**
Station Locality Map	Wagonga Inlet and Wallaga Lake						100.0	**4-254**
Wagonga Inlet	Barlows Bay	218415	56	239464	5988955	AHD		**4-255**
Wallaga Lake	Regatta Point	219405	56	236881	5971060	AHD		**4-256**
Station Locality Map	Bermagui and Bega River Region						100.0	**4-257**
Bermagui Harbour	Bermagui	219470	56	237453	5964777			*
Bega River	Bega River	219410	55	766051	5933982	AHD		**4-258**
Station Locality Map	Eden Region						100.0	**4-259**
Back Lagoon	Back Lagoon	219415	55	759850	5914073	AHD		**4-260**
Merimbula Lake	Merimbula Wharf	220410	55	759297	5913048	AHD		**4-261**
Merimbula Lake	Merimbula Lake	220405	55	756506	5913274	AHD		**4-262**
Pambula Lake	Pambula Lake	220415	55	756743	5905036	AHD		**4-263**
Tasman Sea	Eden Boat Harbour	220470	55	758557	5893267			*
Lake Curalo	Lake Curalo	220420	55	758413	5895378	AHD		**4-264**
Wonboyn Lake	Wonboyn Lake	220452	55	758839	5873472	AHD		**4-265**

* See report MHL2995 NSW Ocean and River Entrance Tidal Levels and Air Pressure Annual Summary 2022–23

^ Data capture percentages do not include ocean tide stations

AHD	Australian Height Datum (1971)
CTF	Cease to Flow of control structure
AD	Assumed Datum
LWRD	Local Water Resources Datum

Estuary water level readings are available in AHD with the exception of Logans Crossing and Mount George, which are in the local water resources datum (LWRD); Kooroowi and

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Ashlea Bridge Downstream, which are in an assumed datum (AD); and Woolgoolga which is using Cease to Flow of control structure (CTF) as gauge zero. There are a number of estuary level gauges that still maintain level data in the local port datum, which generally equates to Indian Springs Low Water (ISLW). An indicative adjustment from the AHD level to local datum is shown in **Table 4-3**. AHD levels were calculated circa 1990 for MHL by NSW Public Works Survey, using the range ratio method and tidal harmonic analysis over varying time periods. Please note that AHD levels are revised from time to time and improvements to GPS surveying techniques may provide additional refinement.

Table 4-3 Summary of adjustment from AHD to local datum

River/estuary	Station	Local datum *	Adjustment AHD (1971) to local datum
Cobaki Broadwater	Cobaki	TRHD	+0.863
Terranora Inlet	Dry Dock	TRHD	+0.875
Terranora Broadwater	Terranora	TRHD	+0.853
Tweed River	Letitia 2A	TRHD	+0.886
Tweed River	Barneys Point	TRHD	+0.883
Tweed River	Tumbulgum	TRHD	+0.893
Tweed River	North Murwillumbah	TRHD	+0.909
Tweed River	Bray Park Weir	TRHD	+0.934
Tweed River	Murwillumbah Bridge	TRHD	+0.909
Rous River	Kynnumboon	TRHD	+0.926
Cudgen Lake	Bogangar	BRFMD	+0.051
Cudgen Creek	Kingscliff	BRFMD	+0.066
Marshalls Creek	Orana Bridge	BRFMD	+0.024
Marshalls Creek	Billinudgel	BRFMD	+0.019
Brunswick River	Mullumbimby	BRFMD	+0.010
Richmond River	Missingham Bridge	RRVD	+0.860
Richmond River	Byrnes Point	RRVD	+0.857
Richmond River	Wardell	RRVD	+0.824
Richmond River	Woodburn	RRVD	+0.815
Evans River	Evans River Fishing Co-op	RRVD	+0.809
Evans River	Iron Gates	RRVD	+0.819
Tucombil Canal	Tucombil Highway Bridge	RRVD	+0.815
Rocky Mouth Creek	Rocky Mouth Creek	RRVD	+0.815
Richmond River	Bungawalbin	RRVD	+0.809
Bungawalbin Creek	Bungawalbin Creek	RRVD	+0.891
Richmond River	Coraki	RRVD	+0.815
Wilsons River	East Gundurimba	RRVD	+0.831
Leycester Creek	Tuncester	RRVD	+0.855
Wilsons River	Woodlawn College	RRVD	+0.826
Karuah River	Mallabula Point	PSHD	+0.959
Parramatta River	Silverwater Bridge	ZFD	+0.925
Georges River	Liverpool Weir	WC	-2.762

*TRHD - Tweed River Hydro Datum (1963), BRFMD - Brunswick River Flood Mitigation Datum (1962), RRVD - Richmond River Valley Datum (1979), PSHD - Port Stephens Hydro Datum (1970), WC – Weir Crest Datum (1980), ZFD – Zero Fort Denison (1897)

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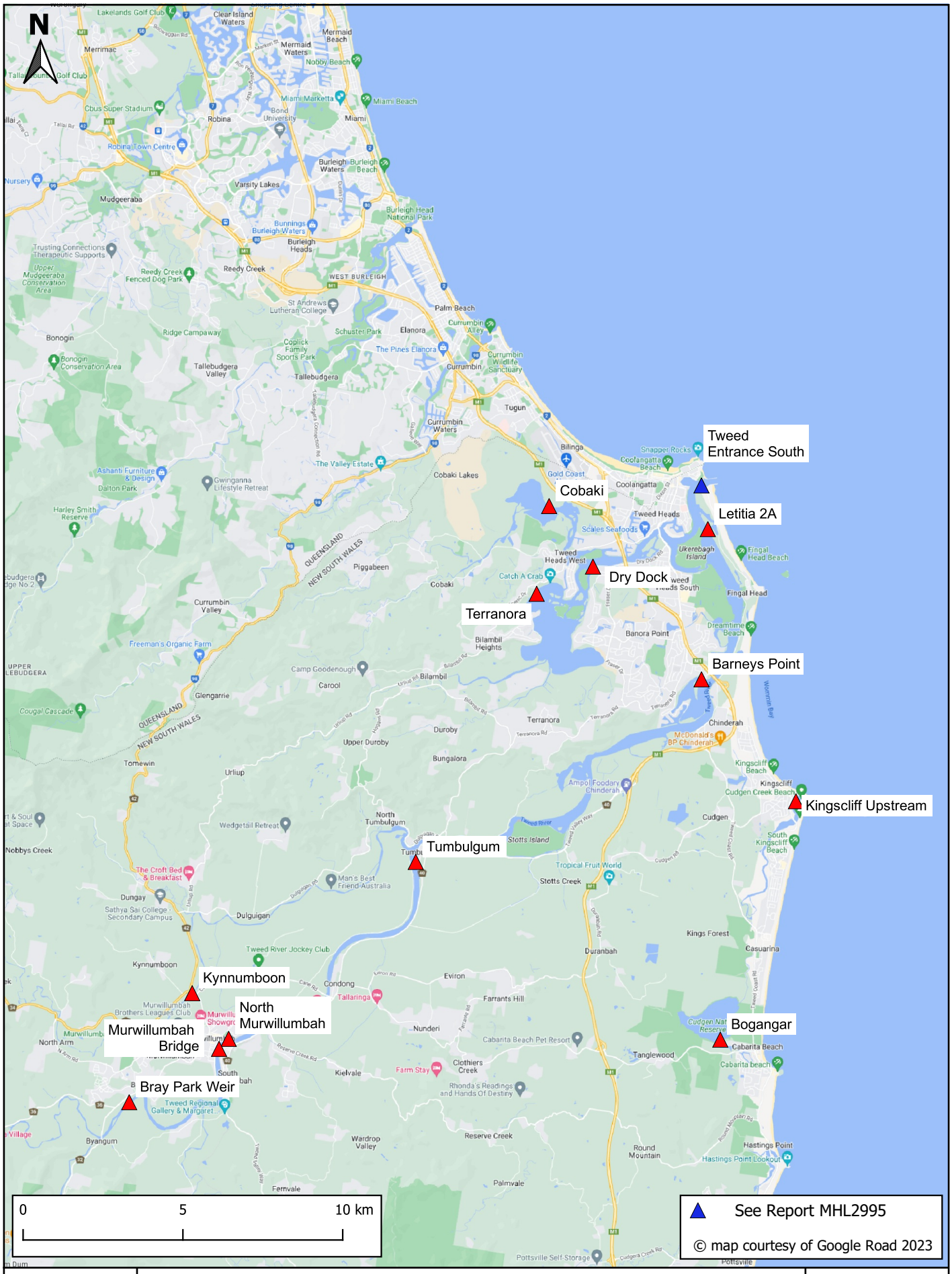
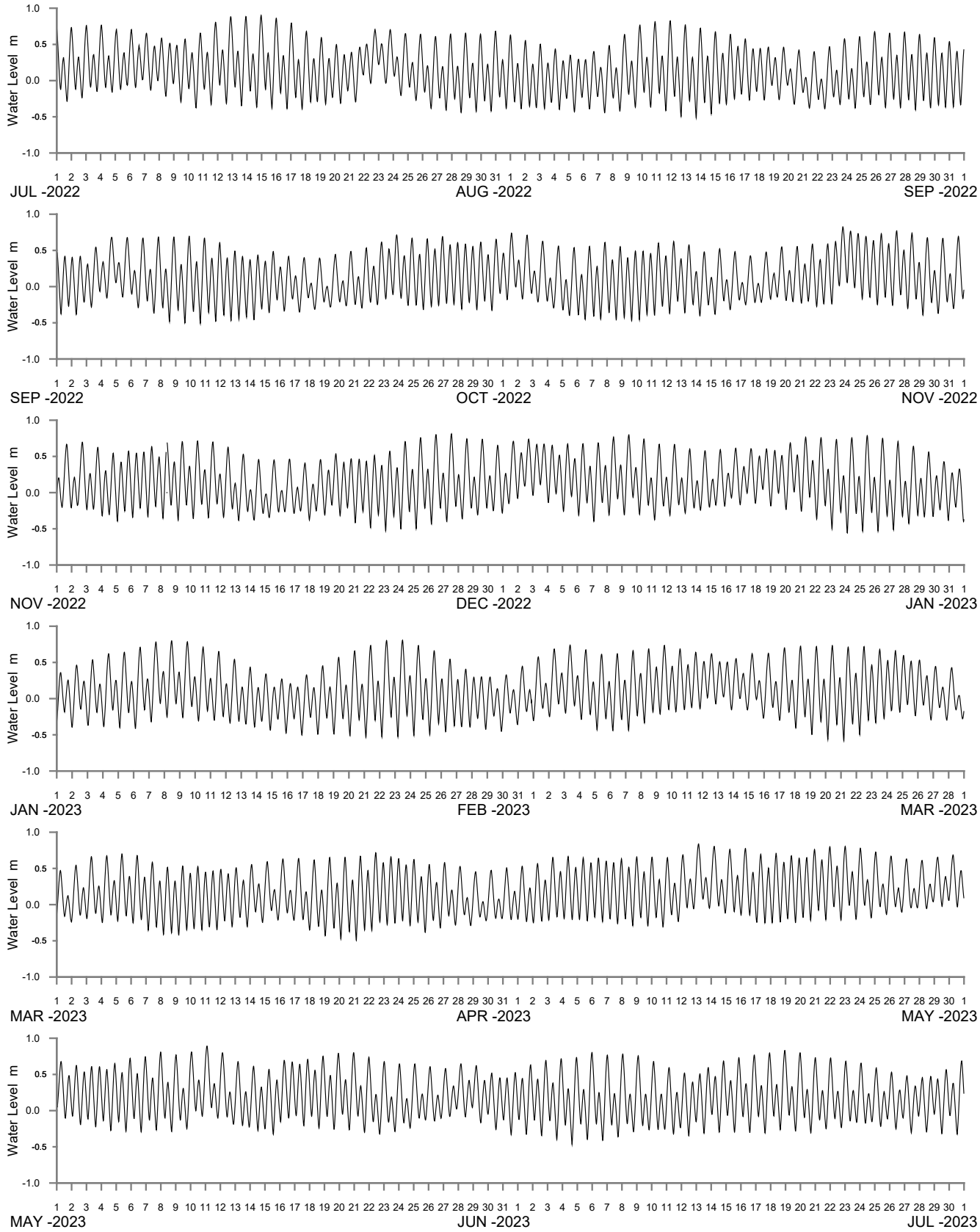


NSW GOVERNMENT

STATION LOCATIONS
TWEED RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-1



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

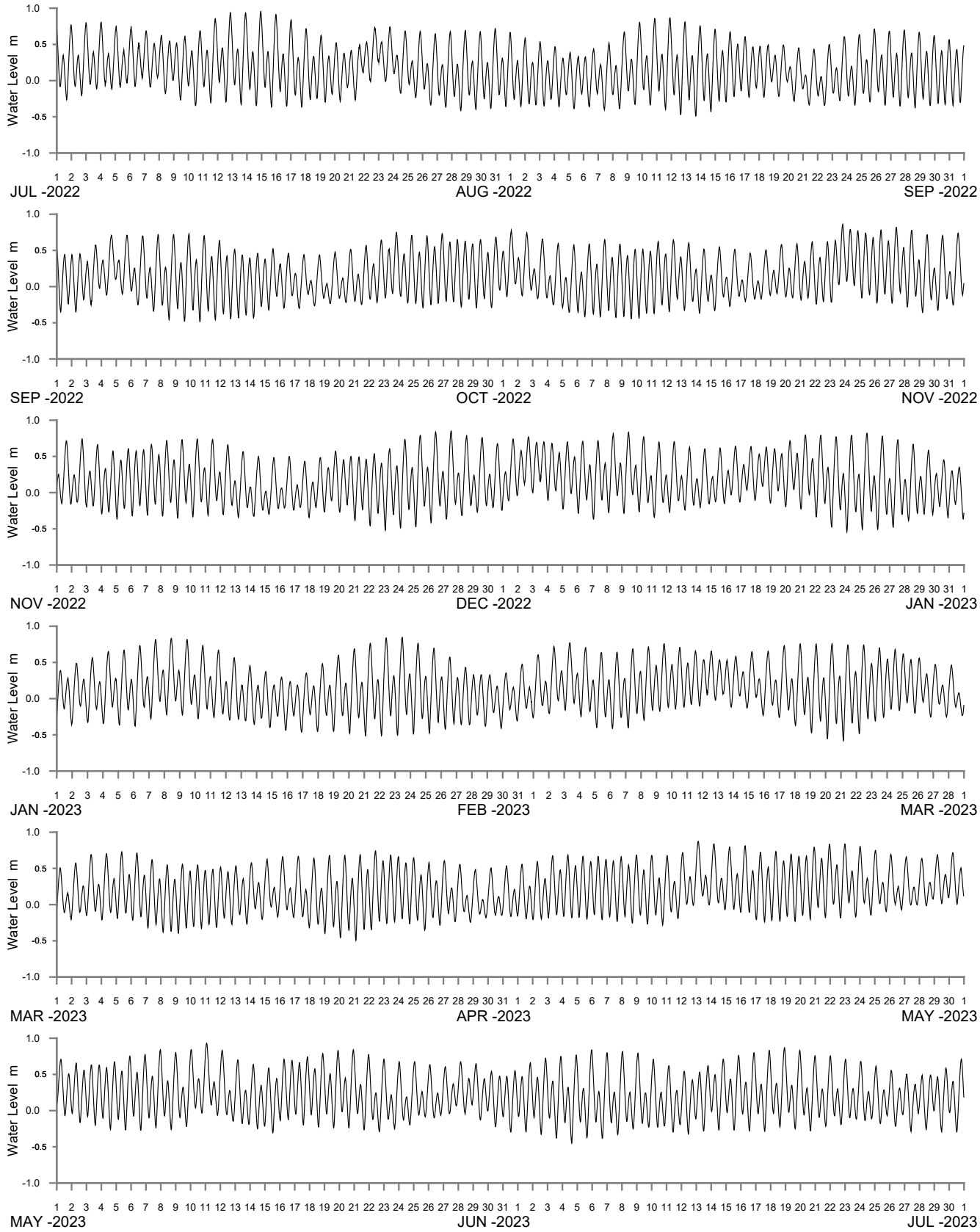
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BROADWATER AT COBAKI
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-2



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

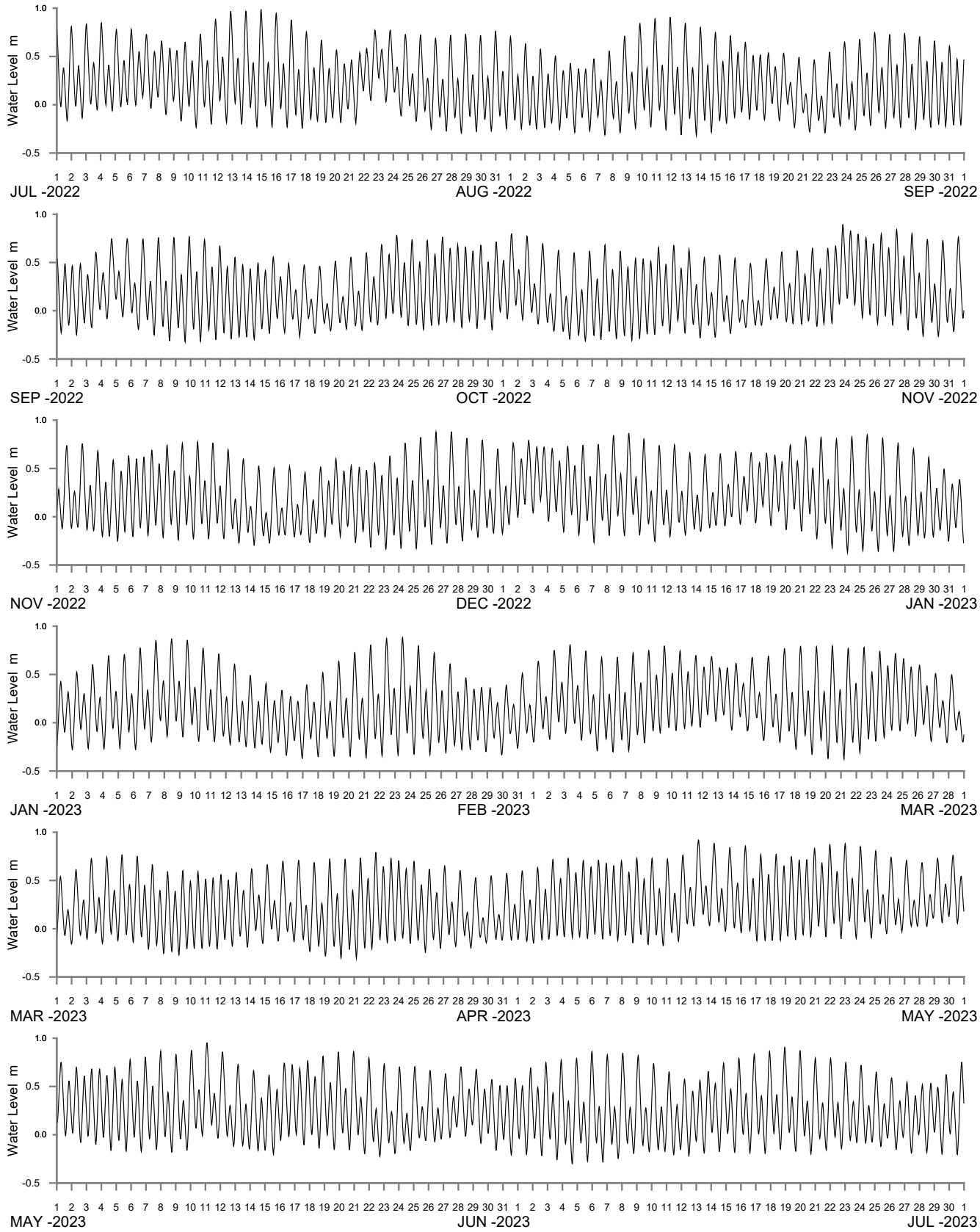
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TERRANORA INLET AT DRY DOCK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-3



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

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TERRANORA INLET AT TERRANORA
2022–23

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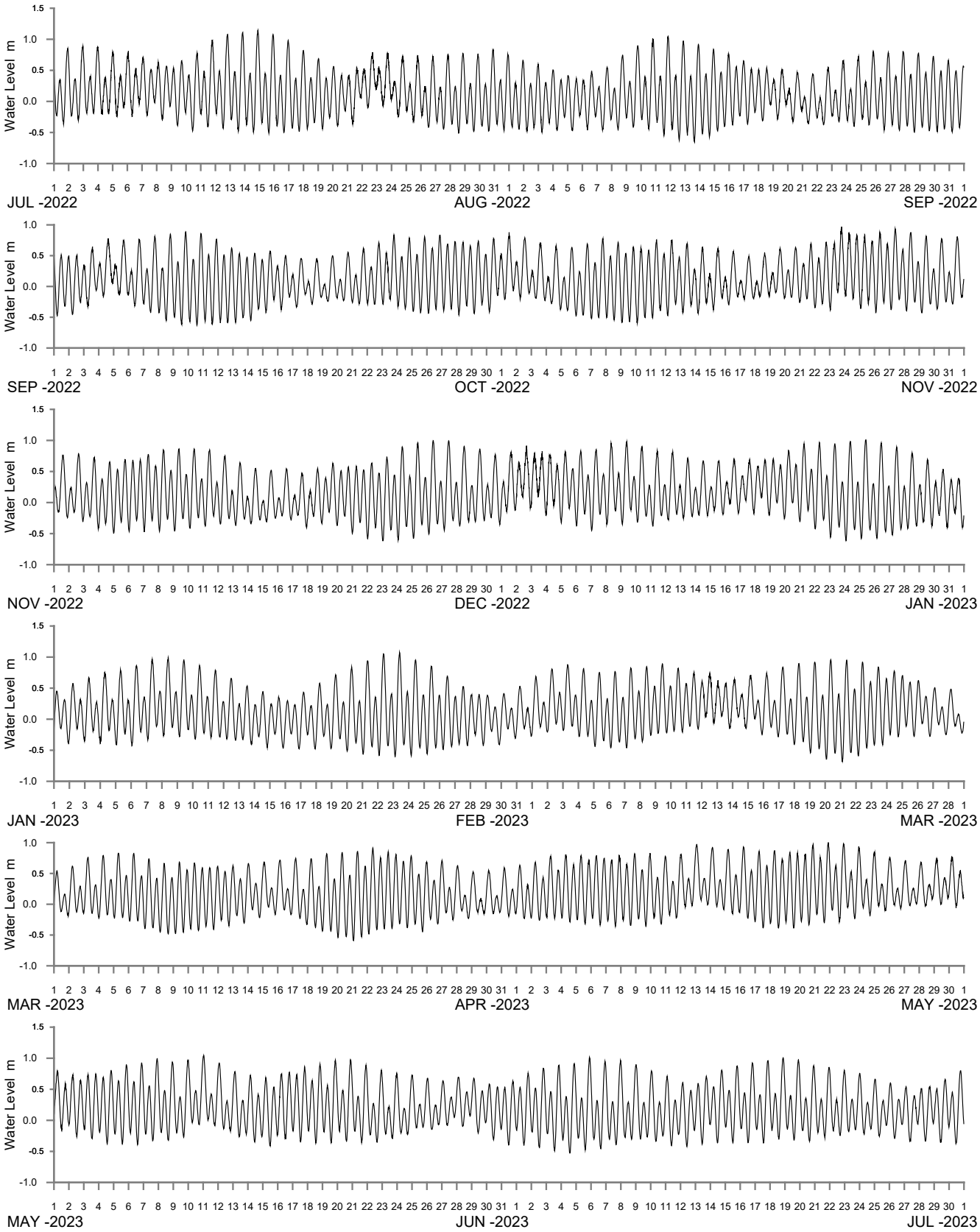
Report MHL2994
Figure
4-4



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

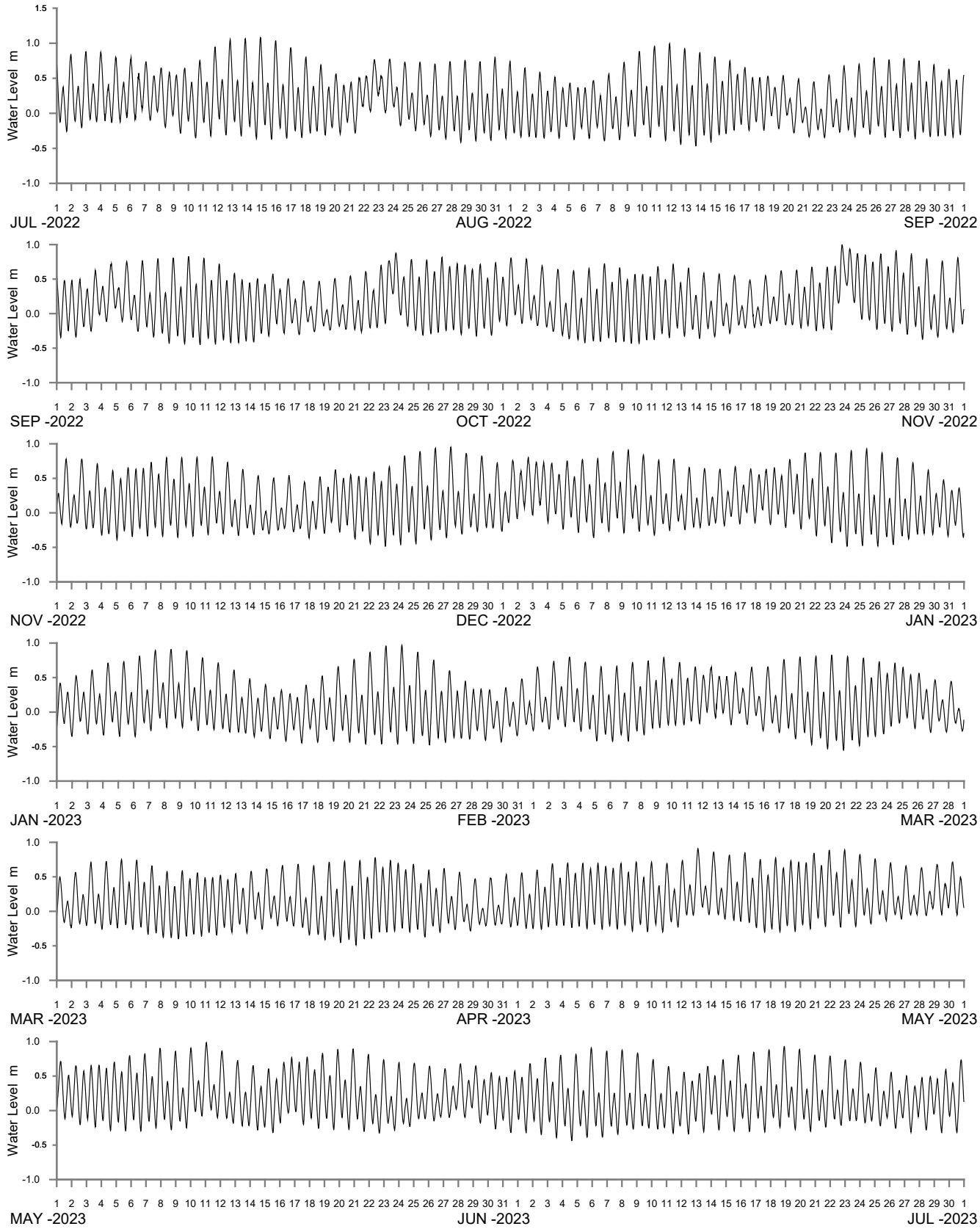
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TWEED RIVER AT LETITIA 2A
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-5



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

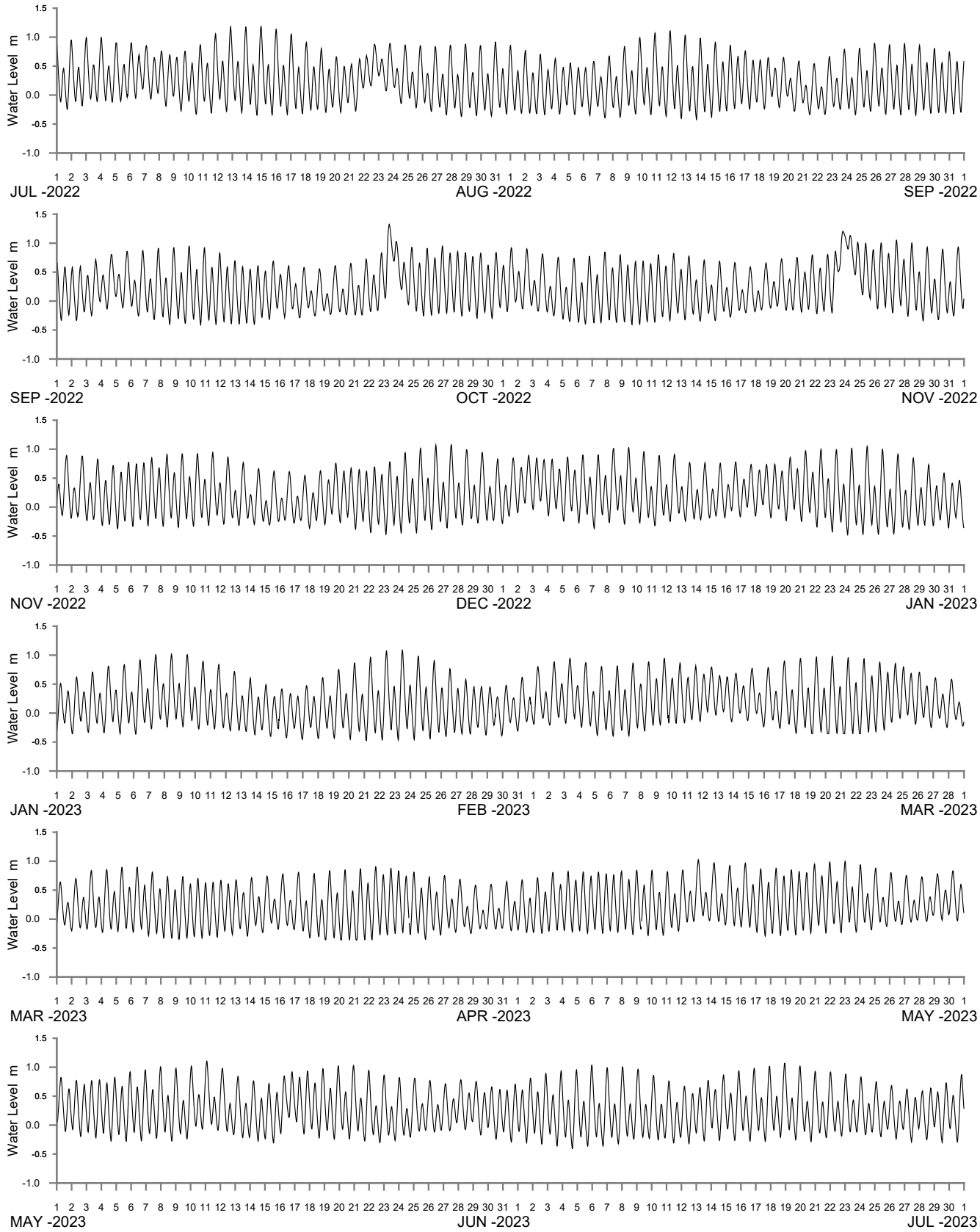
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TWEED RIVER AT BARNEYS POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-6



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TWEED RIVER AT TUMBULGUM
2022–23

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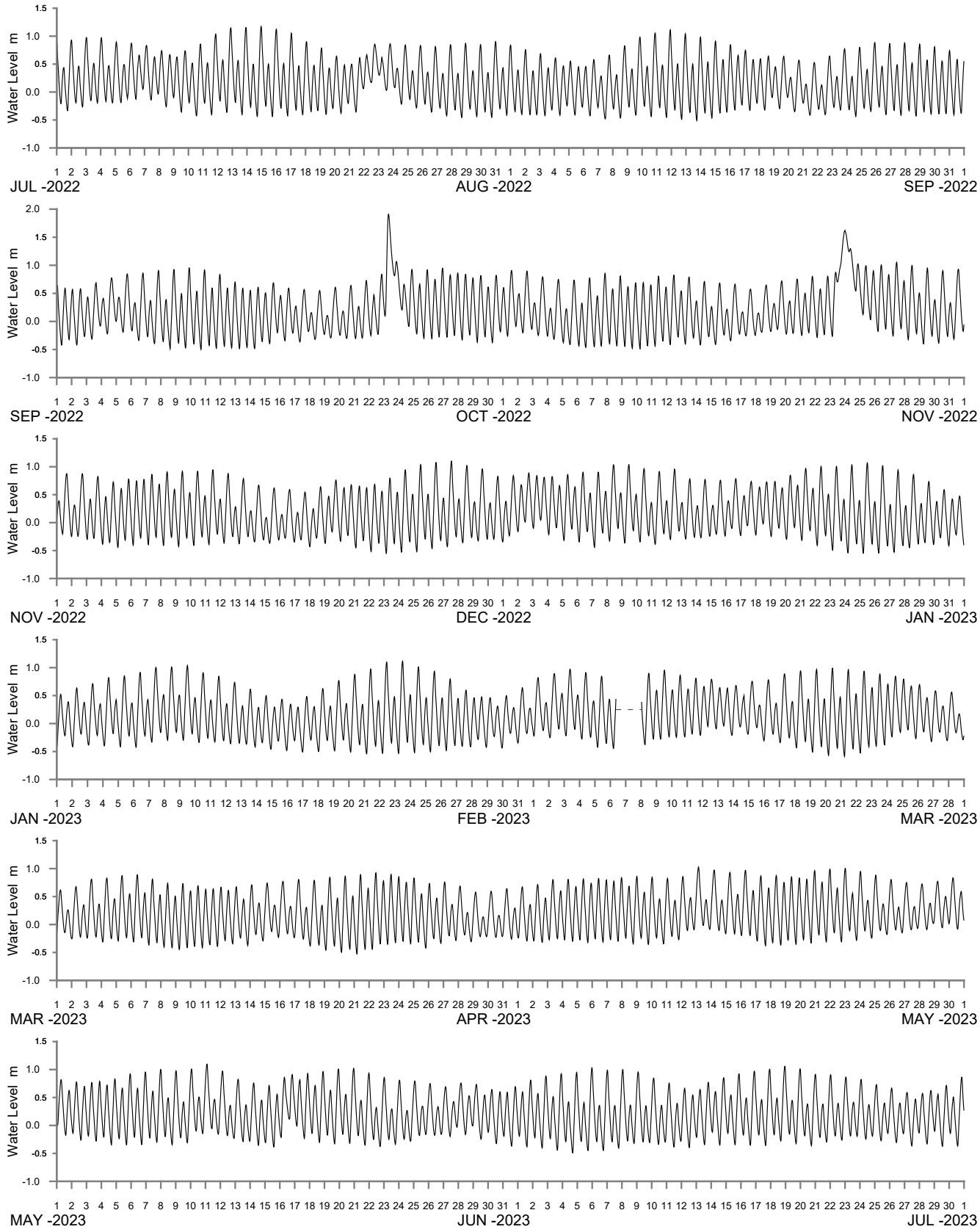
Report MHL2994
Figure
4-7



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

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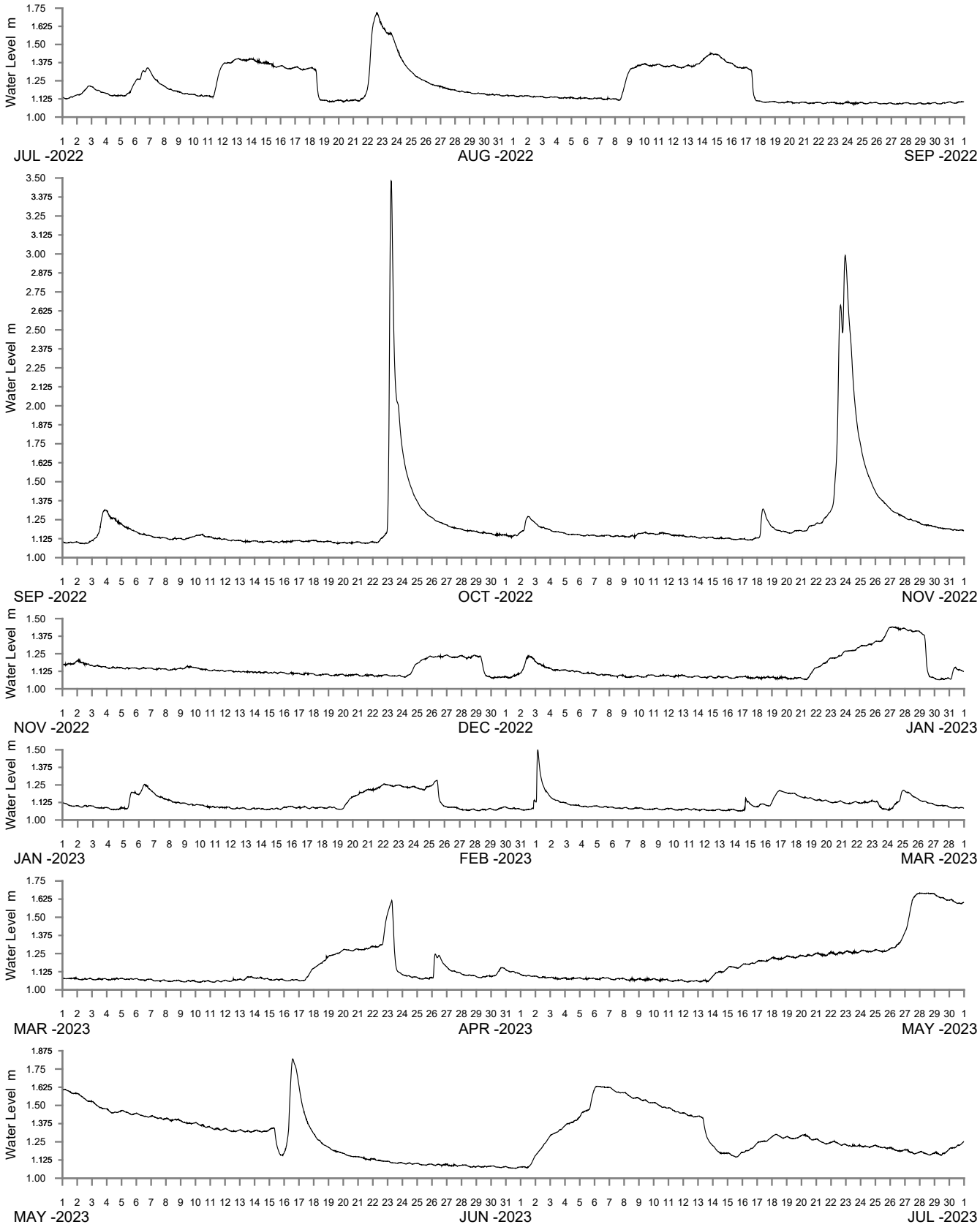
TWEED RIVER AT NORTH MURWILLUMBAH
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-8



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

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TWEED RIVER AT BRAY PARK WEIR
2022–23

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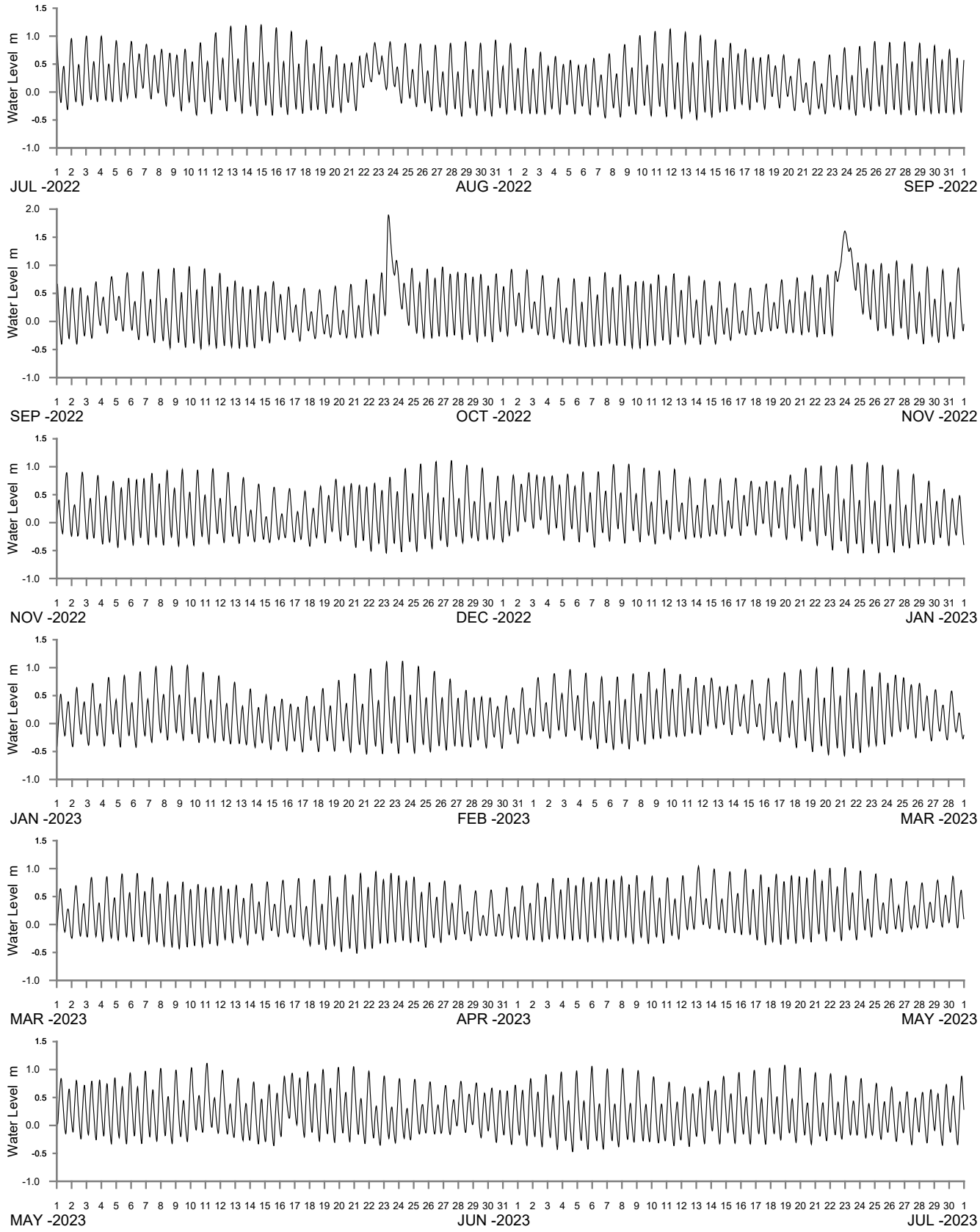
Report MHL2994
Figure
4-9



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

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TWEED RIVER AT MURWILLUMBAH BRIDGE
2022–23

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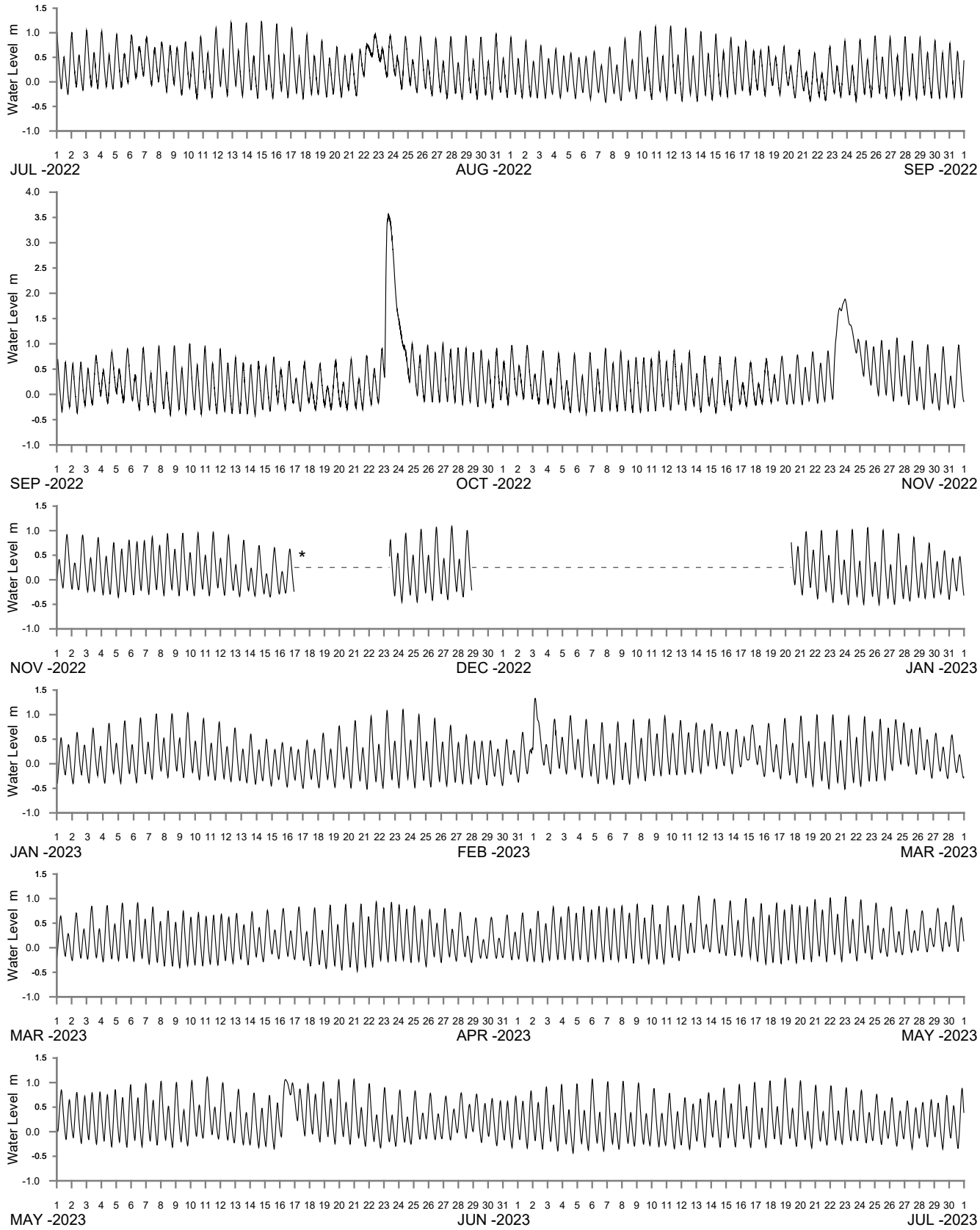
Report MHL2994
Figure
4-10



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - DATA LOSS

* Data loss due to station vandalism

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ROUS RIVER AT KYNNUMBOON
2022–23

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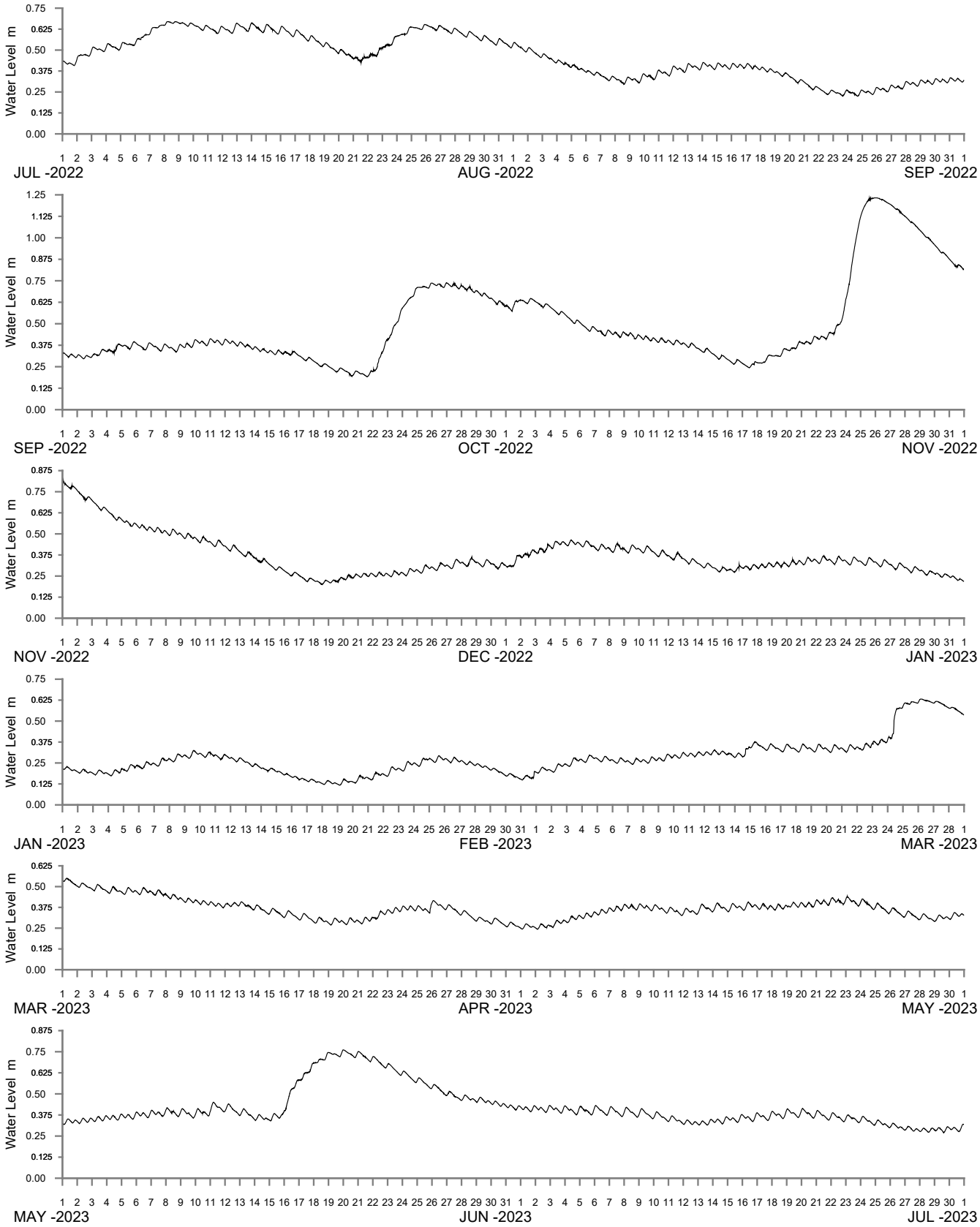
Report MHL2994
Figure
4-11



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CUDGEN LAKE AT BOGANGAR
2022–23

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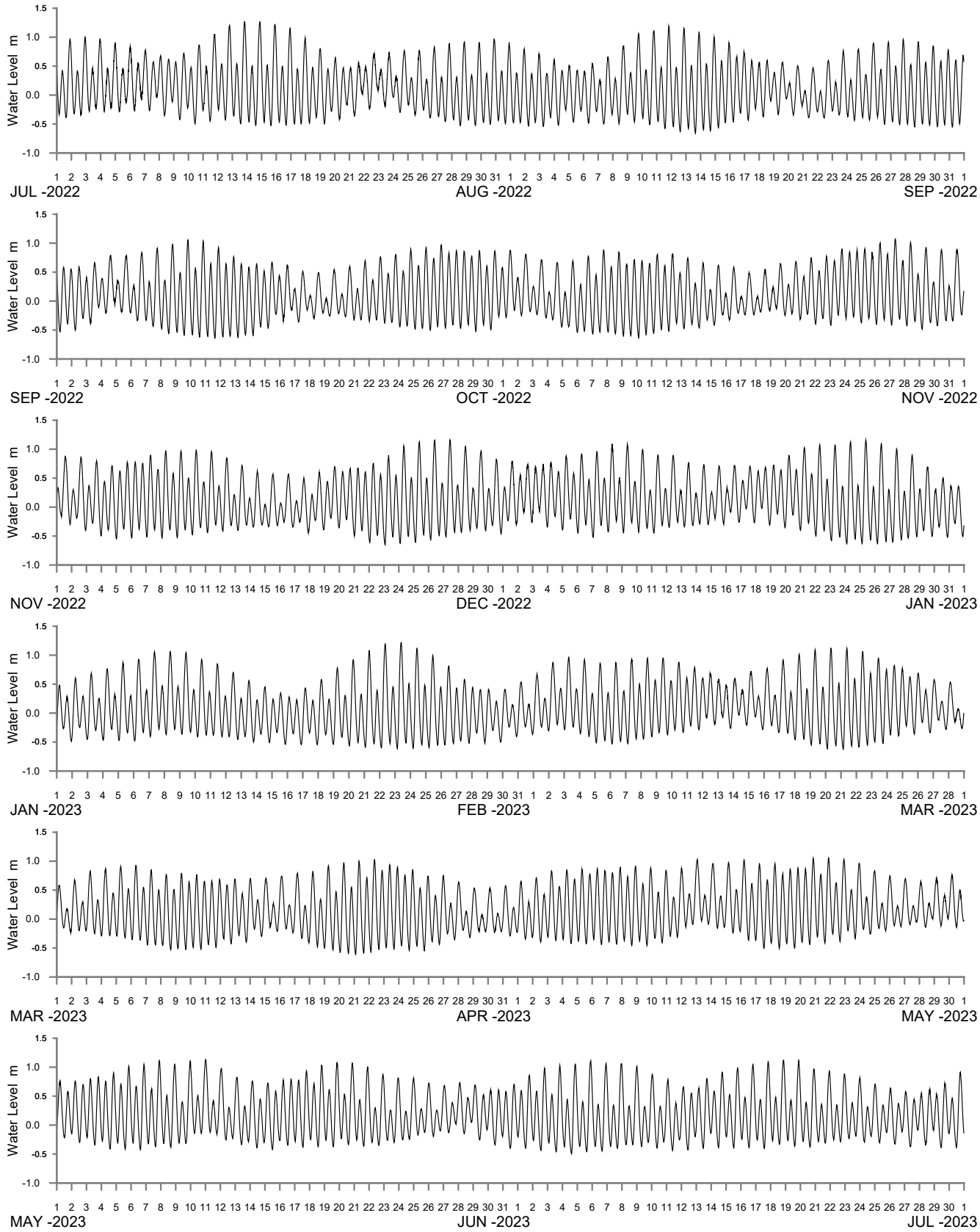
Report MHL2994
Figure
4-12



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

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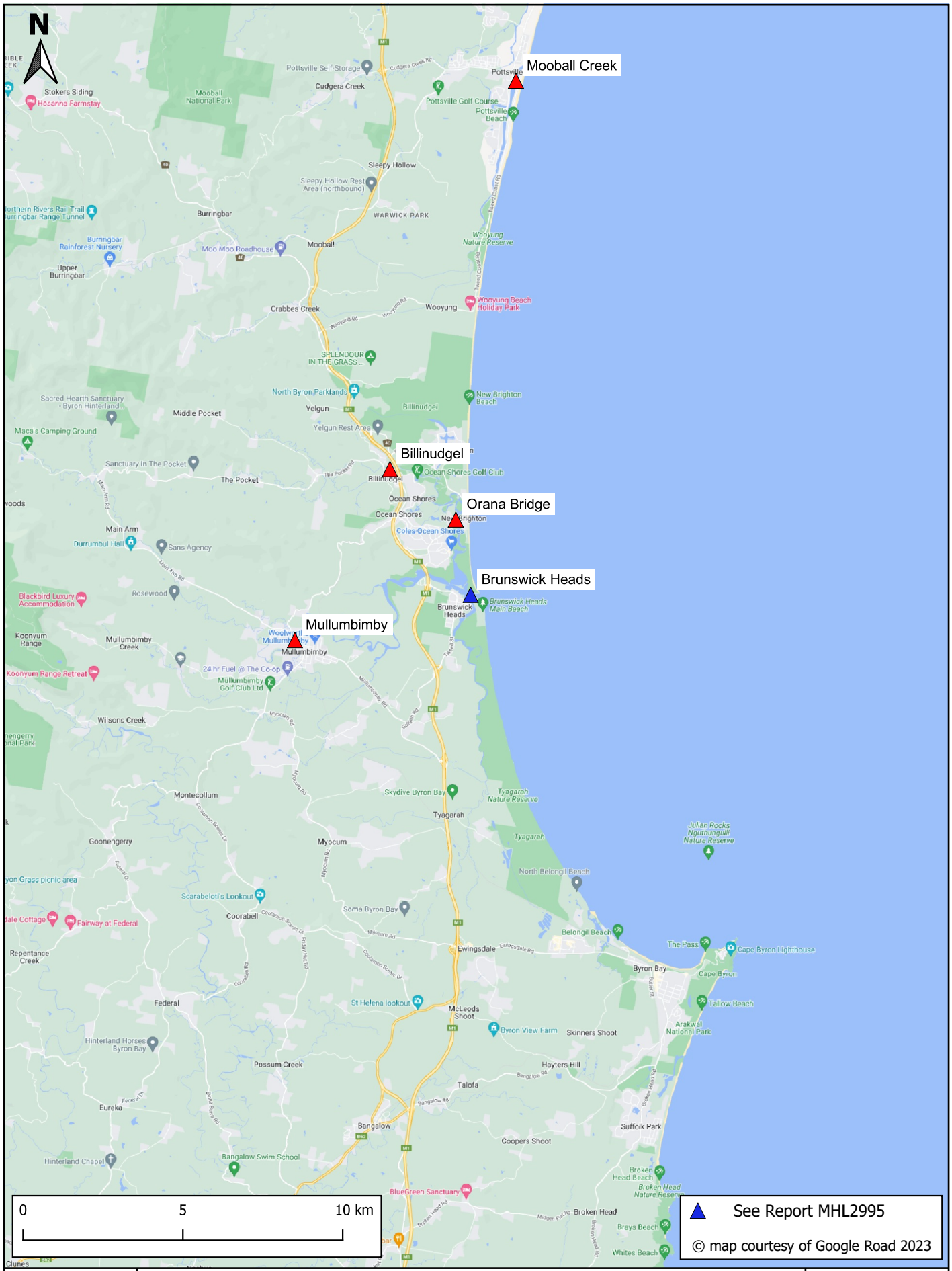
CUDGEN CREEK AT KINGSCLIFF UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-13

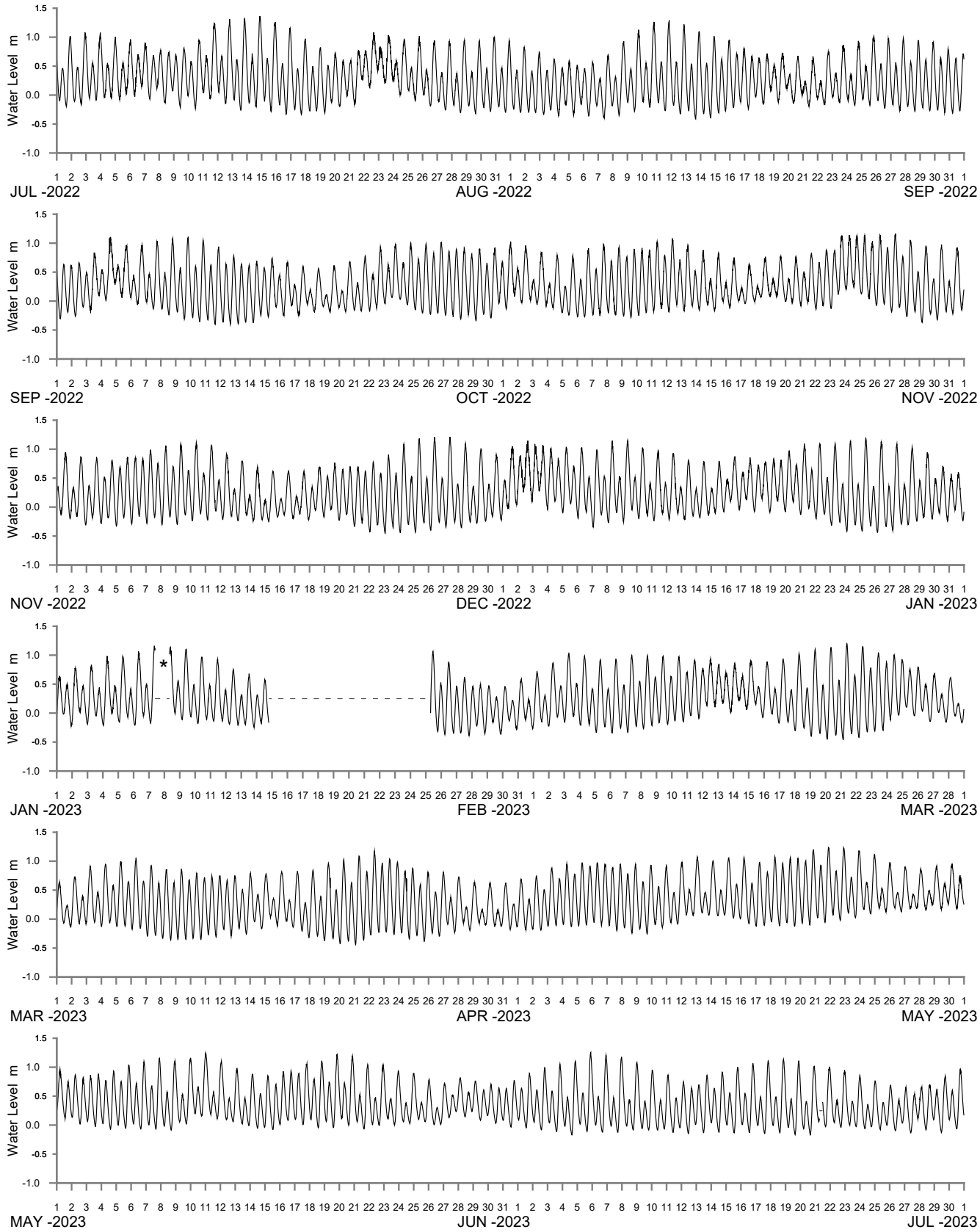


NSW GOVERNMENT

STATION LOCATIONS
BRUNSWICK RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-14



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - DATA LOSS

* Data loss due to faulty logger

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MOOBALL CREEK AT MOOBALL CREEK
2022–23

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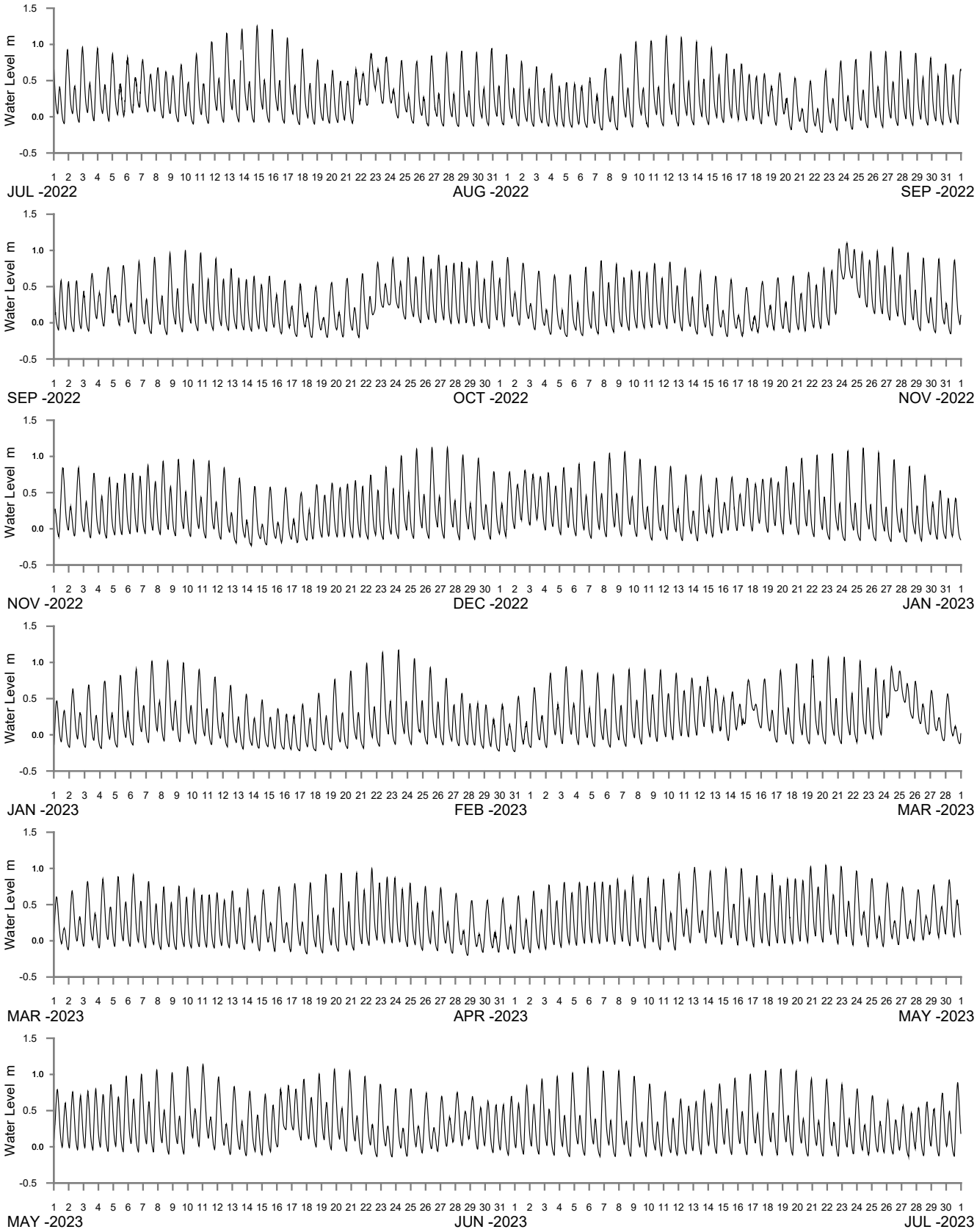
Report MHL2994
Figure
4-15



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

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MARSHALLS CREEK AT ORANA BRIDGE
2022–23

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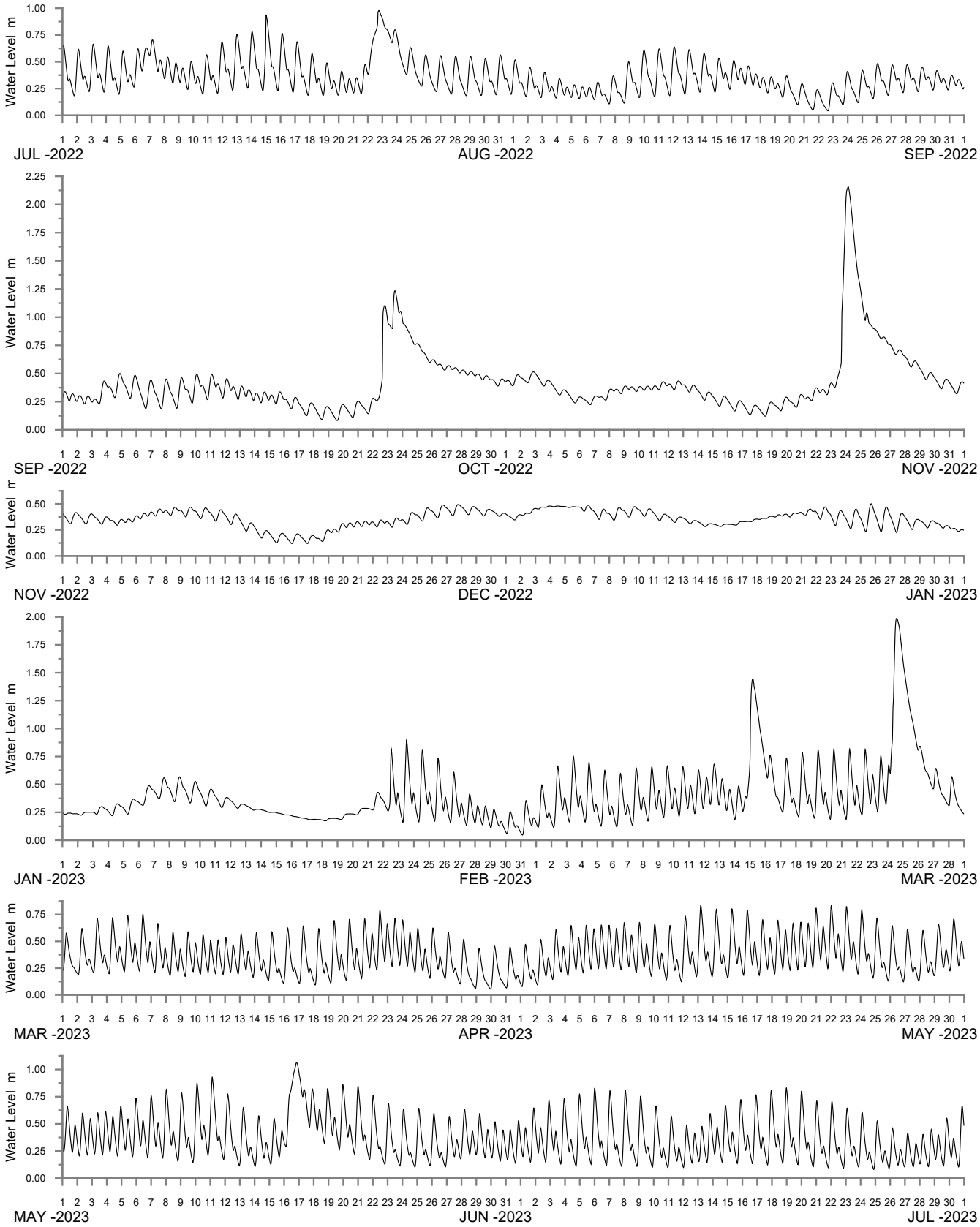
Report MHL2994
Figure
4-16



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

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MARSHALLS CREEK AT BILLINUDGEL
2022–23

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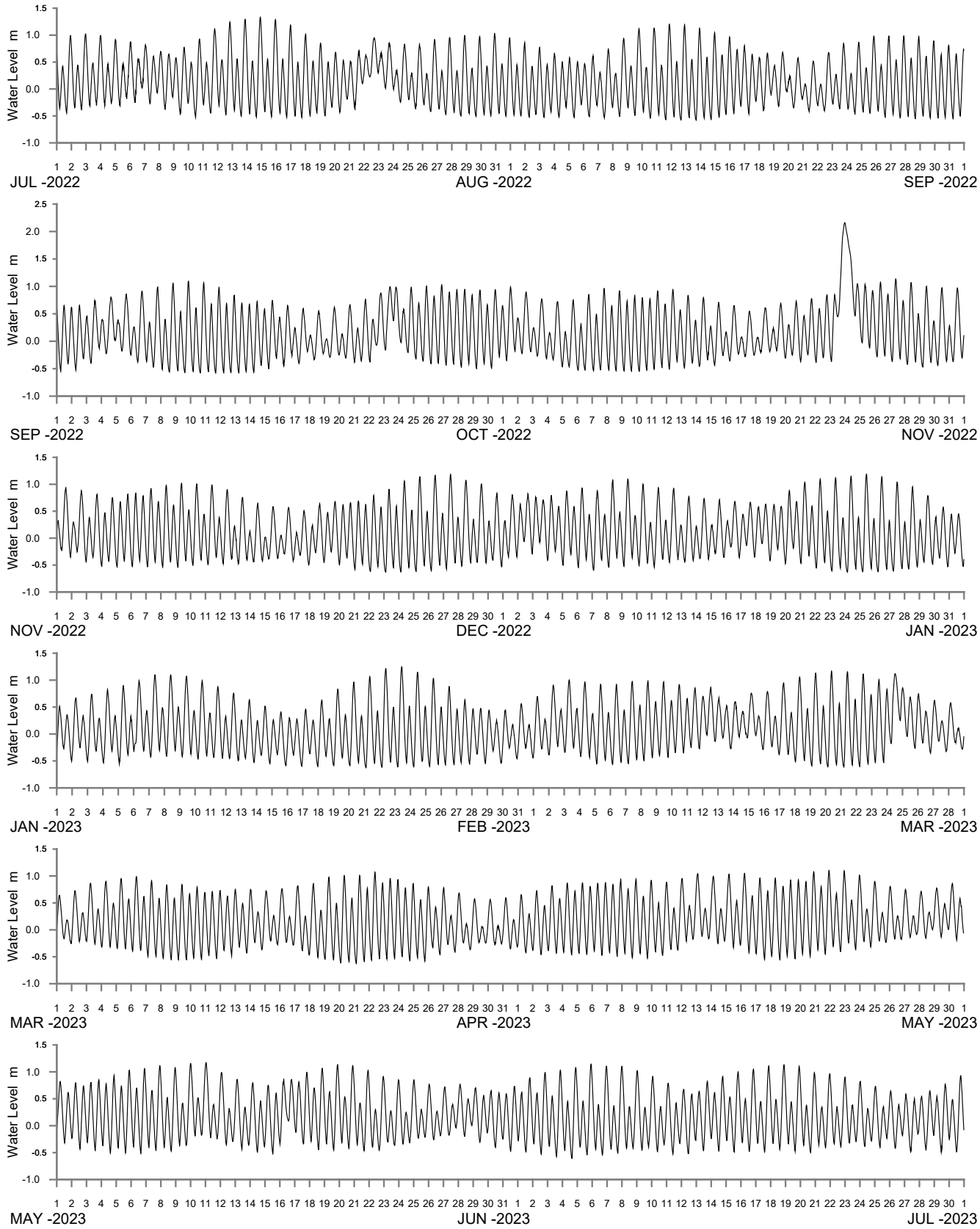
Report MHL2994
Figure
4-17



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BRUNSWICK RIVER AT MULLUMBIMBY
2022–23

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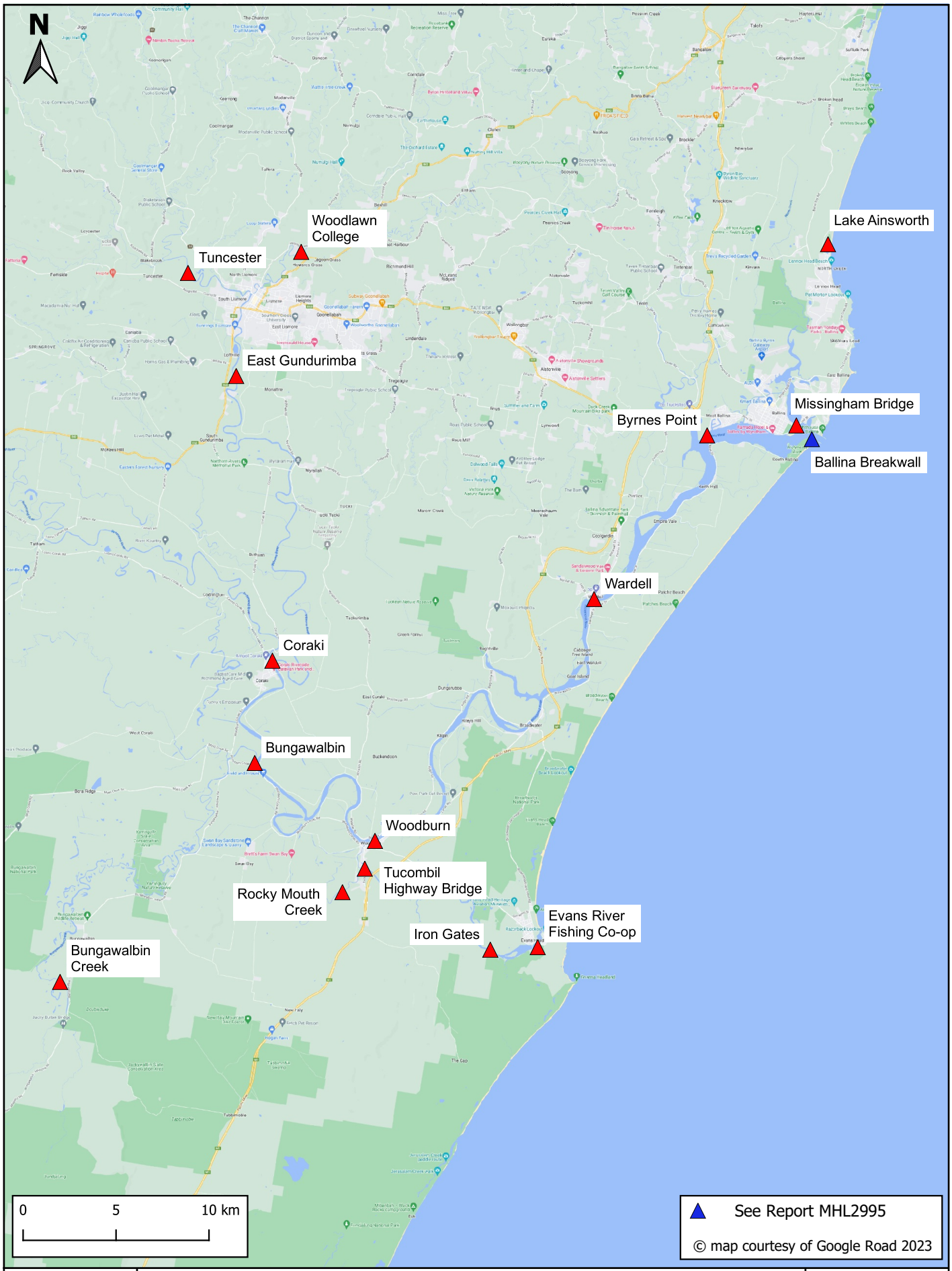
Report MHL2994
Figure
4-18



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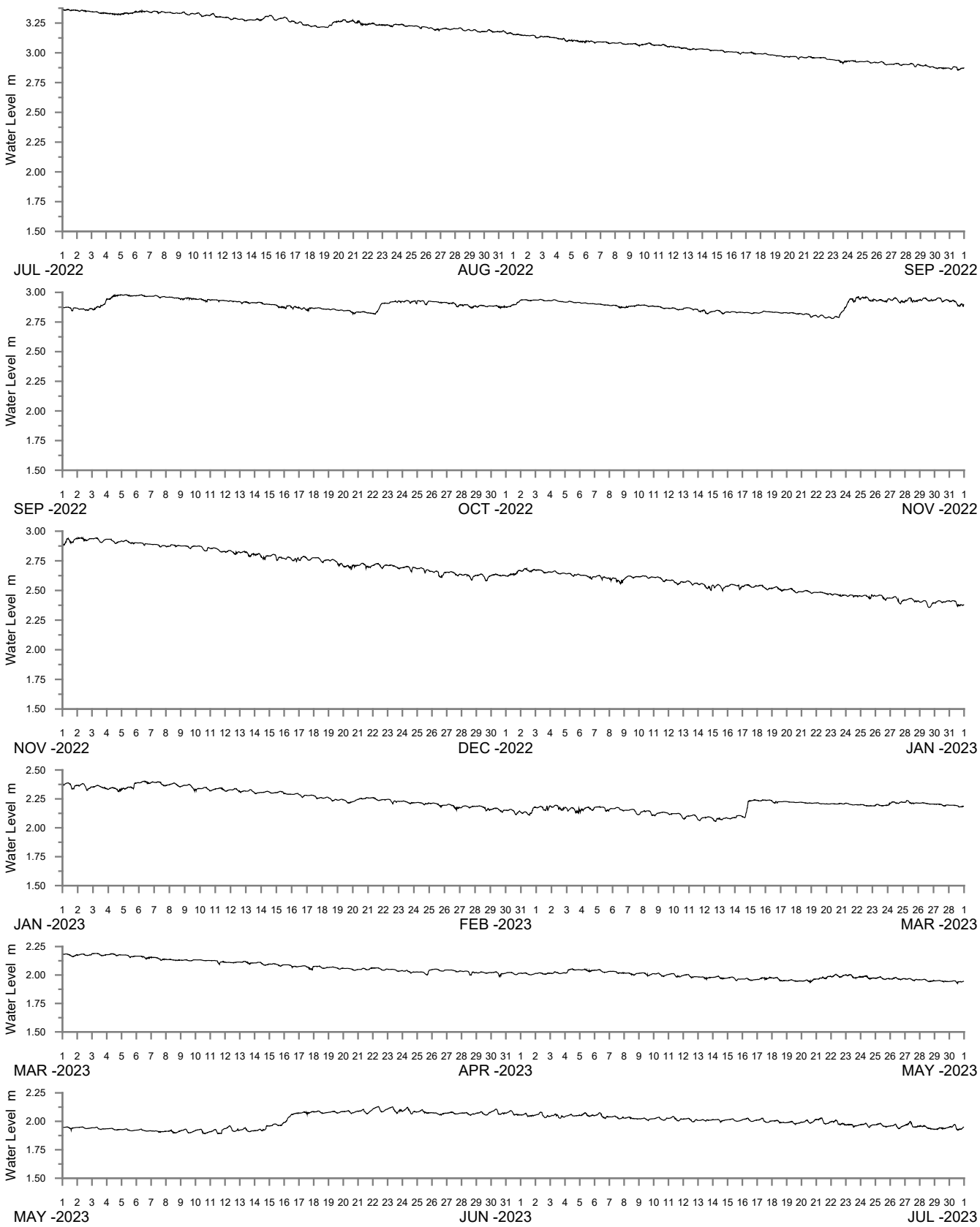
STATION LOCATIONS
RICHMOND RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-19



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LENNOX HEAD AT LAKE AINSWORTH
2022–23

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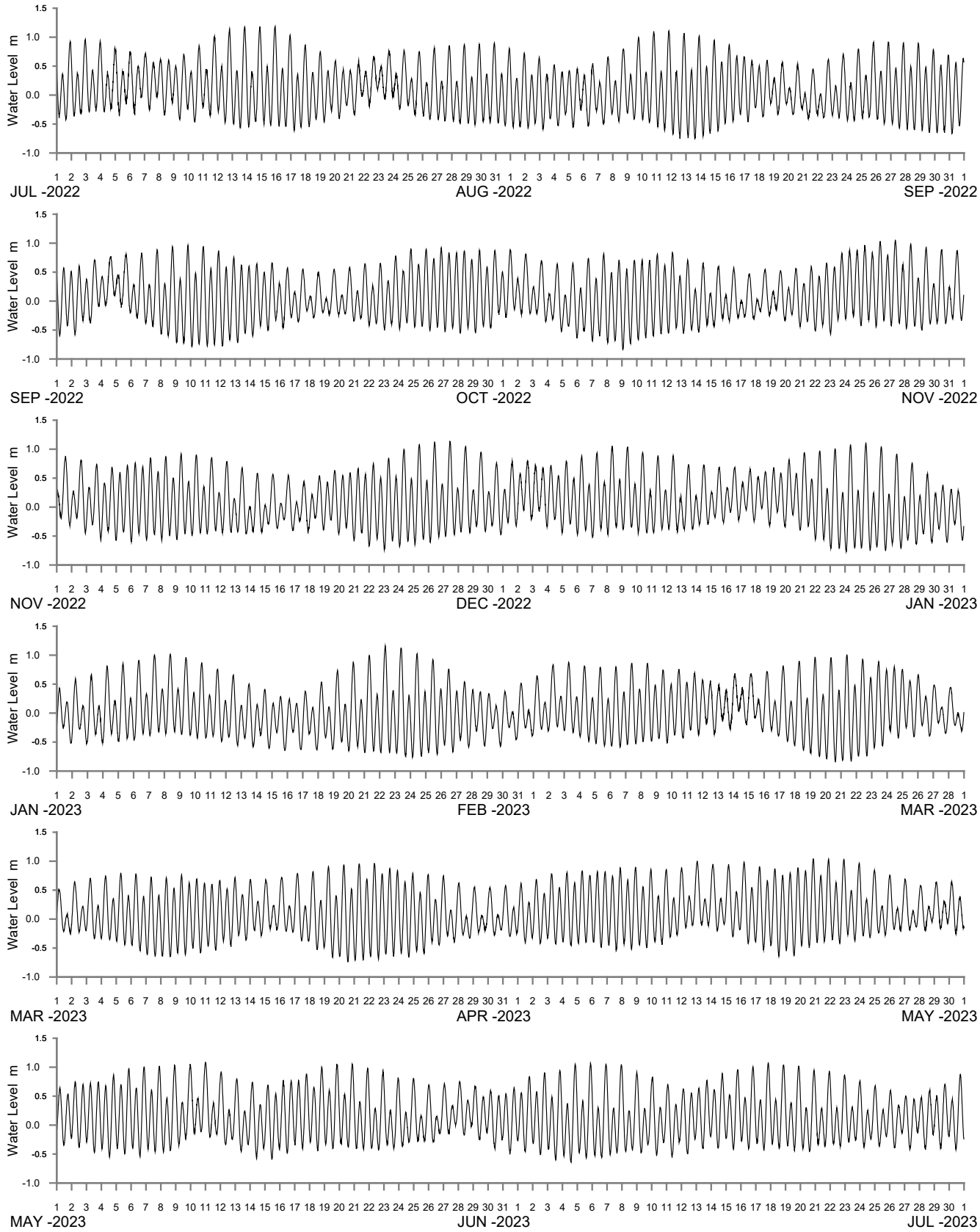
Report MHL2994
Figure
4-20



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

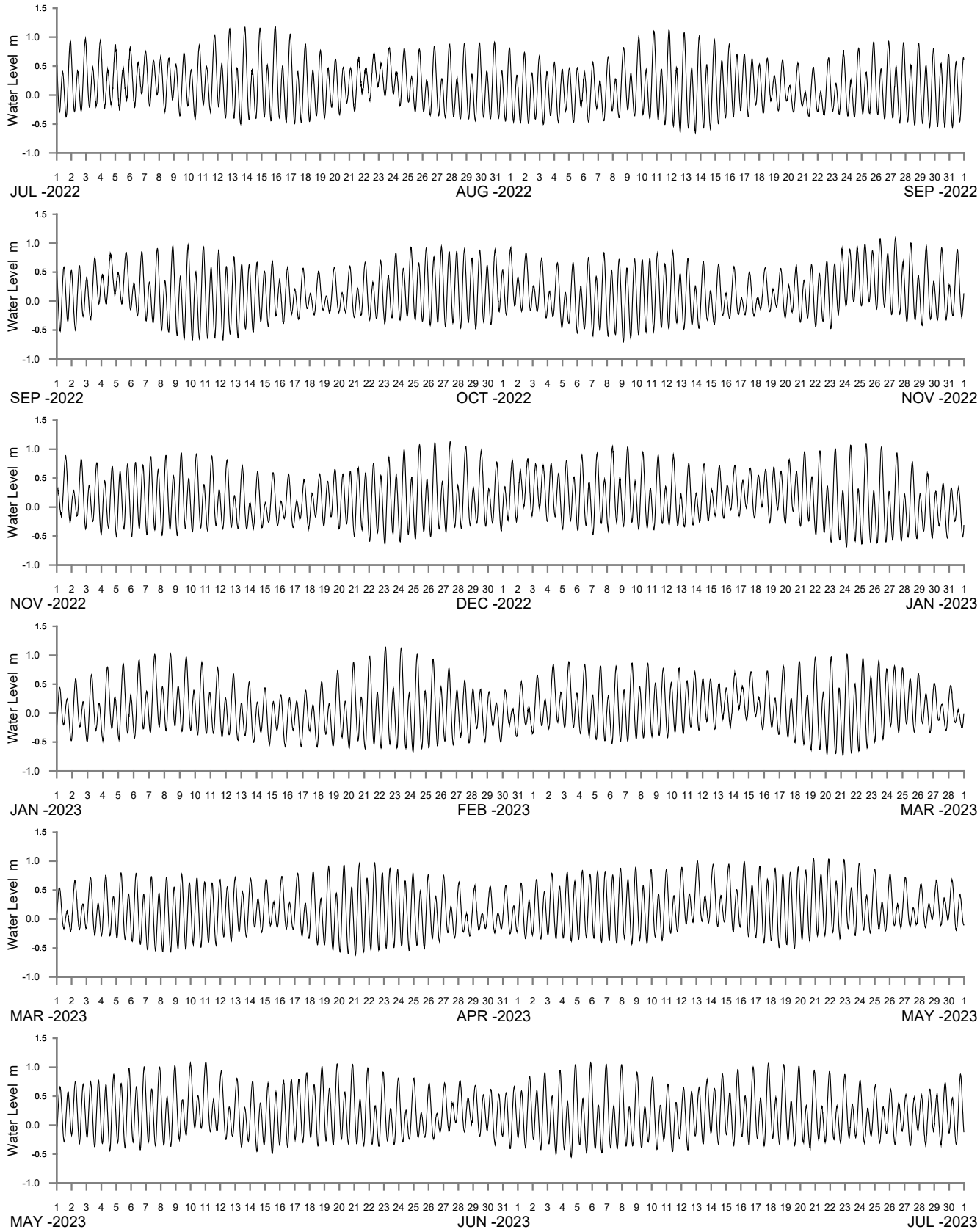
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

RICHMOND RIVER AT MISSINGHAM BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-21



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

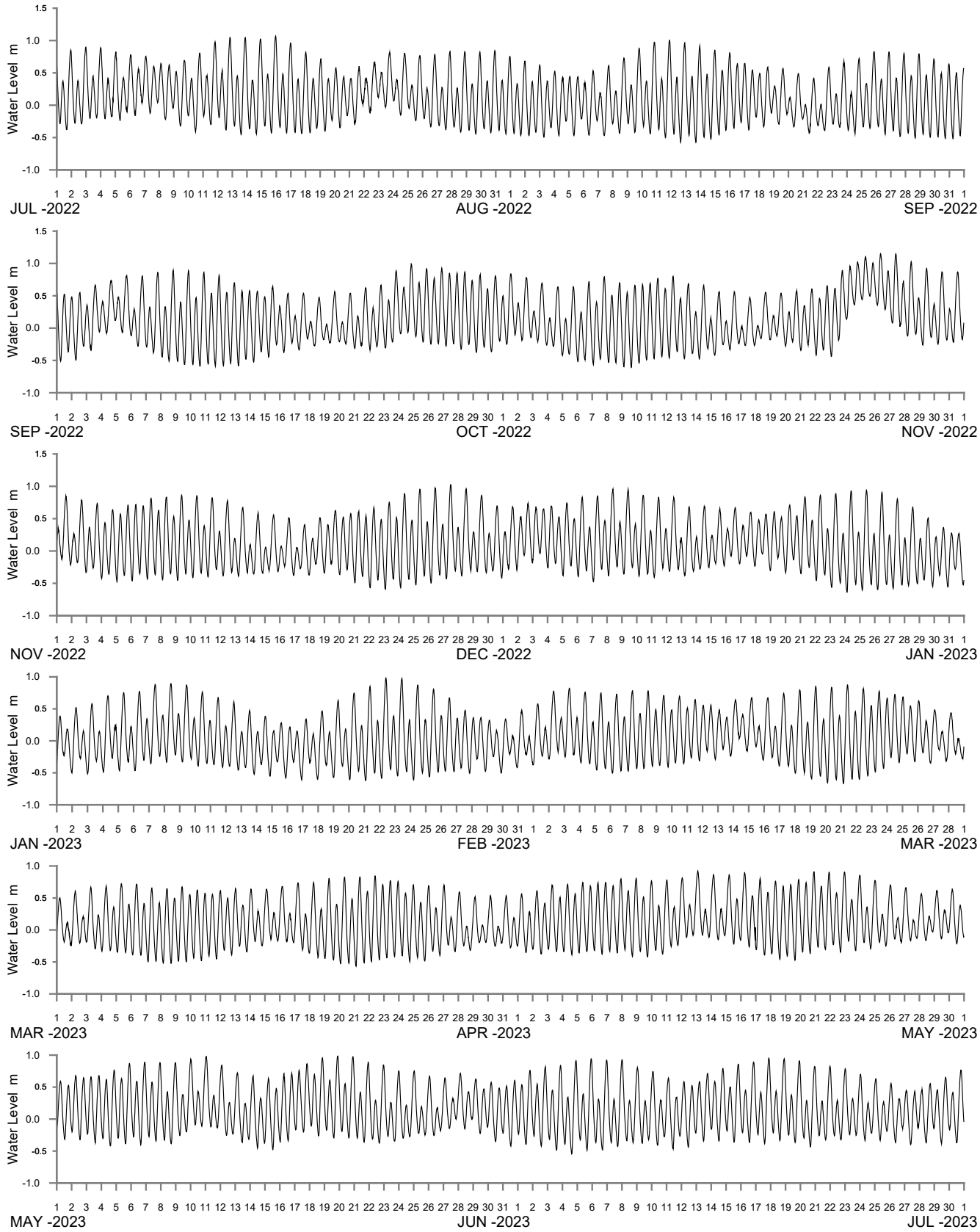
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

RICHMOND RIVER AT BYRNES POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-22



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

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RICHMOND RIVER AT WARDELL
2022–23

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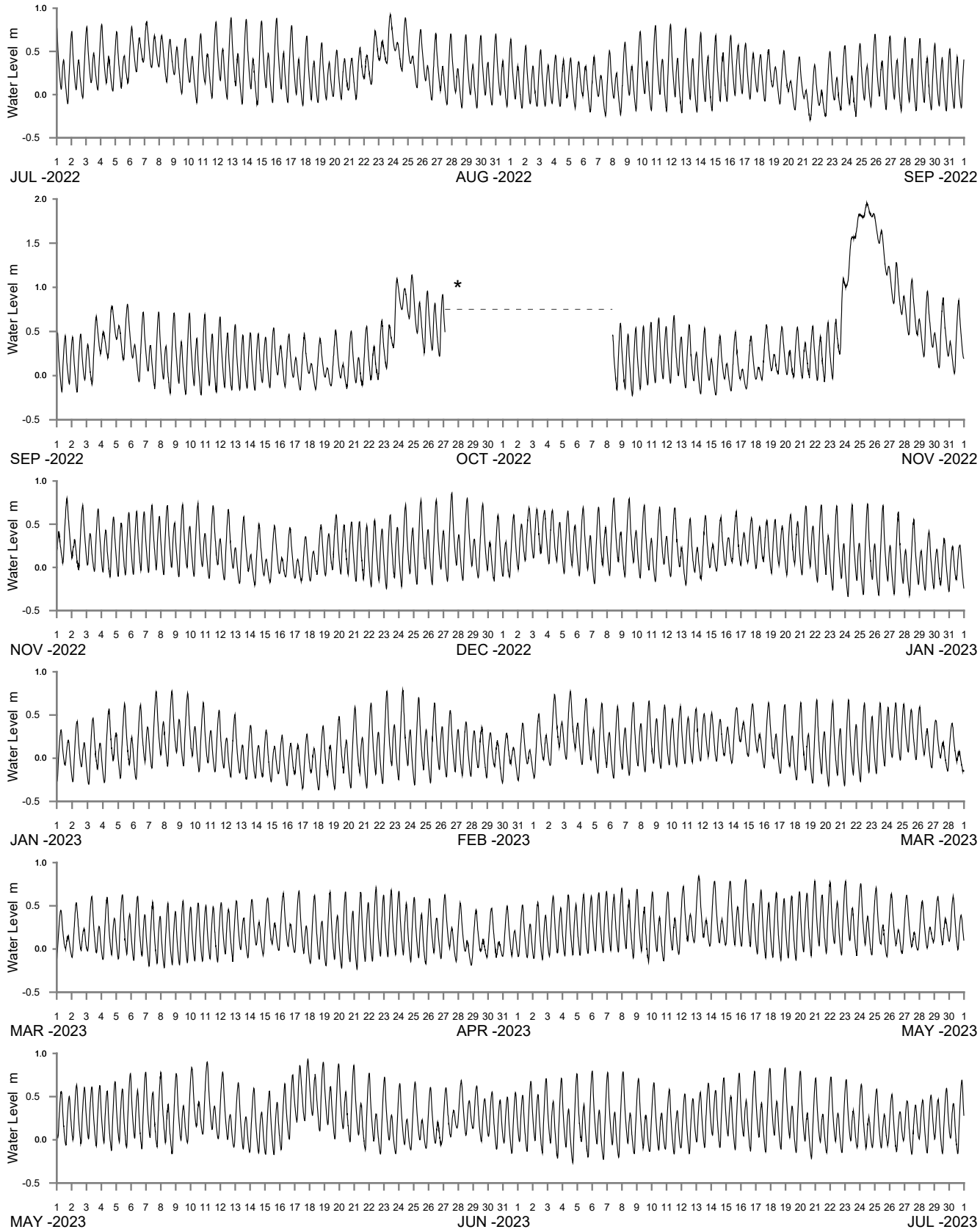
Report MHL2994
Figure
4-23



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

* Data loss due to a communications issue

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RICHMOND RIVER AT WOODBURN
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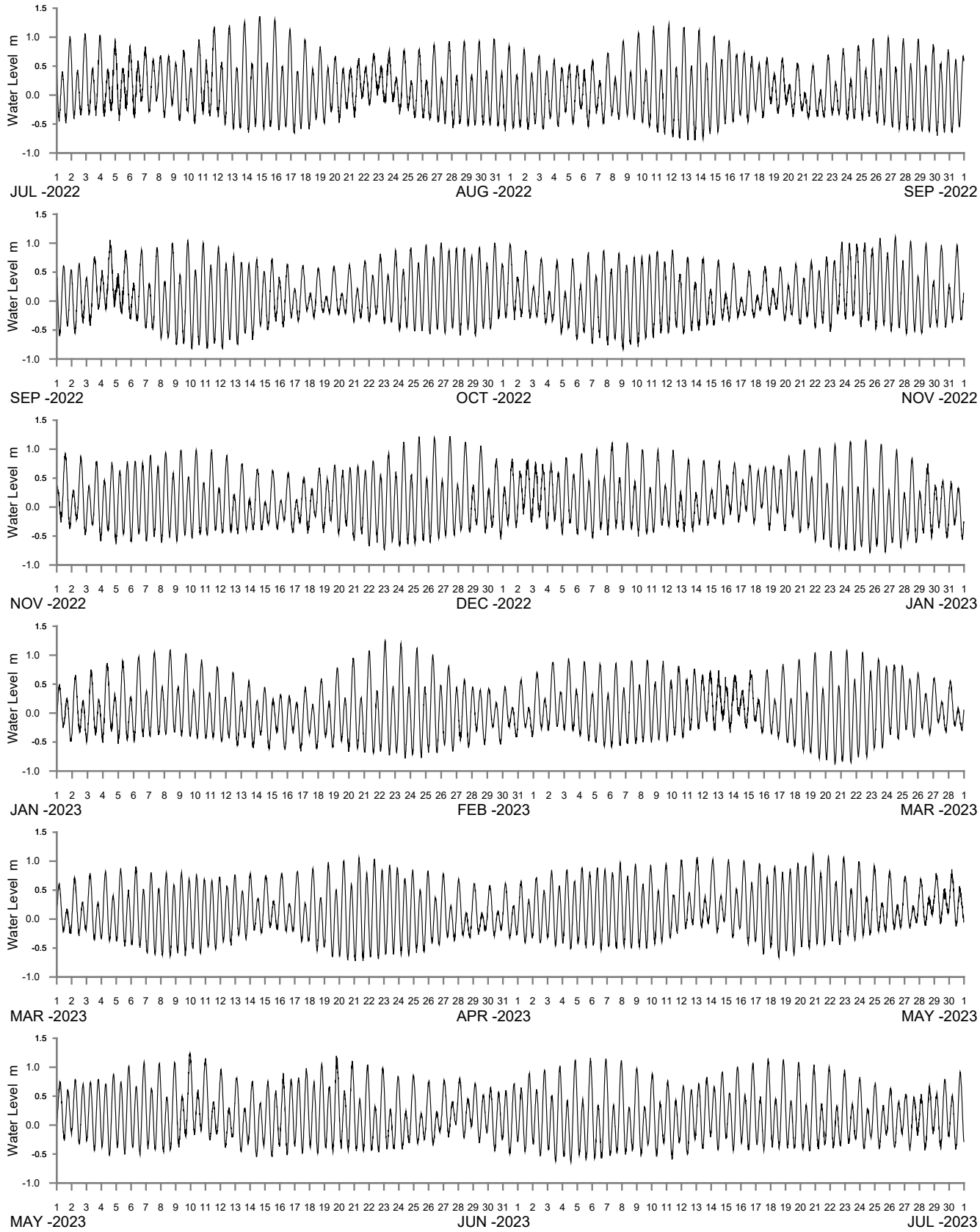
Report MHL2994
Figure
4-24



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

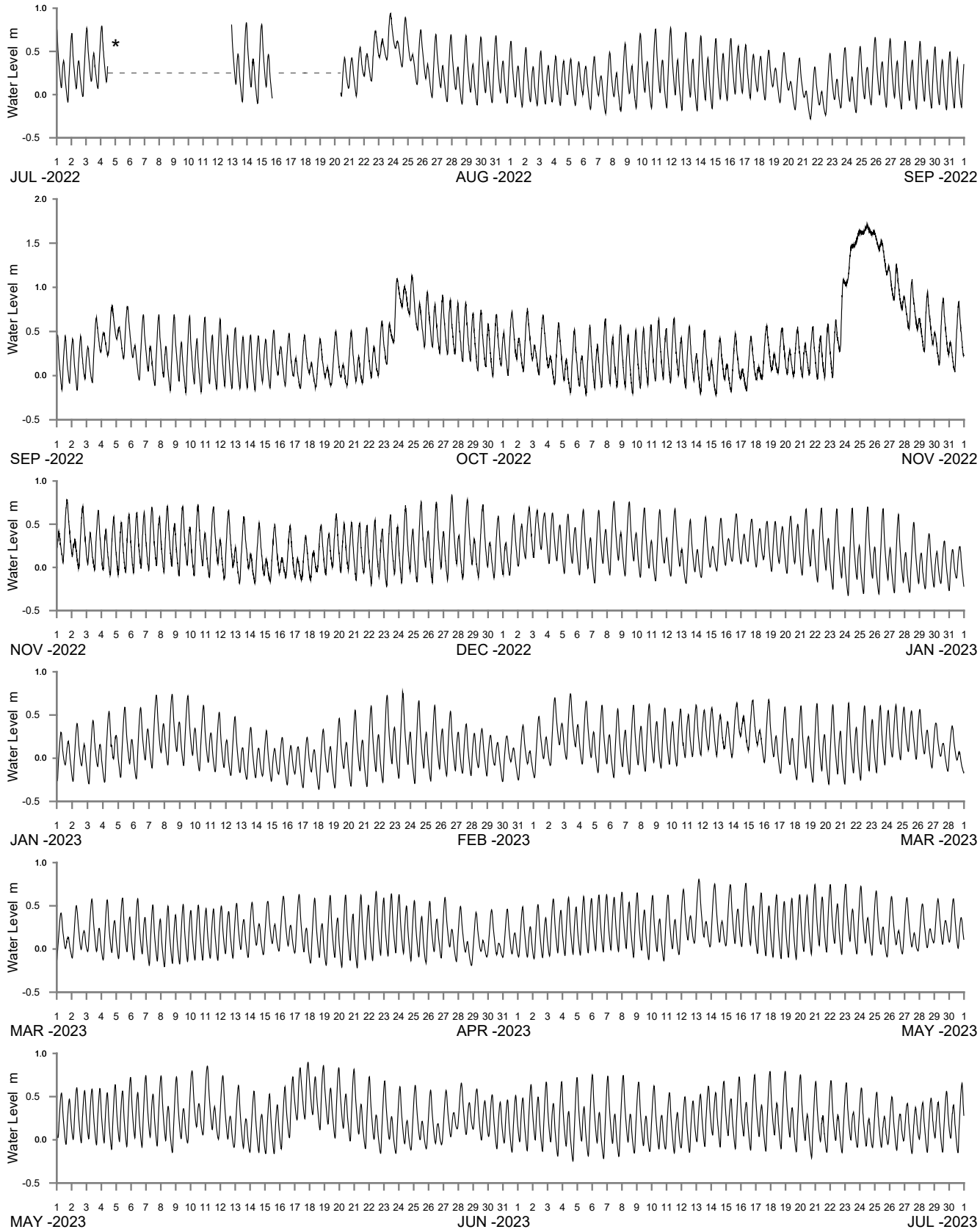
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

EVANS RIVER AT EVANS RIVER FISHING CO-OP
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-25



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

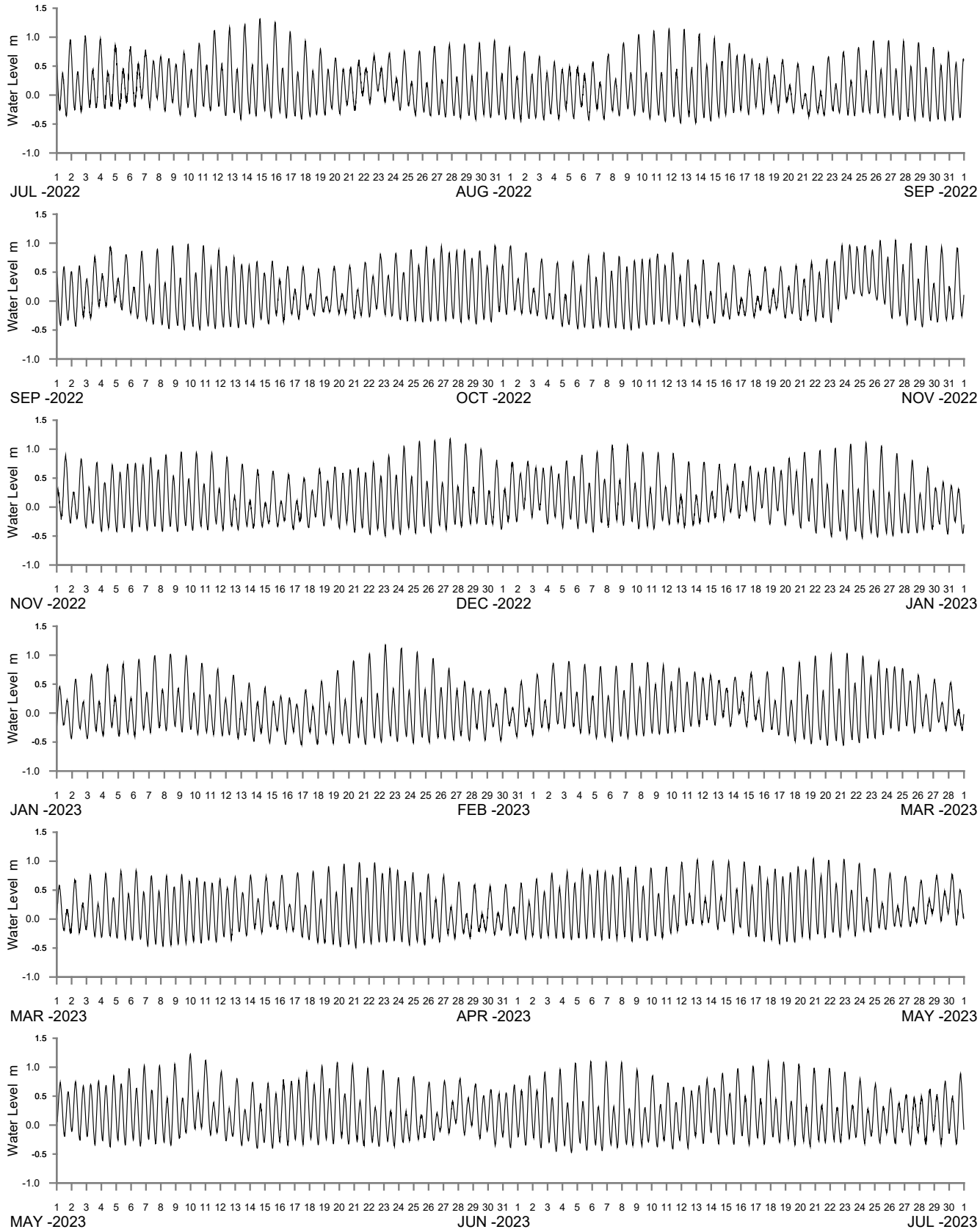
* Data loss due to a compressor failure

NSW GOVERNMENT

TUCOMBIL CANAL AT TUCOMBIL HIGHWAY BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-26



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

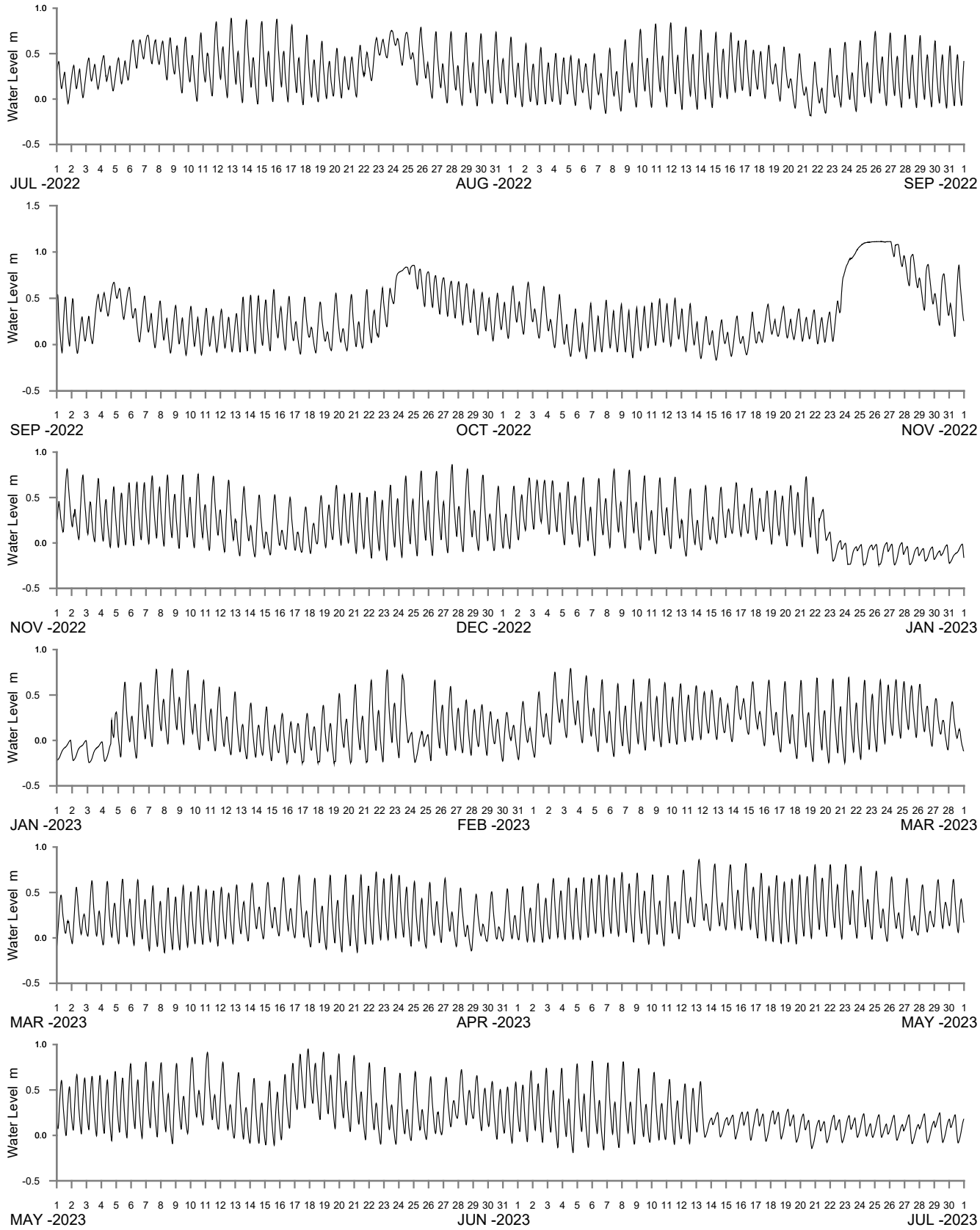
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

EVANS RIVER AT IRON GATES
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-27



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

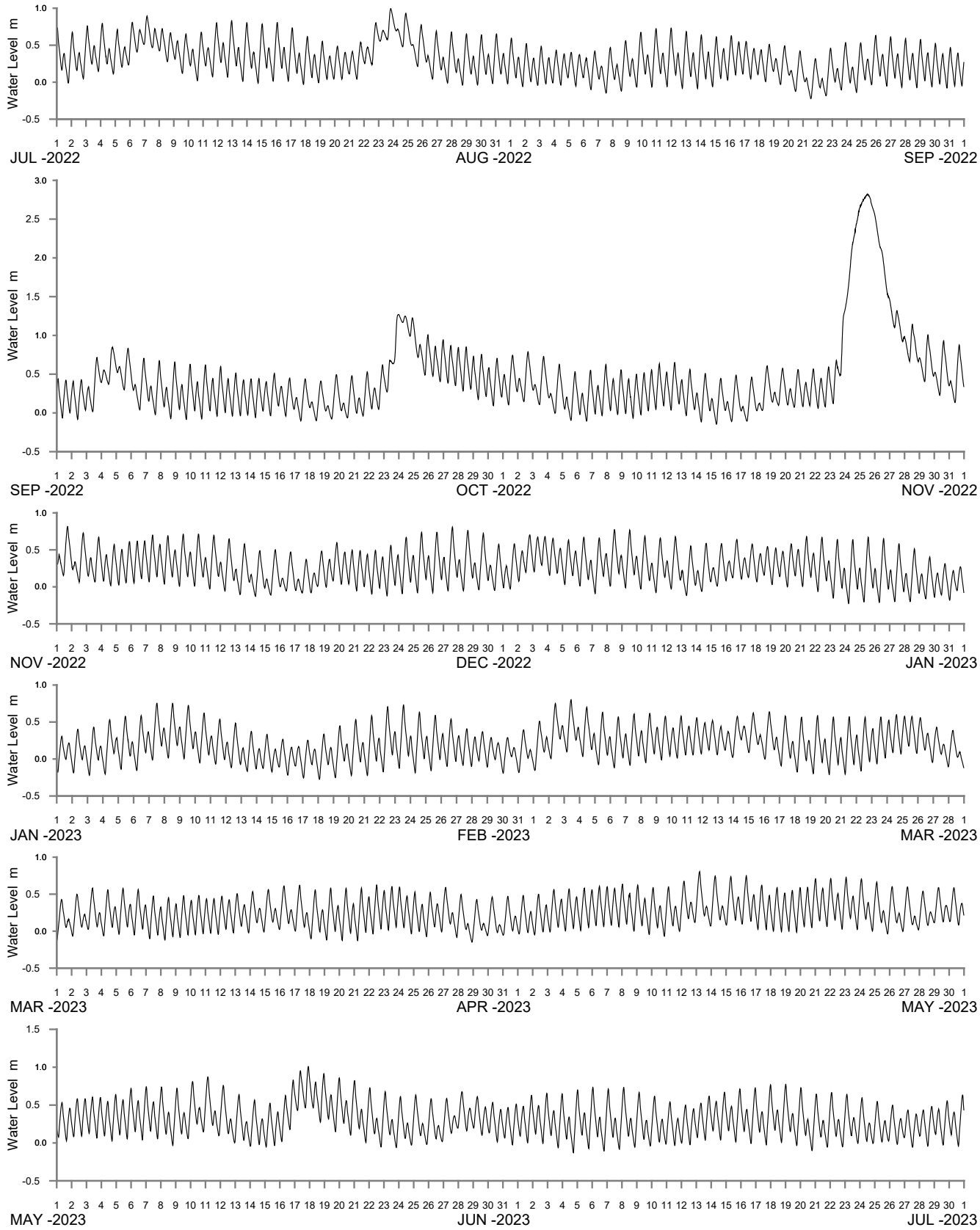
* Please note that the tidal influence and flood peaks are attenuated by the operation of flood gates at this monitoring station

NSW GOVERNMENT

ROCKY MOUTH CREEK AT ROCKY MOUTH CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-28



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

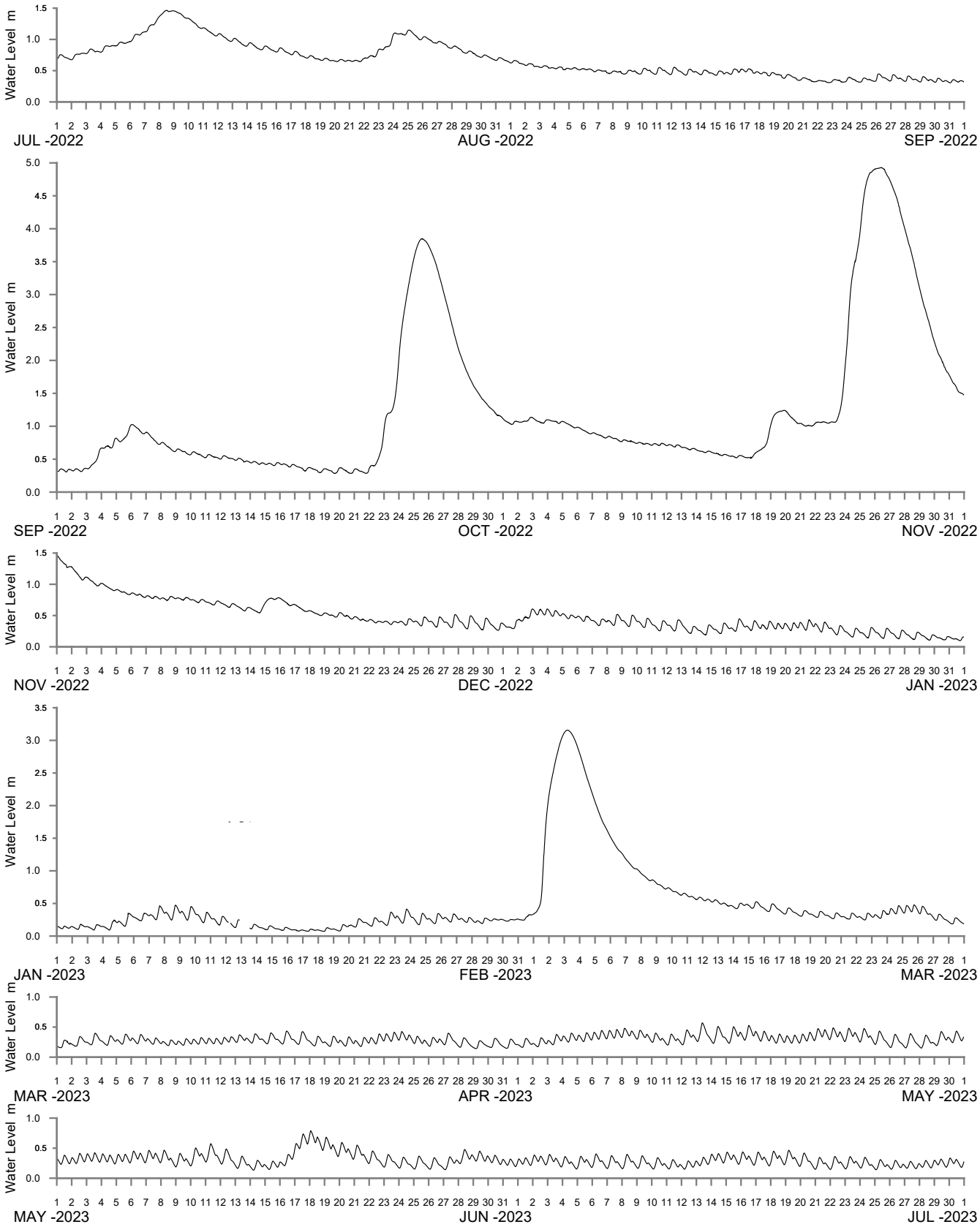
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

RICHMOND RIVER AT BUNGAWALBIN
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-29



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

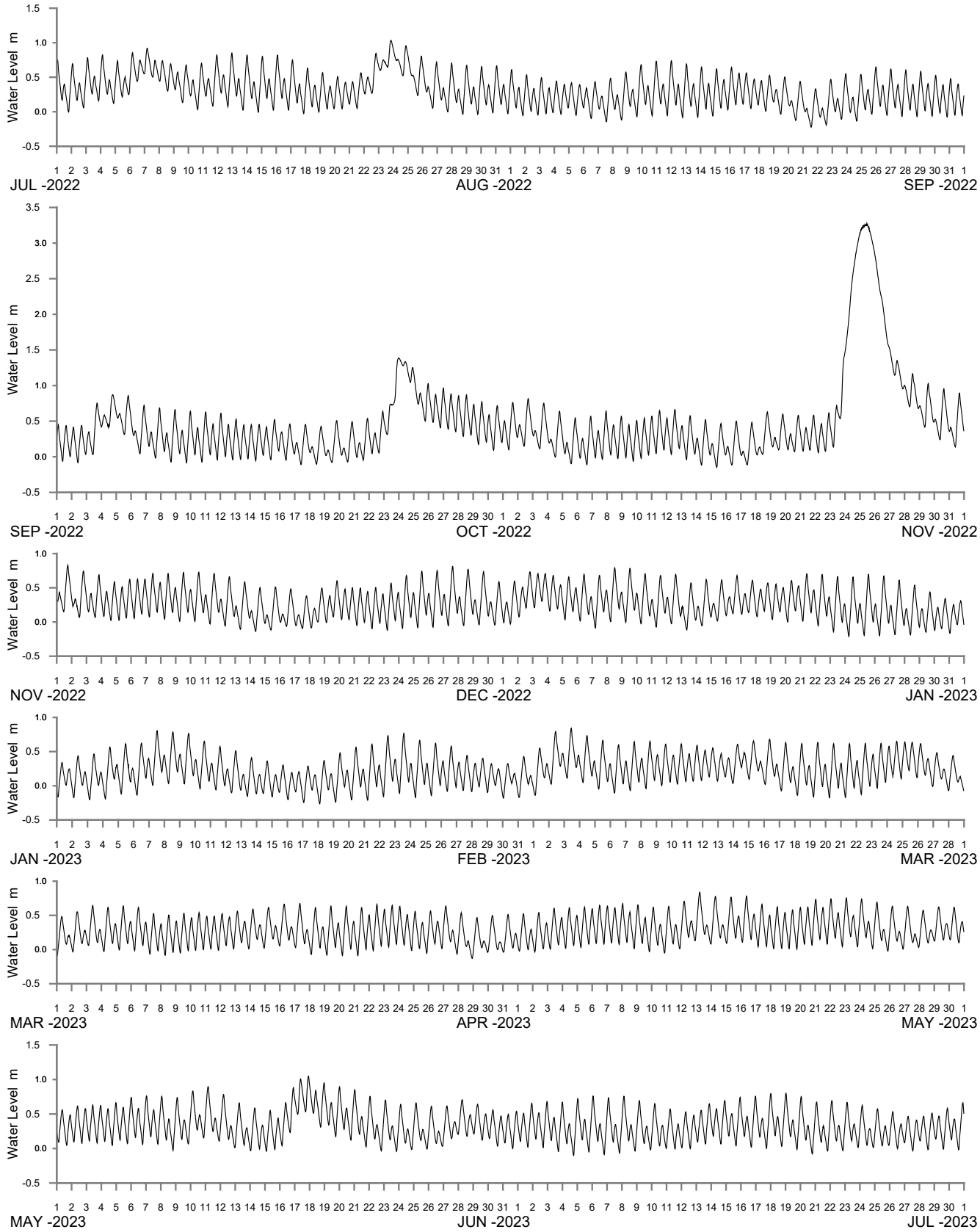
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BUNGAWALBIN CREEK AT BUNGAWALBIN CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-30



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

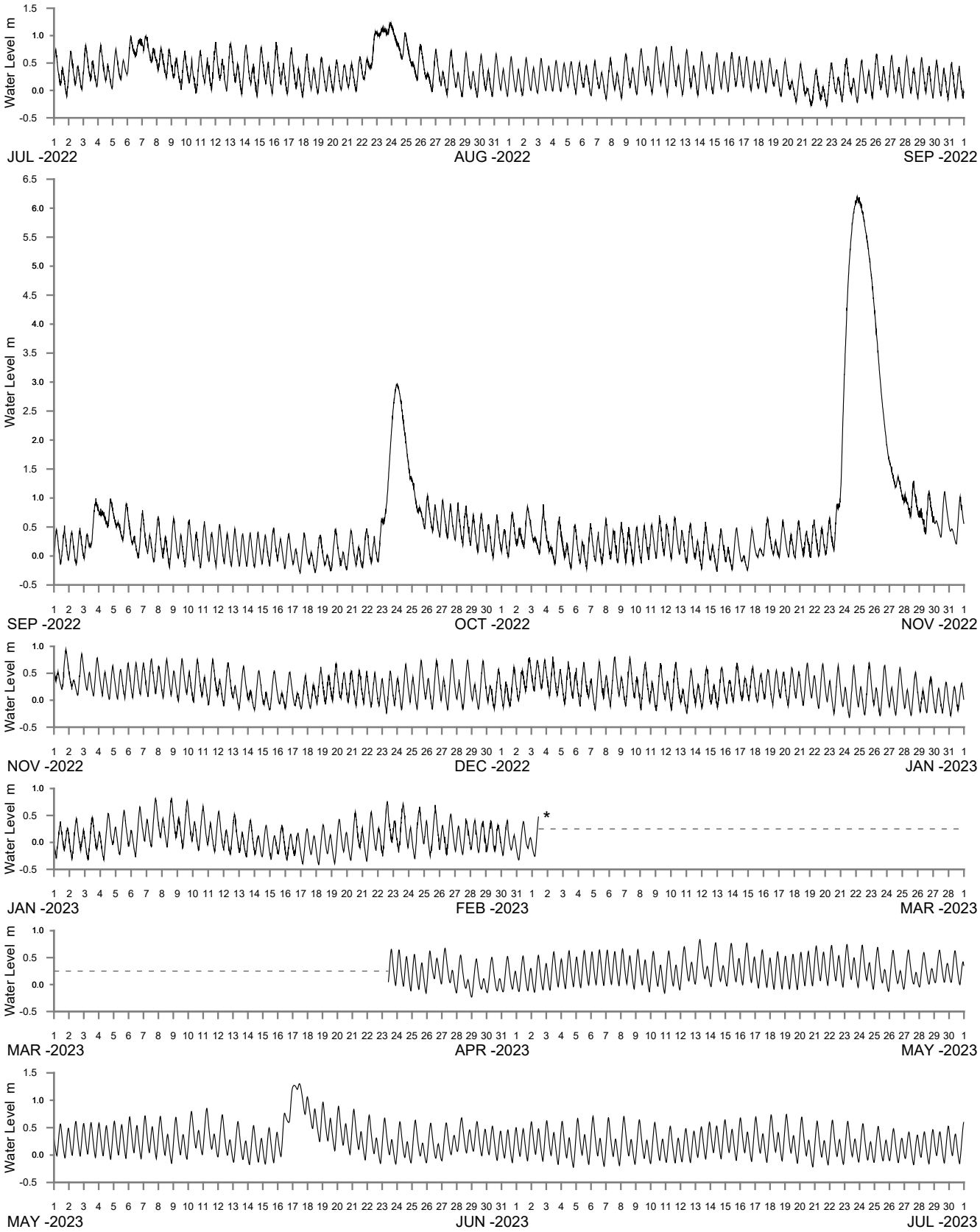
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

RICHMOND RIVER AT CORAKI
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-31



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

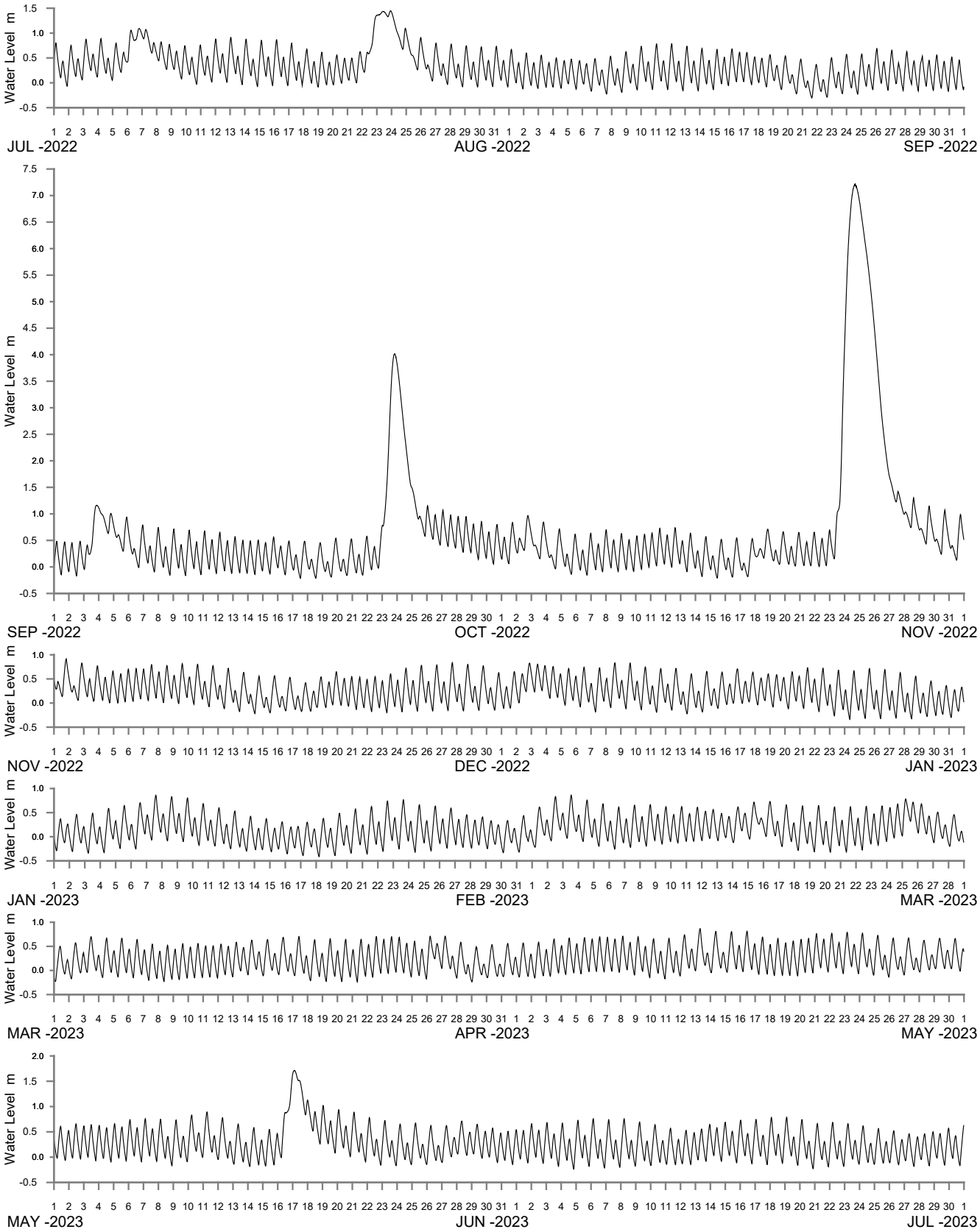
* Data loss due to orifice failure

NSW GOVERNMENT

WILSONS RIVER AT EAST GUNDURIMBA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-32



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

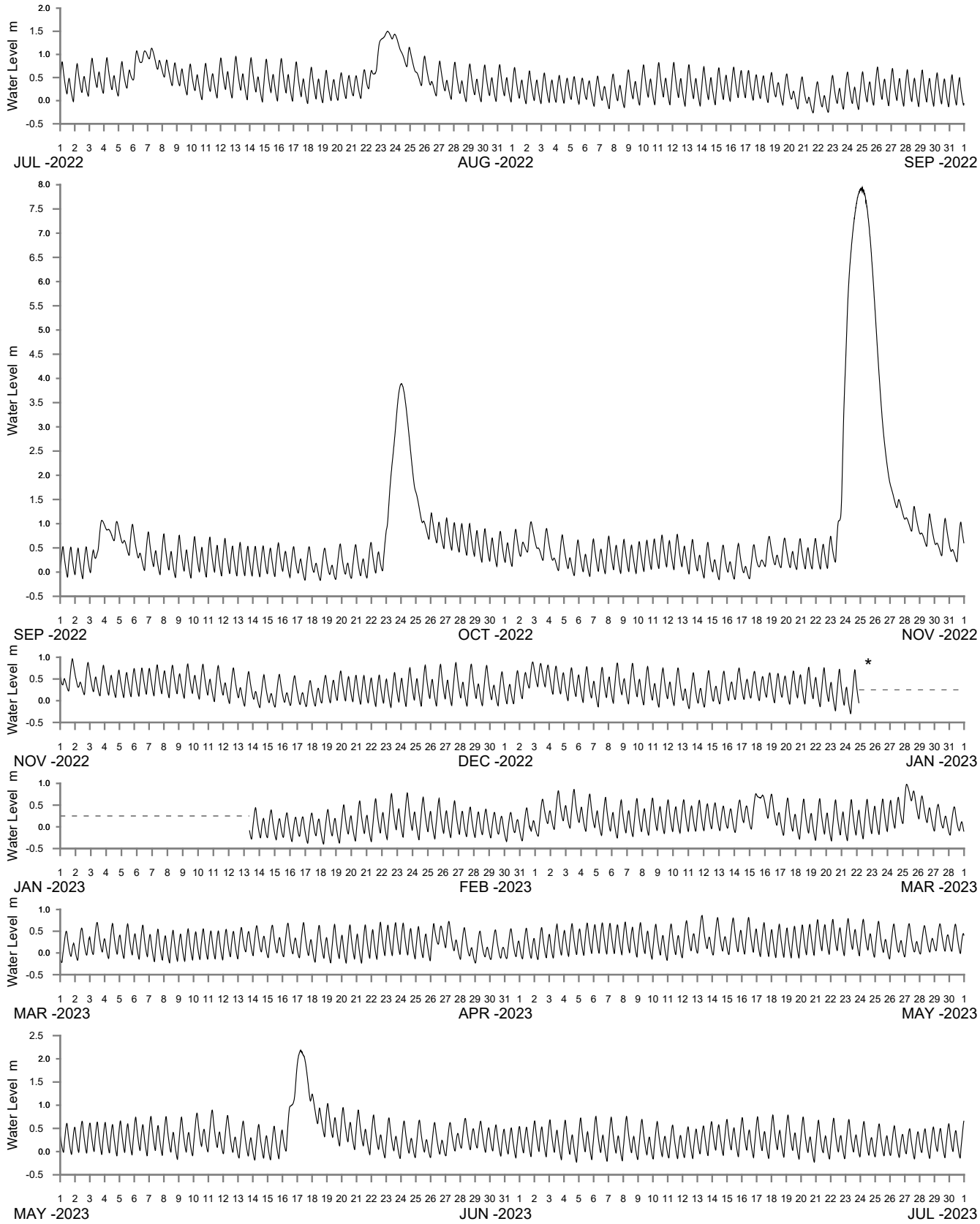
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LEYCESTER CREEK AT TUNCESTER
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-33

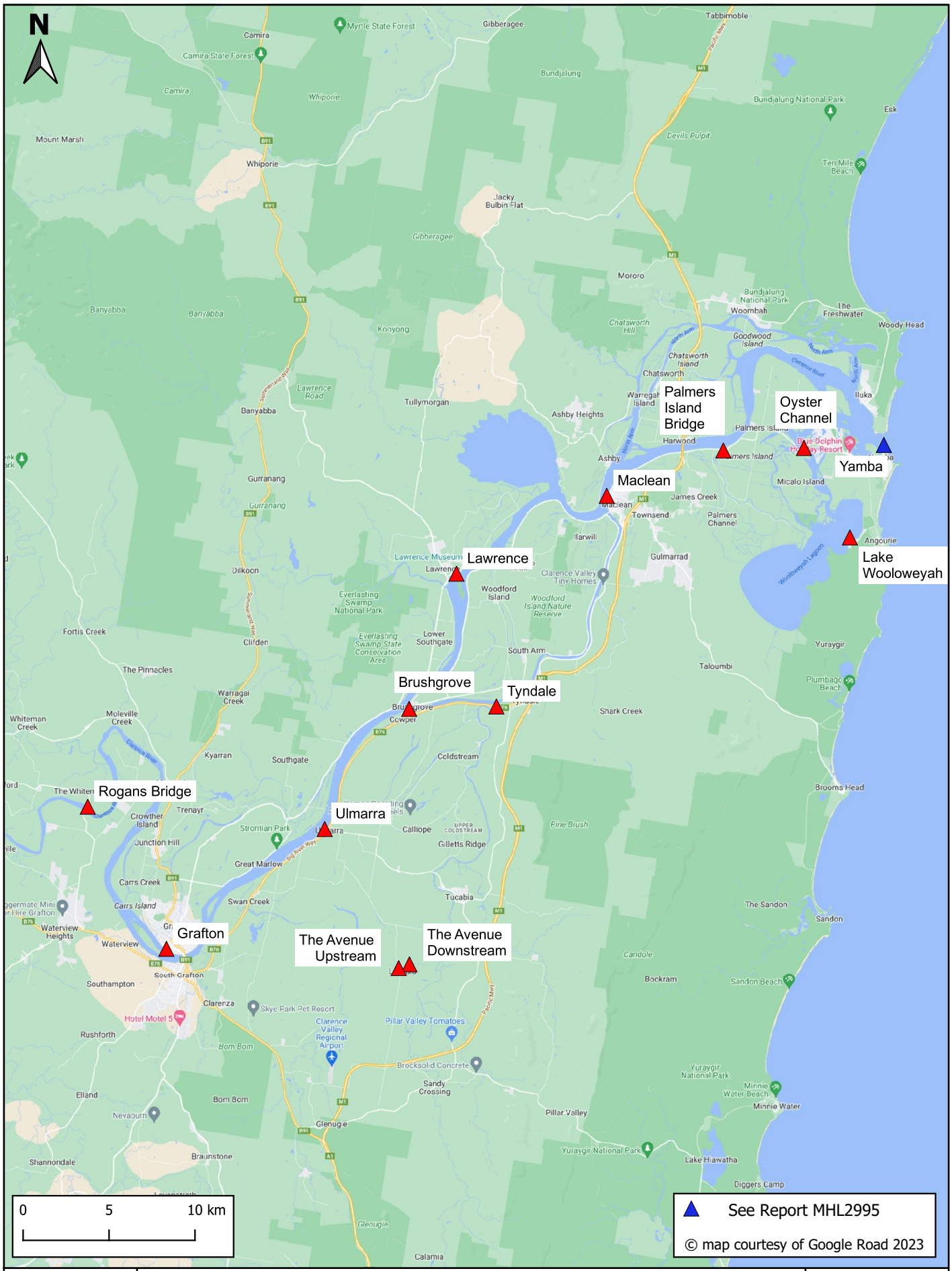


WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

* Data loss due to power failure

NSW GOVERNMENT	WILSONS RIVER AT WOODLAWN COLLEGE 2022–23	Manly Hydraulics Laboratory Report MHL2994 Figure 4-34

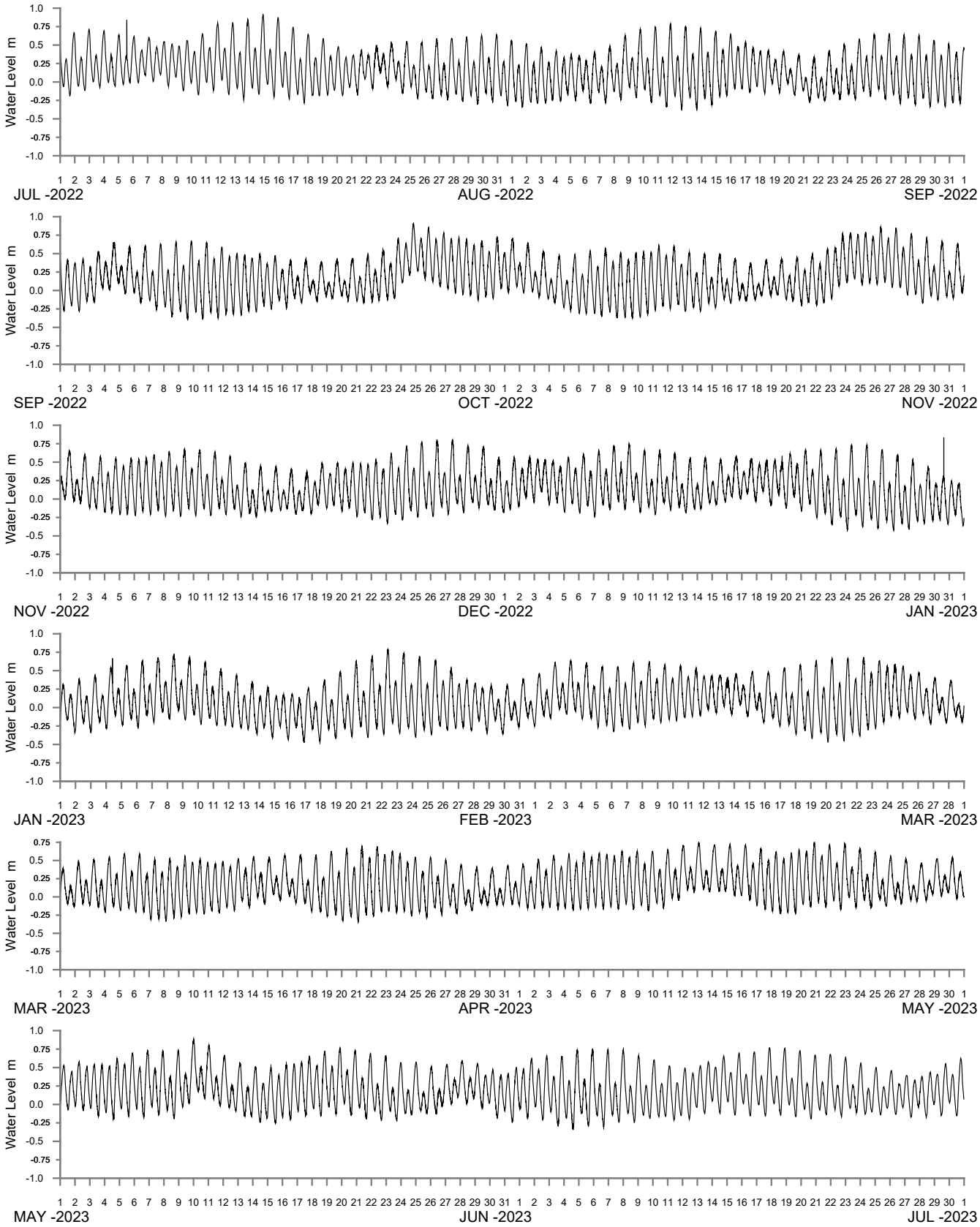


NSW GOVERNMENT

STATION LOCATIONS
CLARENCE RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-35



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

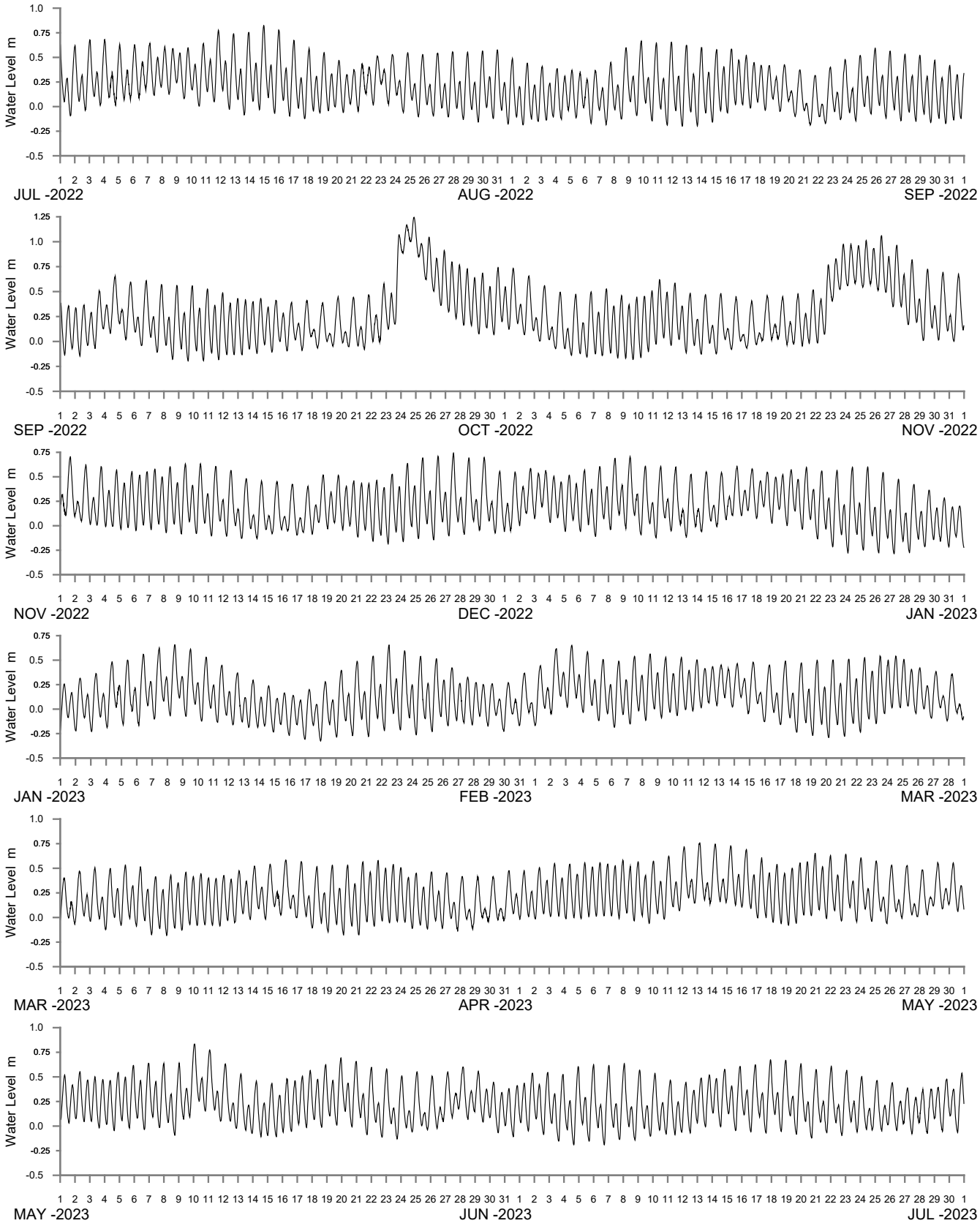
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CLARENCE RIVER AT OYSTER CHANNEL
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-36



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

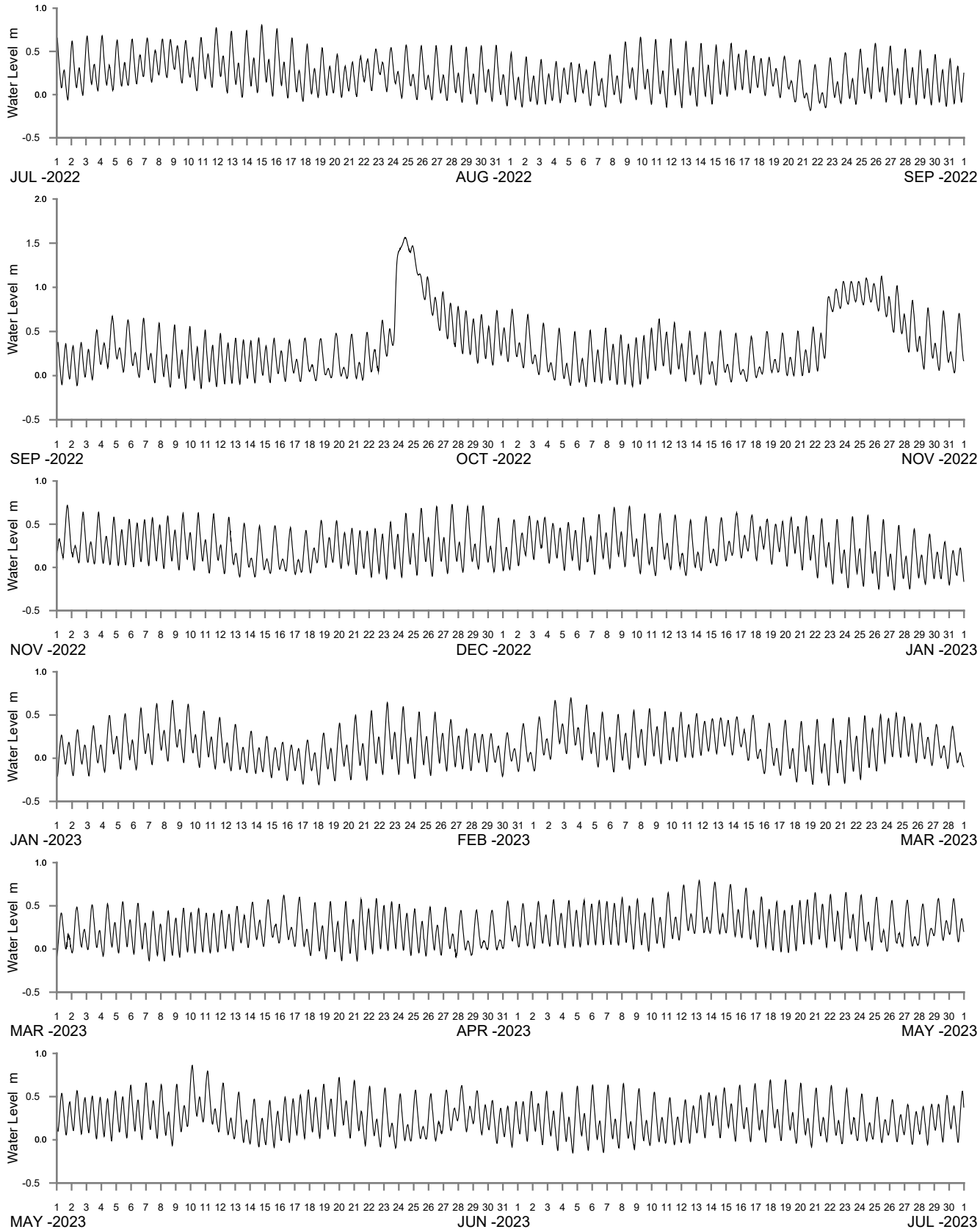
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CLARENCE RIVER AT MACLEAN
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-37



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

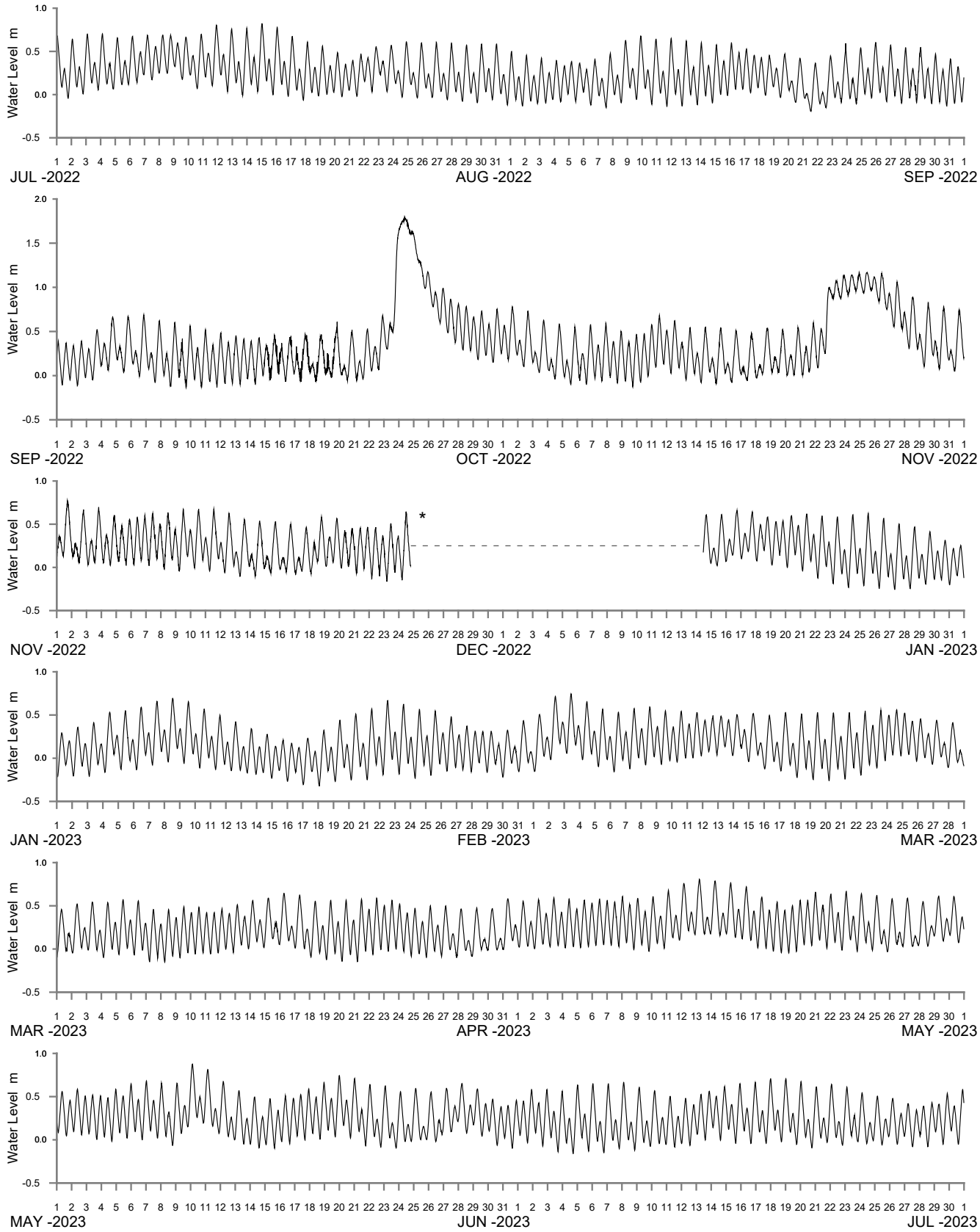
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CLARENCE RIVER AT LAWRENCE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-38



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

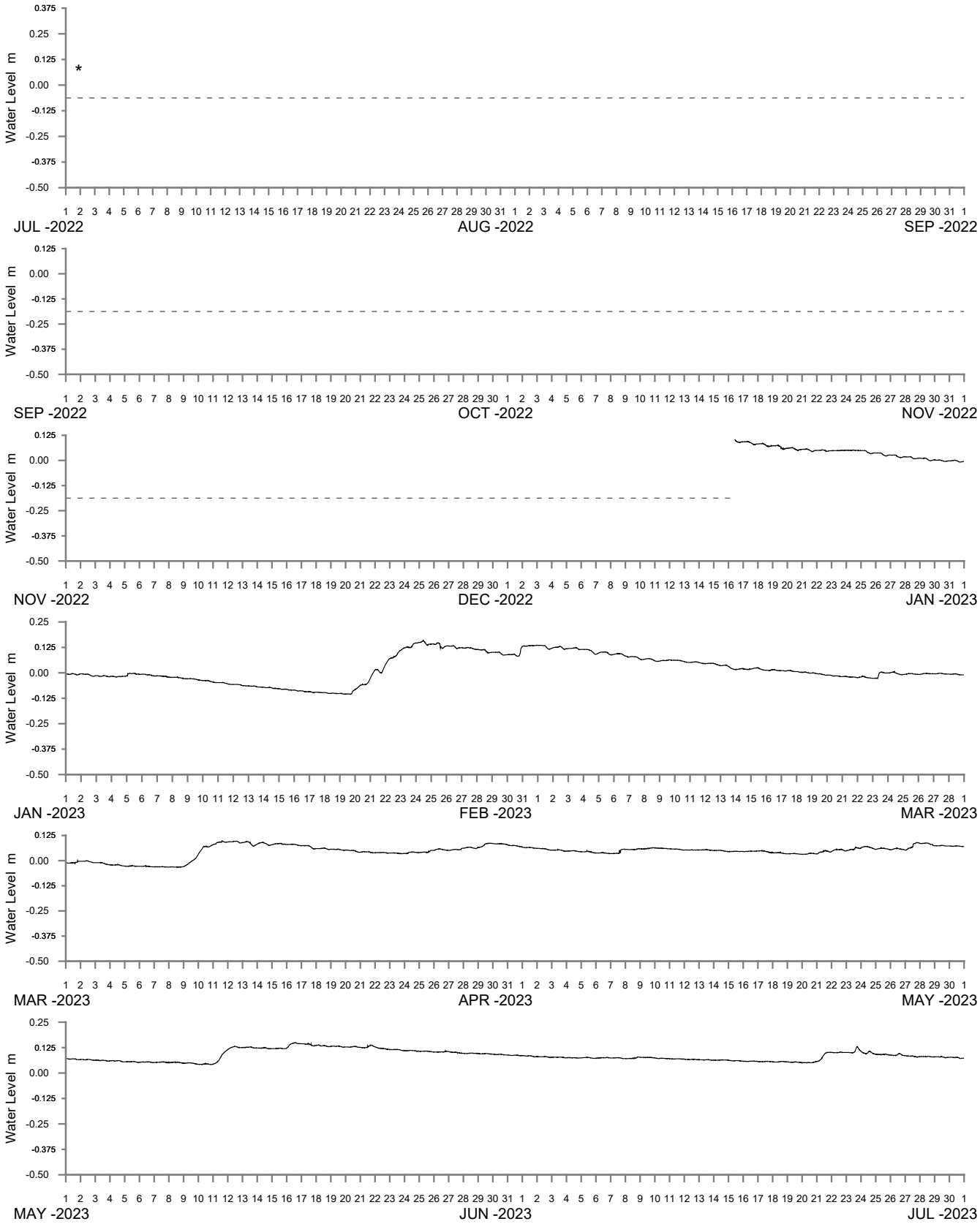
*Data loss due to siltation of the orifice

NSW GOVERNMENT

CLARENCE RIVER AT TYNDALE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-39



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

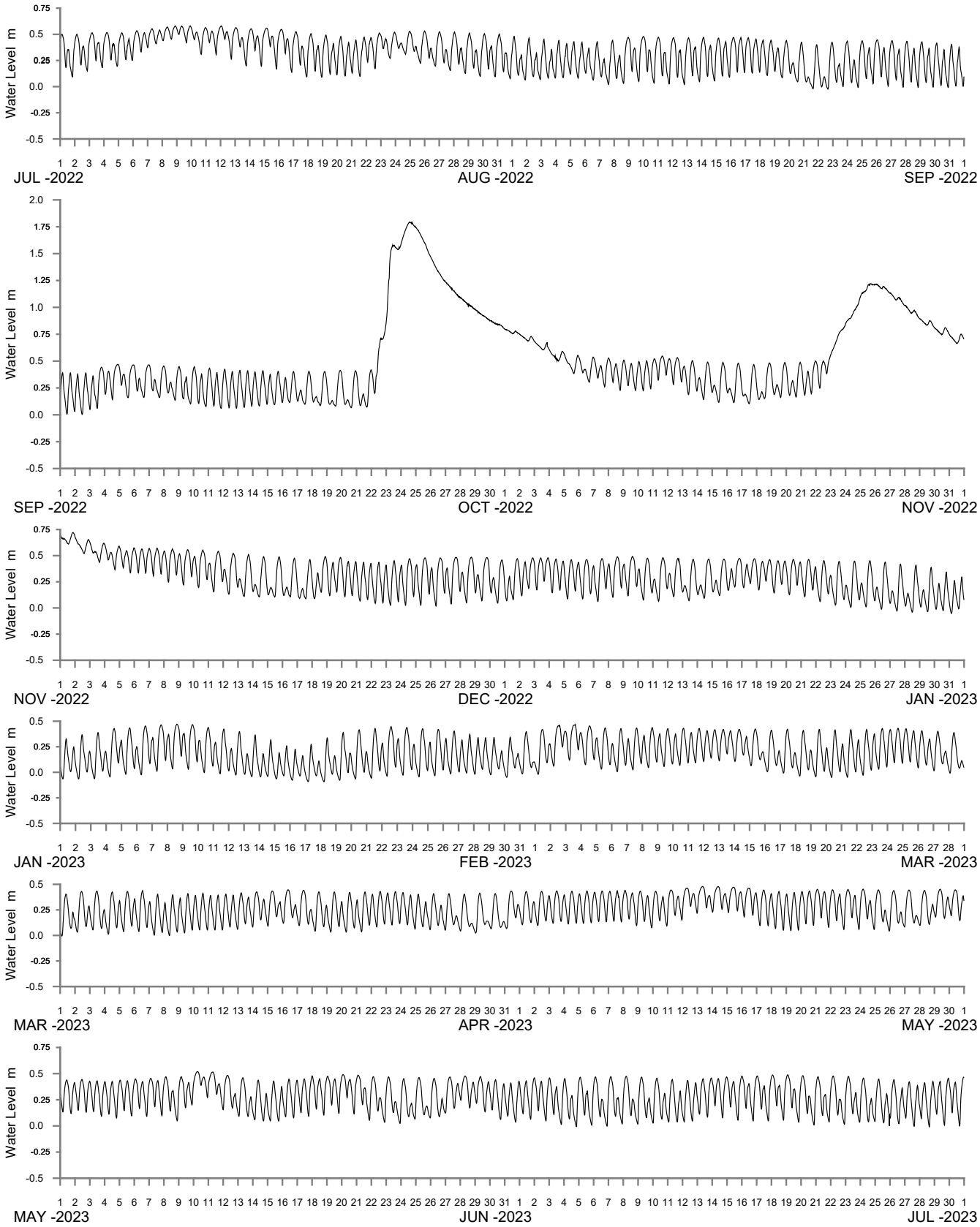
* Data loss due to orifice failure and siltation

NSW GOVERNMENT

CLARENCE RIVER AT THE AVENUE UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-40



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

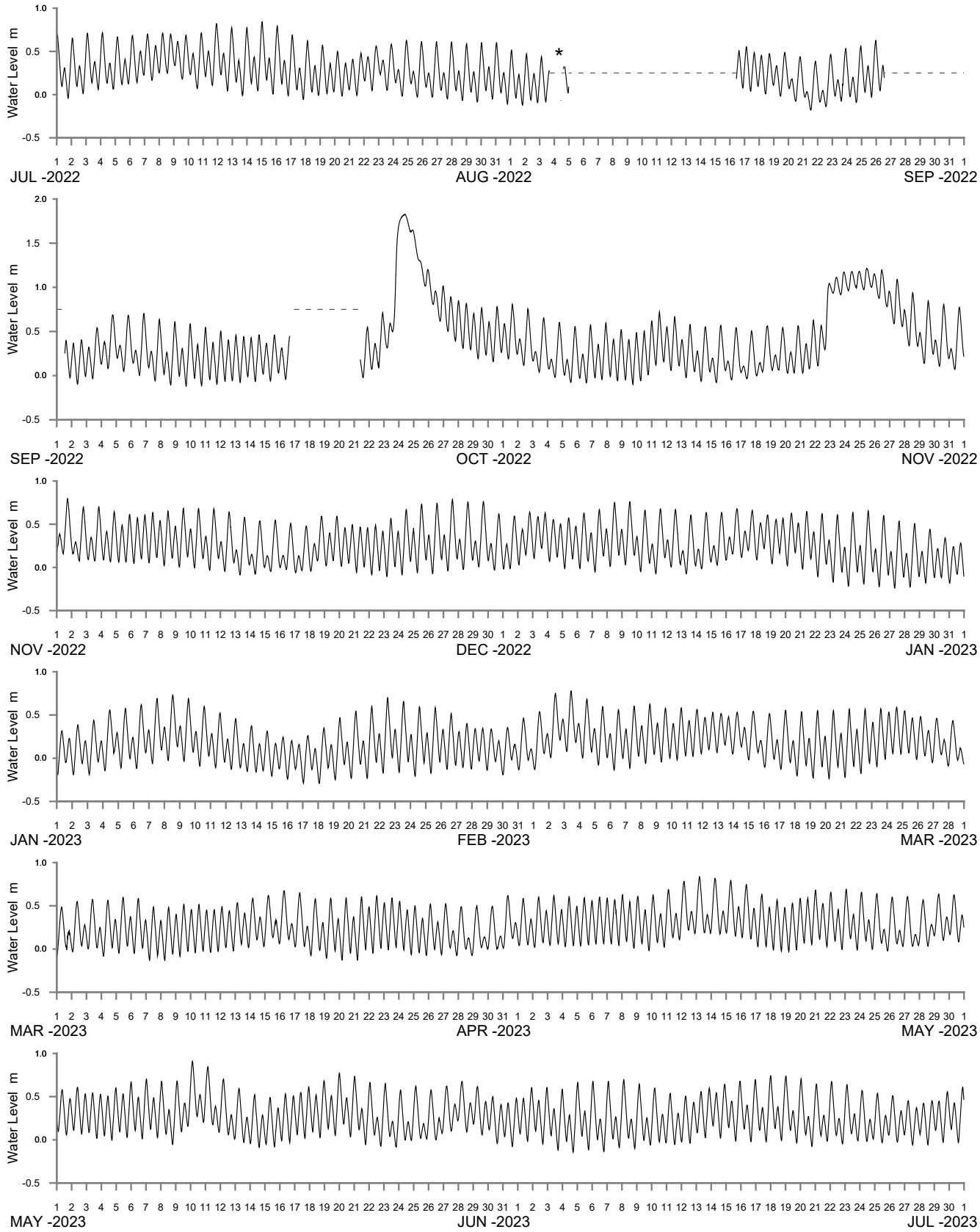
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CLARENCE RIVER AT THE AVENUE DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-41



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

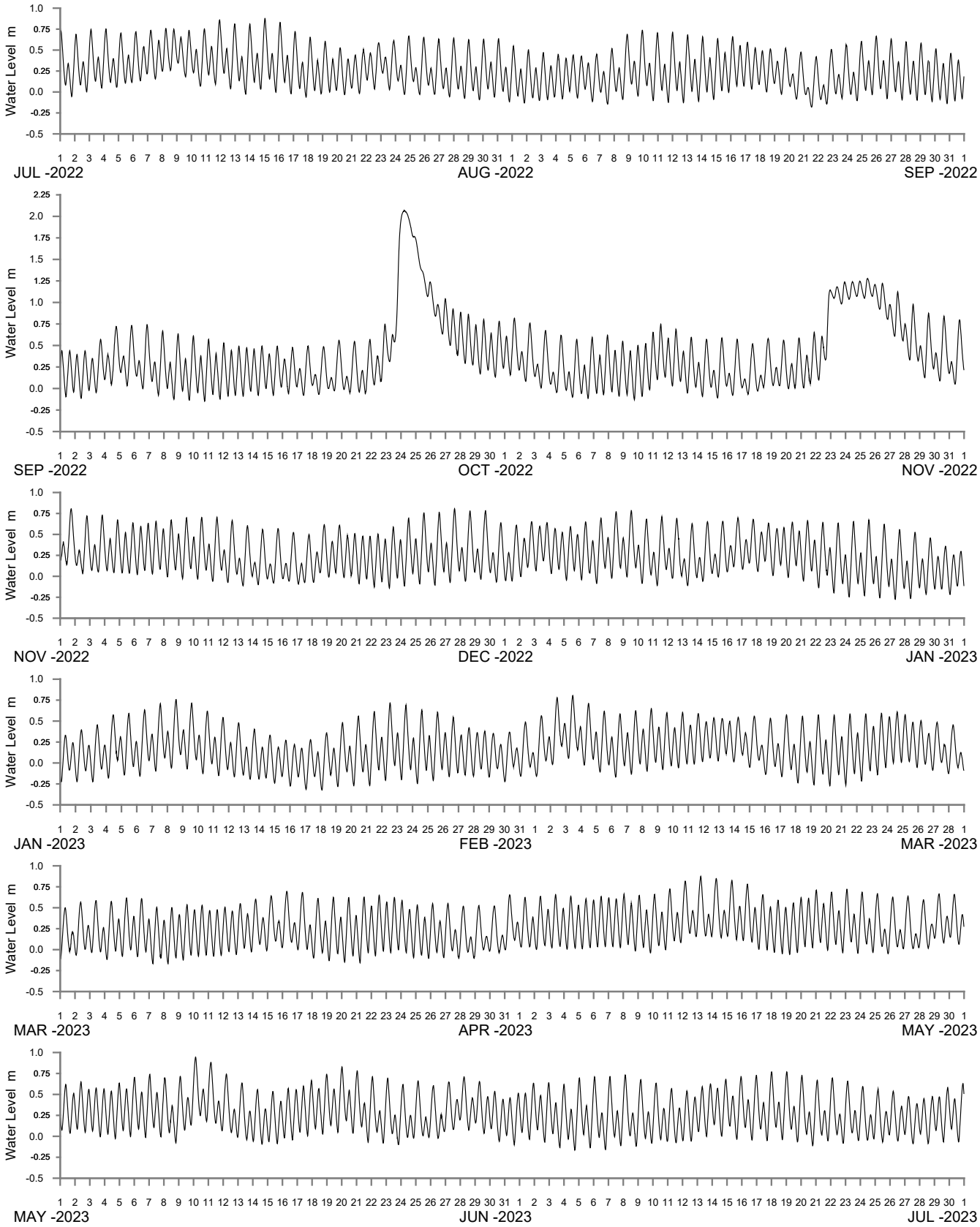
* Data loss due to a logger programming issue

NSW GOVERNMENT

CLARENCE RIVER AT BRUSHGROVE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-42



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

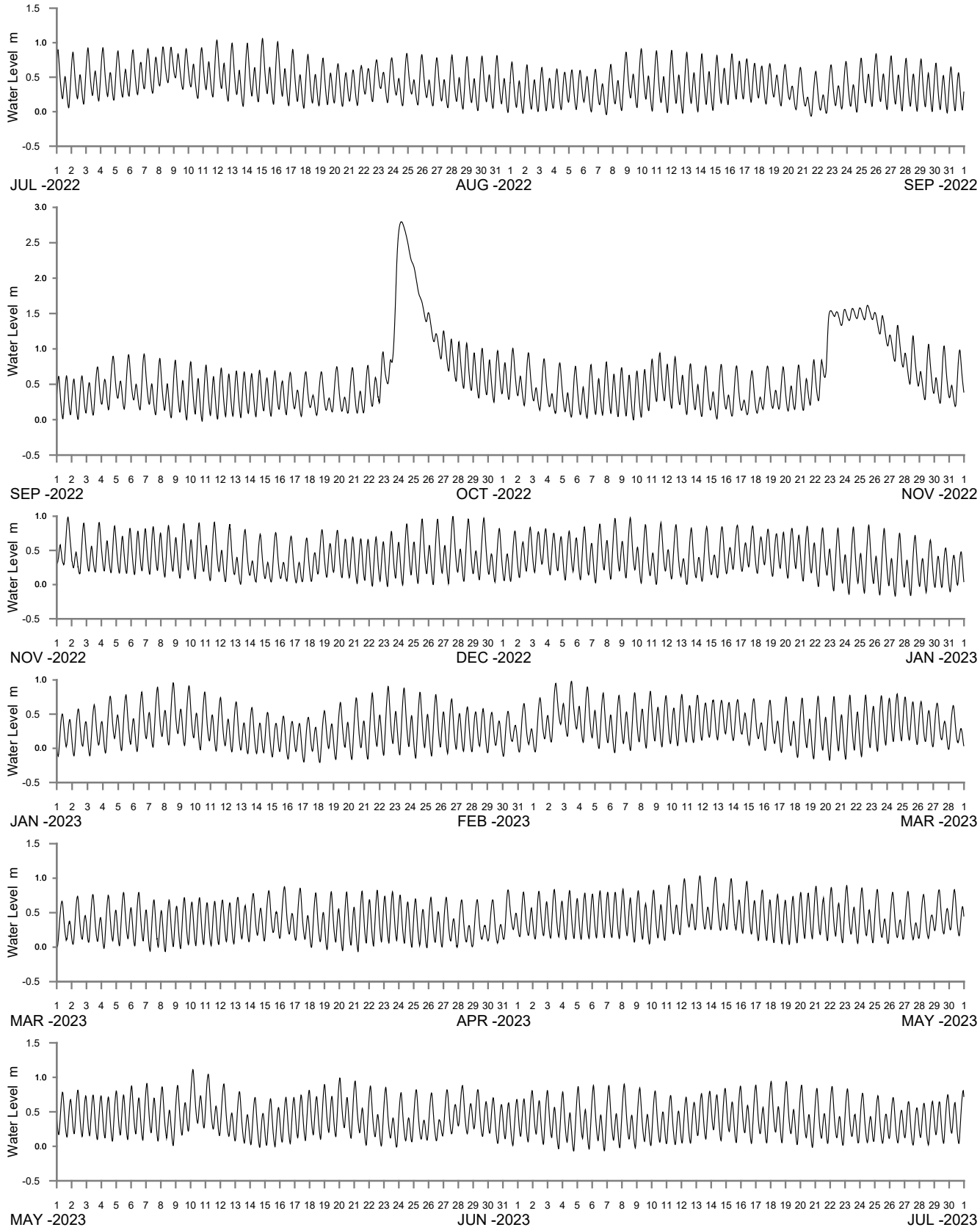
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CLARENCE RIVER AT ULMARRA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-43



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

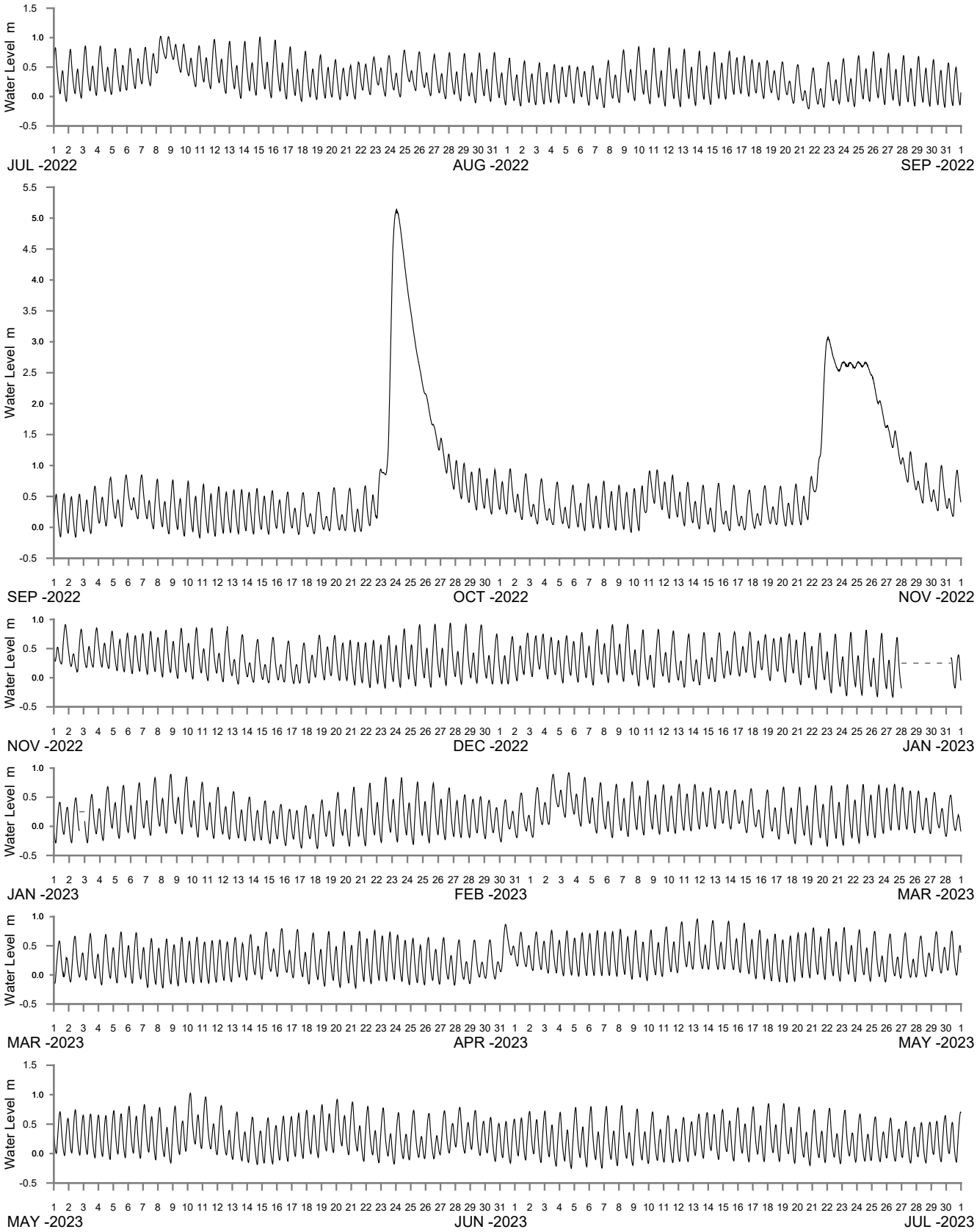
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CLARENCE RIVER AT GRAFTON
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-44



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

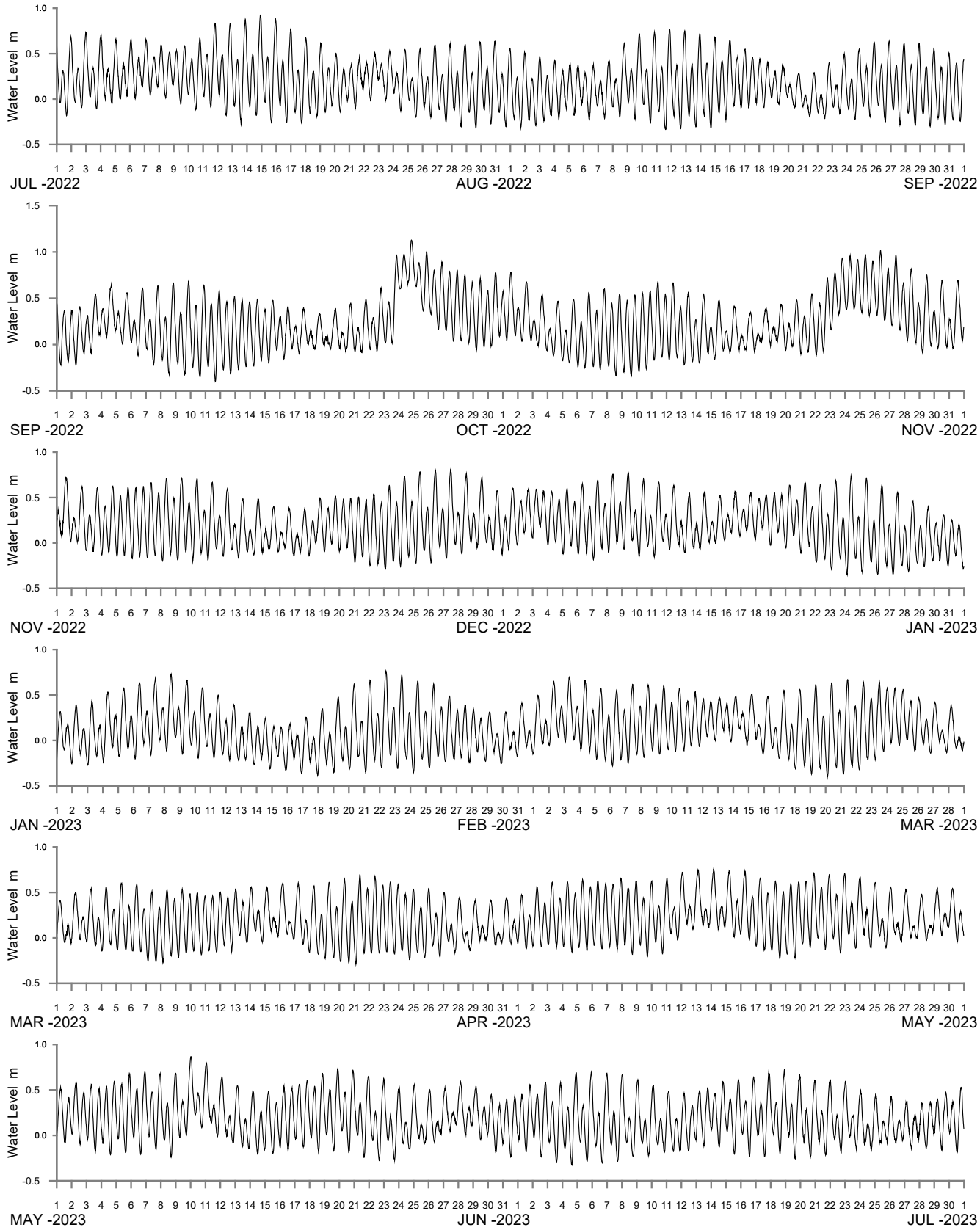
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CLARENCE RIVER AT ROGANS BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-45



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

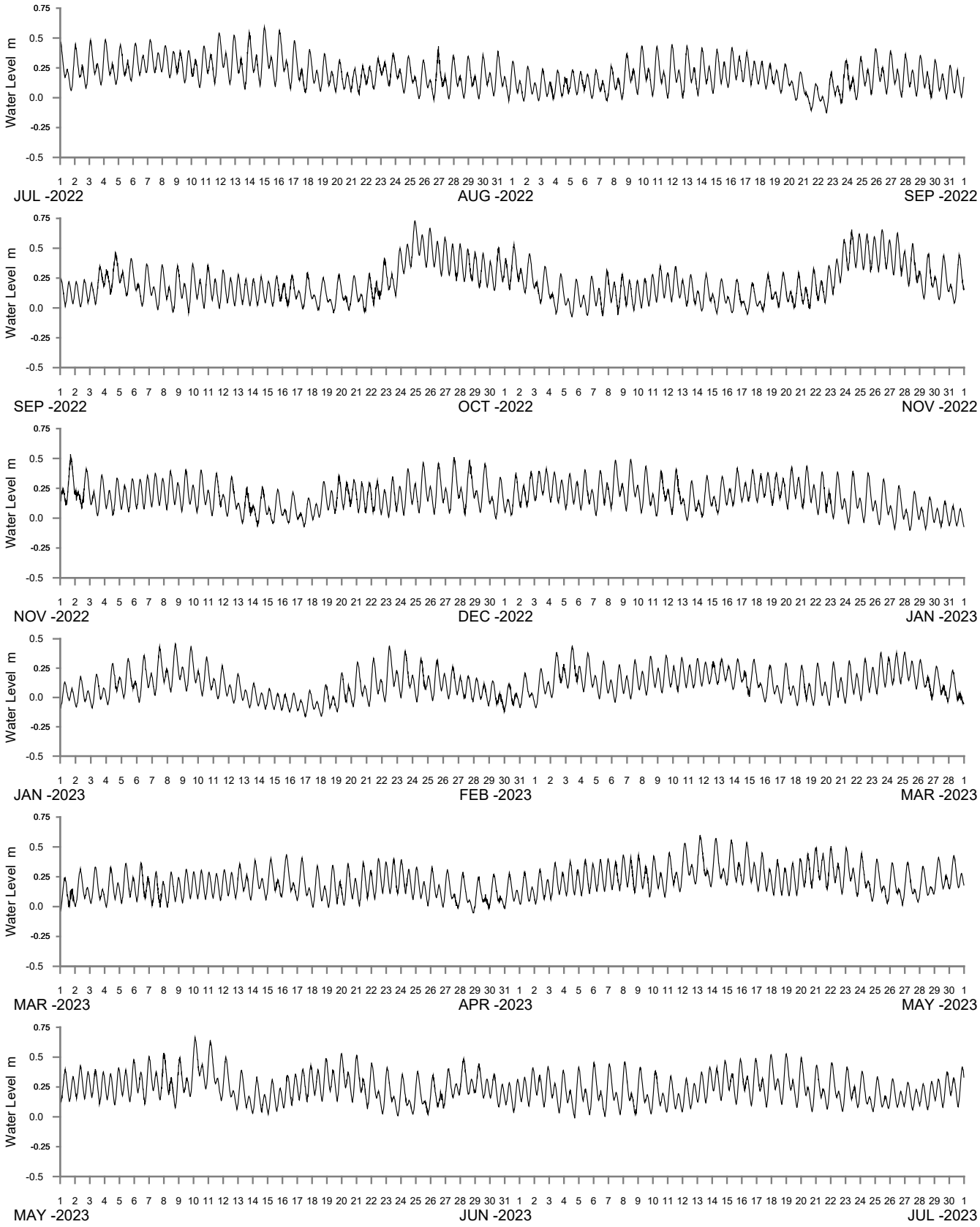
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

PALMERS CHANNEL AT PALMERS ISLAND BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-46



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

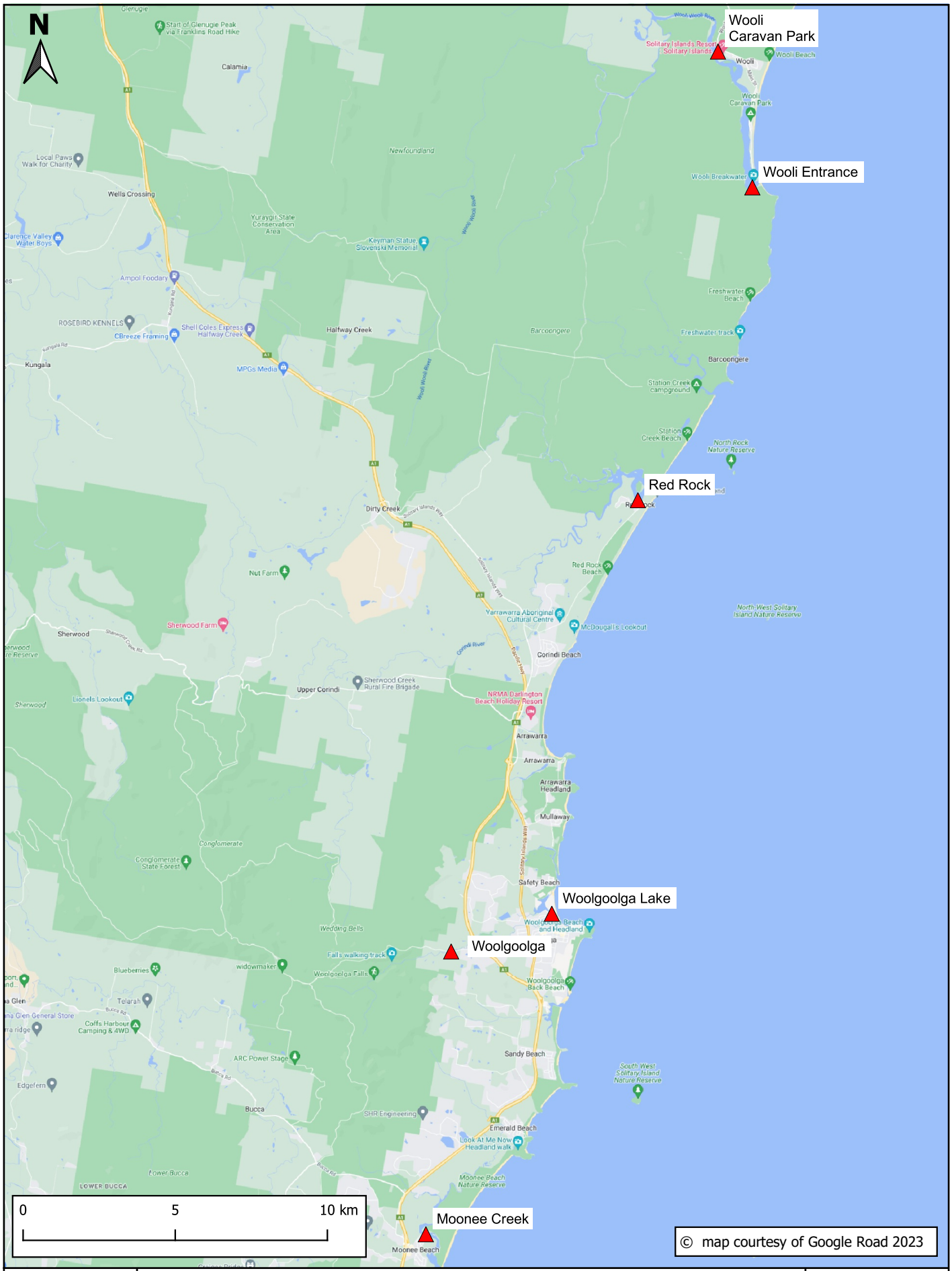
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LAKE WOOLOWEYAH AT LAKE WOOLOWEYAH
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-47

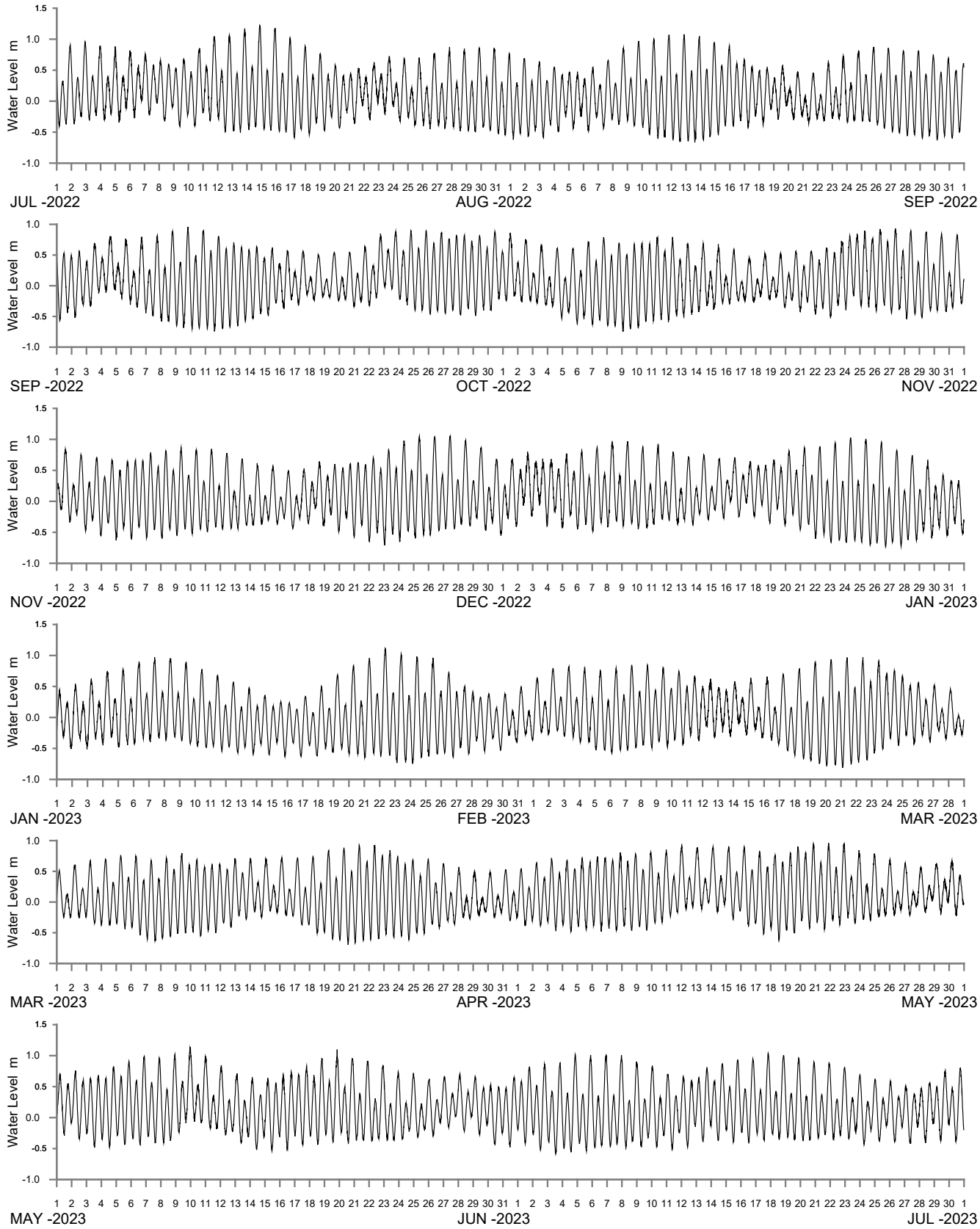


NSW GOVERNMENT

STATION LOCATIONS
WOOLGOOLGA REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-48



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

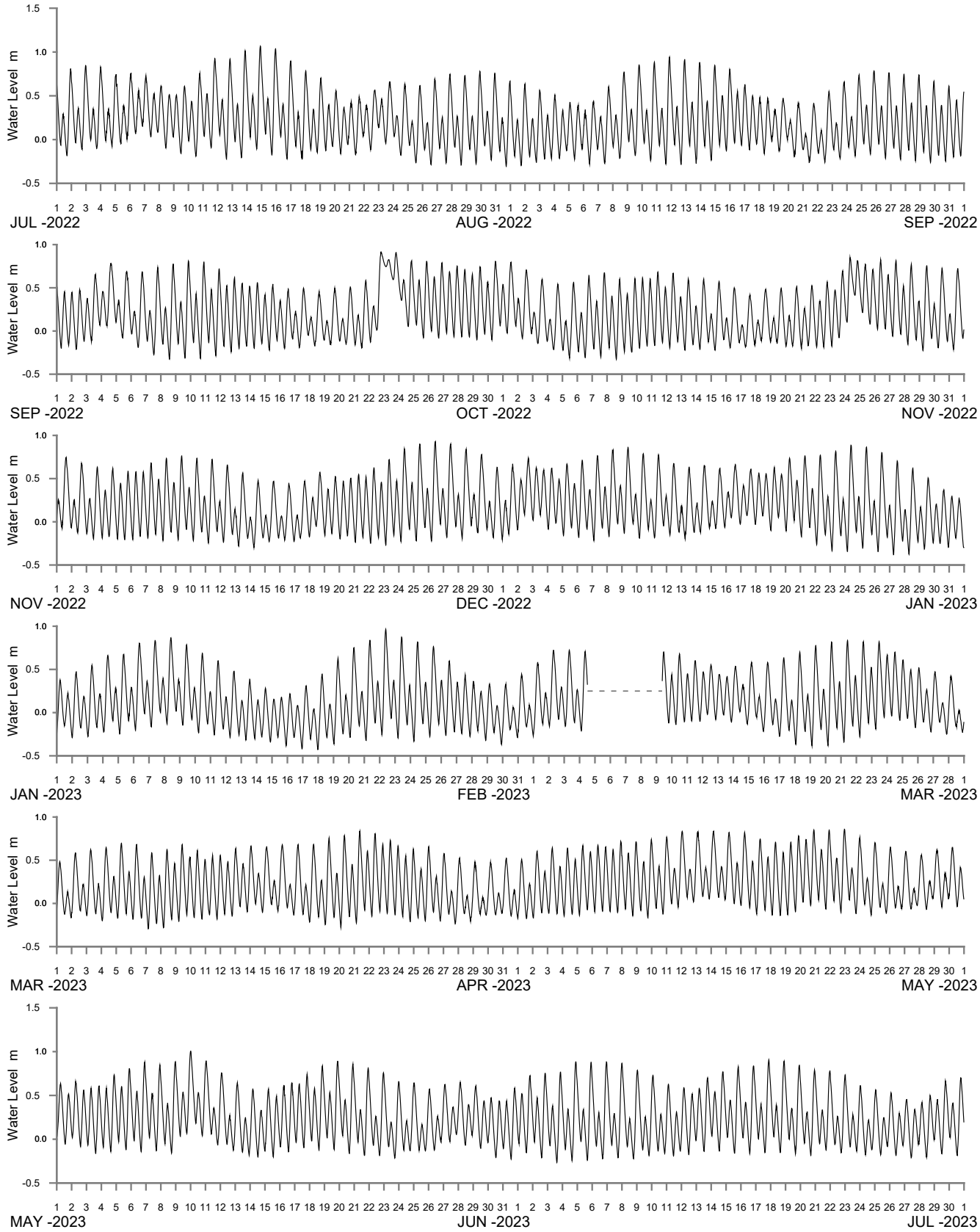
- - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WOOLI RIVER AT WOOLI ENTRANCE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-49



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

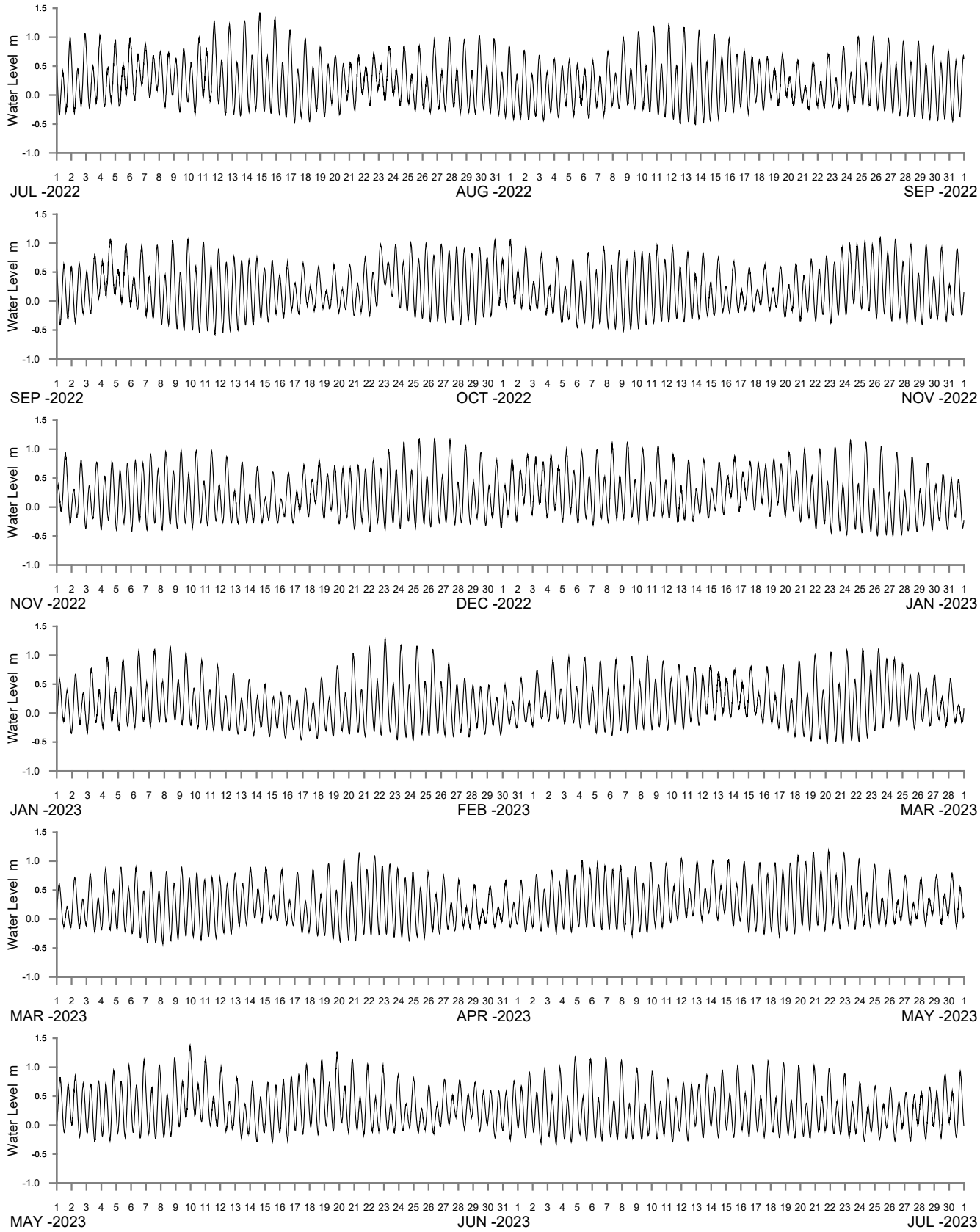
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WOOLI RIVER AT WOOLI CARAVAN PARK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-50



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

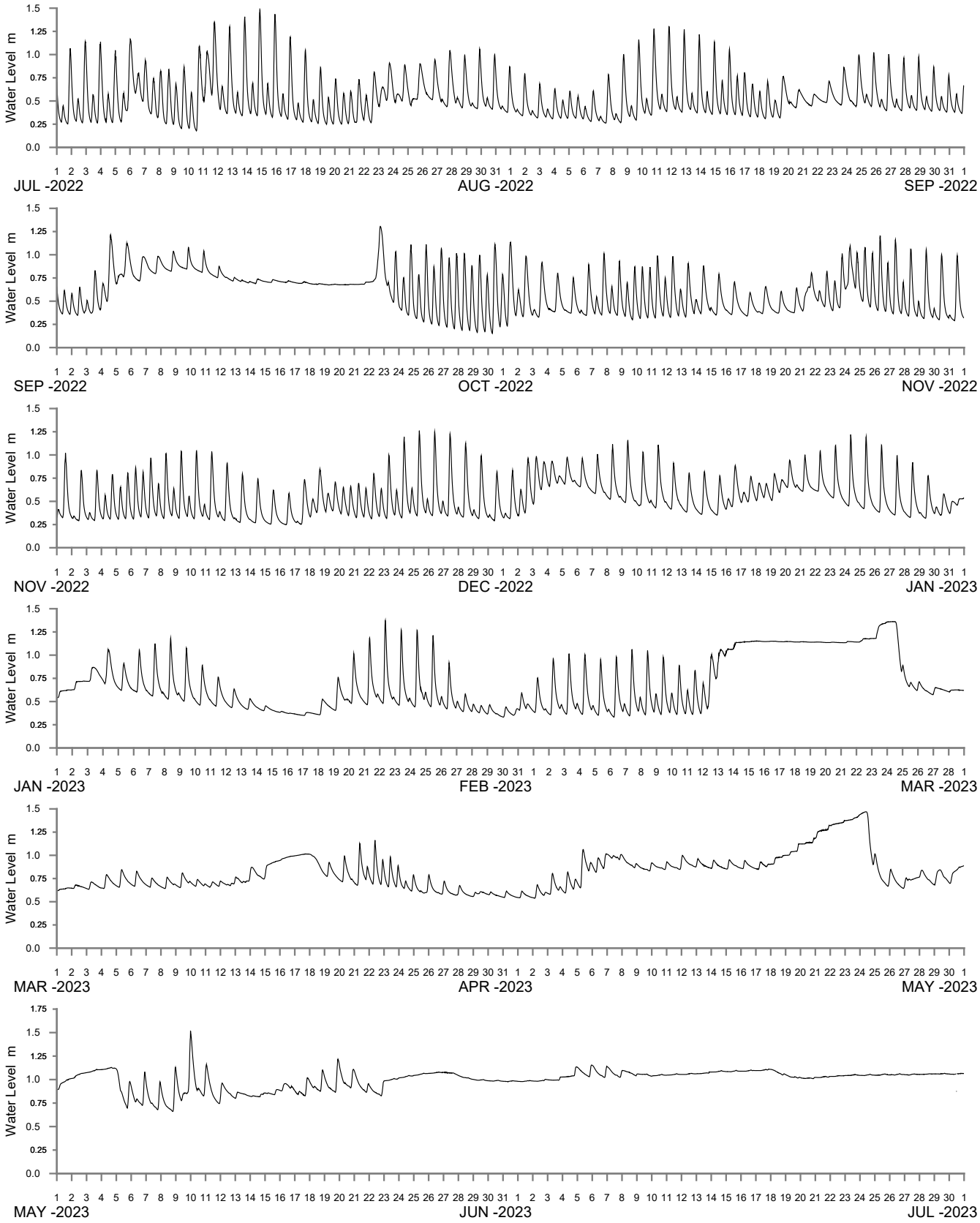
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CORINDI RIVER AT RED ROCK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-51



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

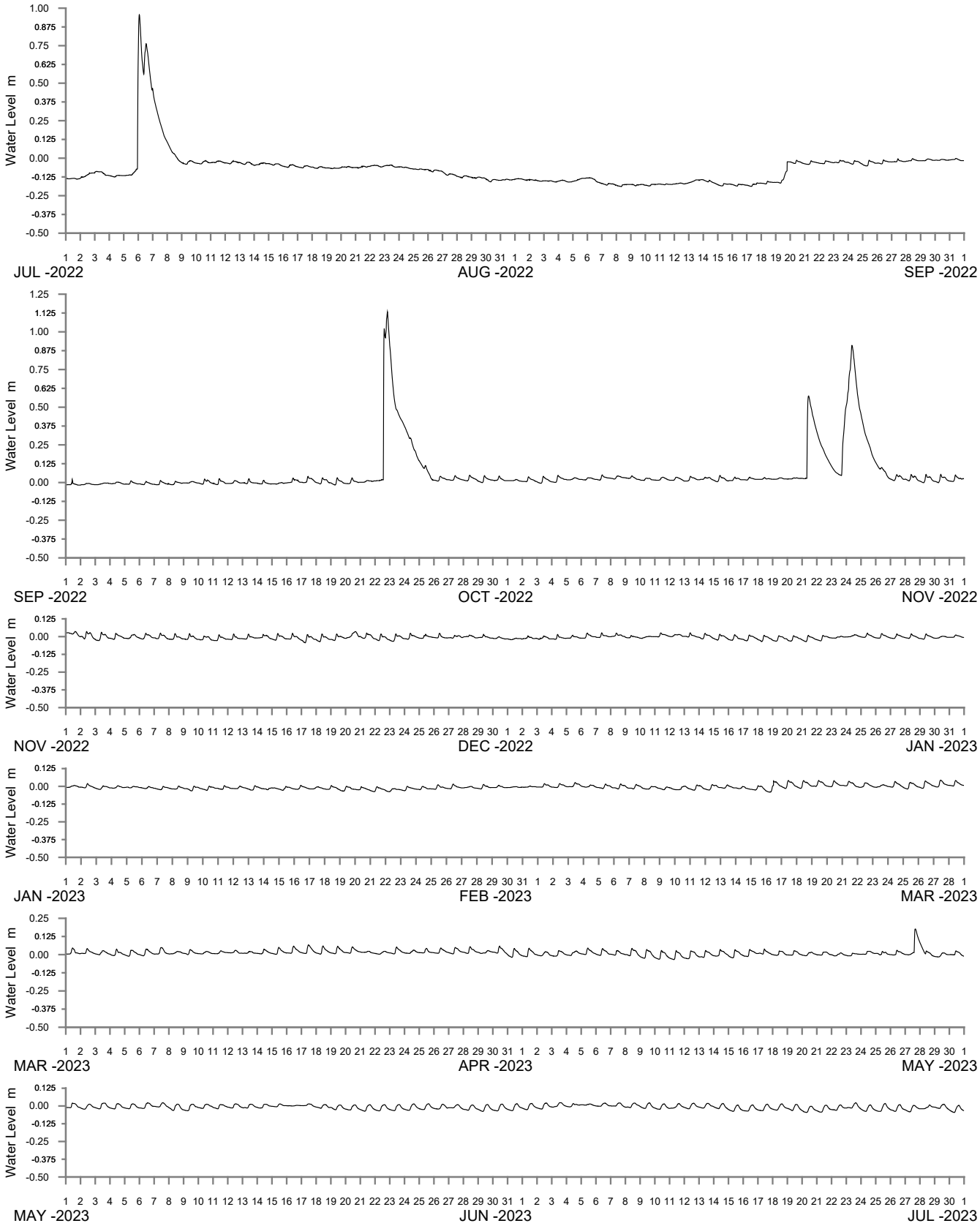
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WOOLGOOLGA LAKE AT WOOLGOOLGA LAKE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-52



WATER LEVEL REFERENCED TO CTF OF CONTROL STRUCTURE

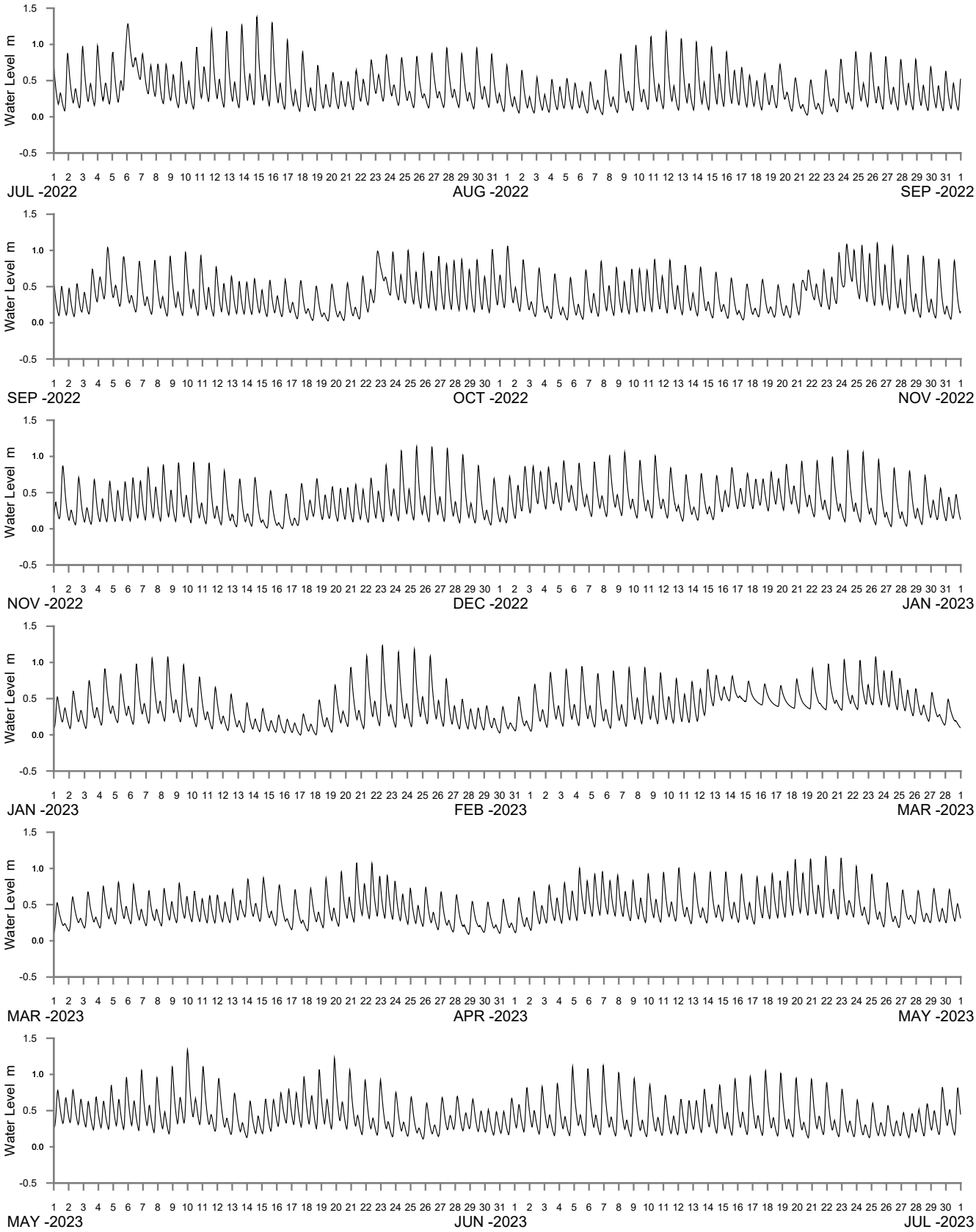
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WOOLGOOLGA CREEK AT WOOLGOOLGA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-53



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

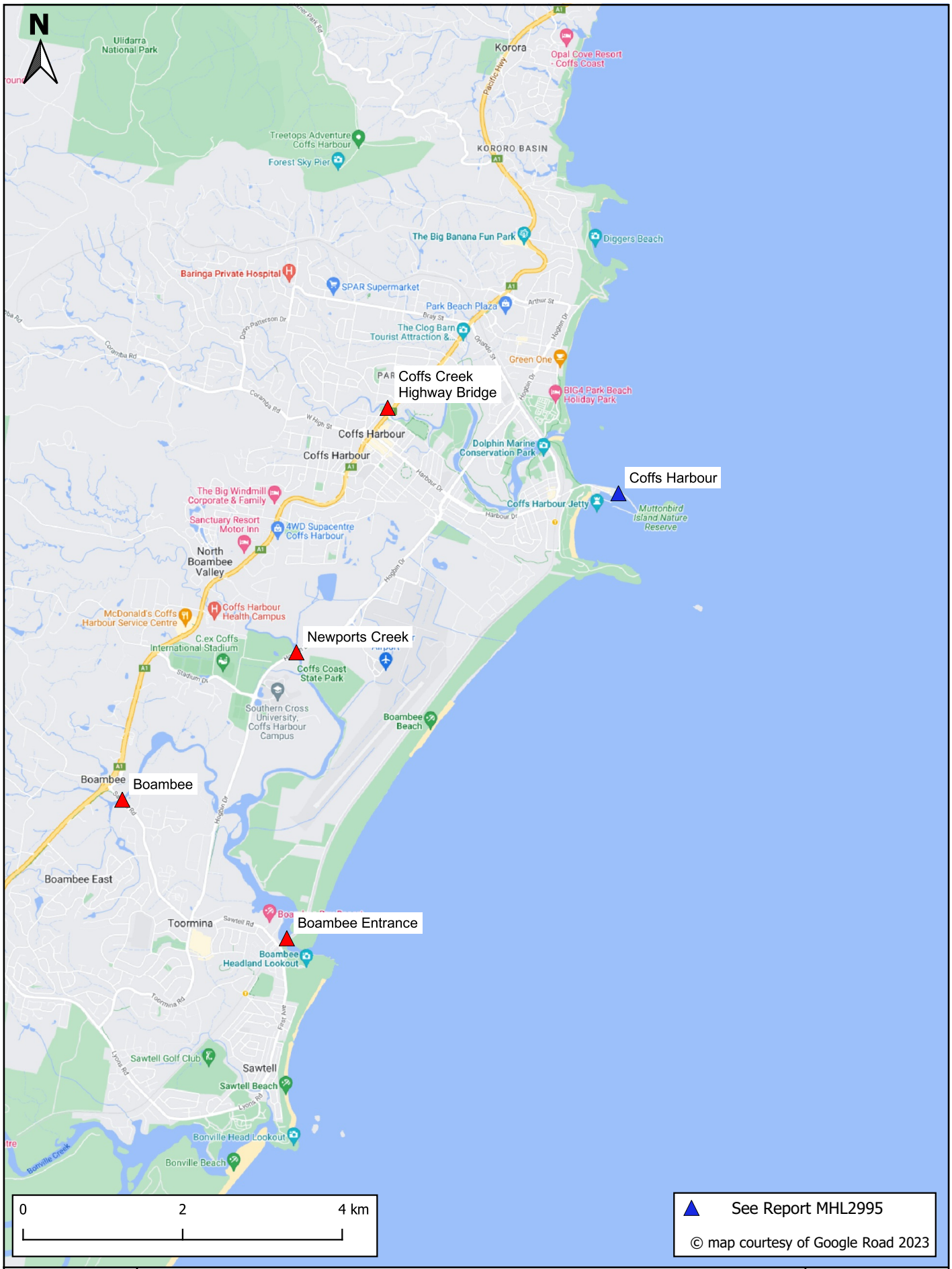
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MOONEE CREEK AT MOONEE CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-54

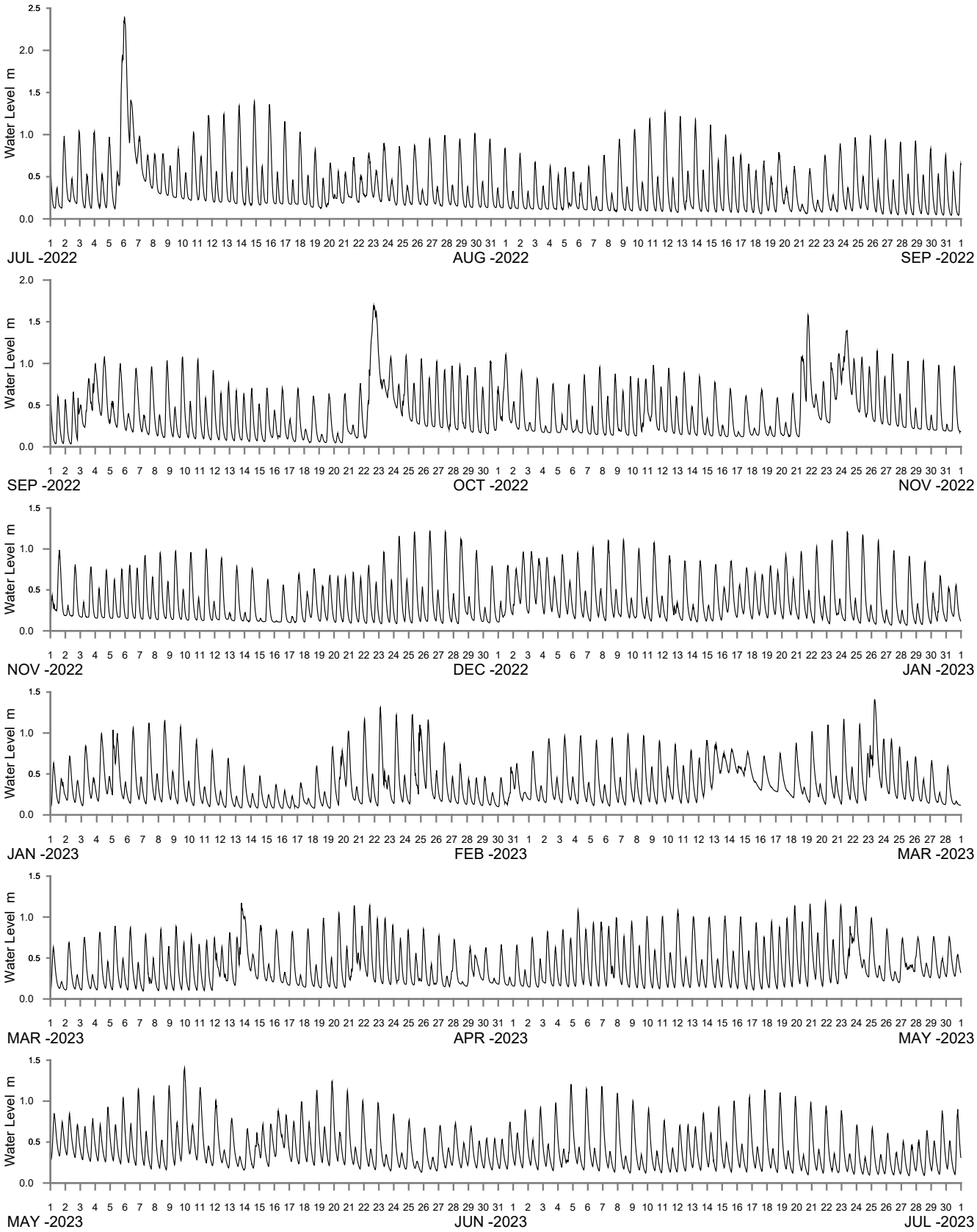


NSW GOVERNMENT

STATION LOCATIONS
COFFS HARBOUR REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-55



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

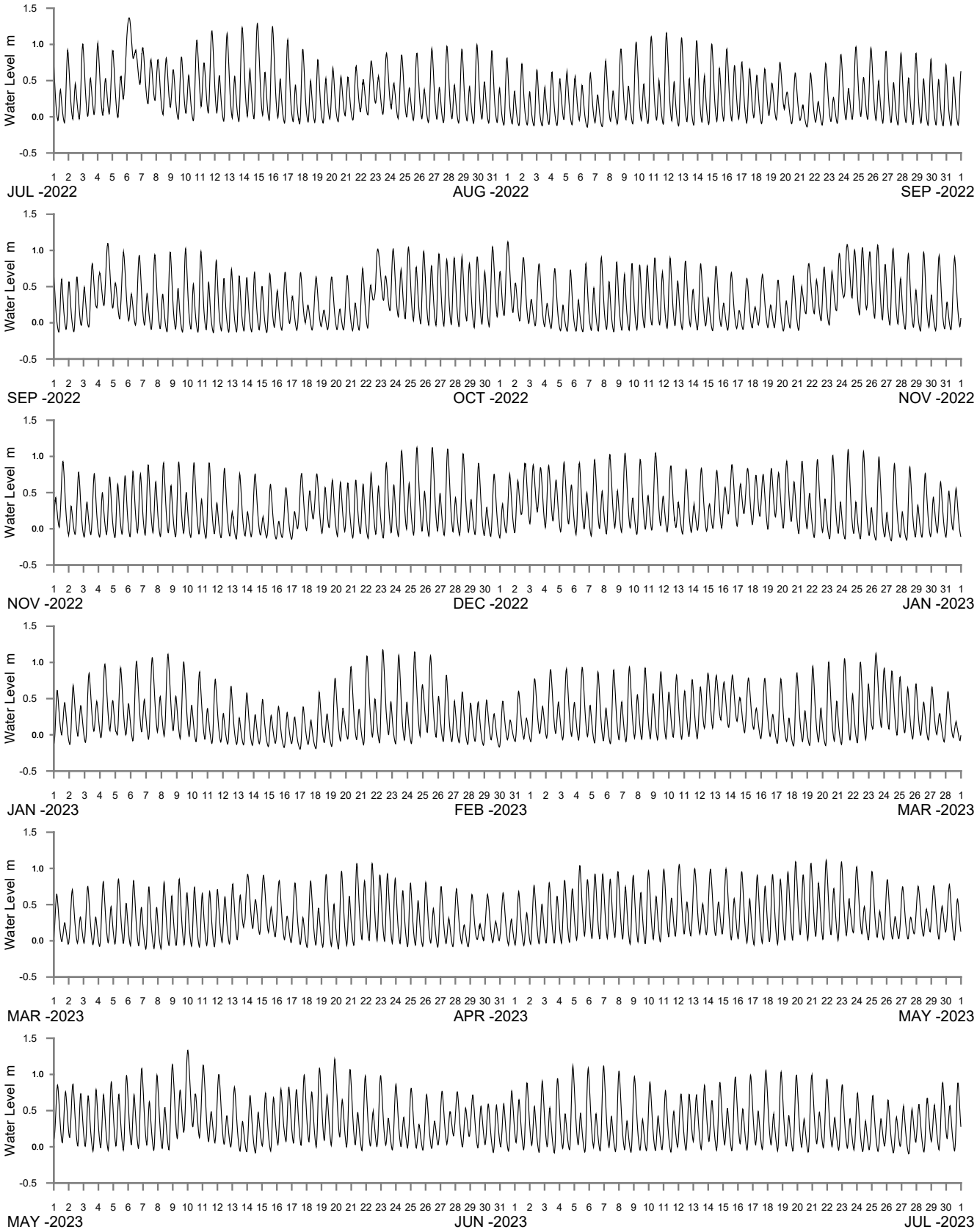
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

COFFS CREEK AT COFFS CREEK HIGHWAY BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-56



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

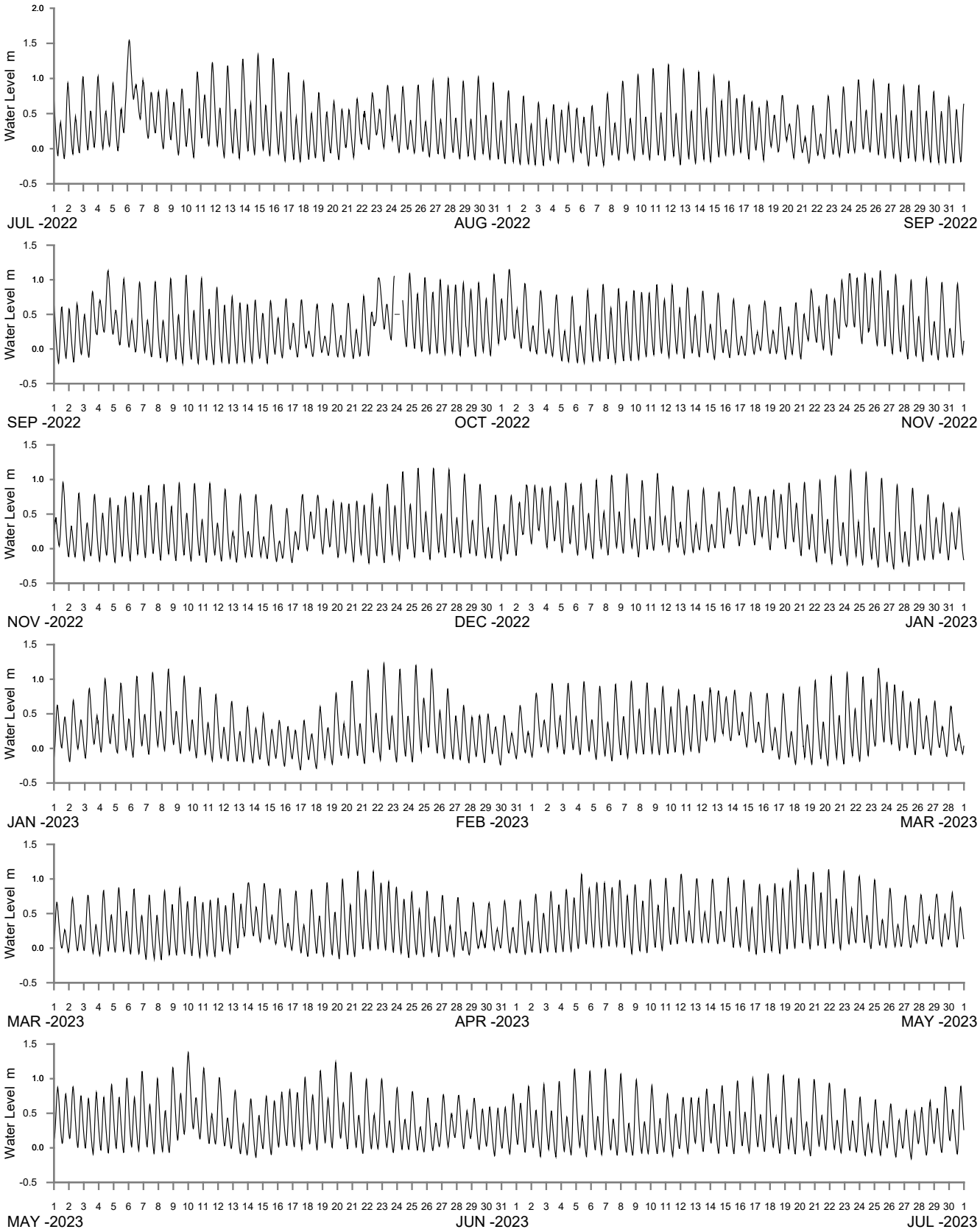
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

NEWPORTS CREEK AT NEWPORTS CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-57



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

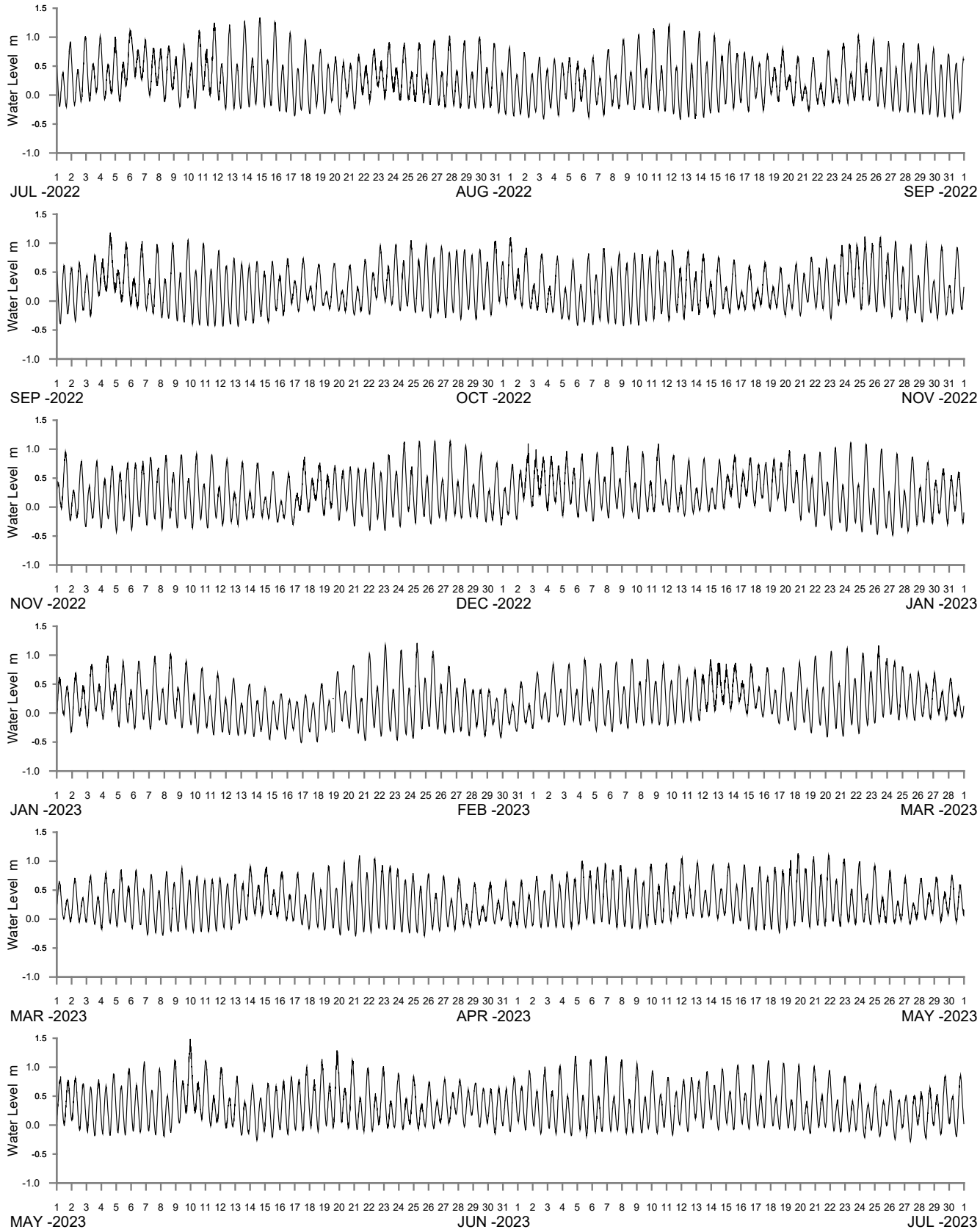
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BOAMBEE CREEK AT BOAMBEE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-58



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

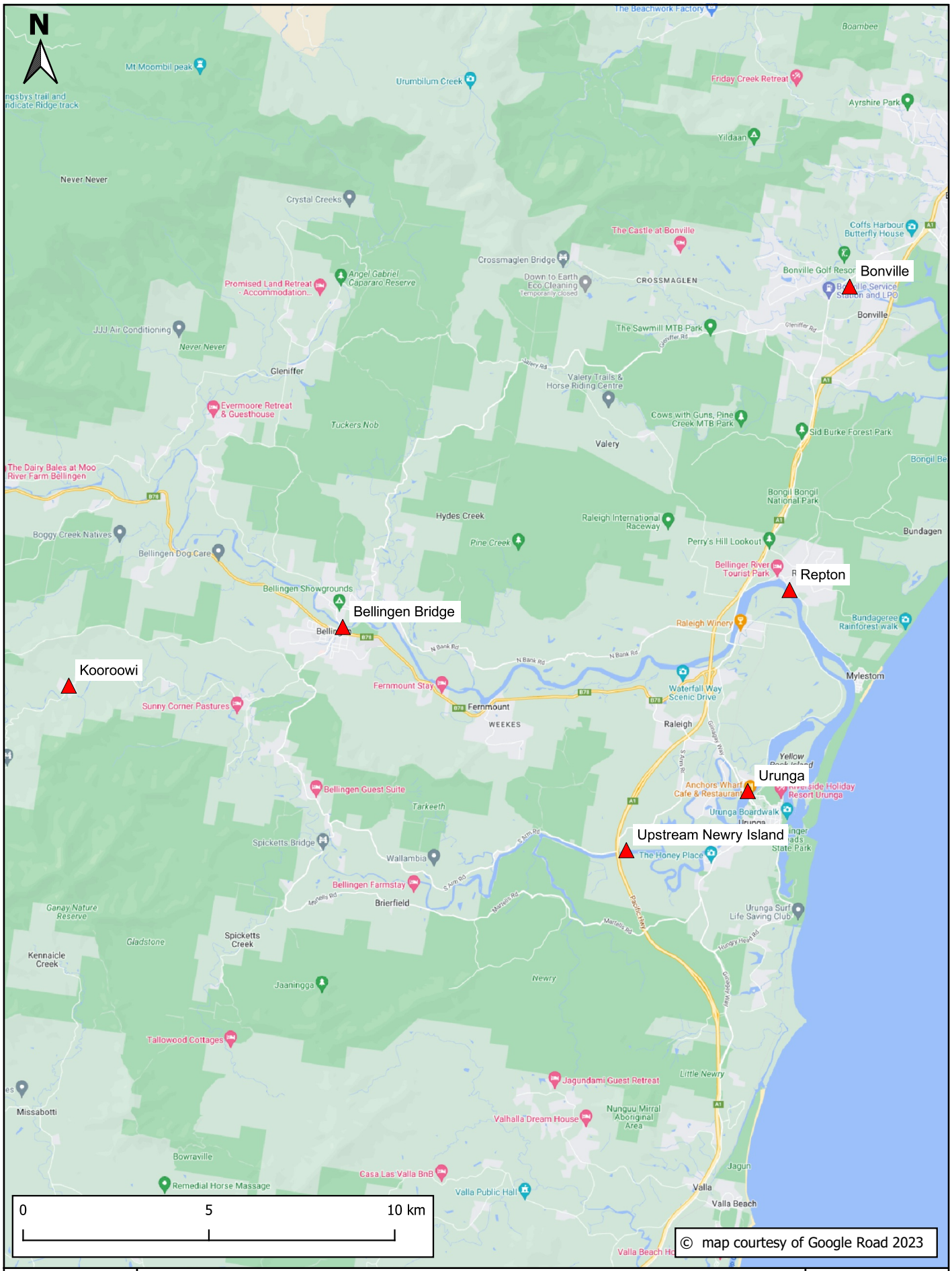
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BOAMBEE CREEK AT BOAMBEE ENTRANCE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-59

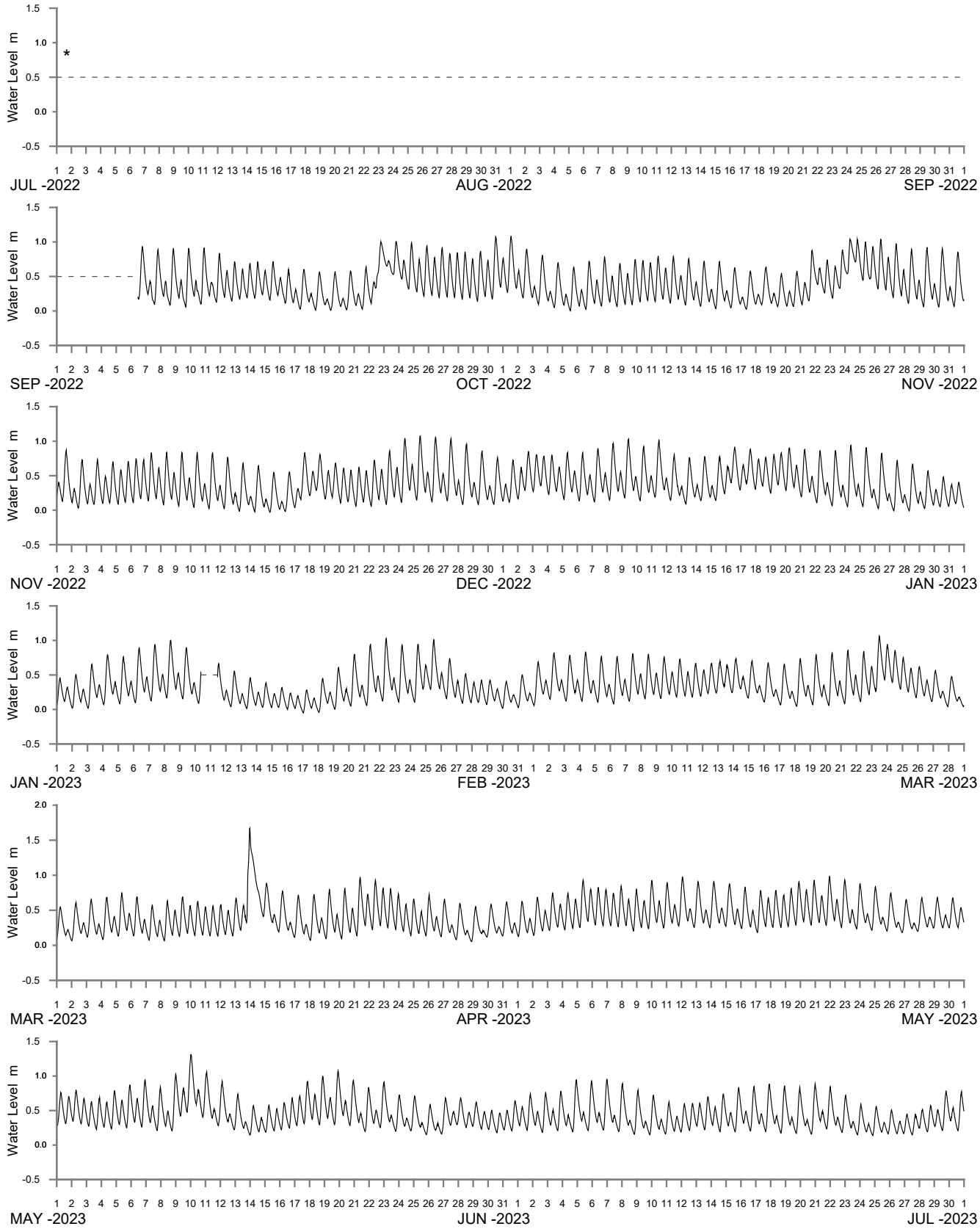


NSW GOVERNMENT

STATION LOCATIONS
BELLINGER RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-60



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

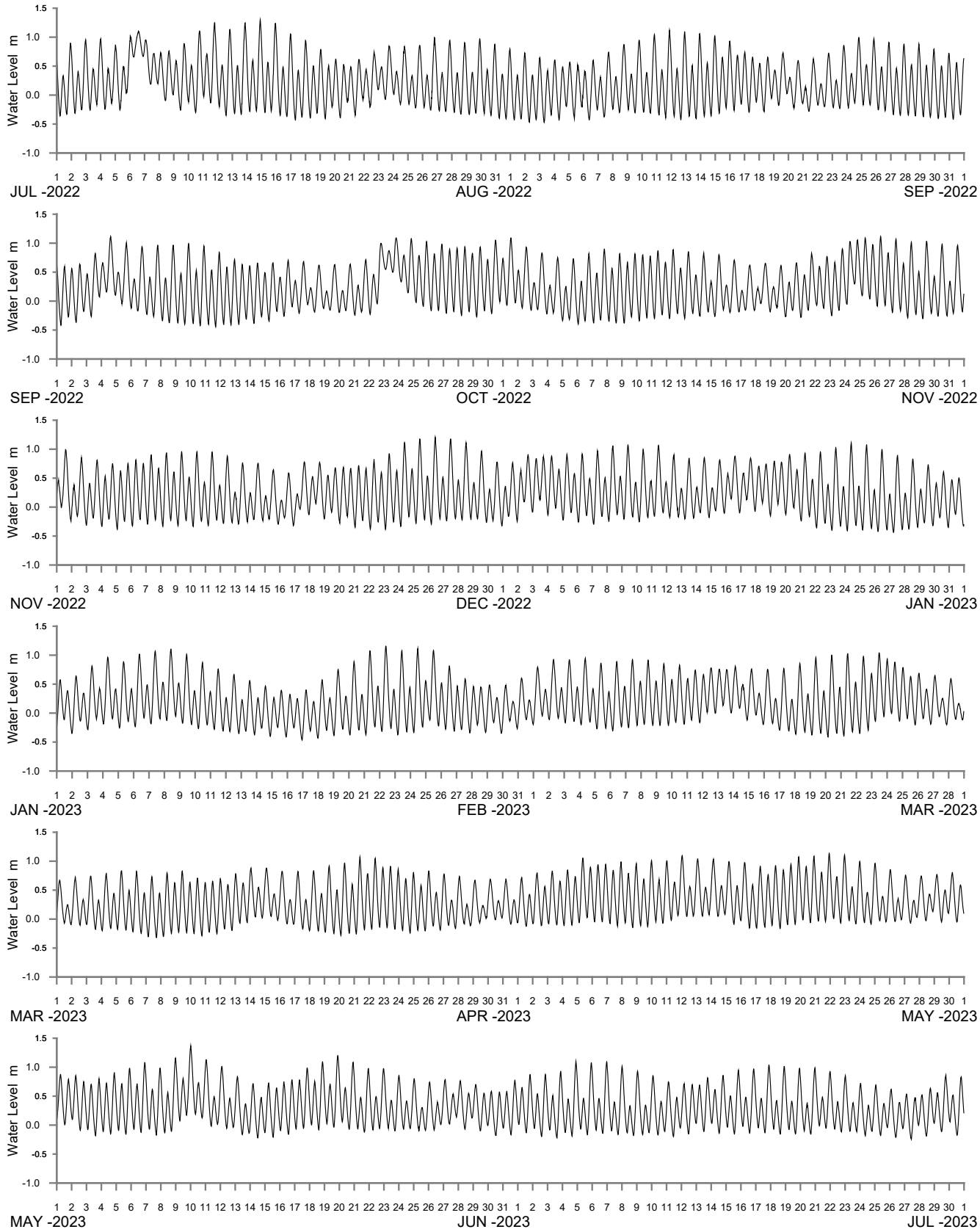
* Data loss due to sensor and logger failure

NSW GOVERNMENT

BONVILLE CREEK AT BONVILLE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-61



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

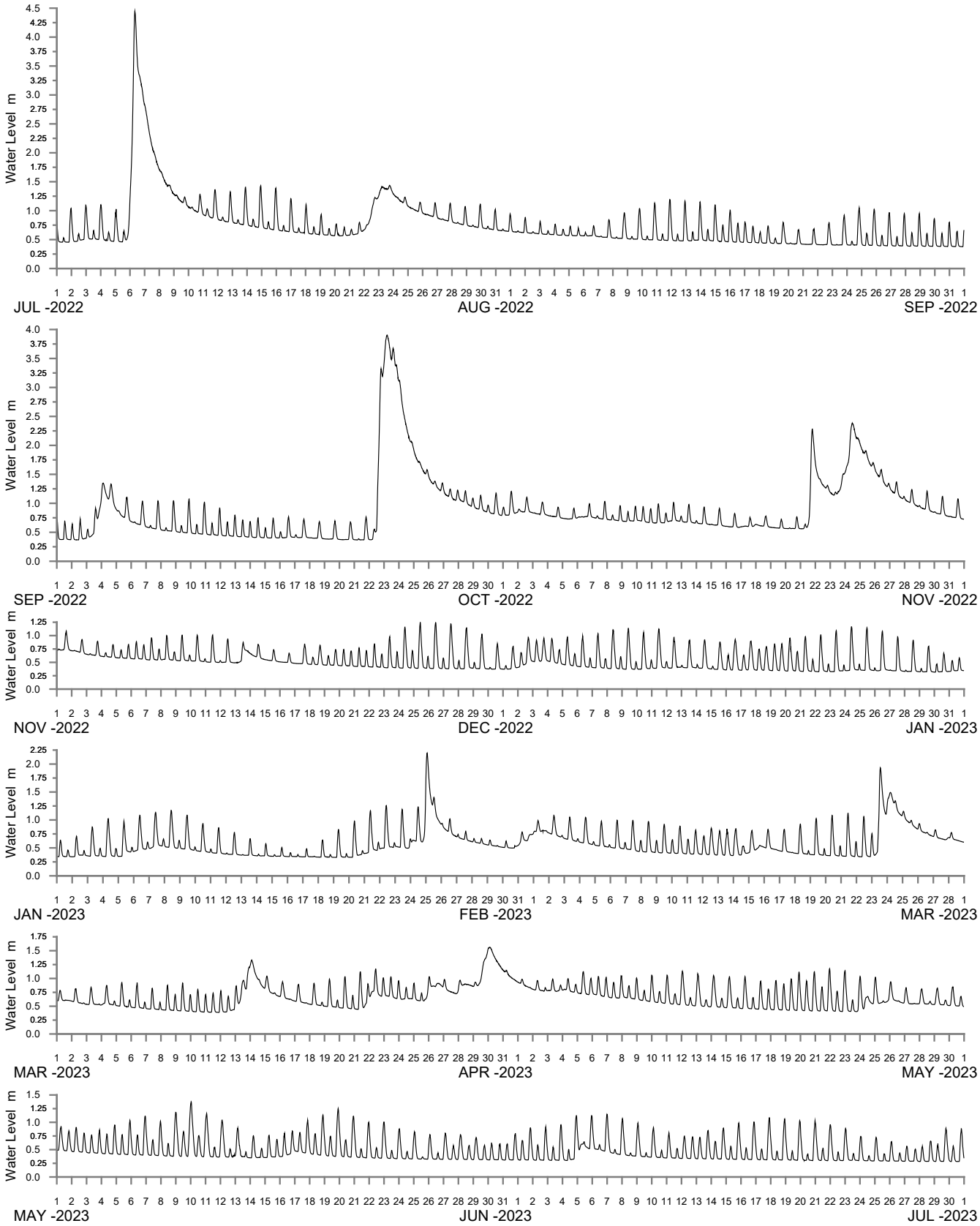
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BELLINGER RIVER AT REPTON
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-62



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

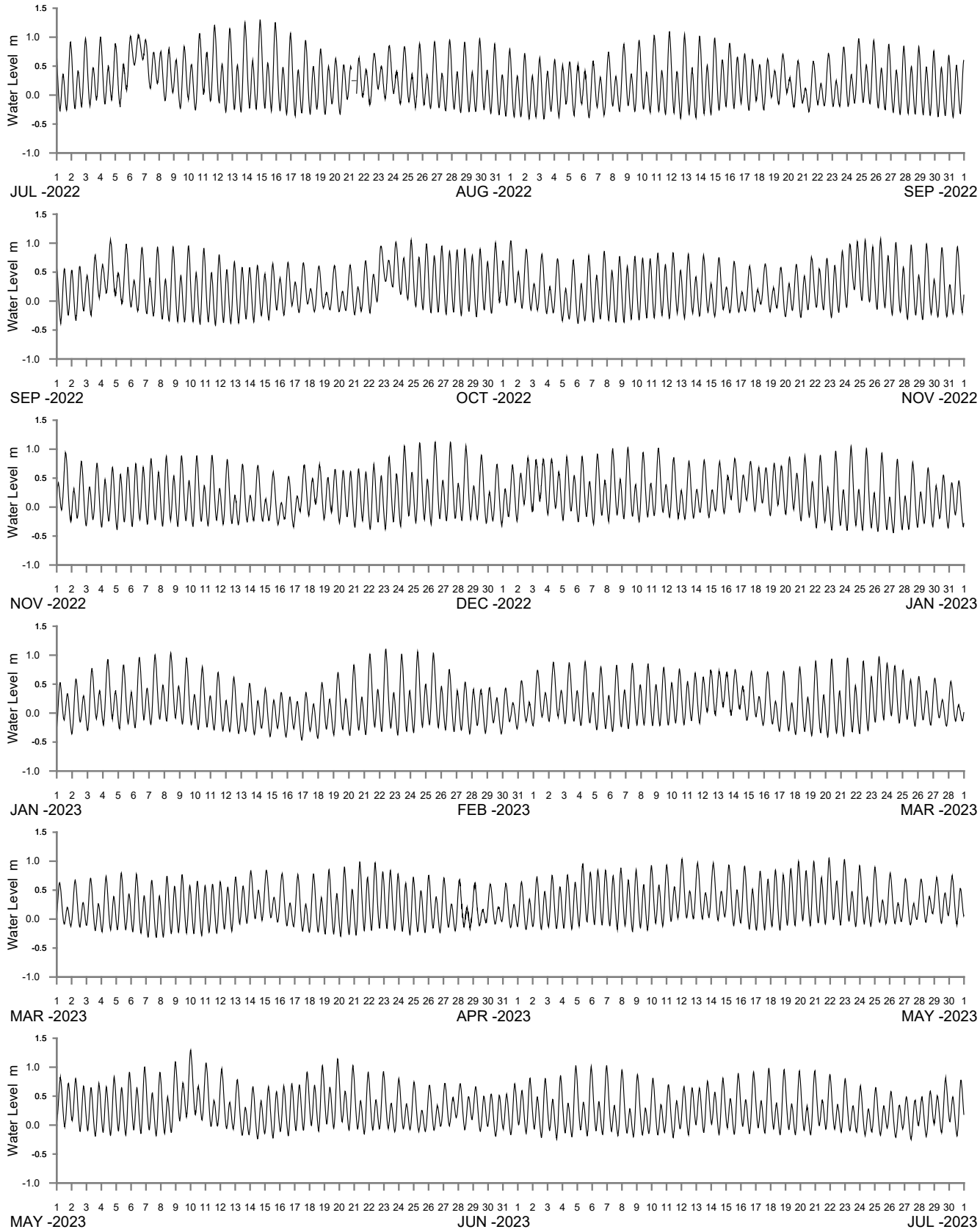
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BELLINGER RIVER AT BELLINGEN BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-63



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

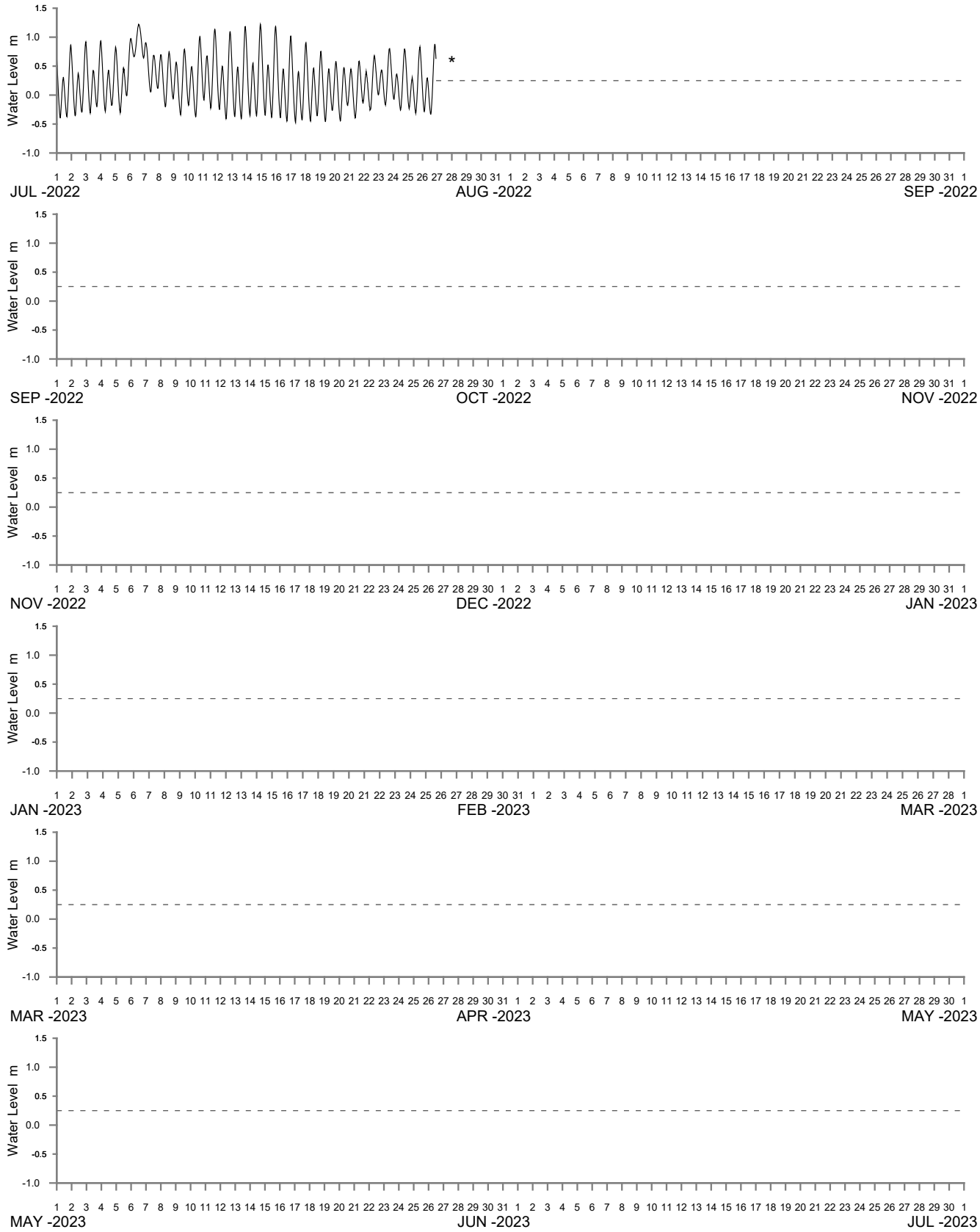
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

KALANG RIVER AT URUNGA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-64



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

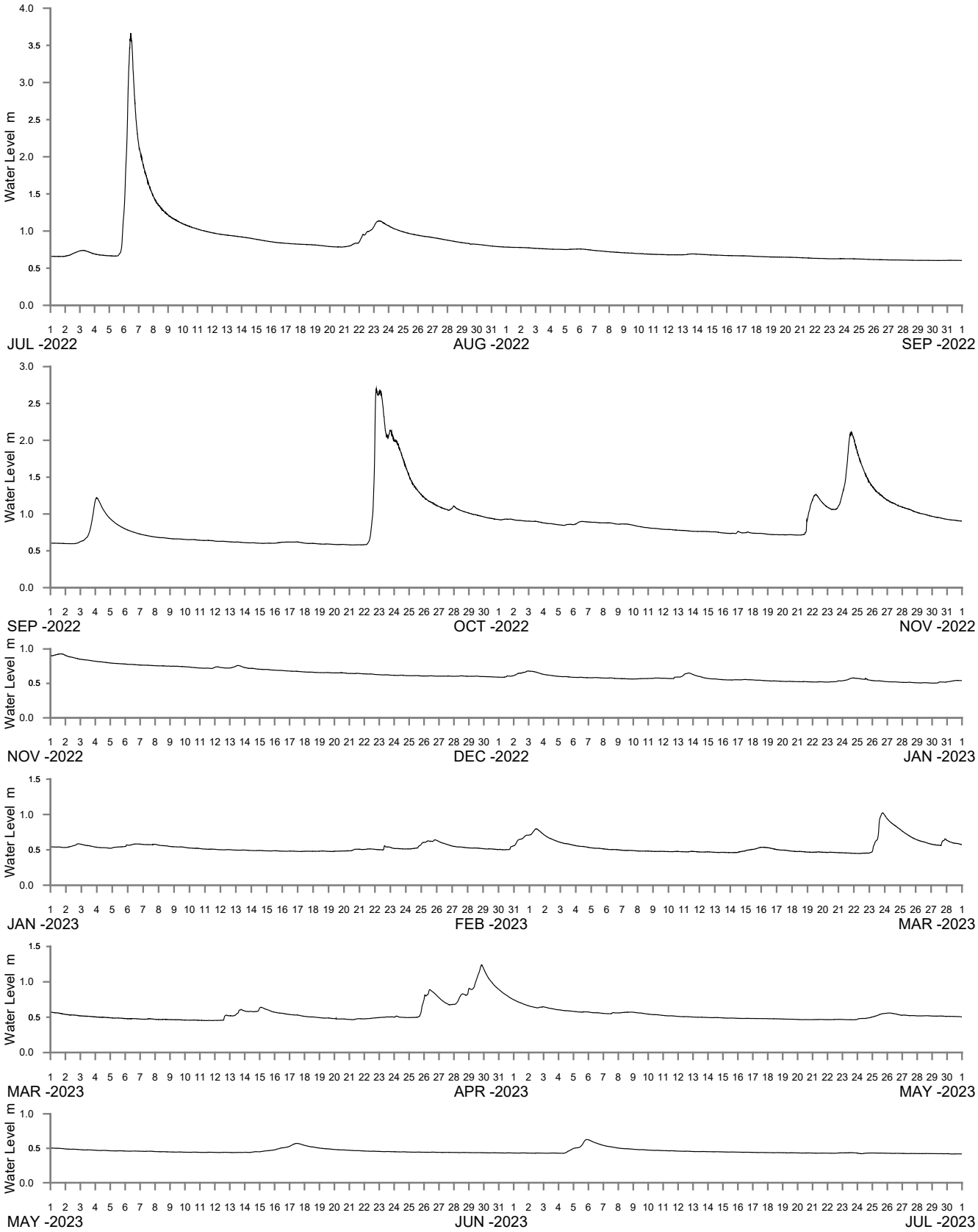
* Data loss due to collapse of monitoring structure attached to the navigational marker. Temporary standalone monitoring was unsuccessful. A new radar attached to Newry Island Bridge is awaiting approvals.

NSW GOVERNMENT

KALANG RIVER AT UPSTREAM NEWRY ISLAND
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-65



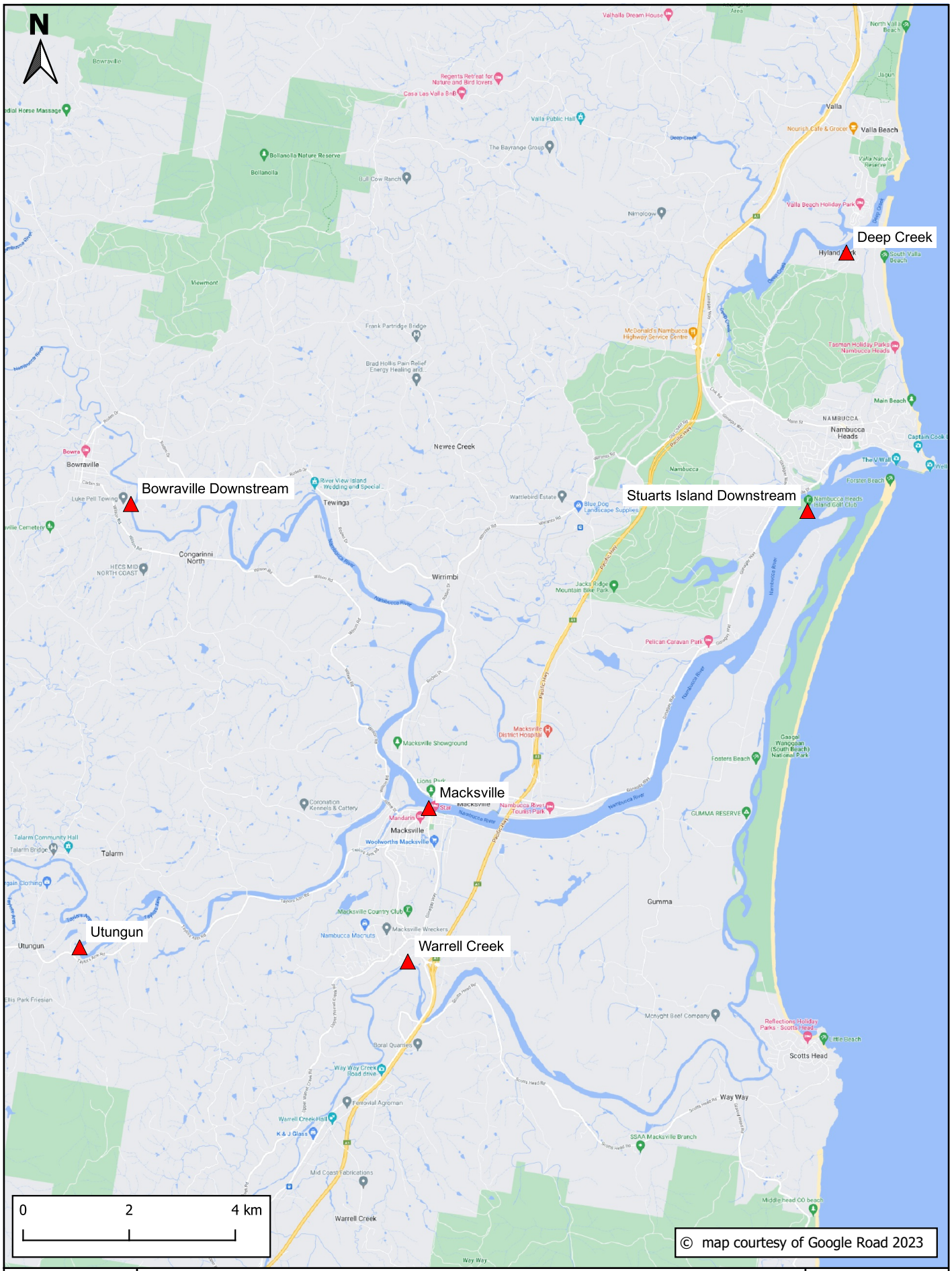
WATER LEVEL REFERENCED TO ASSUMED DATUM

- - - - - - - - - - - - DATA LOSS

KALANG RIVER AT KOOROOWI
2022–23

Manly Hydraulics Laboratory

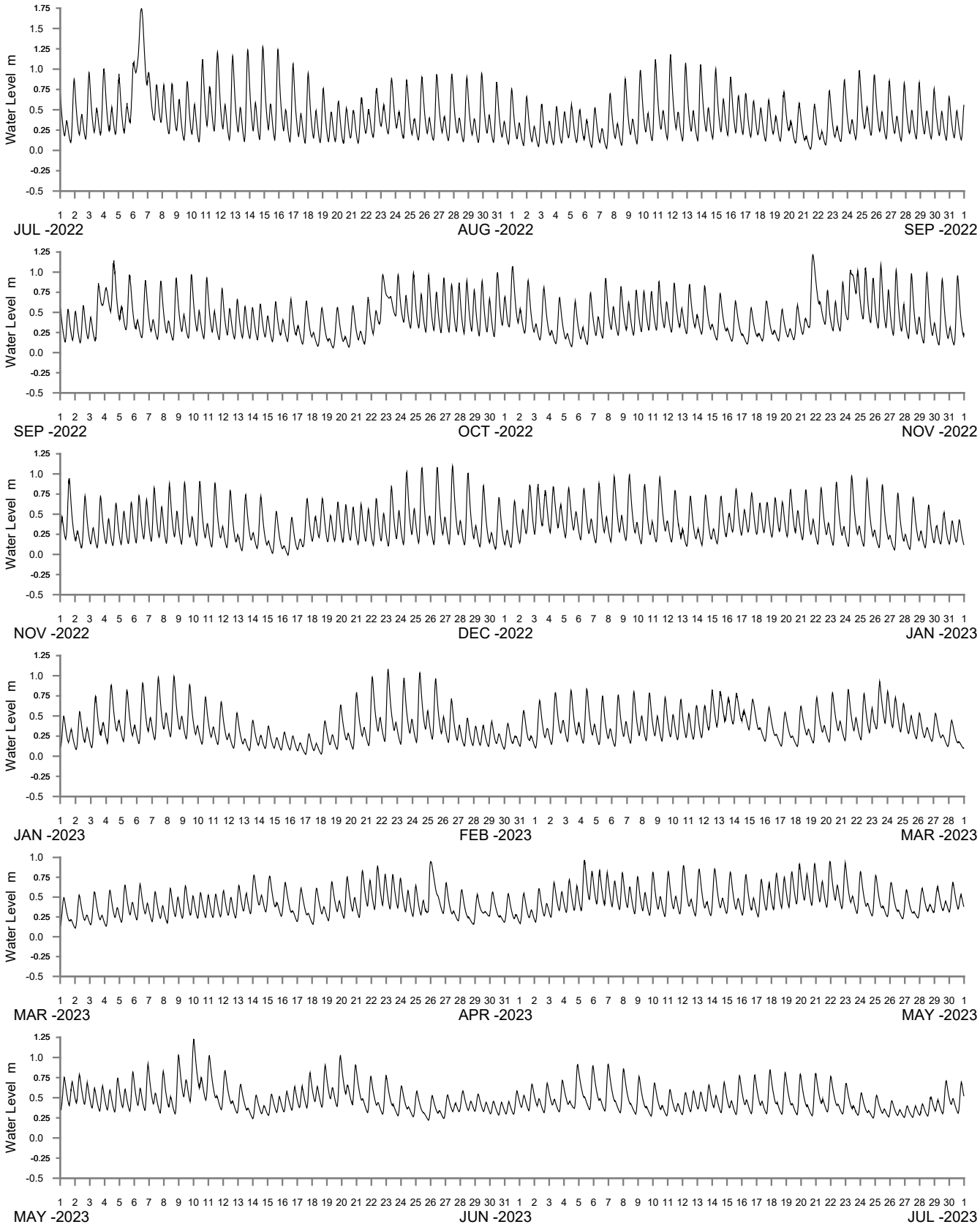
Report MHL2994
Figure
4-66



STATION LOCATIONS
NAMBUCCA RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-67



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

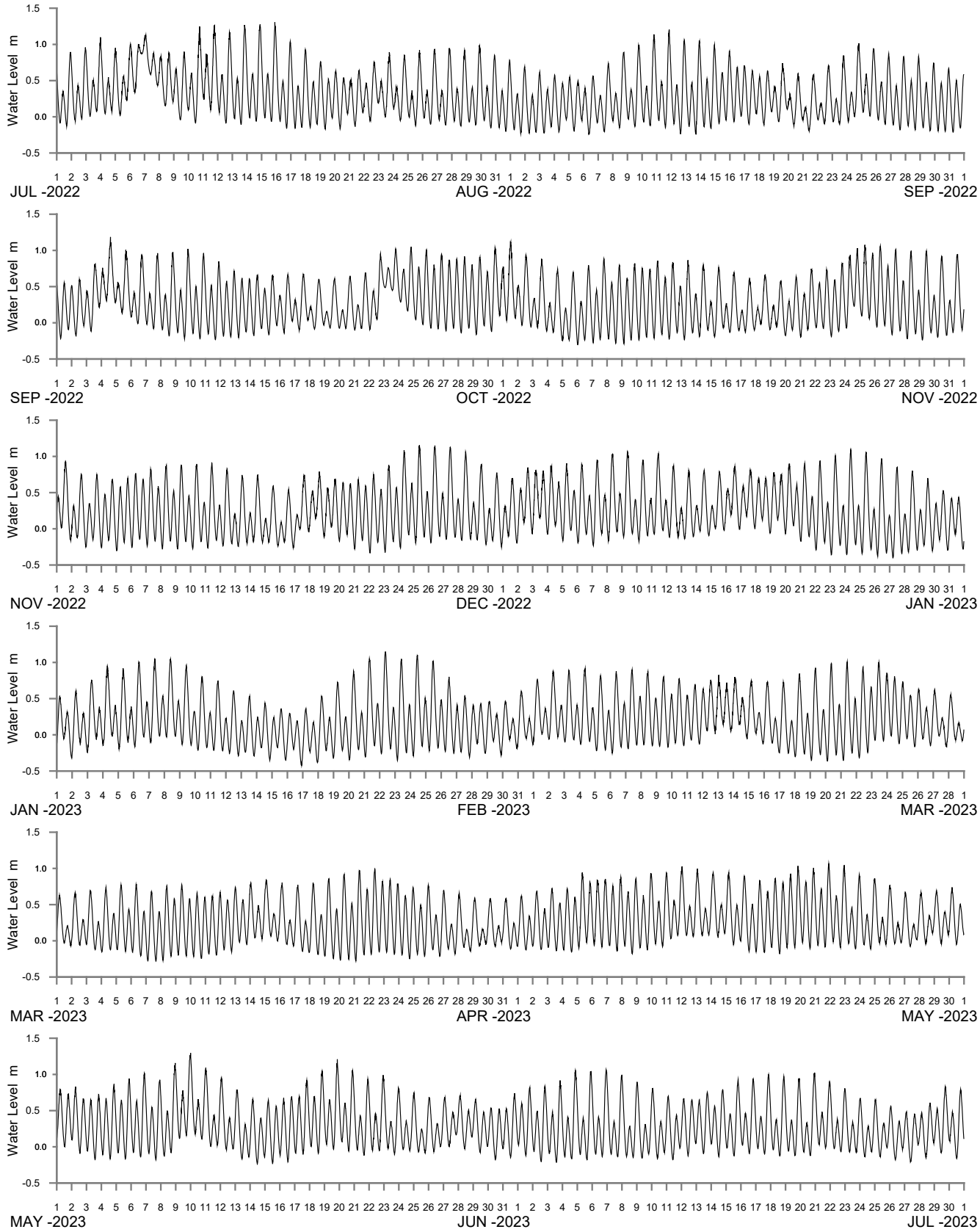
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

DEEP CREEK AT DEEP CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-68



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

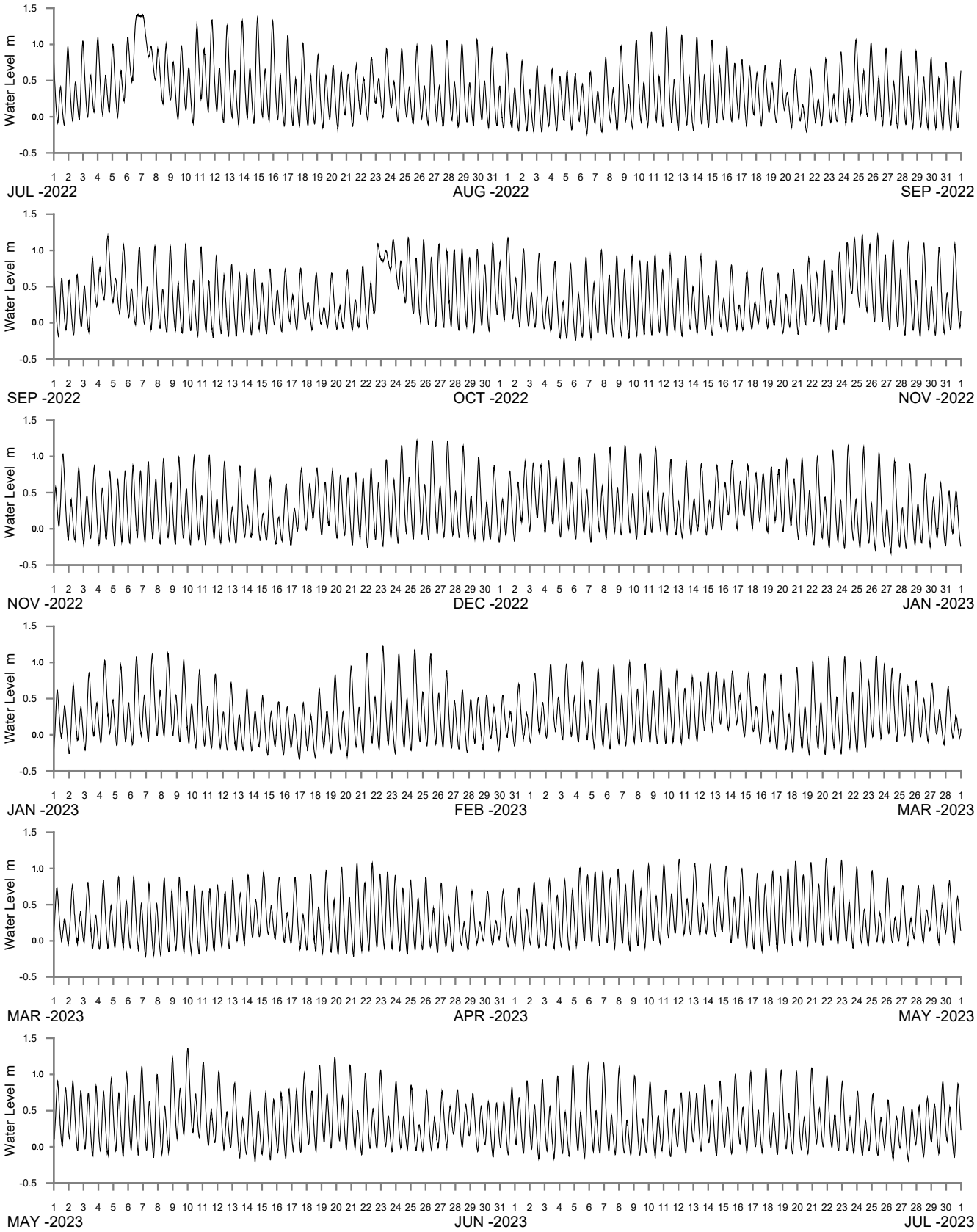
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

NAMBUCCA RIVER AT STUARTS ISLAND DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-69



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

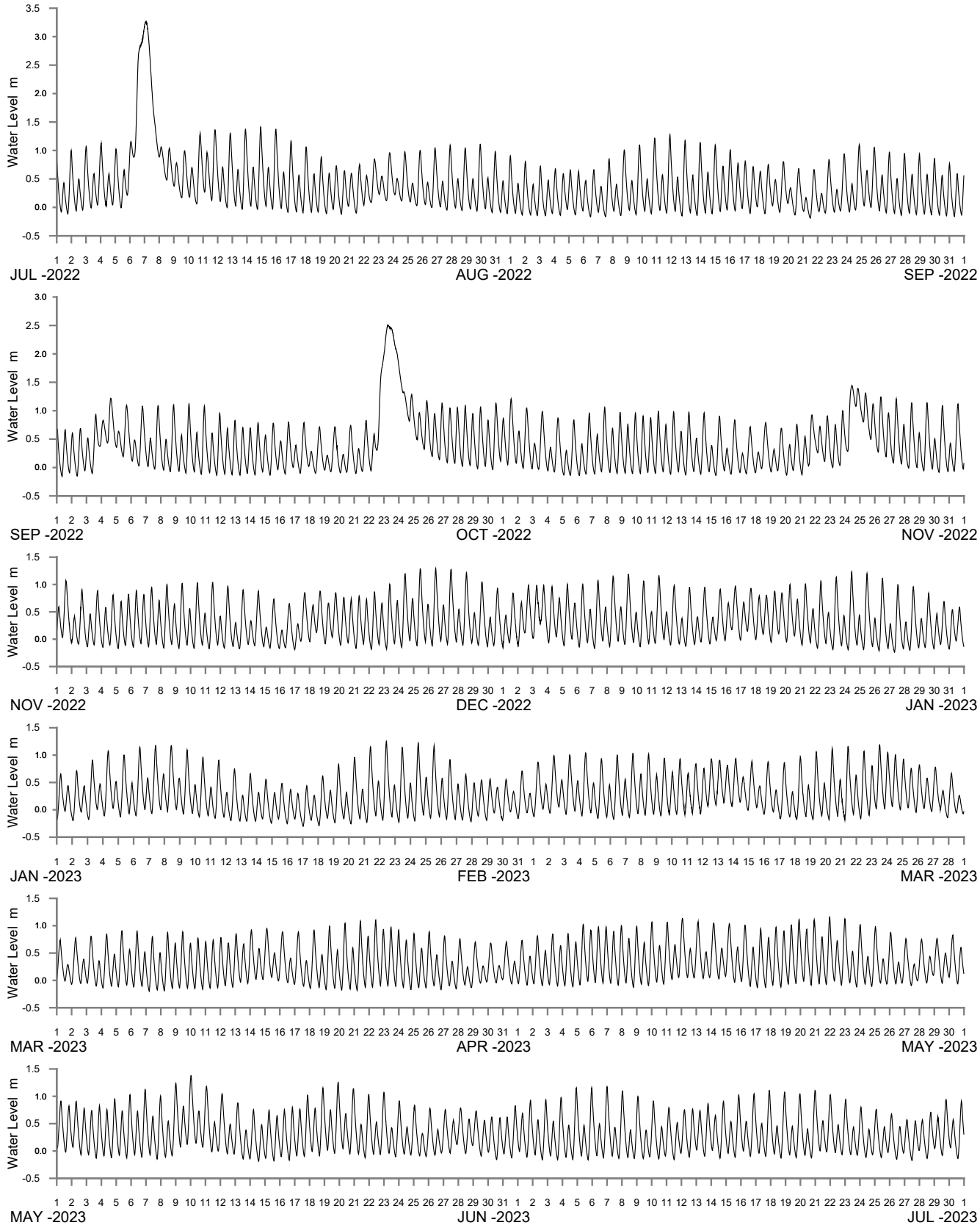
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

NAMBUCCA RIVER AT MACKSVILLE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-70



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

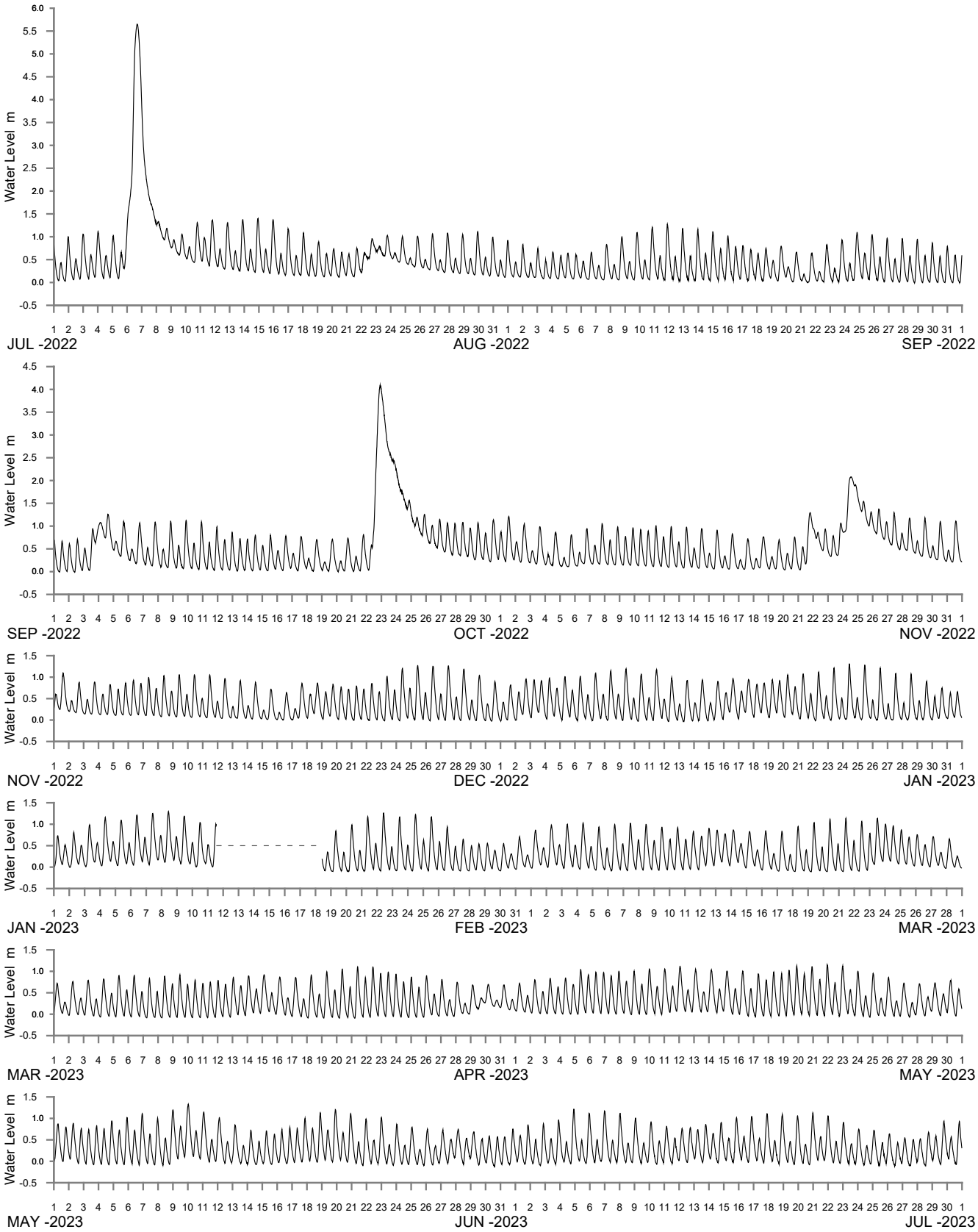
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TAYLORS ARM AT UTUNGUN
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-71



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

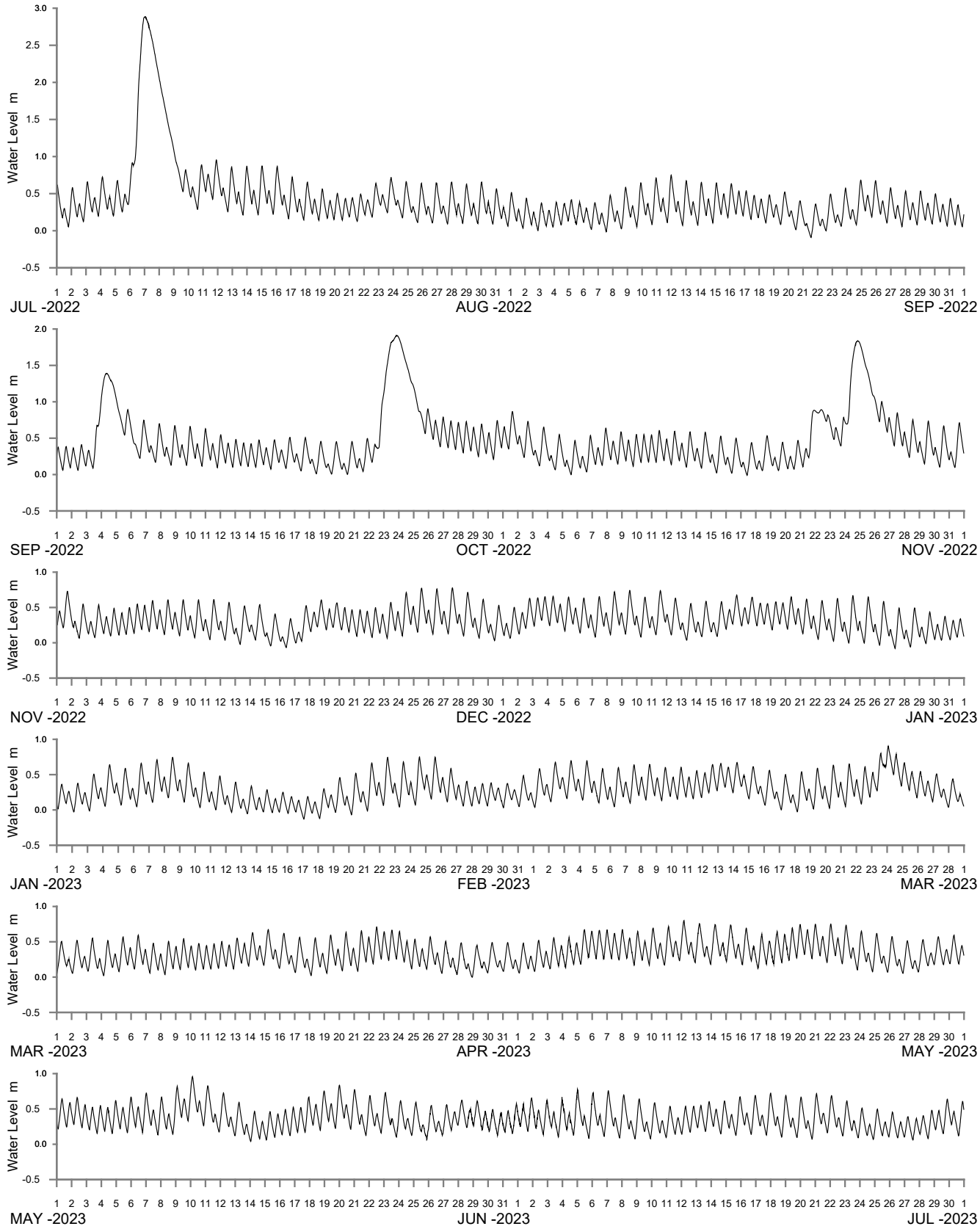
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

NAMBUCCA RIVER AT BOWRAVILLE DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-72



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

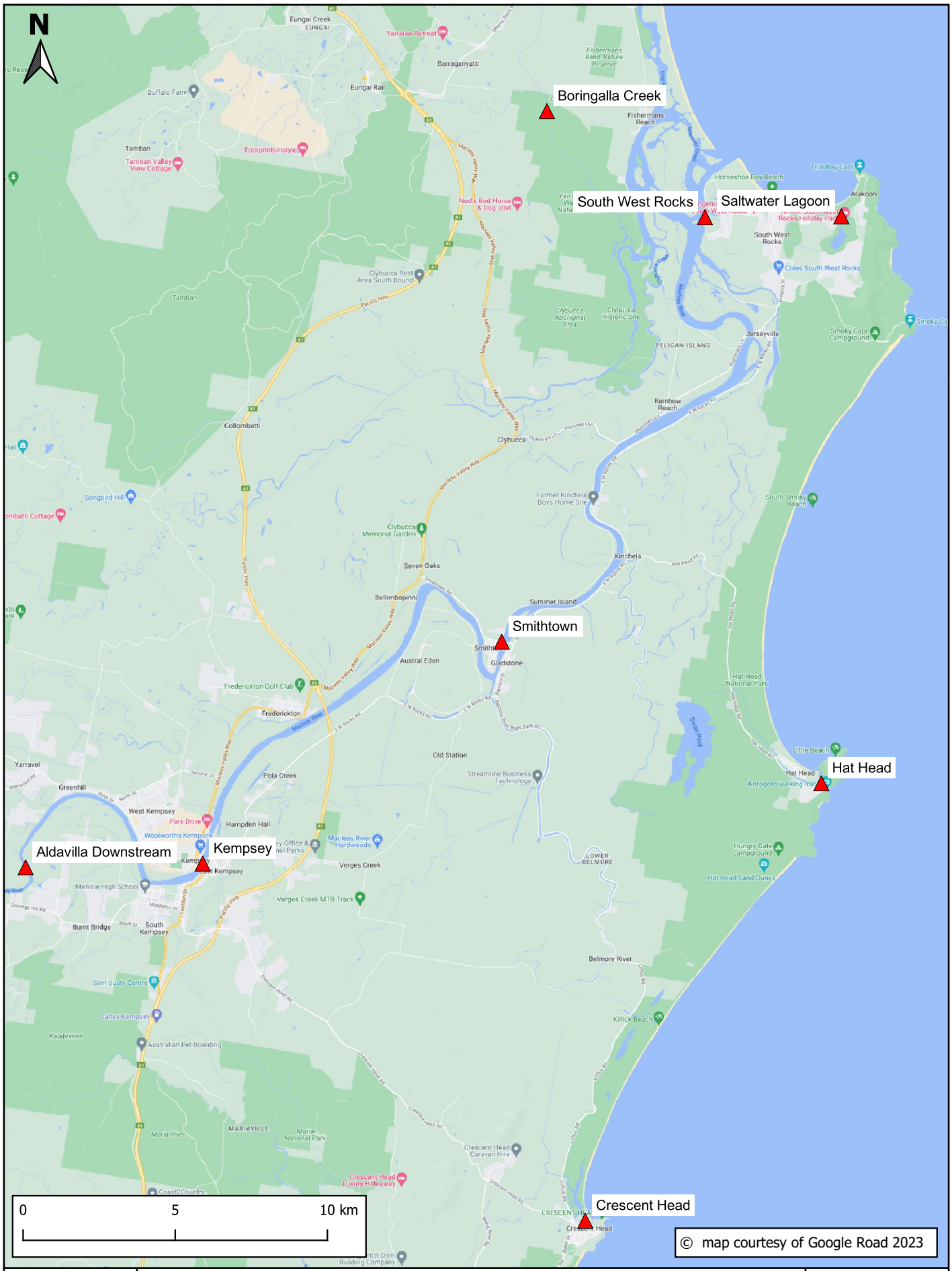
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WARRELL CREEK AT WARRELL CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-73

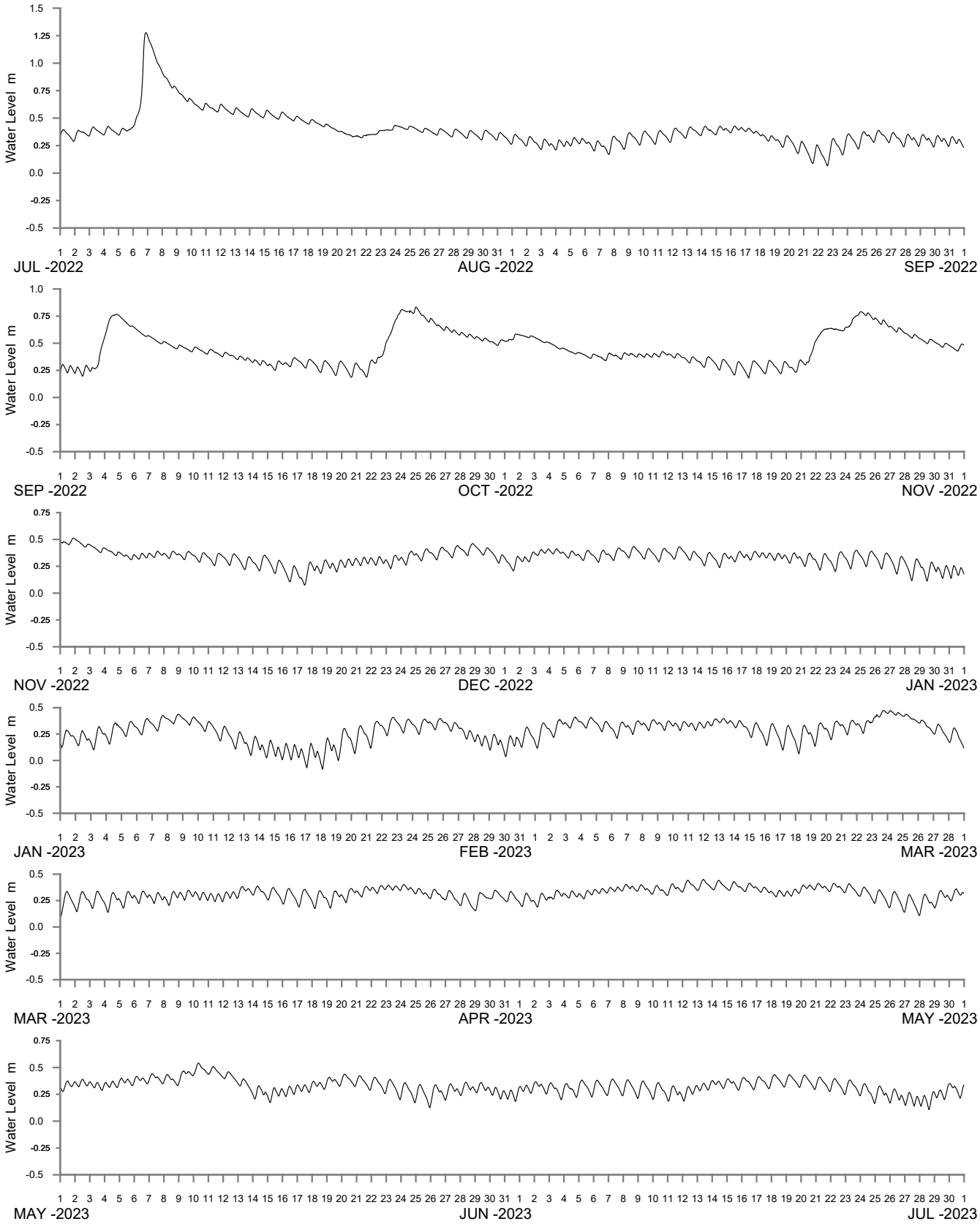


NSW GOVERNMENT

STATION LOCATIONS
MACLEAY RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-74



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

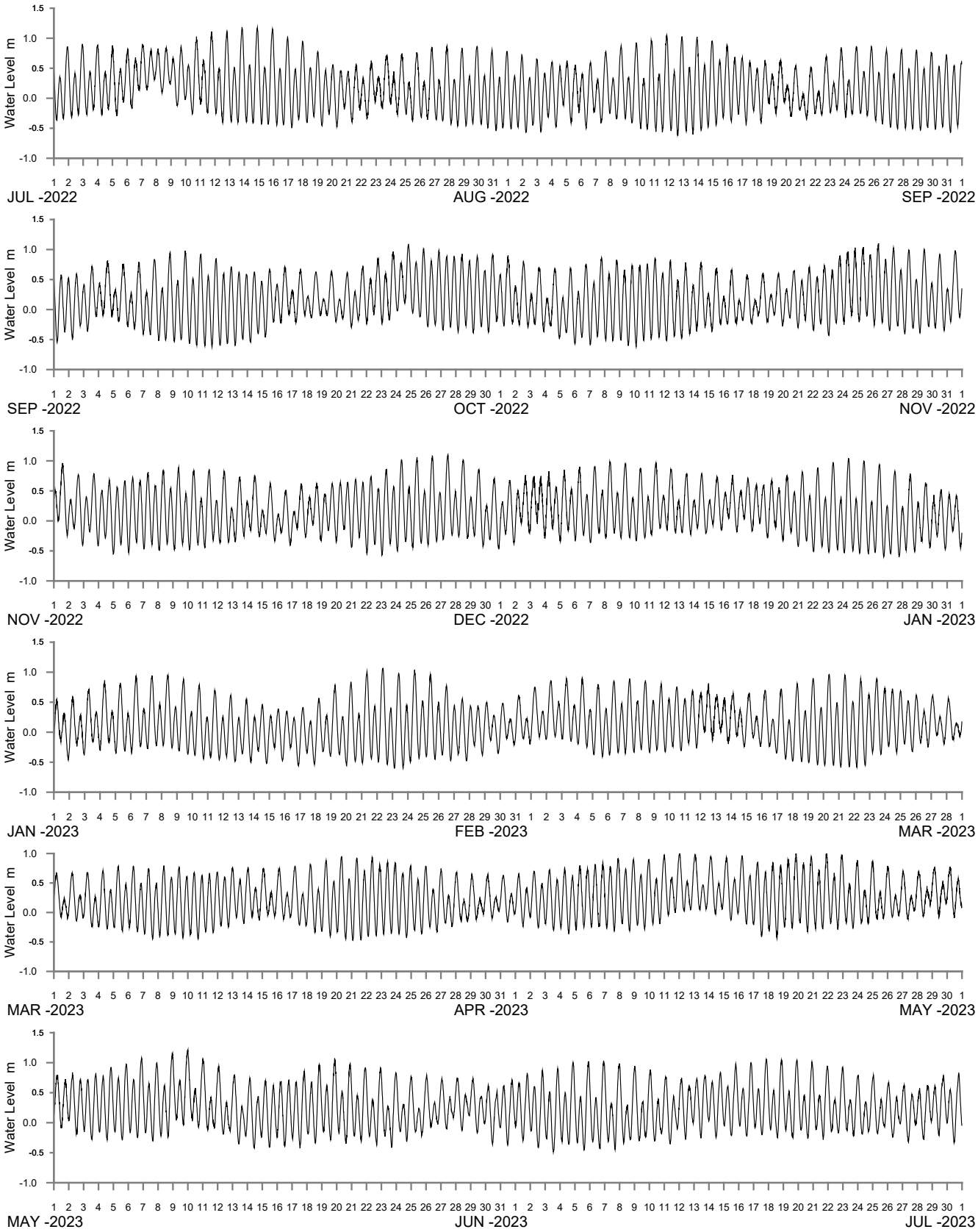
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BORINGALLA CREEK.AT BORINGALLA CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-75



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

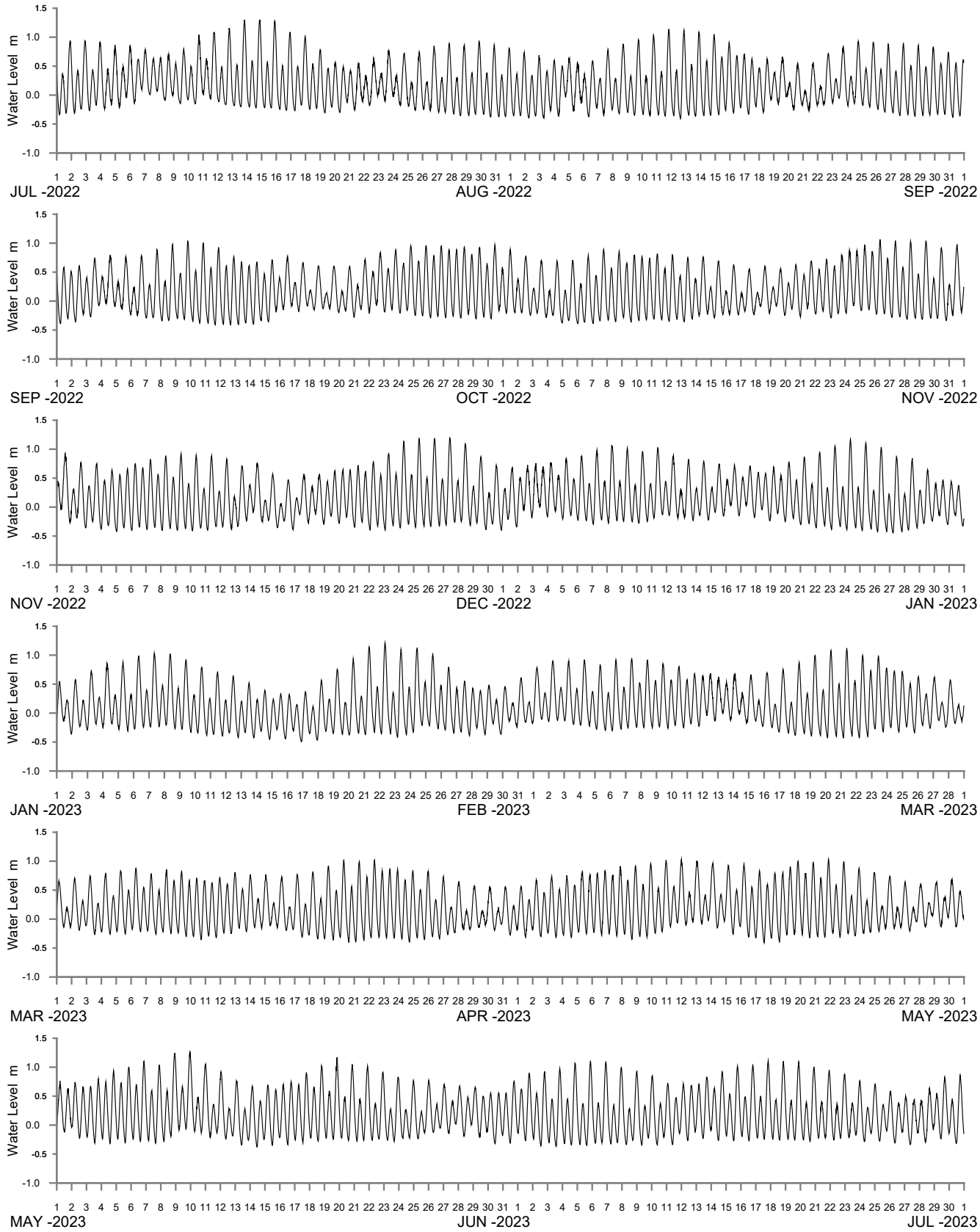
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MACLEAY RIVER AT SOUTH WEST ROCKS
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-76



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

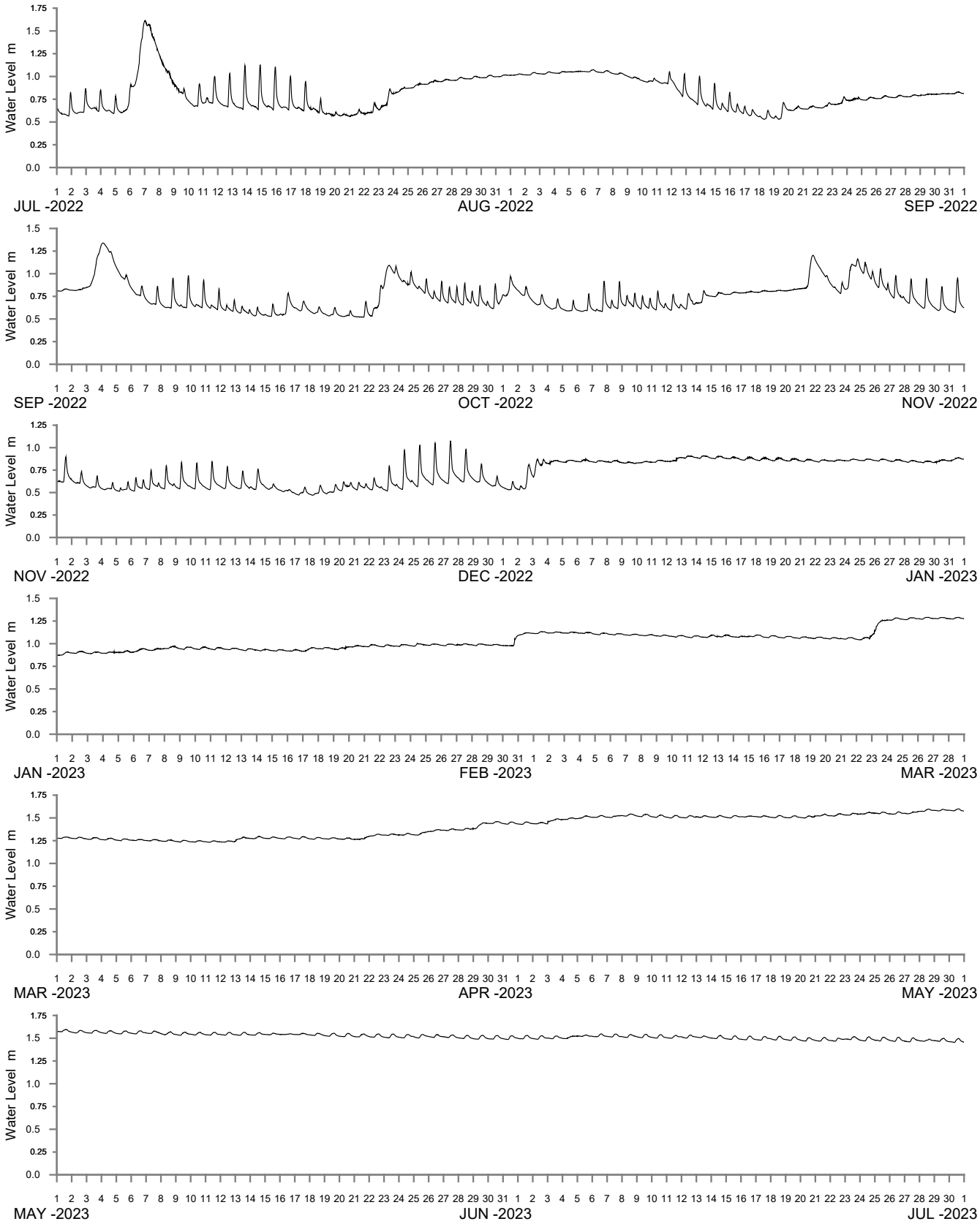
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

KOROGORA CREEK AT HAT HEAD
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-77



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

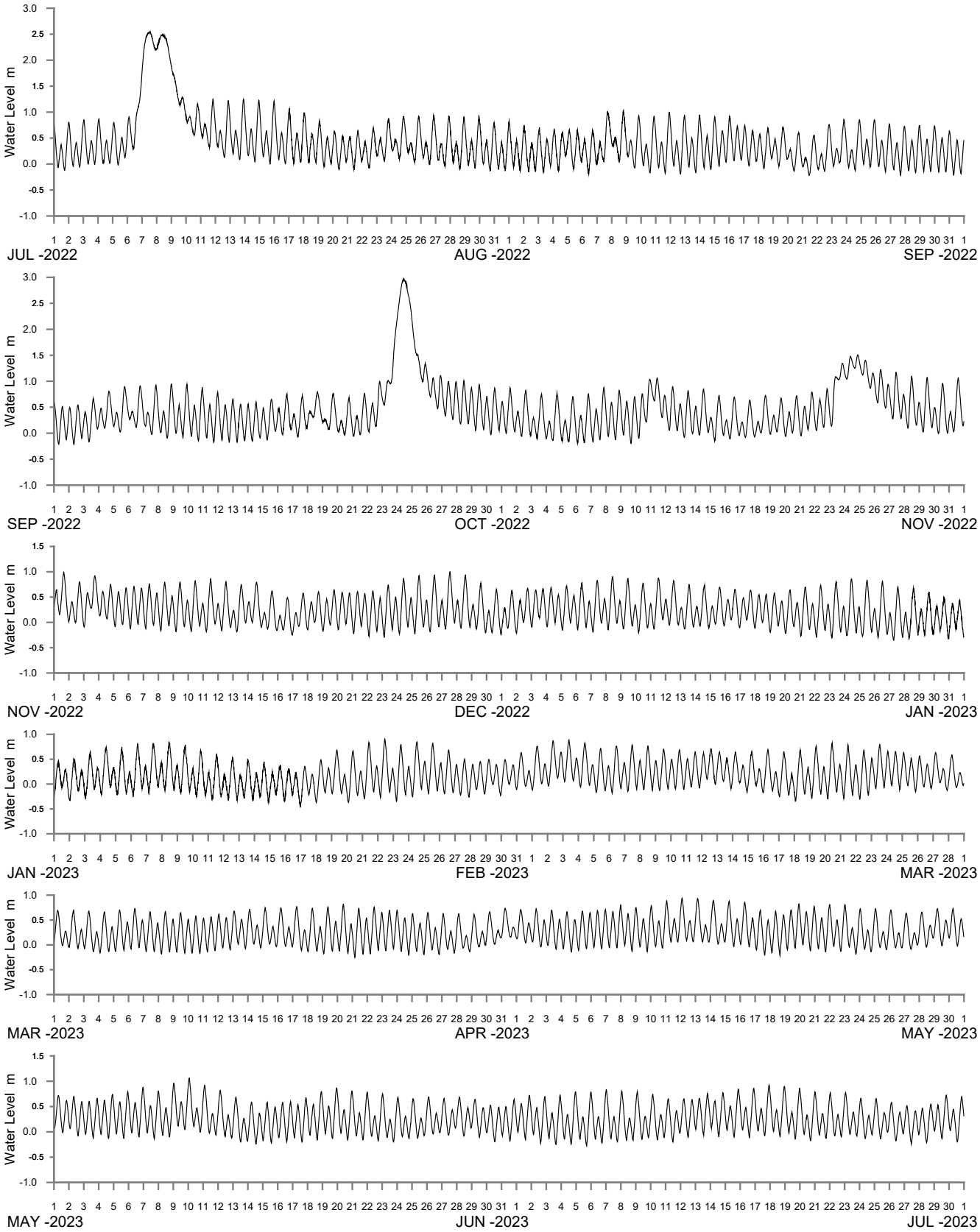
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

SALTWATER LAGOON AT SALTWATER LAGOON
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-78



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

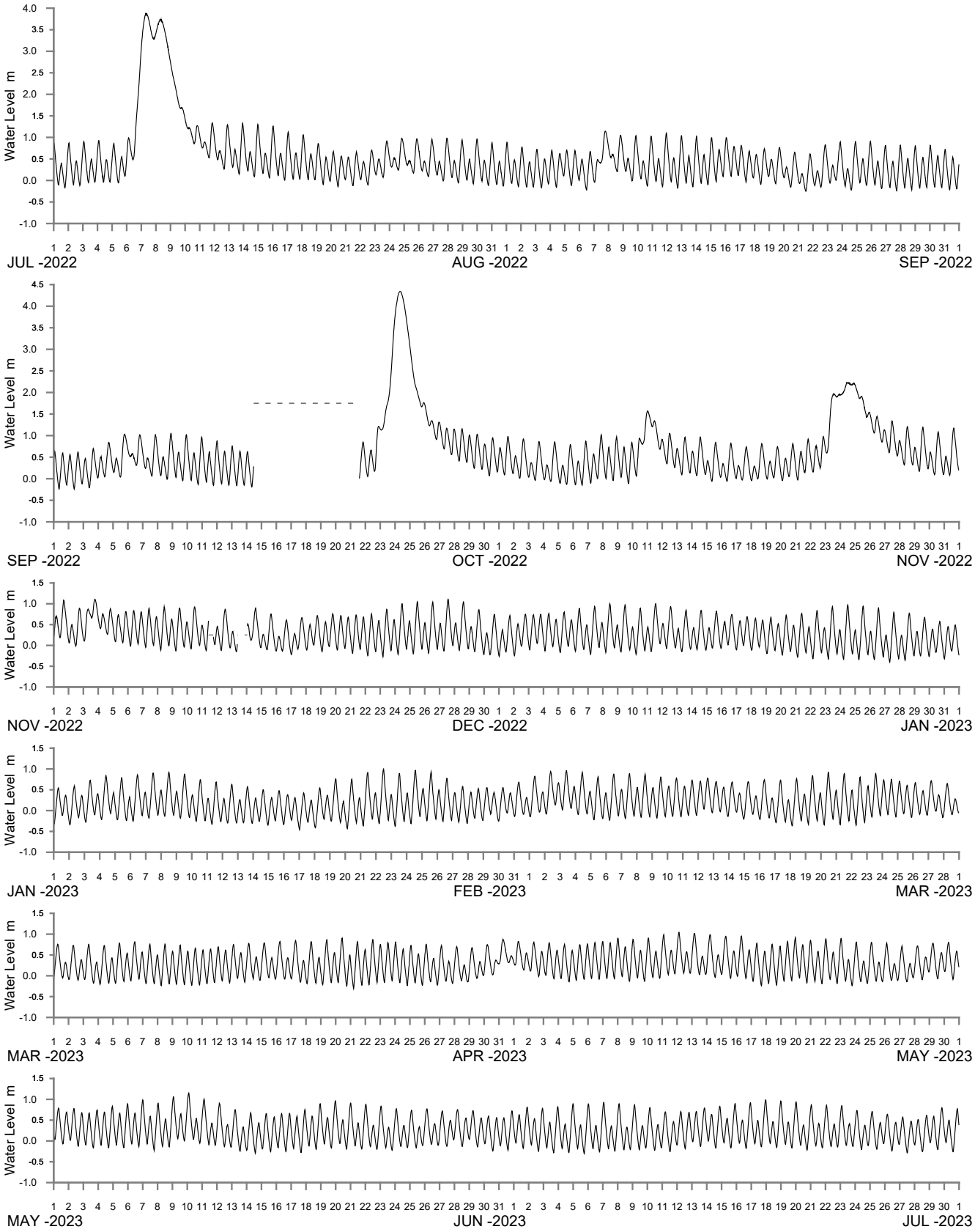
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MACLEAY RIVER AT SMITHTOWN
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-79



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

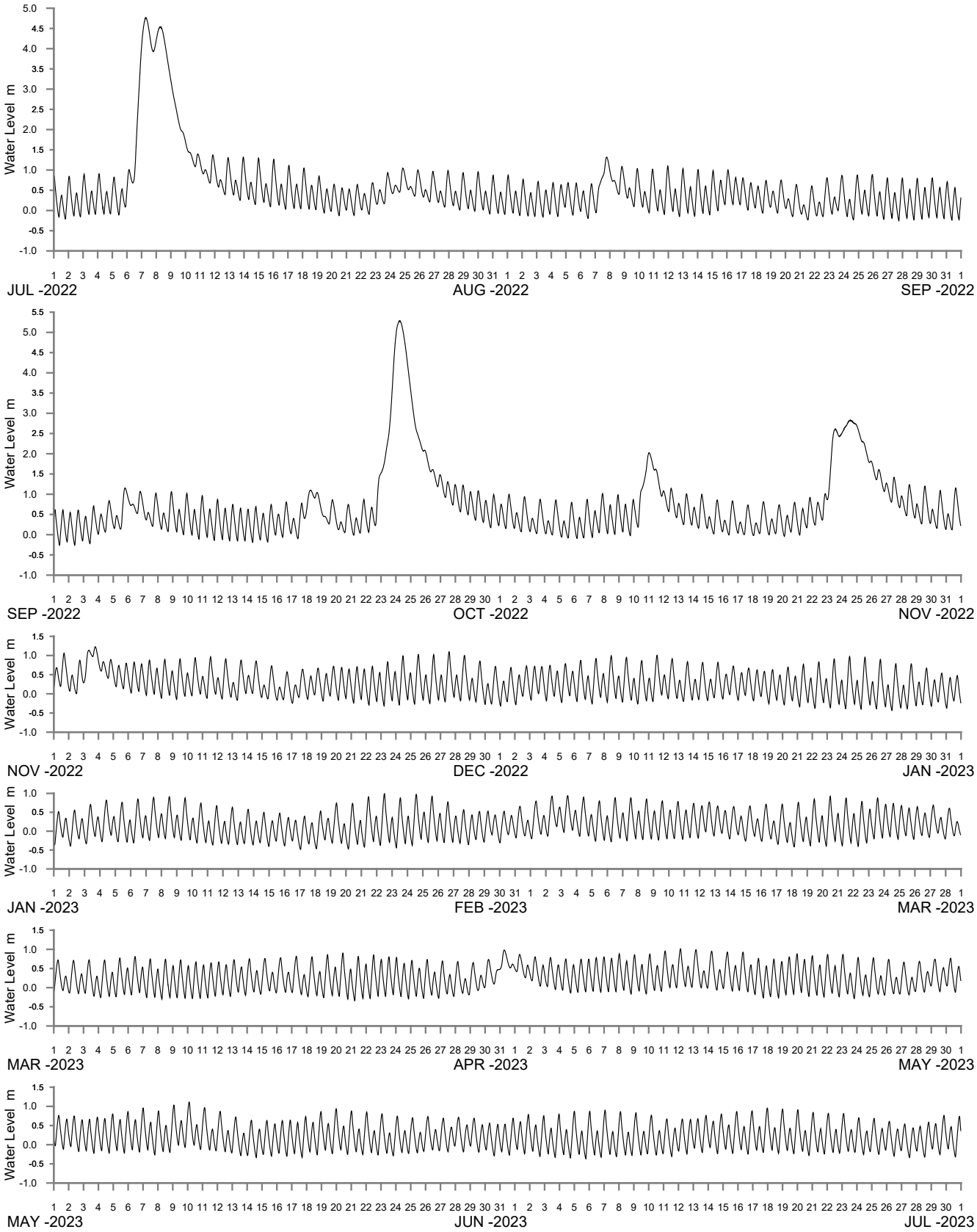
- - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MACLEAY RIVER AT KEMPSEY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-80



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

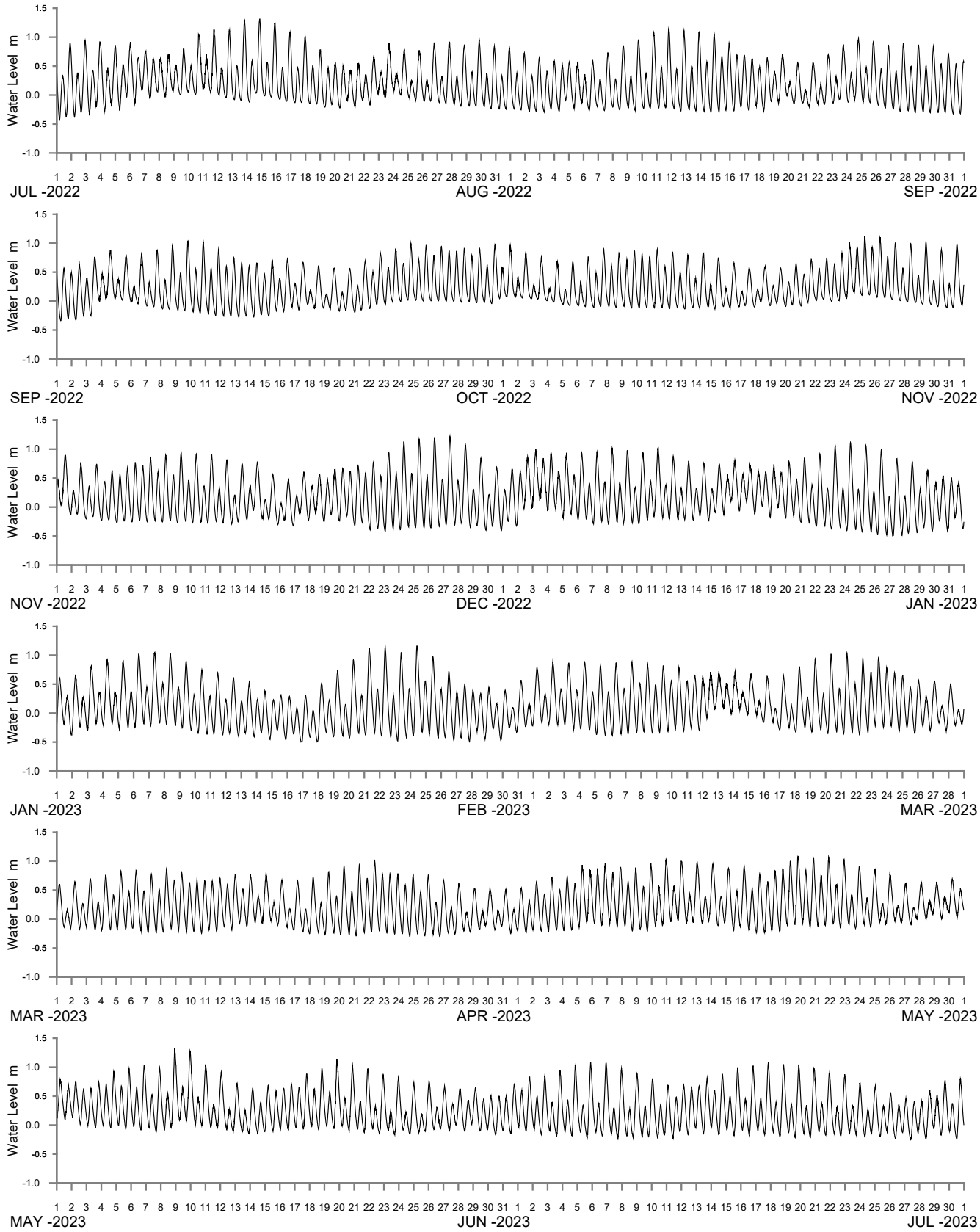
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MACLEAY RIVER AT ALDAVILLA DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-81



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

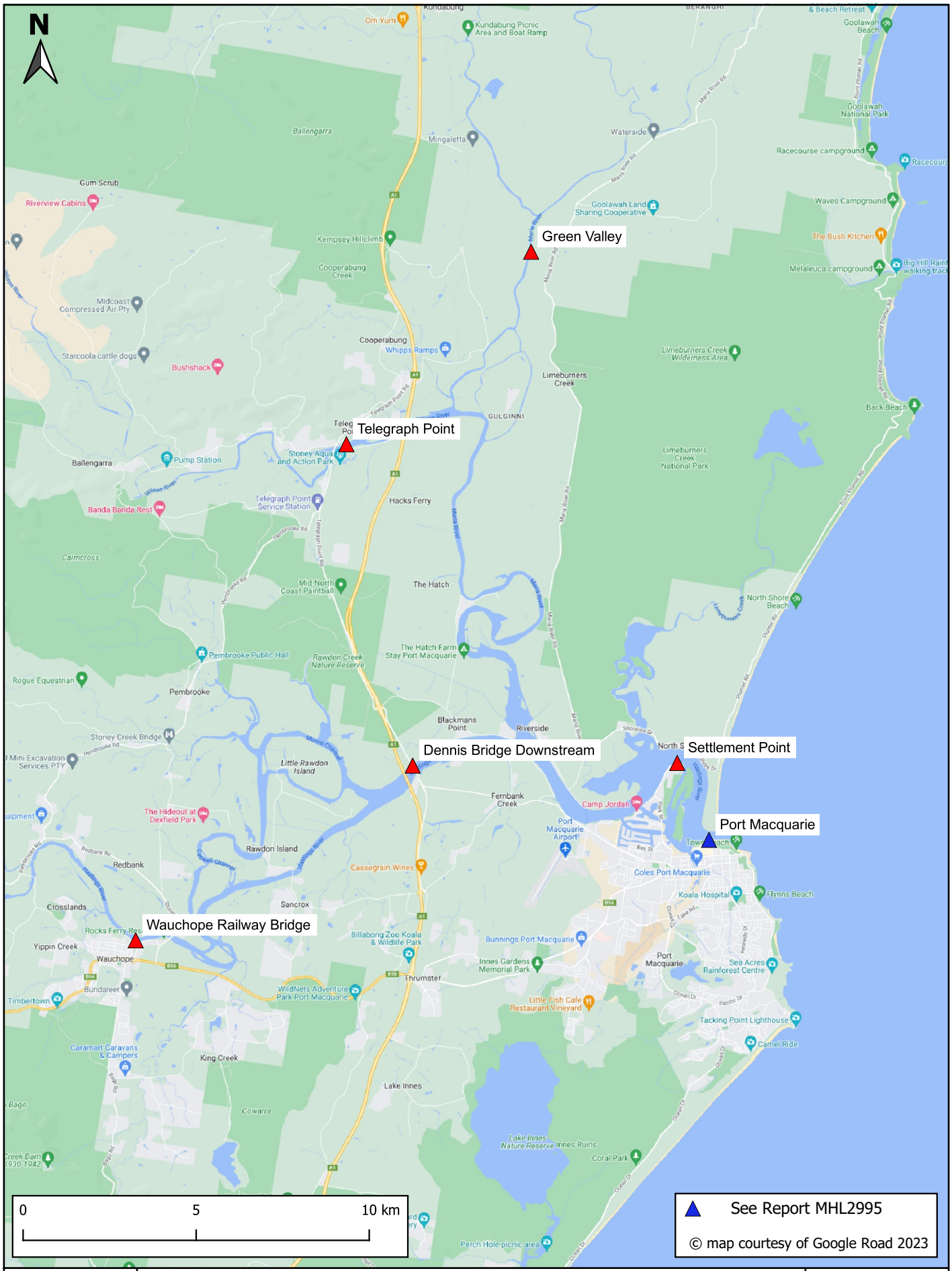
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

KILLICK CREEK AT CRESCENT HEAD
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-82

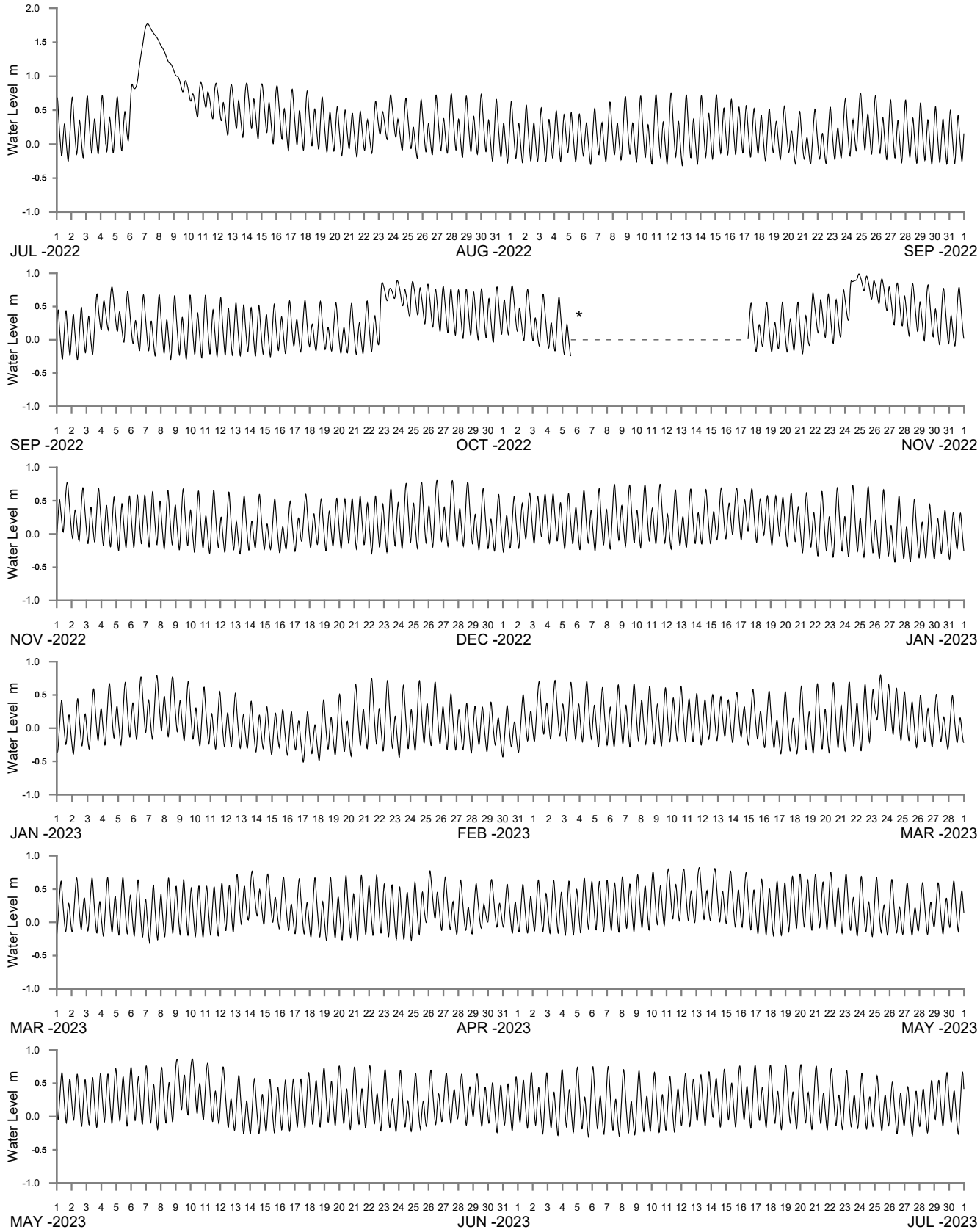


NSW GOVERNMENT

STATION LOCATIONS
HASTINGS RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-83



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

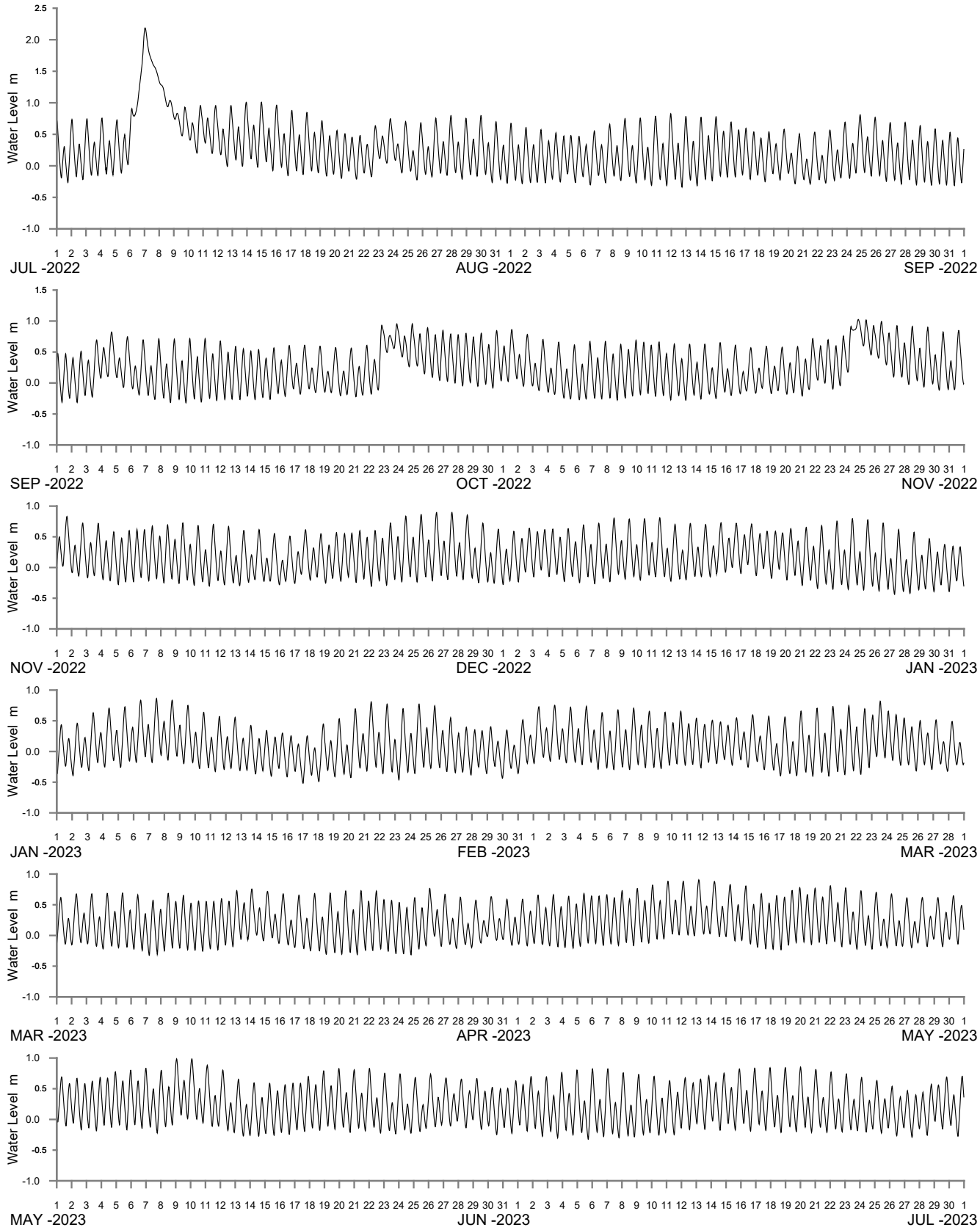
* Data loss due to low gas

NSW GOVERNMENT

MARIA RIVER AT GREEN VALLEY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-84



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

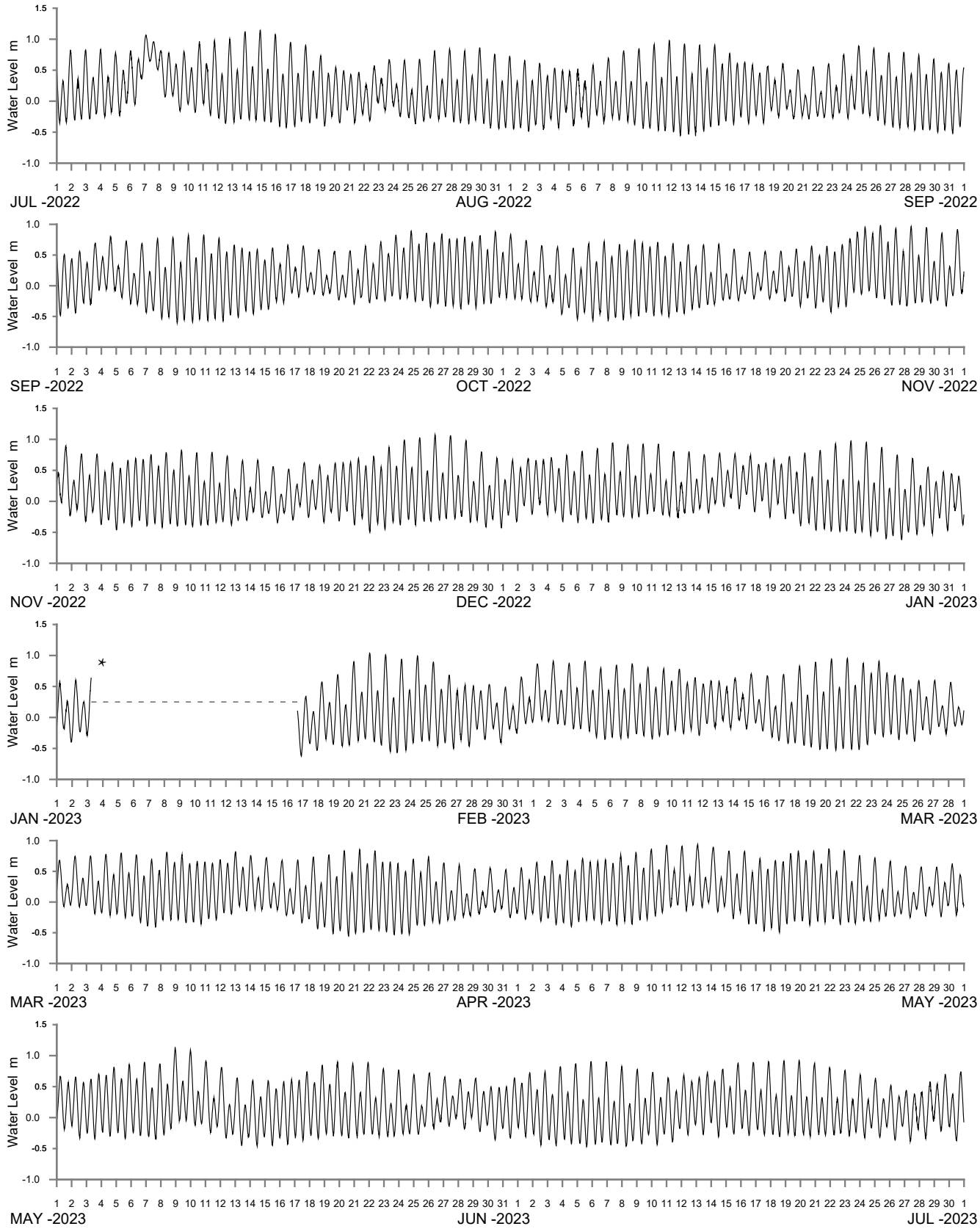
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WILSONS RIVER AT TELEGRAPH POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-85



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

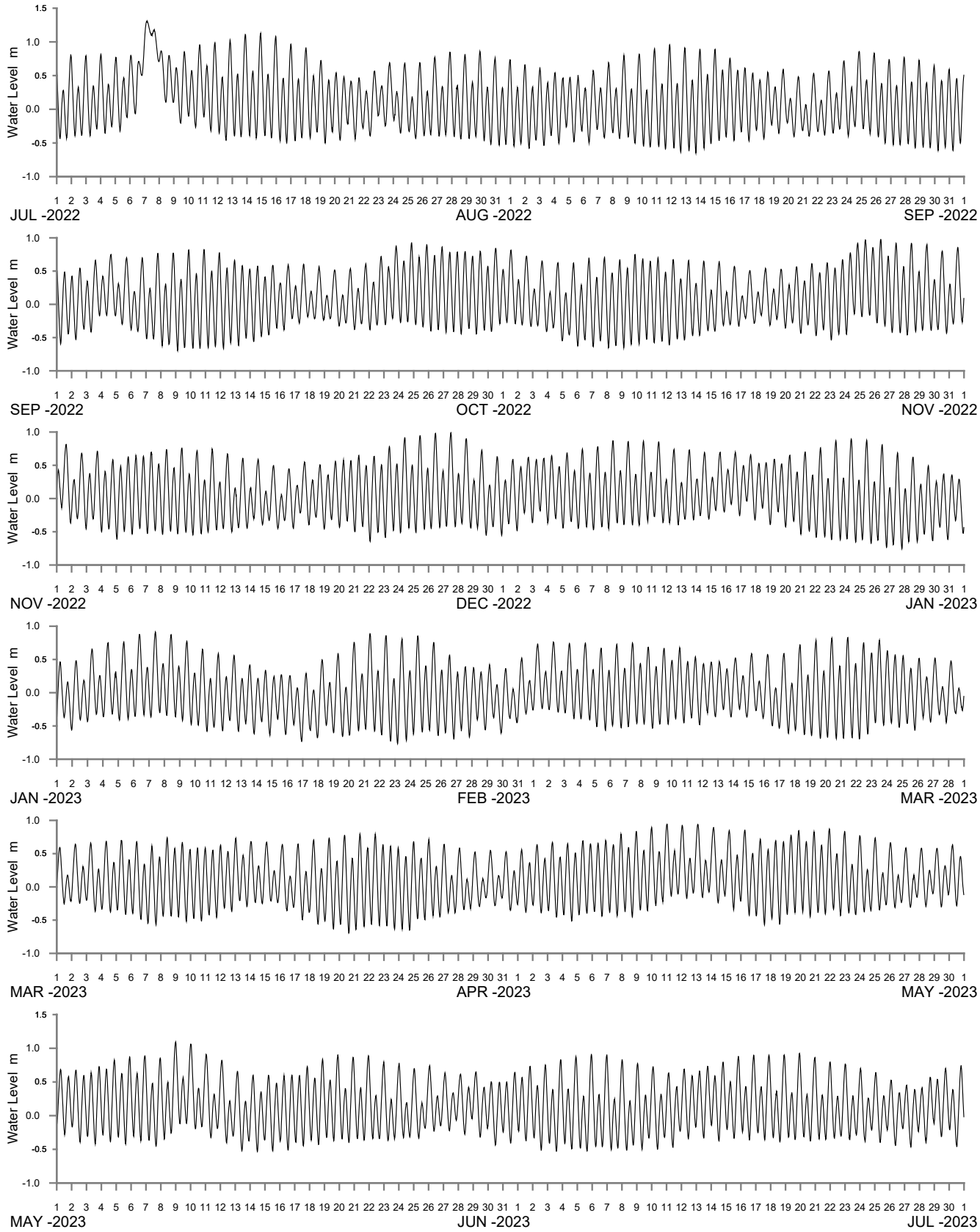
* Data loss due to biofouling of pressure transducer

NSW GOVERNMENT

HASTINGS RIVER AT SETTLEMENT POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-86



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

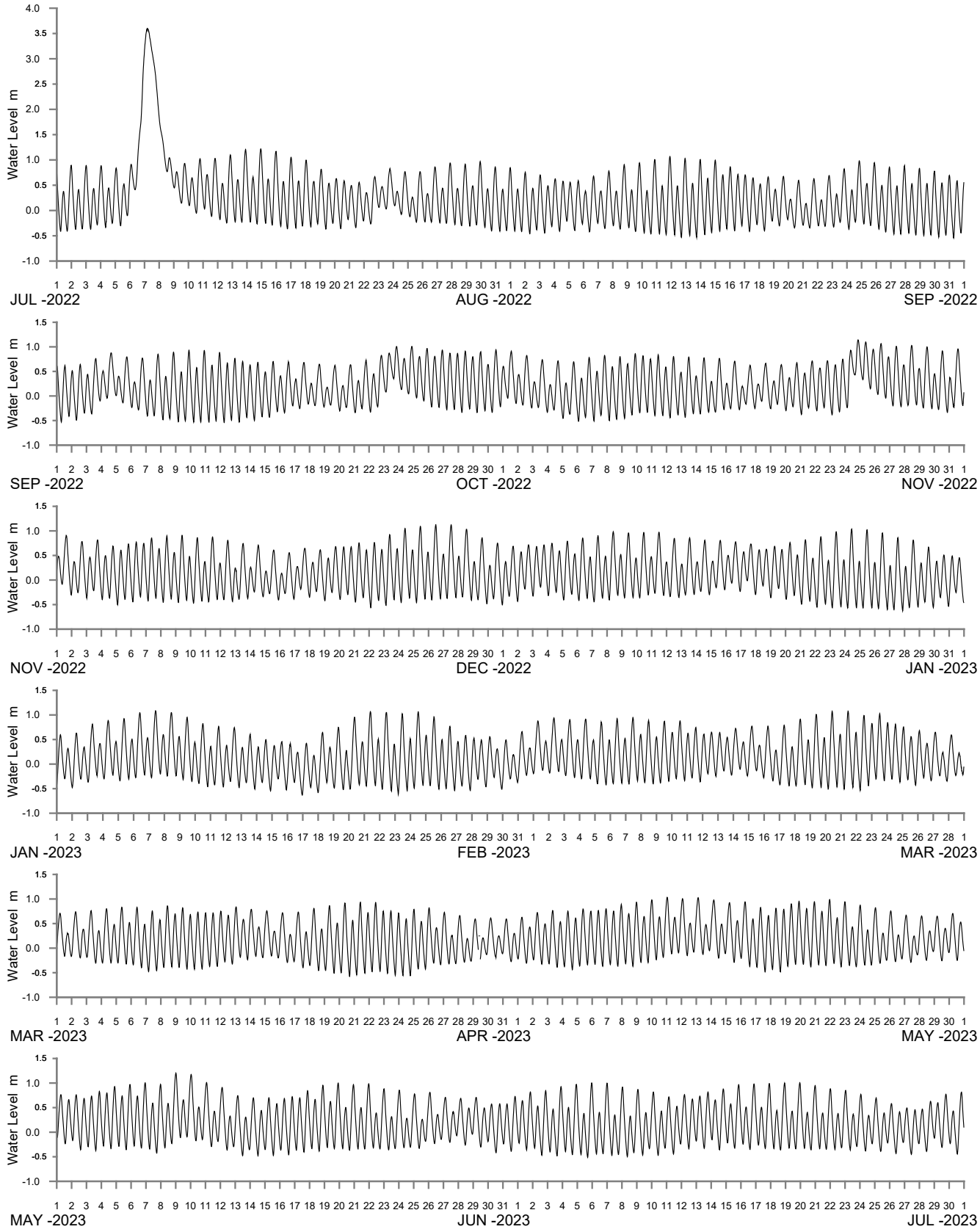
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HASTINGS RIVER AT DENNIS BRIDGE DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-87



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

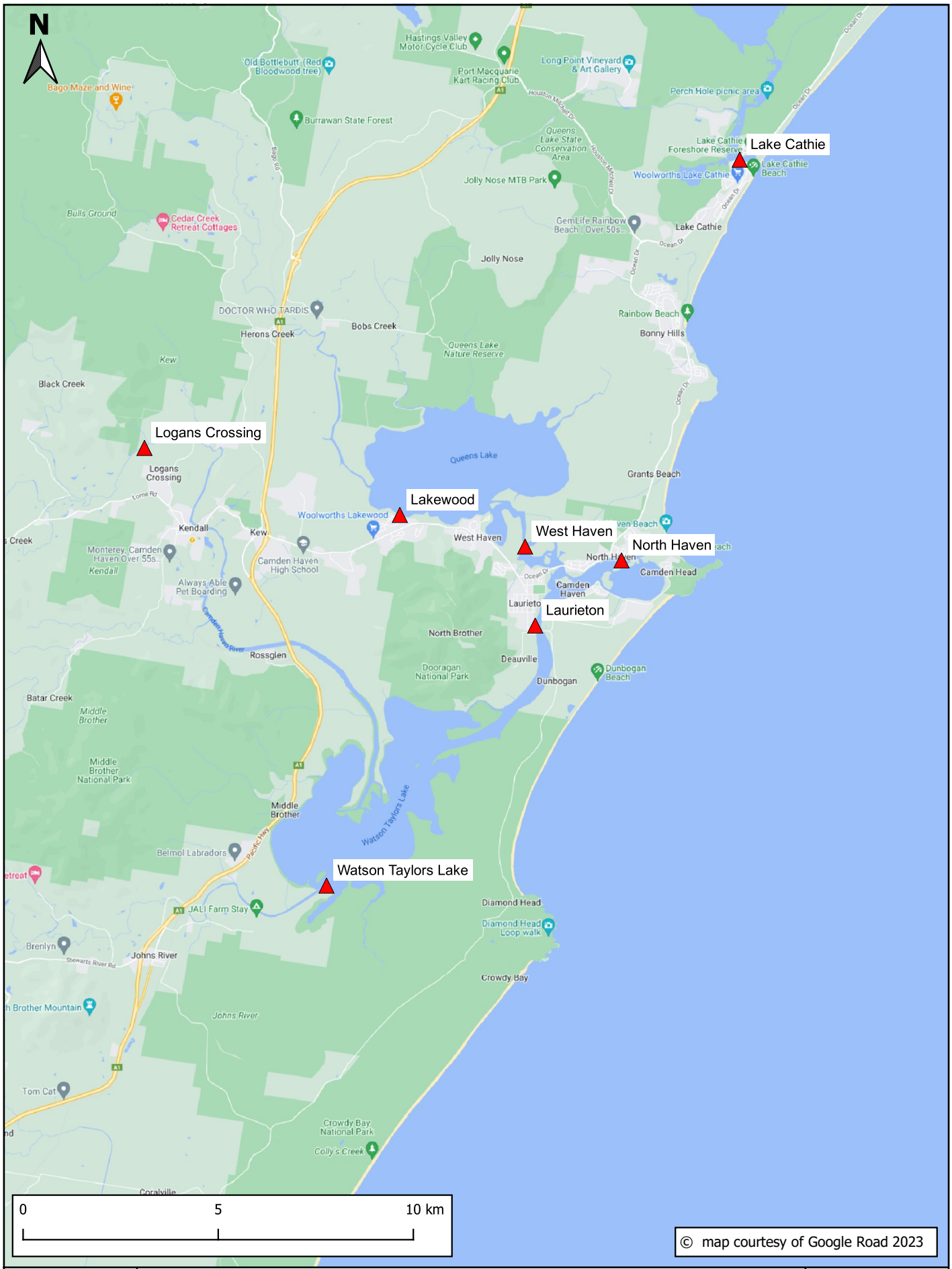
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HASTINGS RIVER AT WAUCHOPE RAILWAY BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-88

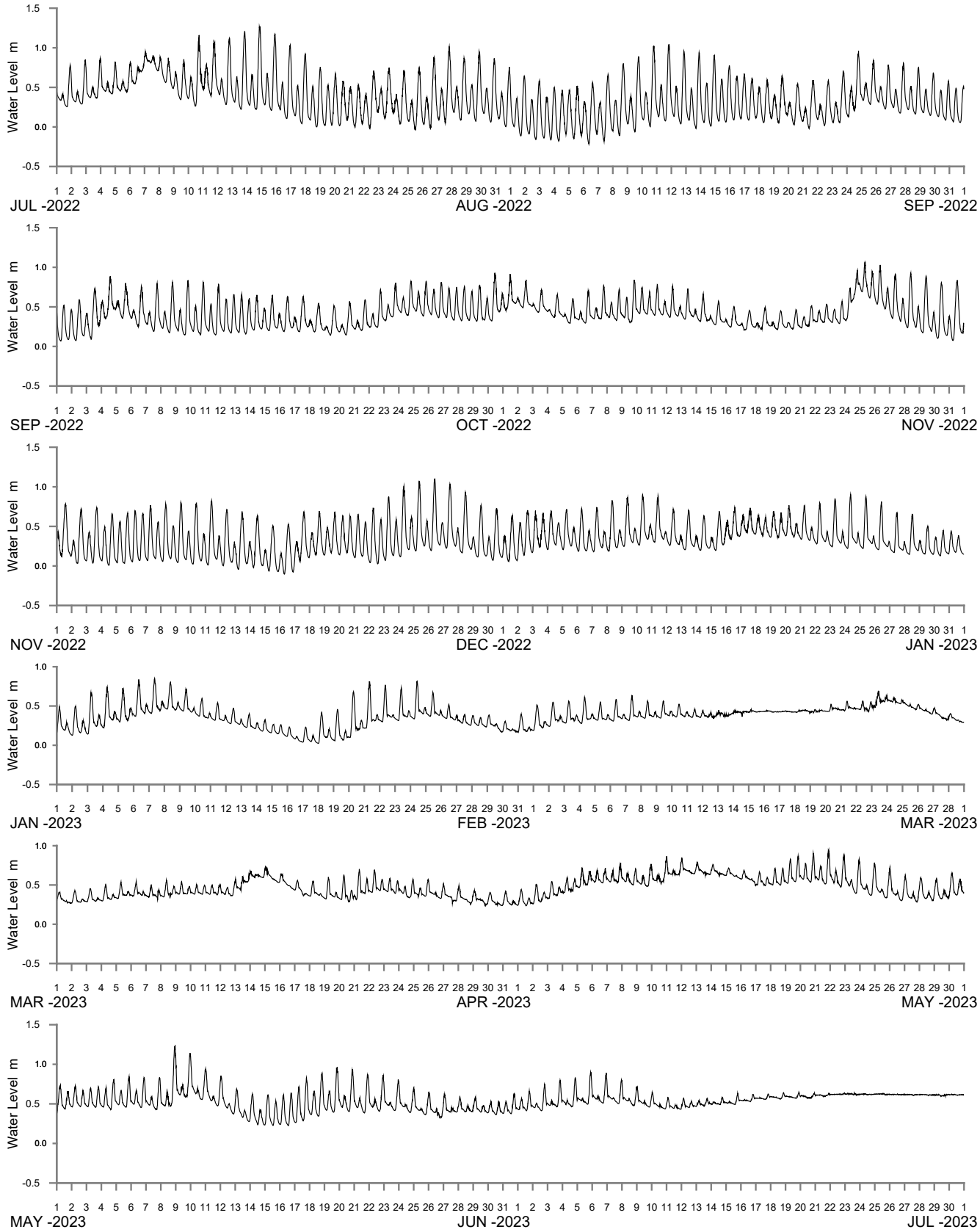


NSW GOVERNMENT

STATION LOCATIONS
CAMDEN HAVEN REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-89



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

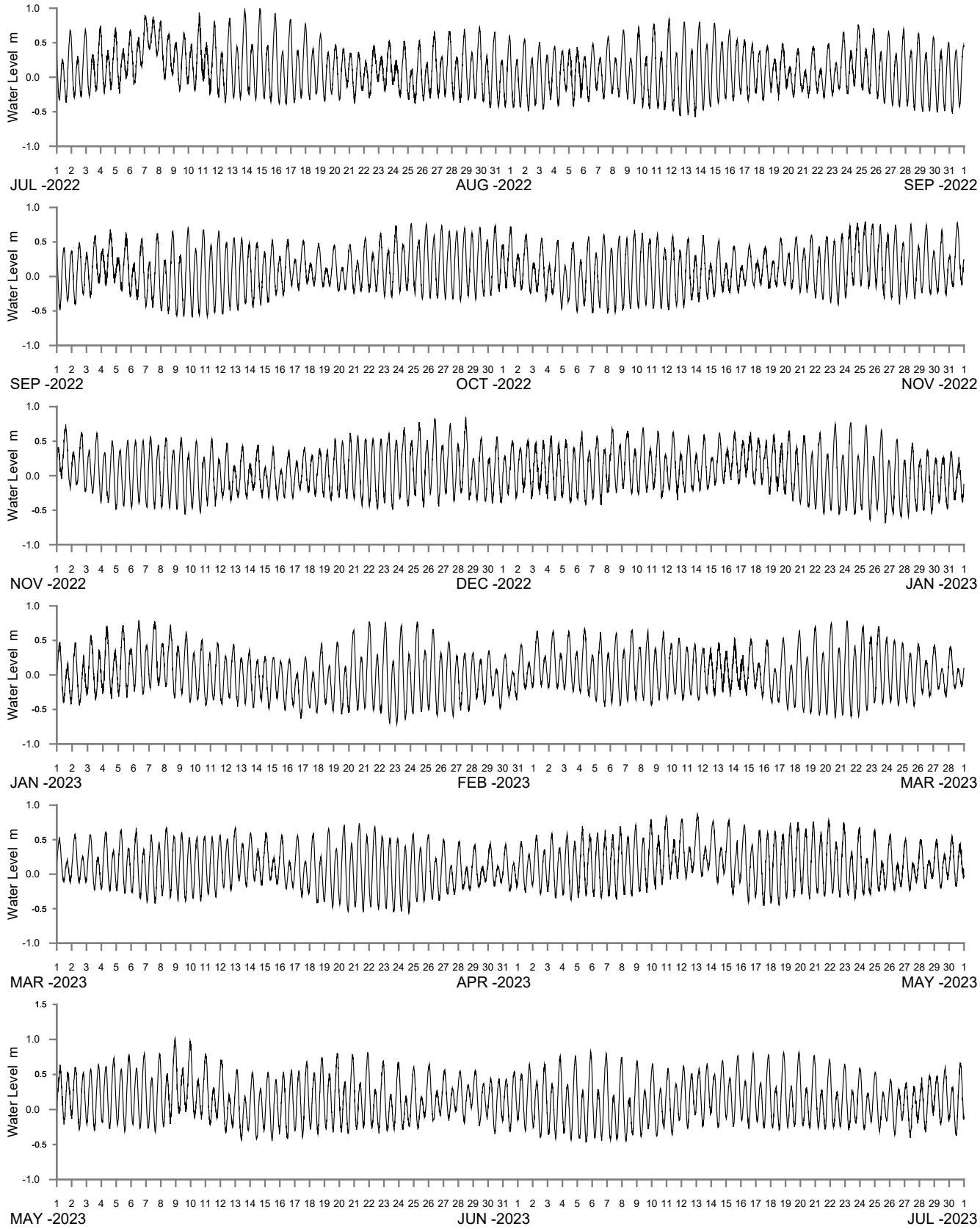
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LAKE CATHIE AT LAKE CATHIE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-90



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

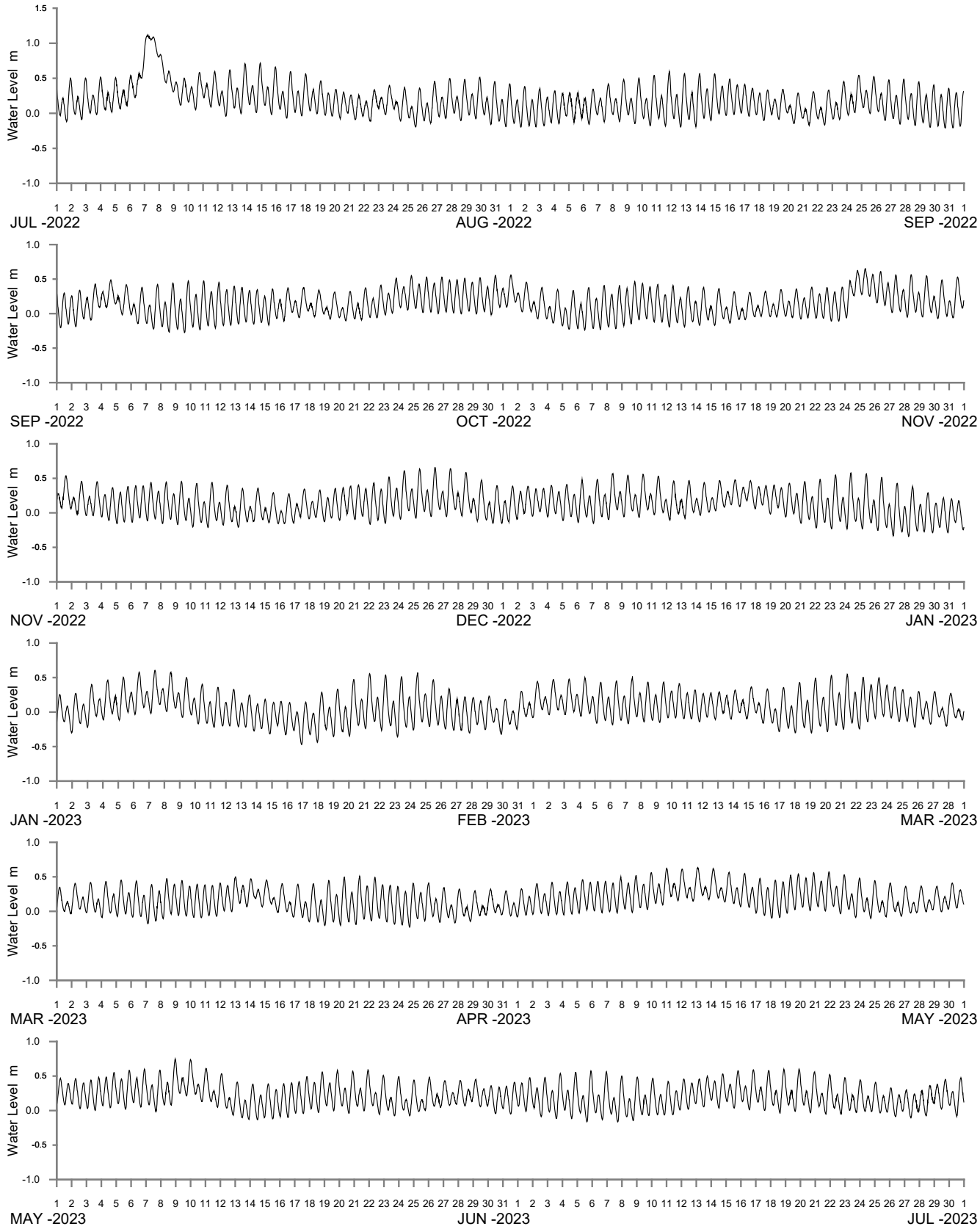
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CAMDEN HAVEN RIVER AT NORTH HAVEN
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-91



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

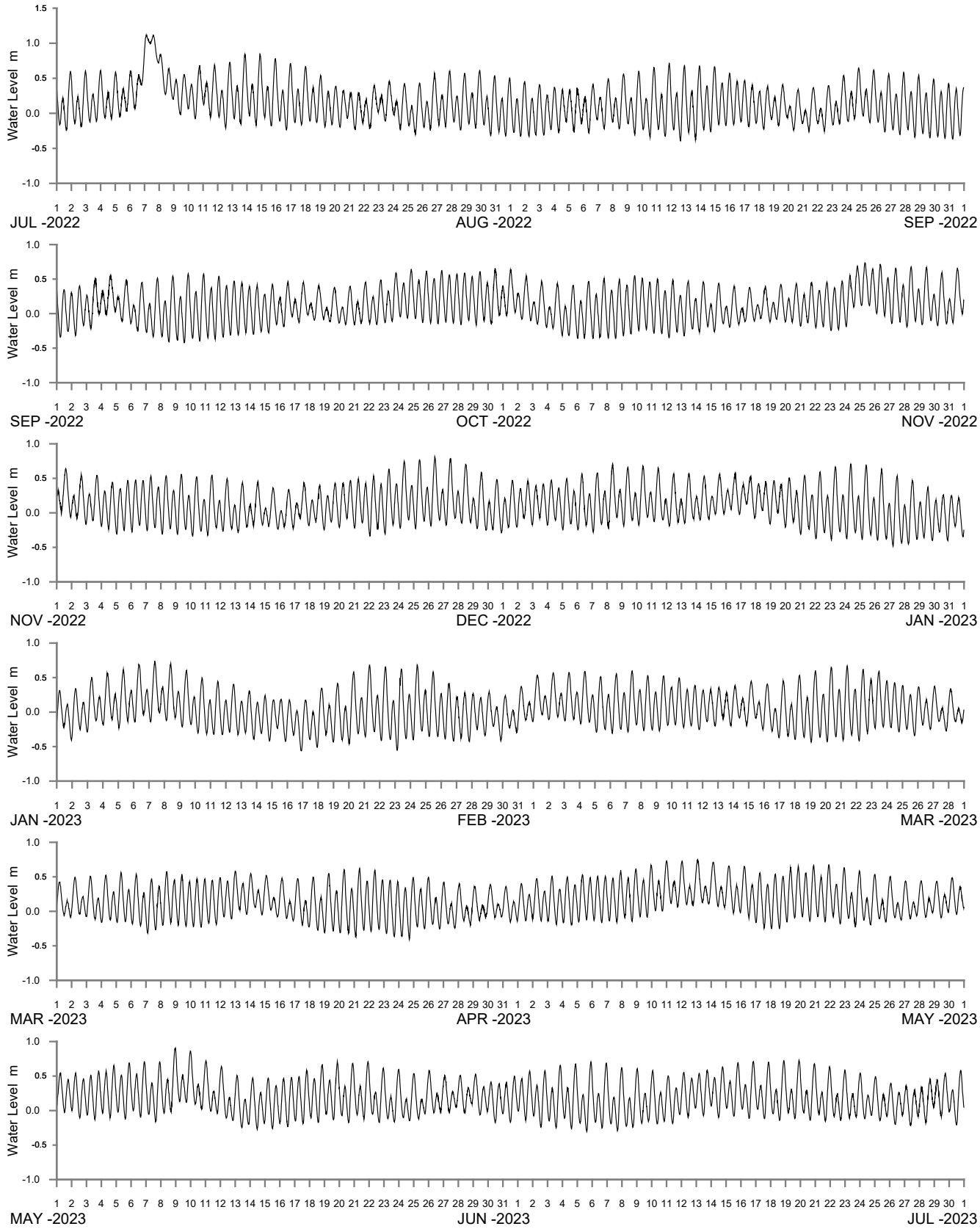
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

STRINGRAY CREEK AT WEST HAVEN
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-92



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

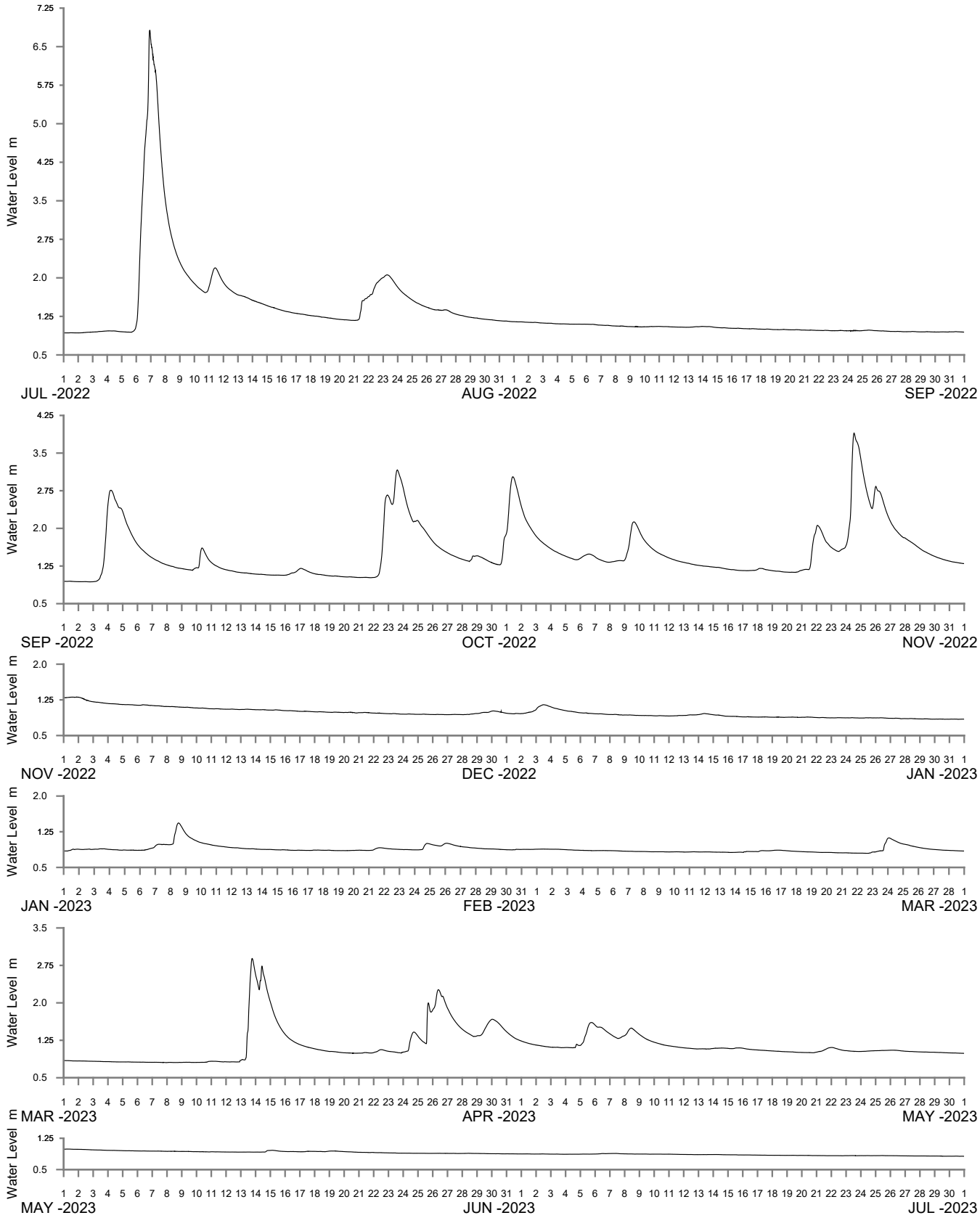
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CAMDEN HAVEN RIVER AT LAURIETON
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-93



WATER LEVEL REFERENCED TO ASSUMED DATUM

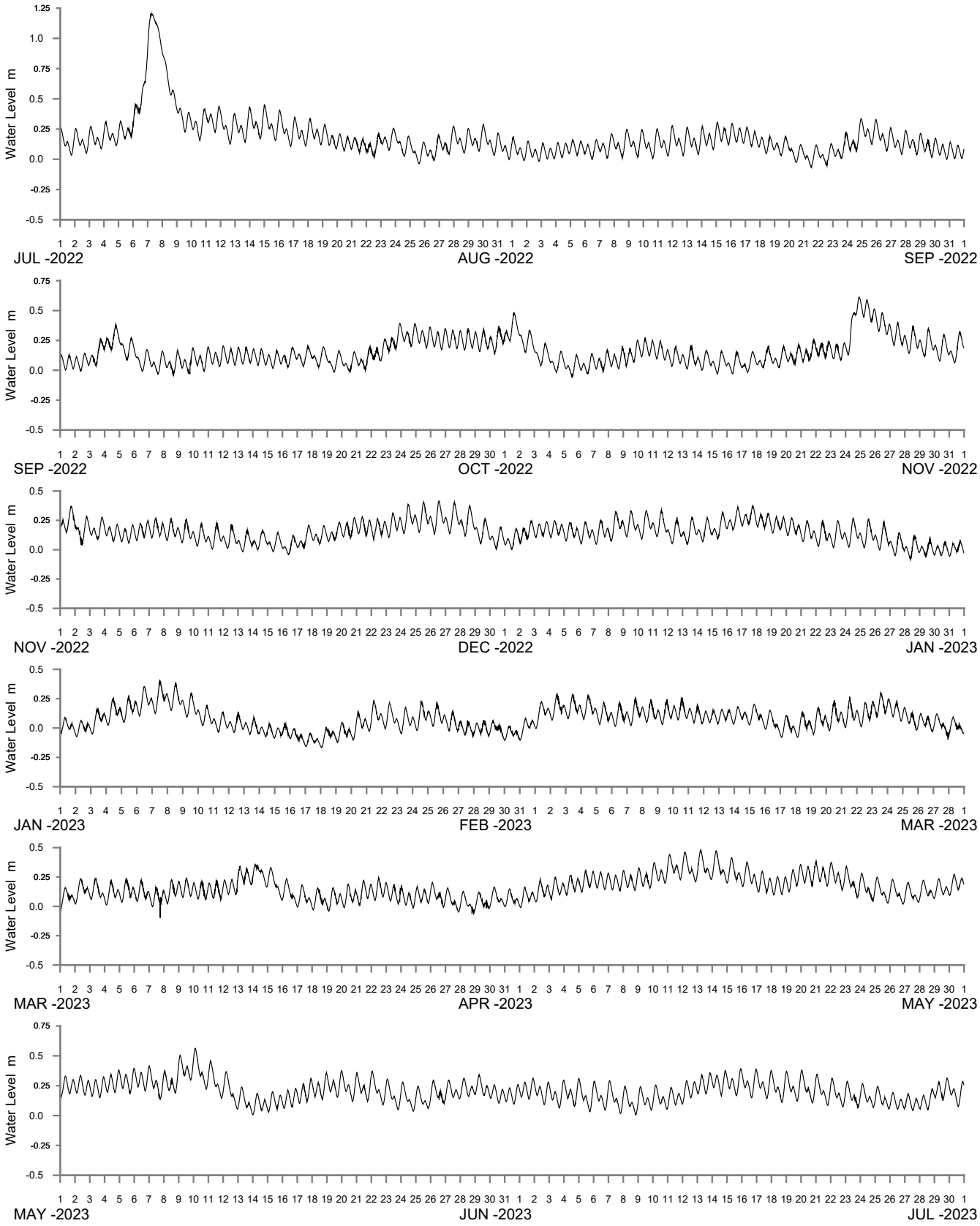
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CAMDEN HAVEN RIVER AT LOGANS CROSSING
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-94



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

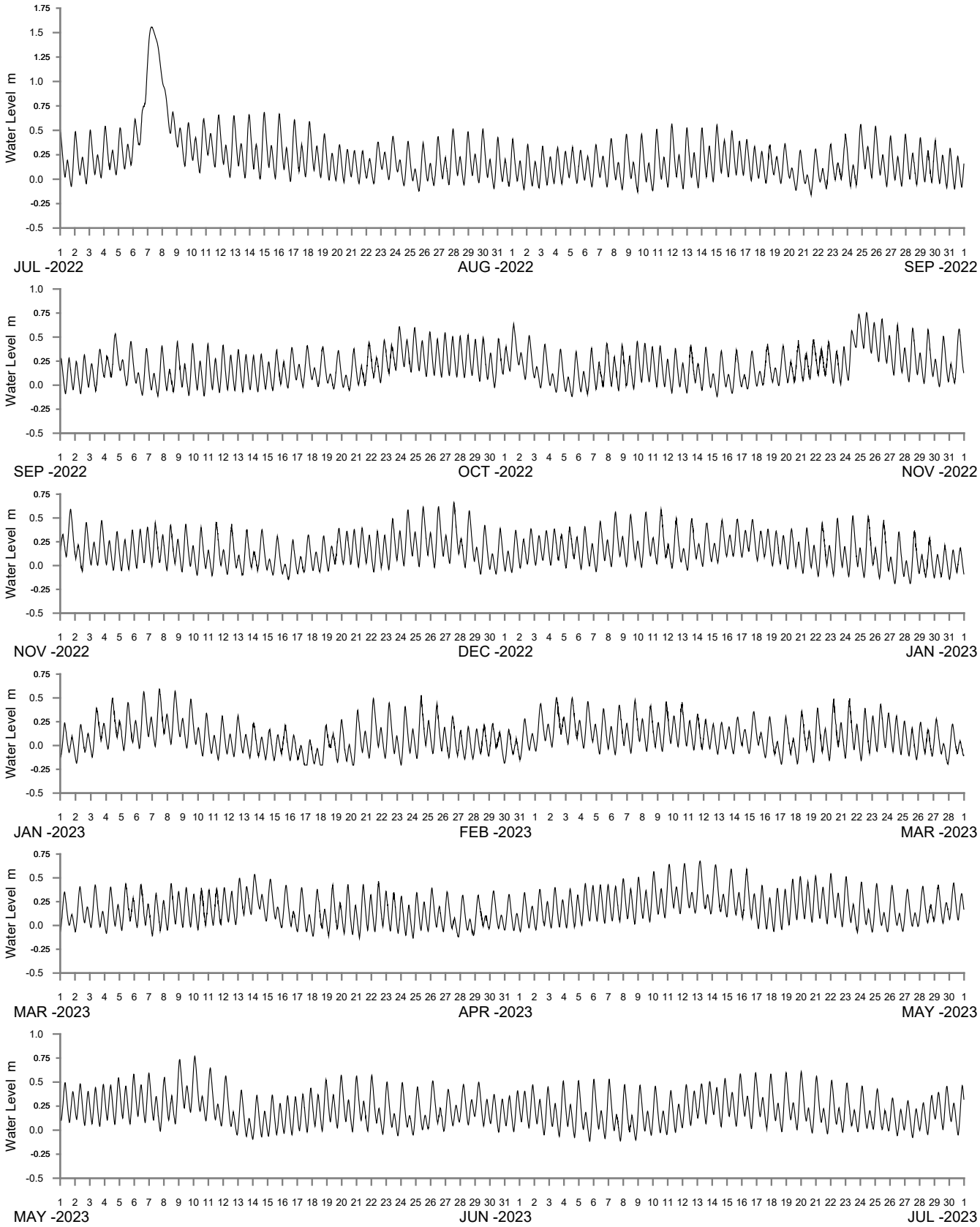
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

QUEENS LAKE AT LAKEWOOD
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-95



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

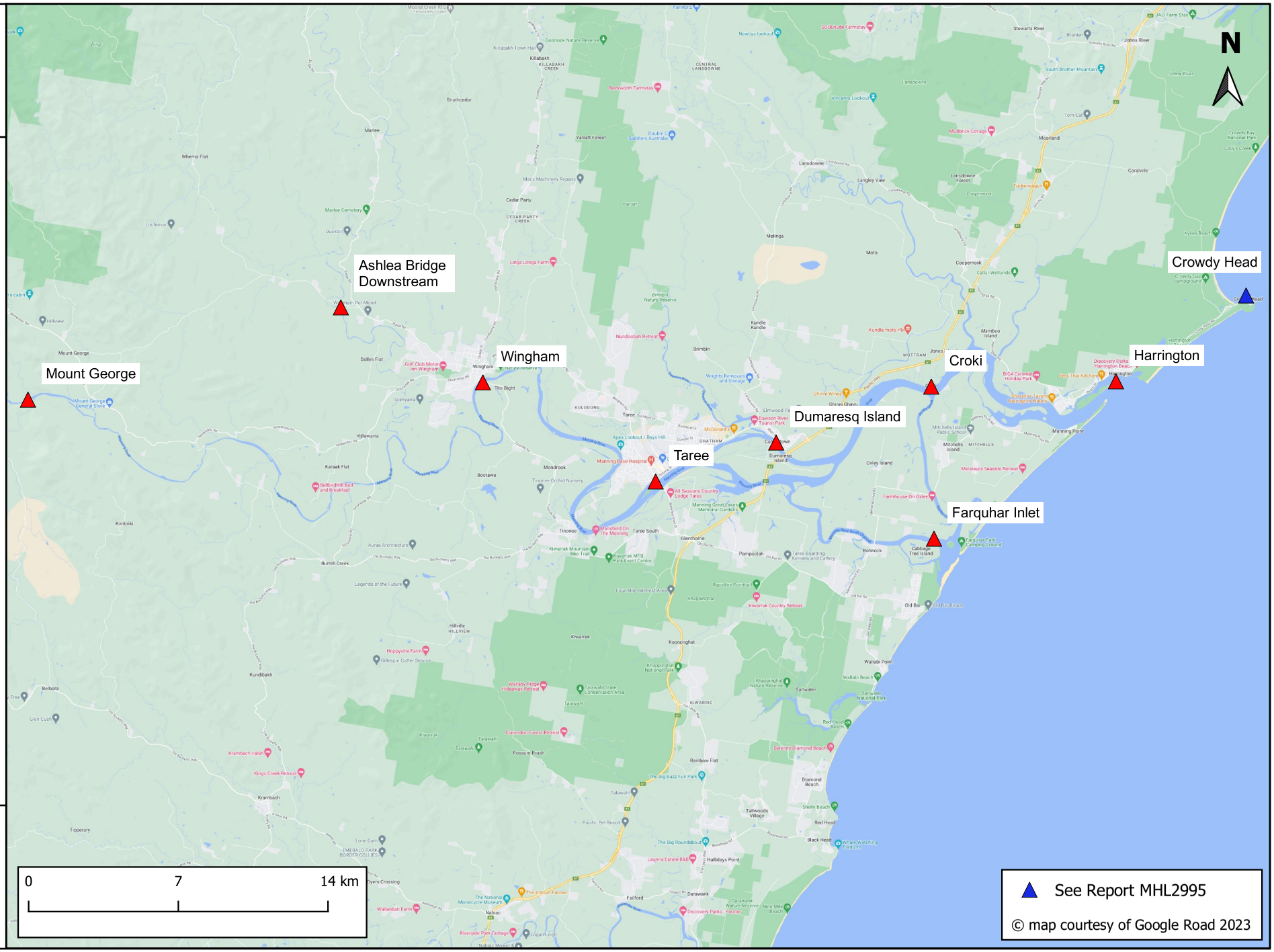
WATSON TAYLORS LAKE AT WATSON TAYLORS LAKE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-96

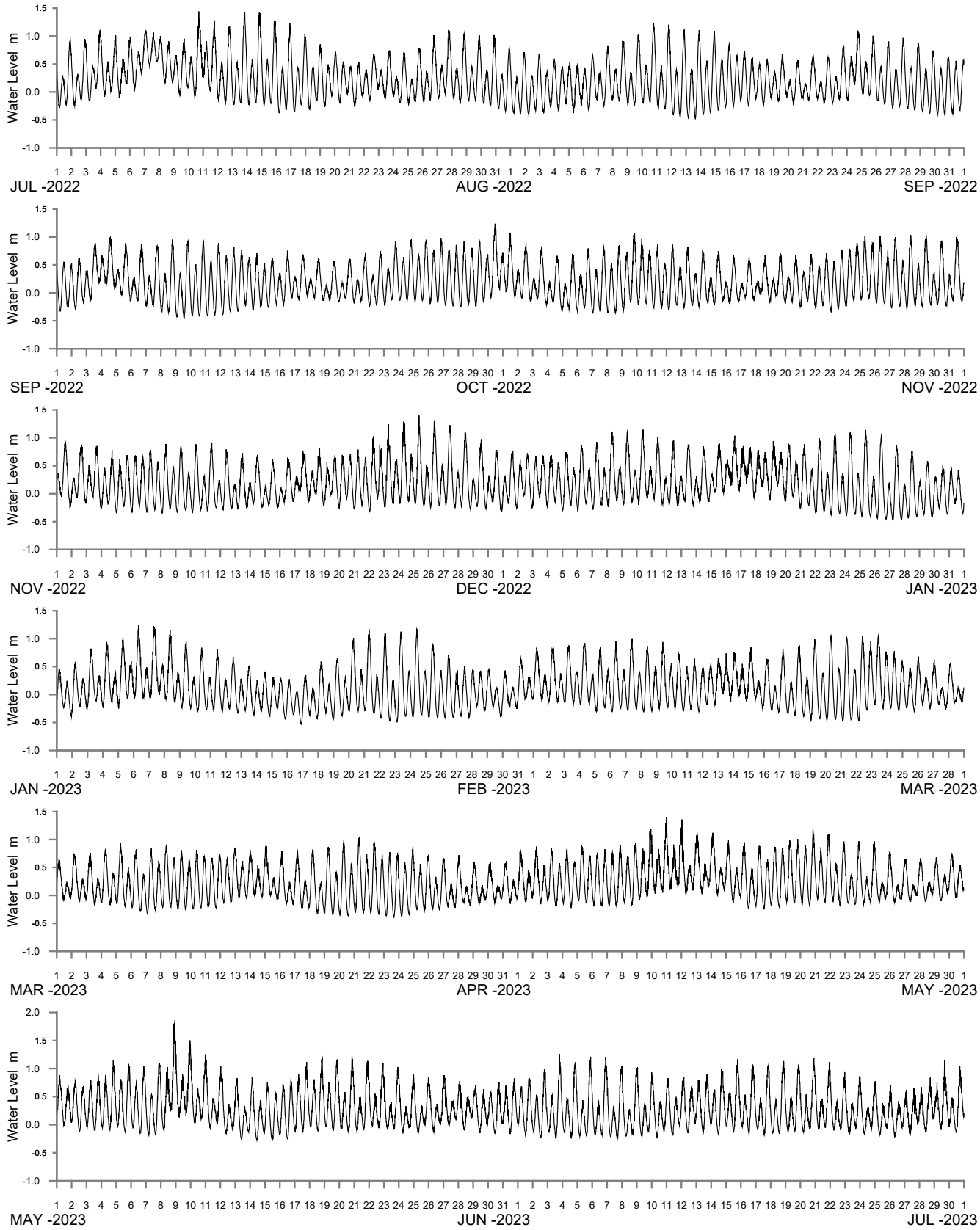
NSW GOVERNMENT

STATION LOCATIONS
MANNING RIVER REGION



Manly Hydraulics Laboratory

Report MHL2994
Figure 4-97



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

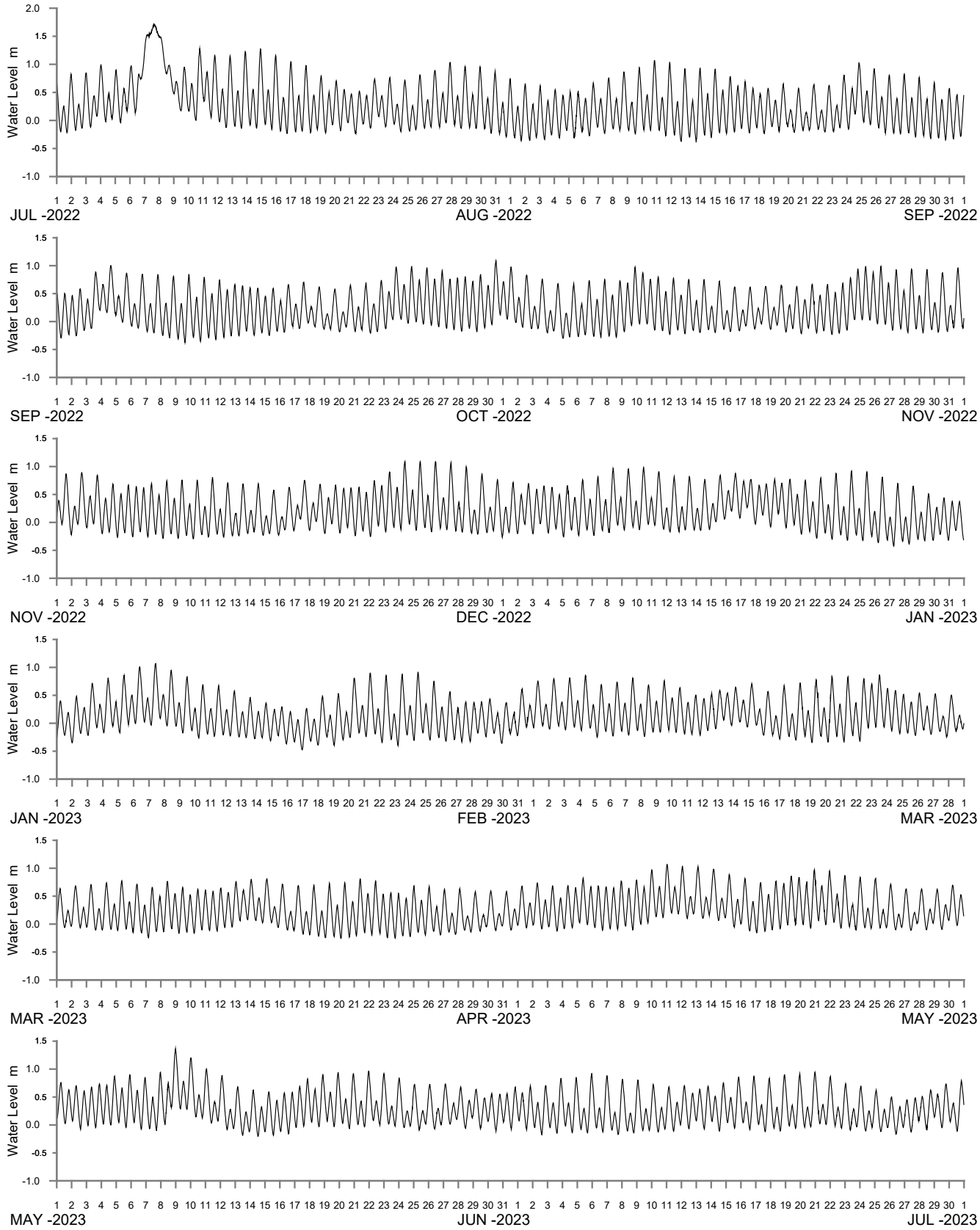
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MANNING RIVER AT HARRINGTON
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-98



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

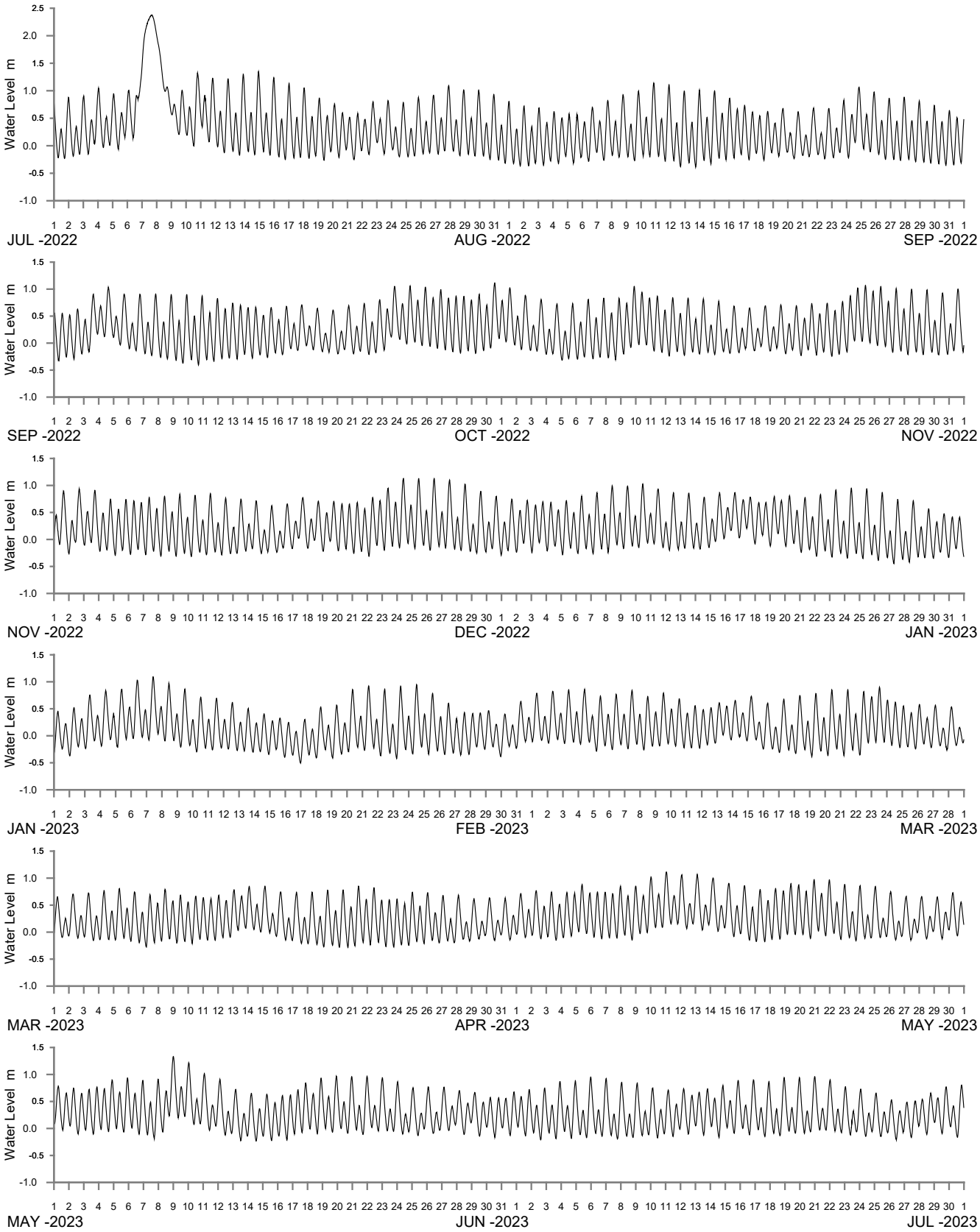
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MANNING RIVER AT CROKI
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-99



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

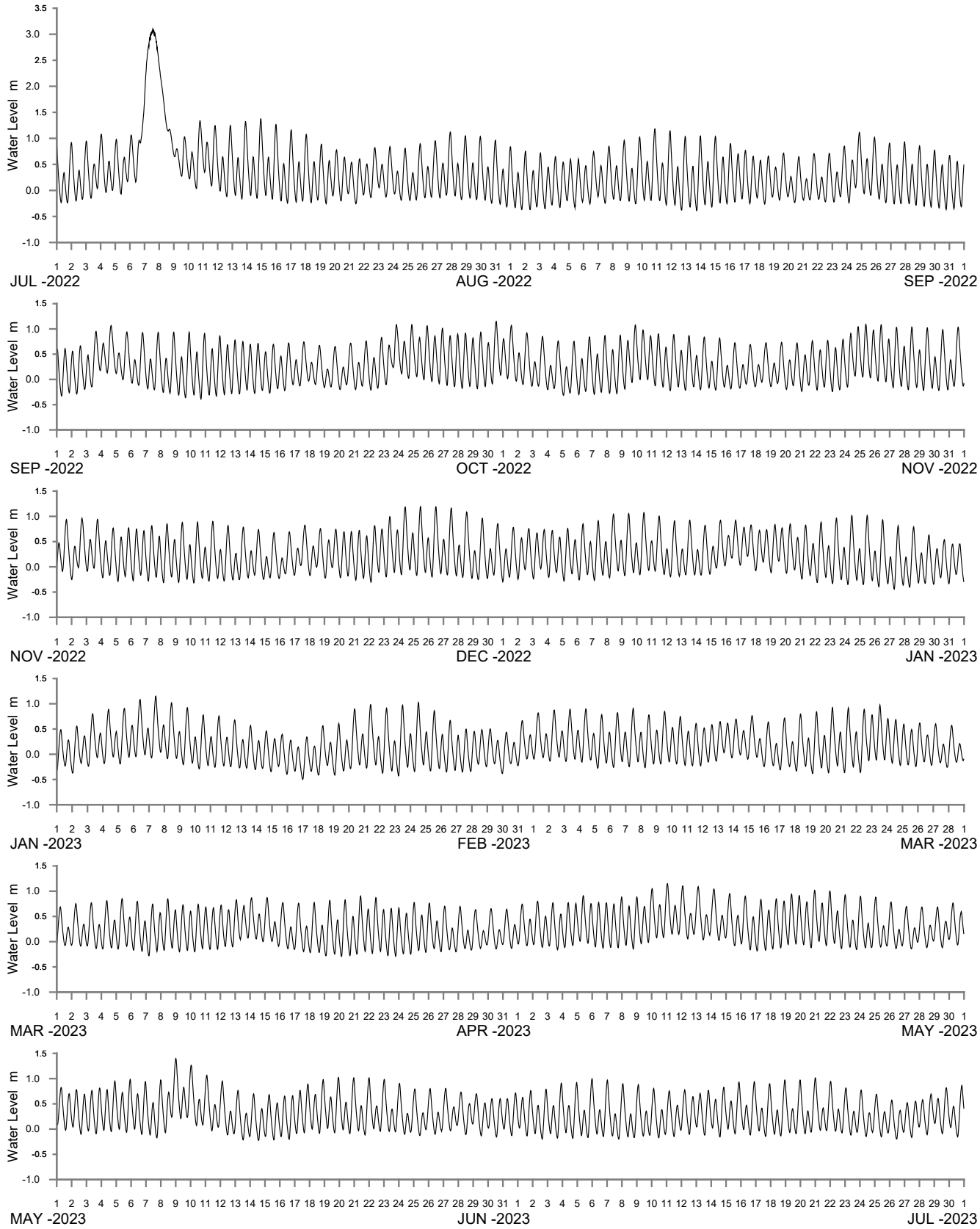
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MANNING RIVER AT DUMARESQ ISLAND
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-100



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

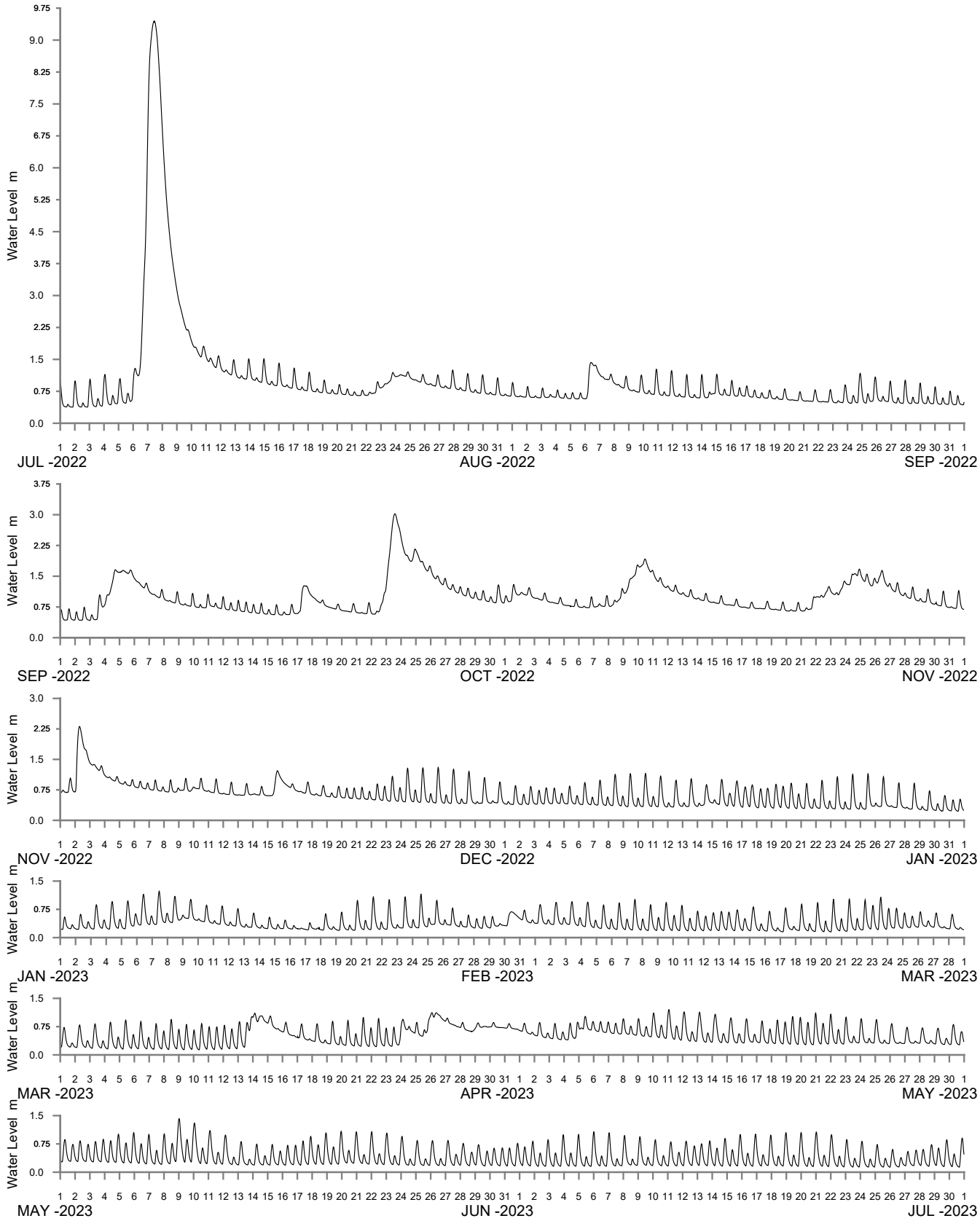
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MANNING RIVER AT TAREE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-101



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

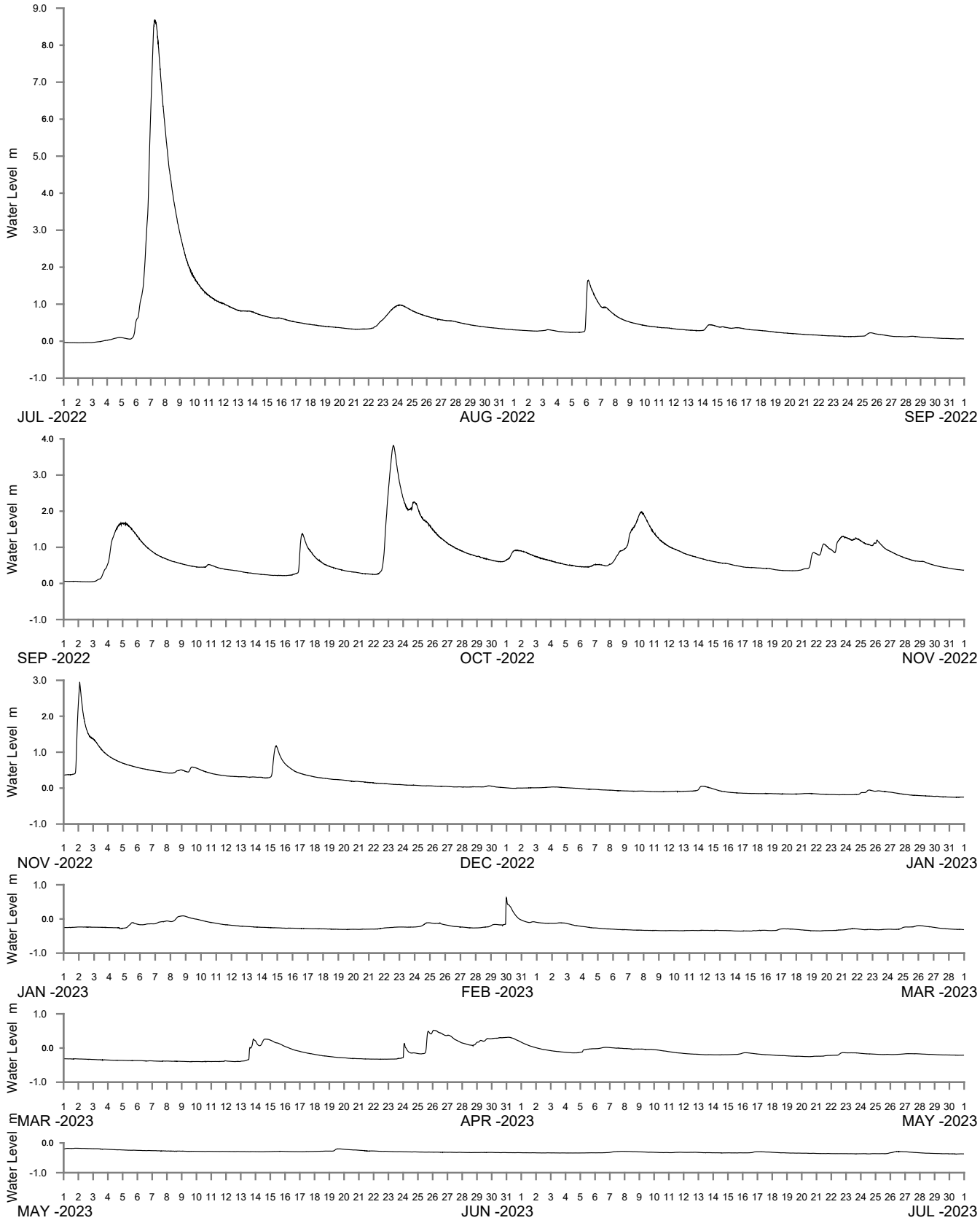
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MANNING RIVER AT WINGHAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-102



WATER LEVEL REFERENCED TO LOCAL WATER RESOURCES DATUM

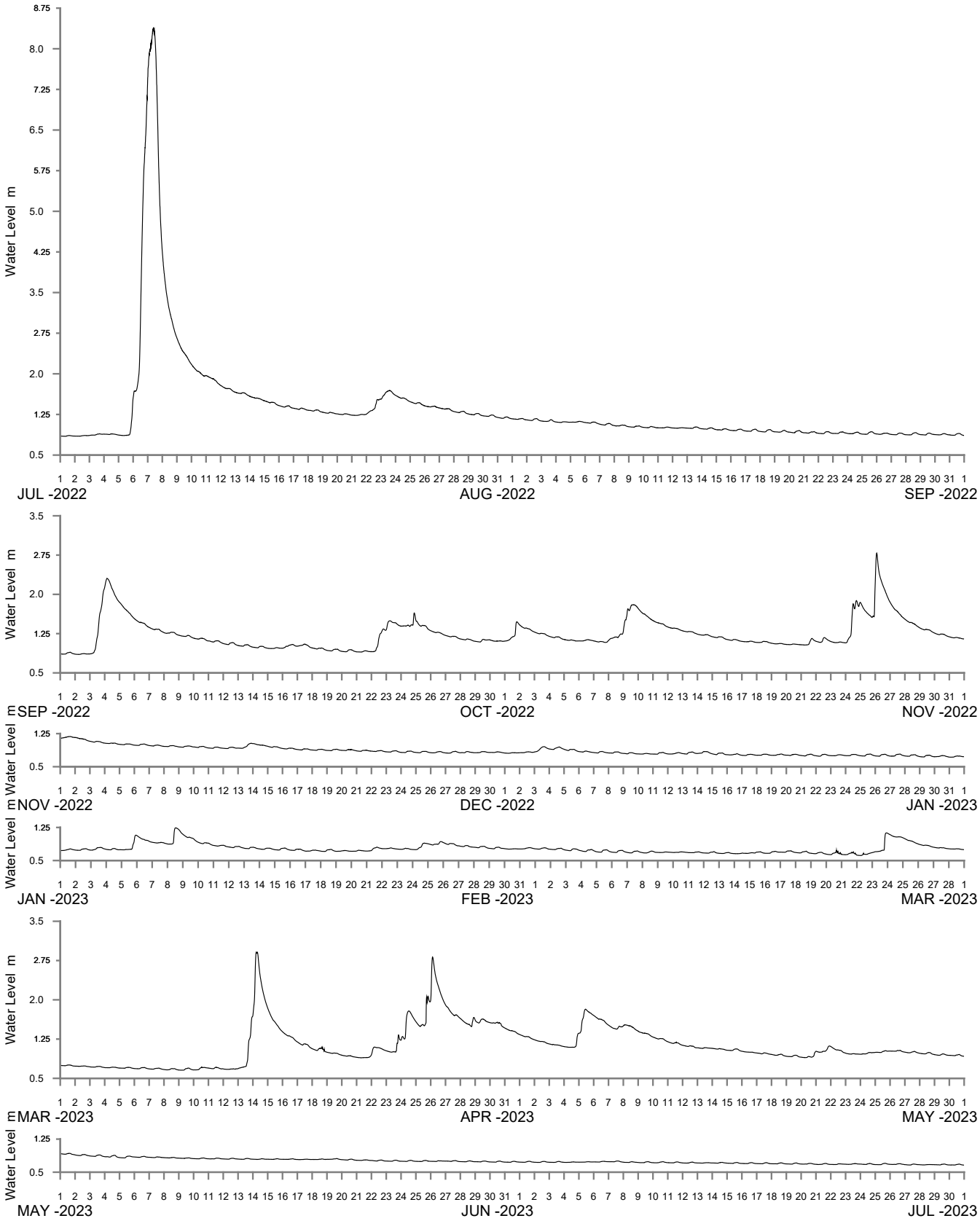
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MANNING RIVER AT MOUNT GEORGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-103



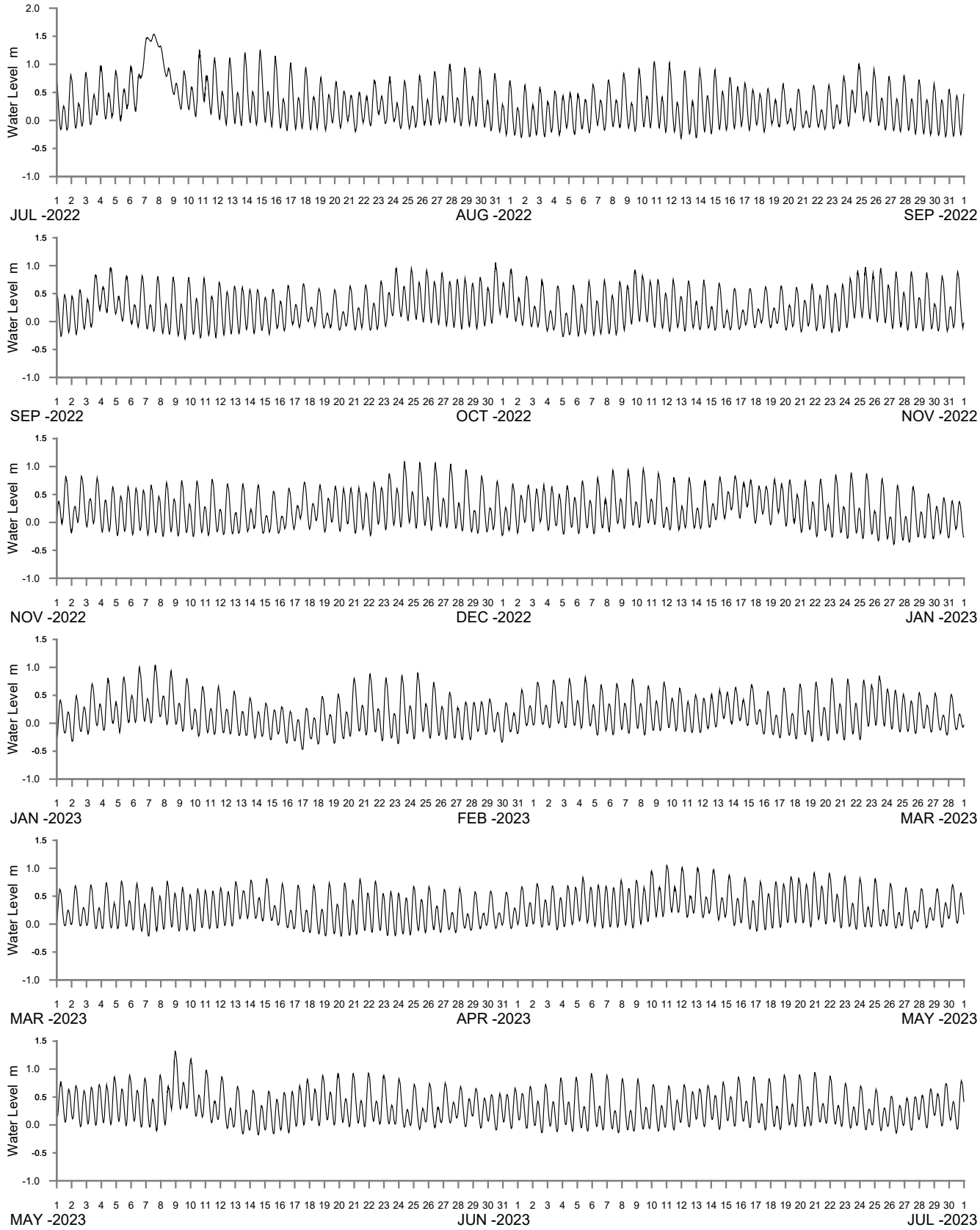
WATER LEVEL REFERENCED TO ASSUMED DATUM

- - - - - - - - - - - - DATA LOSS

DINGO CREEK AT ASHLEA BRIDGE DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-104



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

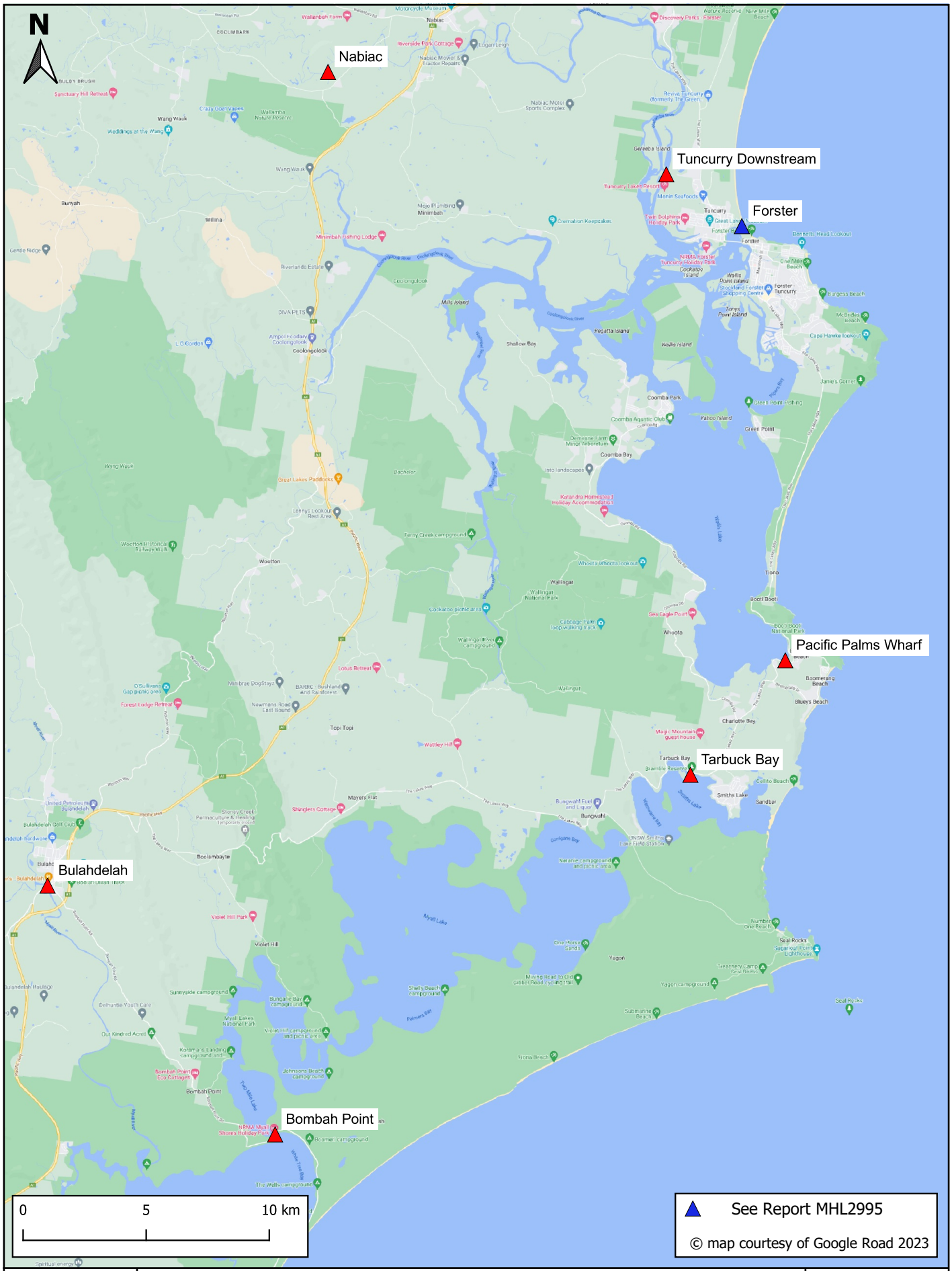
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MANNING RIVER AT FARQUHAR INLET
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-105

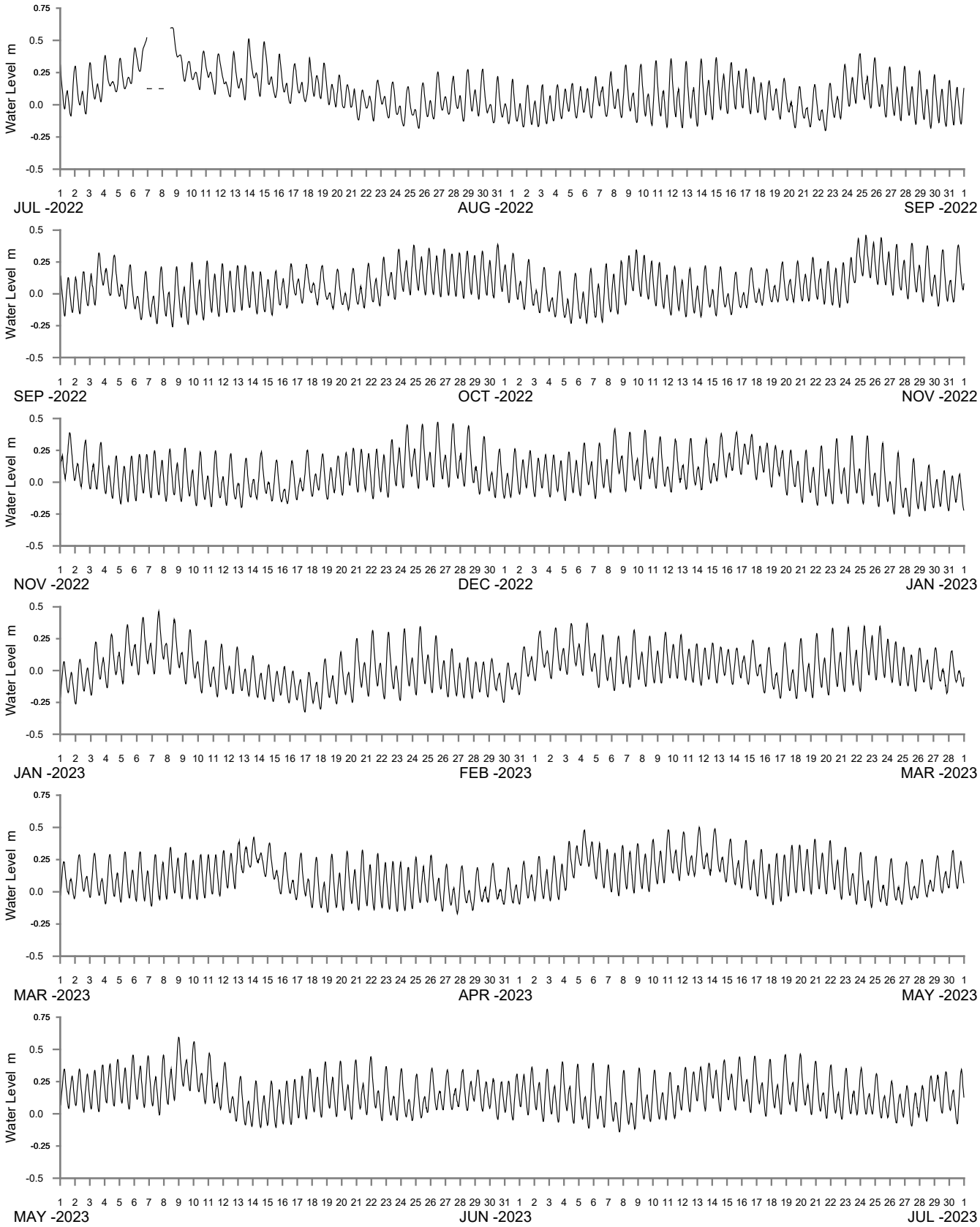


NSW GOVERNMENT

STATION LOCATIONS
GREAT LAKES REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-106



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

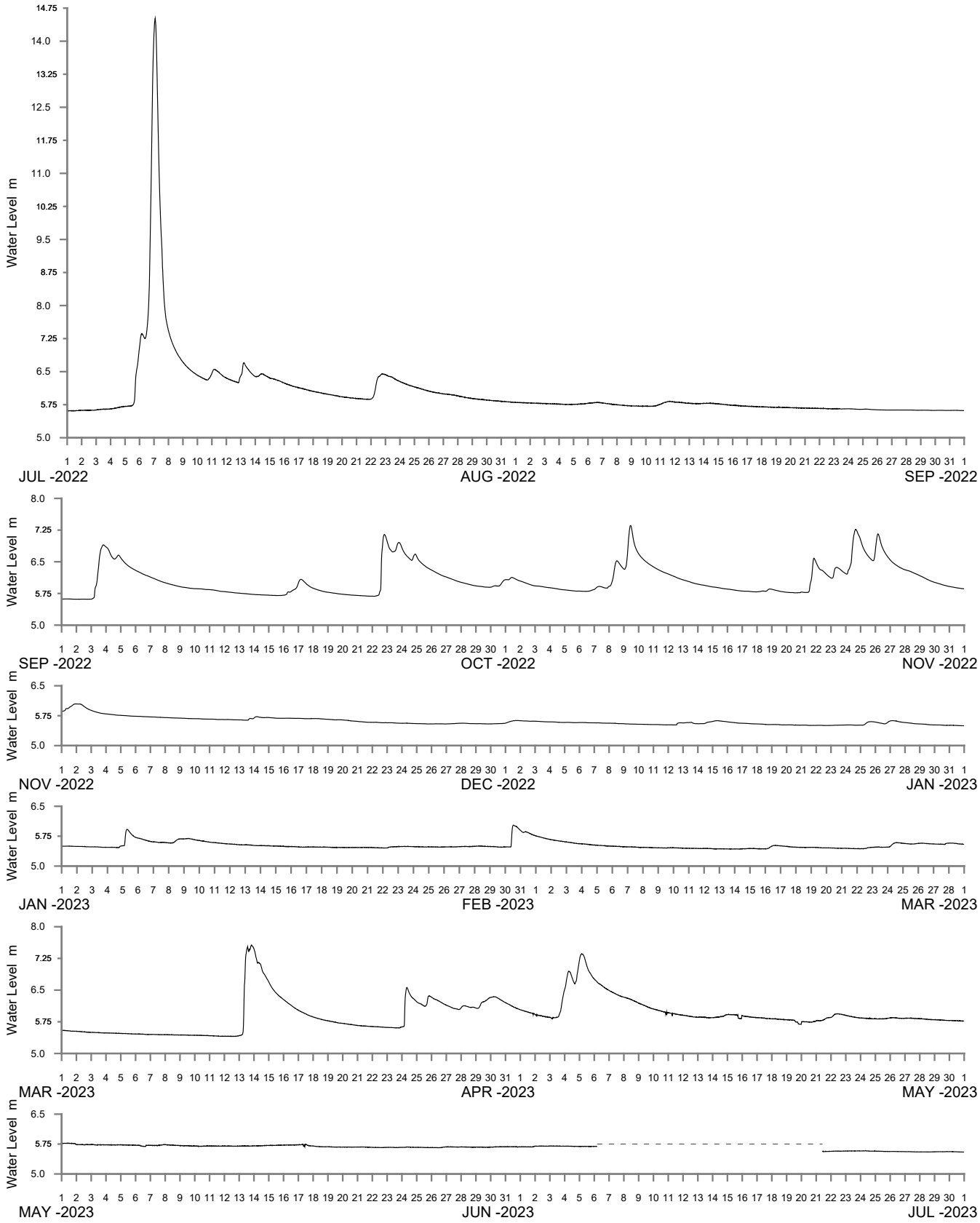
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WALLAMBA RIVER AT TUNCURRY DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-107



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

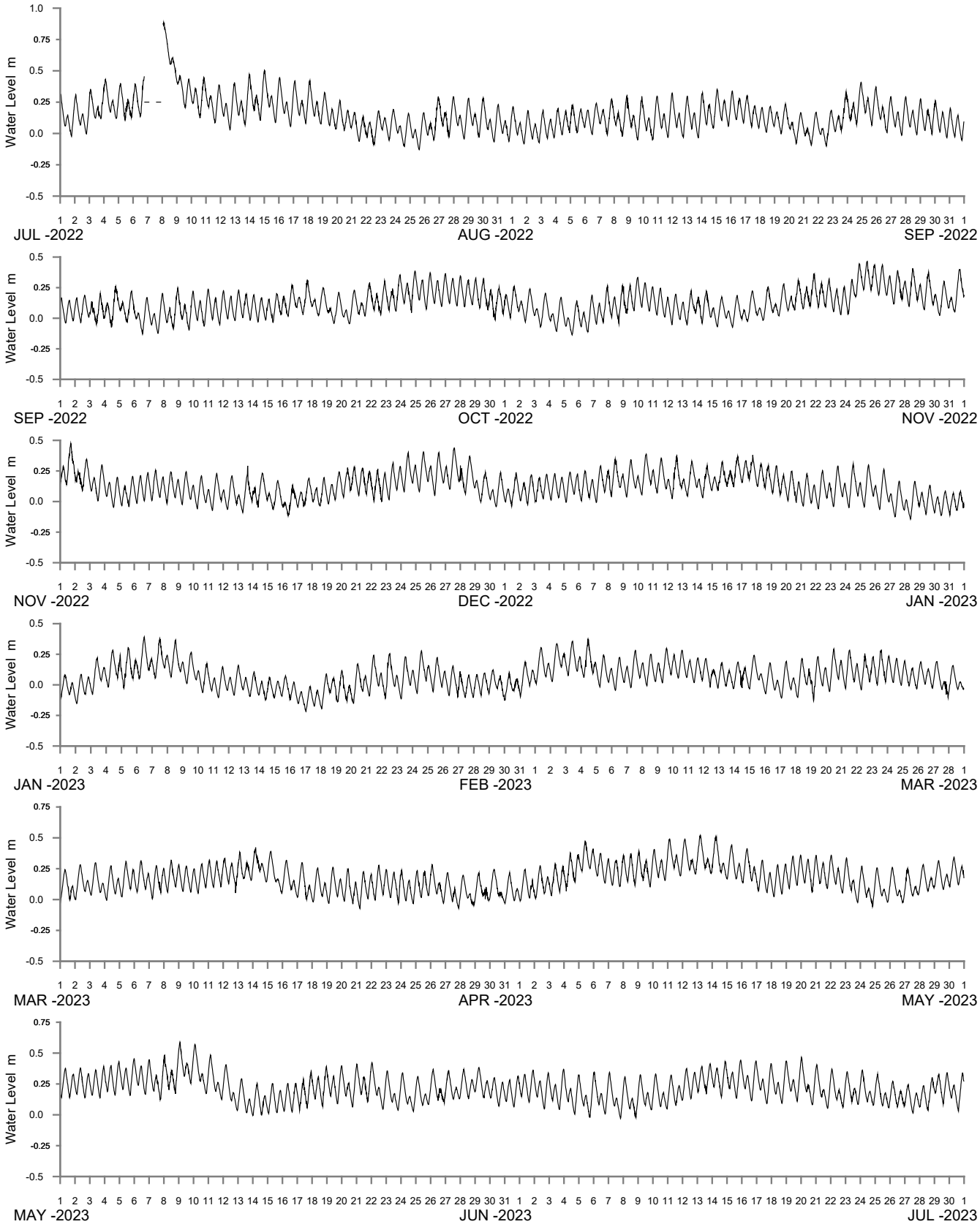
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WALLAMBA RIVER AT NABIAC
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-108



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

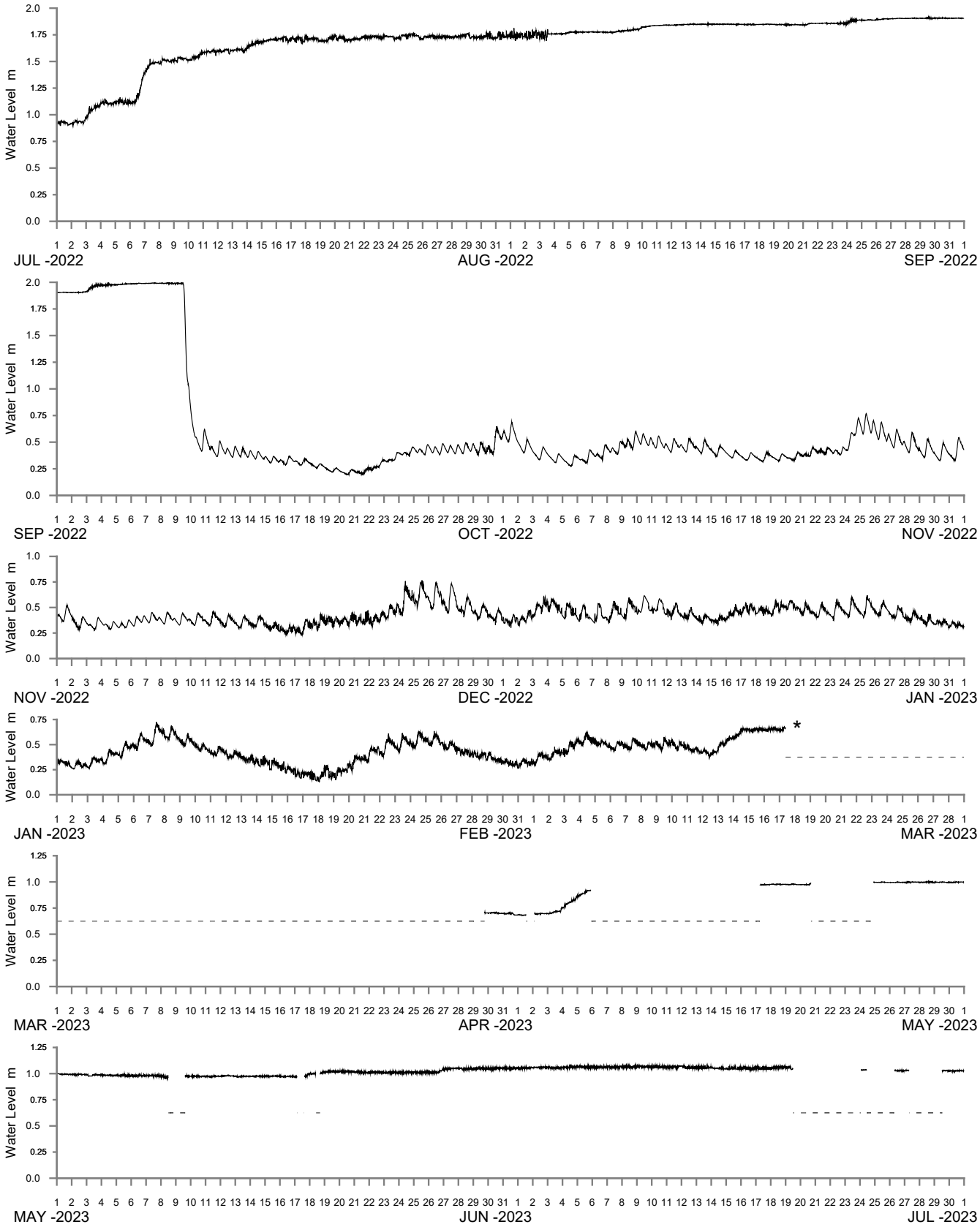
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WALLIS LAKES AT PACIFIC PALMS WHARF
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-109



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

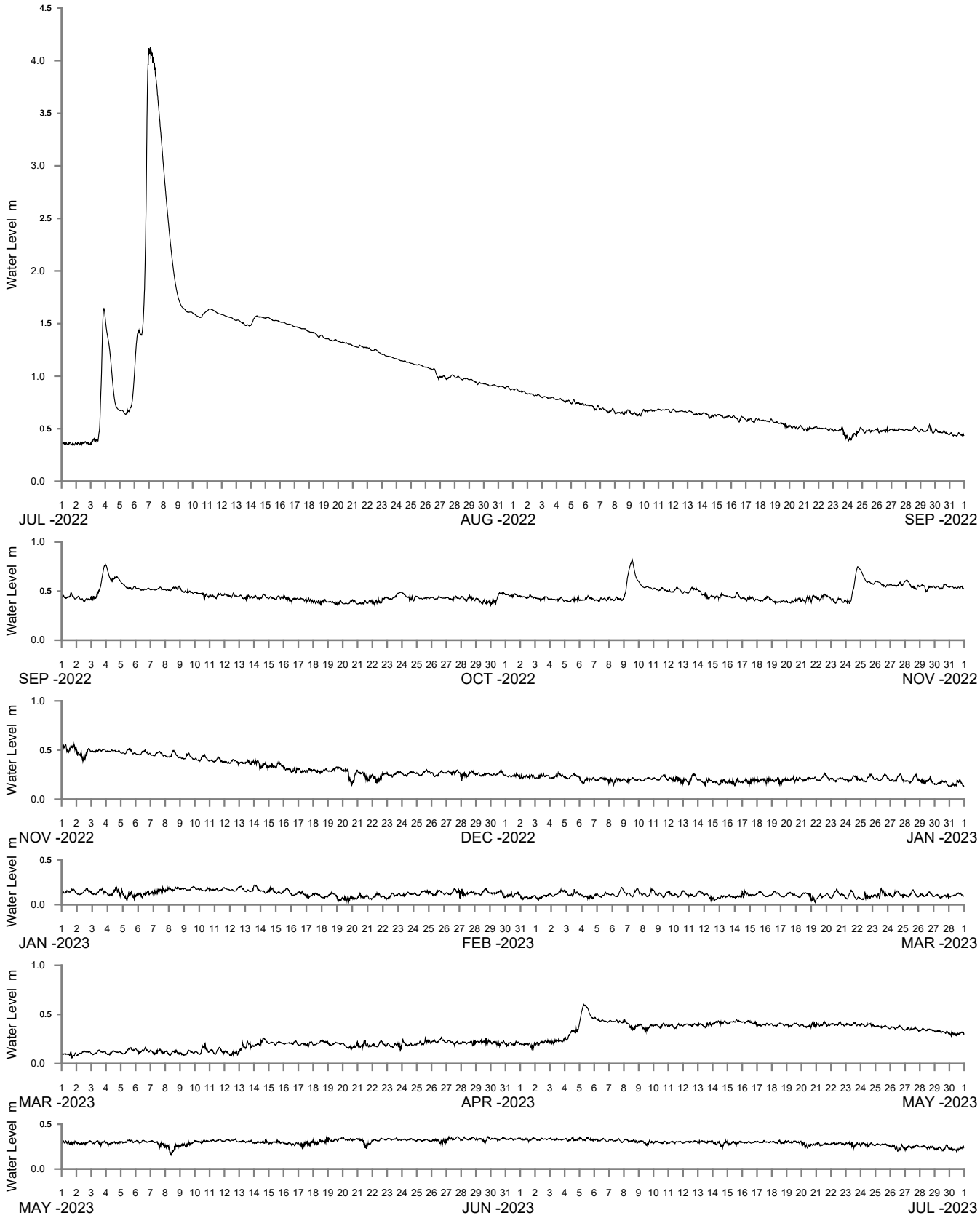
* Data loss due to orifice/gas line integrity issues

NSW GOVERNMENT

SMITHS LAKE AT TARBUCK BAY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-110



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

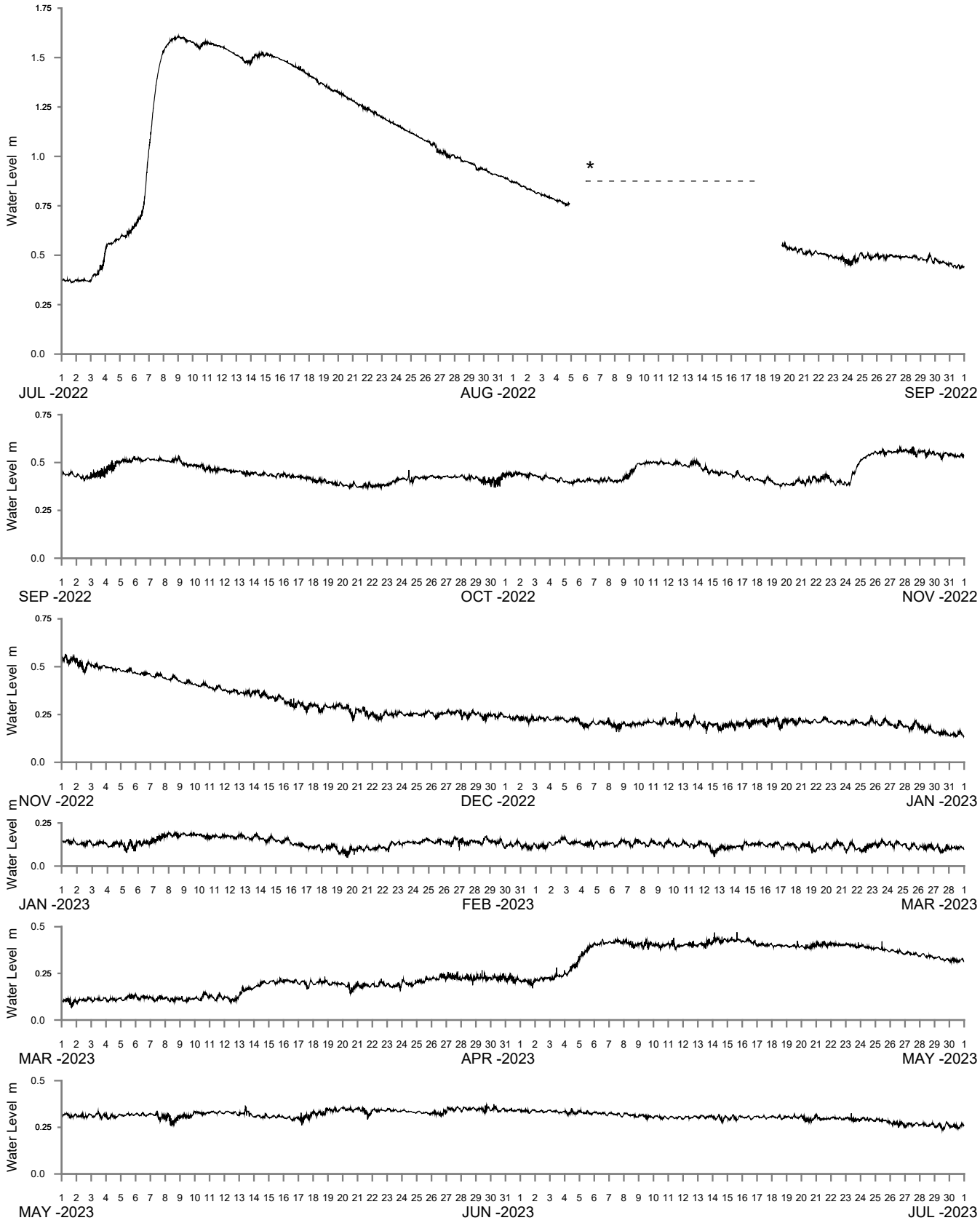
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MYALL RIVER AT BULAHDELAH
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-111



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

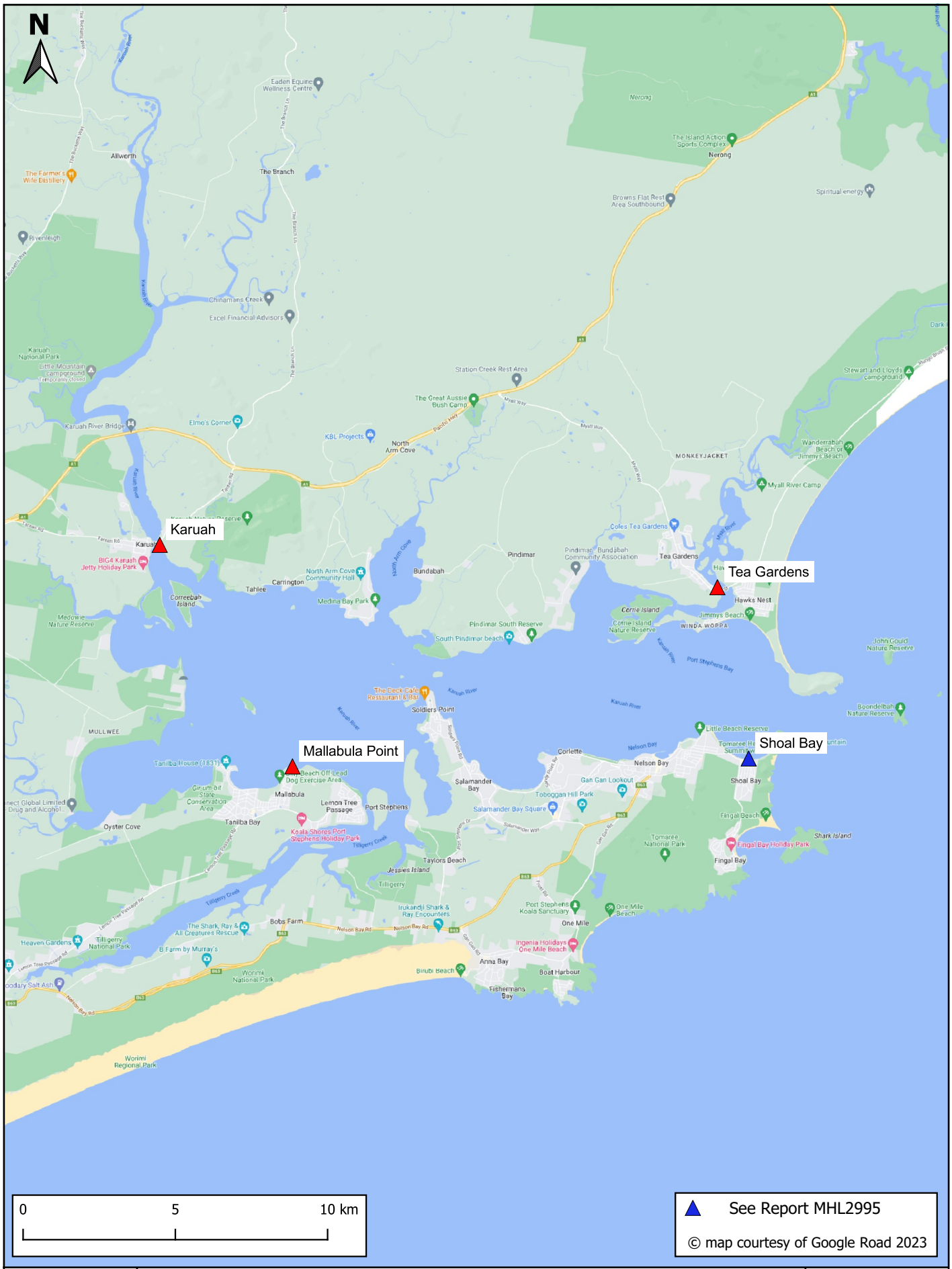
* Data loss due to battery failure

NSW GOVERNMENT

MYALL RIVER AT BOMBAH POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-112

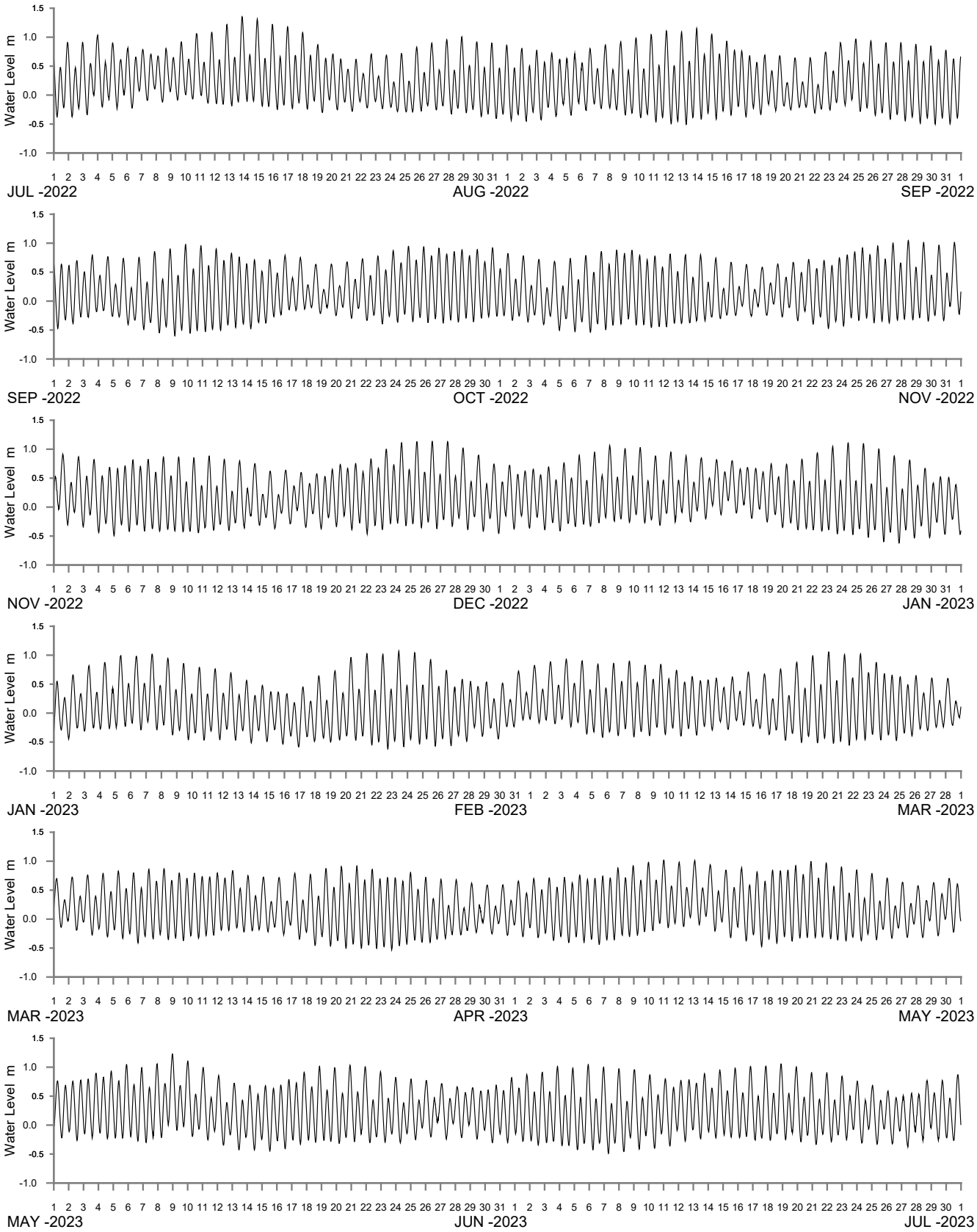


NSW GOVERNMENT

STATION LOCATIONS
PORT STEPHENS REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-113



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

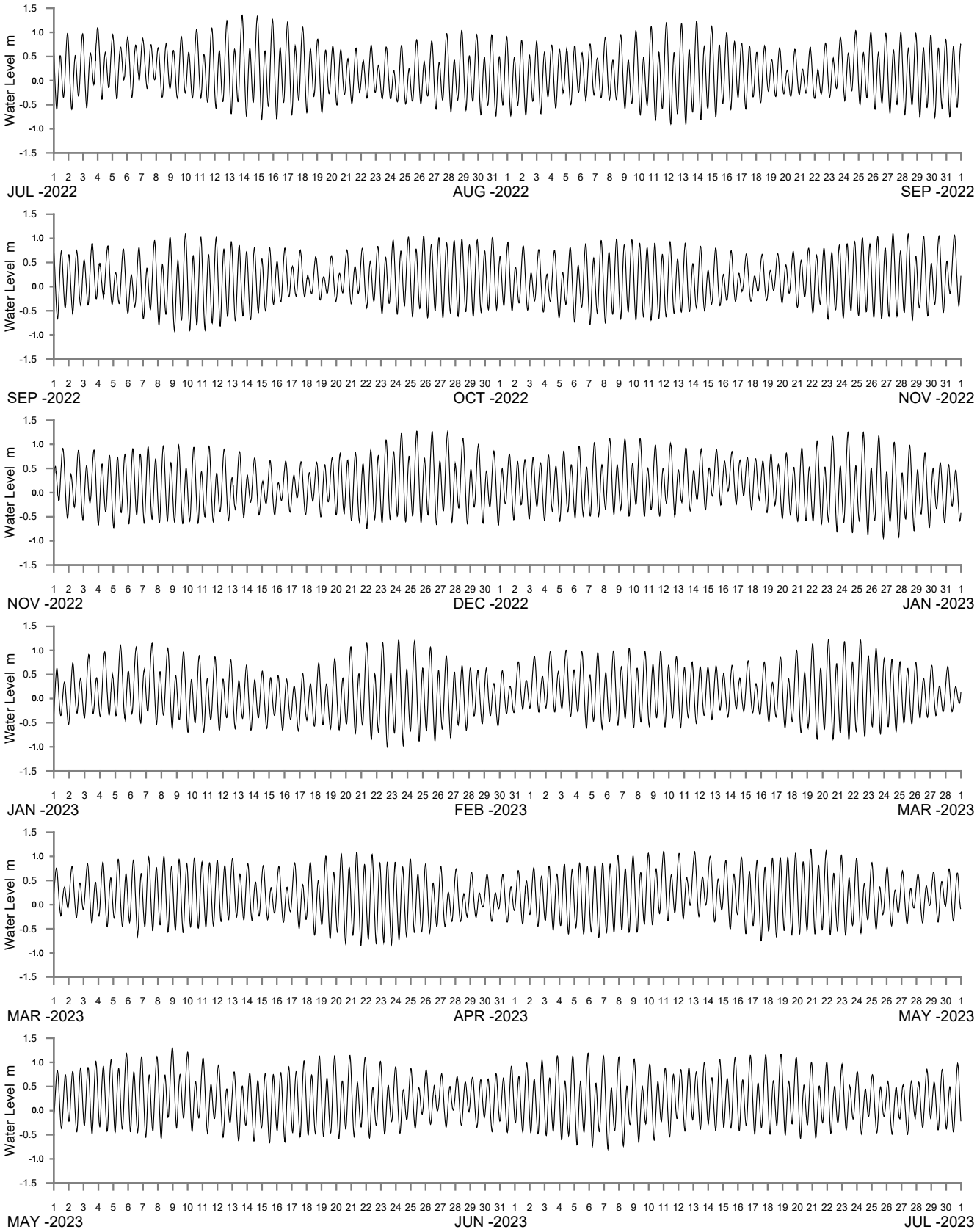
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MYALL RIVER AT TEA GARDENS
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-114



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

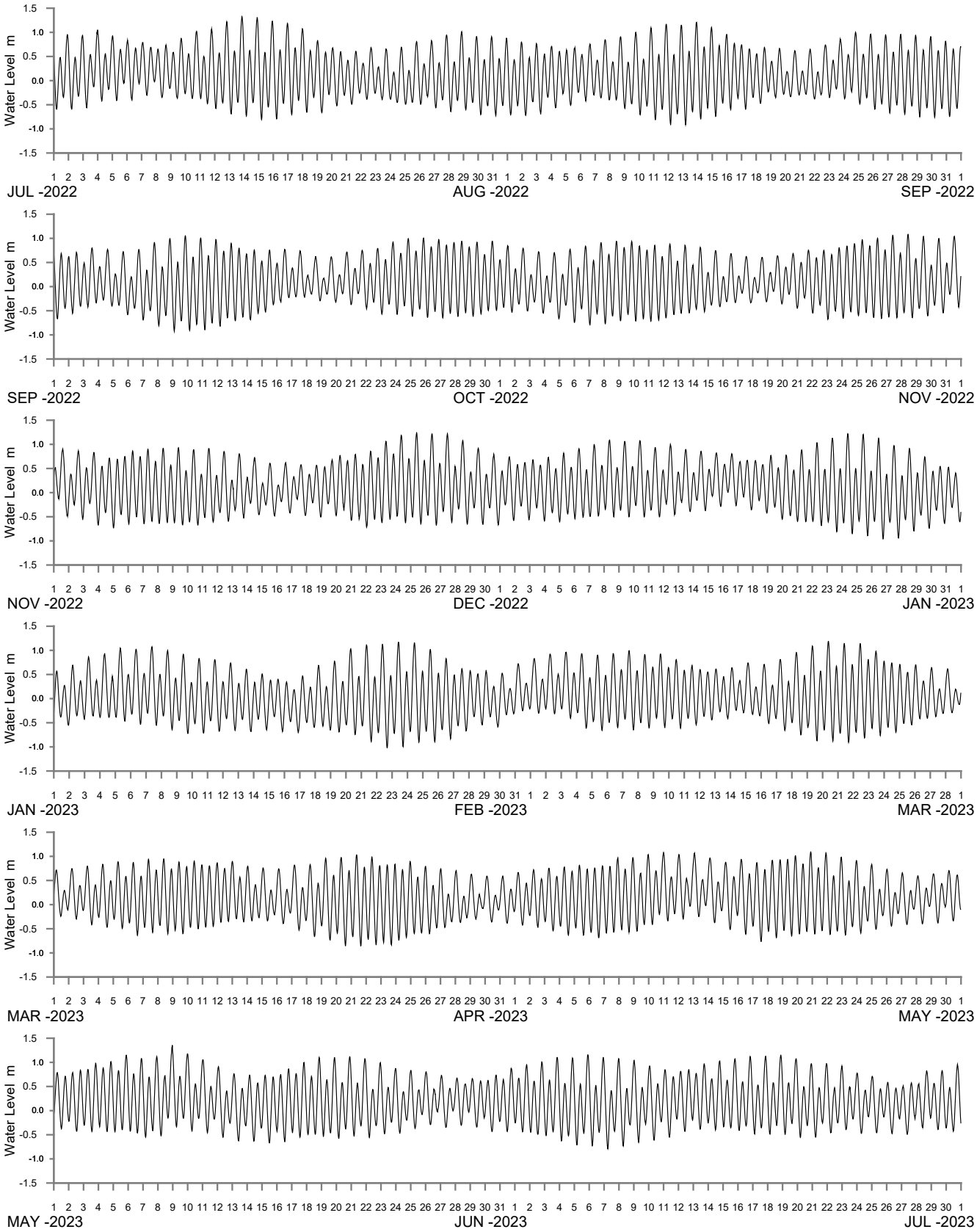
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

KARUAH RIVER AT KARUAH
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-115



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

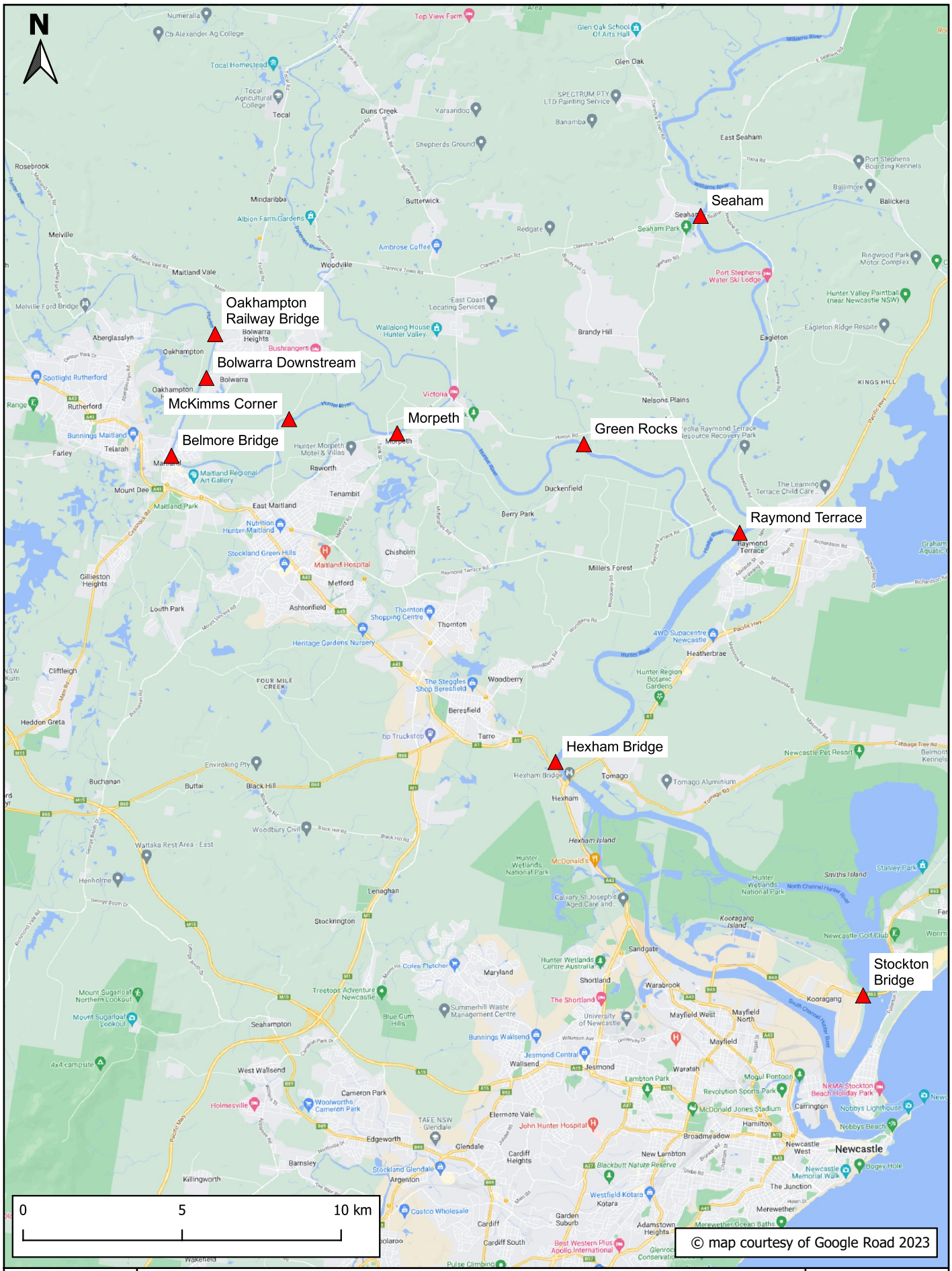
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

KARUAH RIVER AT MALLABULLA POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-116

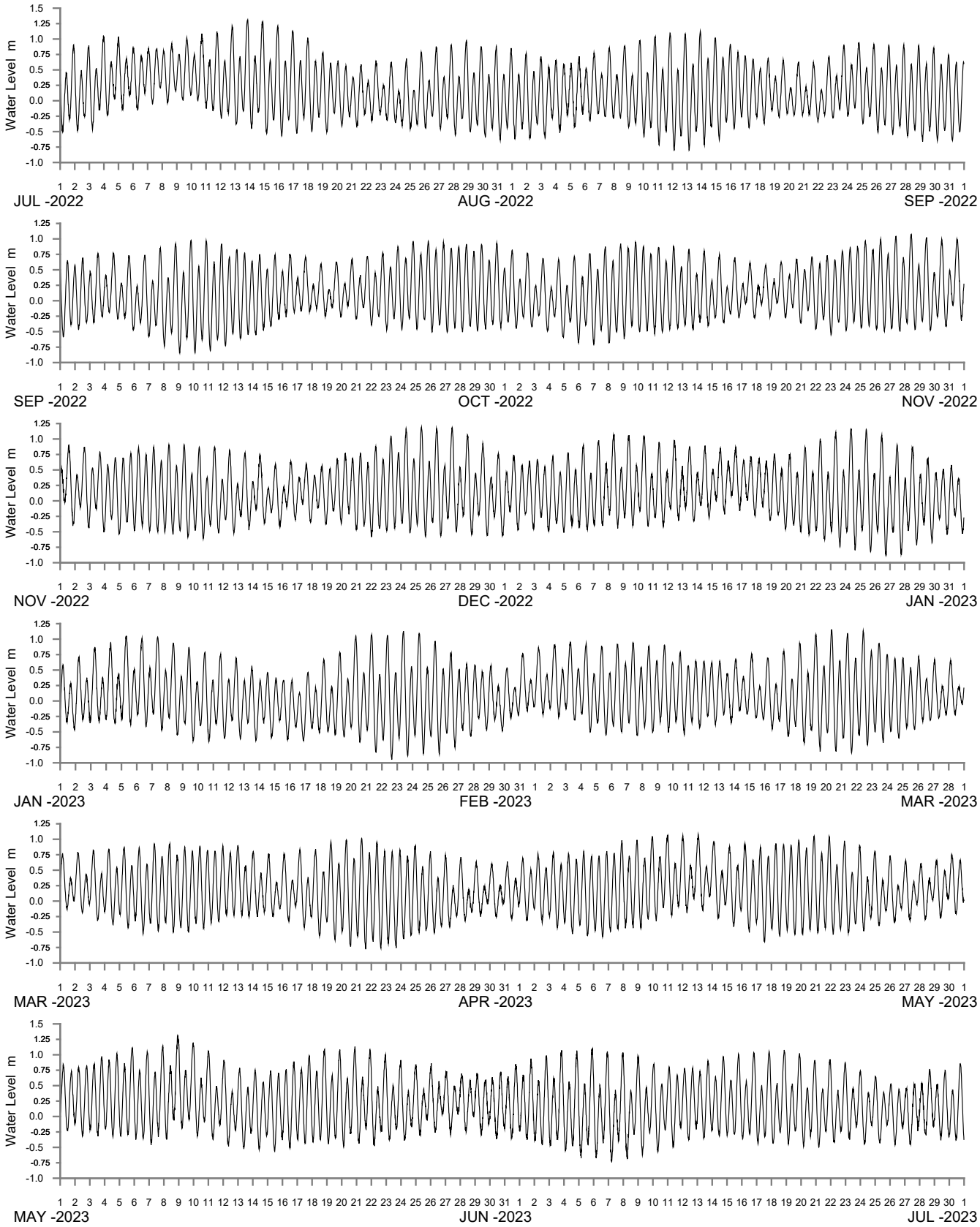


NSW GOVERNMENT

STATION LOCATIONS
HUNTER RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-117



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

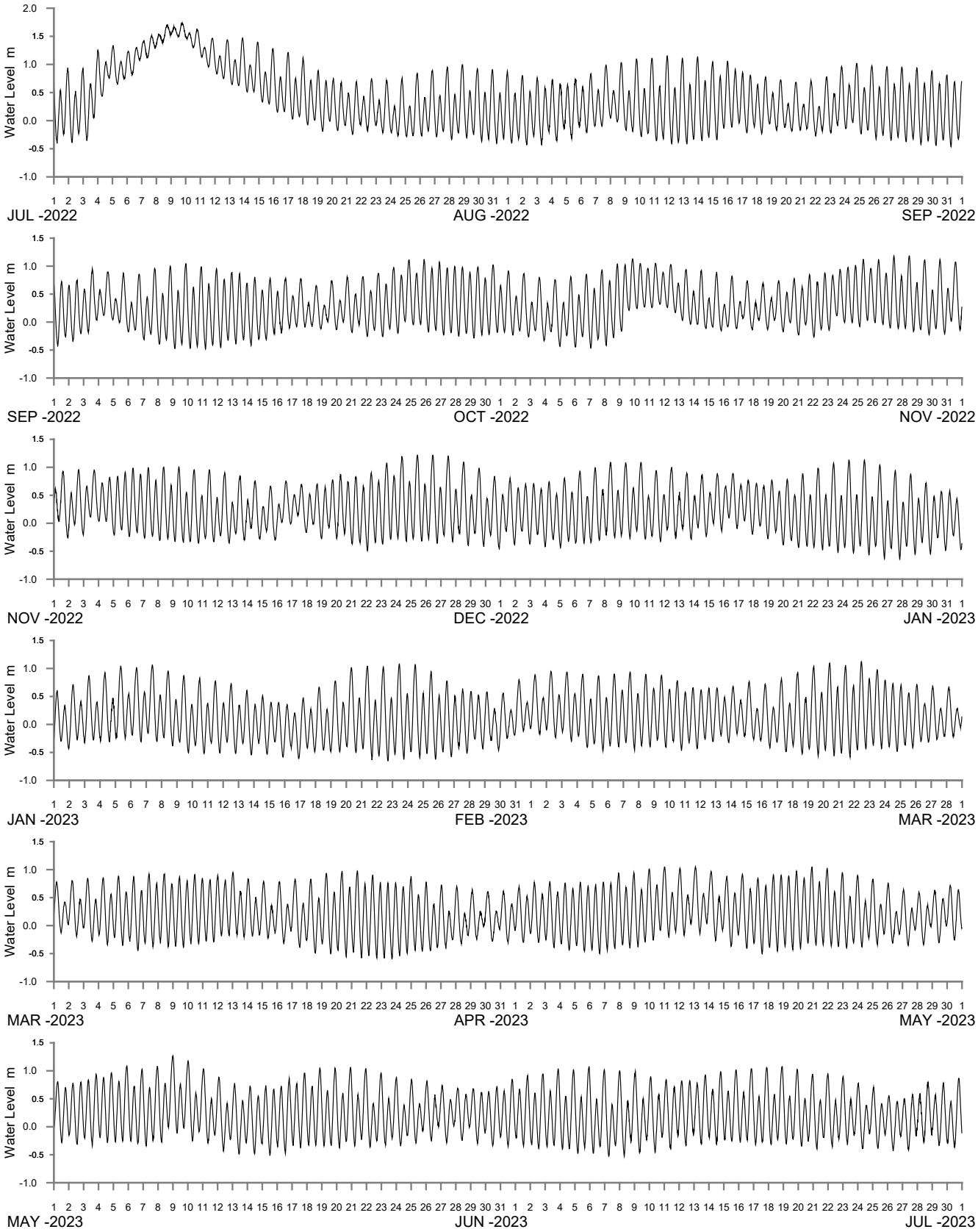
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HUNTER RIVER AT STOCKTON BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-118



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

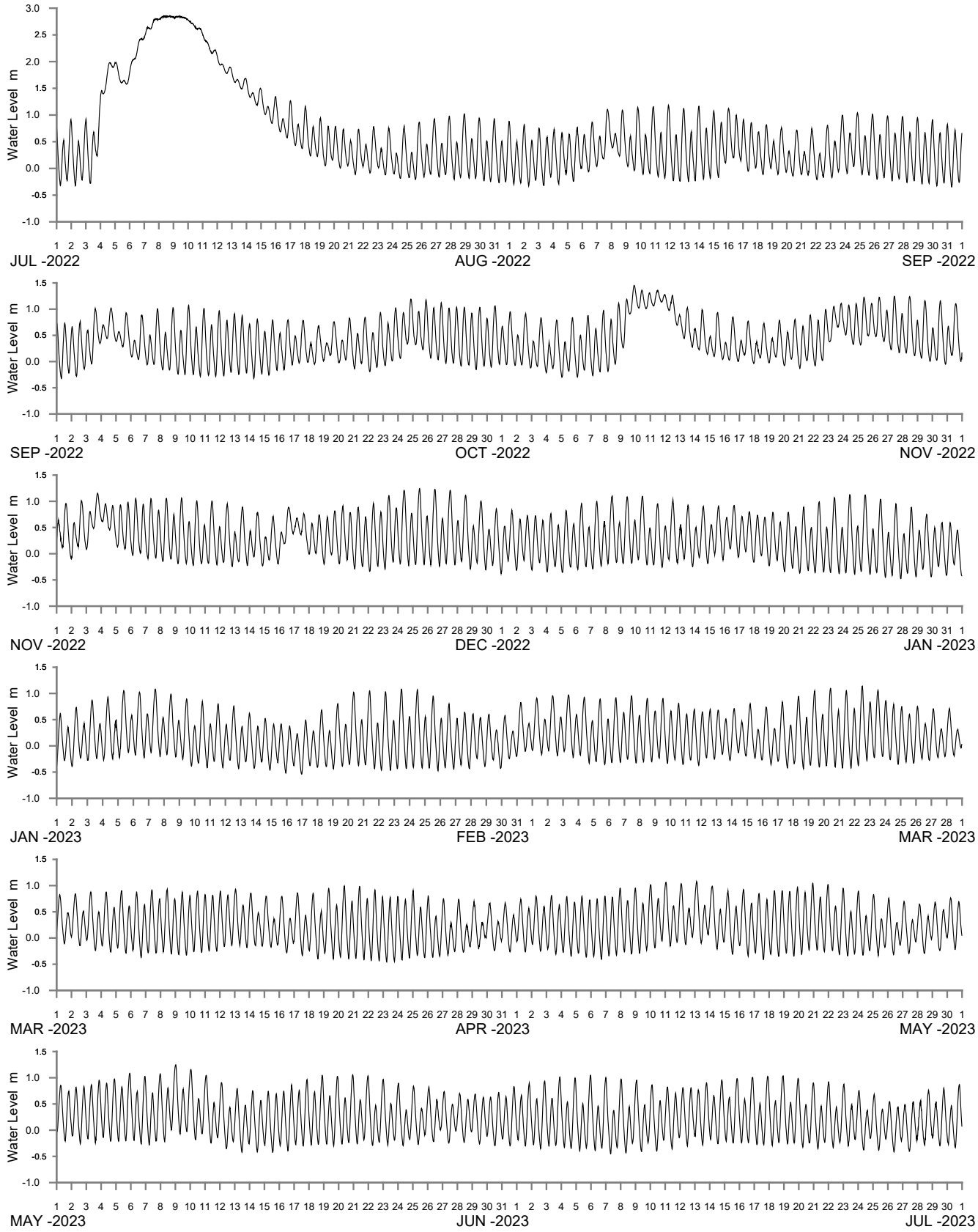
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HUNTER RIVER AT HEXHAM BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-119



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

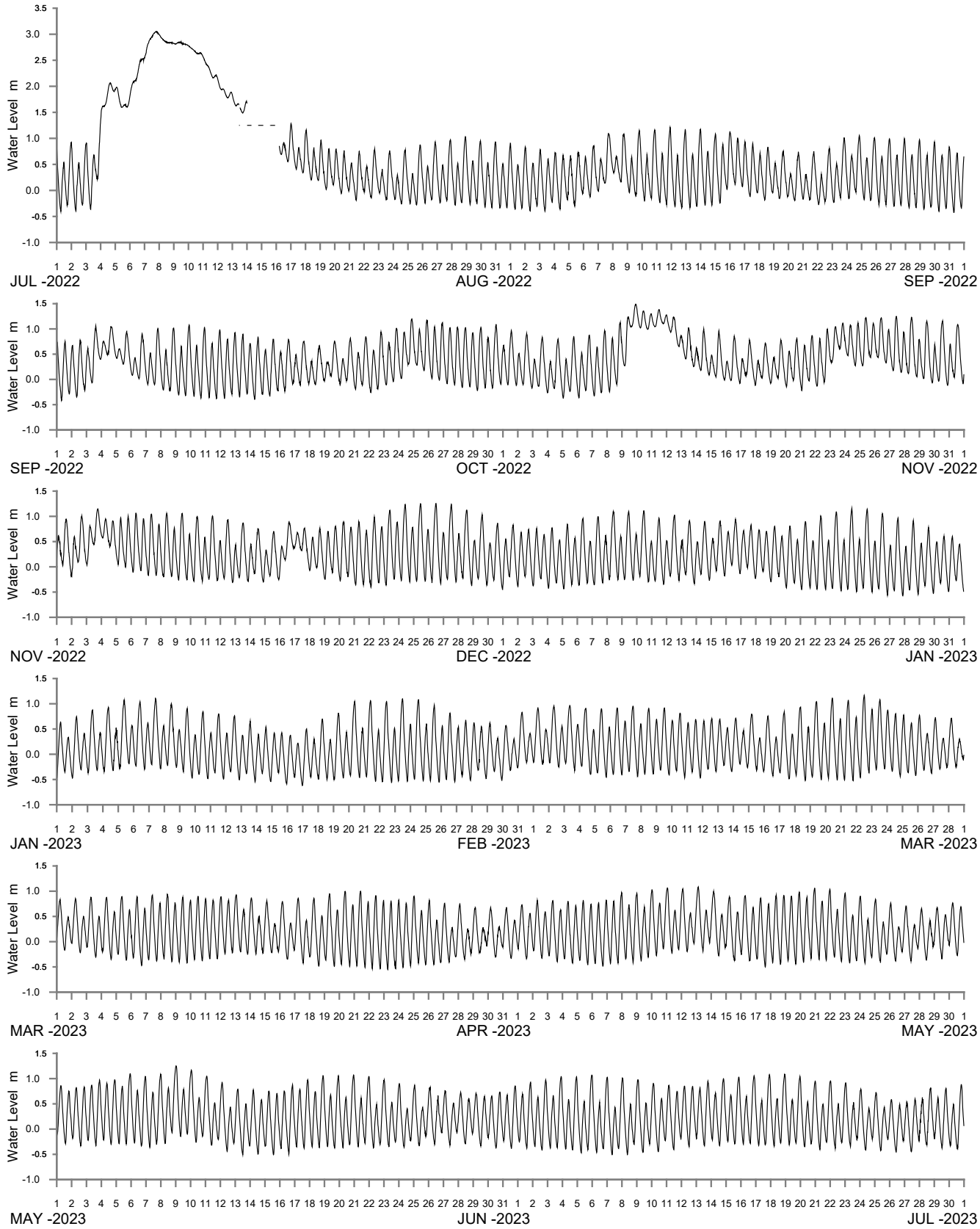
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WILLIAMS RIVER AT RAYMOND TERRACE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-120



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

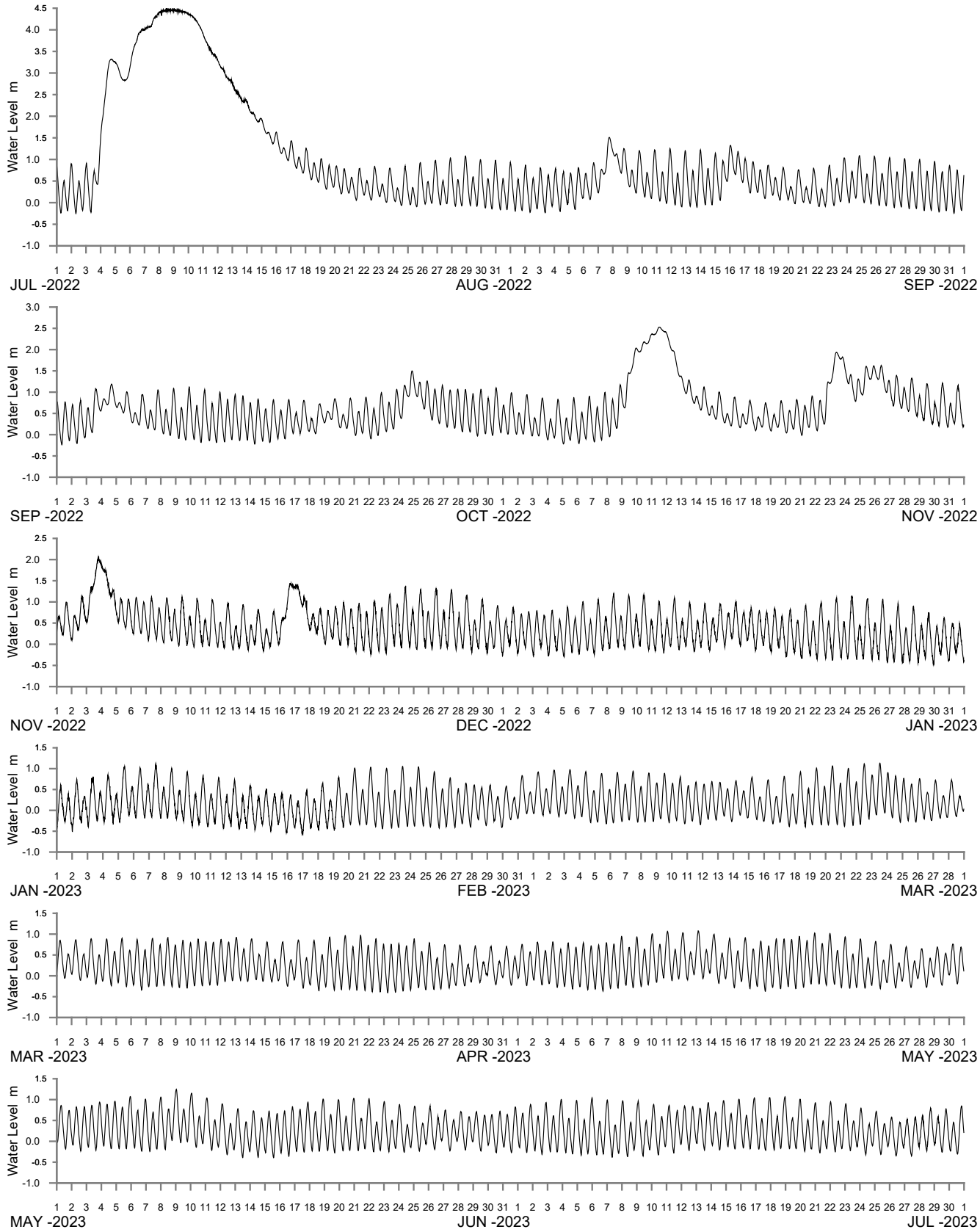
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WILLIAMS RIVER AT SEAHAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-121



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

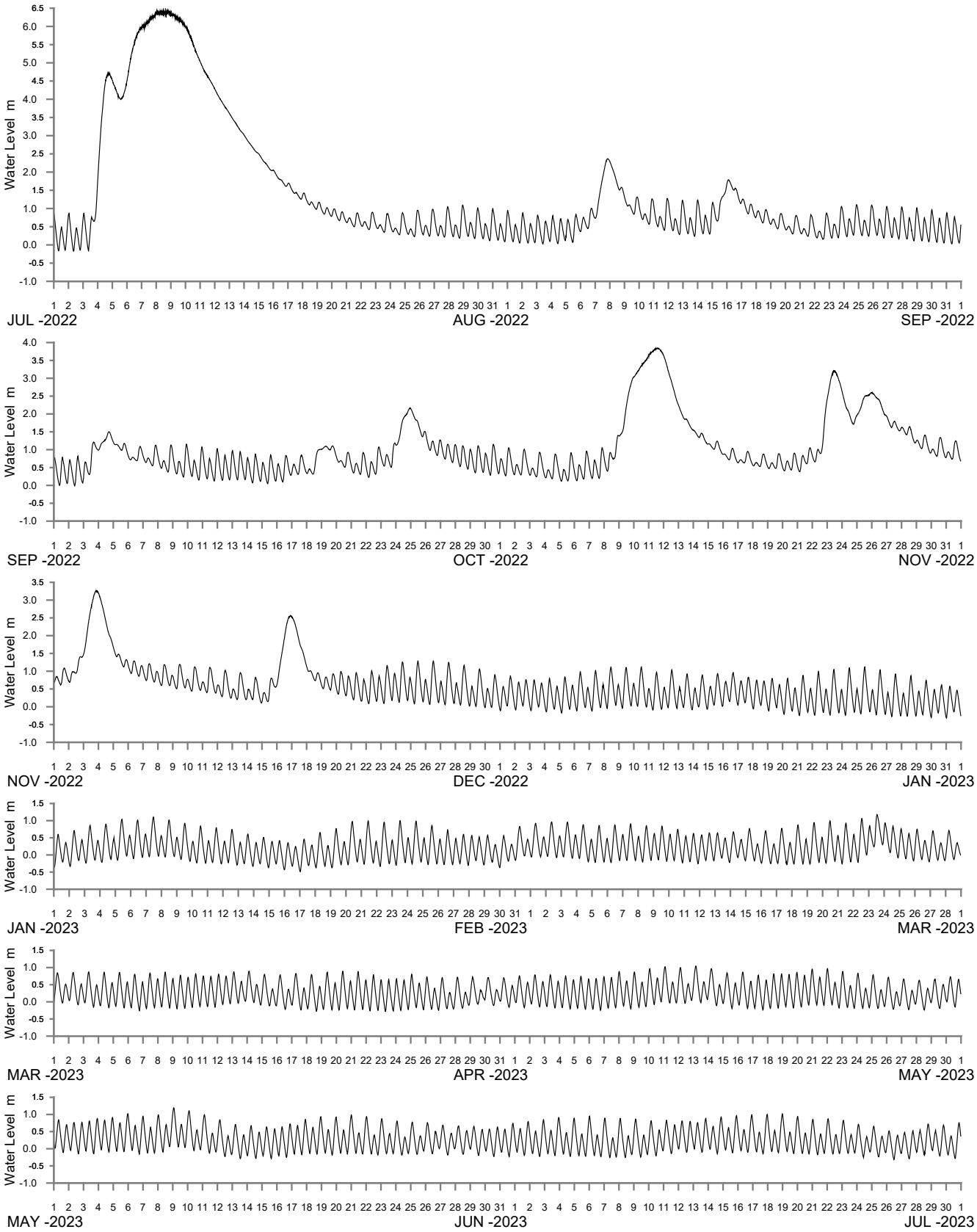
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HUNTER RIVER AT GREEN ROCKS
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-122



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

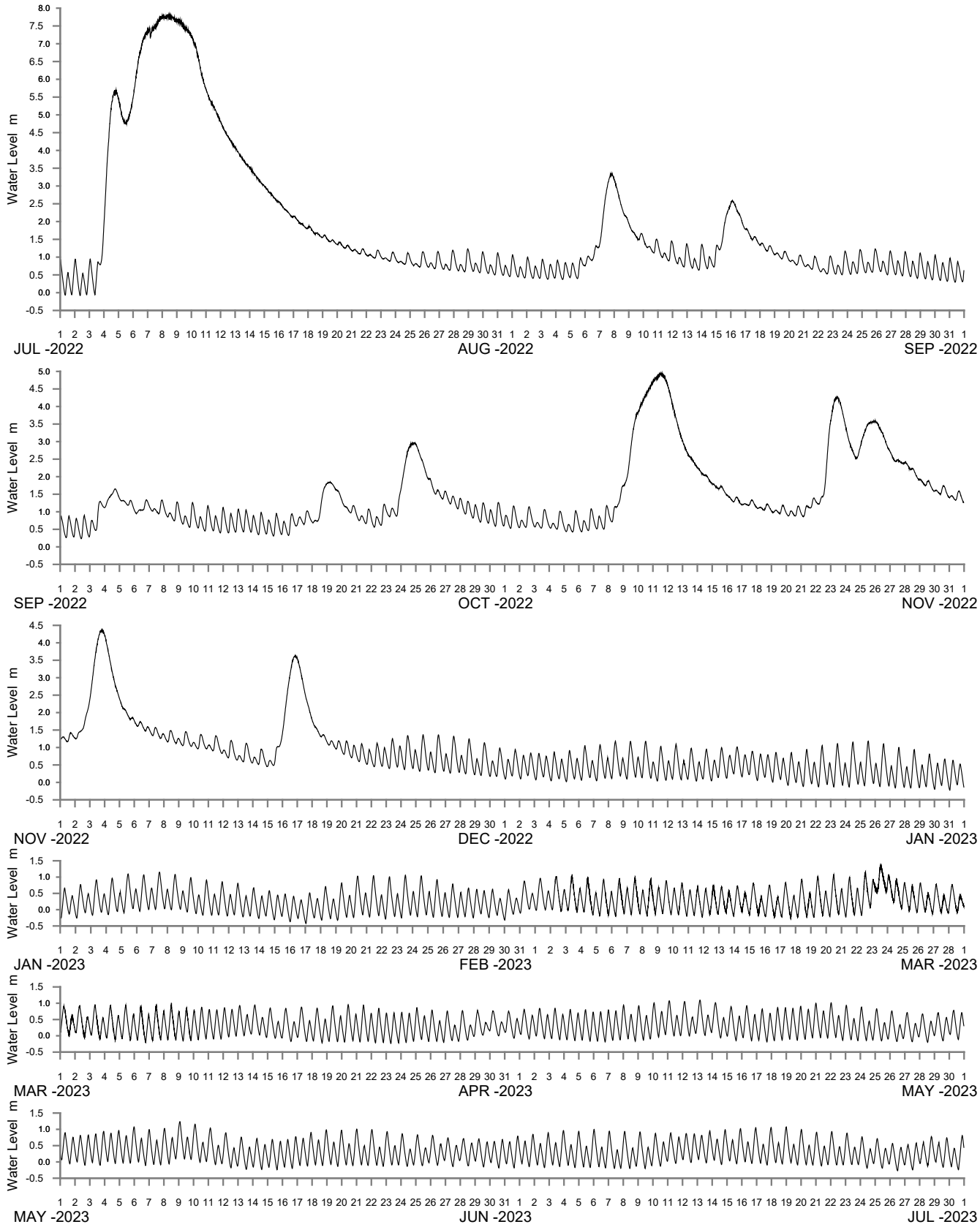
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HUNTER RIVER AT MORPETH
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-123



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

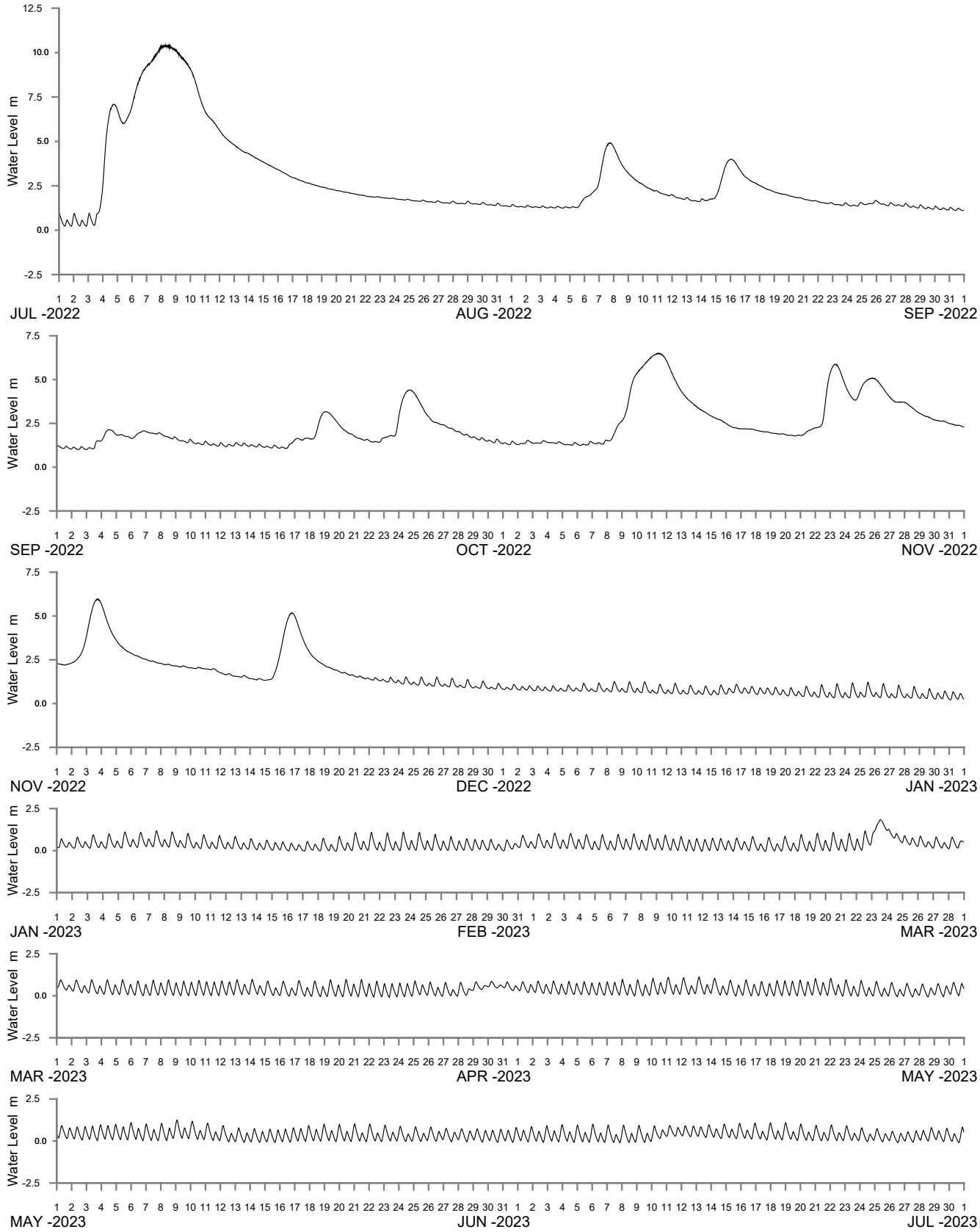
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HUNTER RIVER AT MCKIMMS CORNER
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-124



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

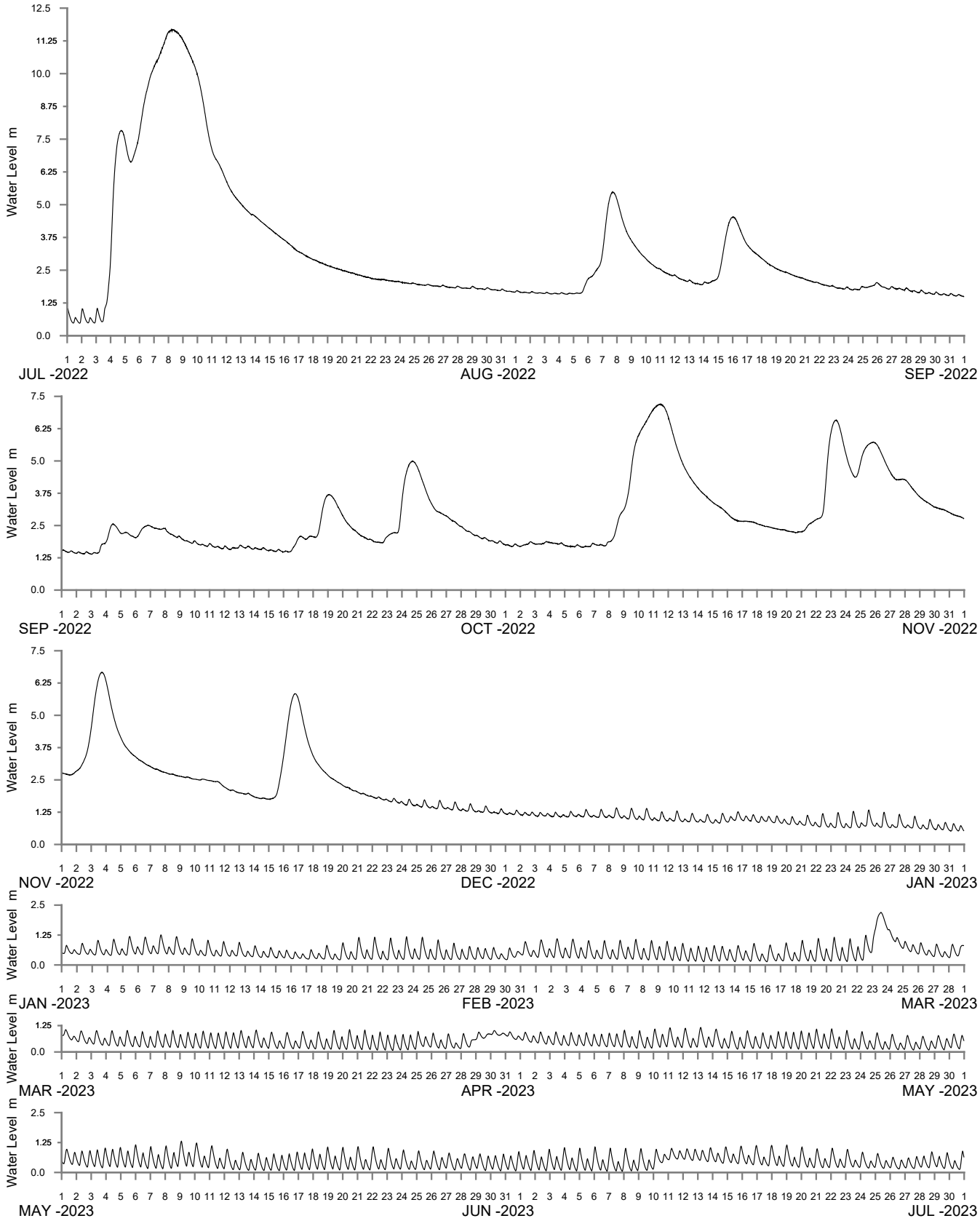
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HUNTER RIVER AT BELMORE BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-125



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

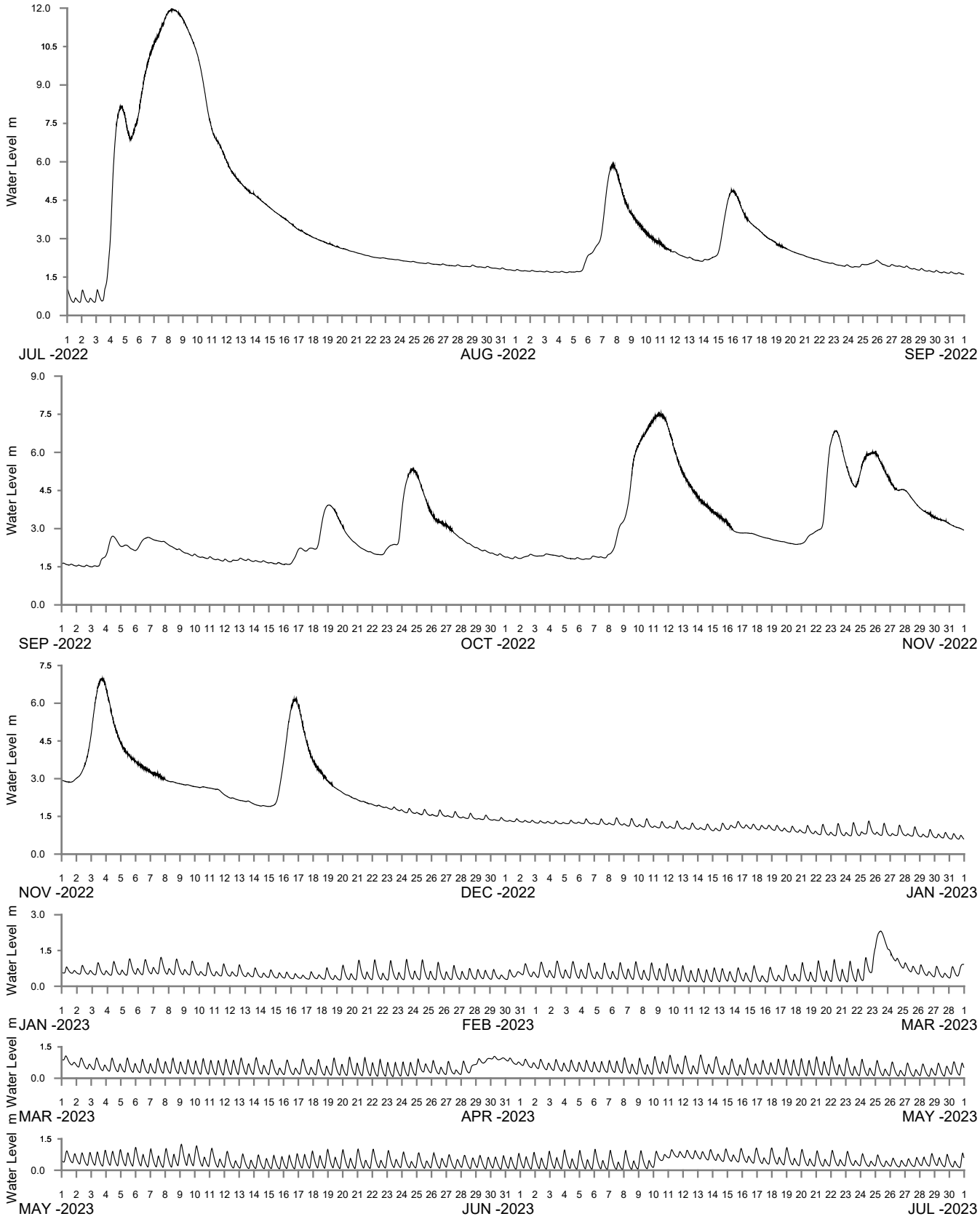
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HUNTER RIVER AT BOLWARRA DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-126



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

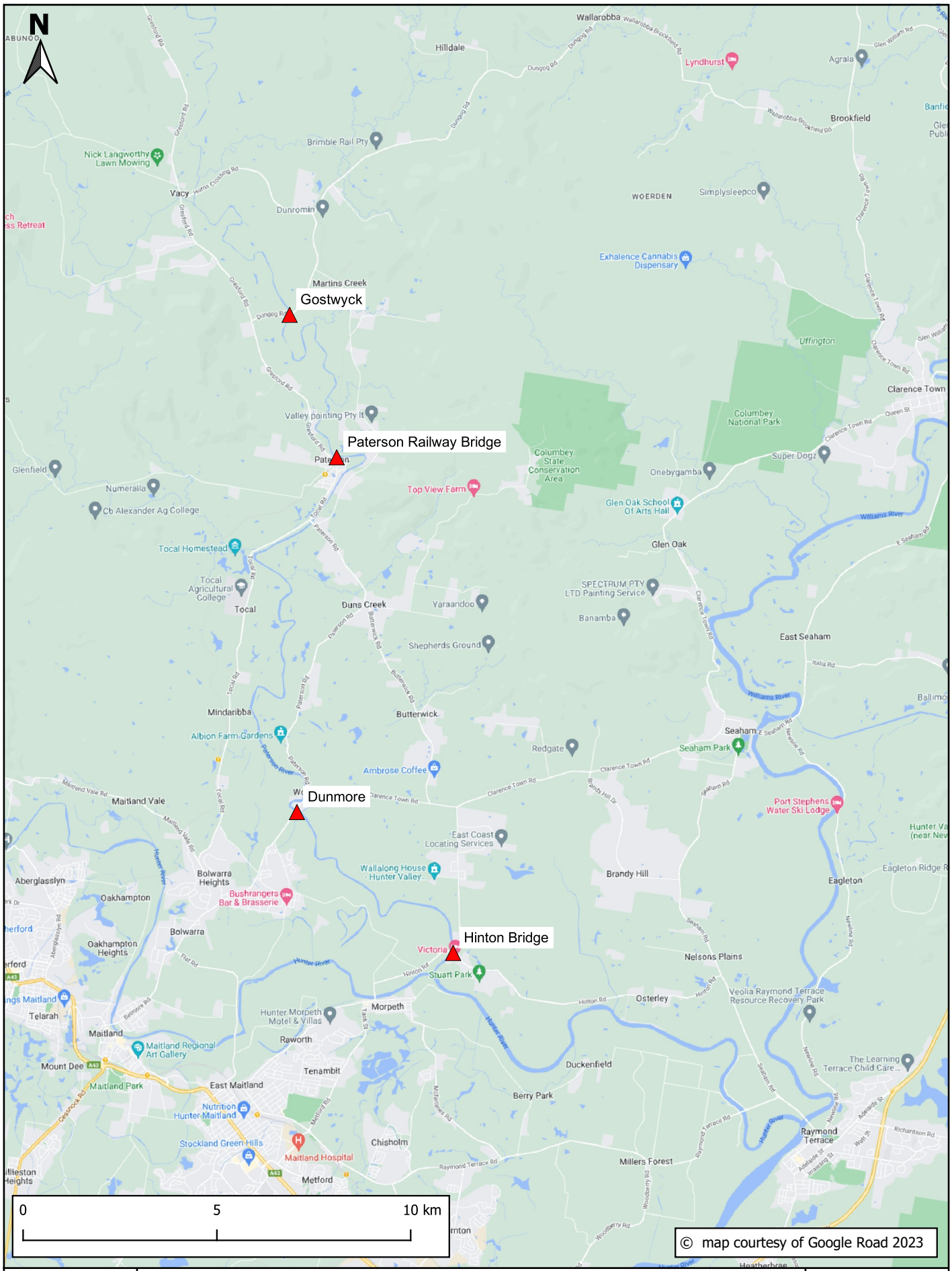
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HUNTER RIVER AT OAKHAMPTON RAILWAY BRIDGE 2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-127

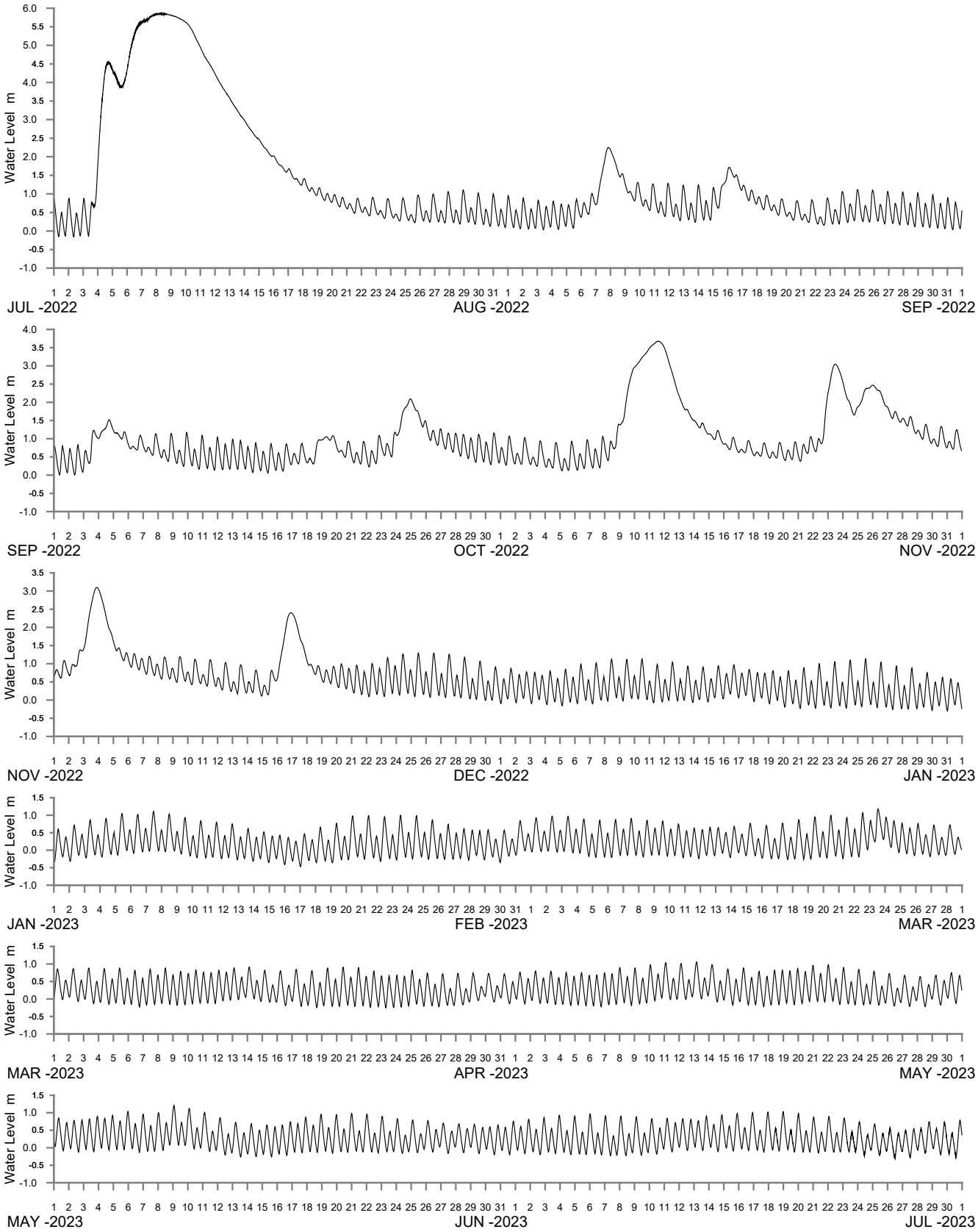


NSW GOVERNMENT

STATION LOCATIONS
PATERSON RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-128



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

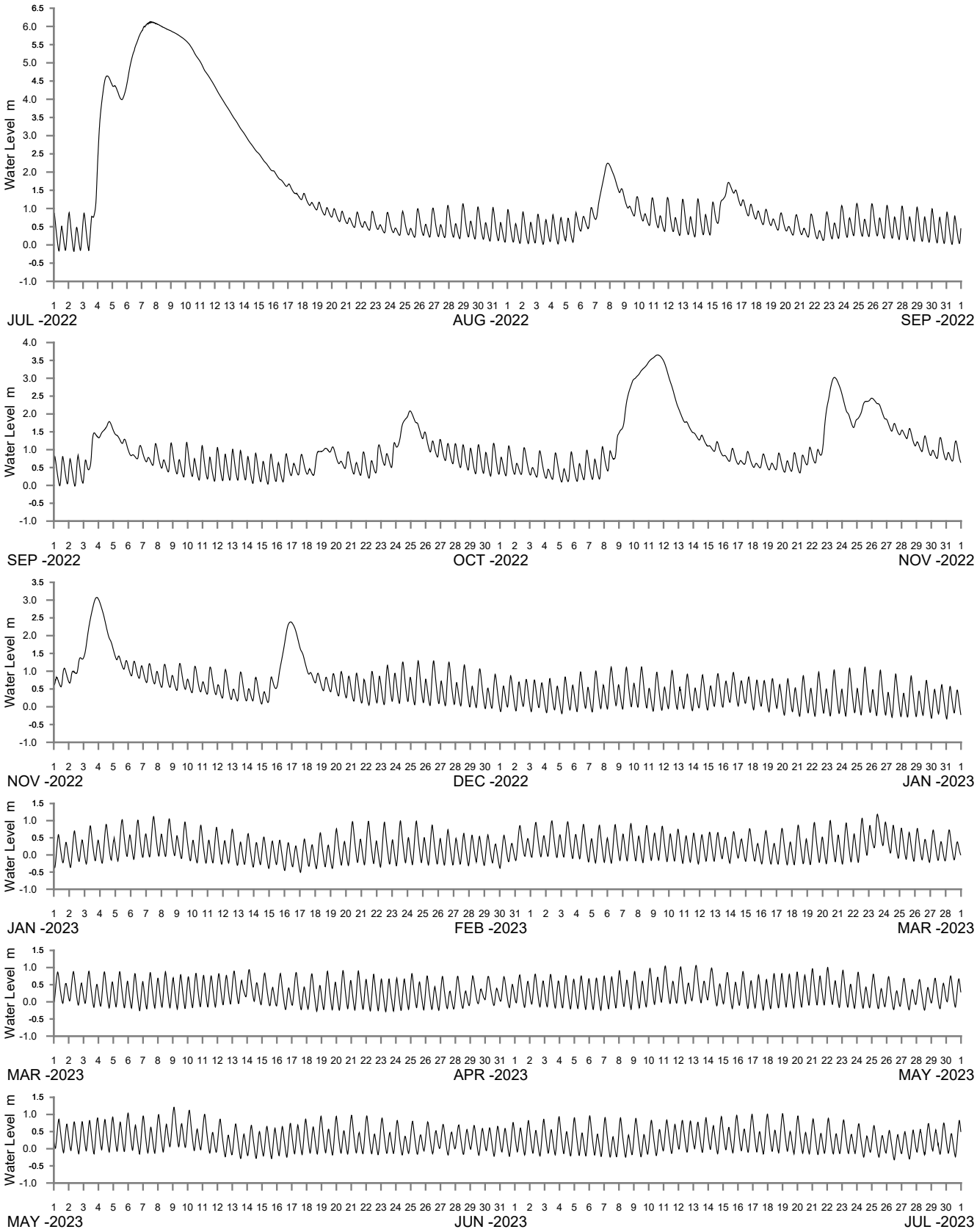
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

PATERSON RIVER AT HINTON BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-129



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

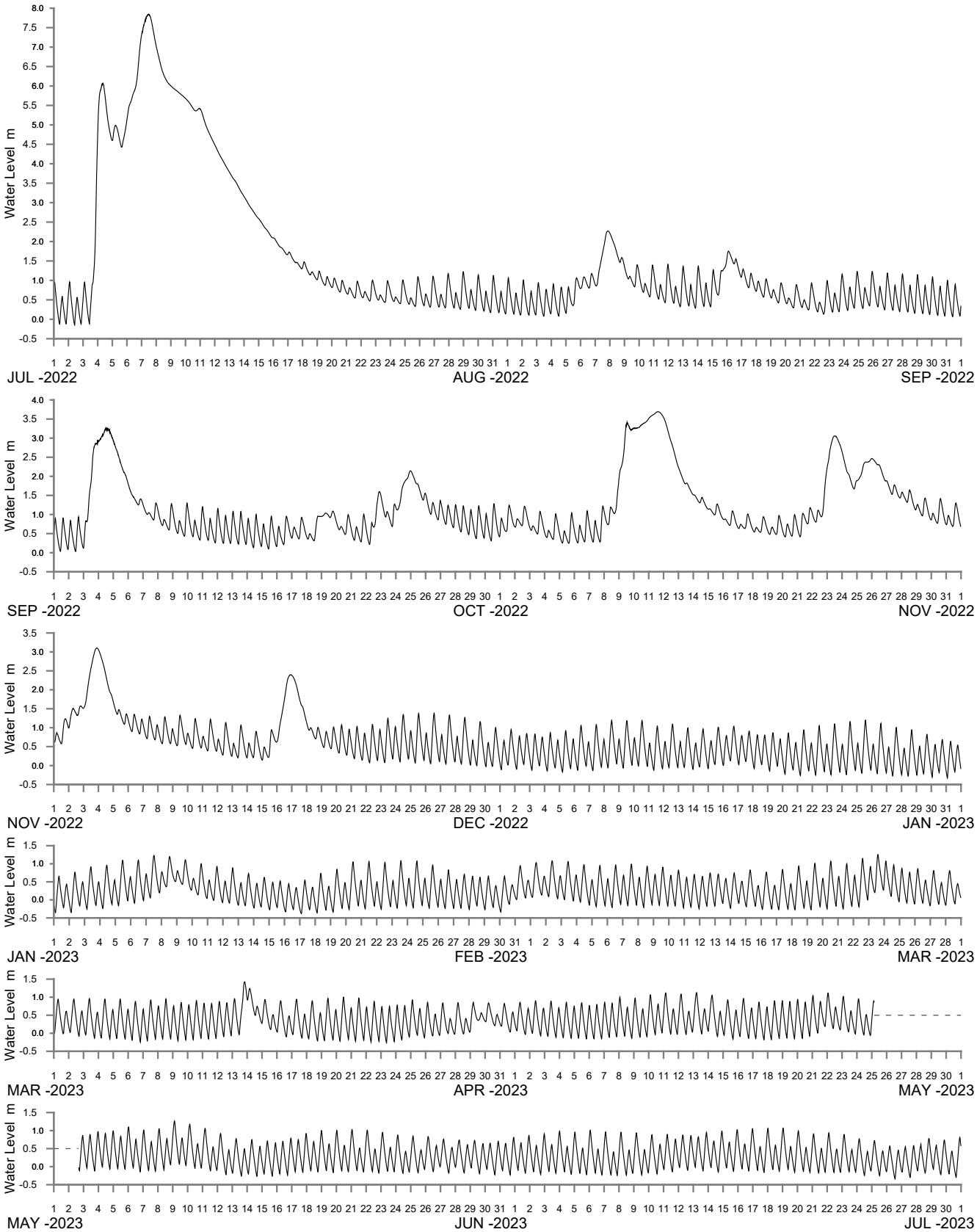
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

PATERSON RIVER AT DUNMORE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-130



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

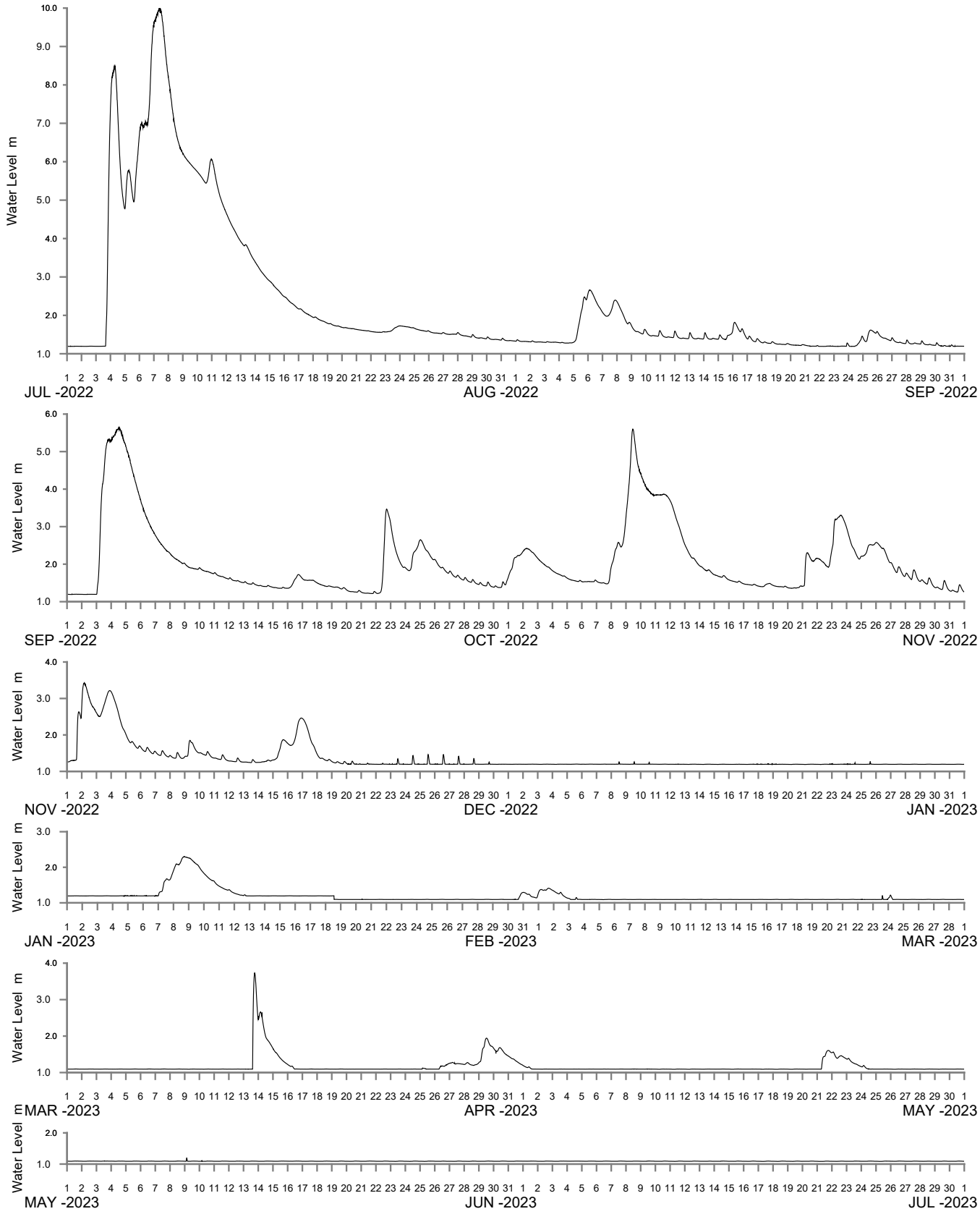
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

PATERSON RIVER AT PATERSON RAILWAY BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-131



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

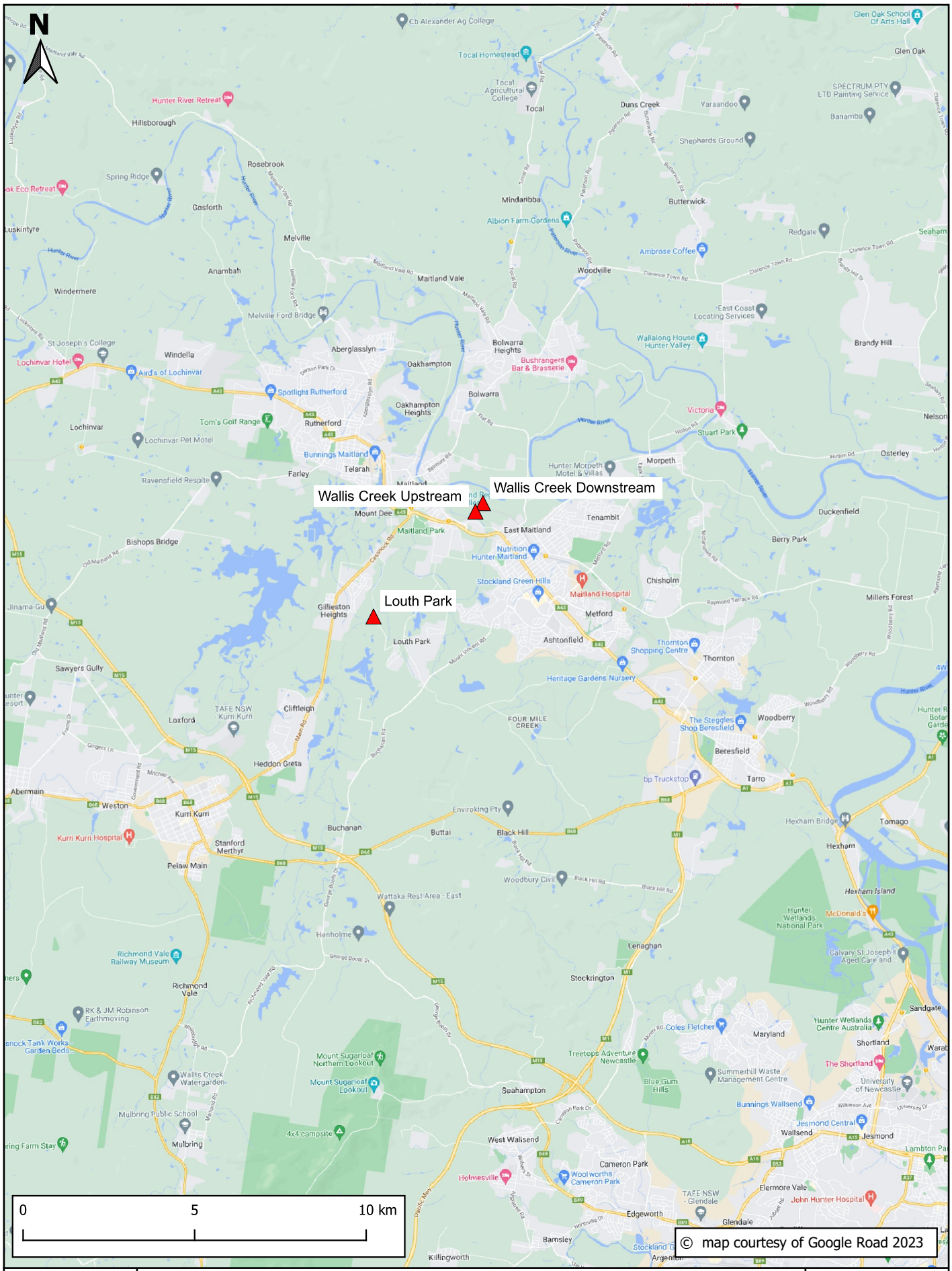
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

PATERSON RIVER AT GOSTWYCK
2022–23

Manly Hydraulics Laboratory

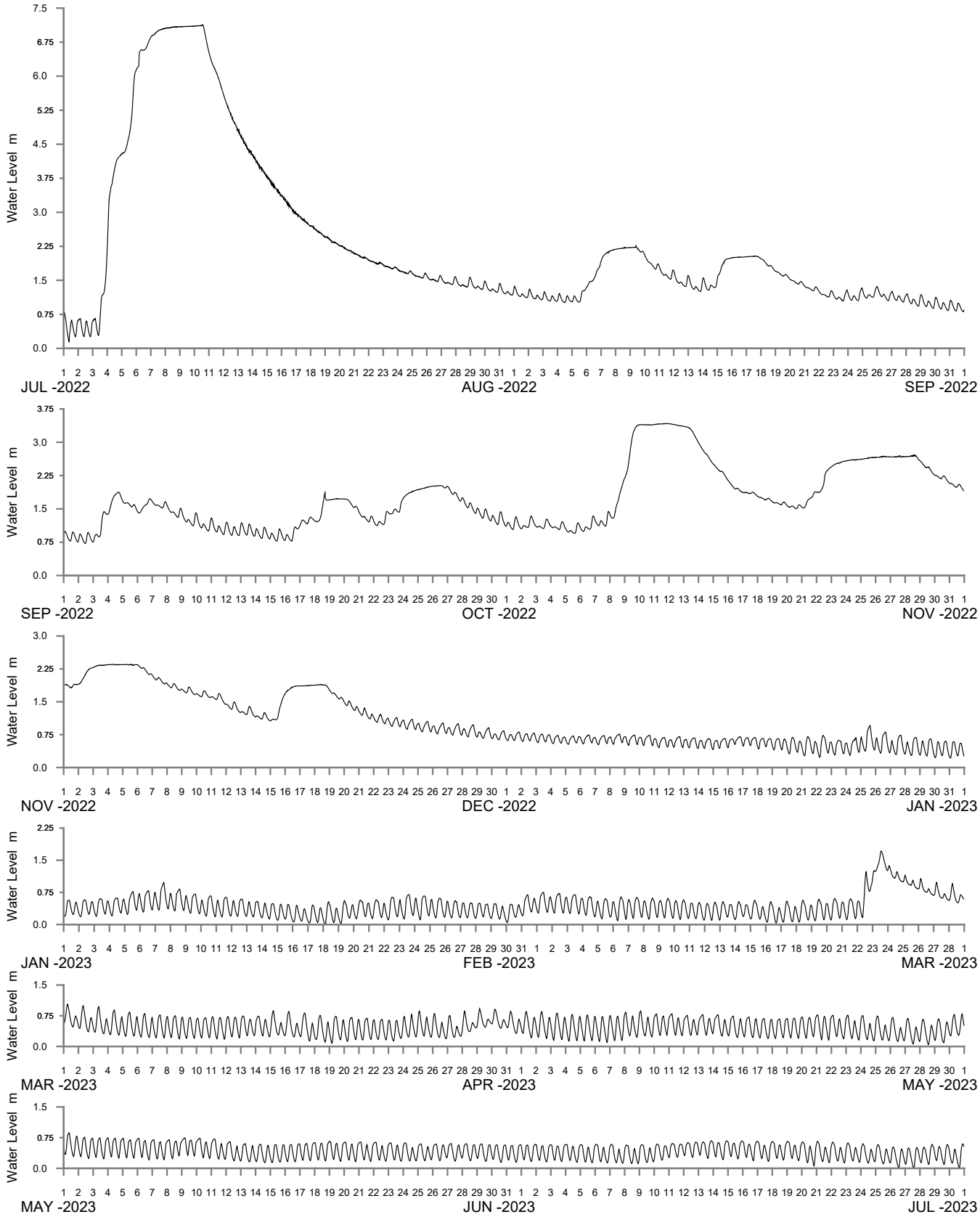
Report MHL2994
Figure
4-132



STATION LOCATIONS
WALLIS CREEK REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-133



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

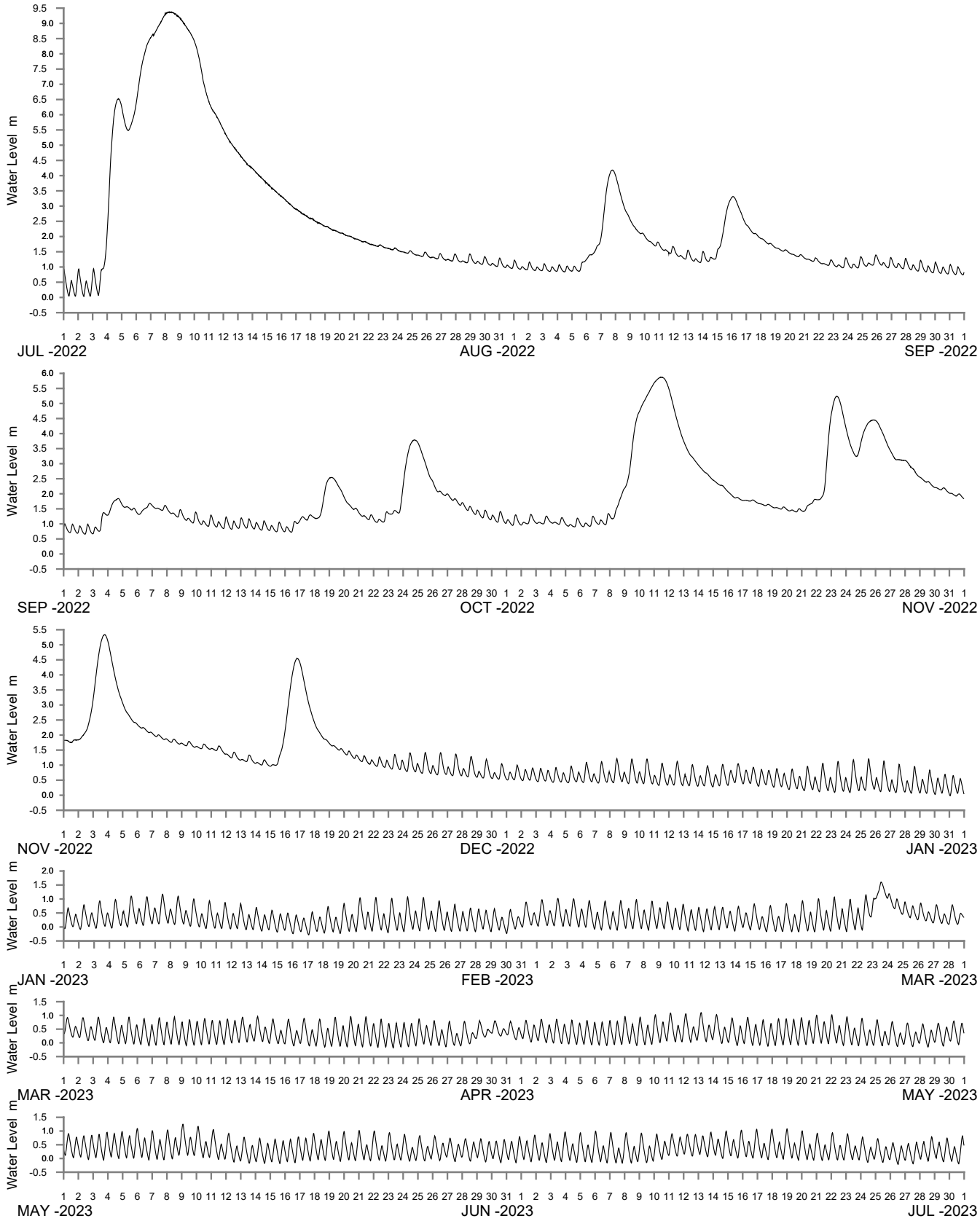
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WALLIS CREEK AT WALLIS CREEK UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-134



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

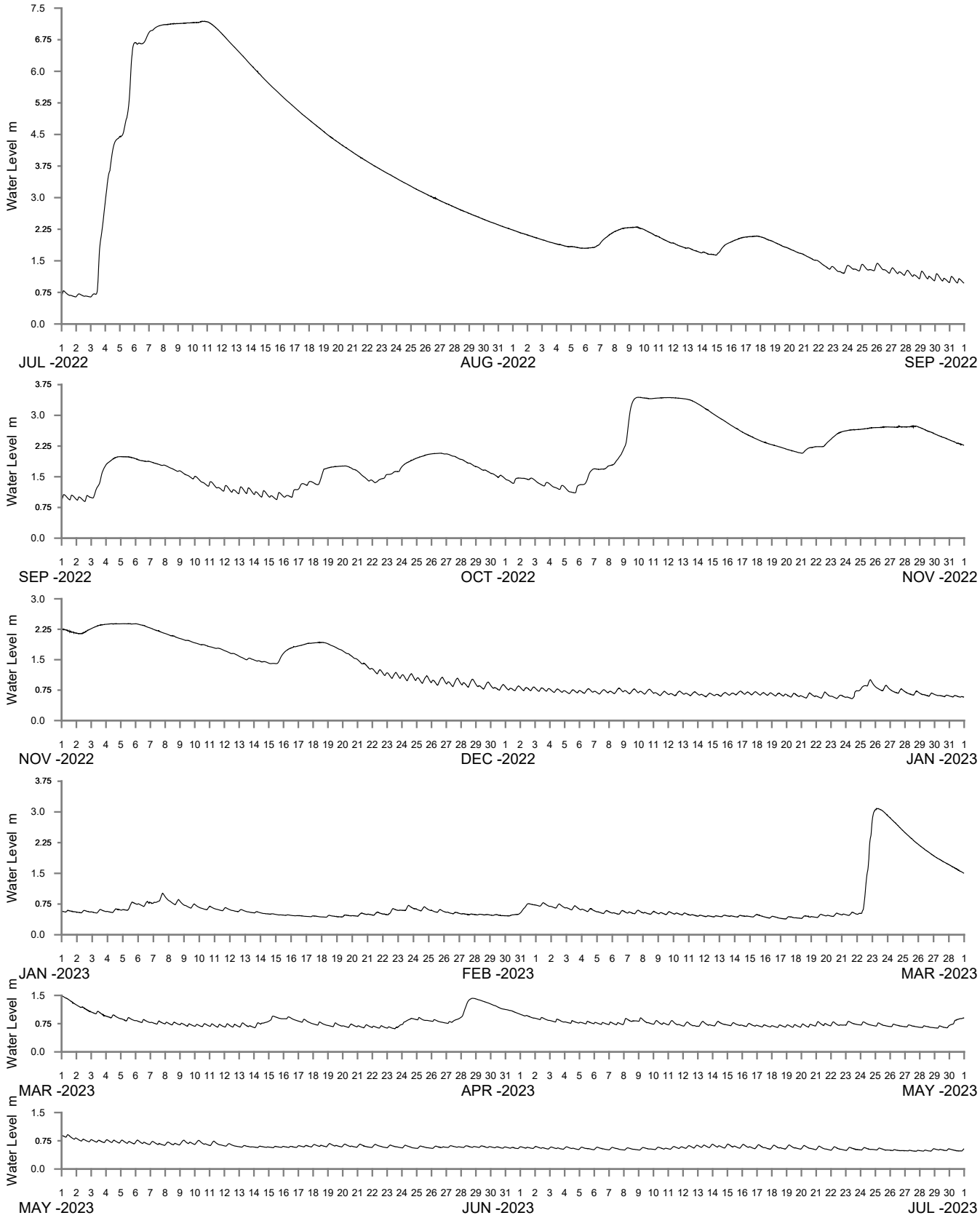
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WALLIS CREEK AT WALLIS CREEK DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-135



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

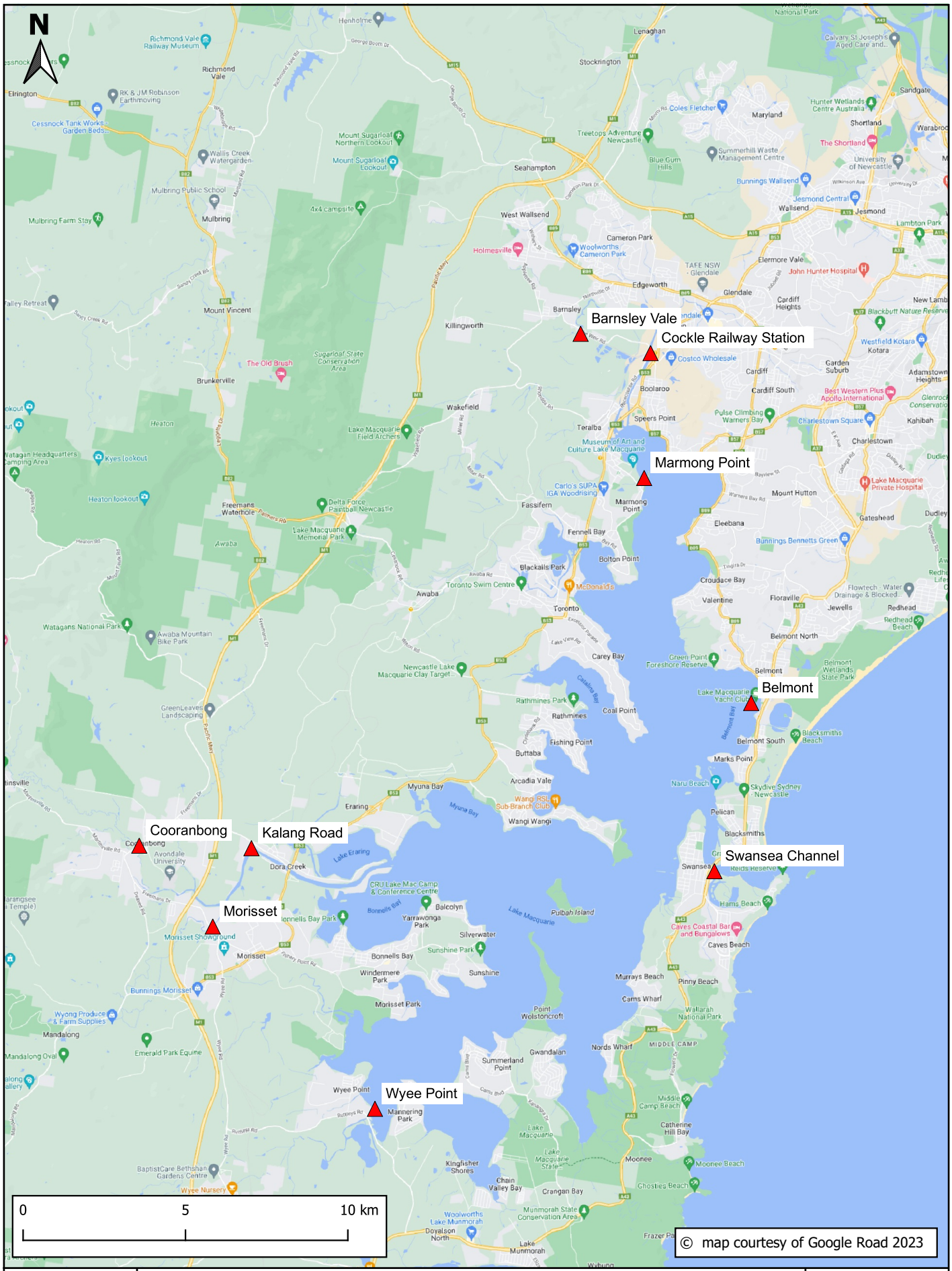
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WALLIS CREEK AT LOUTH PARK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-136

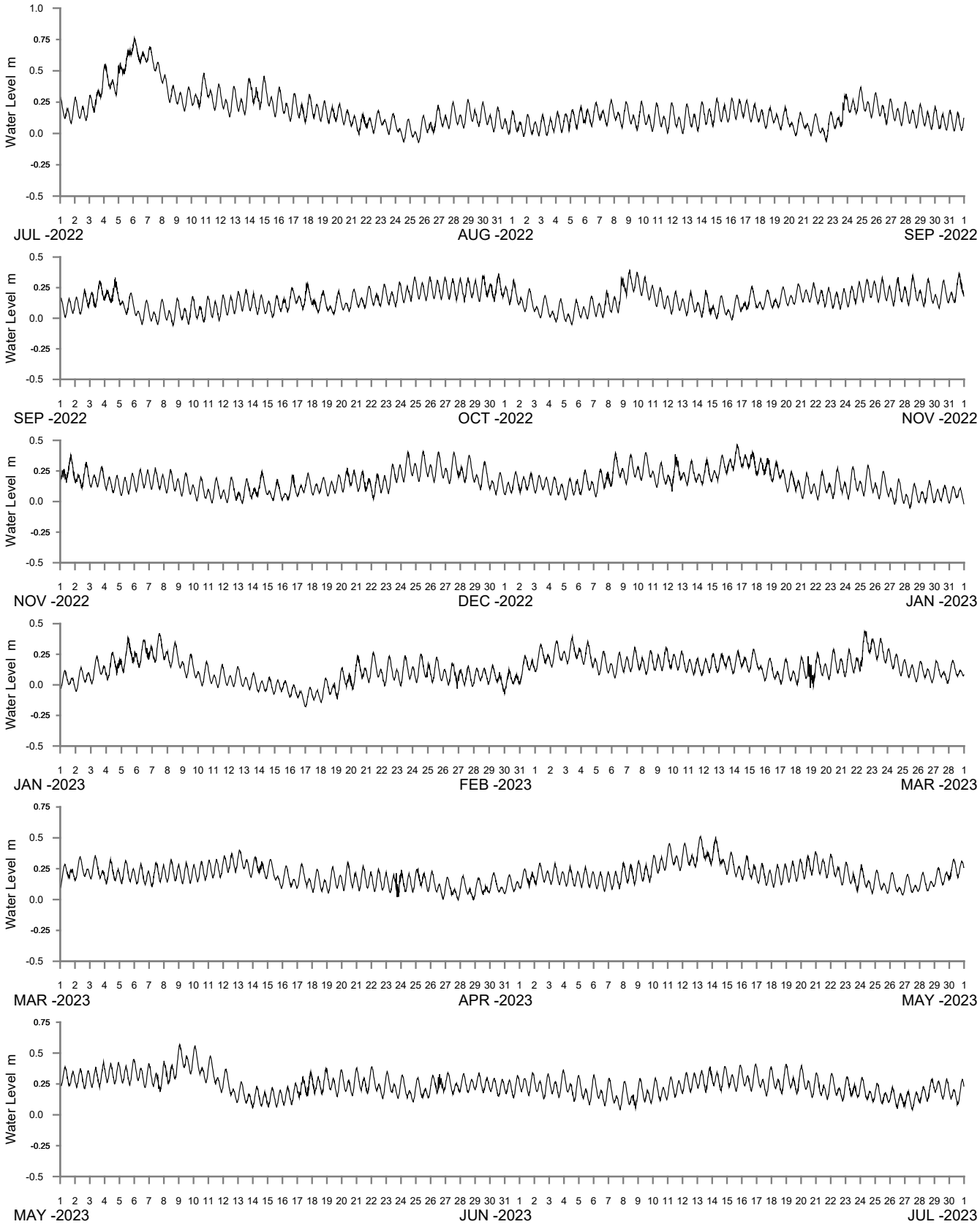


NSW GOVERNMENT

STATION LOCATIONS
LAKE MACQUARIE REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-137



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

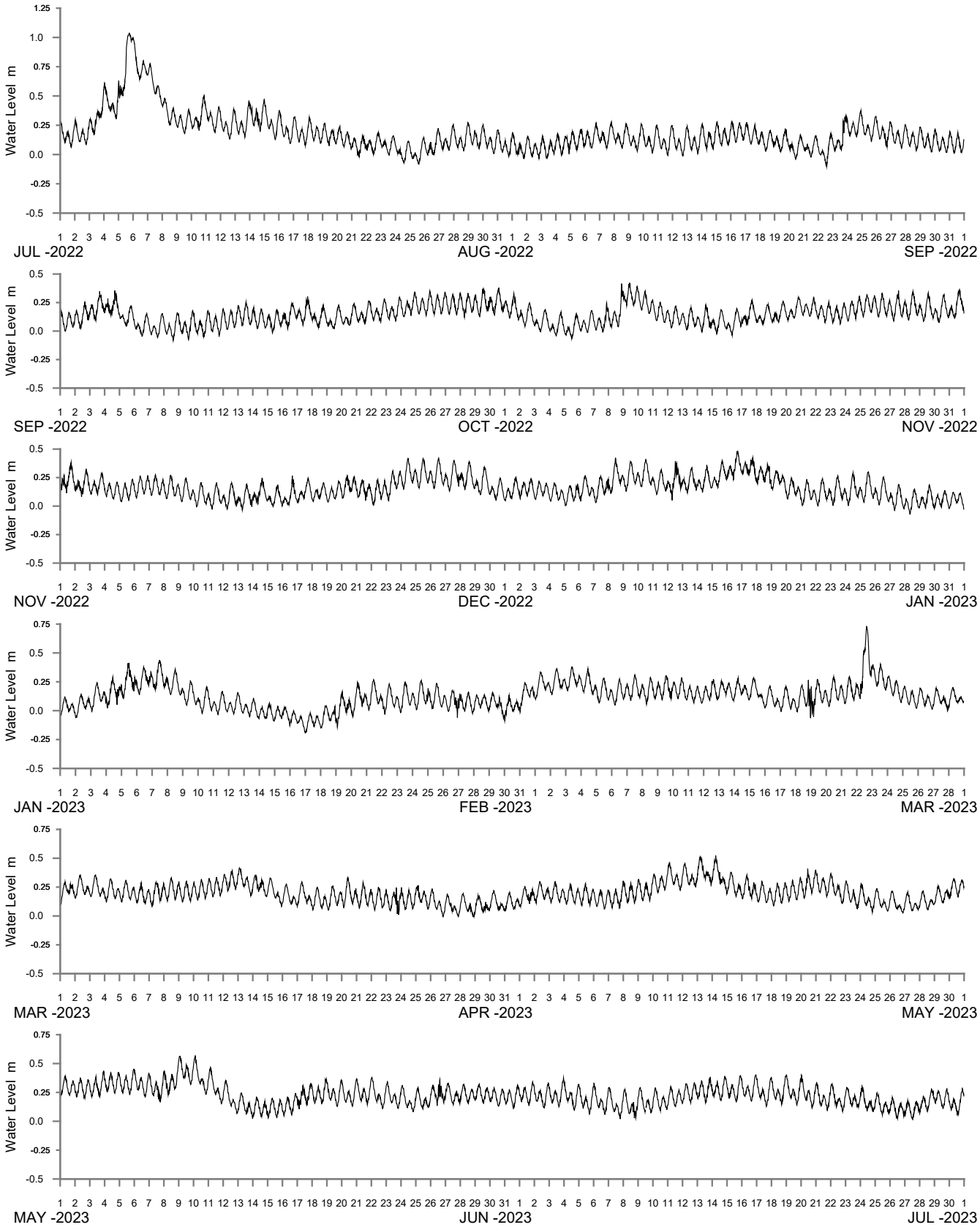
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LAKE MACQUARIE AT MARMONG POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-138



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

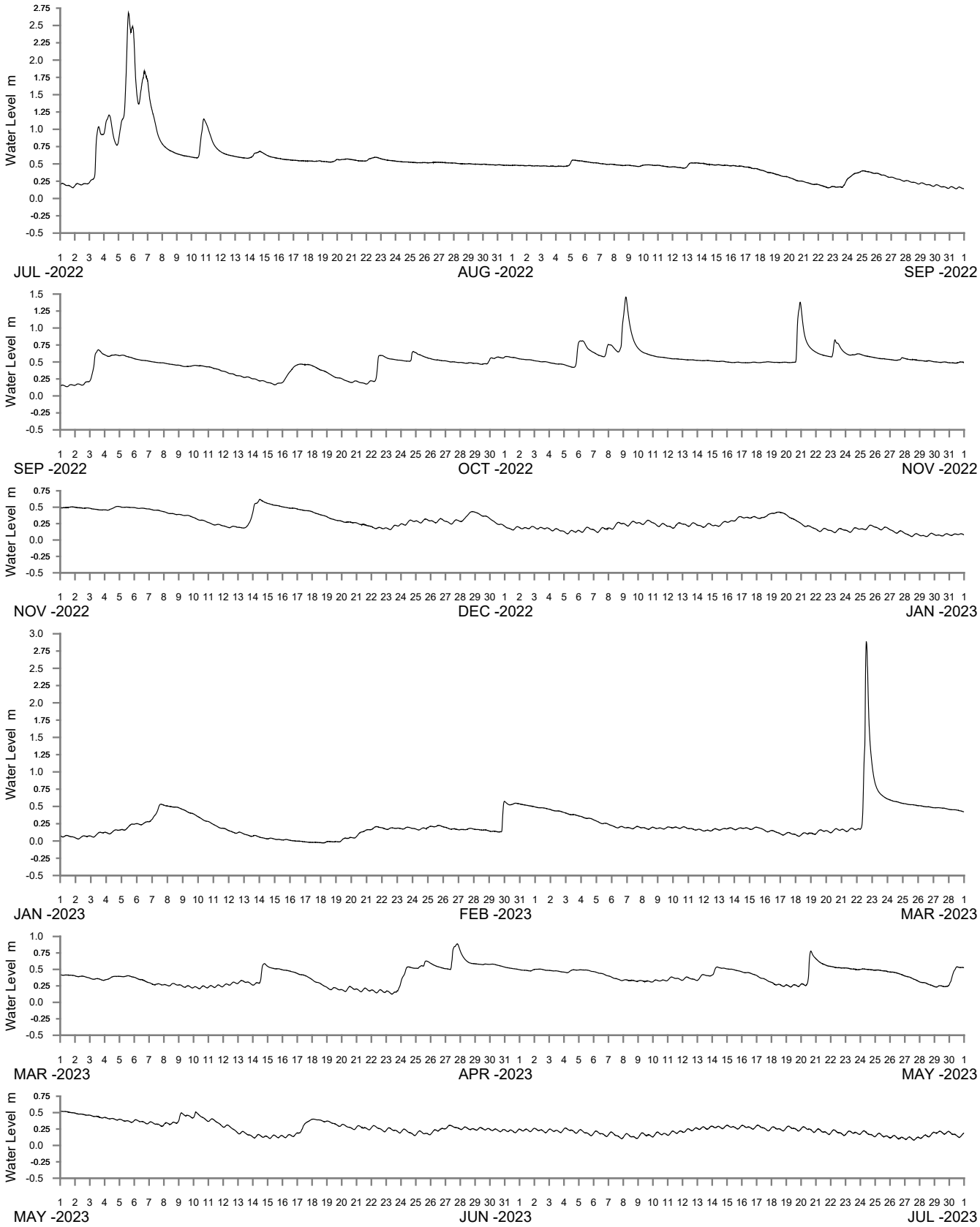
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

COCKLE CREEK AT COCKLE RAILWAY STATION
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-139



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

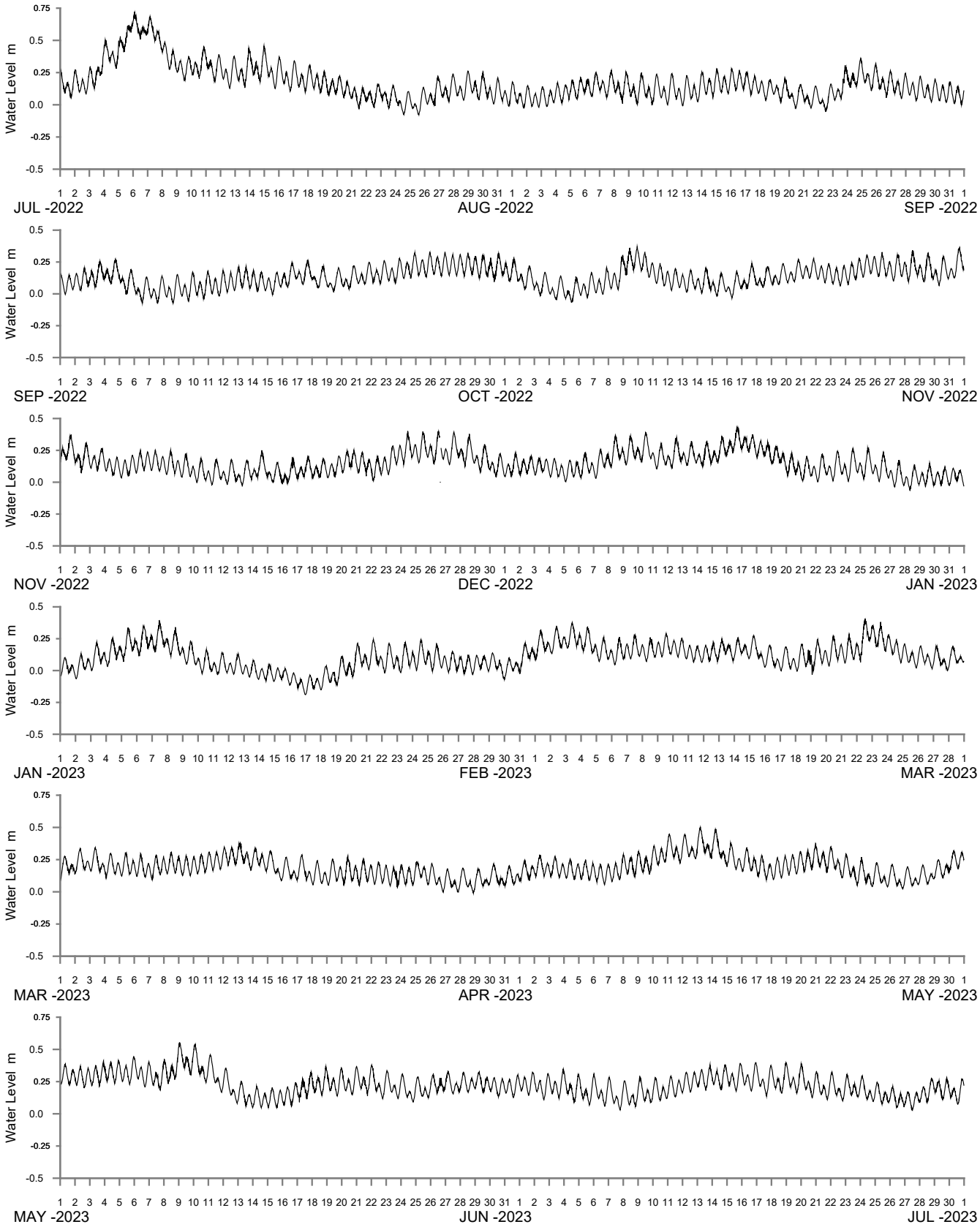
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

COCKLE CREEK AT BARNSLEY VALE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-140



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

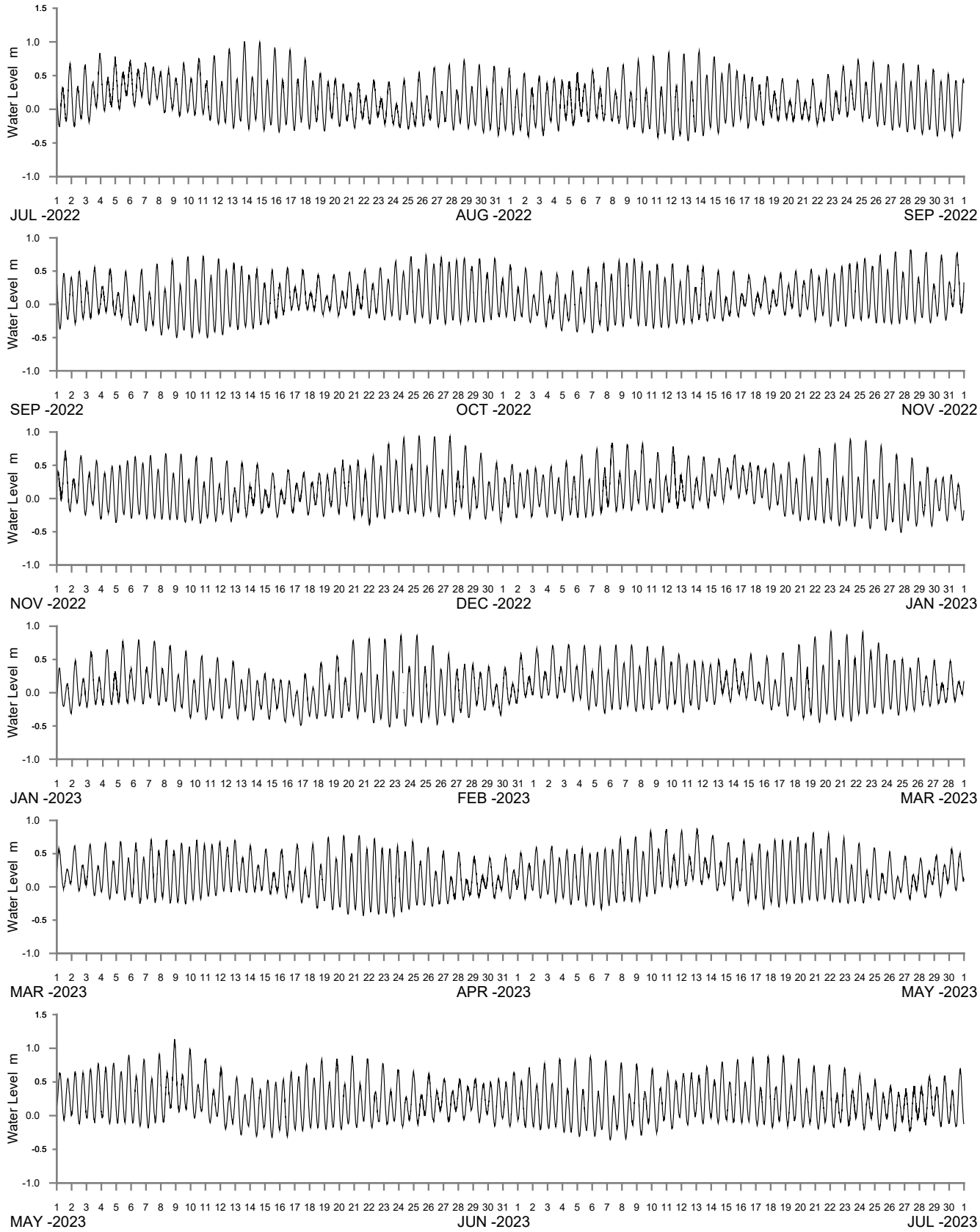
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LAKE MACQUARIE AT BELMONT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-141



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

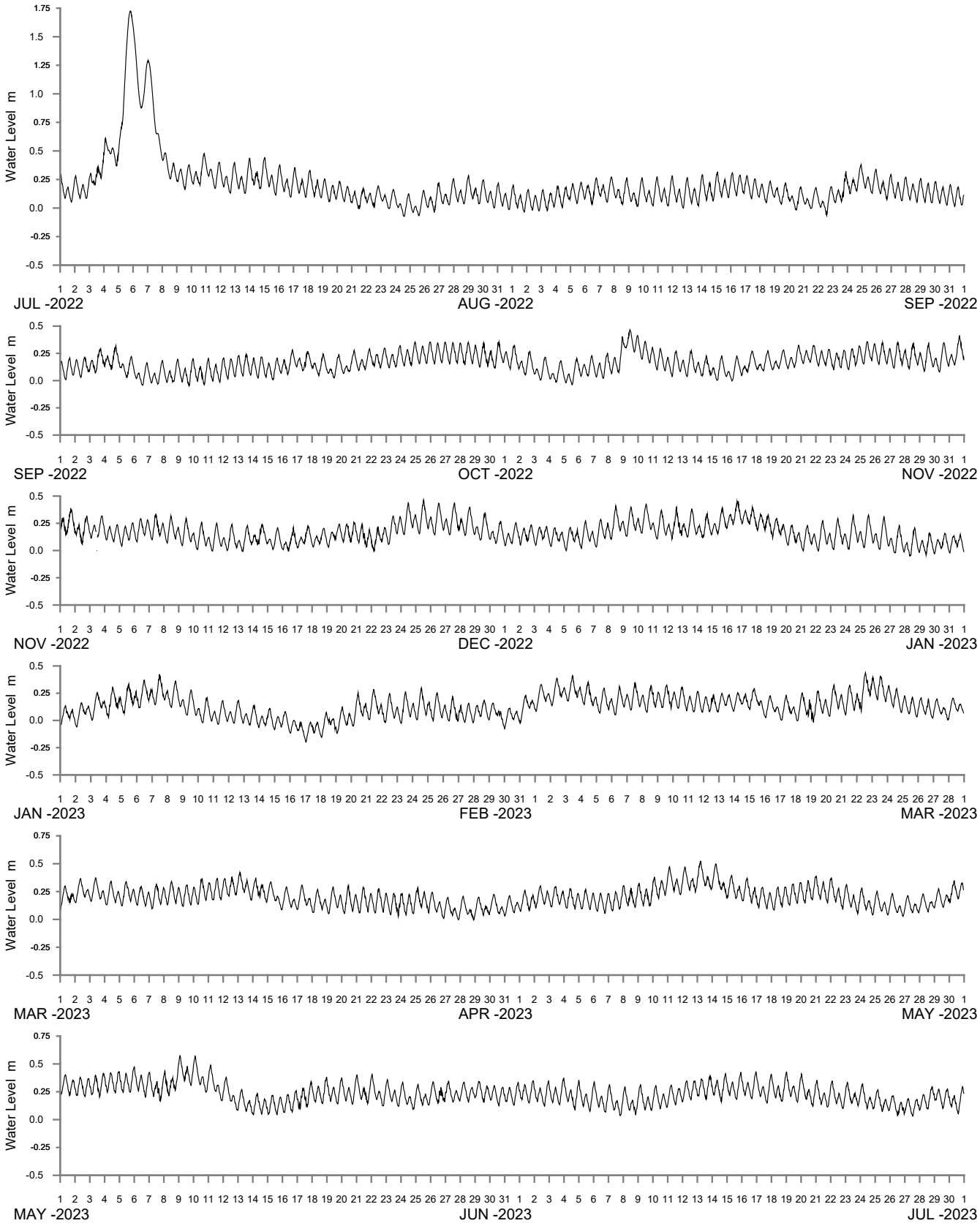
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LAKE MACQUARIE AT SWANSEA CHANNEL
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-142



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

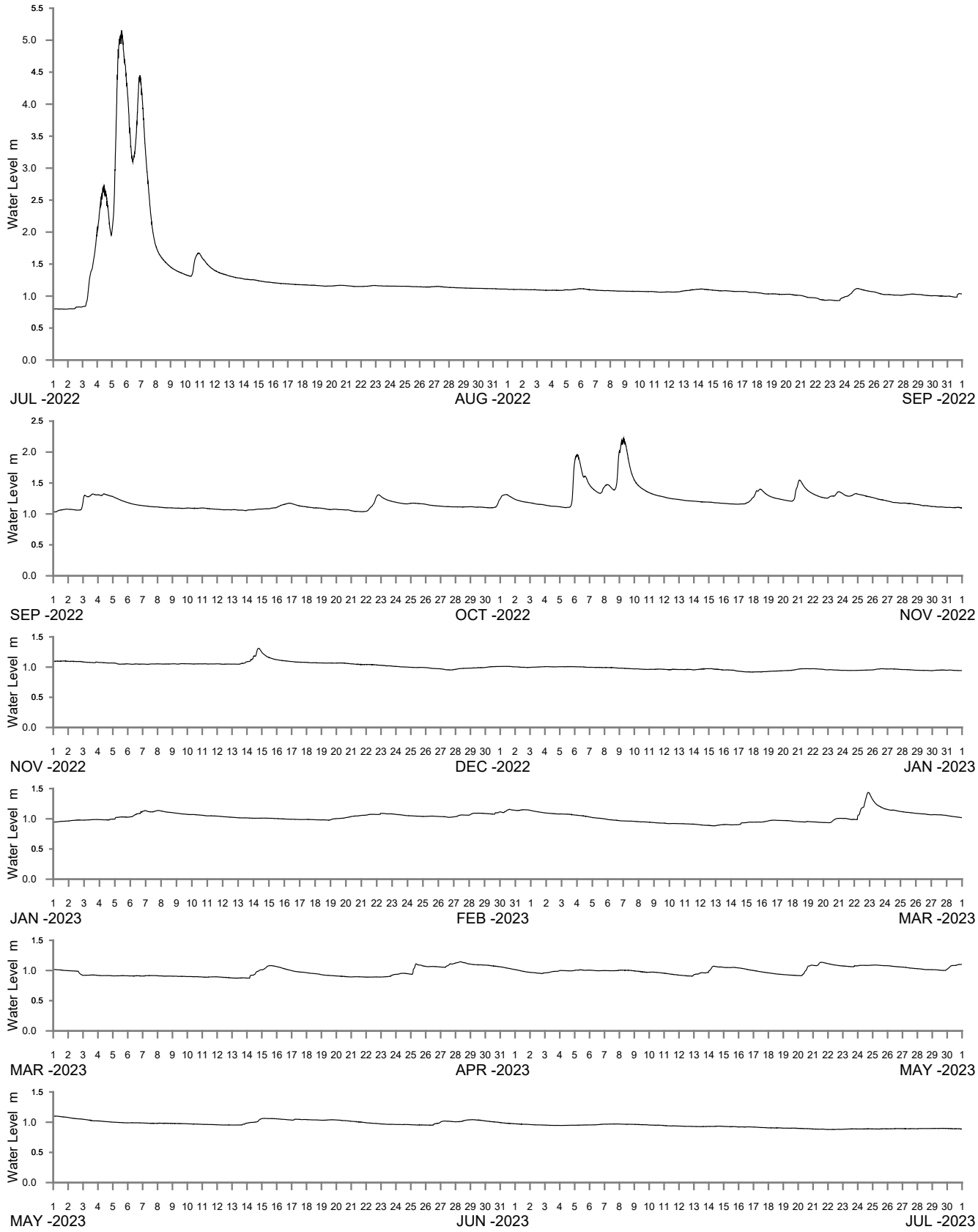
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

DORA CREEK AT KALANG ROAD
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-143



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

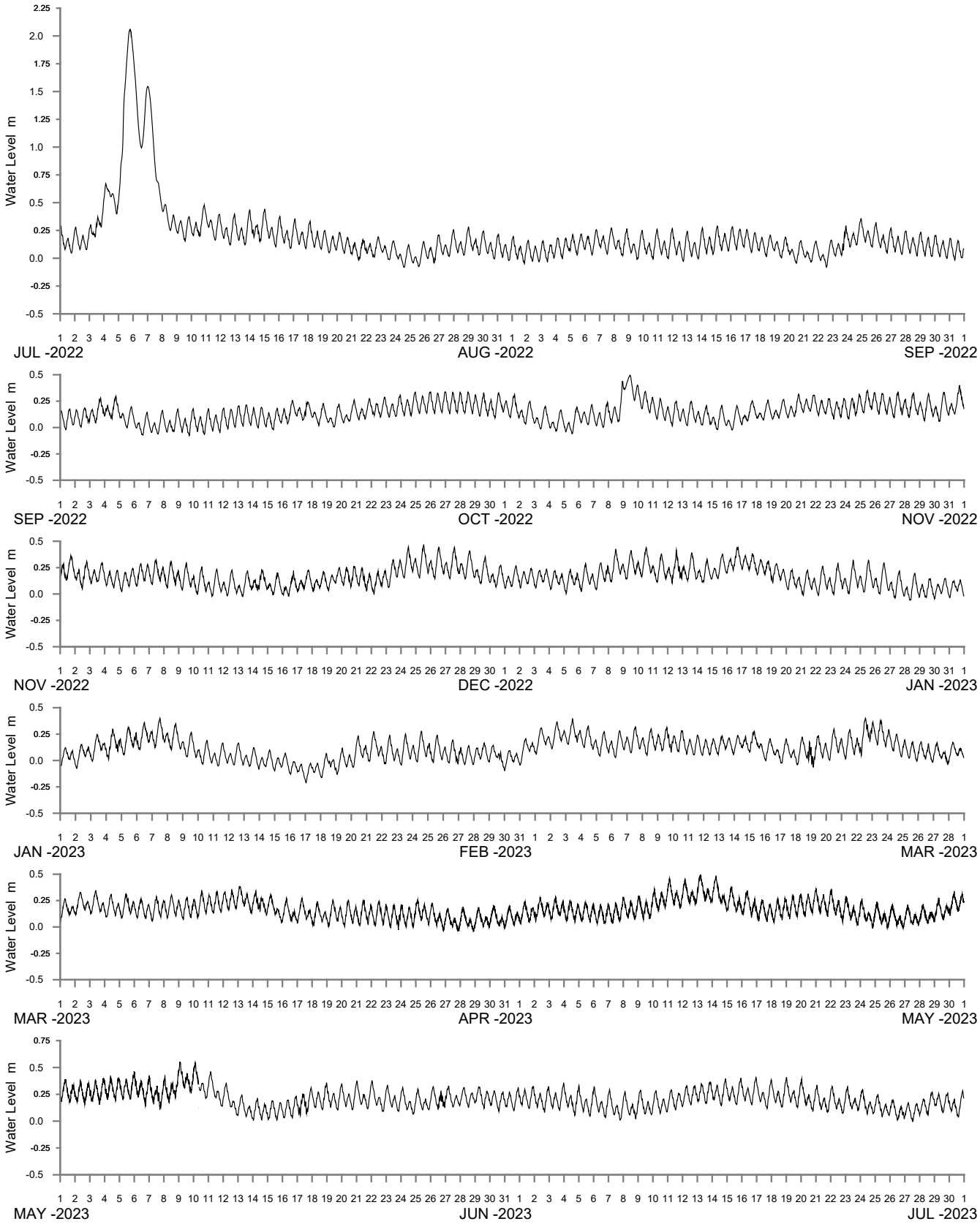
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

DORA CREEK AT COORANBONG
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-144



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

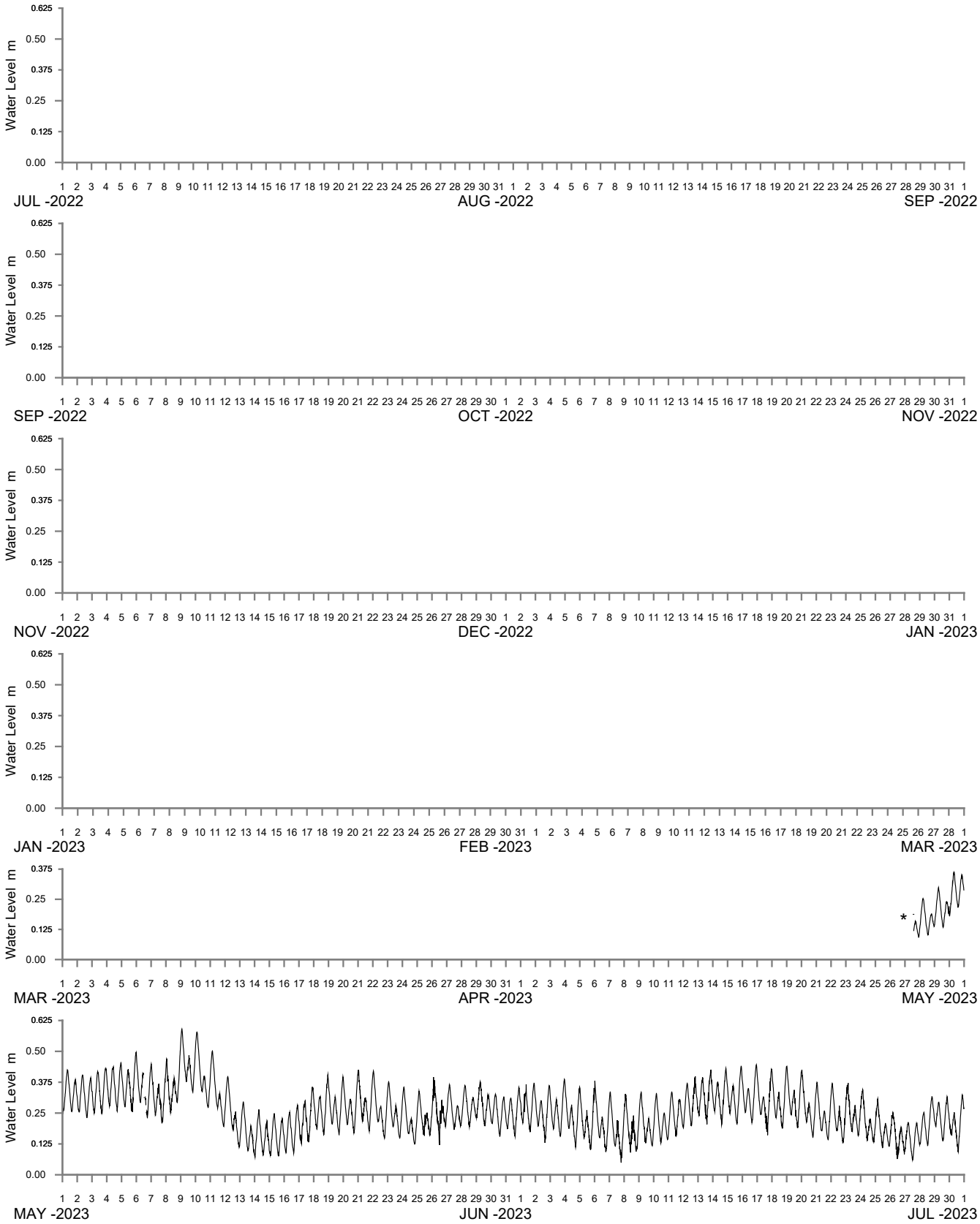
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

STOCKTON CREEK AT MORISSET
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-145



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

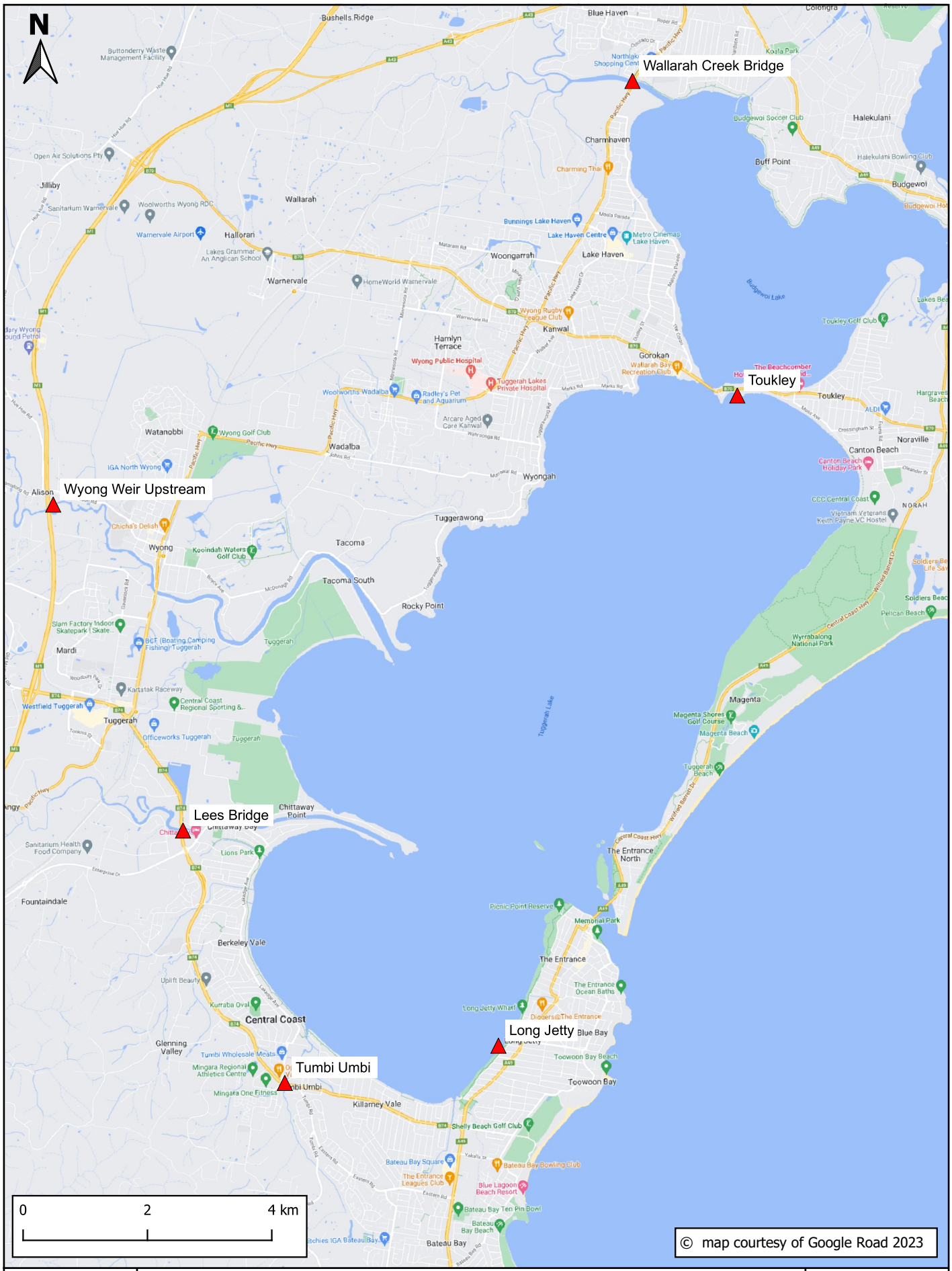
* Station installed on 27/04/2023

NSW GOVERNMENT

LAKE MACQUARIE AT WYEE POINT
2022–23

Manly Hydraulics Laboratory

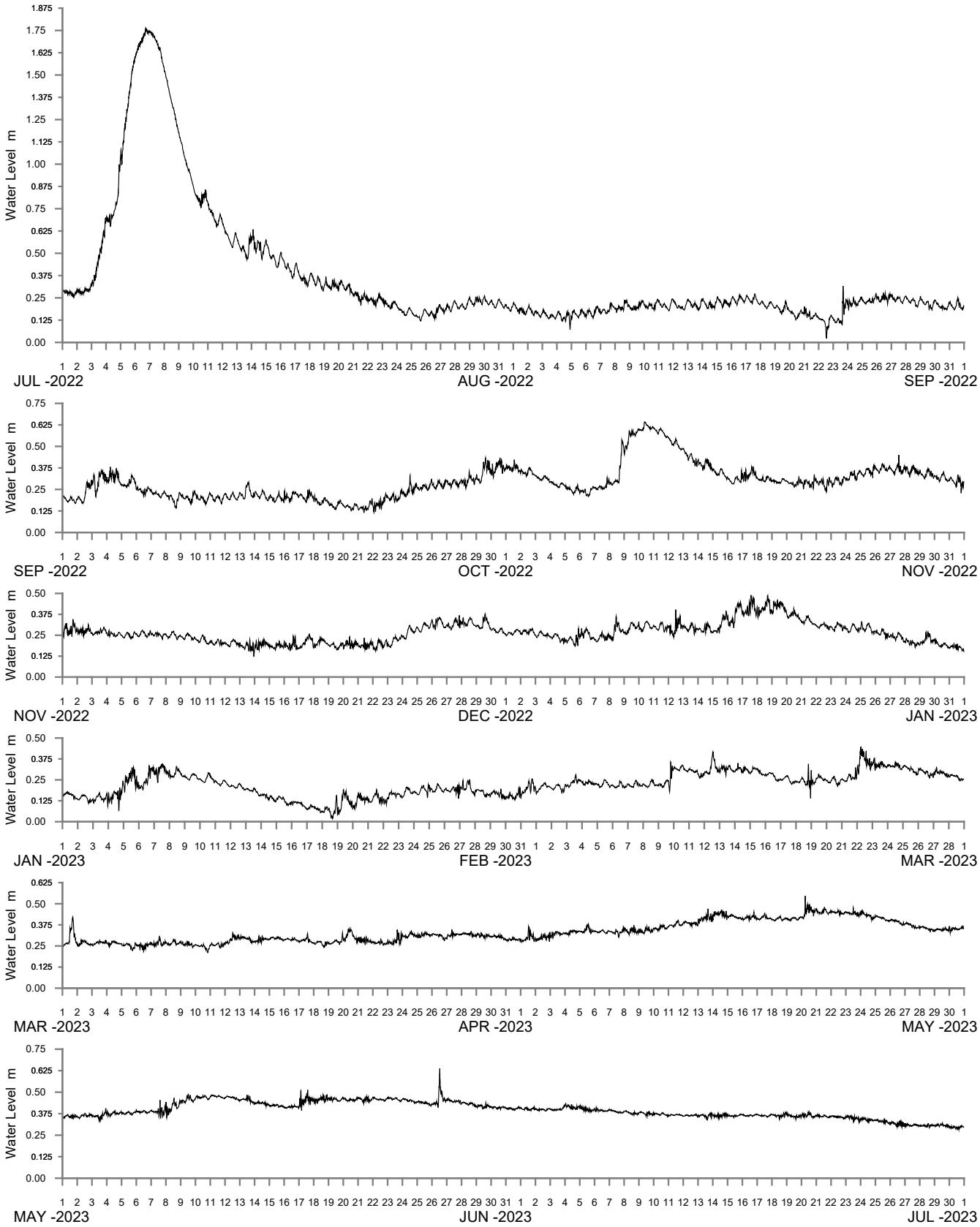
Report MHL2994
Figure
4-146



STATION LOCATIONS
TUGGERAH LAKES REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-147



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

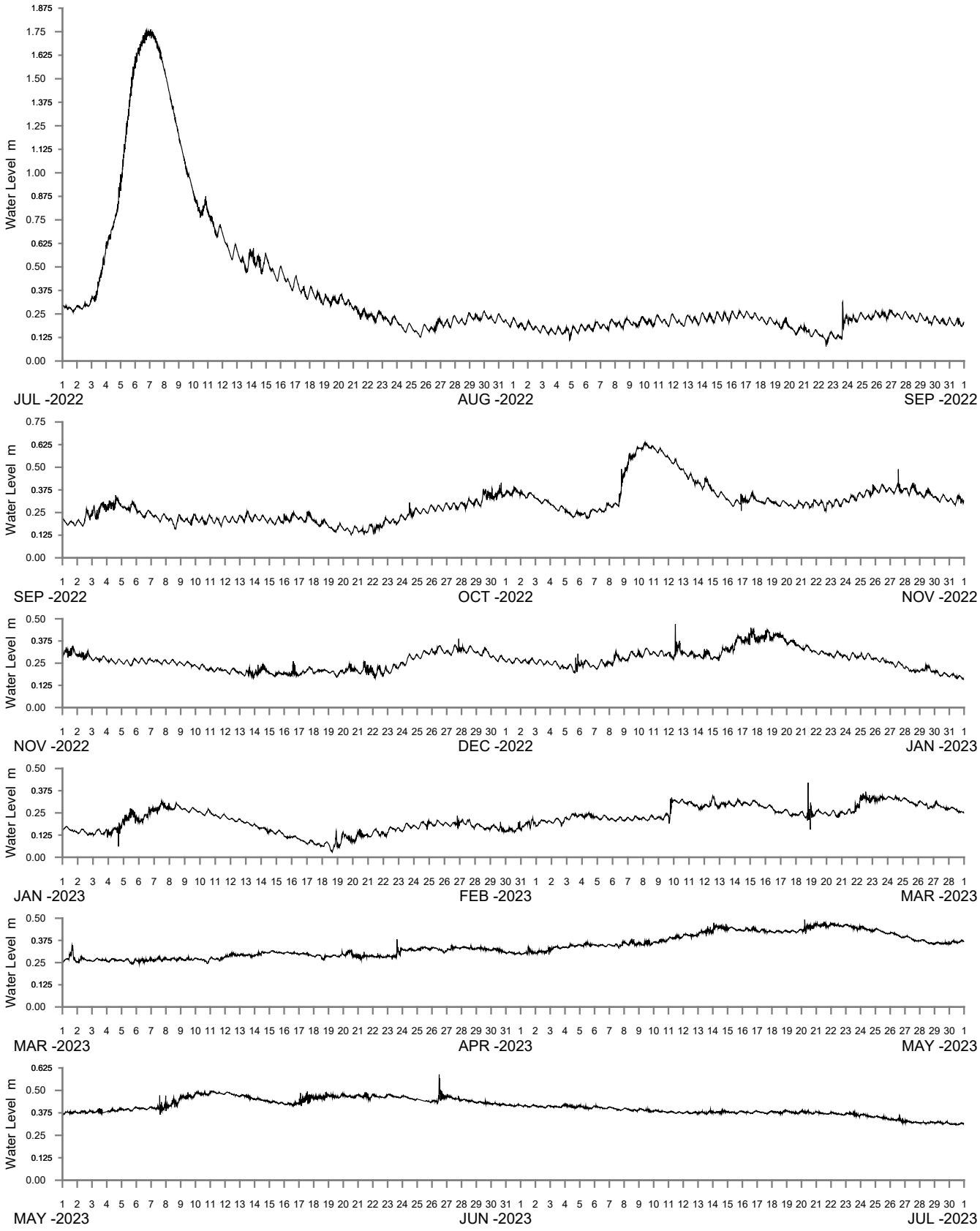
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WALLARAH CREEK AT WALLARAH CREEK BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-148



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

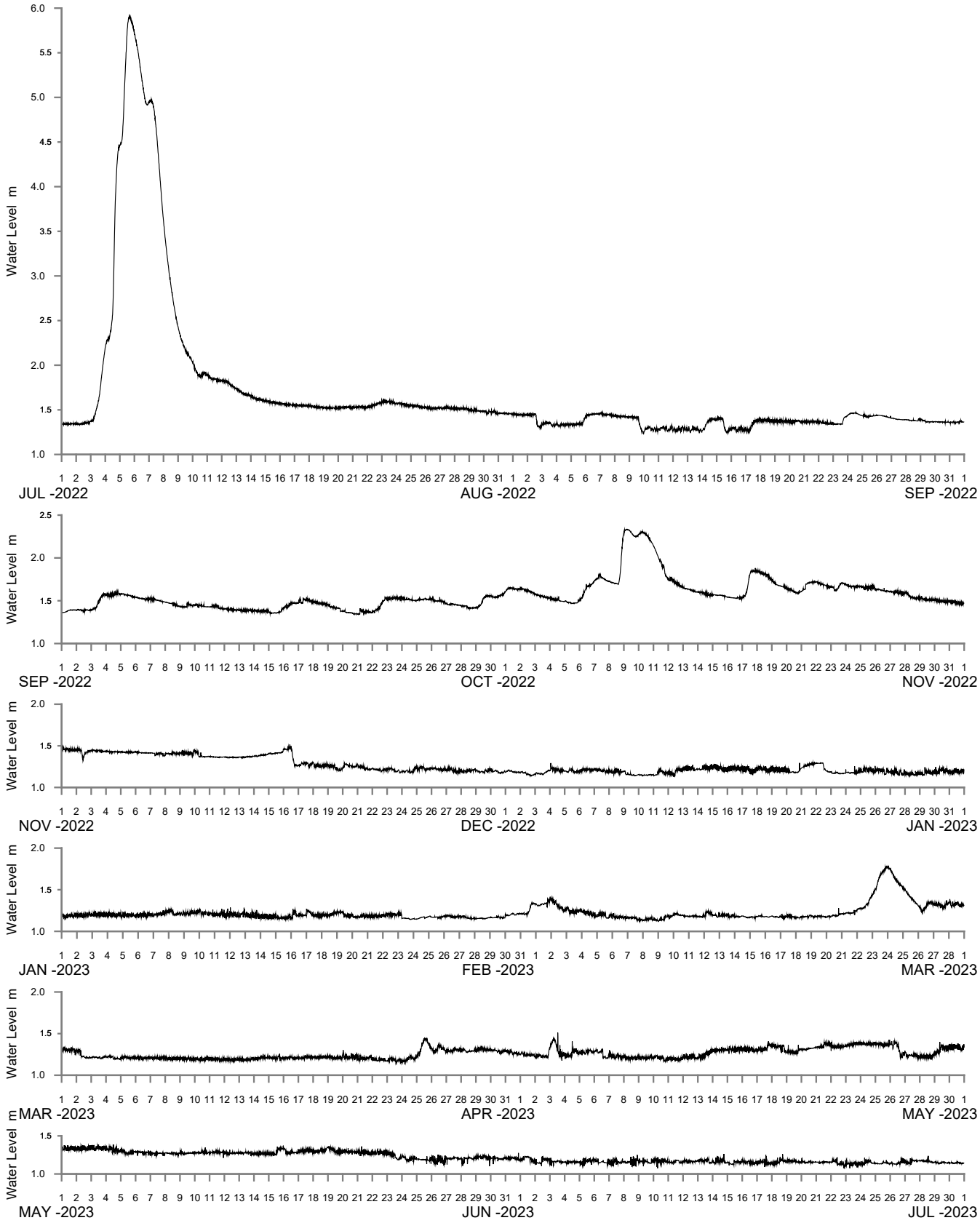
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TUGGERAH LAKE AT TOUKLEY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-149



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

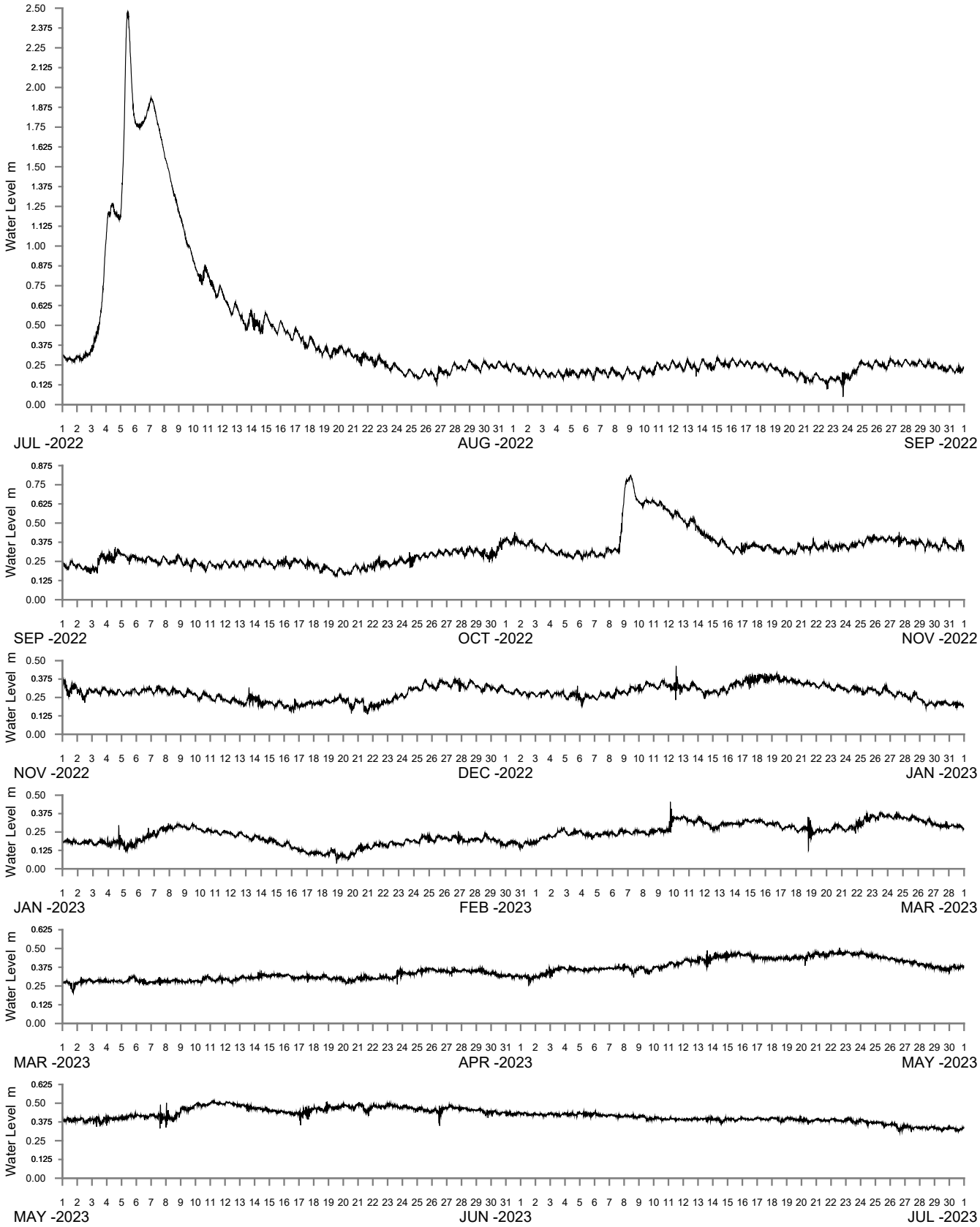
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WYONG RIVER AT WYONG WEIR UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-150



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

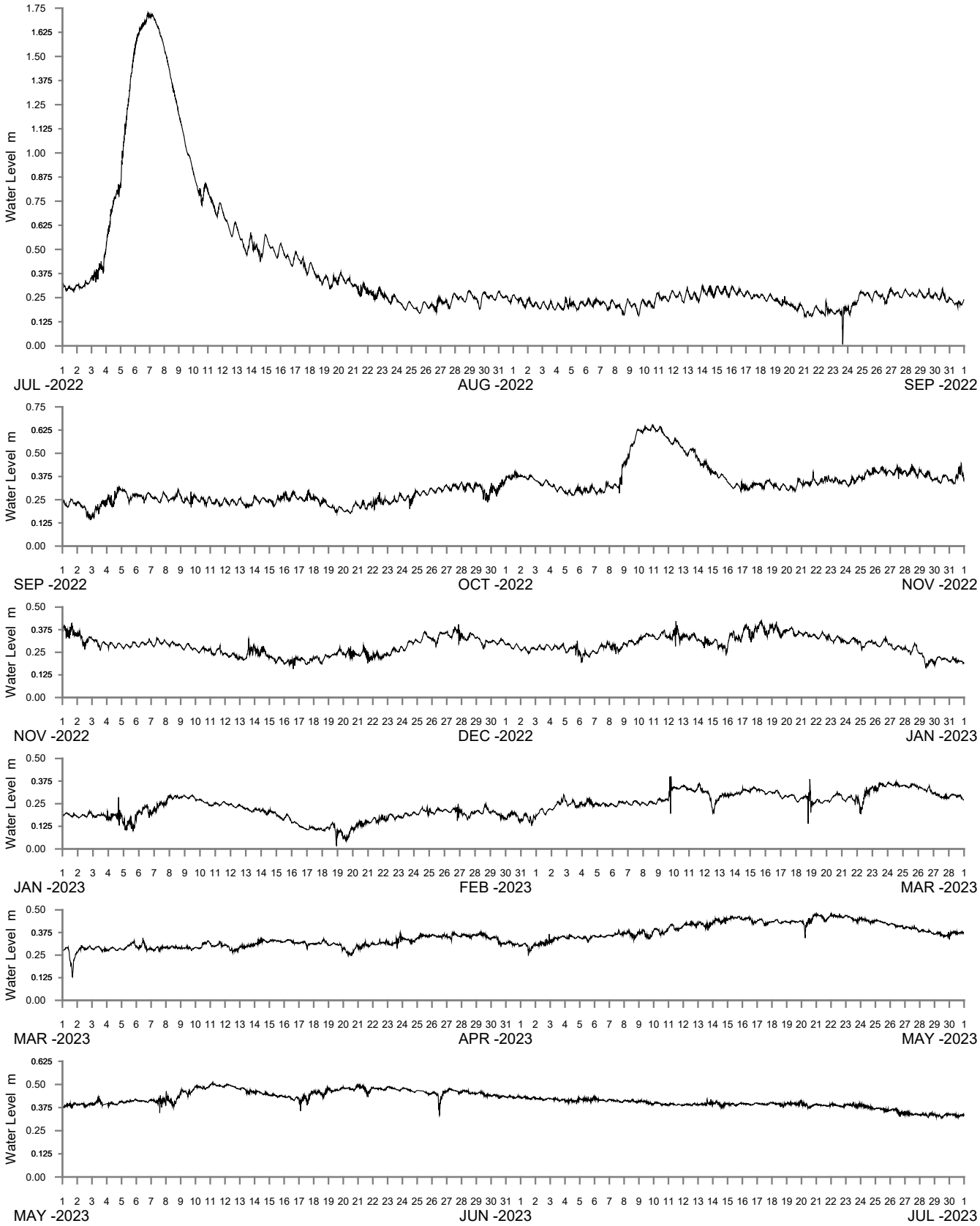
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

OURIMBAH CREEK AT LEES BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-151



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

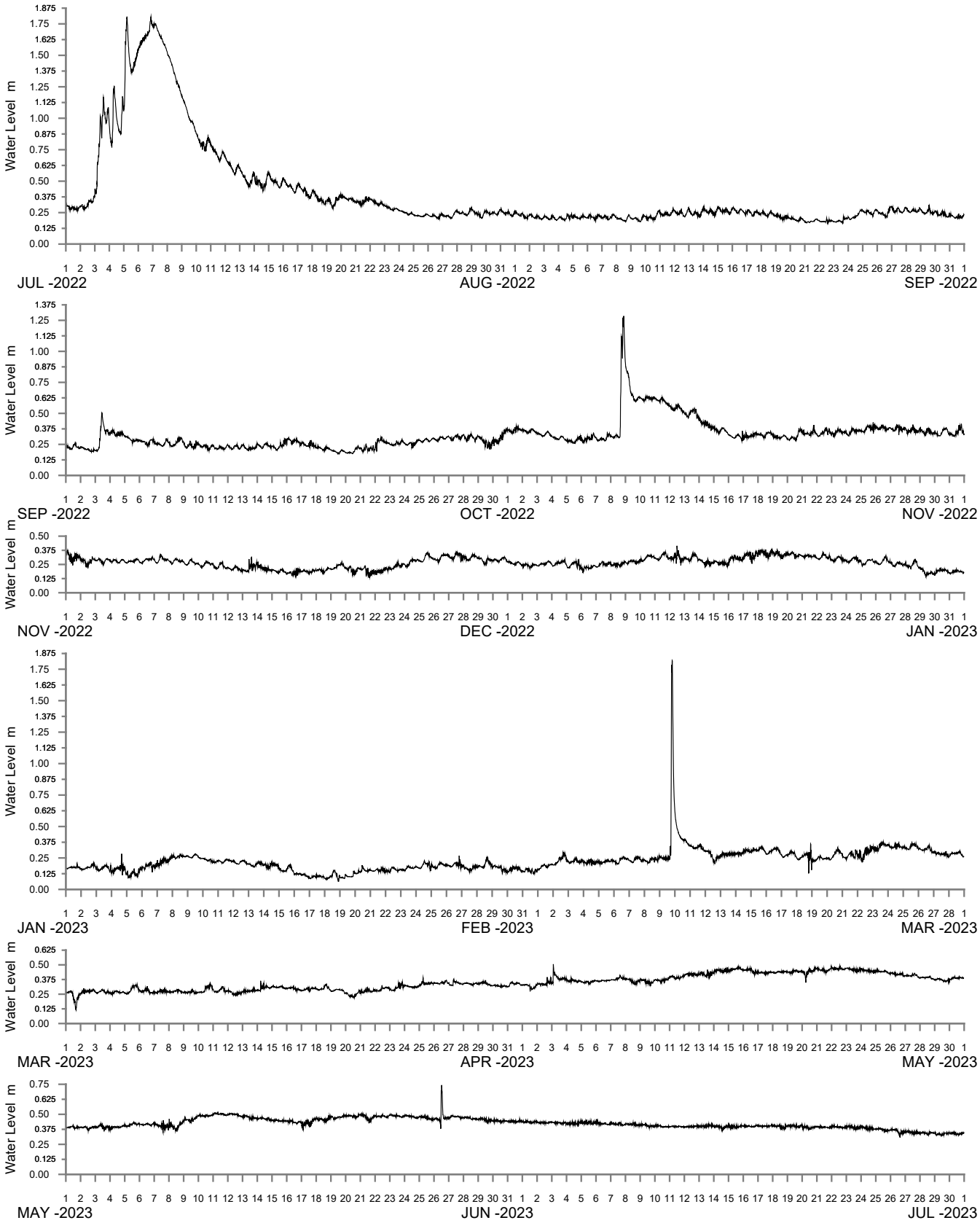
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TUGGERAH LAKE AT LONG JETTY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-152



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

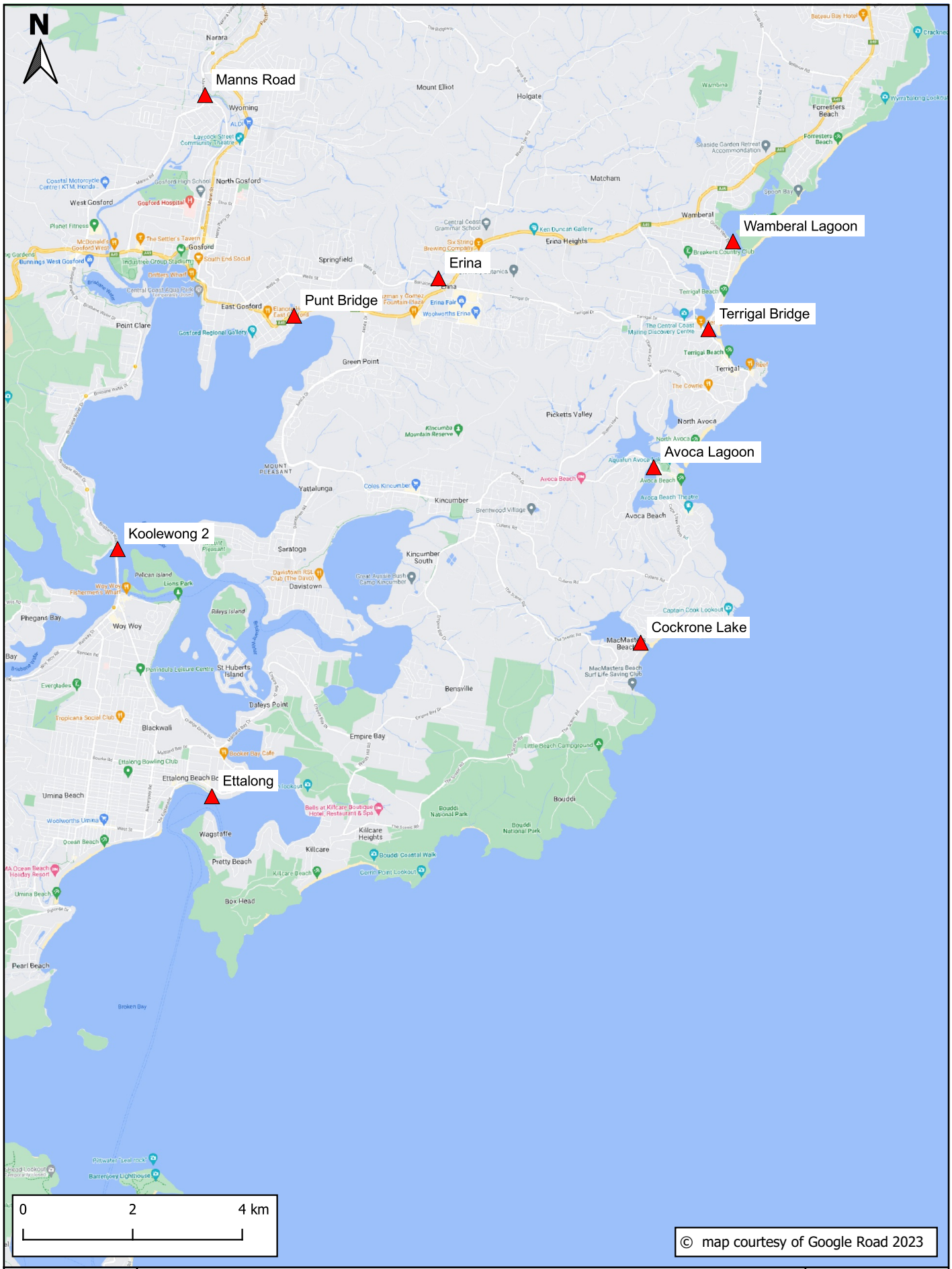
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TUMBI UMBI CREEK AT TUMBI UMBI
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-153

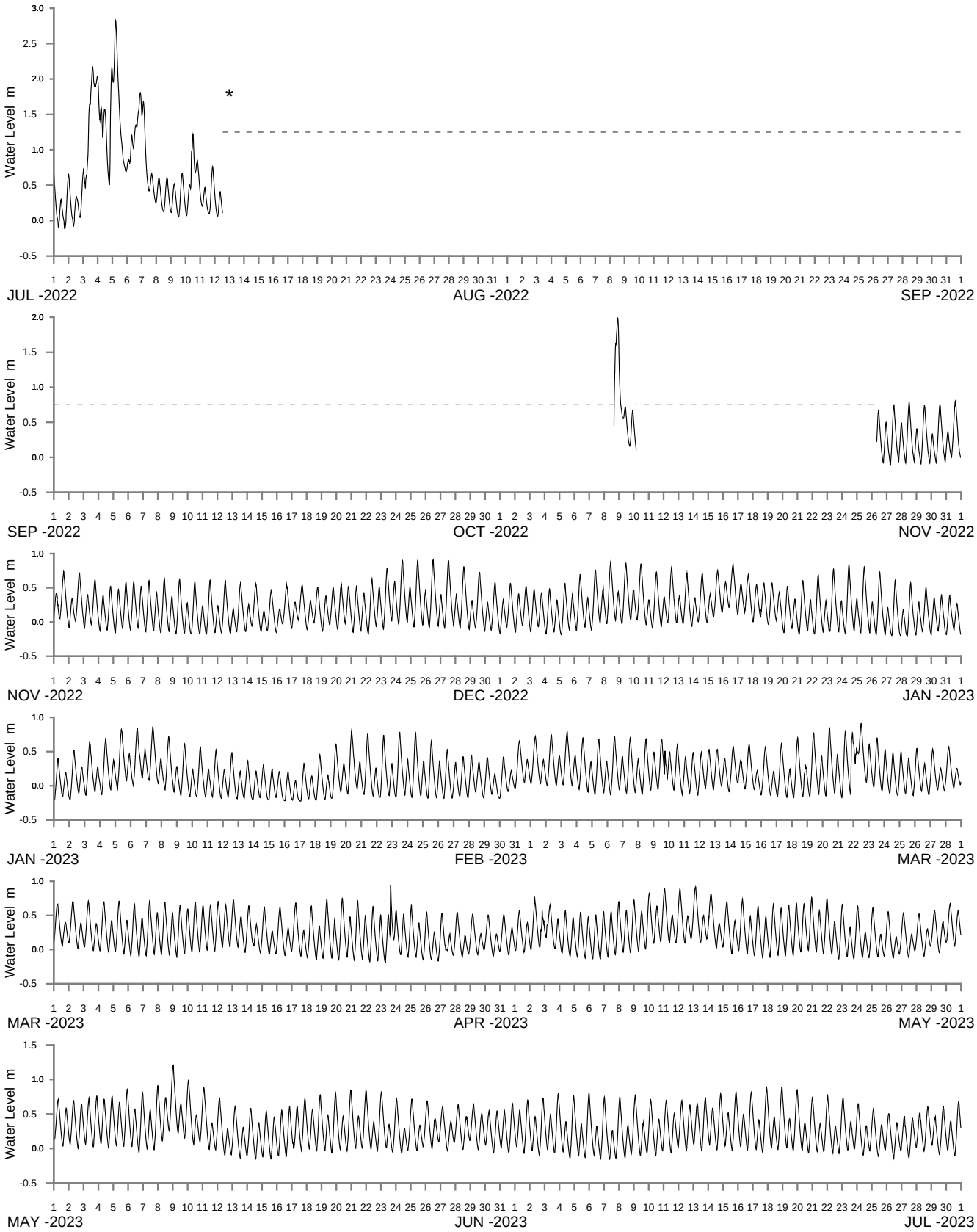


NSW GOVERNMENT

STATION LOCATIONS
BRISBANE WATER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-154



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

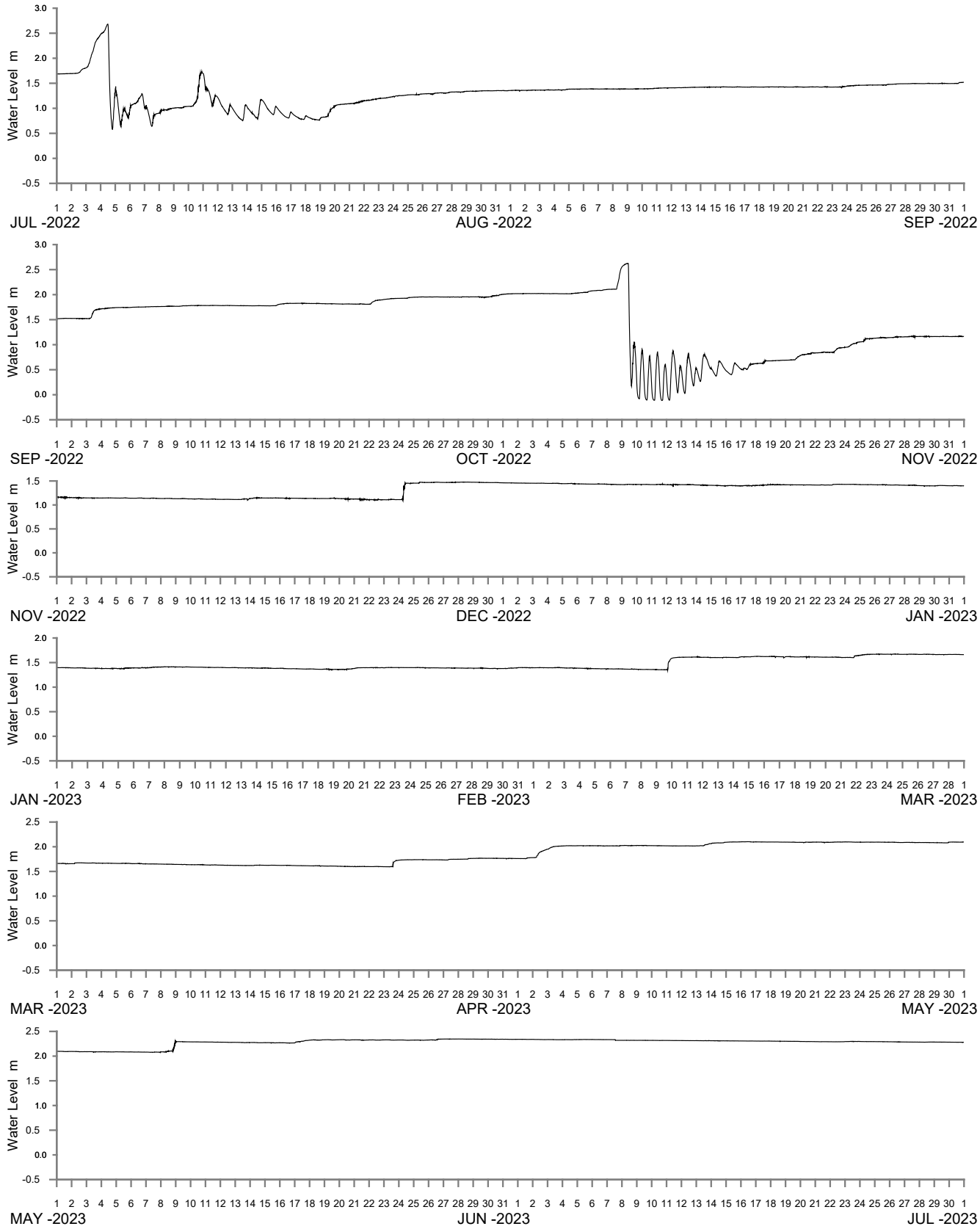
* Data loss due to orifice blockage causing the sensor to go dry at mid tide

NSW GOVERNMENT

NARARA CREEK AT MANNS ROAD
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-155



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

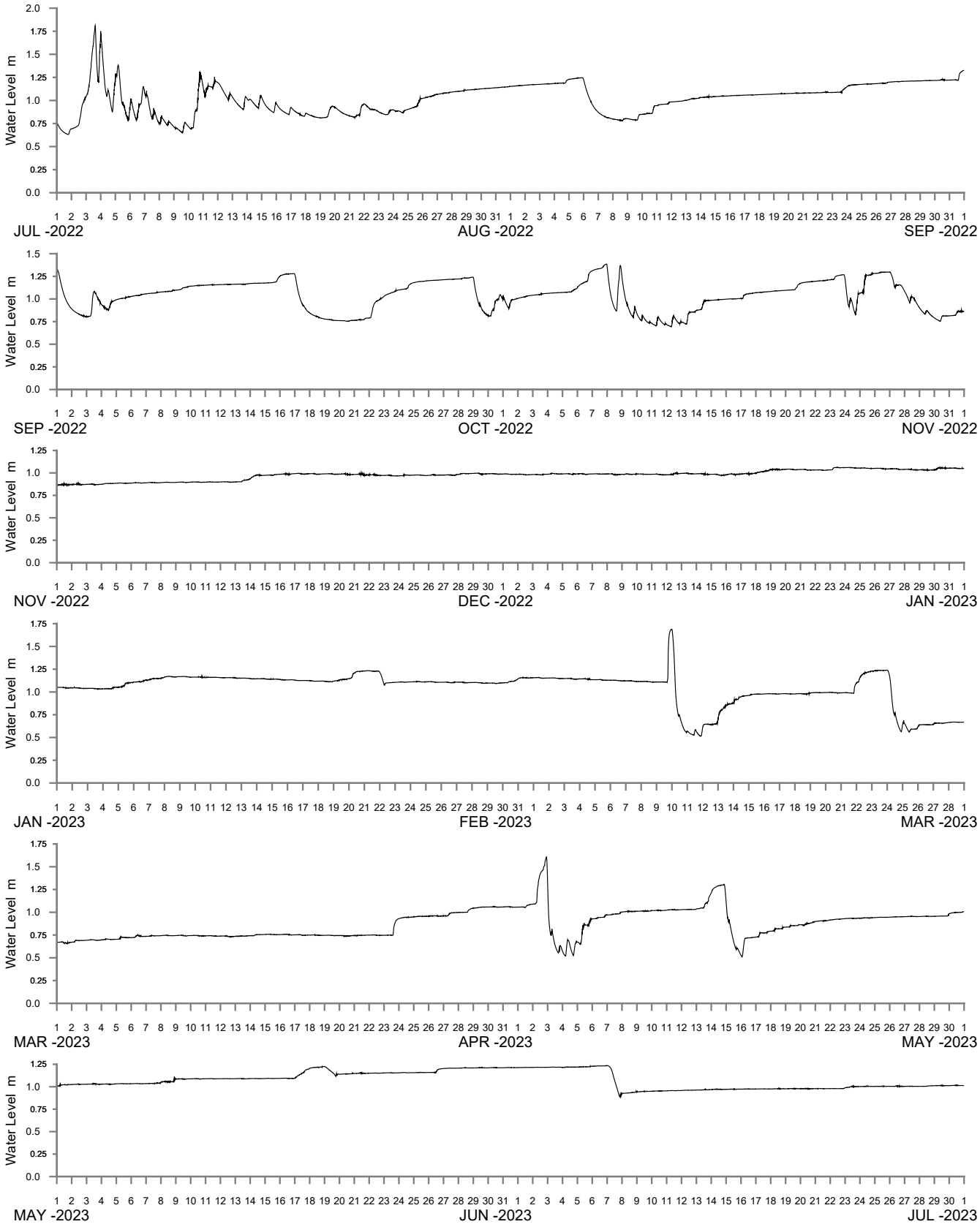
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WAMBERAL LAGOON AT WAMBERAL LAGOON
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-156



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

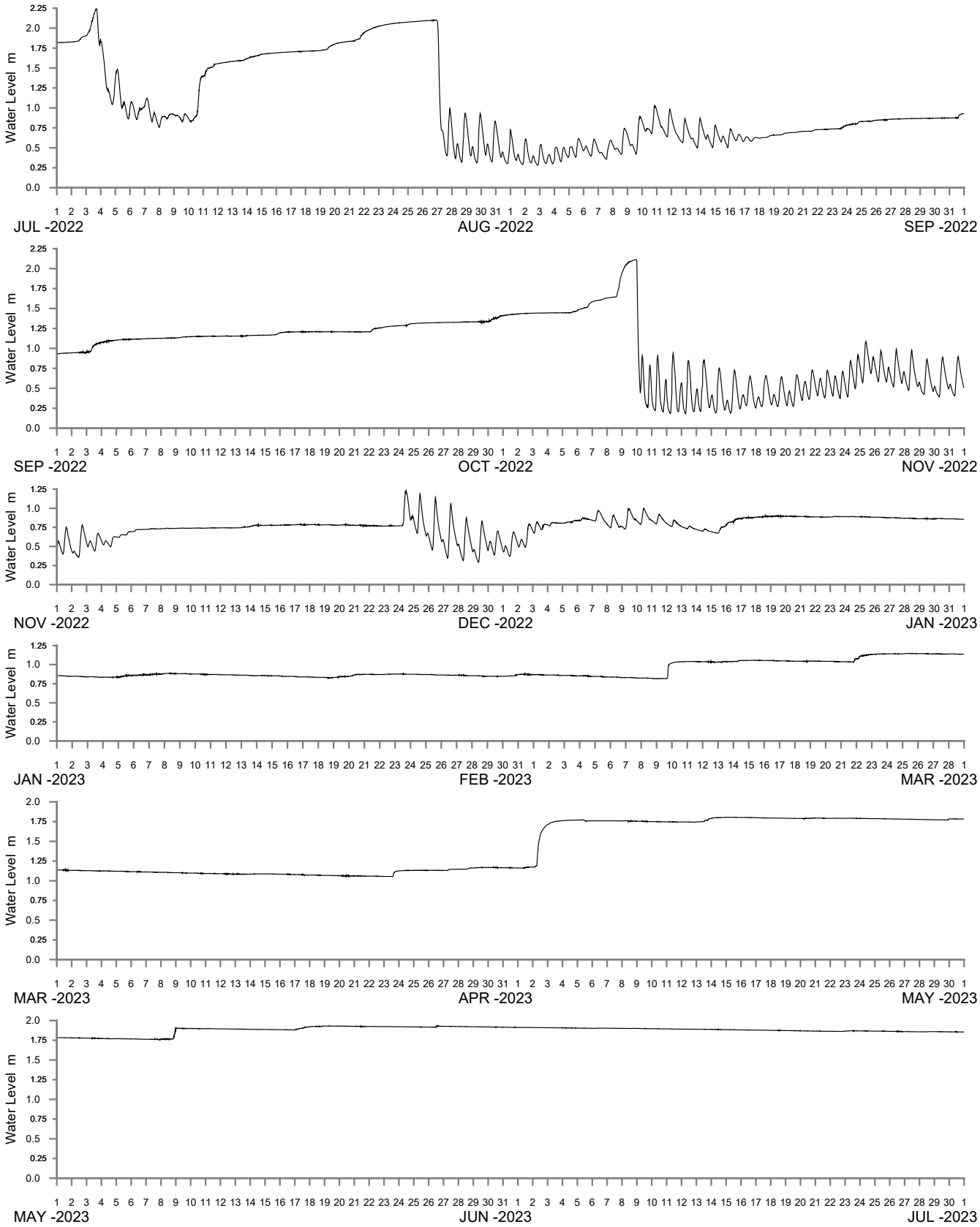
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TERRIGAL LAGOON AT TERRIGAL BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-157



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

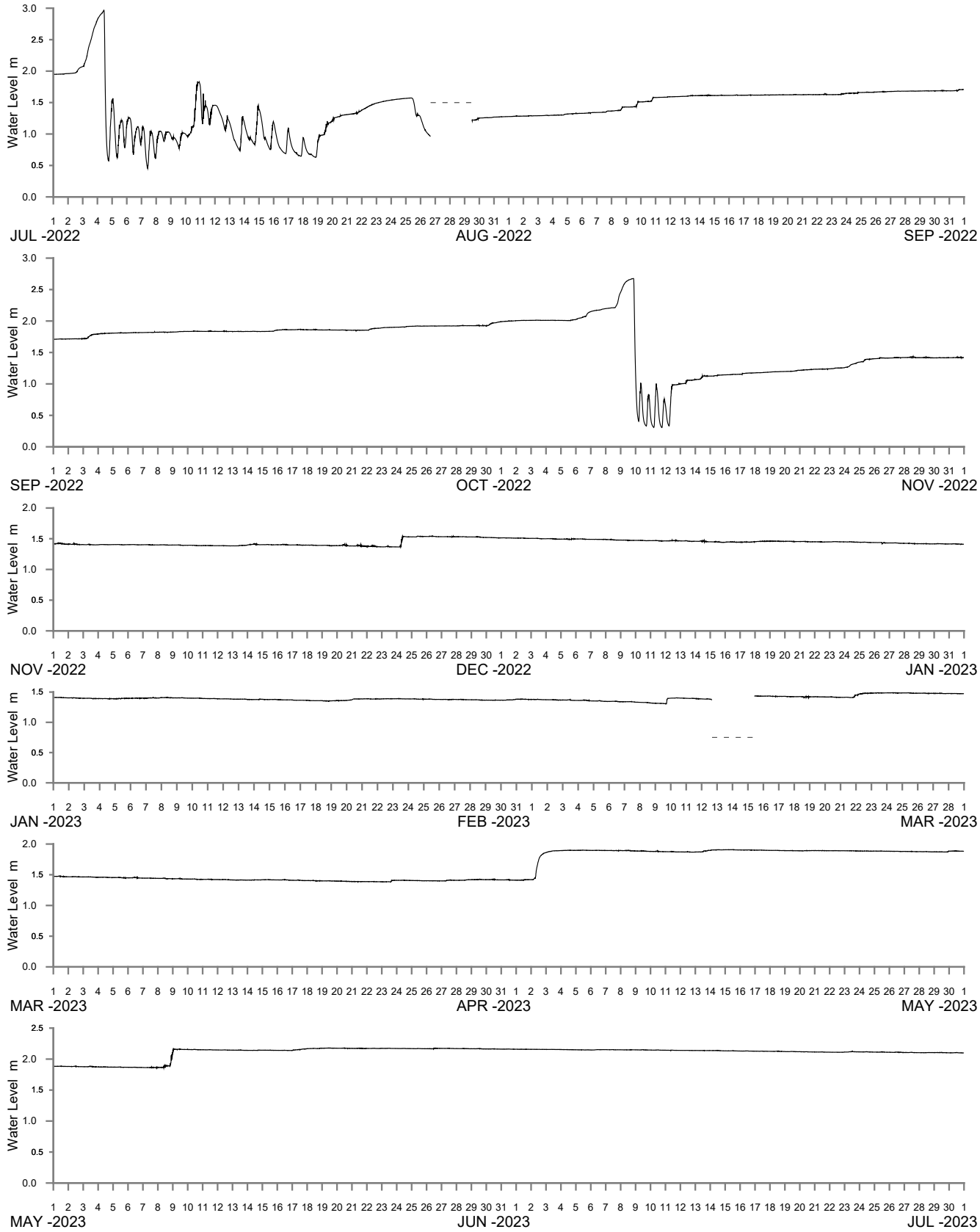
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

AVOCA LAGOON AT AVOCA LAGOON
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-158



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

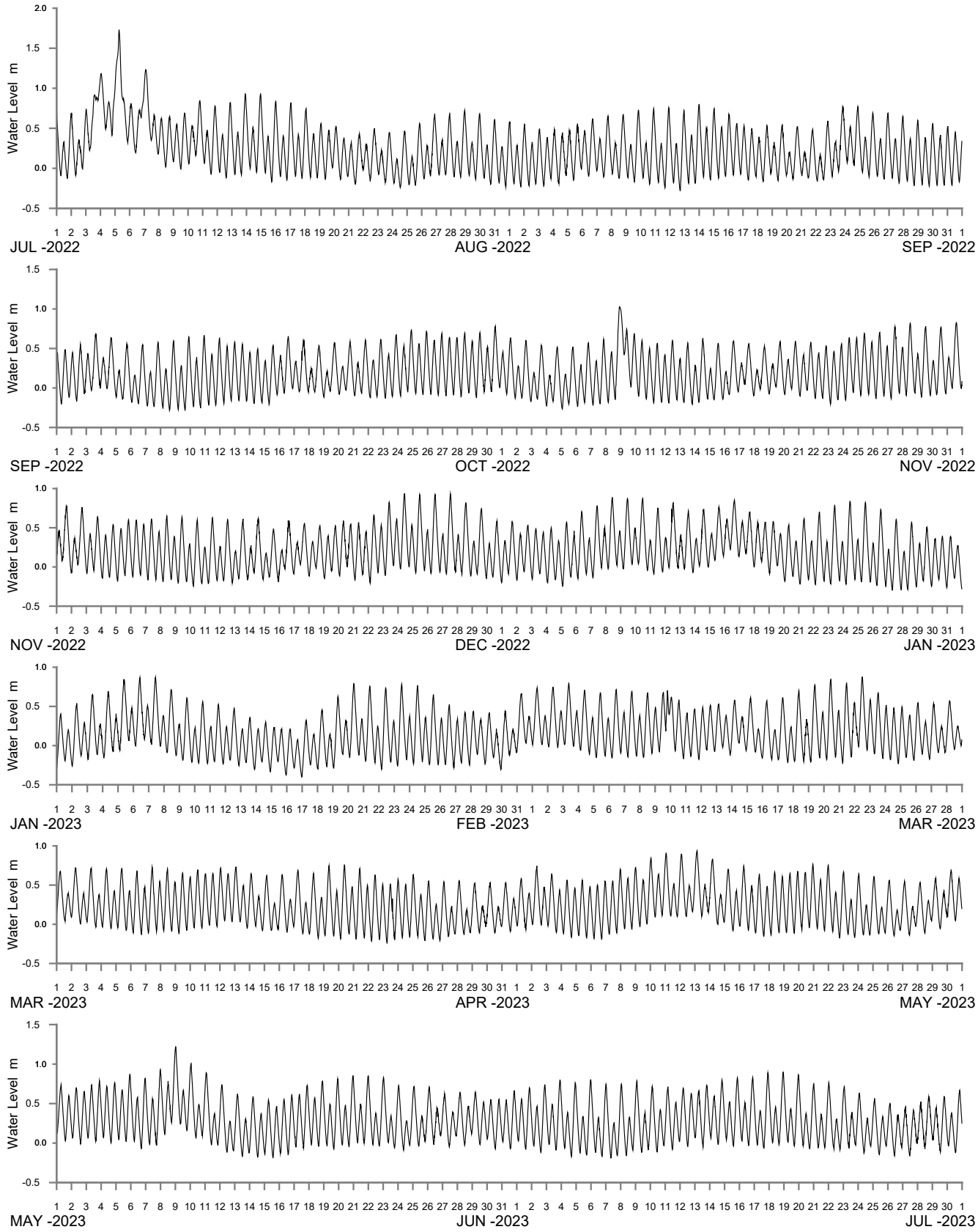
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

COCKRONE LAKE AT COCKRONE LAKE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-159



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

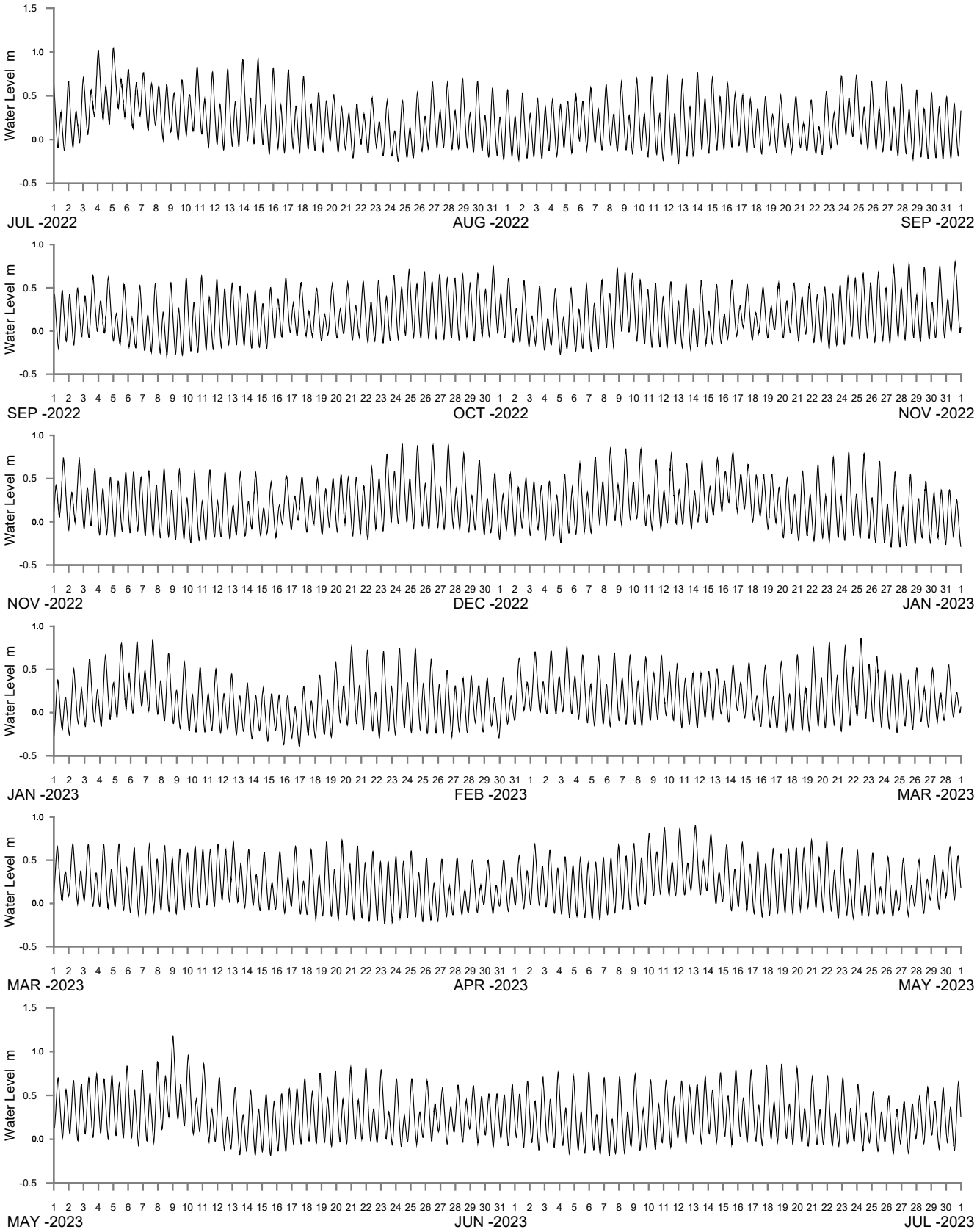
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

ERINA CREEK AT ERINA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-160



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

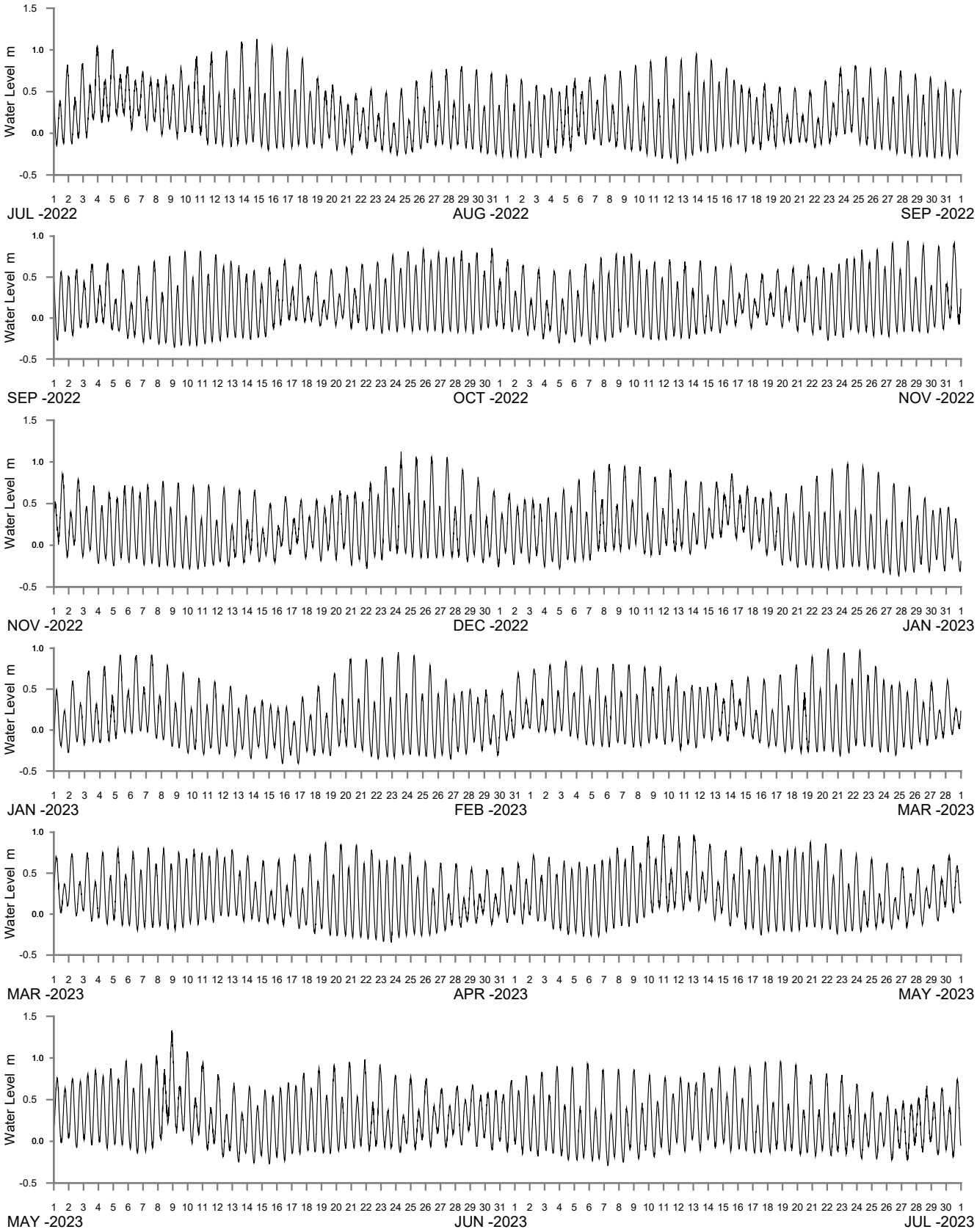
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

ERINA CREEK AT PUNT BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-161



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

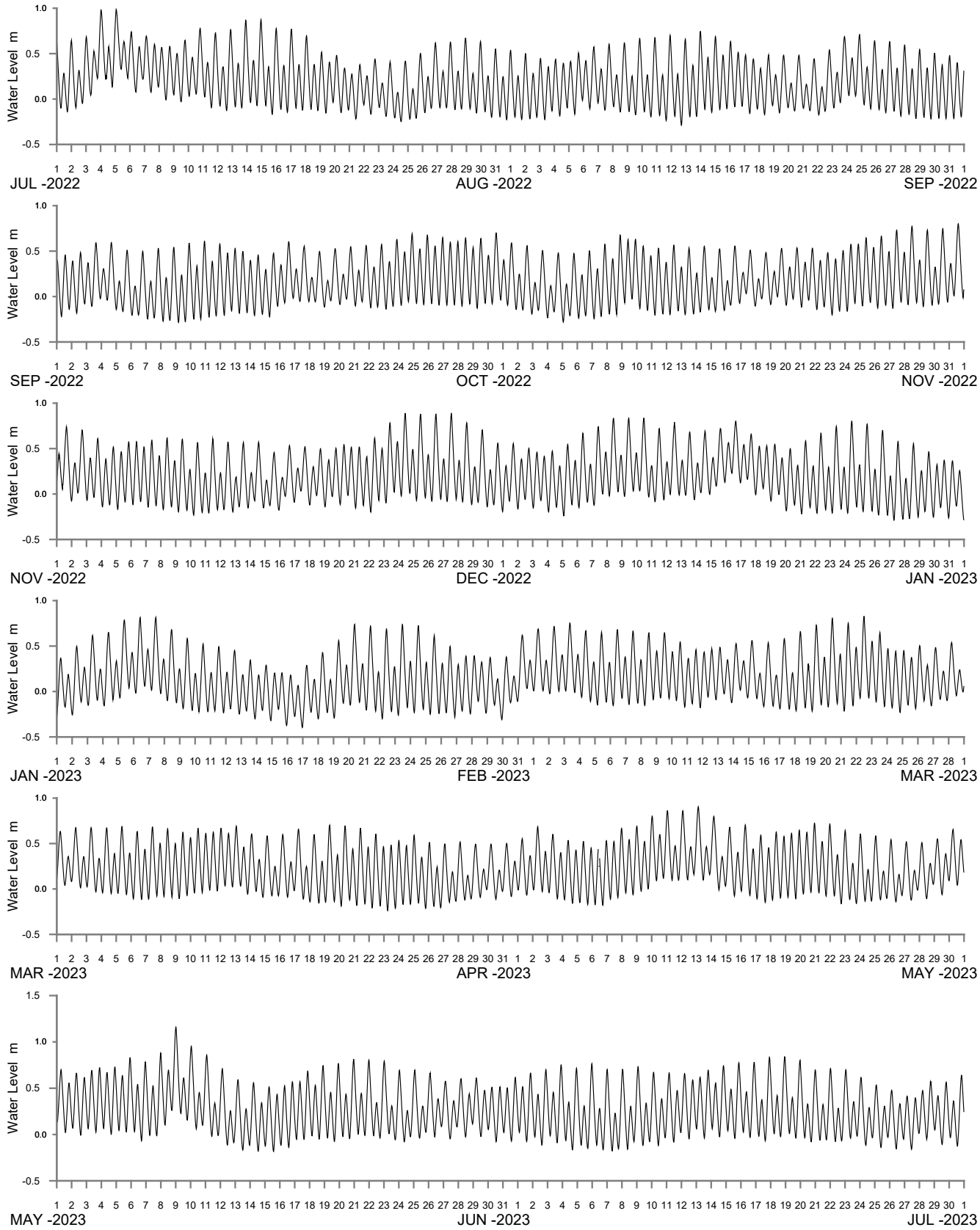
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BRISBANE WATER AT ETTALONG
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-162



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

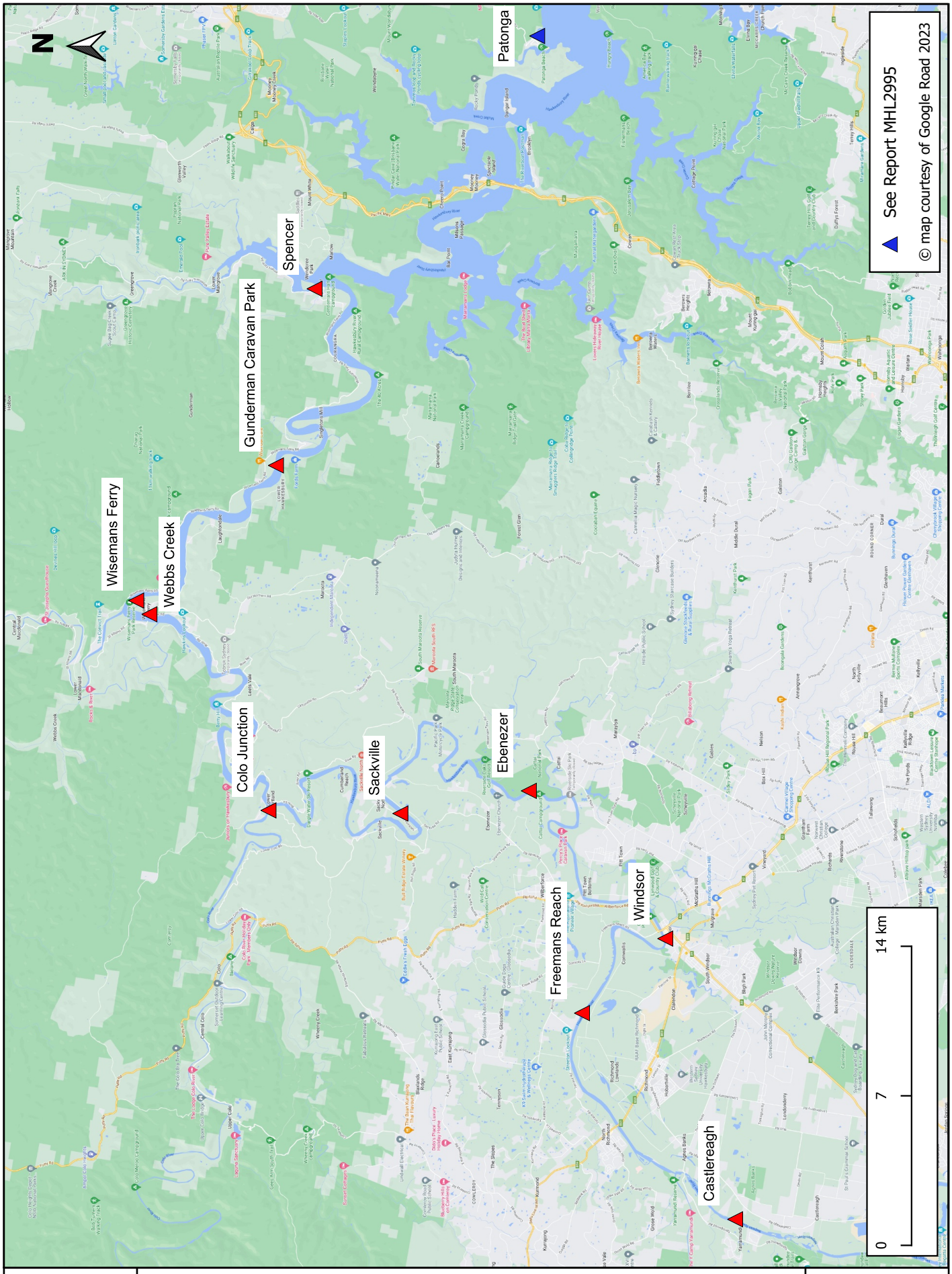
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BRISBANE WATER AT KOOLEWONG 2
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-163

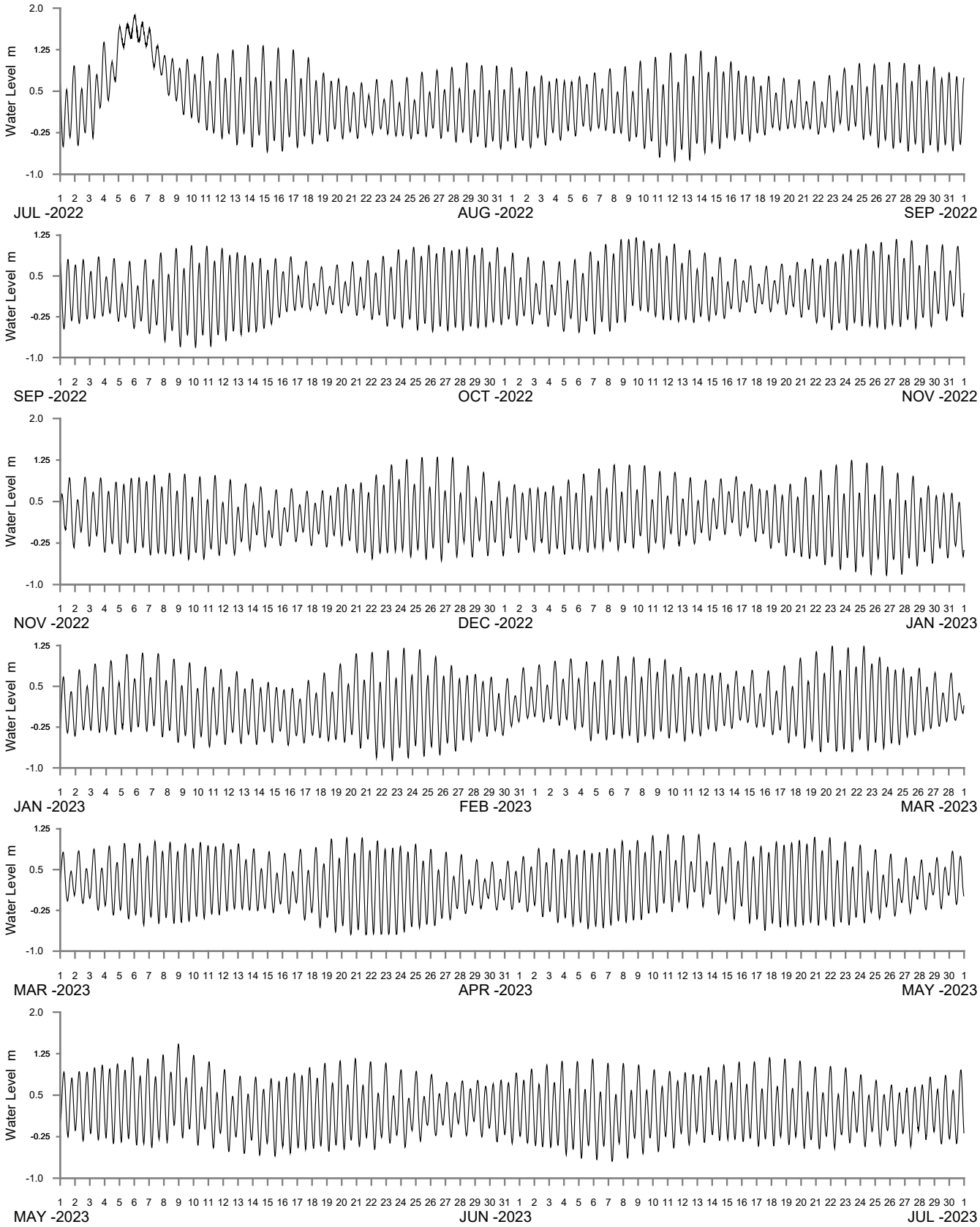


NSW GOVERNMENT

STATION LOCATIONS
HAWKESBURY RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-164



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

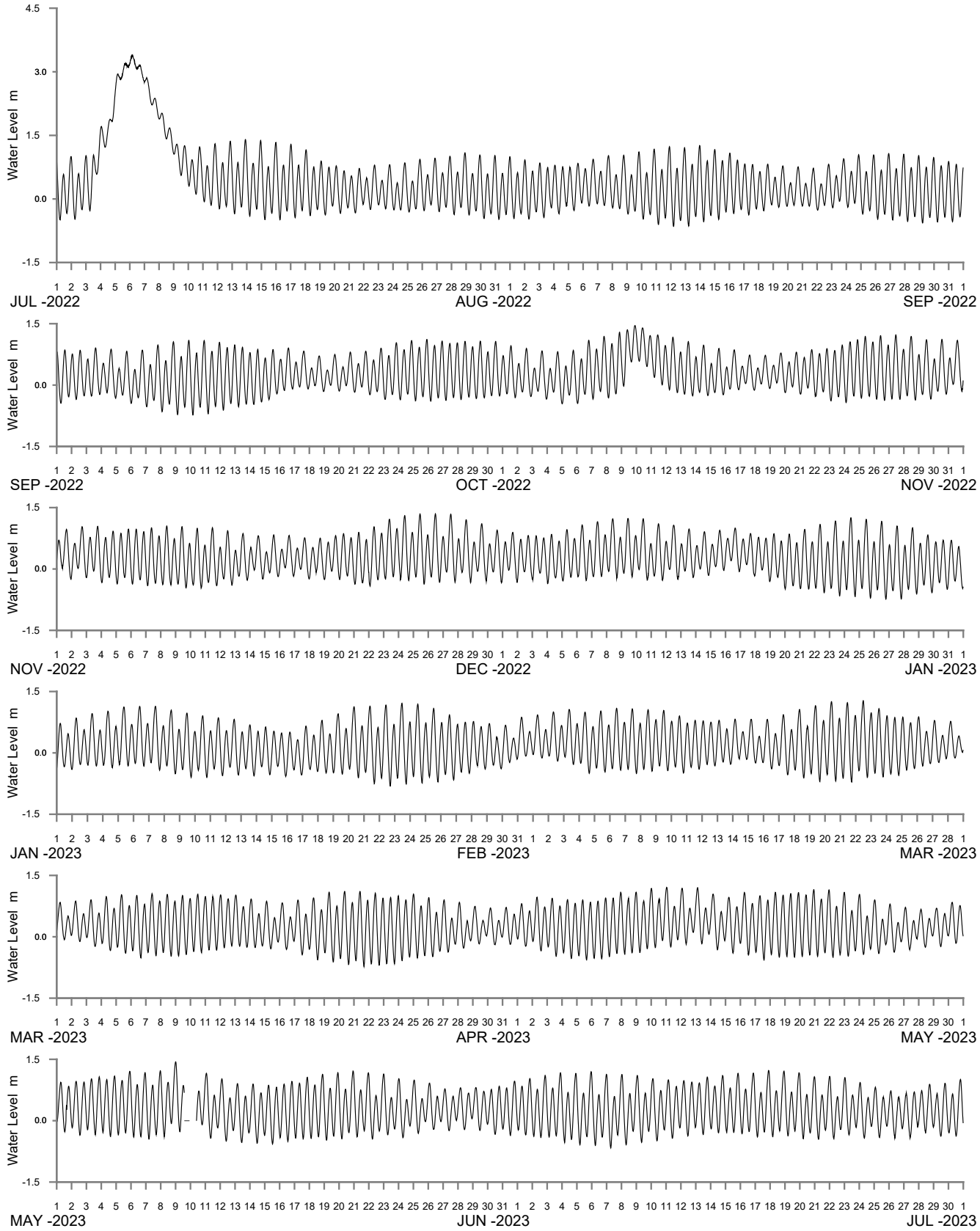
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HAWKESBURY RIVER AT SPENCER
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-165



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

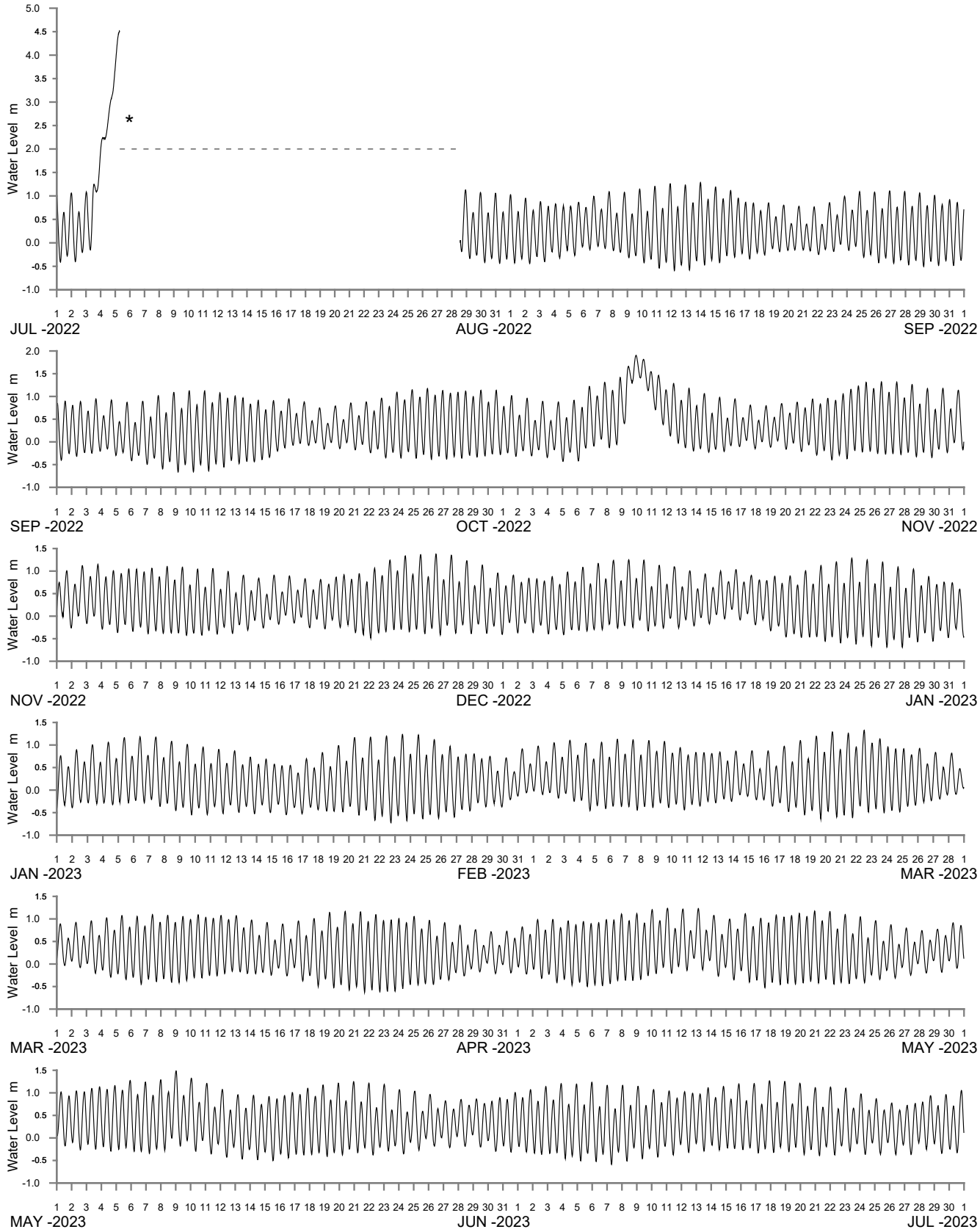
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HAWKESBURY RIVER AT GUNDERMAN CARAVAN PARK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-166



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

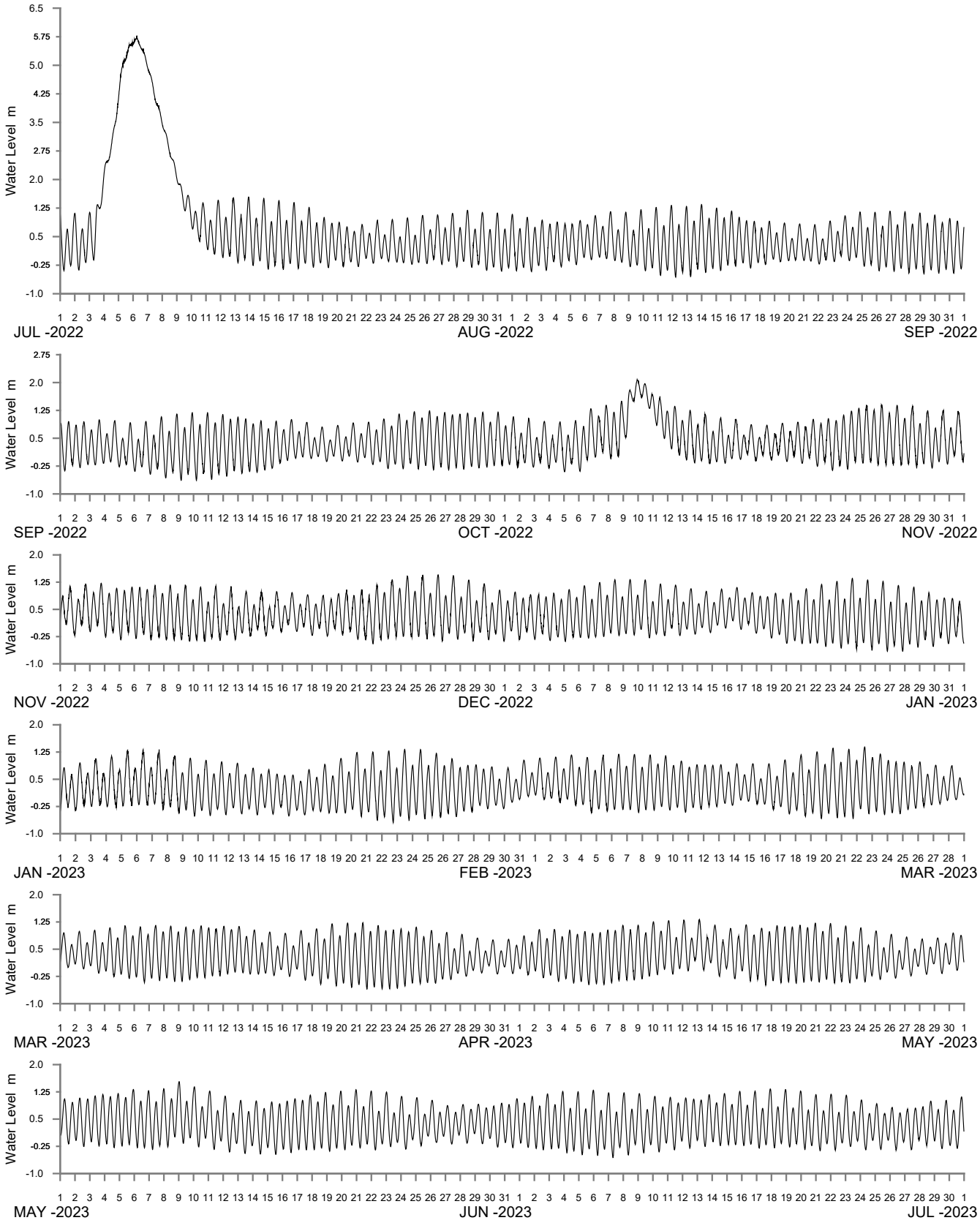
* Data loss duet to station being inundated by flood waters

NSW GOVERNMENT

HAWKESBURY RIVER AT WISEMANS FERRY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-167



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

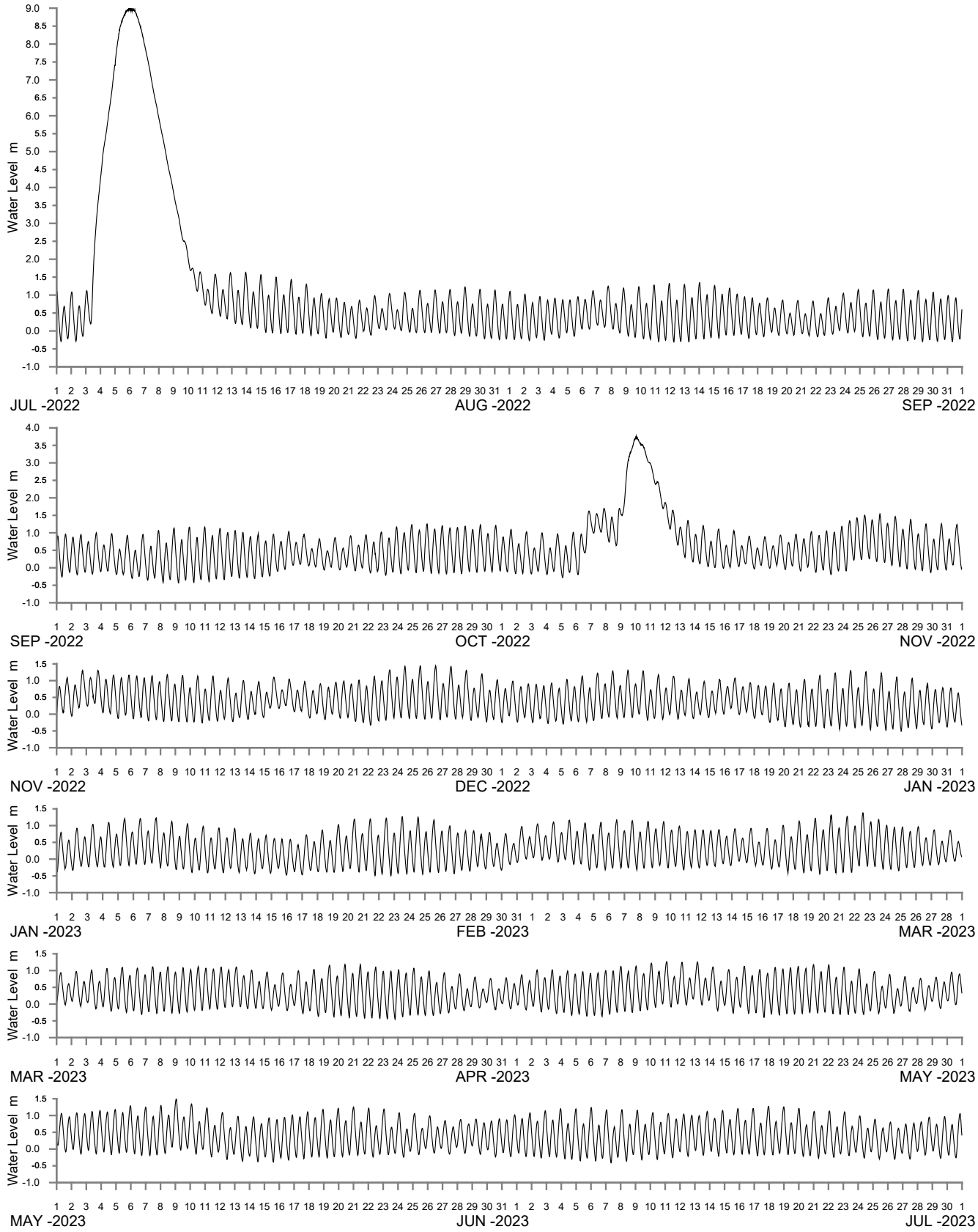
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HAWKESBURY RIVER AT WEBBS CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-168



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

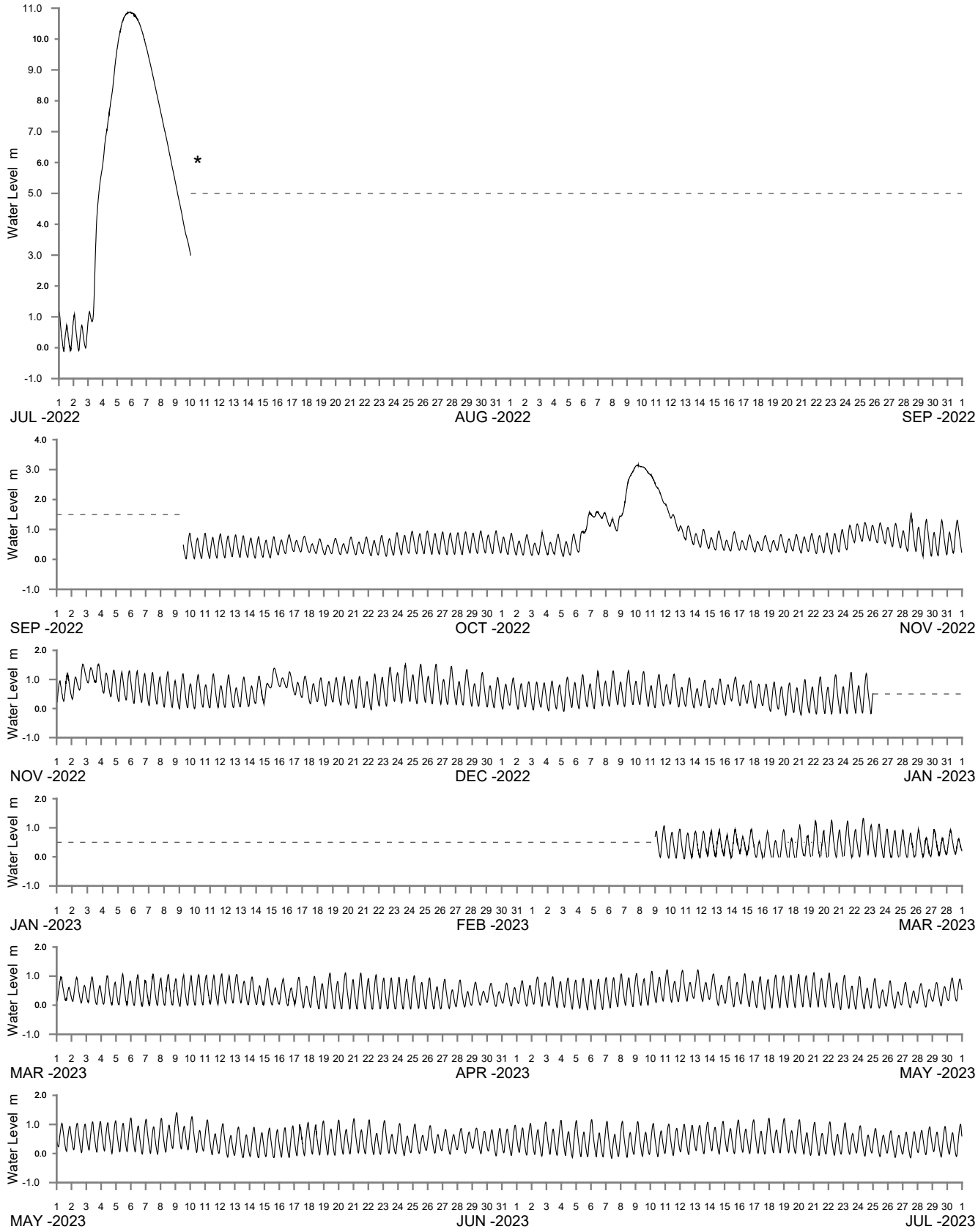
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HAWKESBURY RIVER AT COLO JUNCTION
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-169



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

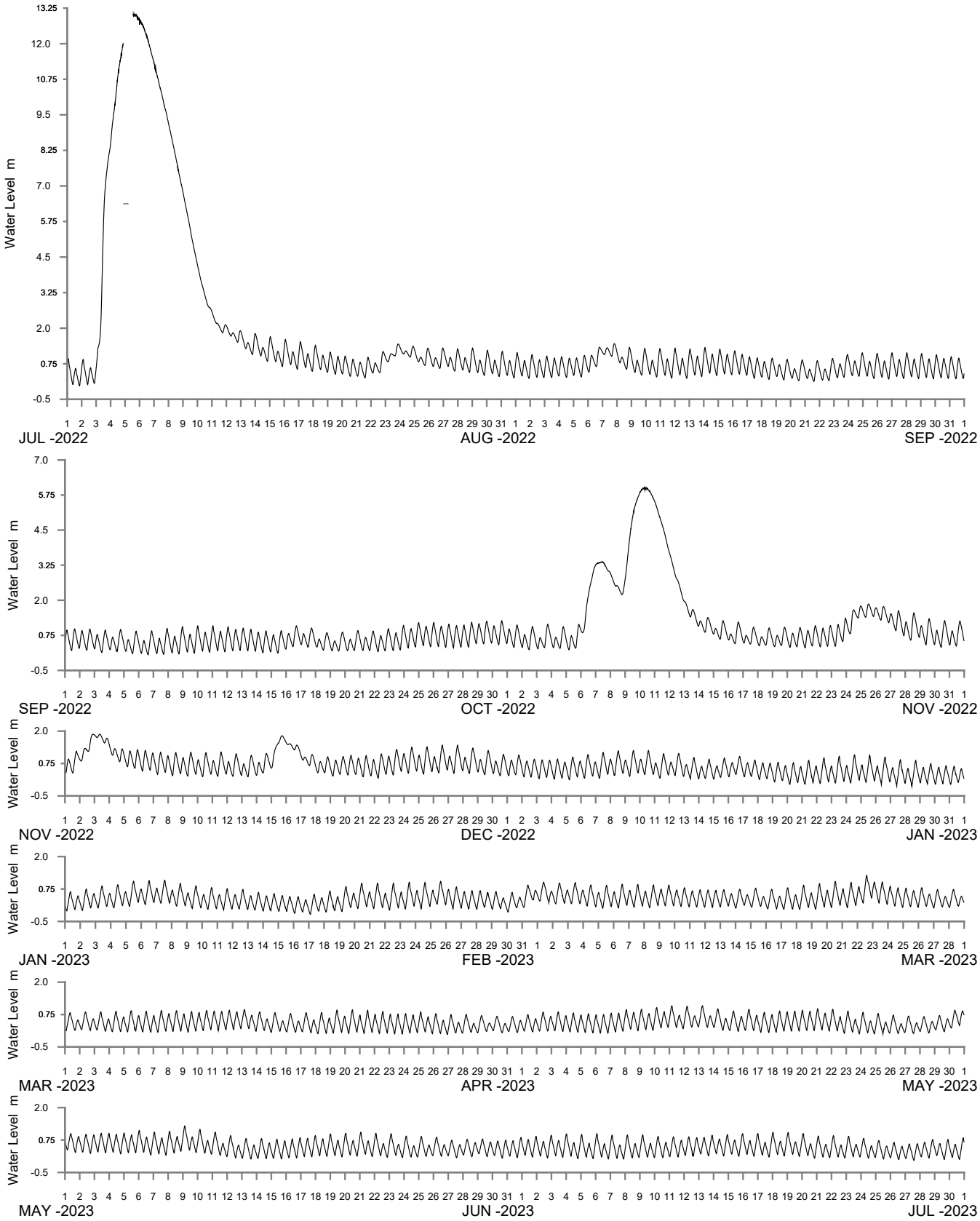
* Data loss due to bank collapse and damage to orifice line

NSW GOVERNMENT

HAWKESBURY RIVER AT SACKVILLE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-170



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

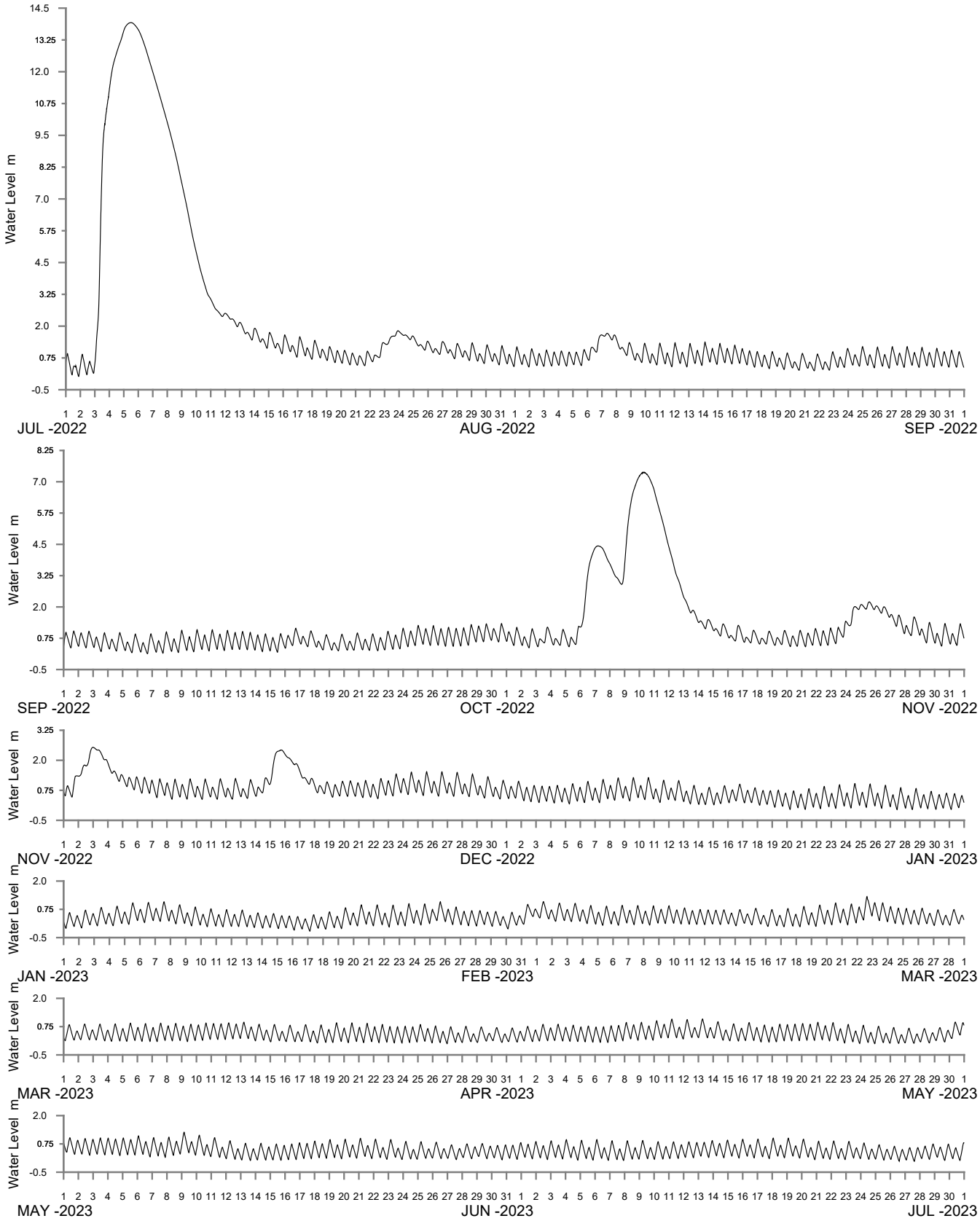
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HAWKESBURY RIVER AT EBENEZER
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-171



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

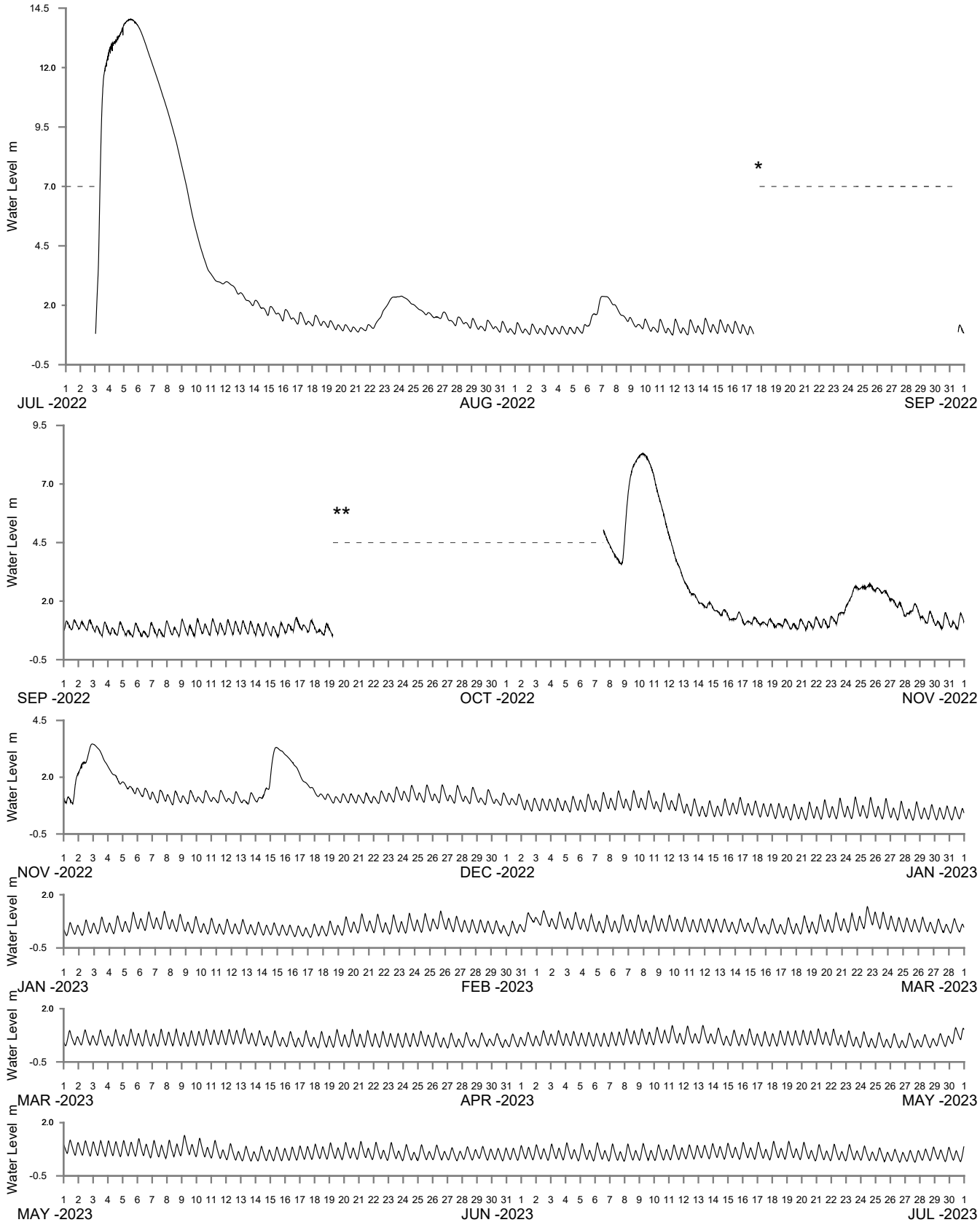
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HAWKESBURY RIVER AT WINDSOR
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-172



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

---------- DATA LOSS

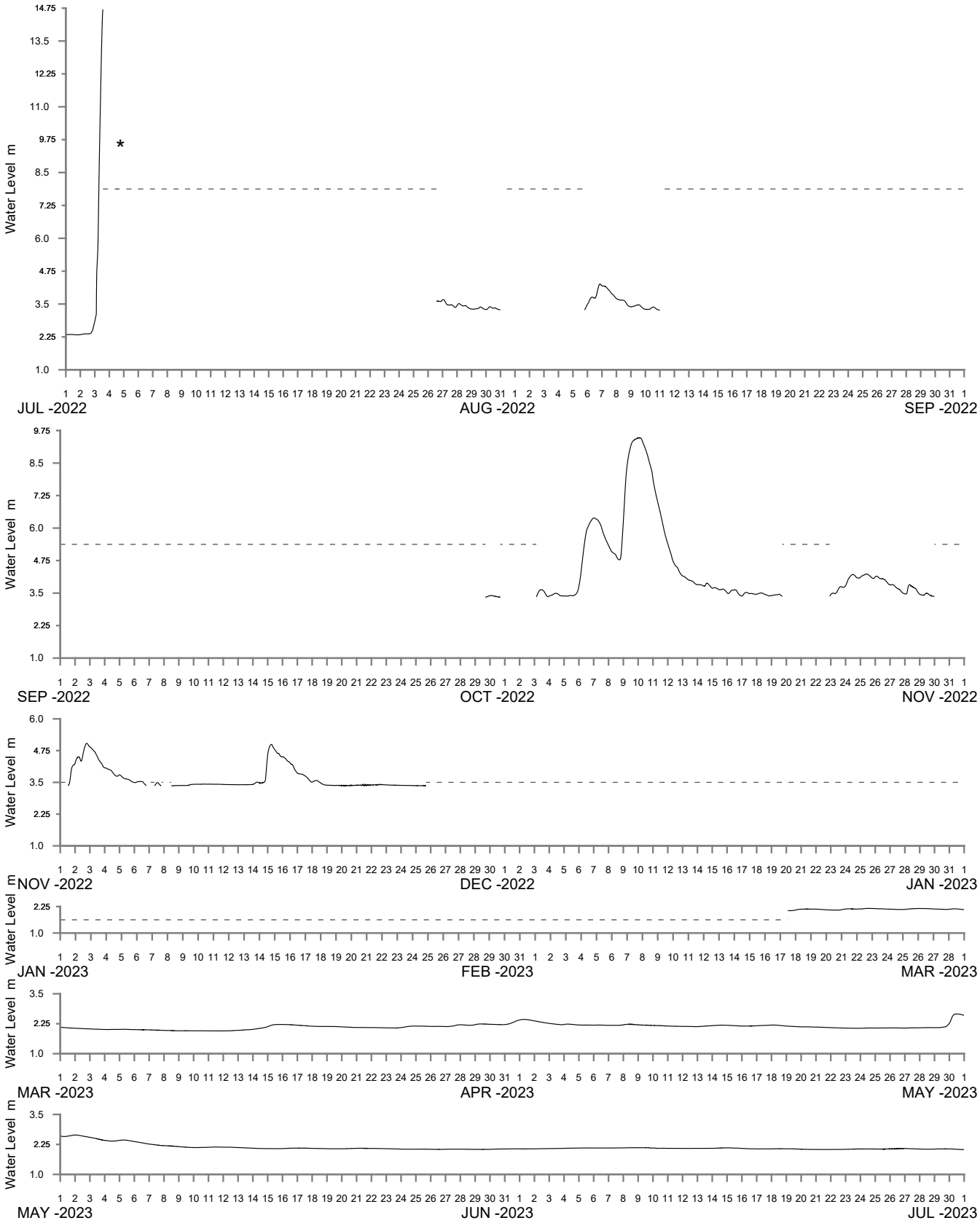
* Data loss due to bank slump and station damage sustained in the Mar 2022 flood. Standalone sensor was able to recover some data ** Data loss due to battery failure

NSW GOVERNMENT

HAWKESBURY RIVER AT FREEMANS REACH
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-173



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

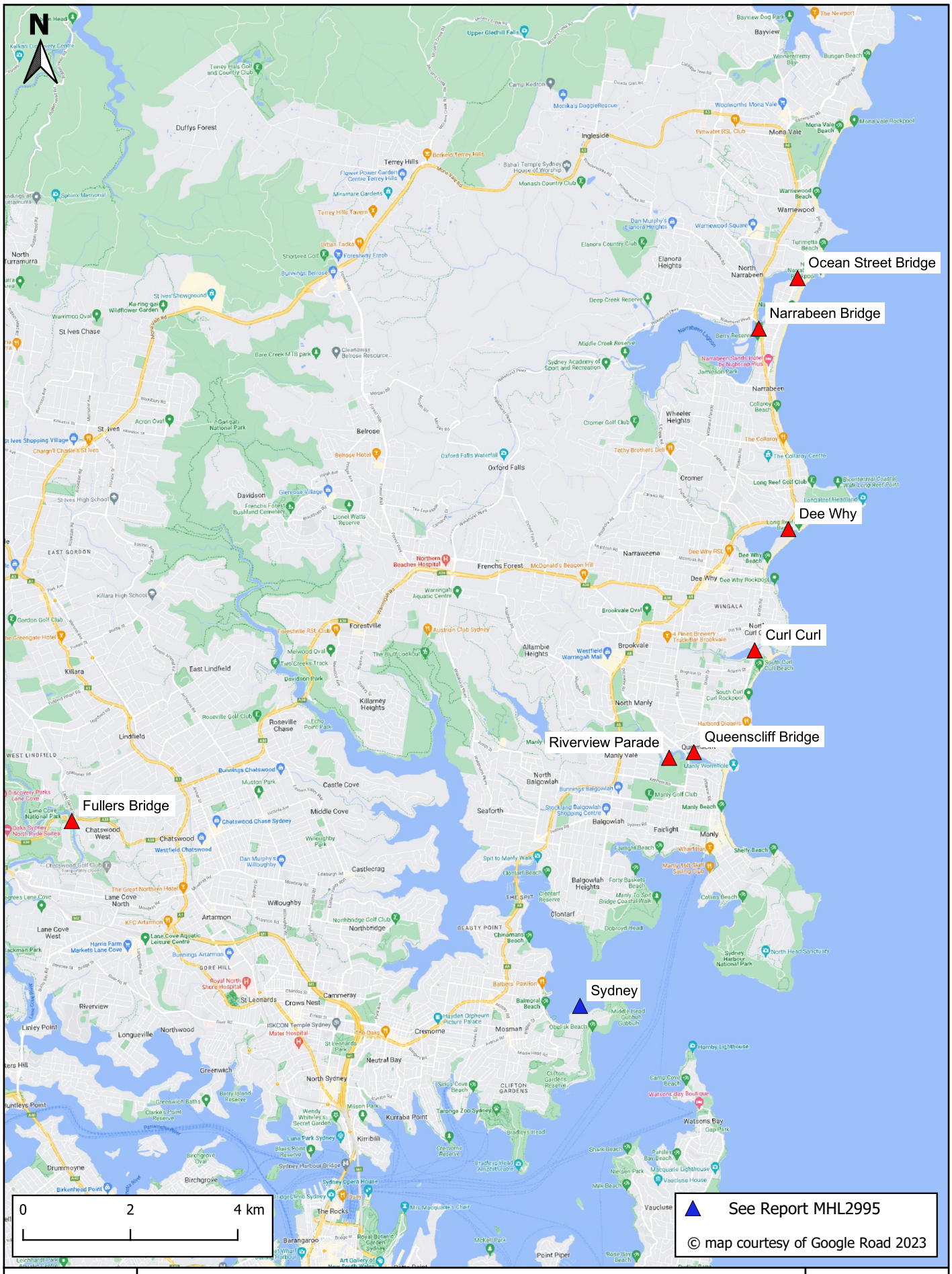
* Data loss due to bank collapse during Jul 2022 flood. A temporary station was able to recover some data until reinstallation in Feb 2023

NSW GOVERNMENT

NEPEAN RIVER AT CASTLEREAGH
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-174

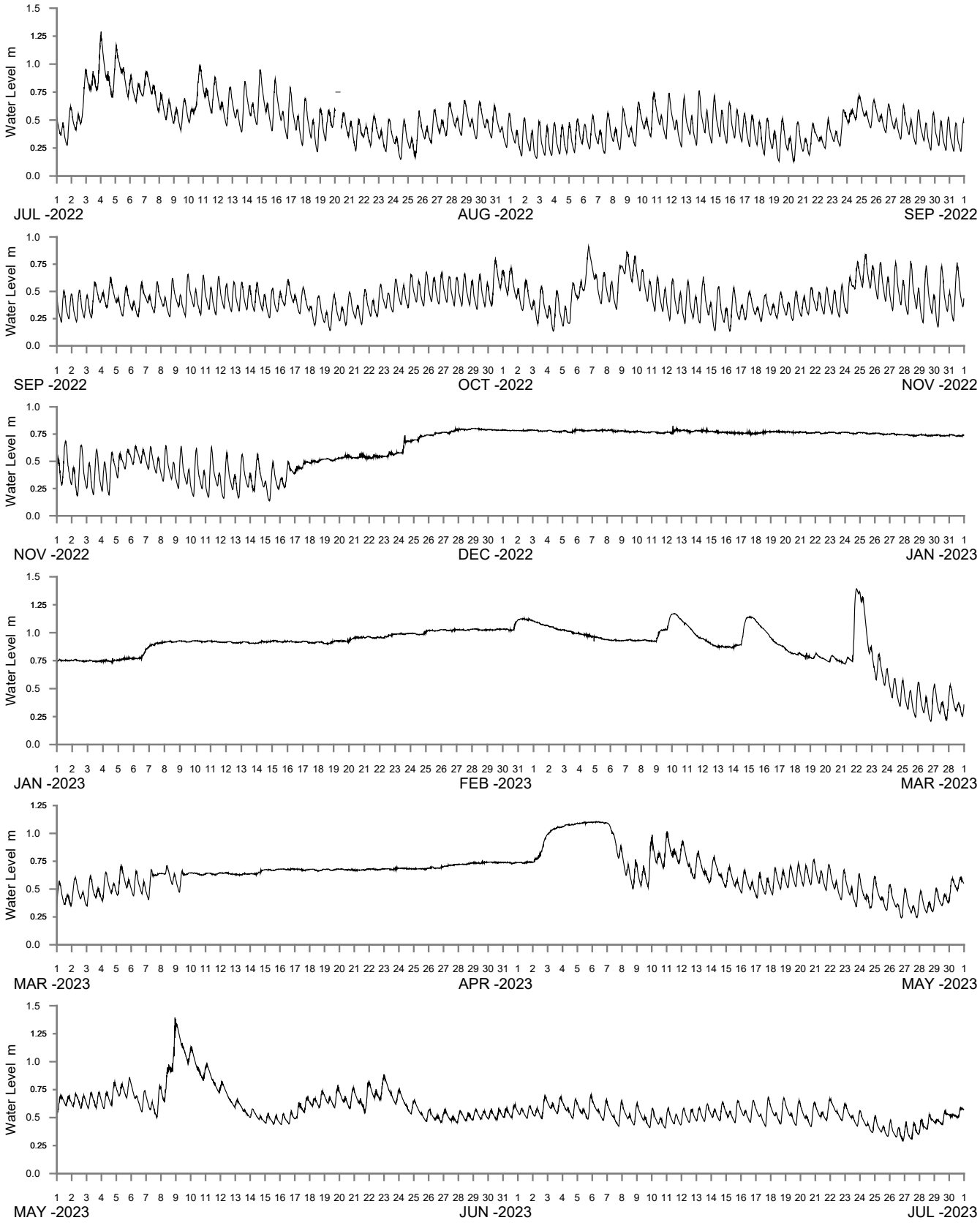


NSW GOVERNMENT

STATION LOCATIONS
NORTH SYDNEY REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-175



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

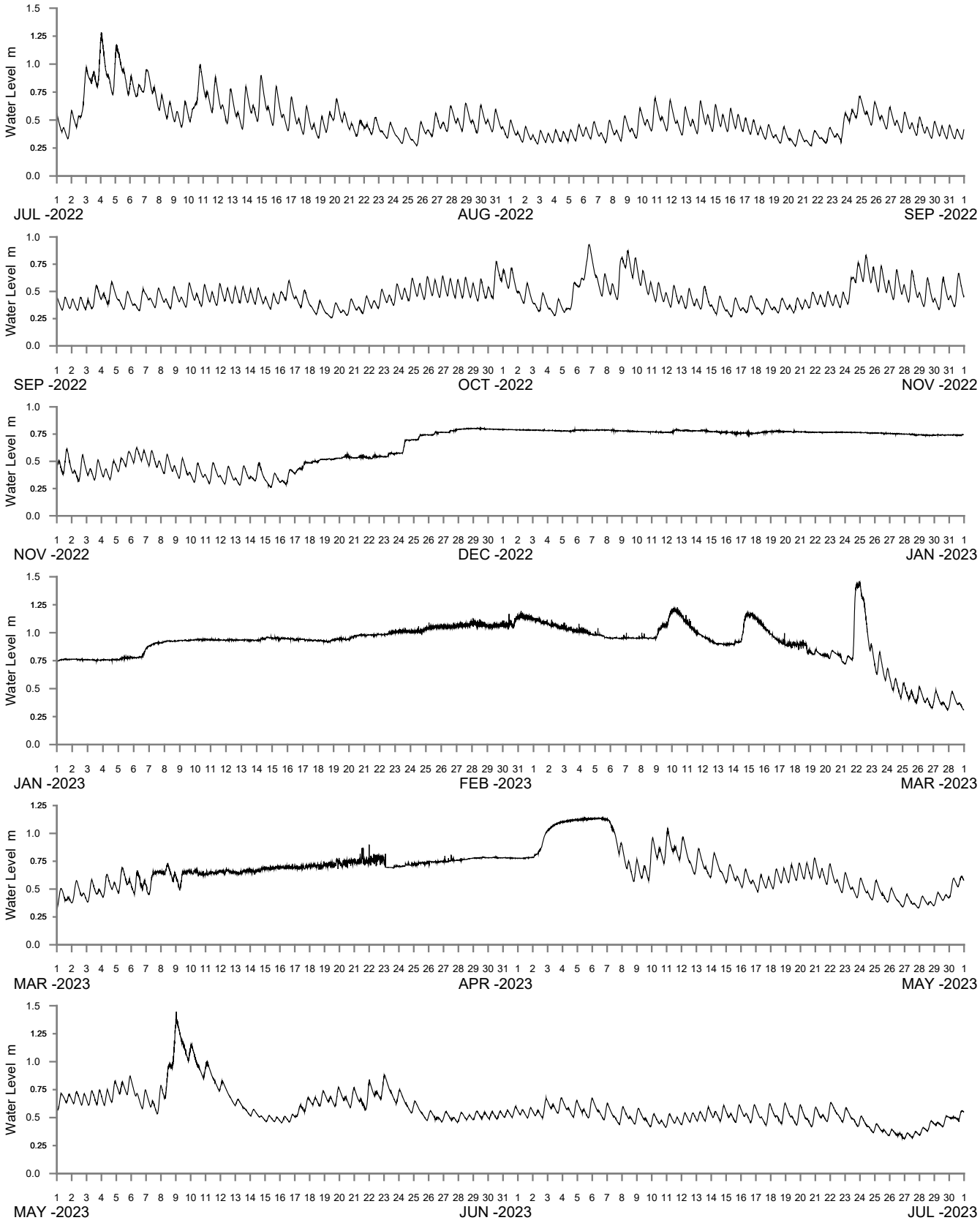
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

NARRABEEN LAGOON AT OCEAN STREET BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-176



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

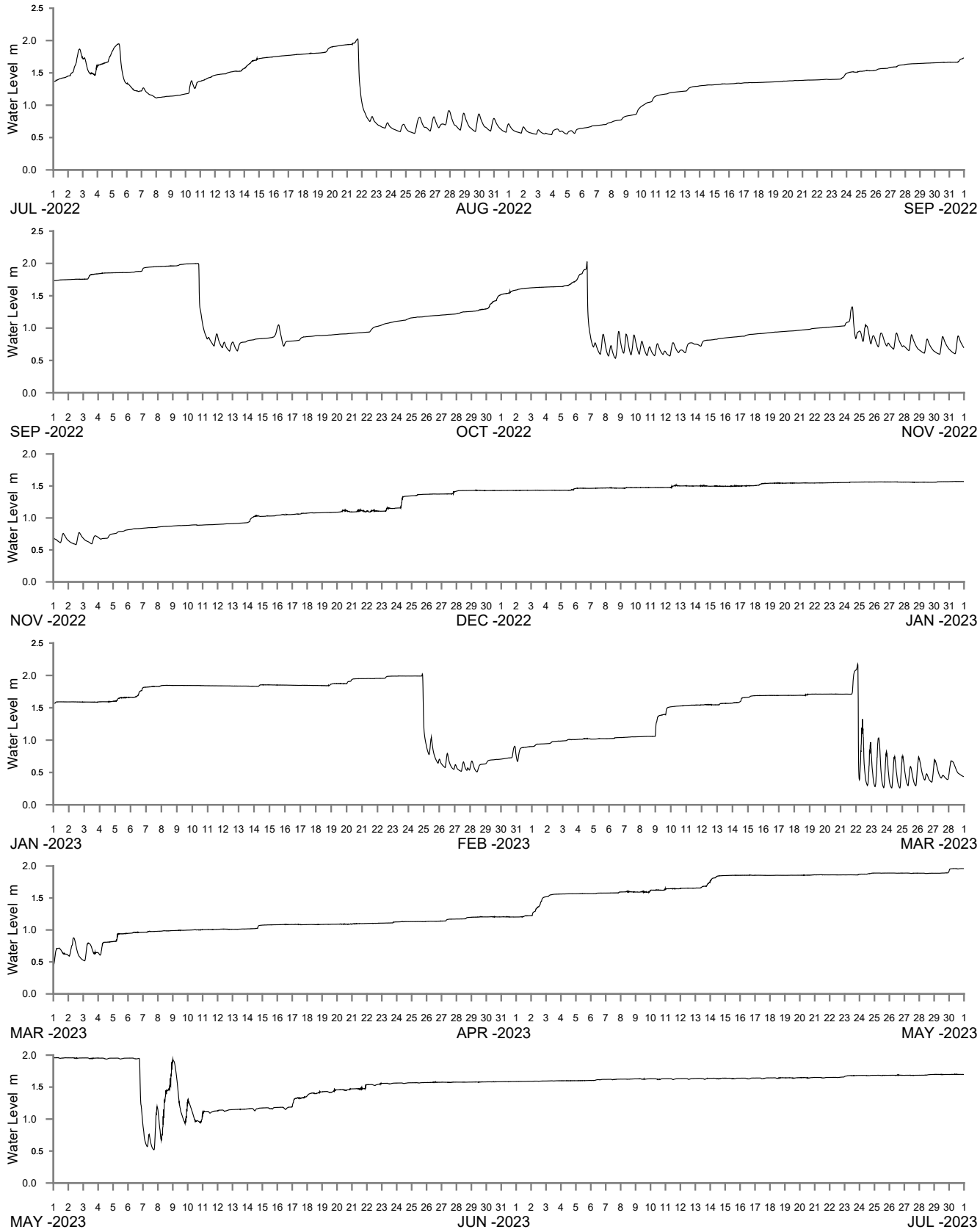
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

NARRABEEN LAGOON AT NARRABEEN BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-177



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

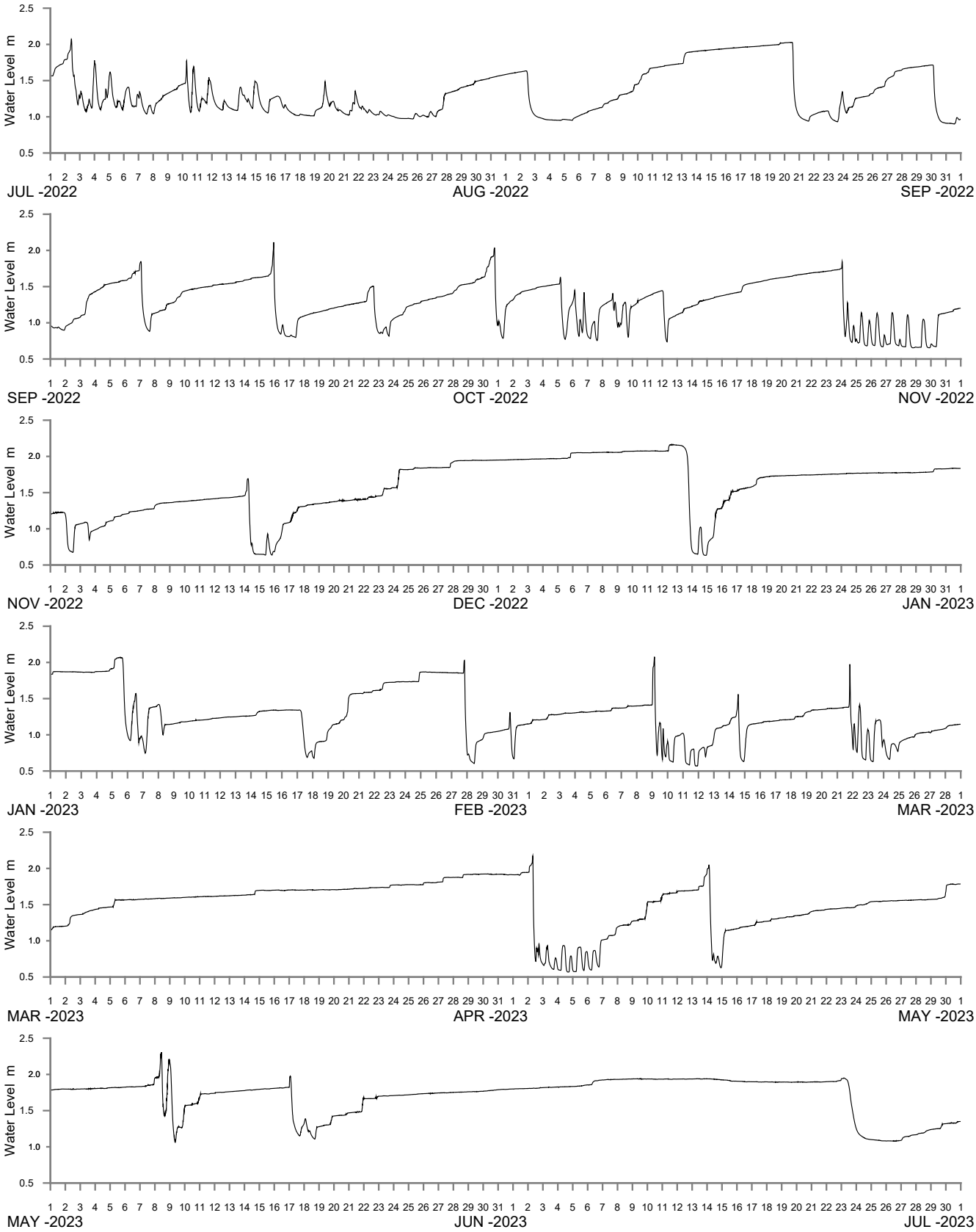
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

DEE WHY LAGOON AT DEE WHY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-178



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

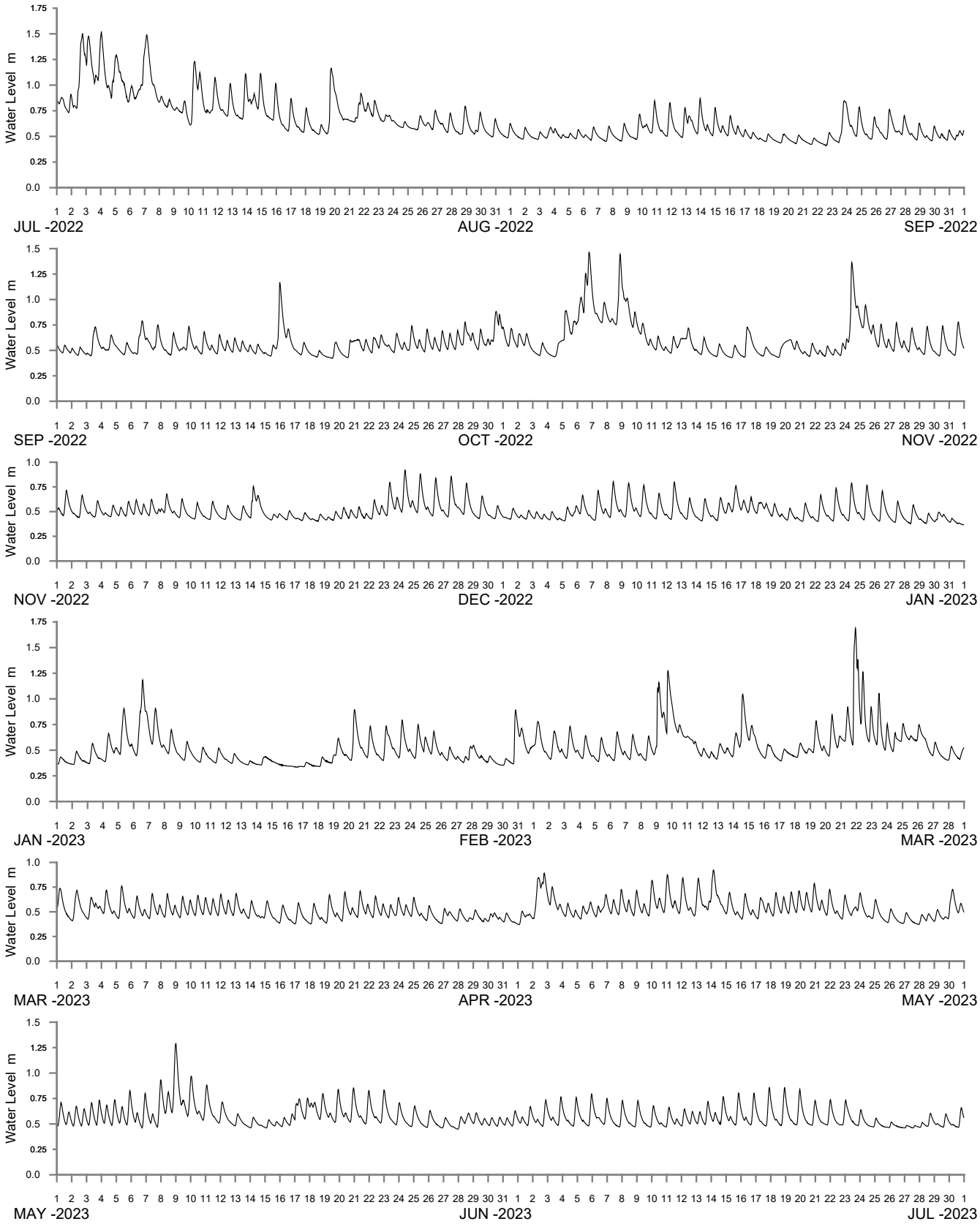
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CURL CURL LAGOON AT CURL CURL
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-179



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

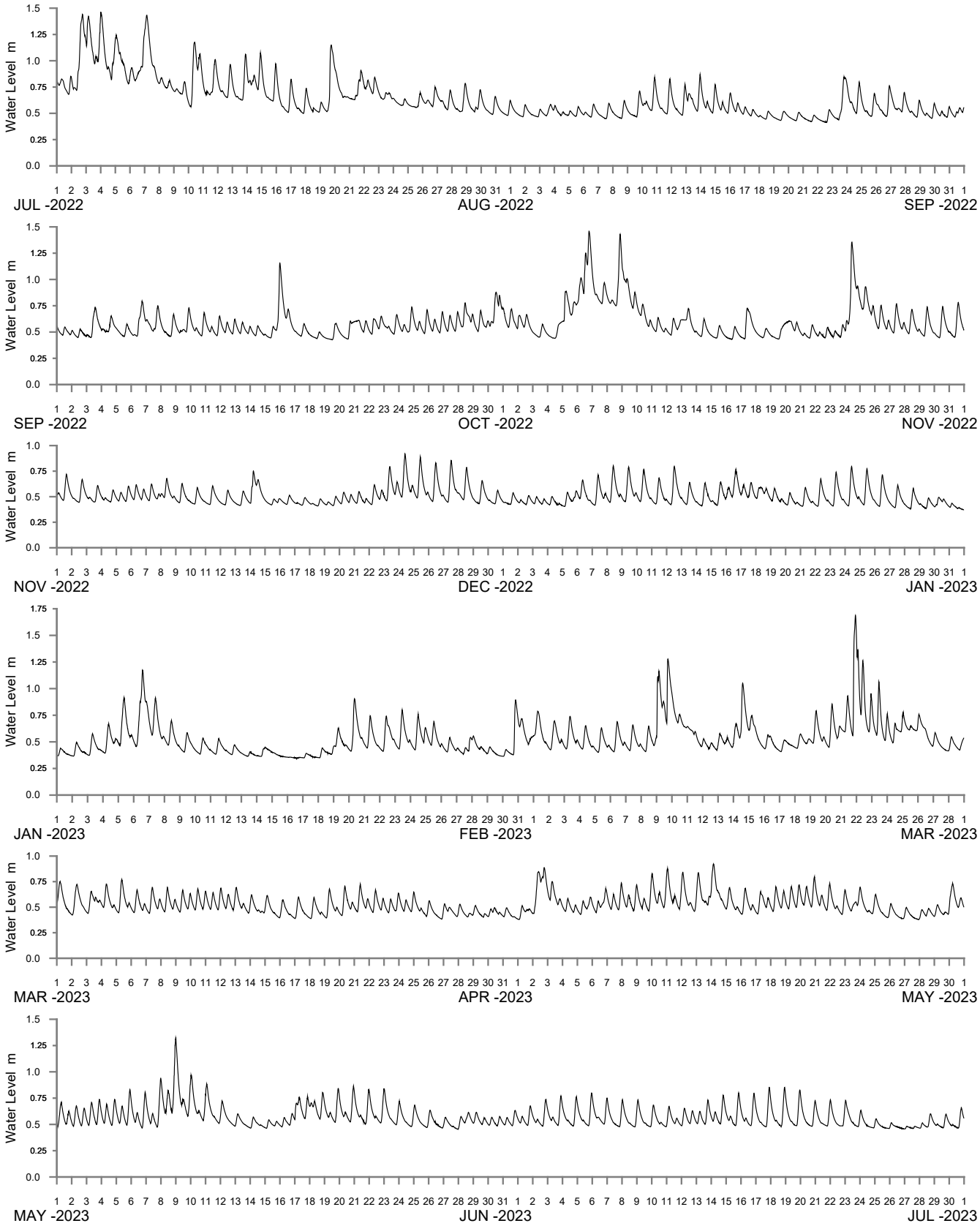
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MANLY LAGOON AT RIVERVIEW PARADE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-180



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

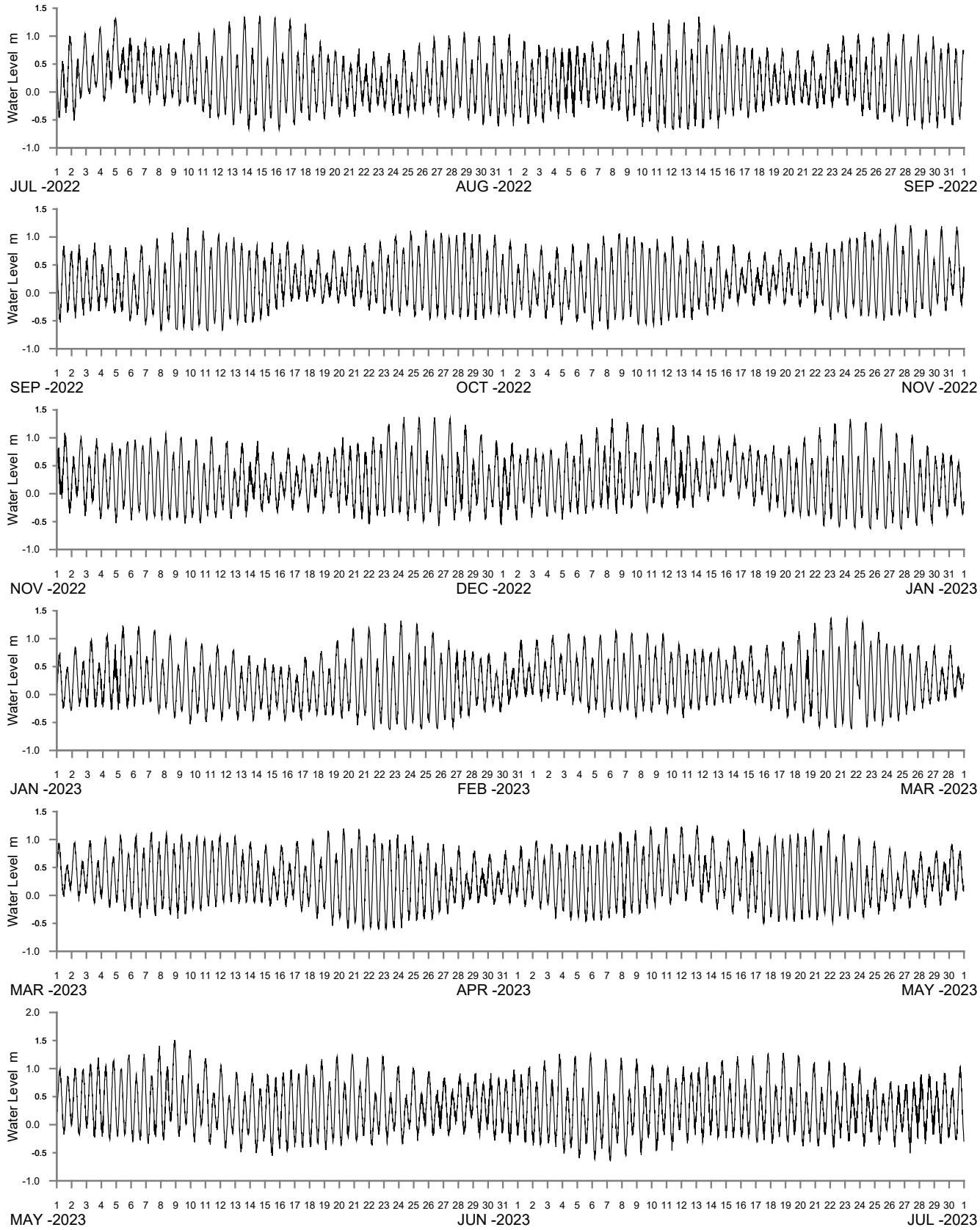
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MANLY LAGOON AT QUEENSCLIFF BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-181



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

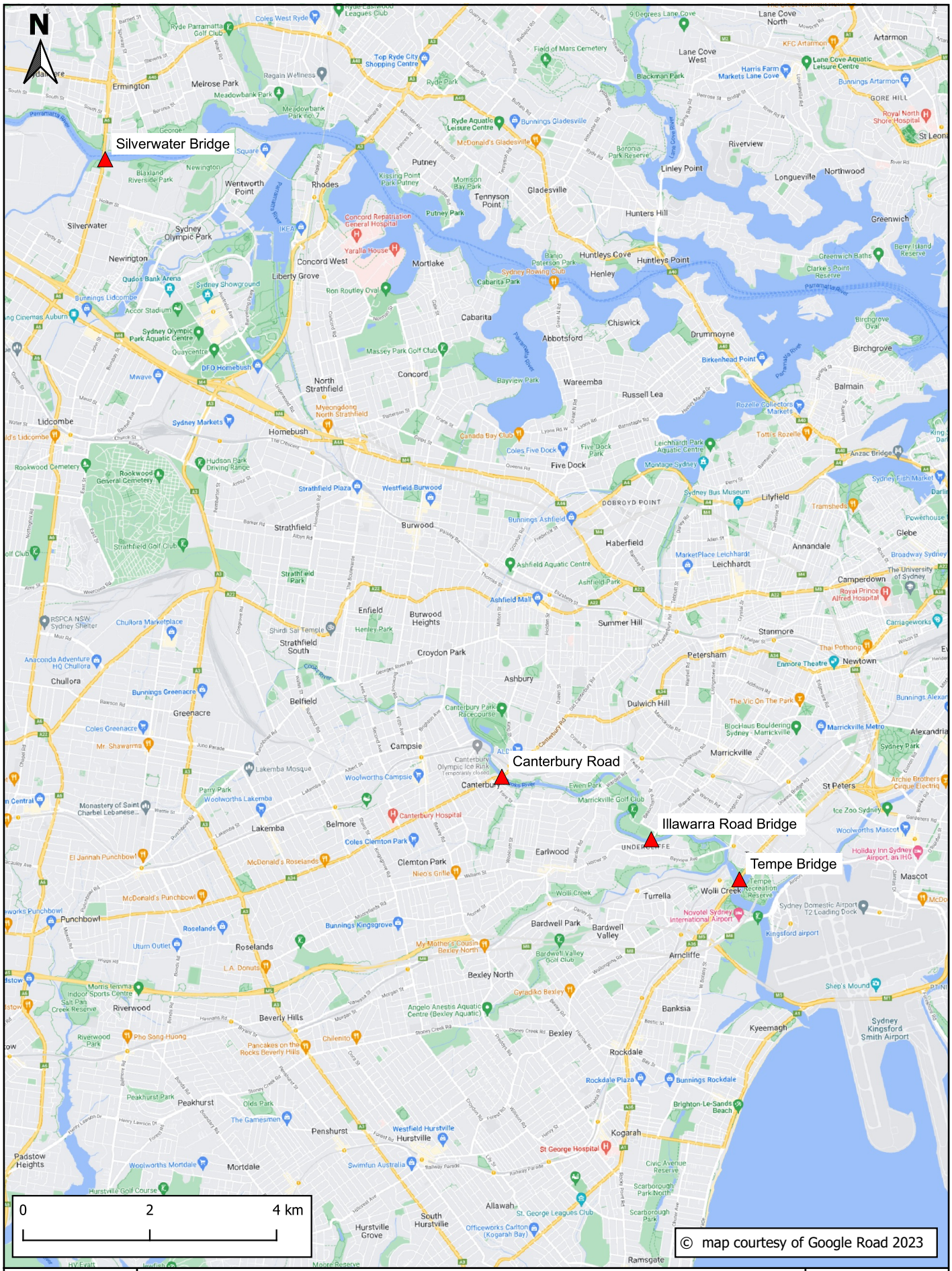
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LANE COVE RIVER AT FULLERS BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-182

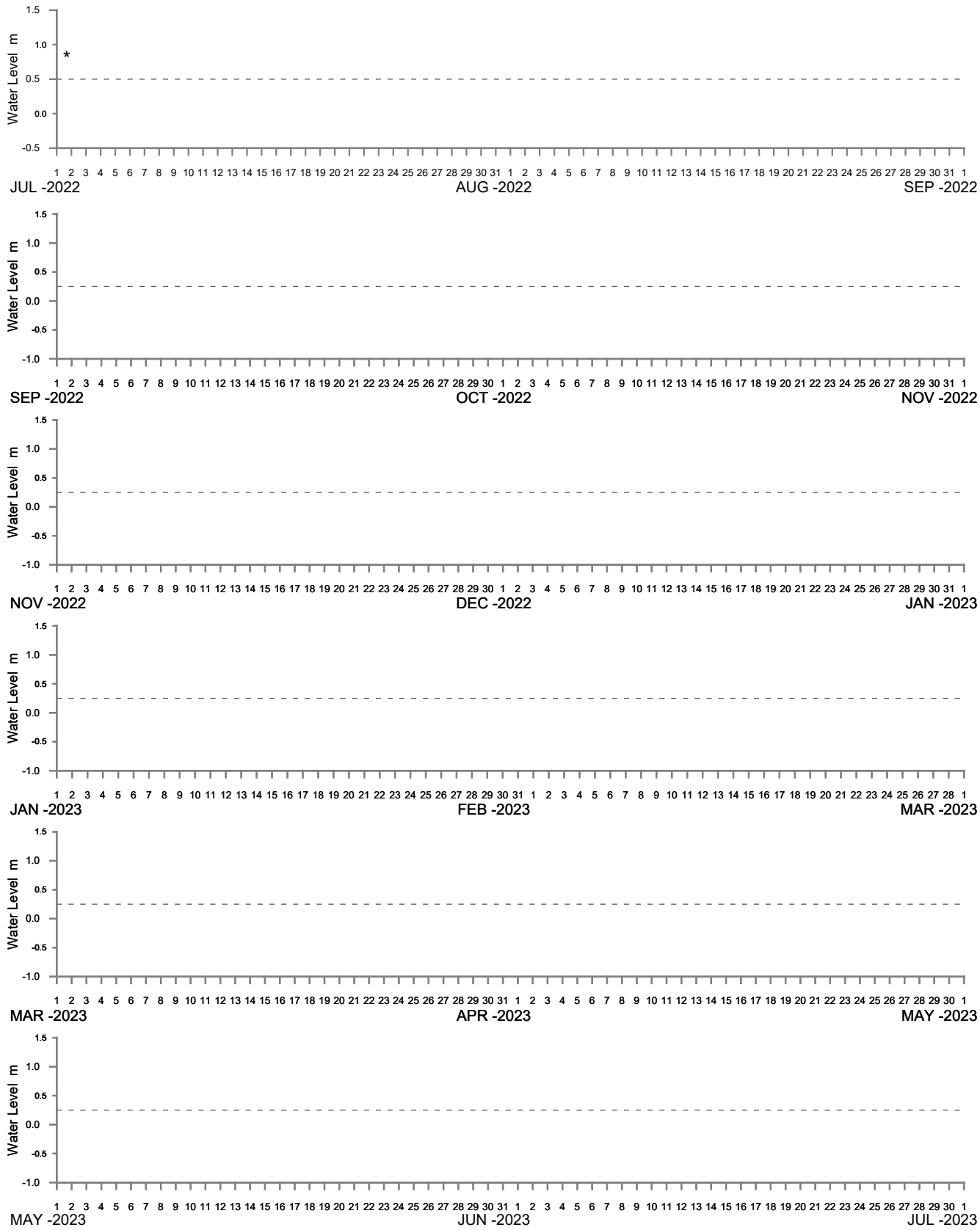


NSW GOVERNMENT

STATION LOCATIONS
PARRAMATTA RIVER AND COOKS RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-183



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

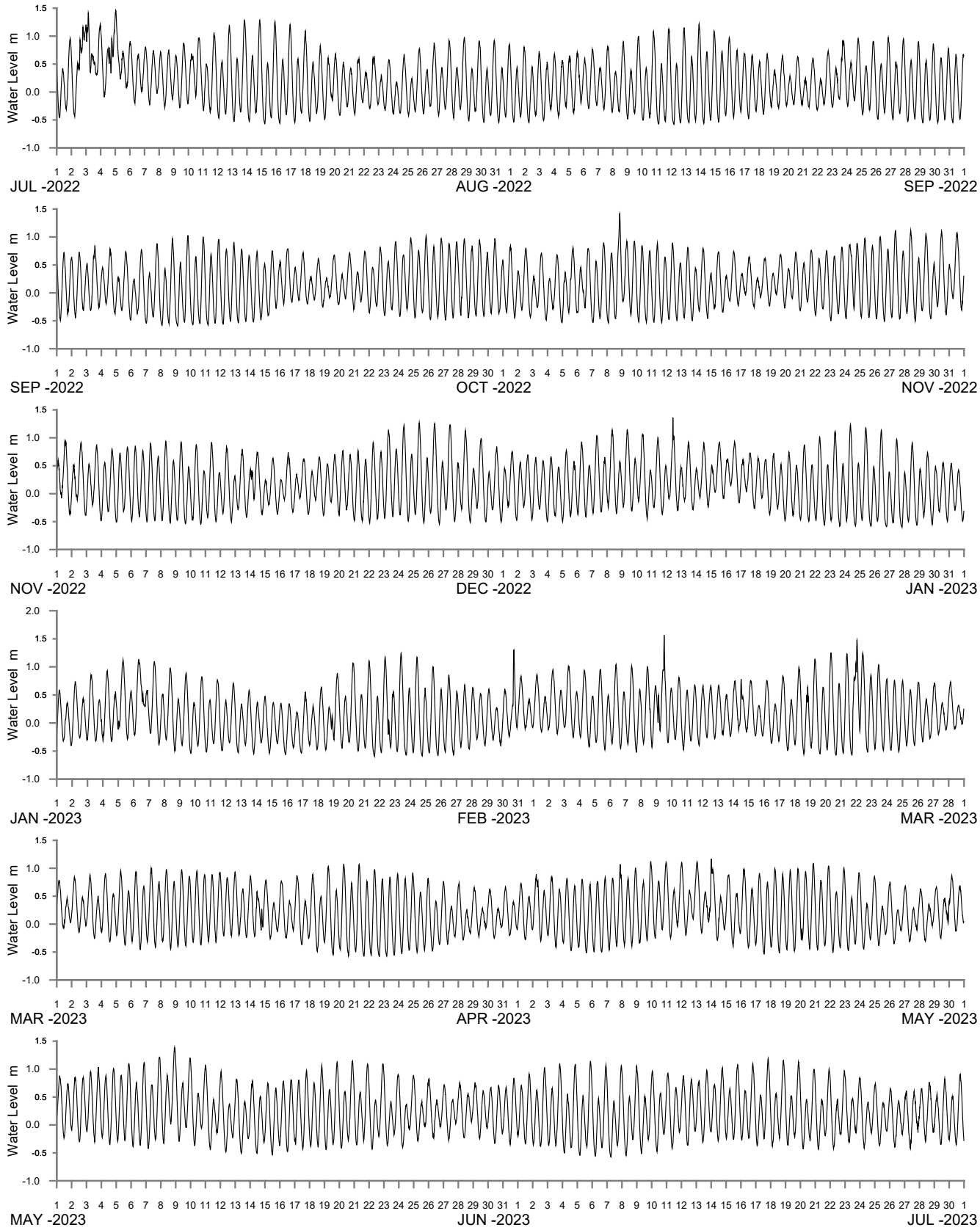
* Data loss due to a compromised conduit

NSW GOVERNMENT

PARRAMATTA RIVER AT SILVERWATER BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-184



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

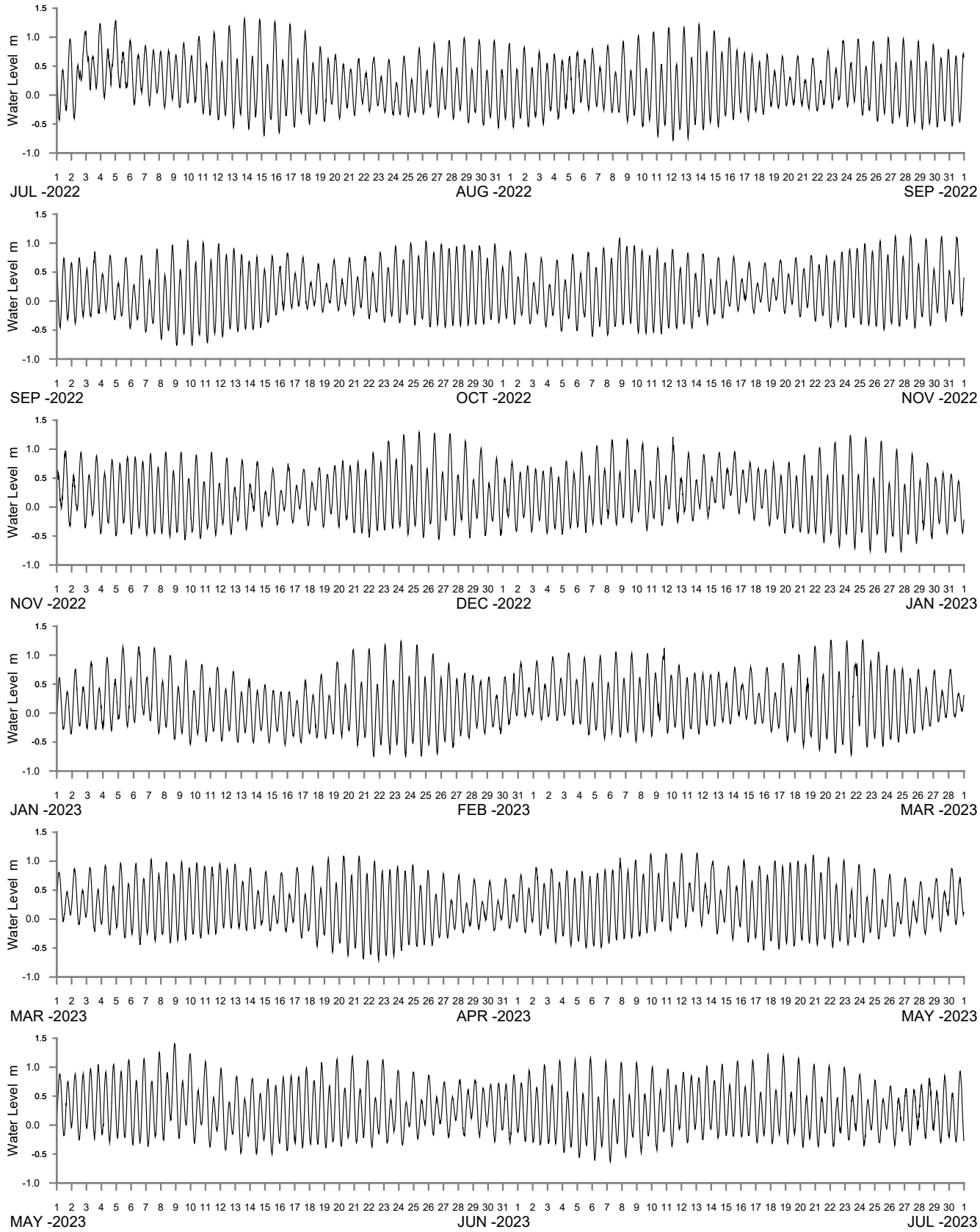
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

COOKS RIVER AT CANTERBURY ROAD
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-185



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

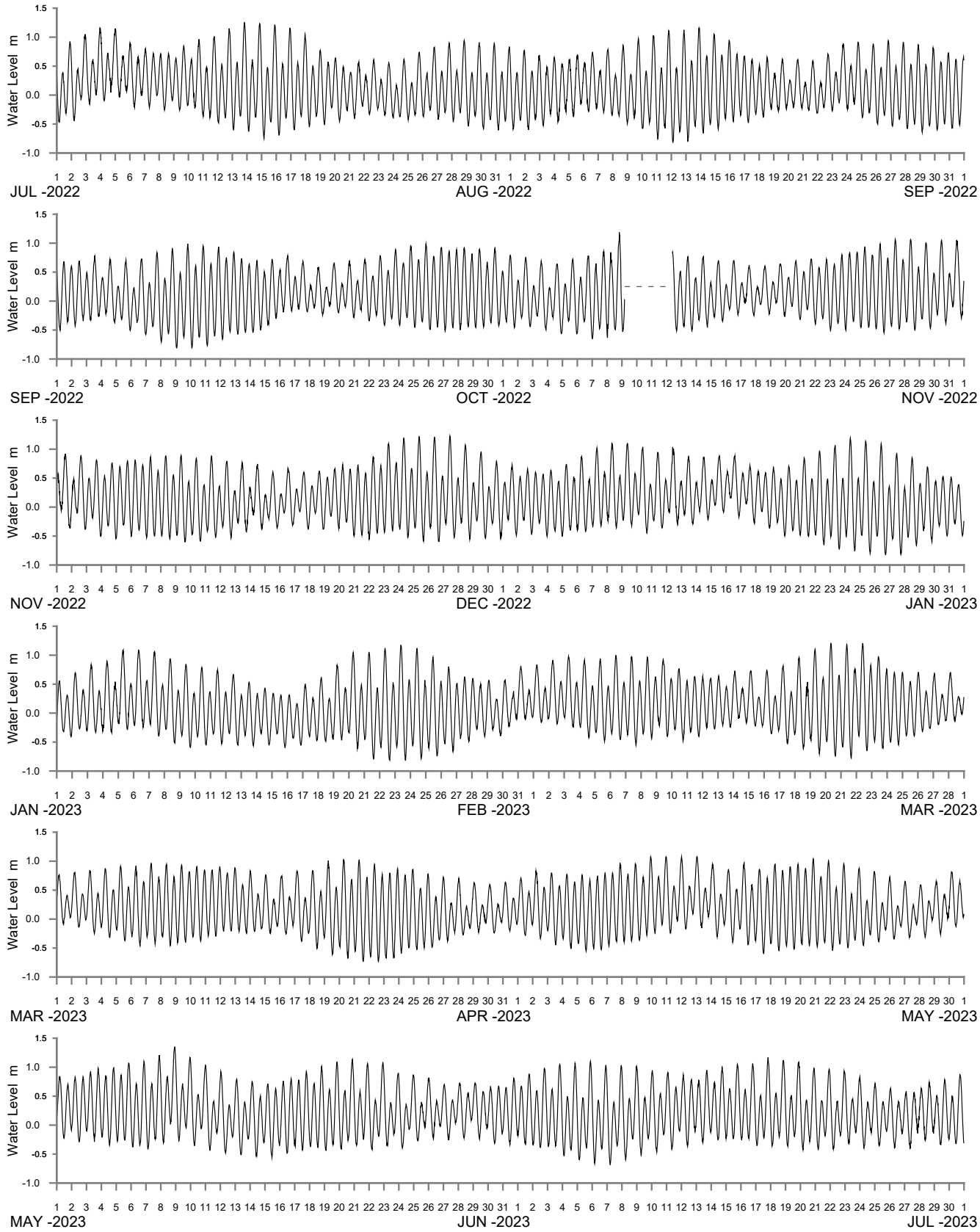
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

COOKS RIVER AT ILLAWARRA ROAD BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-186



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

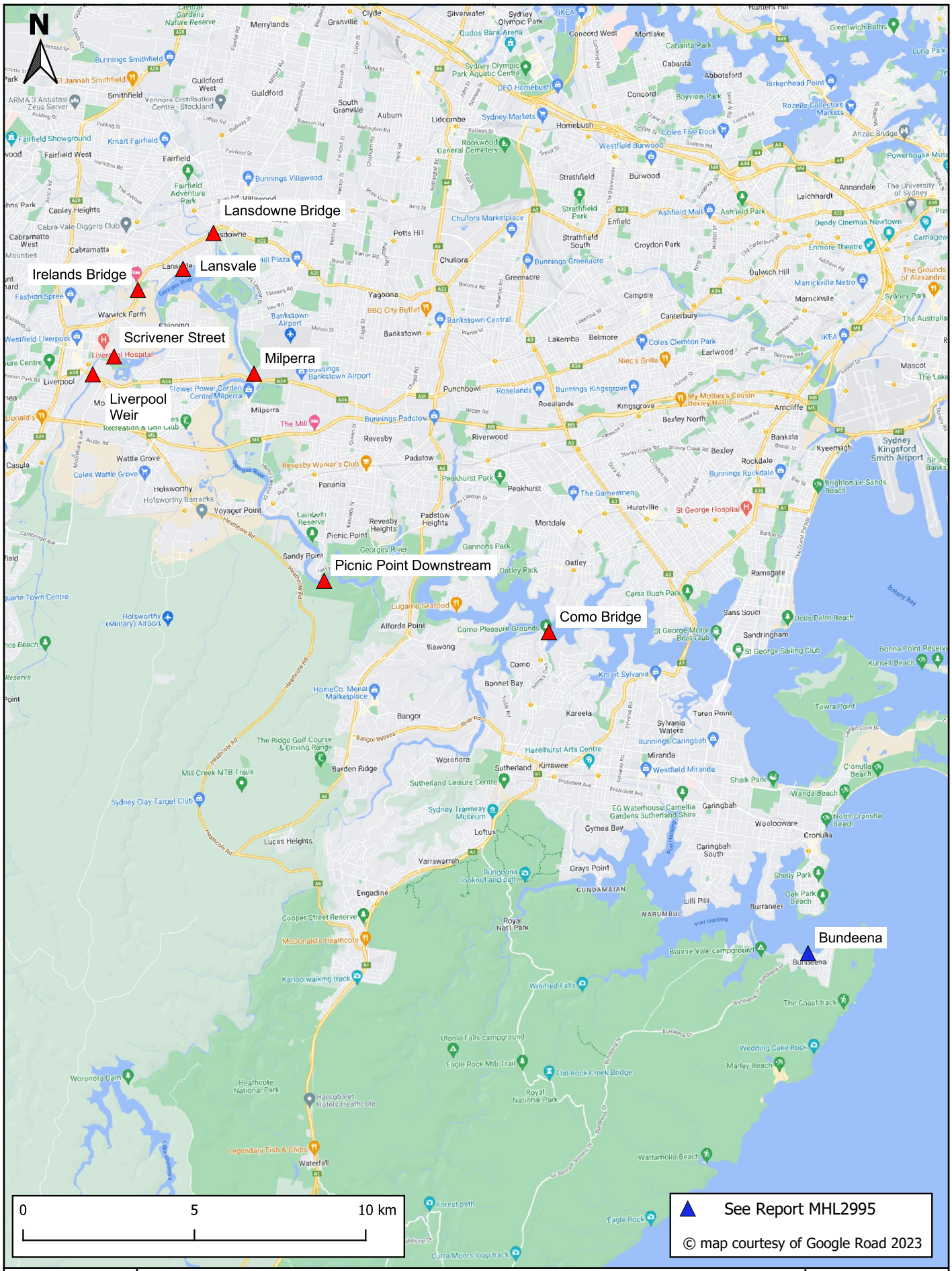
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

COOKS RIVER AT TEMPE BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-187

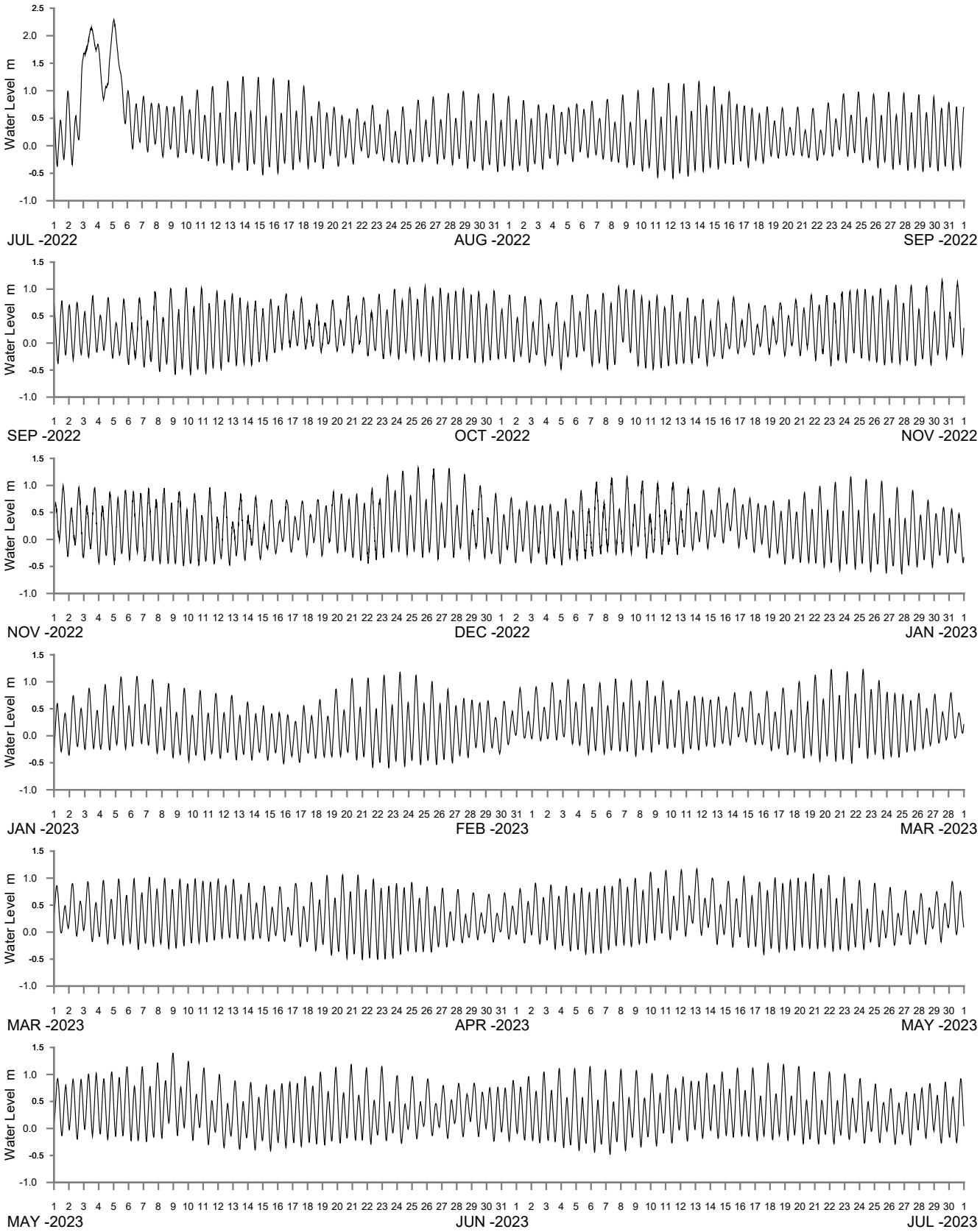


NSW GOVERNMENT

STATION LOCATIONS
GEORGES RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-188



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

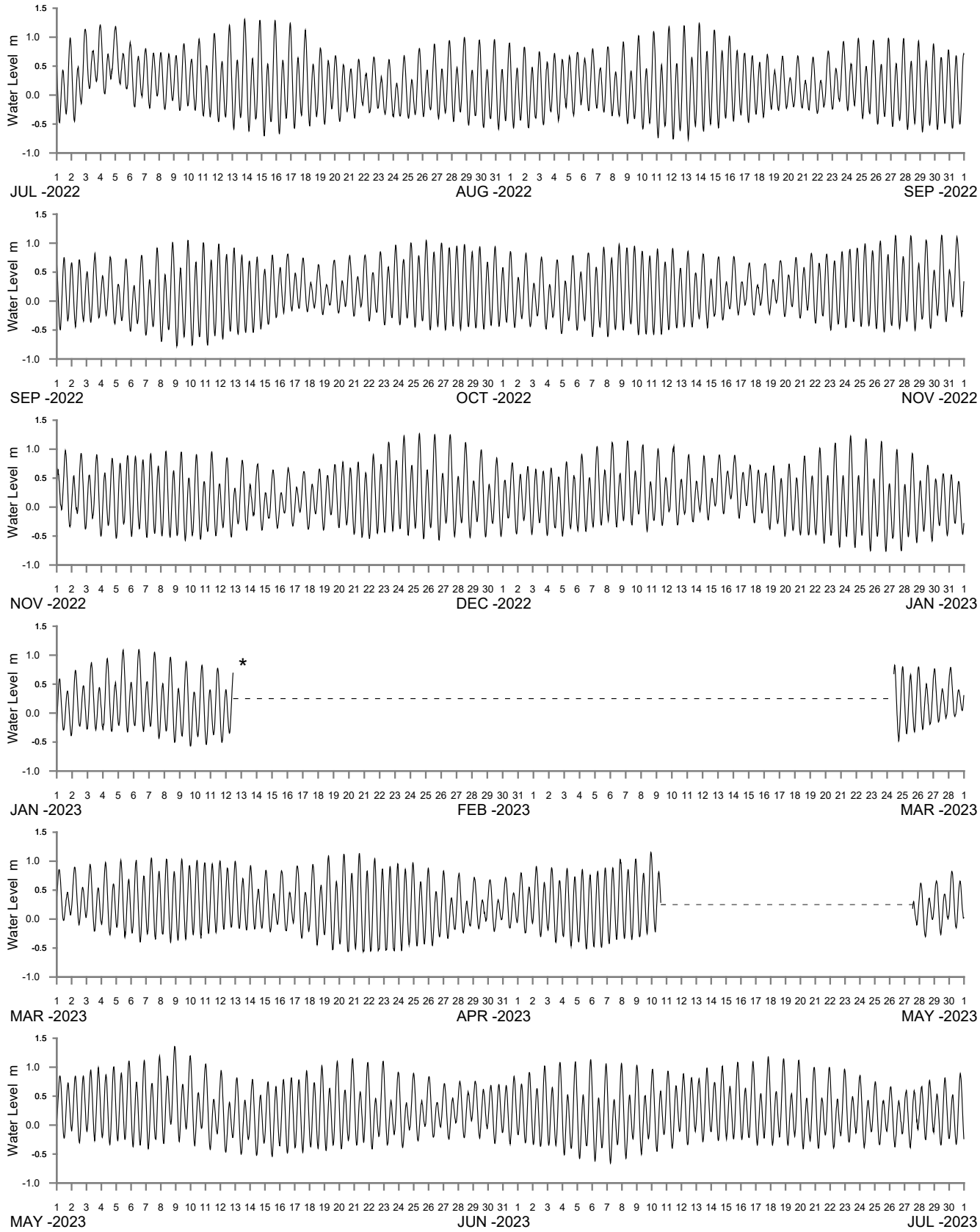
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

GEORGES RIVER AT PICNIC POINT DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-189



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

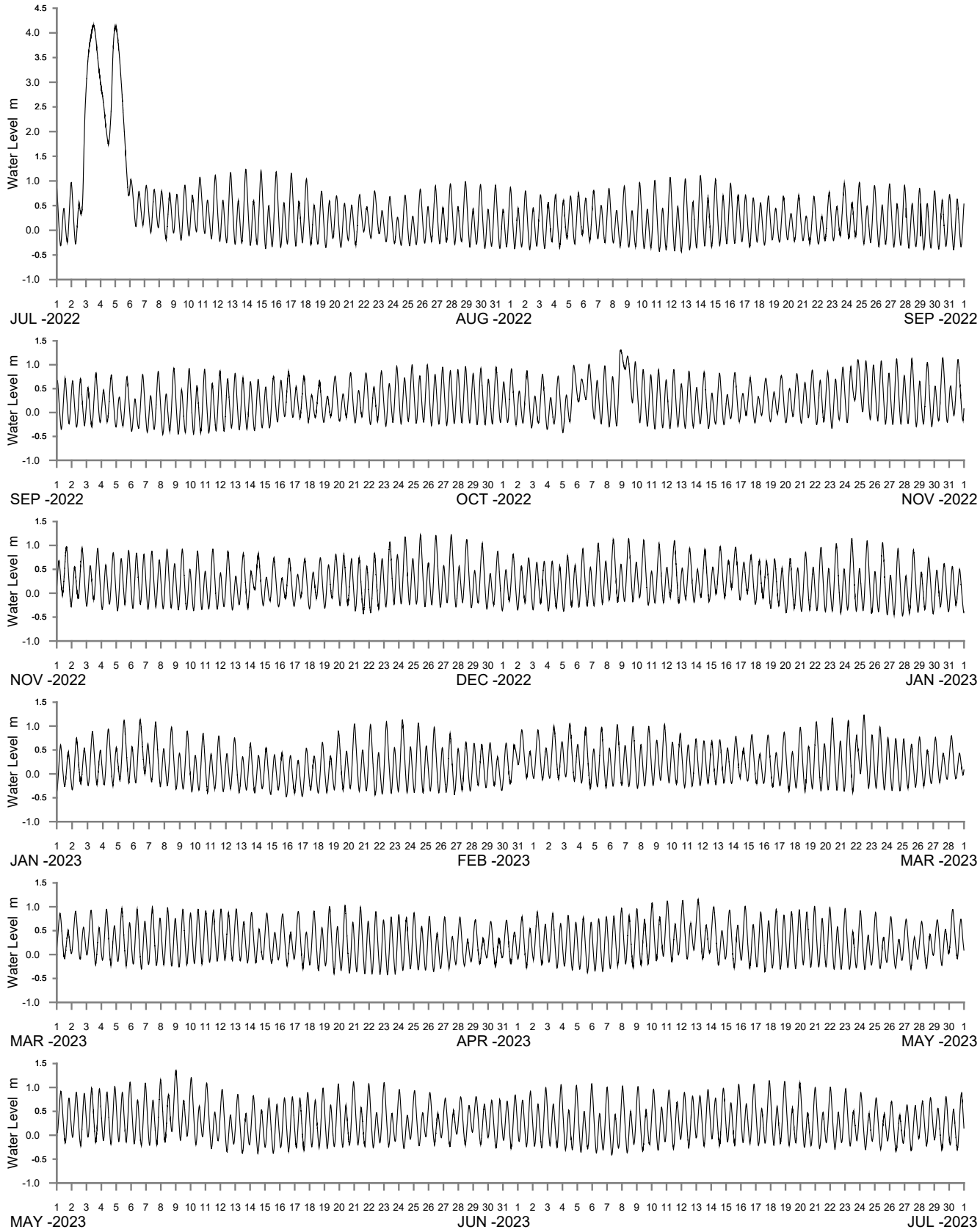
* Data loss due to unsafe instrumentation structure being removed and standalone sensor failure

NSW GOVERNMENT

GEORGES RIVER AT COMO BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-190



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

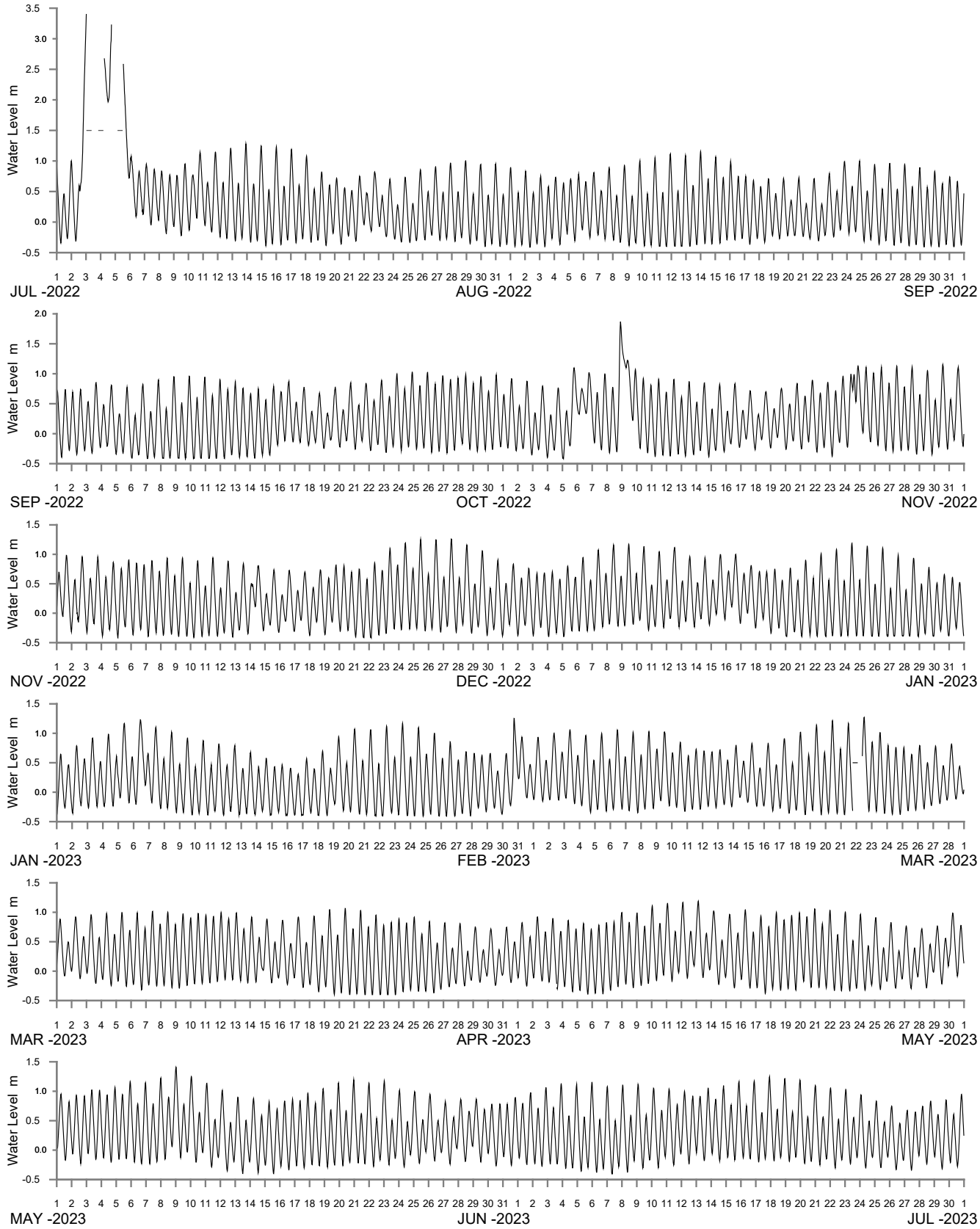
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

GEORGES RIVER AT MILPERRA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-191



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

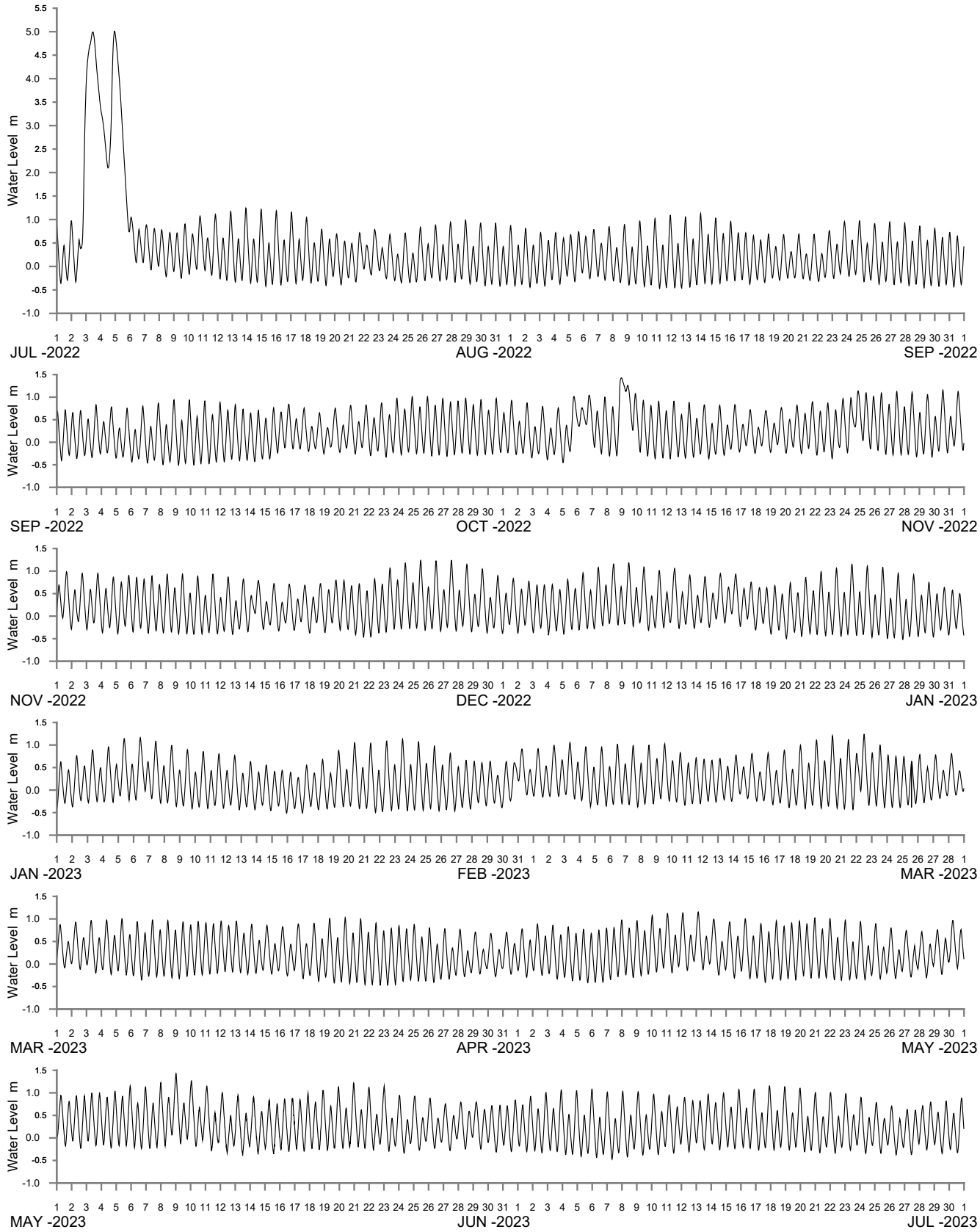
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

PROSPECT CREEK AT LANSDOWNE BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-192



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

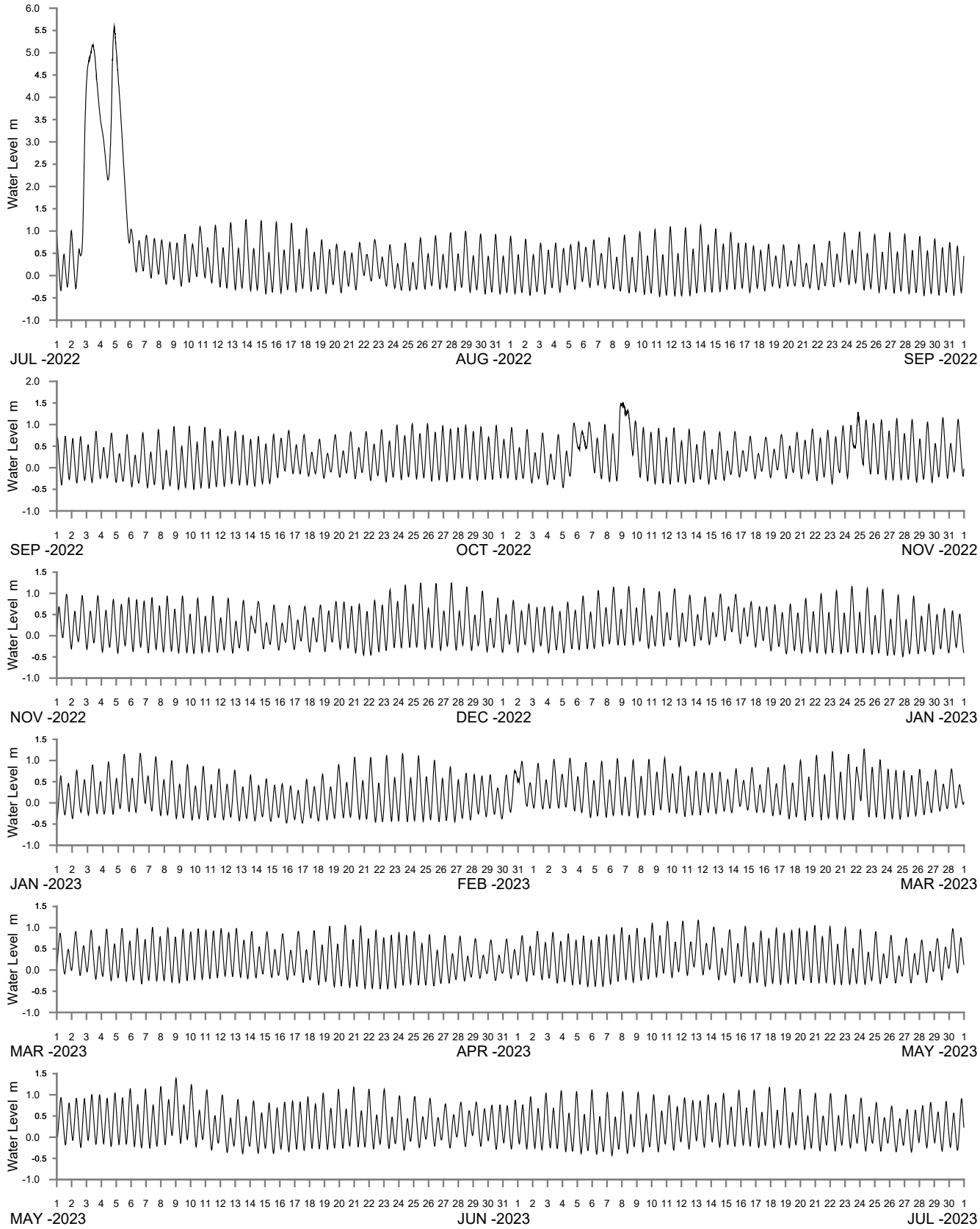
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

GEORGES RIVER AT LANSVALE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-193



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

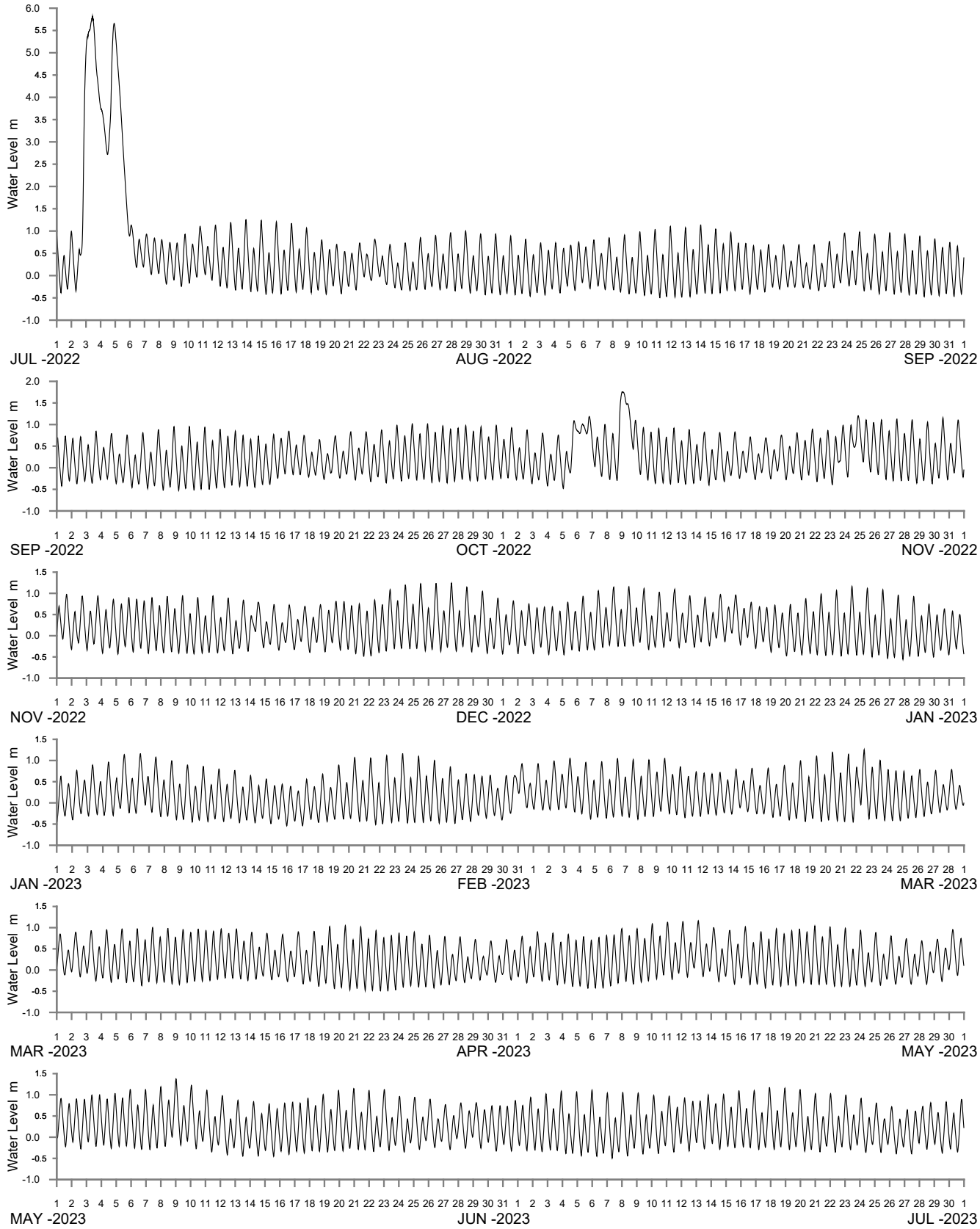
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CABRAMATTA CREEK AT IRELANDS BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-194



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

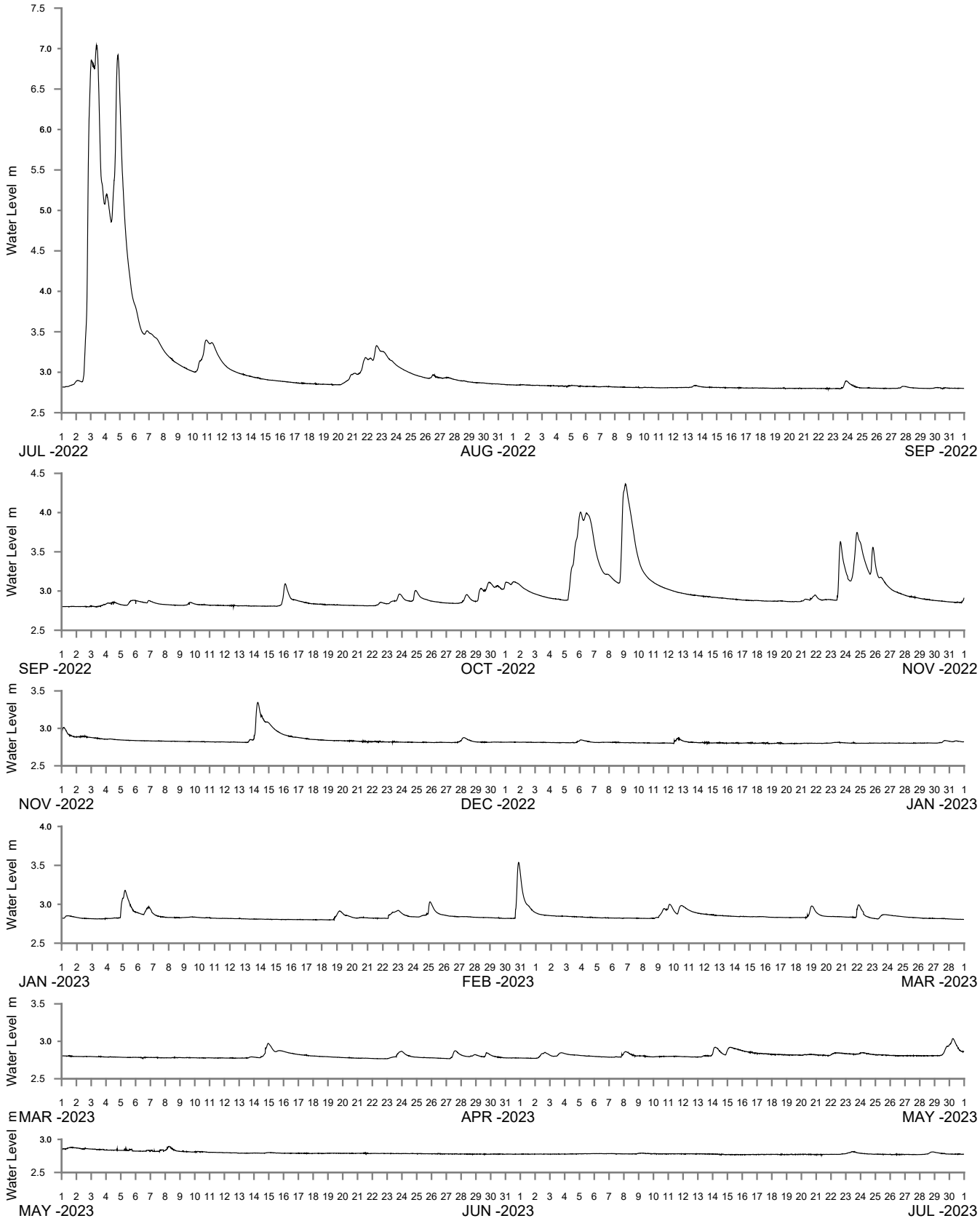
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

GEORGES RIVER AT SCRIVENER STREET
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-195



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

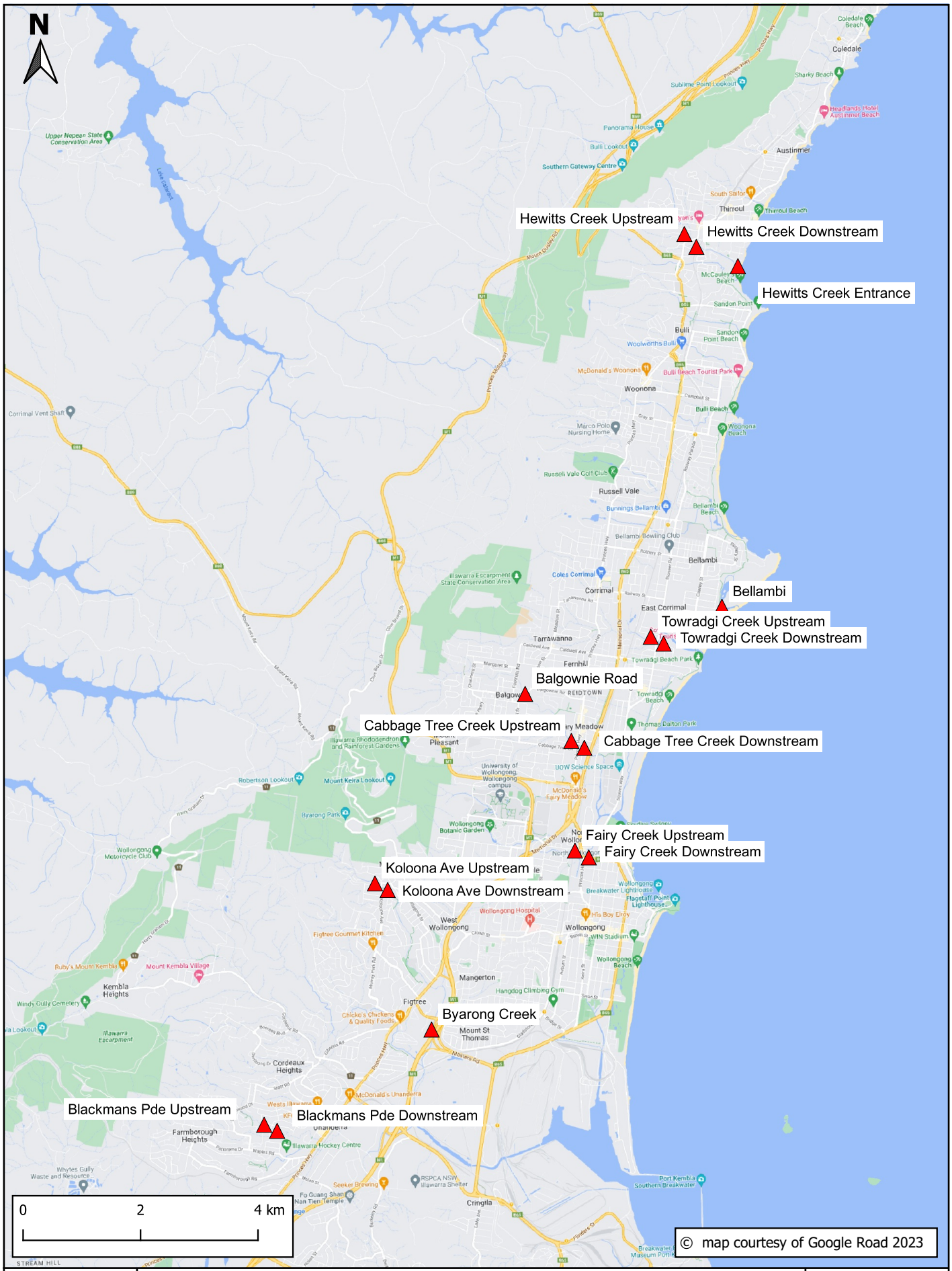
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

GEORGES RIVER AT LIVERPOOL WEIR
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-196

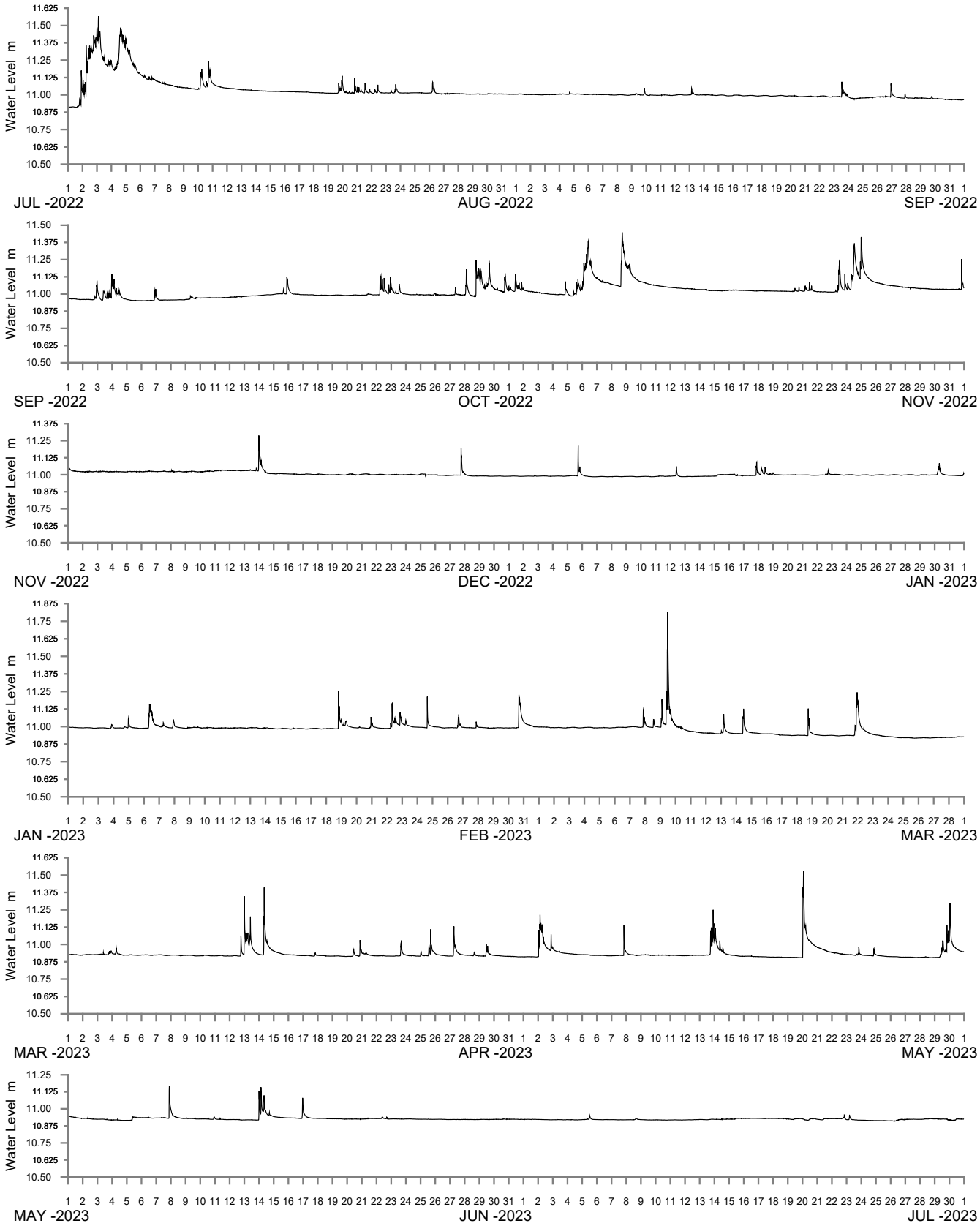


NSW GOVERNMENT

STATION LOCATIONS
WOLLONGONG REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-197



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

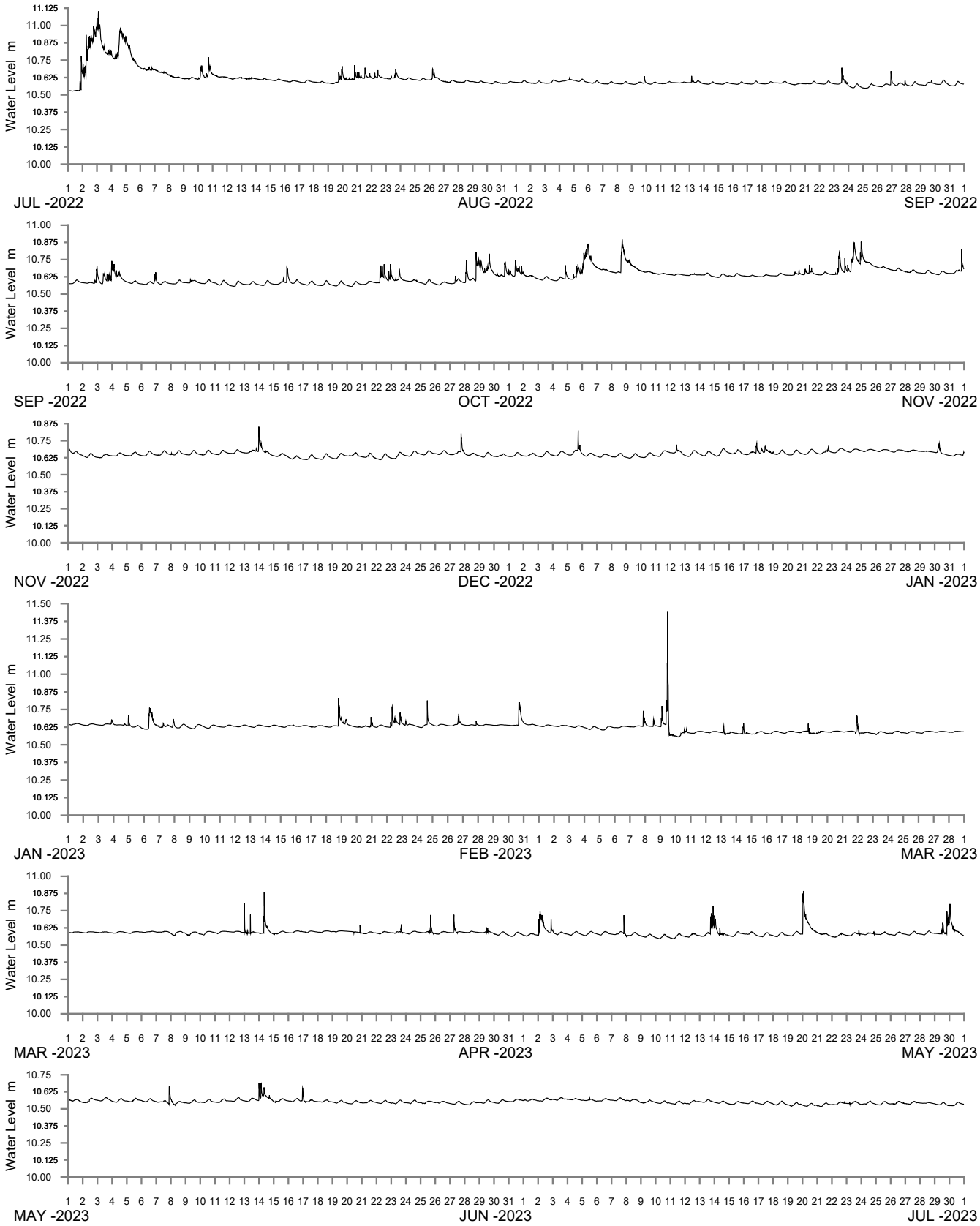
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HEWITTS CREEK AT HEWITTS CREEK UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-198



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

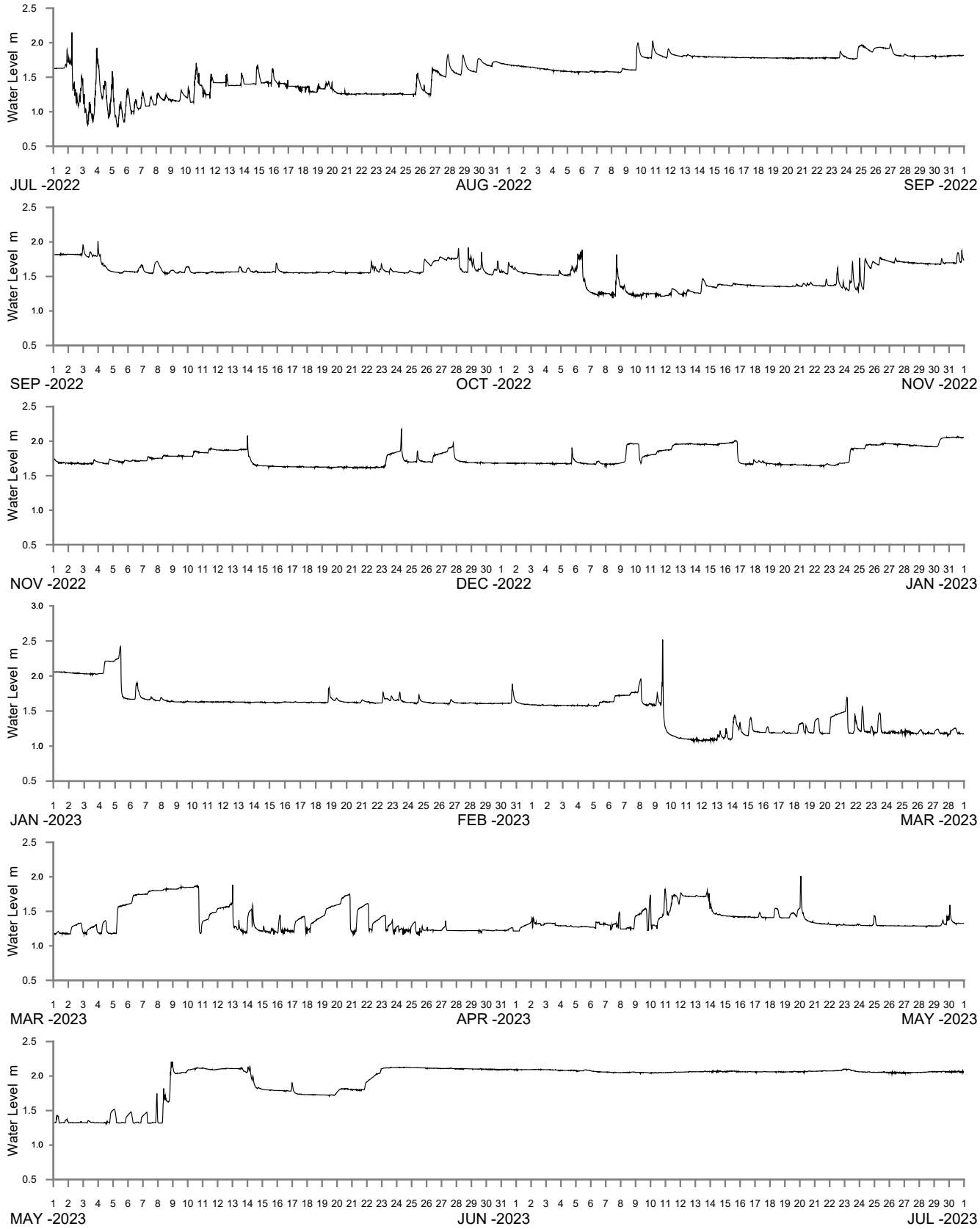
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HEWITTS CREEK AT HEWITTS CREEK DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-199



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

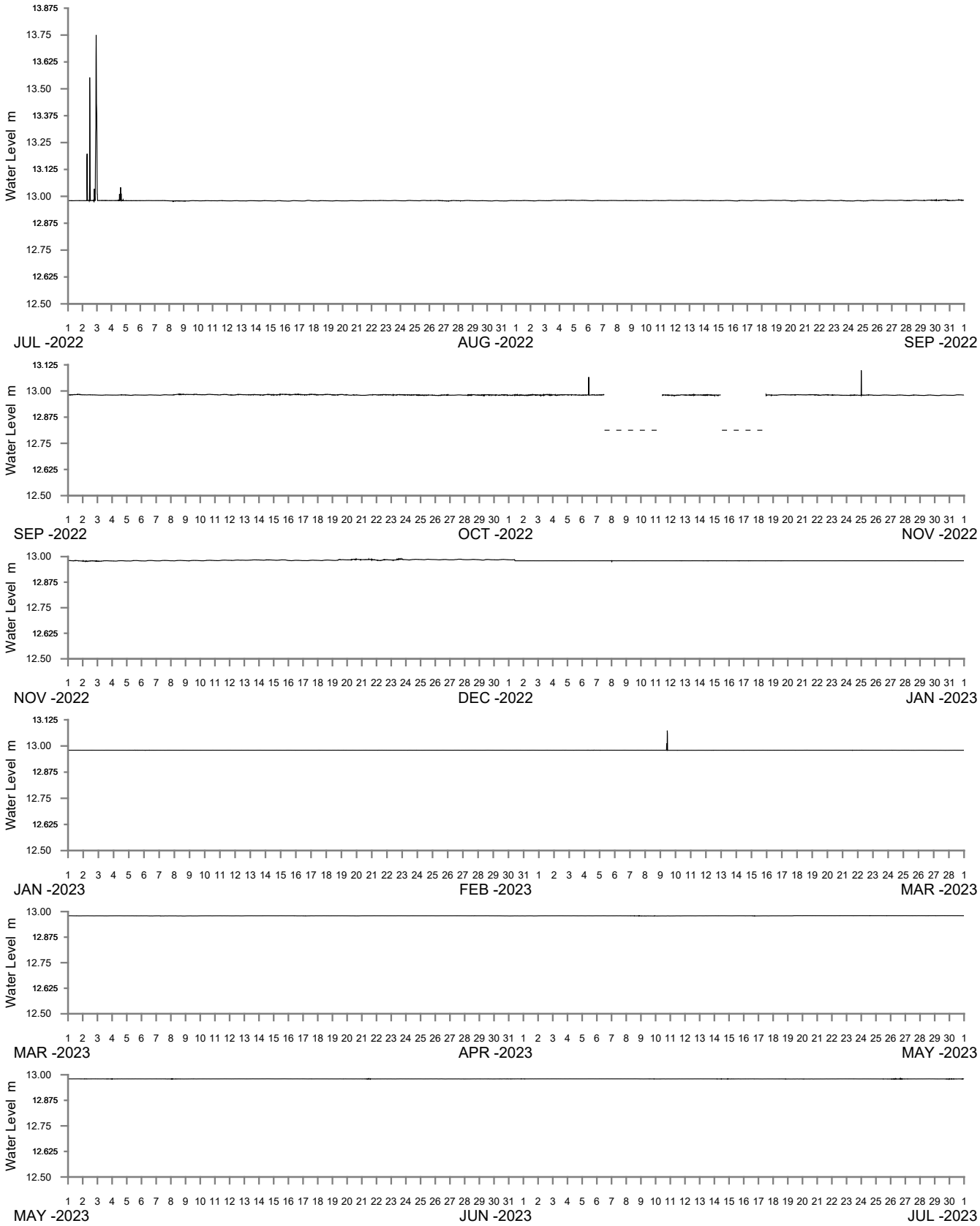
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

HEWITTS CREEK AT HEWITTS CREEK ENTRANCE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-200



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

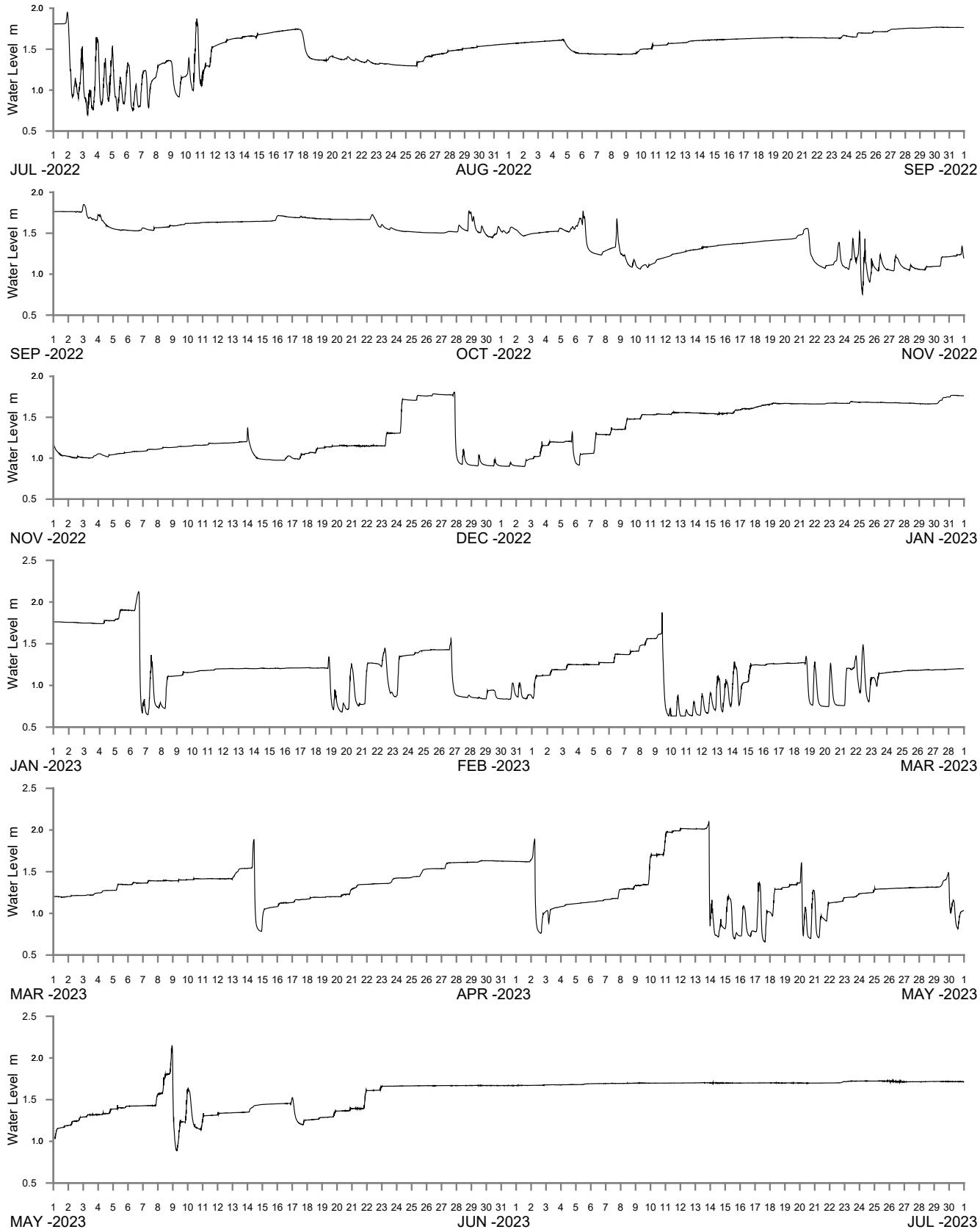
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CABBAGE TREE CREEK AT BALGOWNIE ROAD
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-201



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

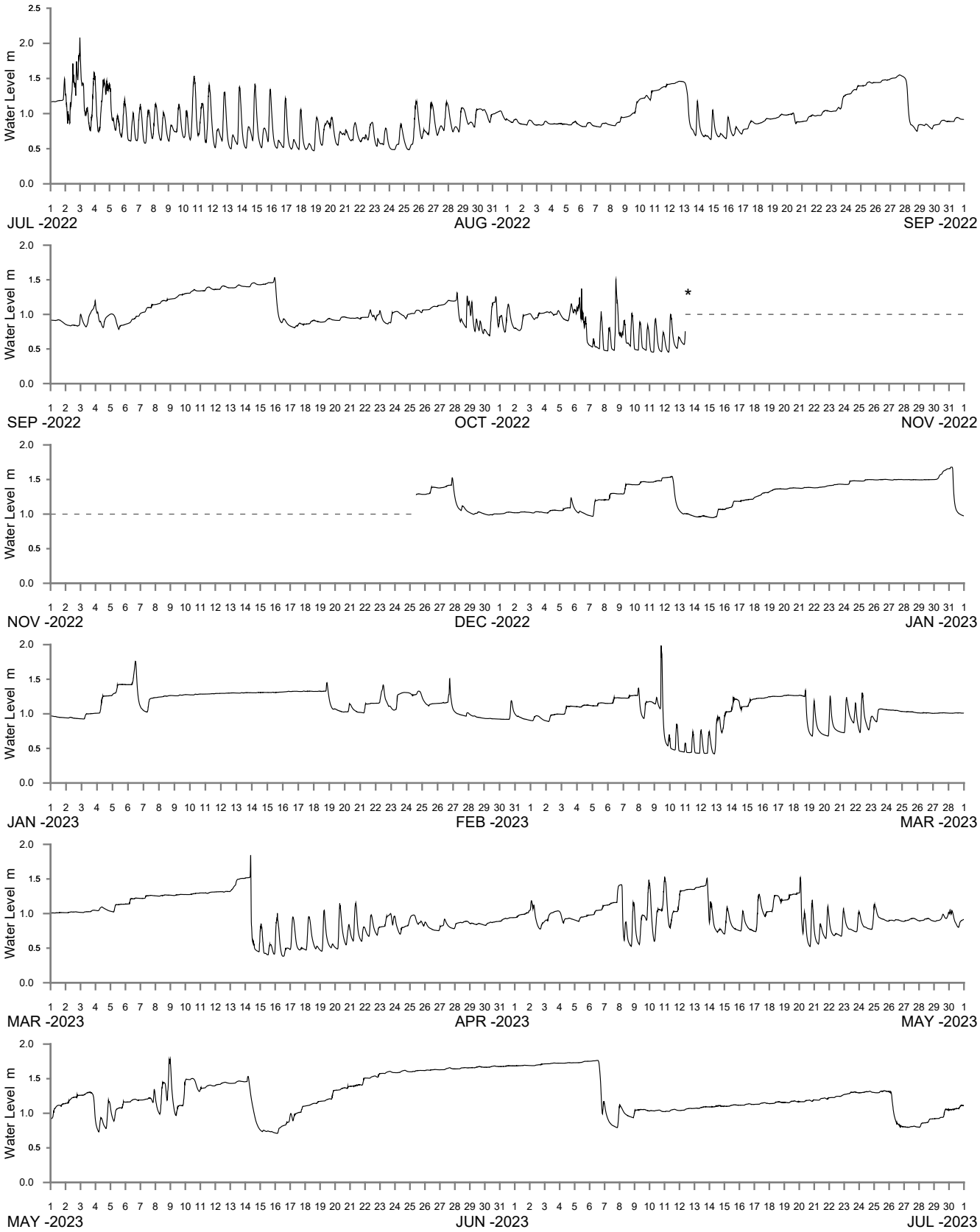
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BELLAMBI LAKE AT BELLAMBI
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-202



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

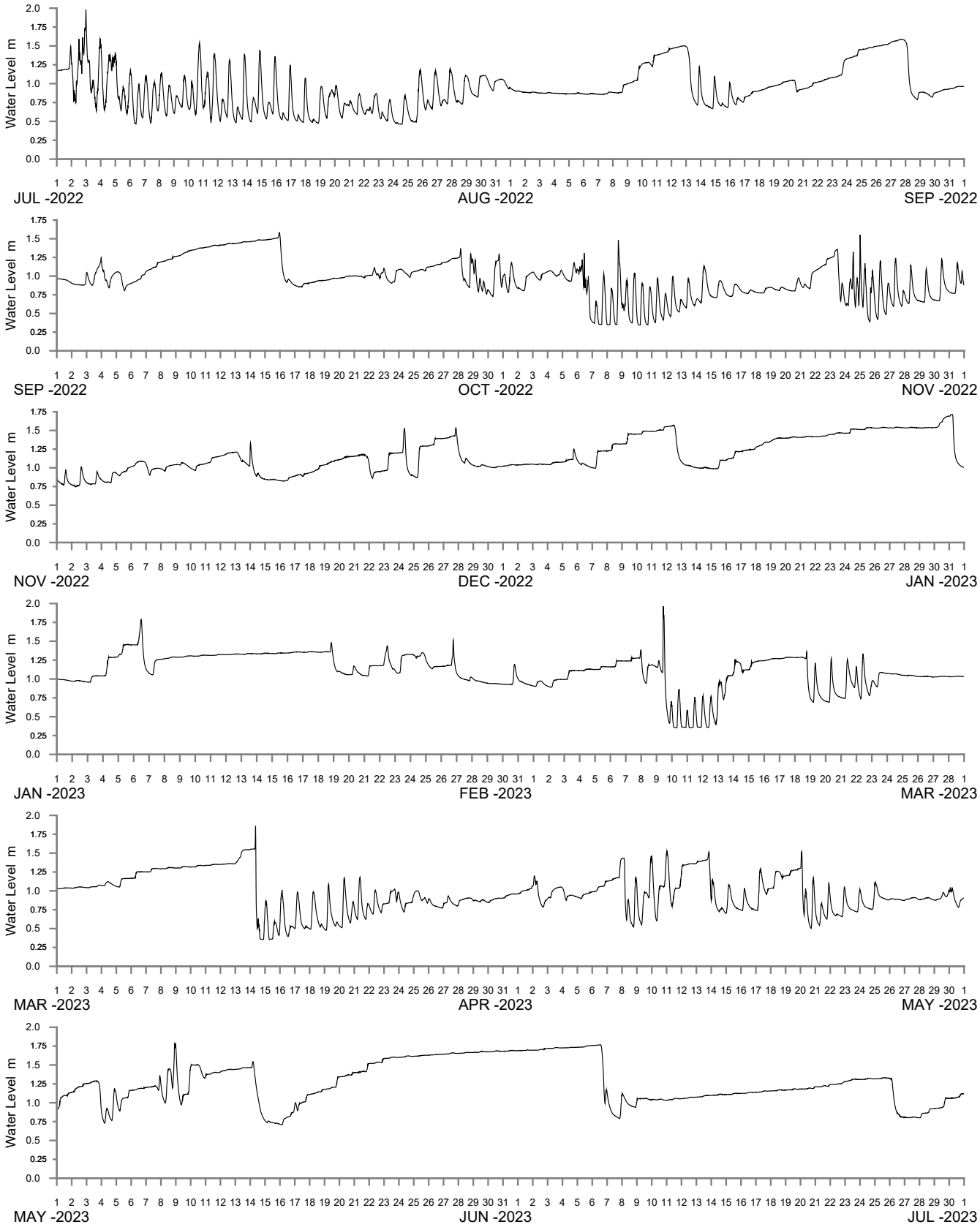
* Data uncertainty >+/-50mm due to sensor drift

NSW GOVERNMENT

TOWRADGI CREEK AT TOWRADGI CREEK UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-203



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

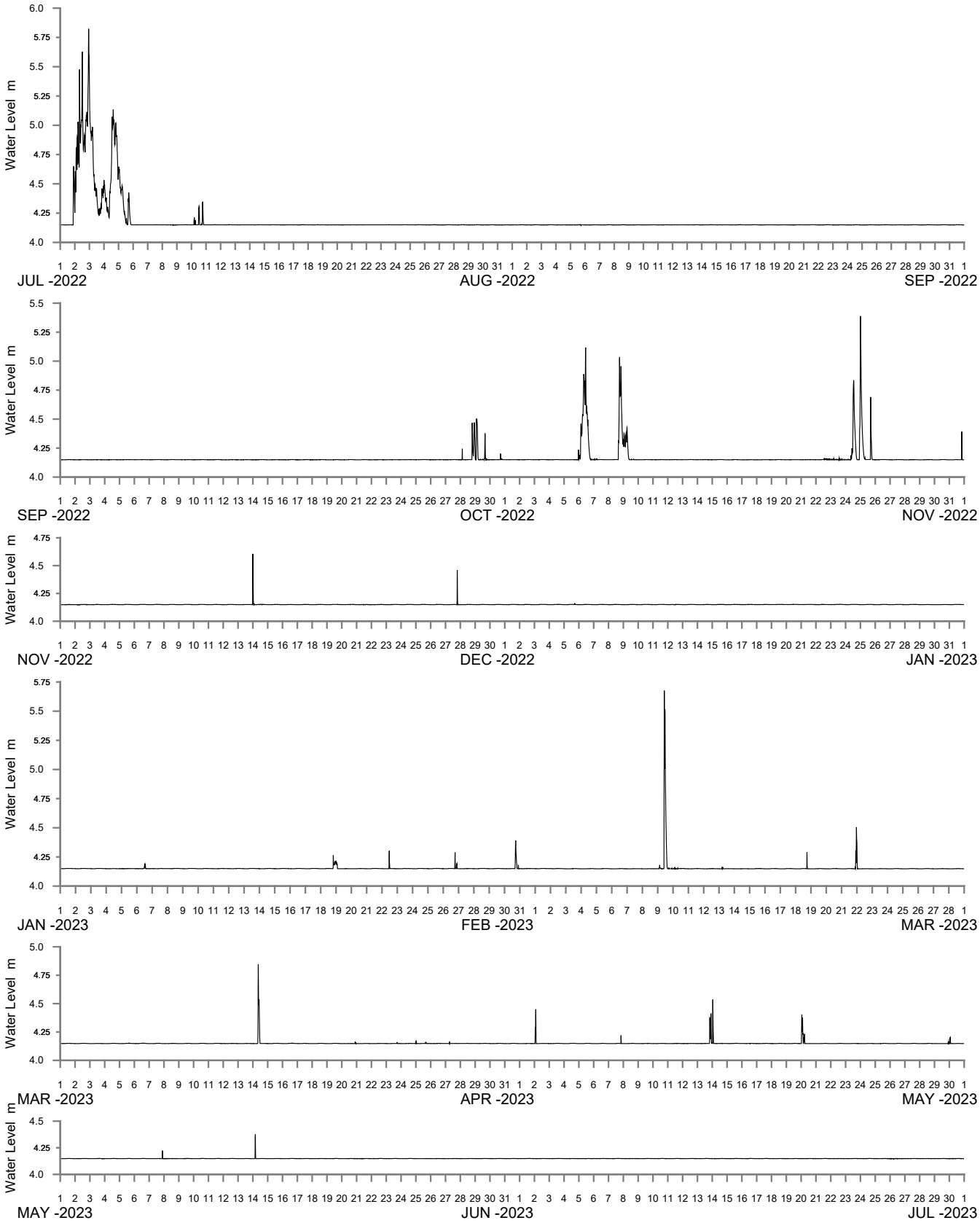
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TOWRADGI CREEK AT TOWRADGI CREEK DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-204



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

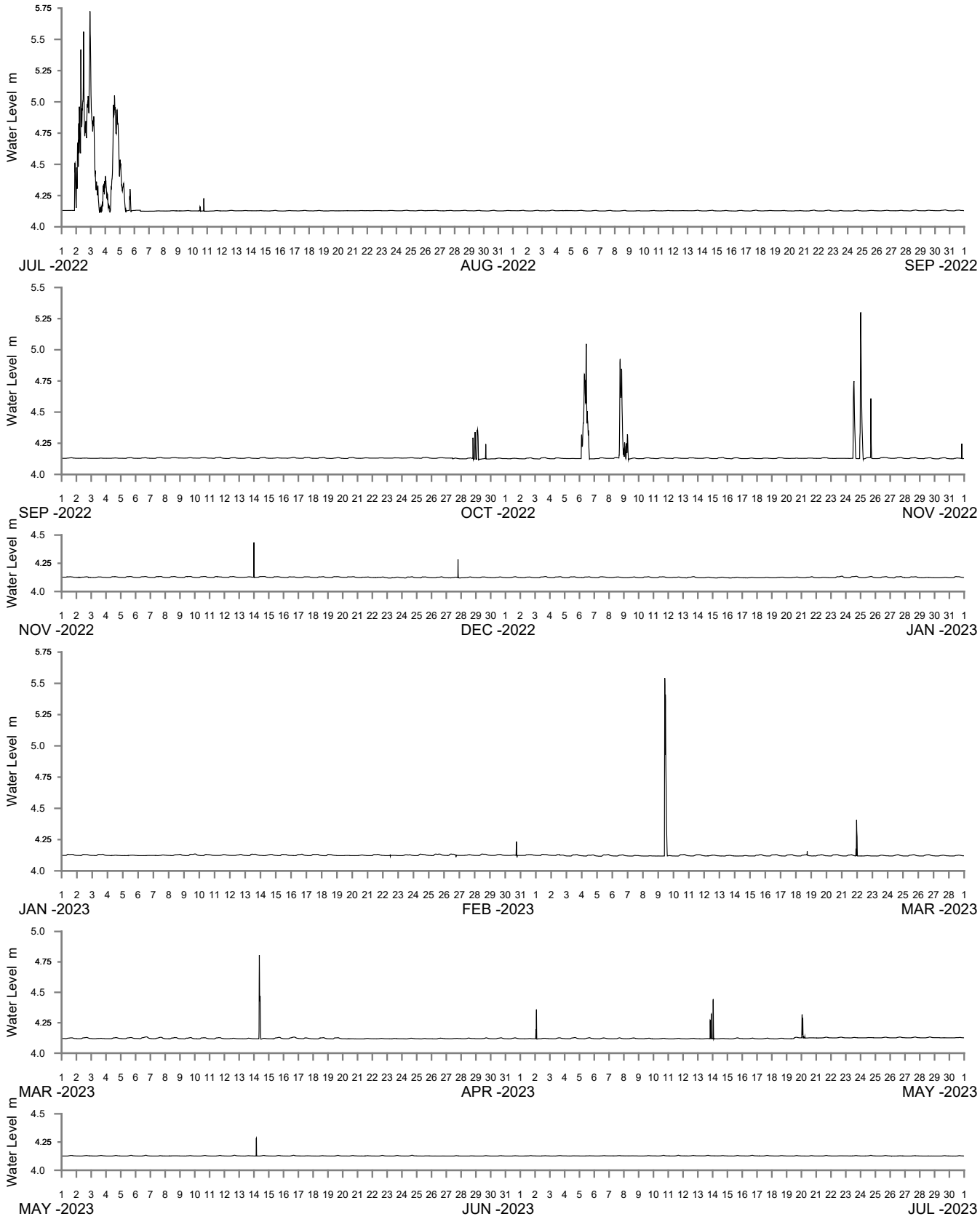
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CABBAGE TREE CREEK AT CABBAGE TREE CREEK UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-205



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

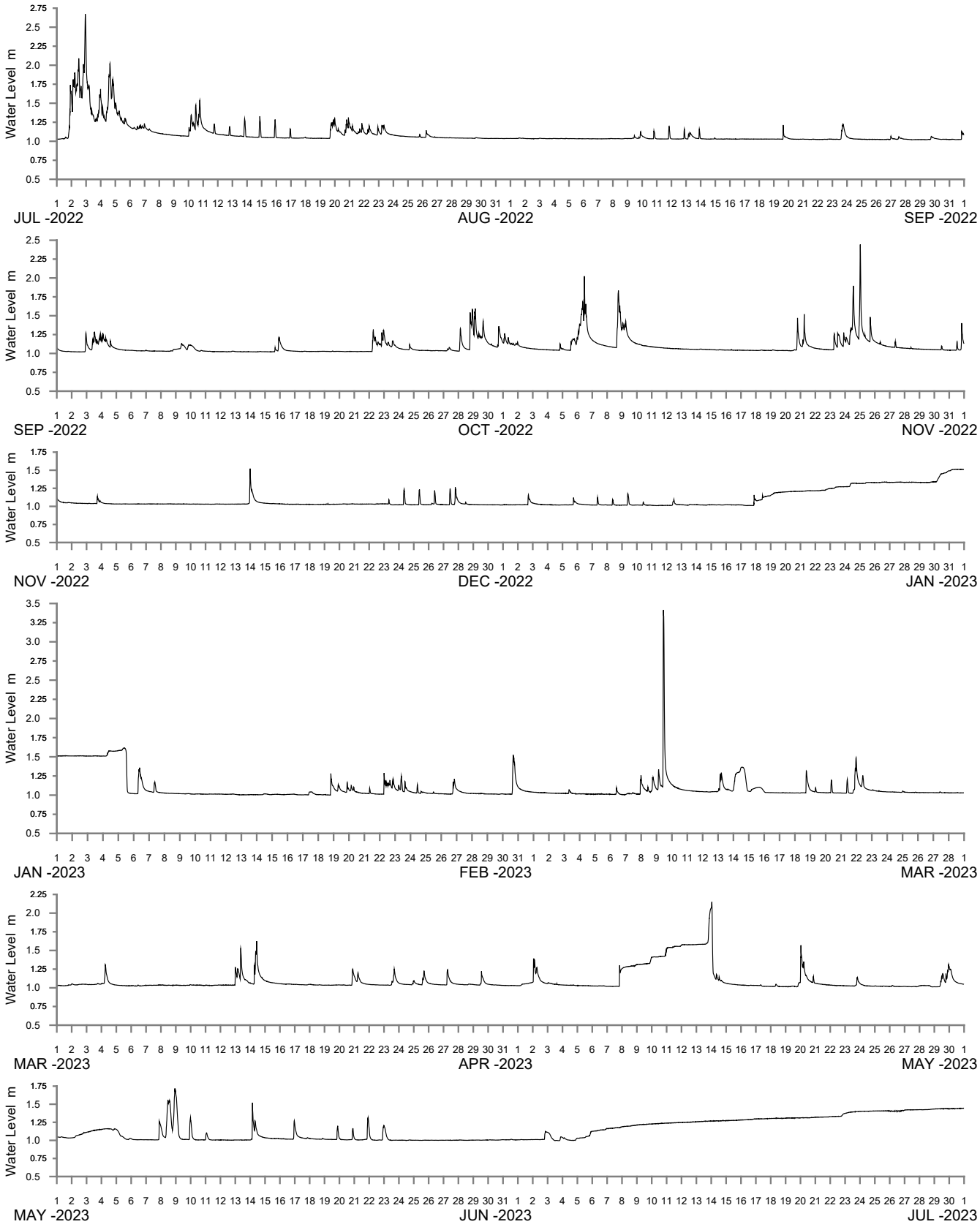
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CABBAGE TREE CREEK AT CABBAGE TREE CREEK DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-206



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

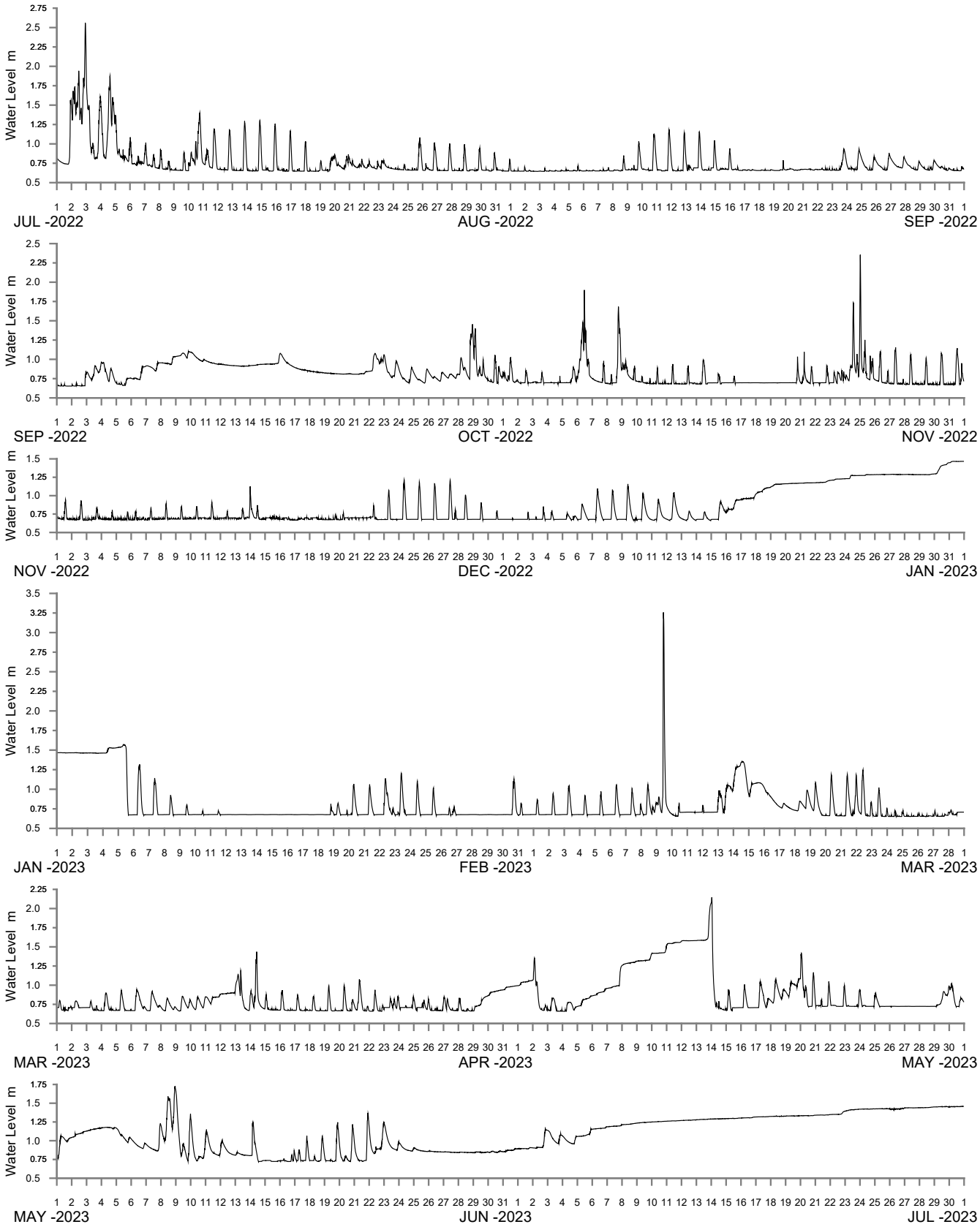
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

FAIRY CREEK AT FAIRY CREEK UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-207



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

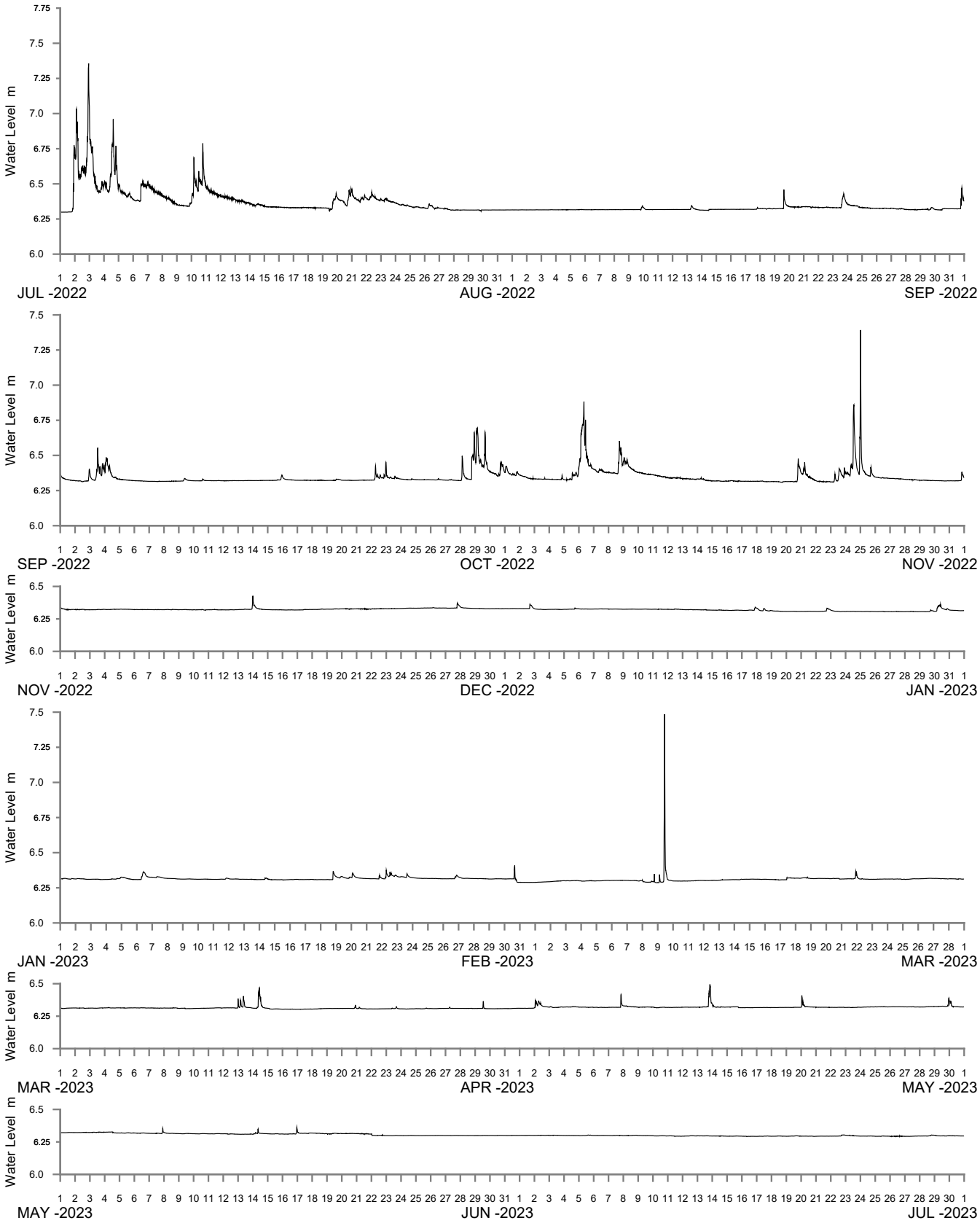
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

FAIRY CREEK AT FAIRY CREEK DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-208



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

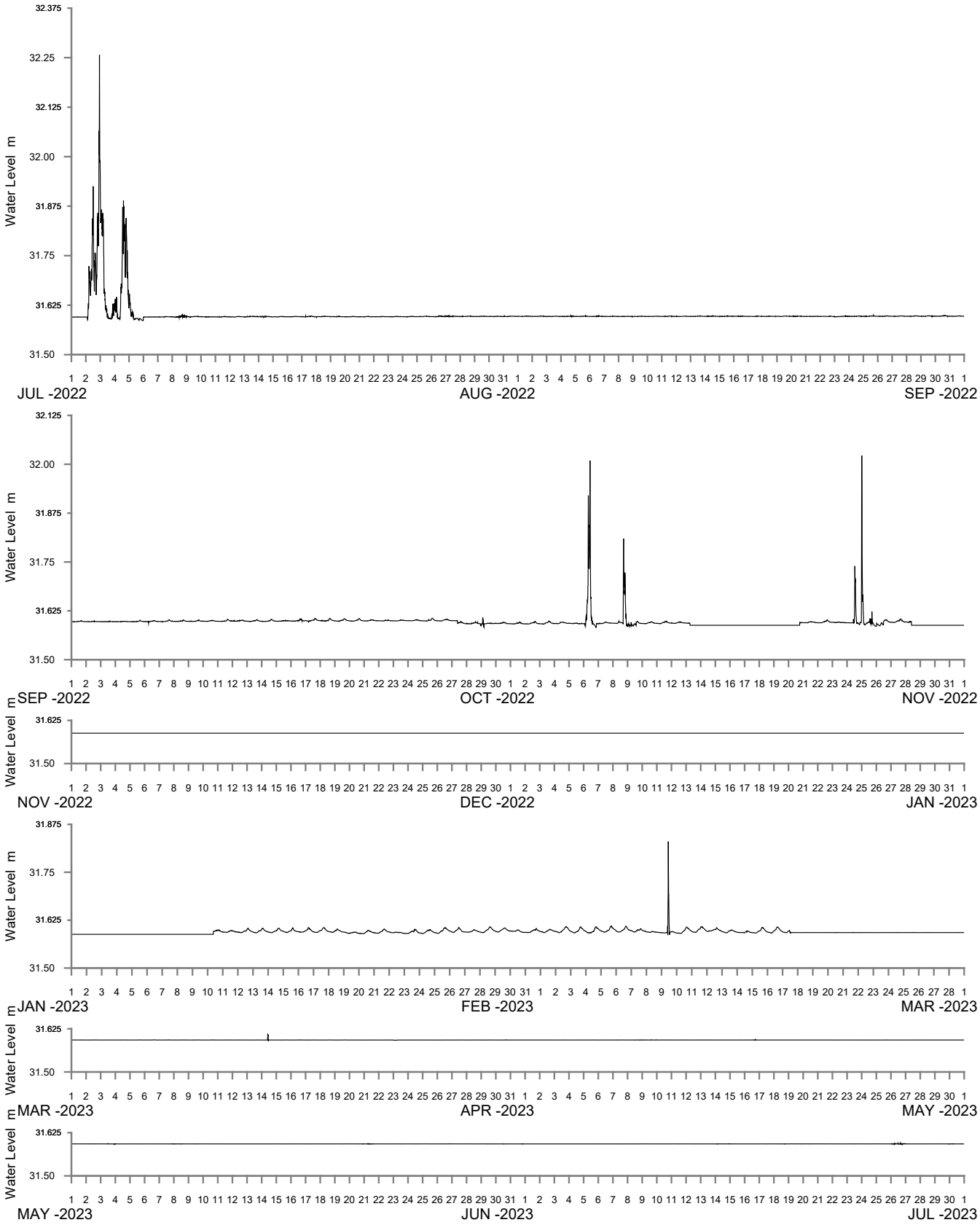
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BYARONG CREEK AT BYARONG CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-209



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

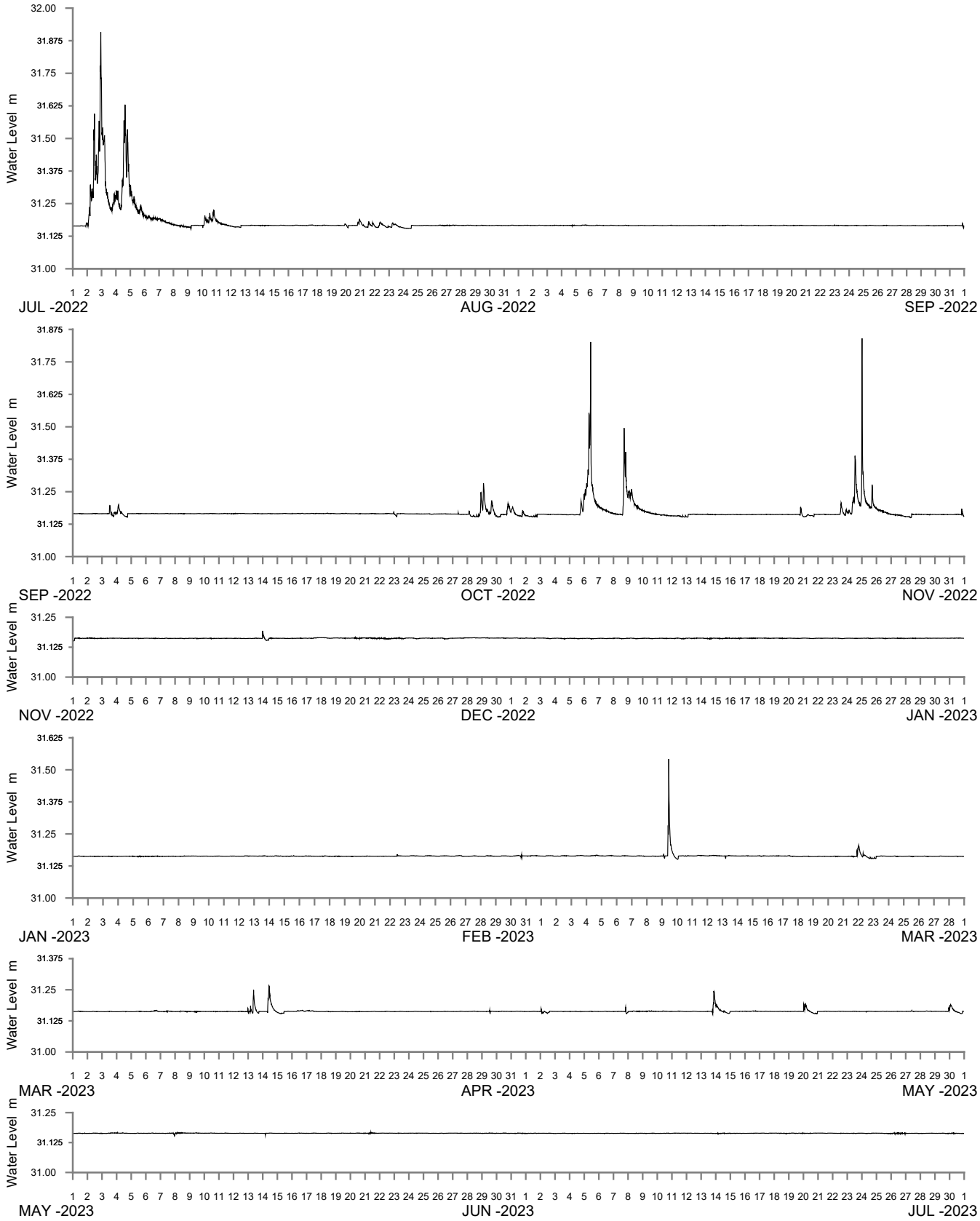
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BYARONG CREEK AT KOLOONA AVENUE UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-210



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

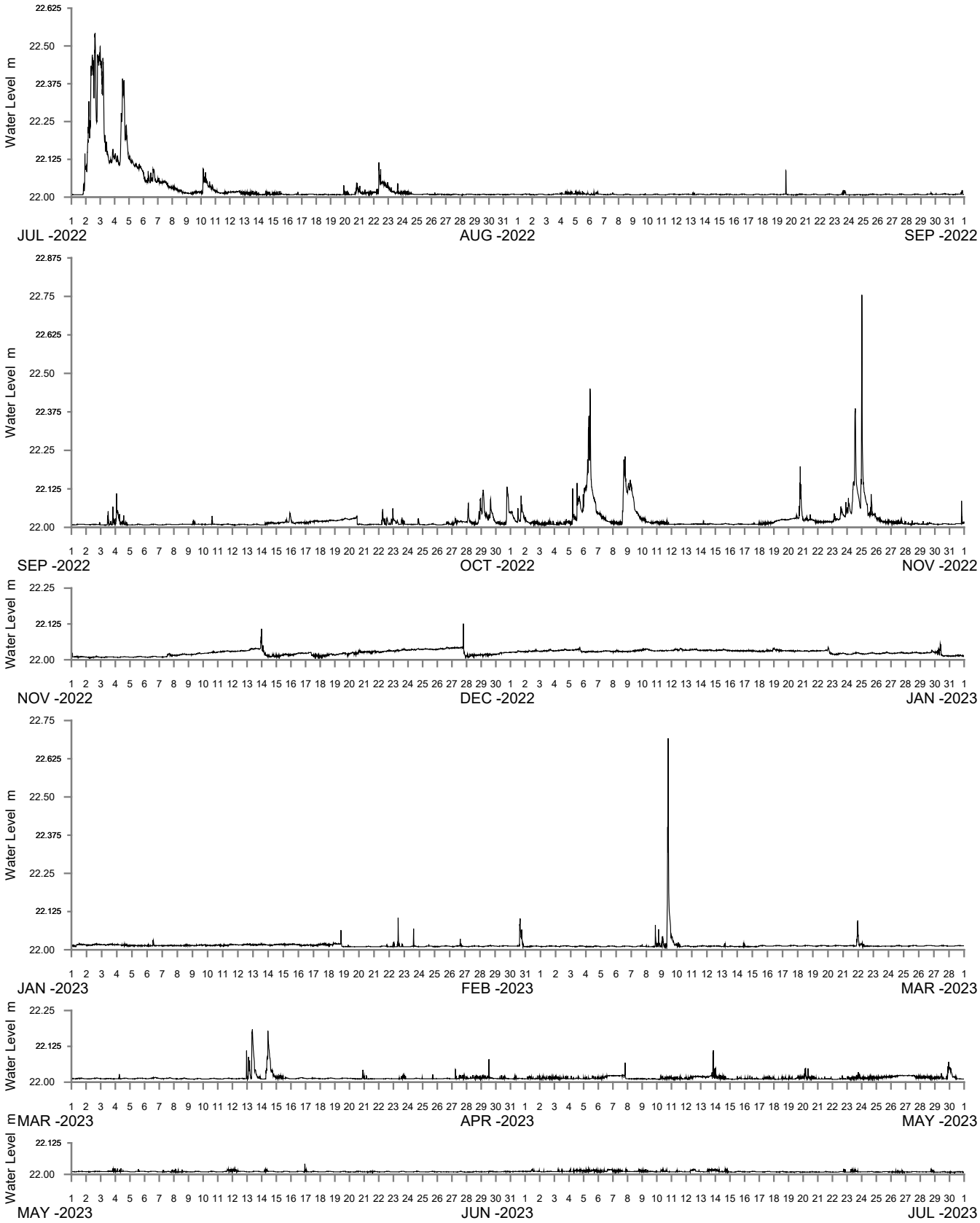
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BYARONG CREEK AT KOLOONA AVENUE DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-211



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

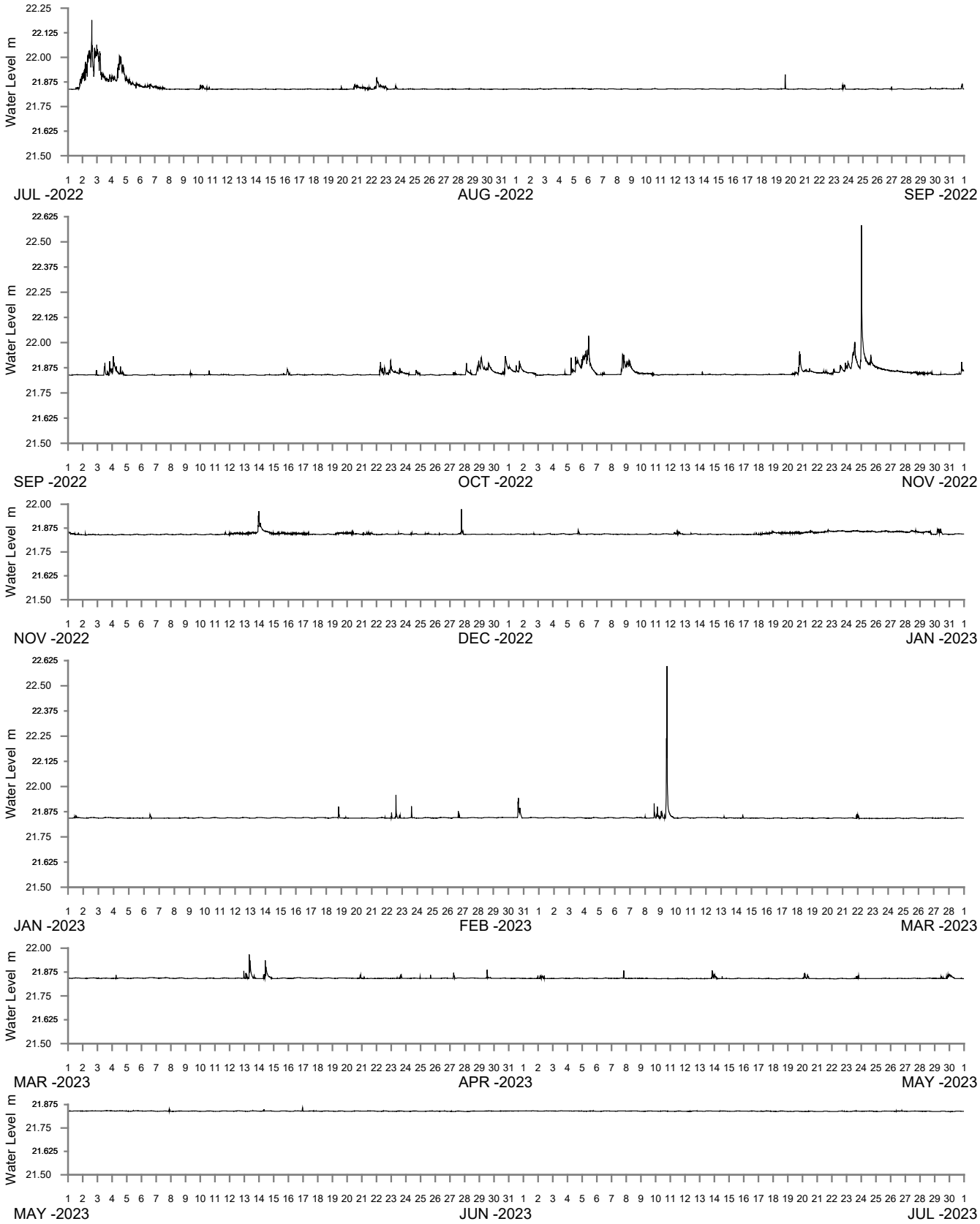
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

AMERICAN CREEK AT BLACKMANS PARADE UPSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-212



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

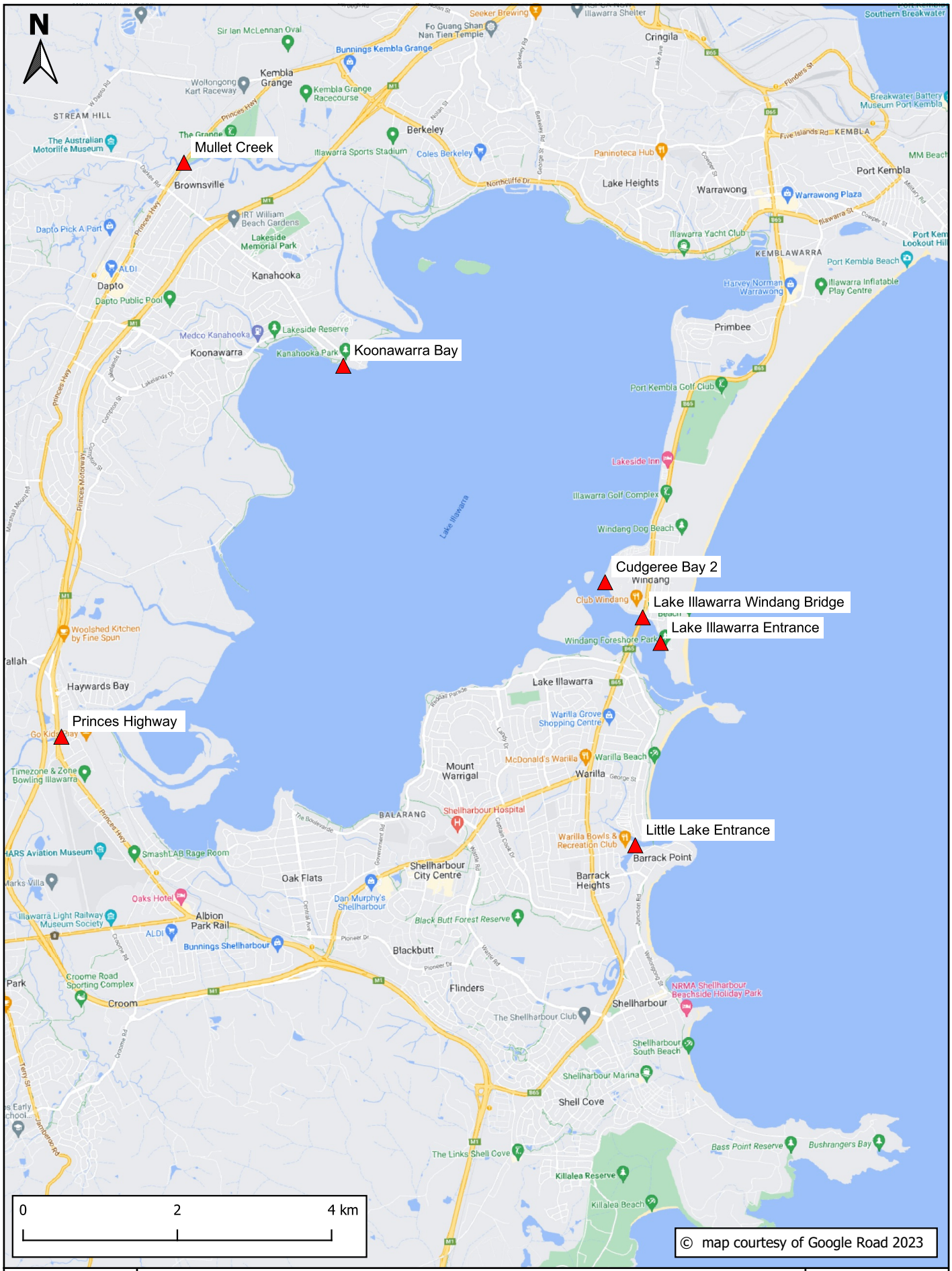
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

AMERICAN CREEK AT BLACKMANS PARADE DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-213

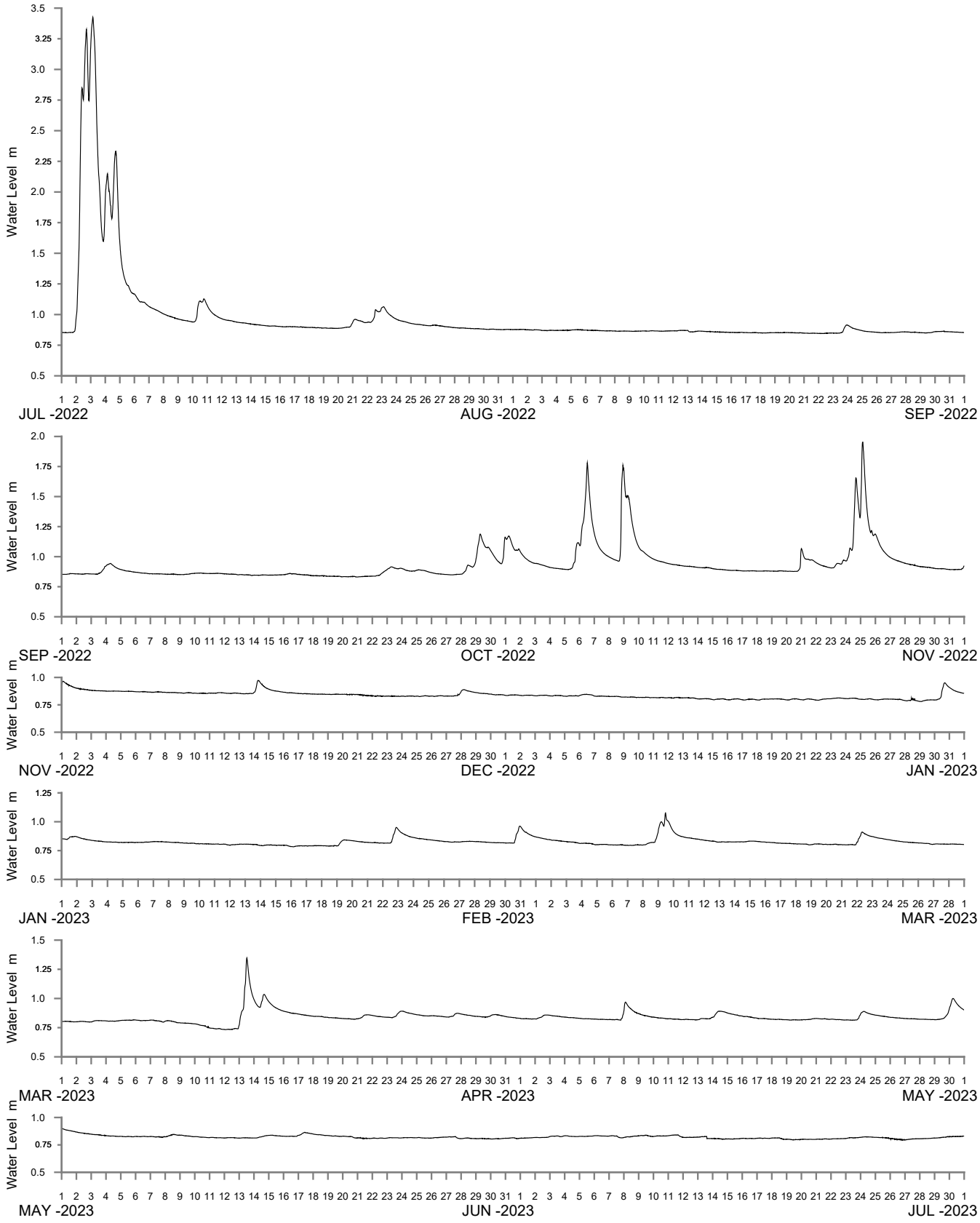


NSW GOVERNMENT

STATION LOCATIONS
LAKE ILLAWARRA REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-214



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

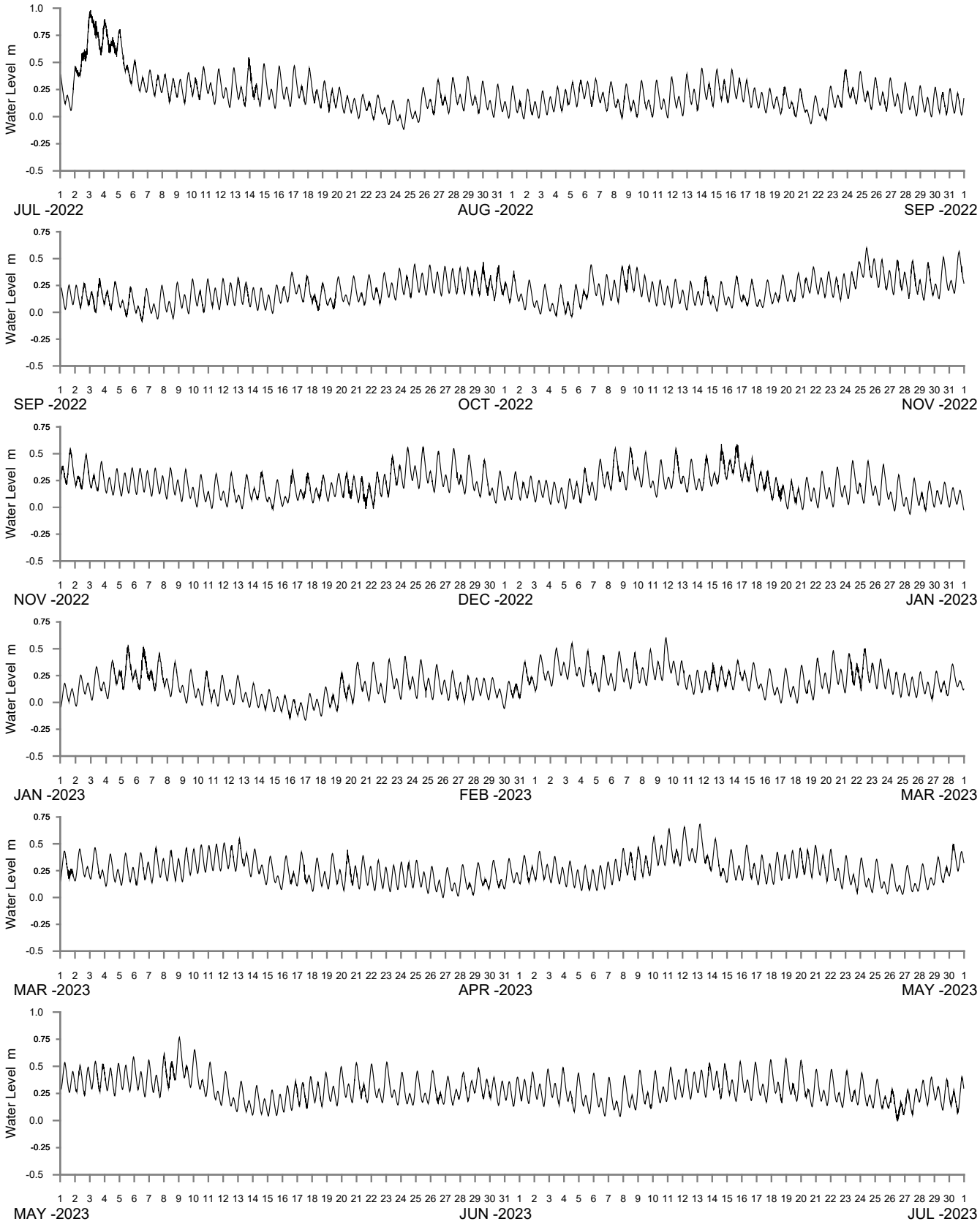
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MULLET CREEK AT MULLET CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-215



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

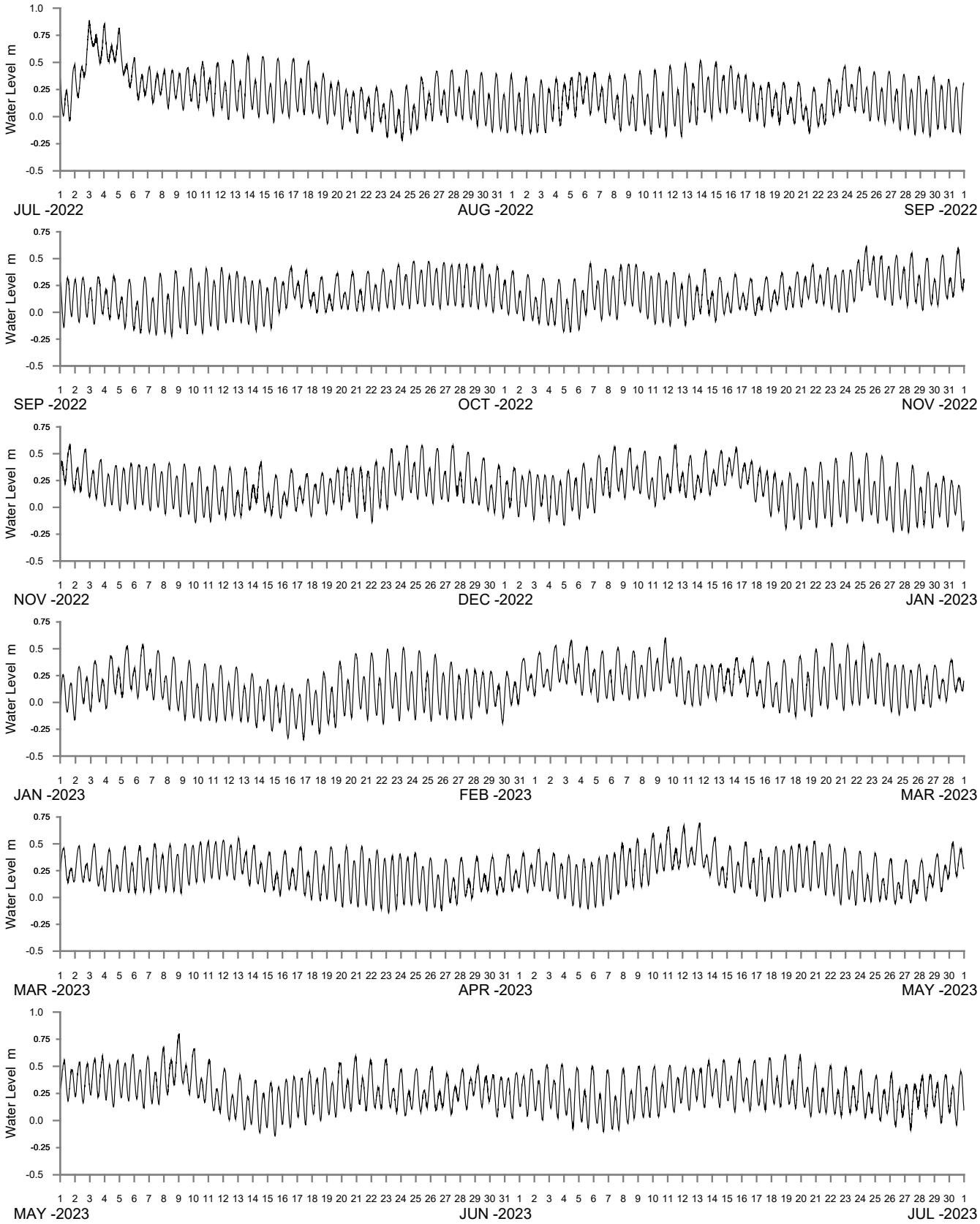
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LAKE ILLAWARRA AT KOONAWARRA BAY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-216



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

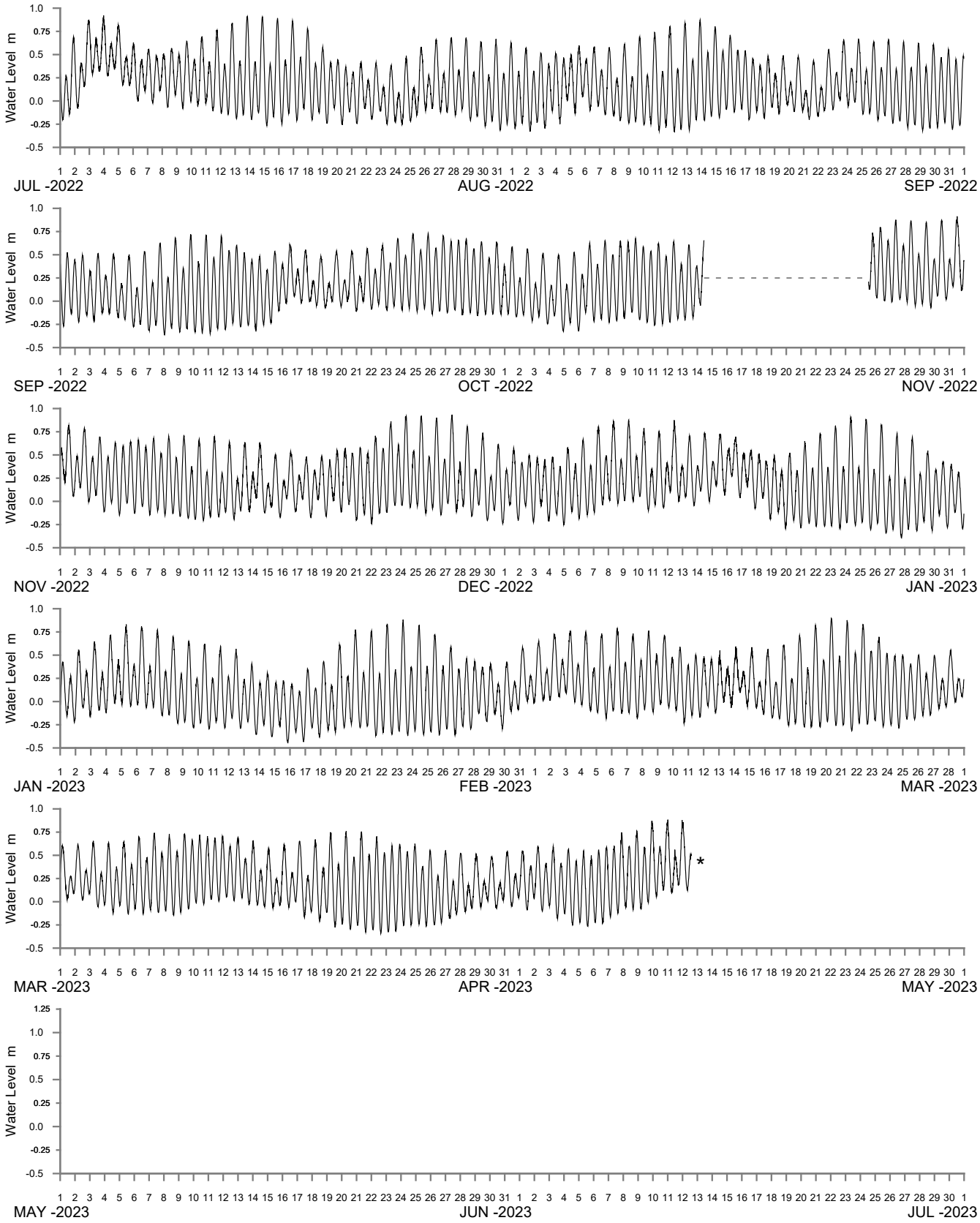
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LAKE ILLAWARRA AT CUDGEREE BAY 2
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-217



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

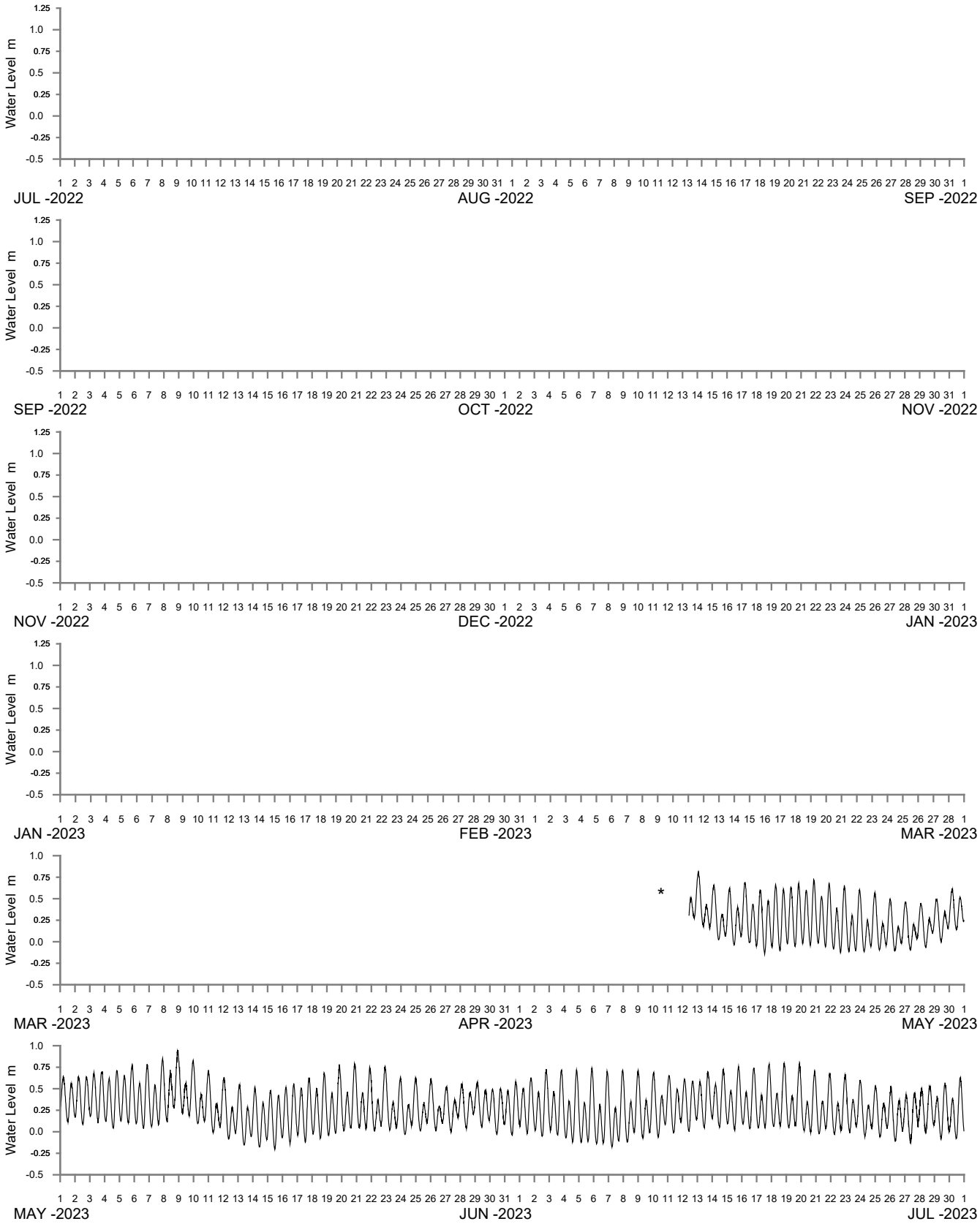
* Station decommissioned on 12/04/2023 due to jetty collapse

NSW GOVERNMENT

LAKE ILLAWARRA AT LAKE ILLAWARRA ENTRANCE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-218



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

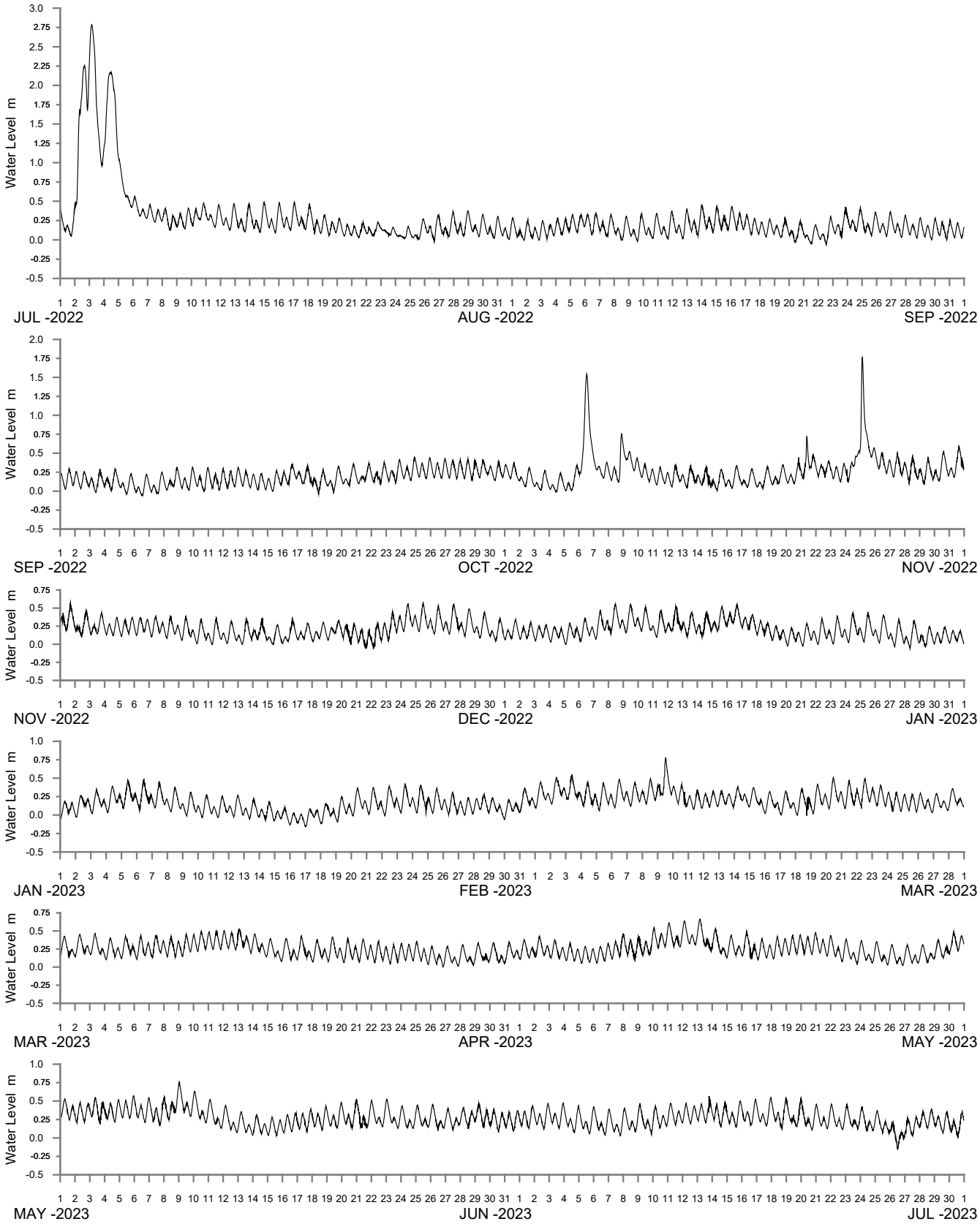
* Station installed on 12/04/2023

NSW GOVERNMENT

LAKE ILLAWARRA AT WINDANG BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-219



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

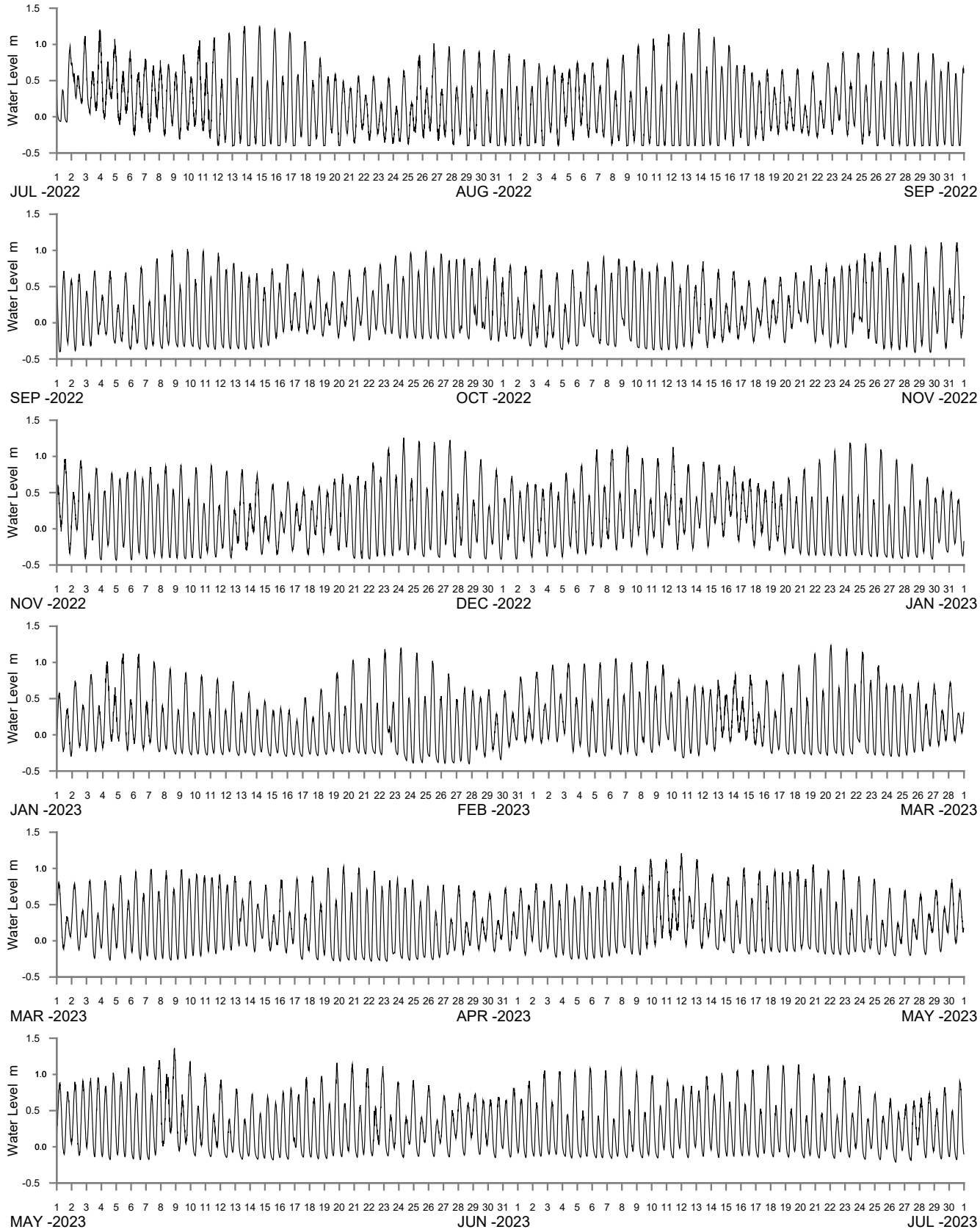
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MACQUARIE RIVULET AT PRINCES HIGHWAY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-220



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

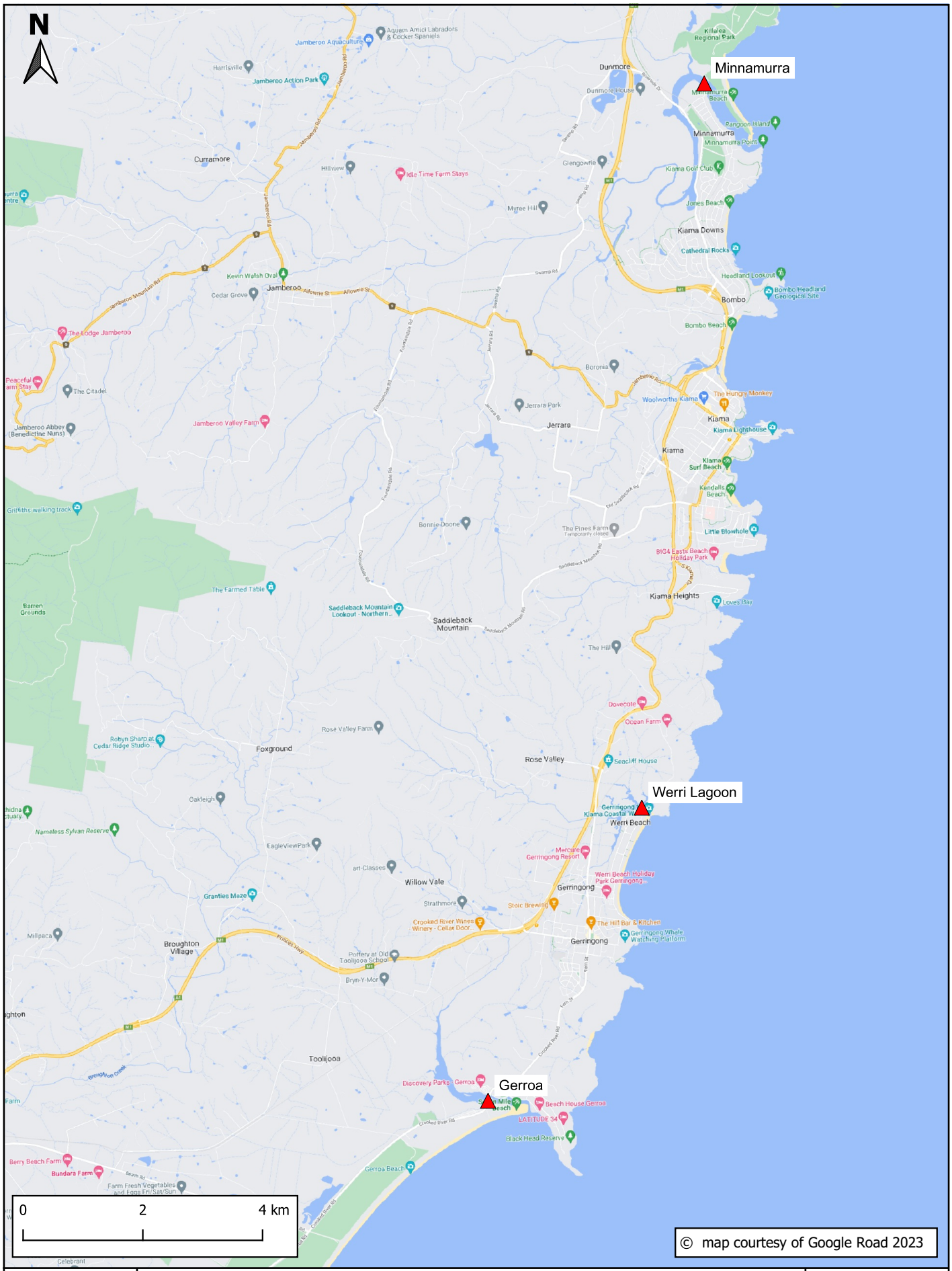
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LITTLE LAKE AT LITTLE LAKE ENTRANCE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-221

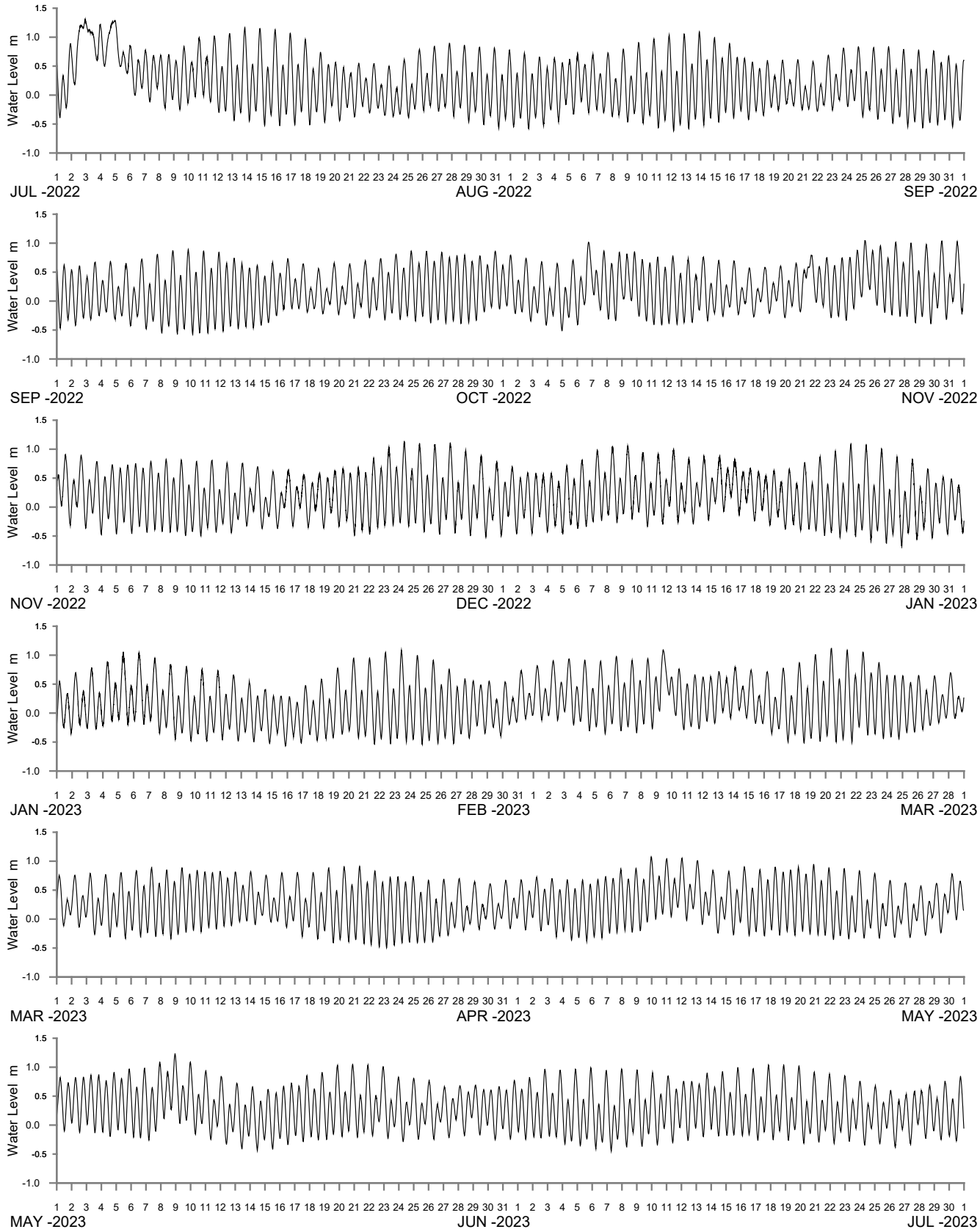


NSW GOVERNMENT

STATION LOCATIONS
KIAMA REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-222



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

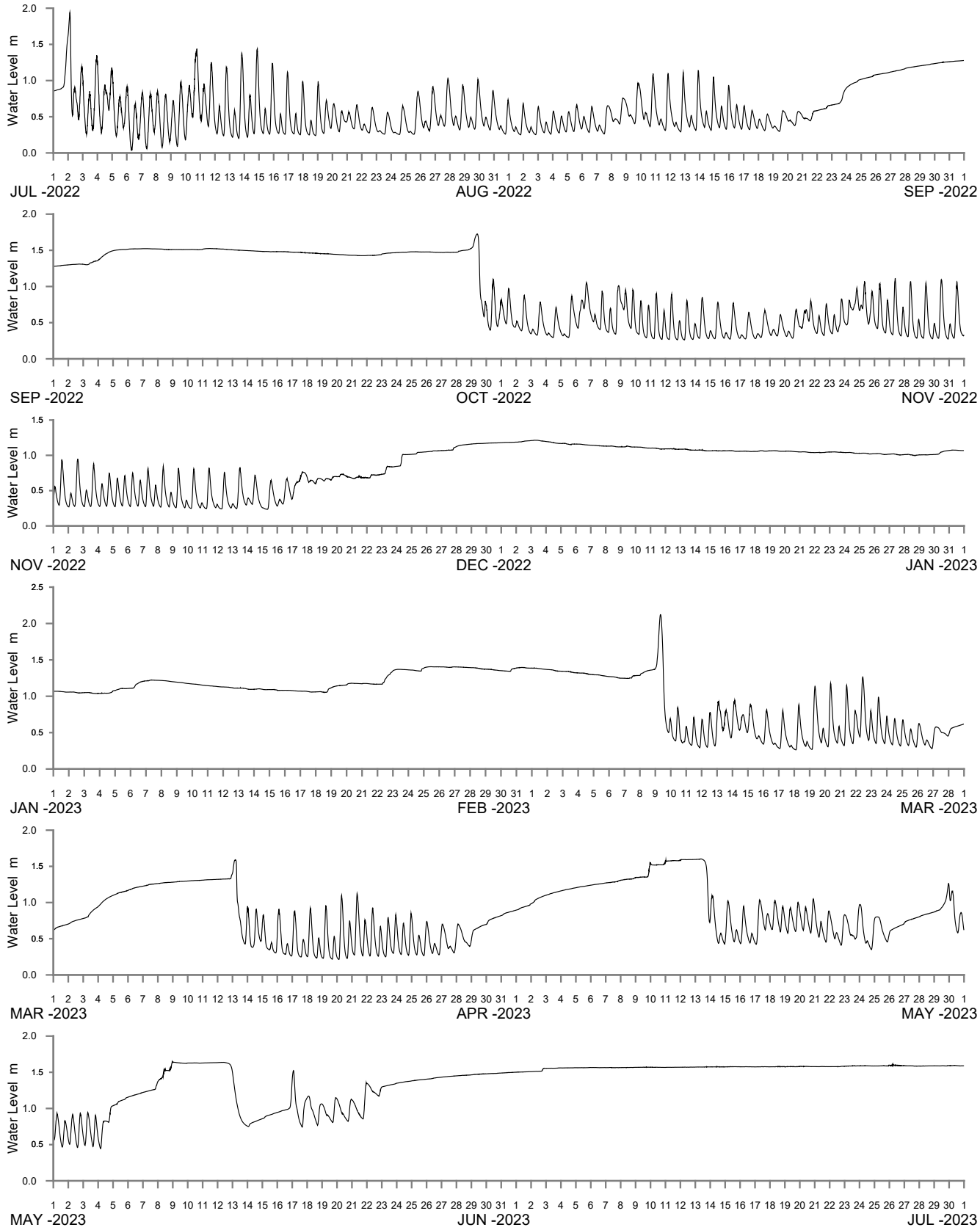
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MINNAMURRA RIVER AT MINNAMURRA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-223



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

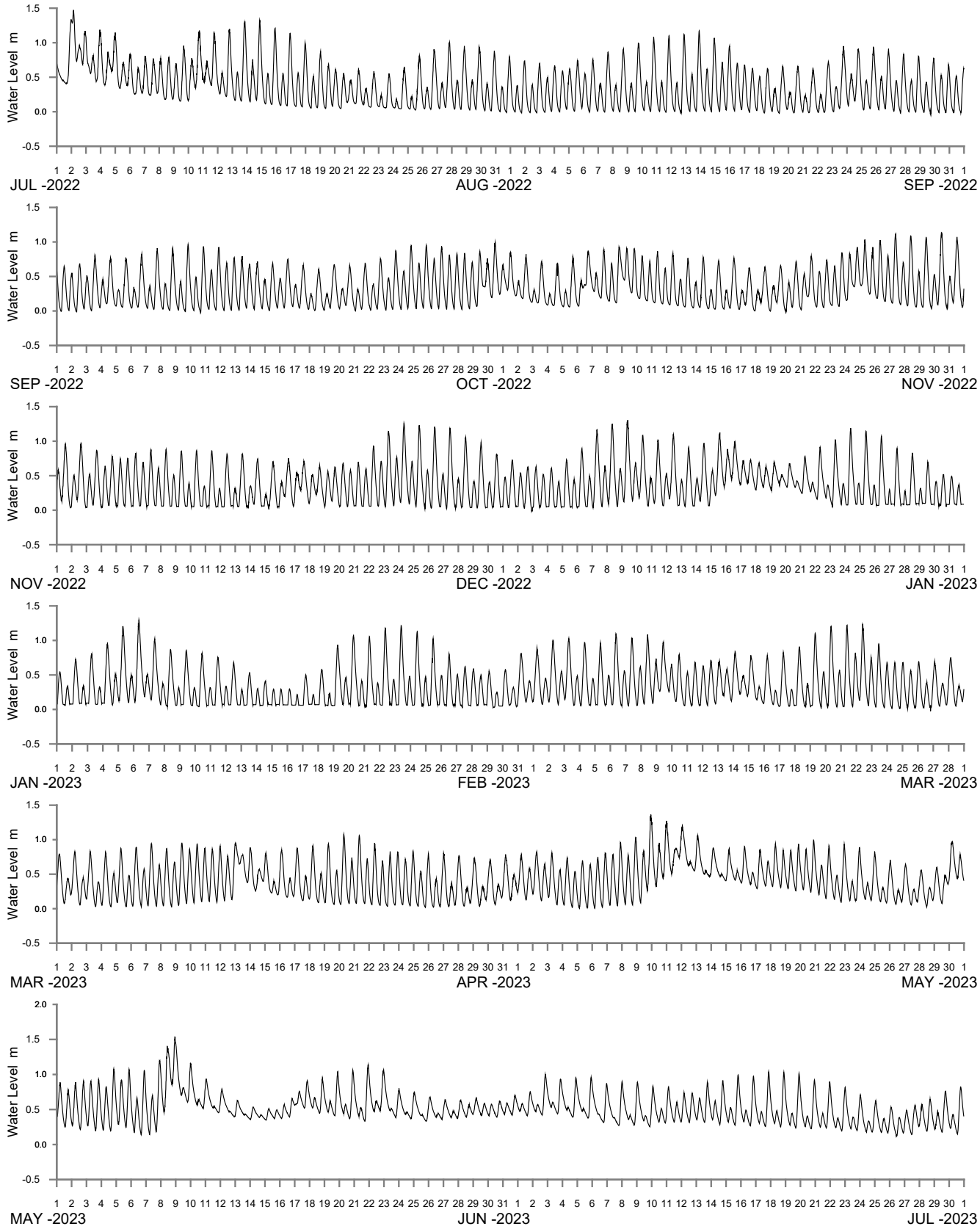
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WERRI LAGOON AT WERRI LAGOON
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-224



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

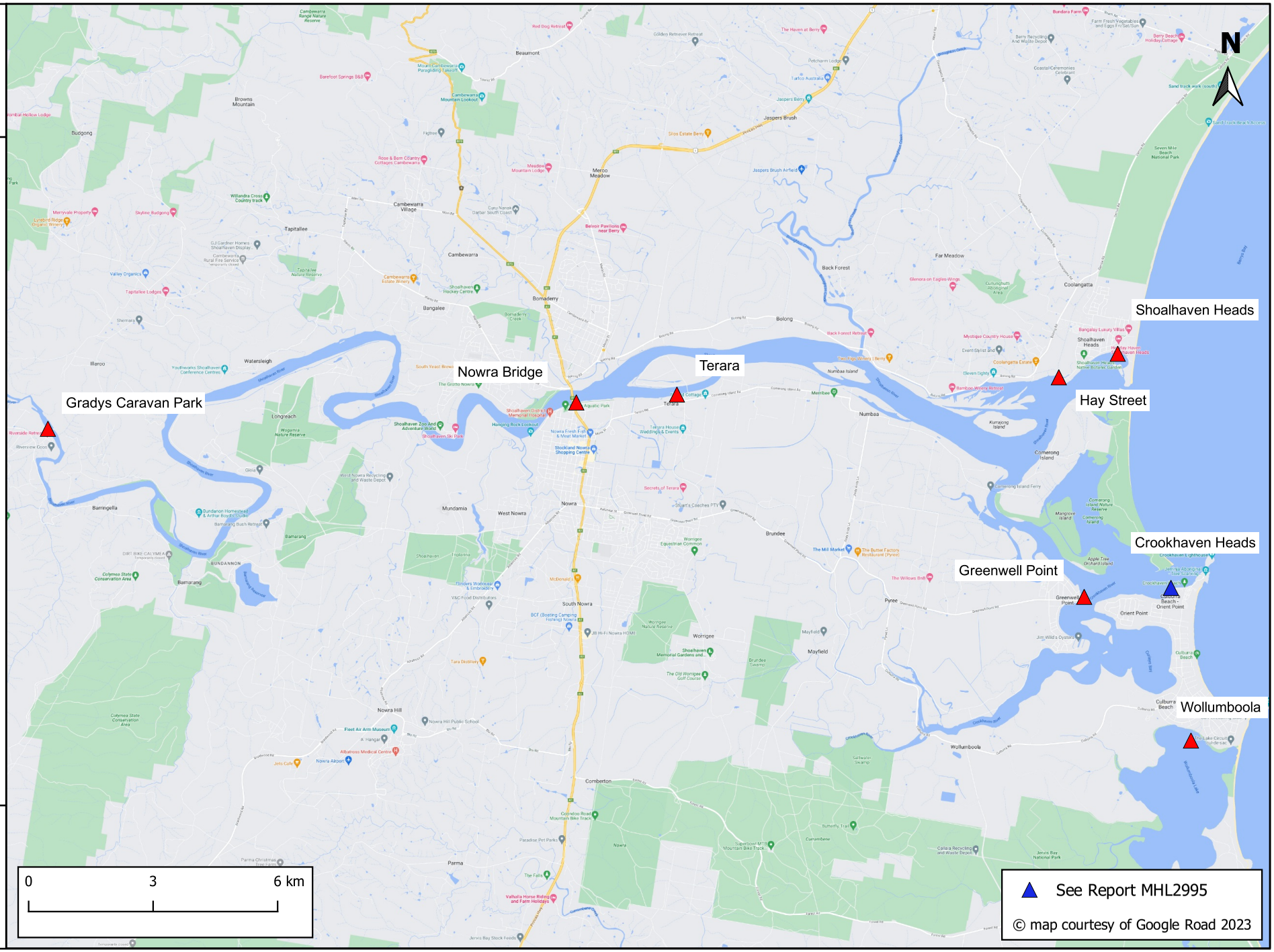
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CROOKED RIVER AT GERROA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-225

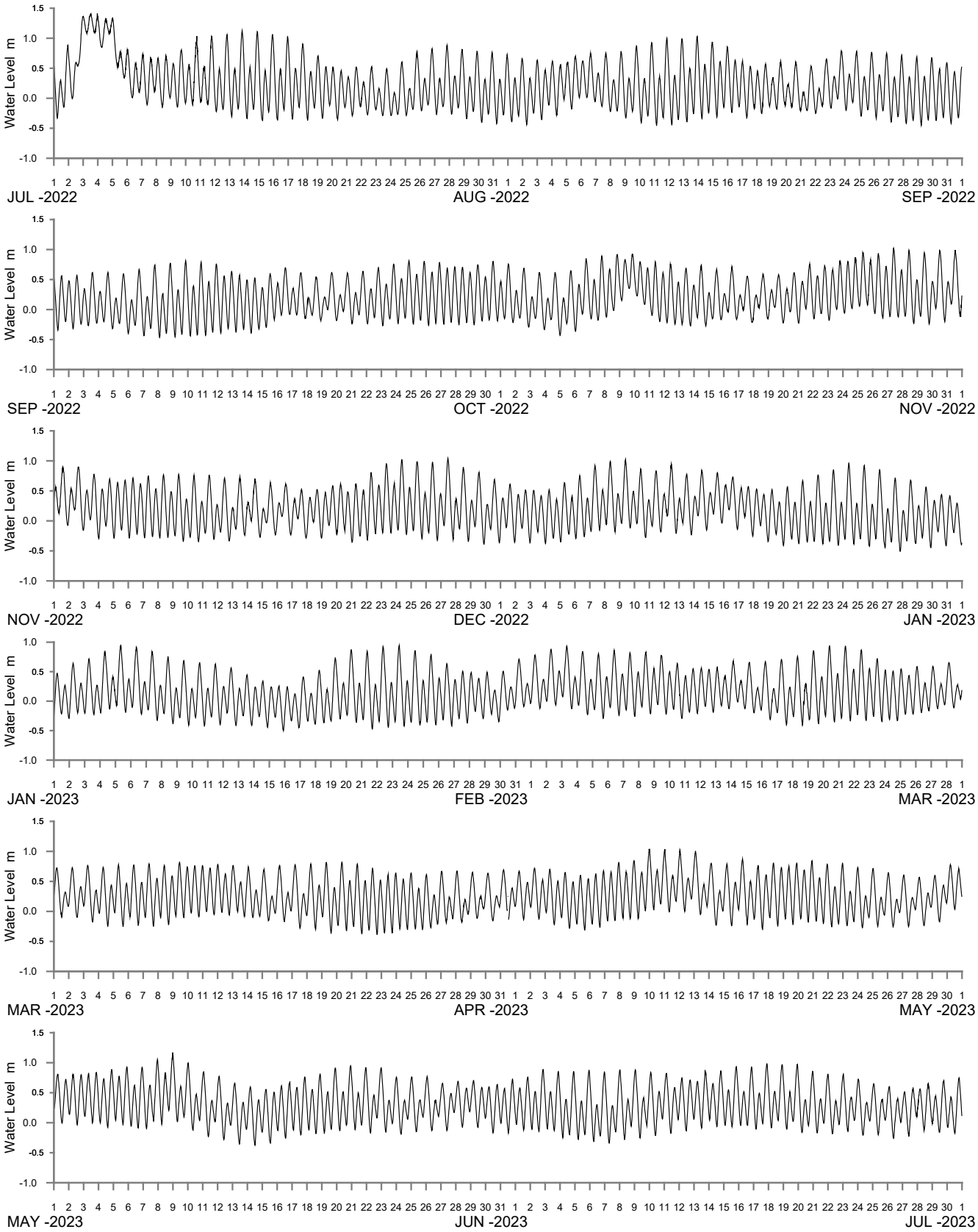


NSW GOVERNMENT

STATION LOCATIONS
SHOALHAVEN RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure 4-226



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

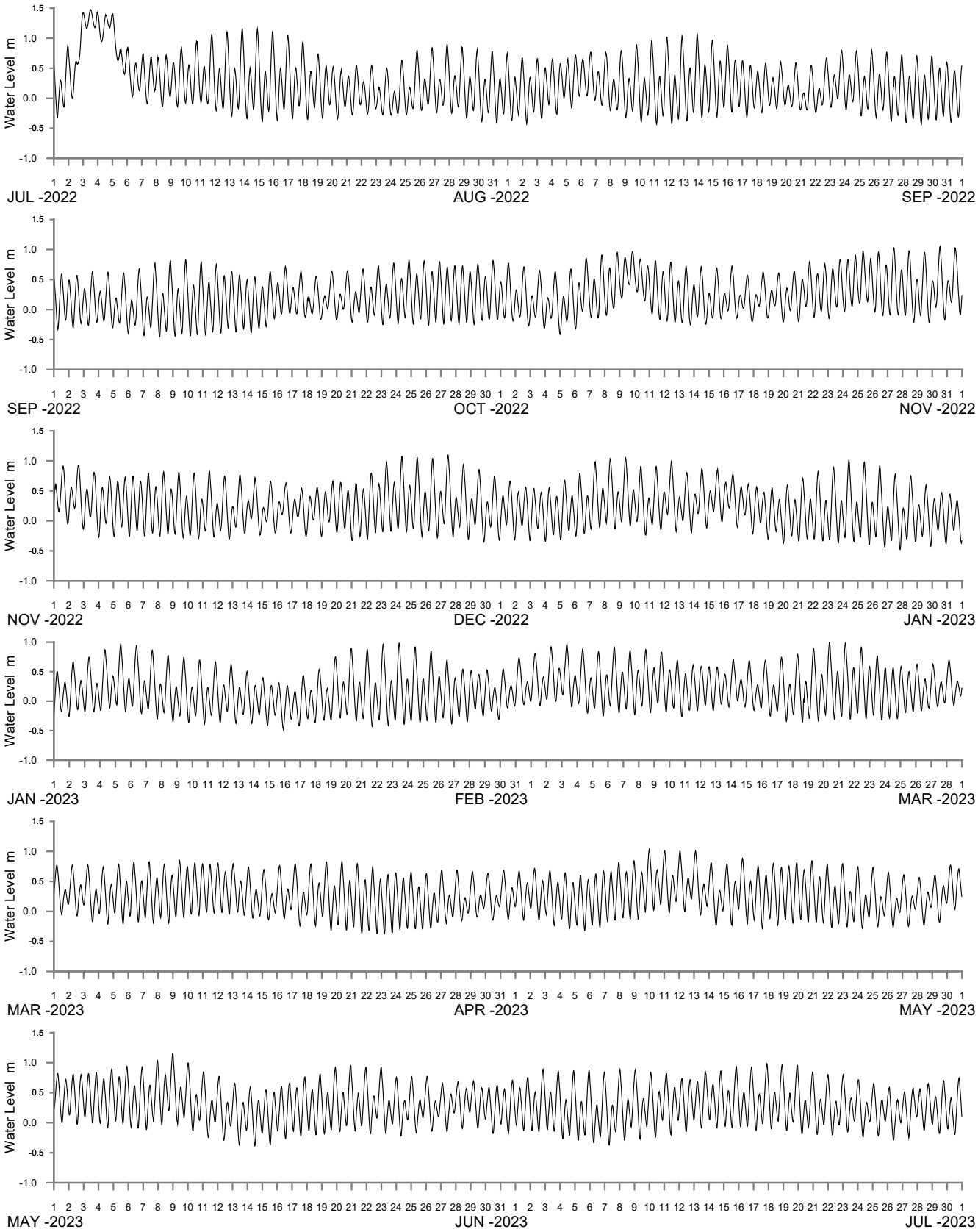
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

SHOALHAVEN RIVER AT SHOALHAVEN HEADS
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-227



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

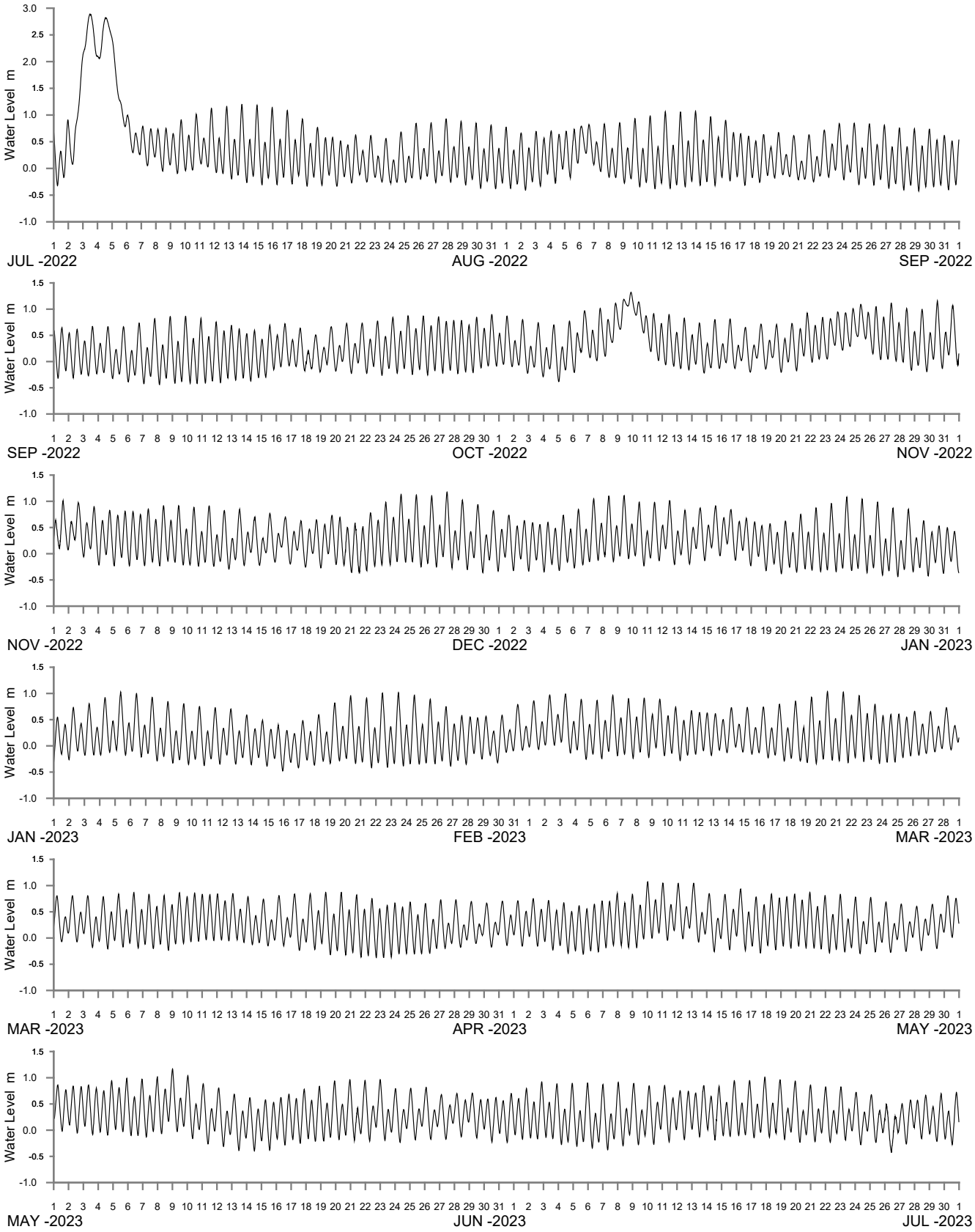
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

SHOALHAVEN RIVER AT HAY STREET
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-228



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

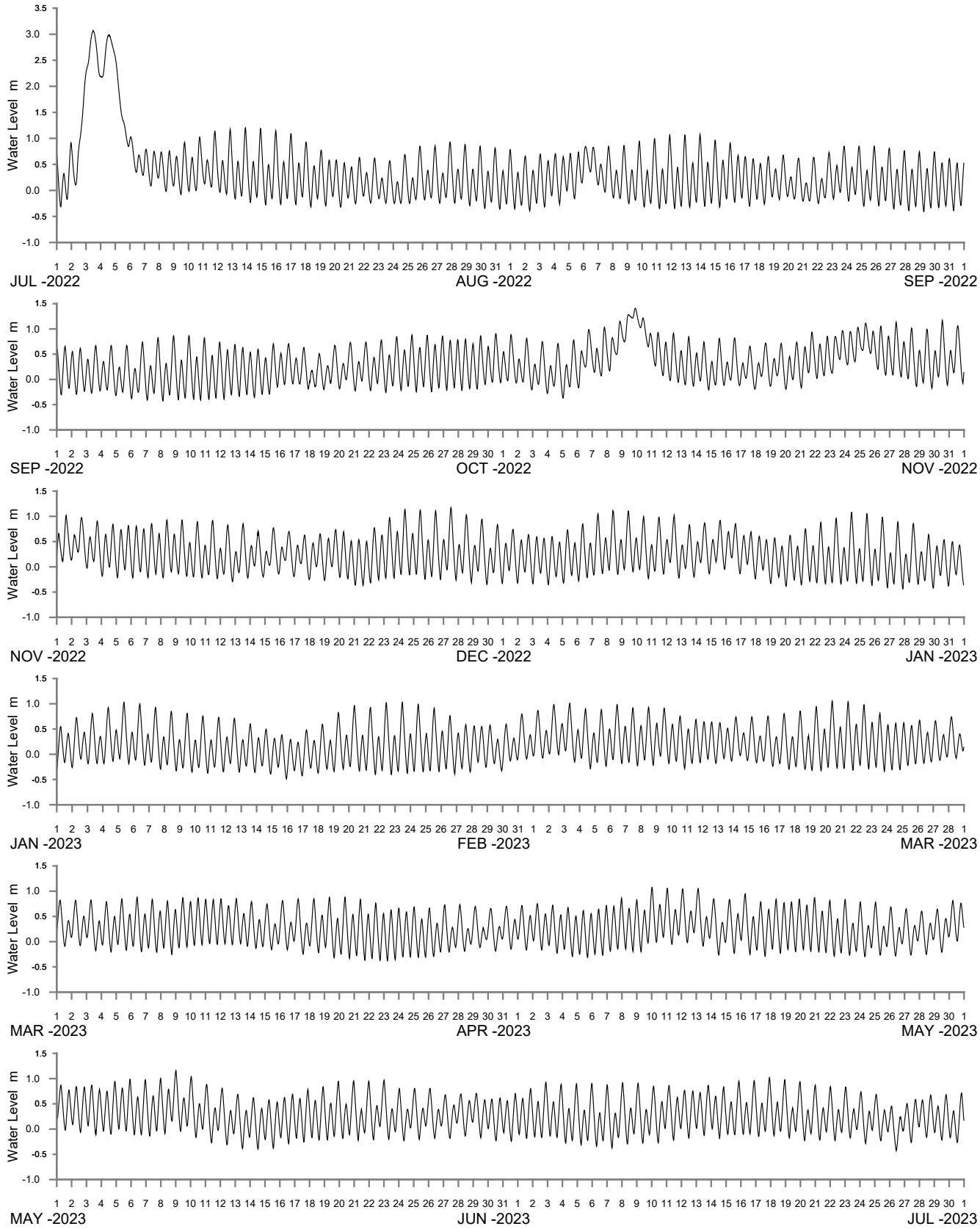
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

SHOALHAVEN RIVER AT TERARA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-229



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

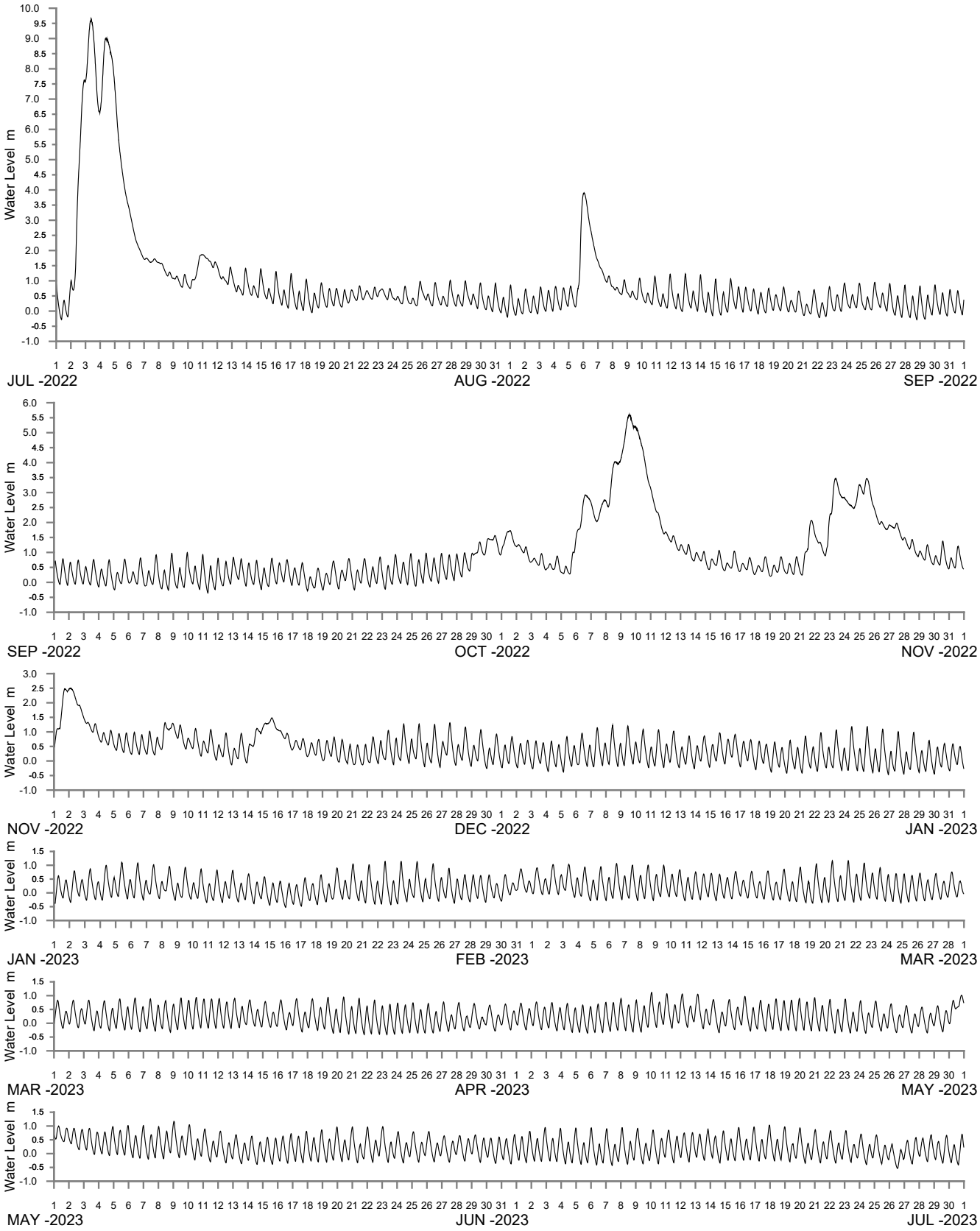
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

SHOALHAVEN RIVER AT NOWRA BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-230



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

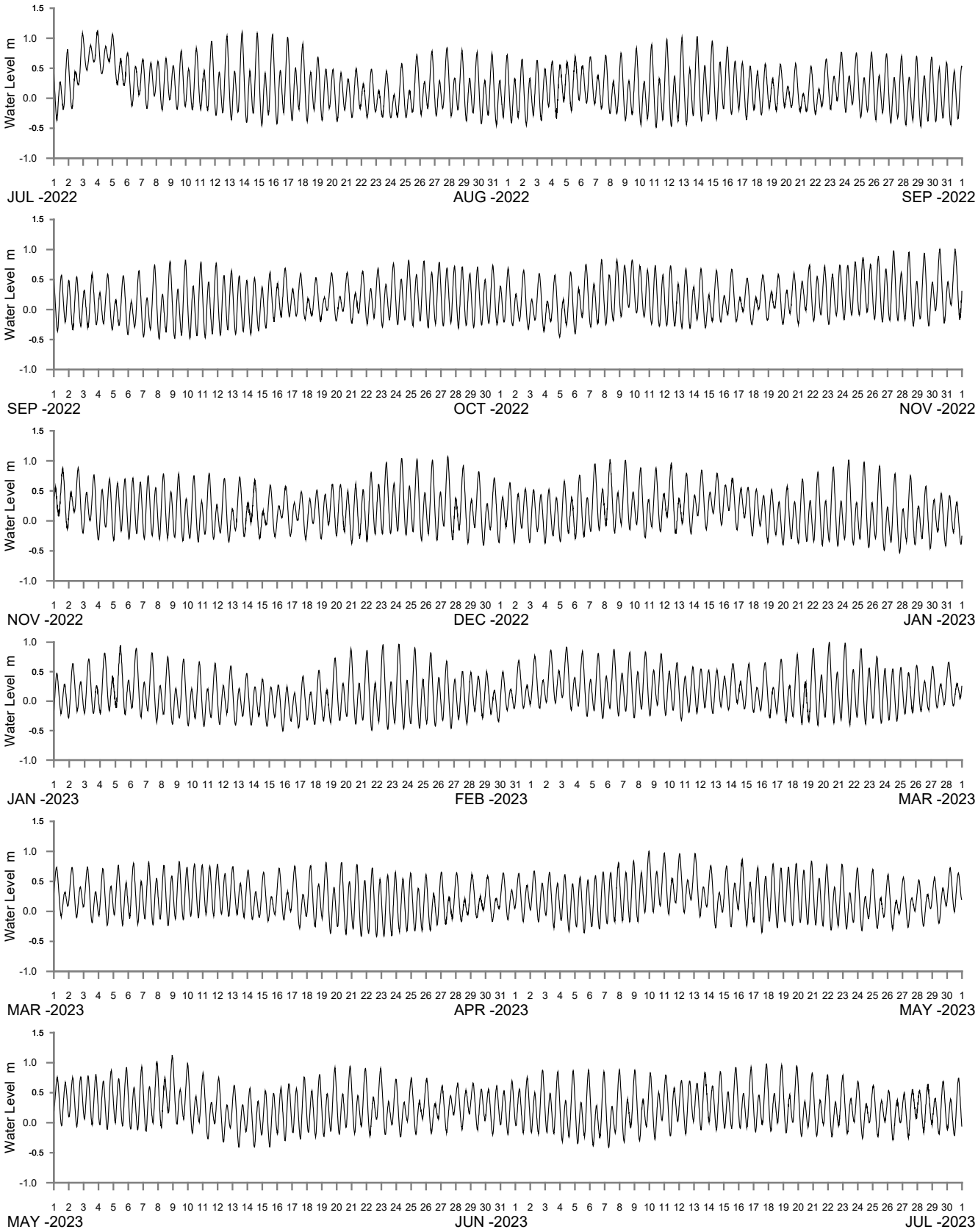
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

SHOALHAVEN RIVER AT GRADY'S CARAVAN PARK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-231



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

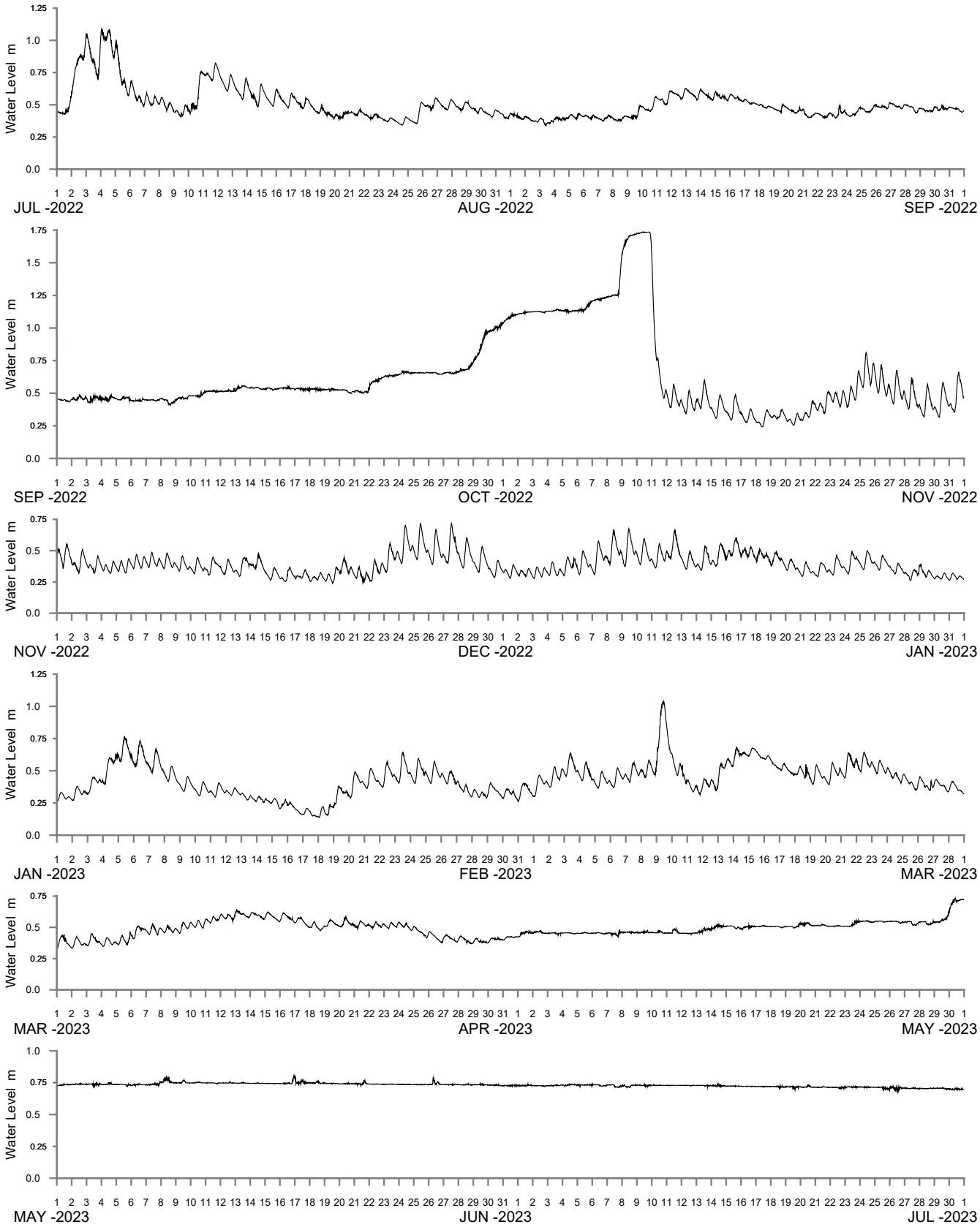
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CROOKHAVEN RIVER AT GREENWELL POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-232



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

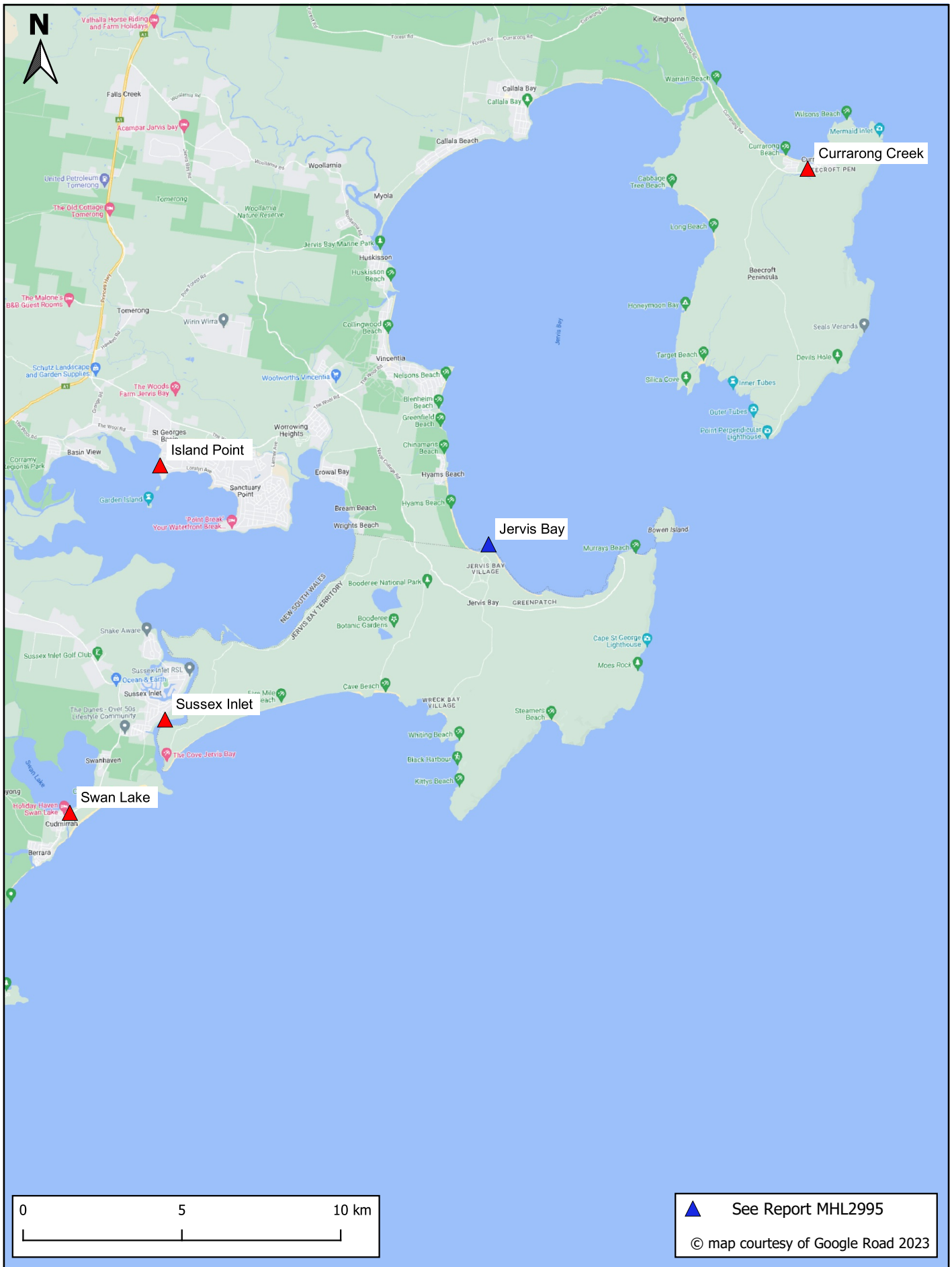
- - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WOLLUMBOOLA LAKE AT WOLLUMBOOLA
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-233

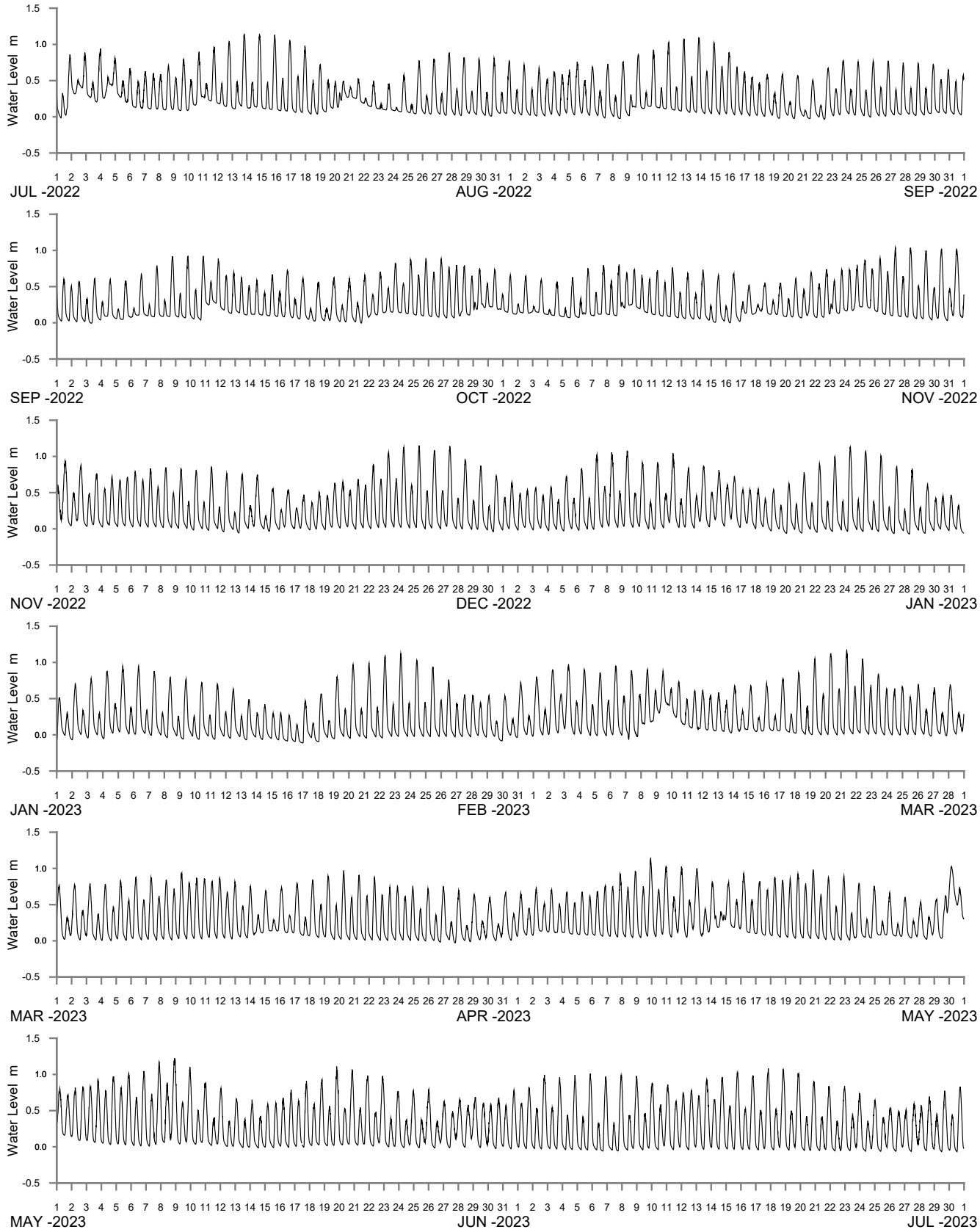


NSW GOVERNMENT

STATION LOCATIONS
JERVIS BAY REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-234



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

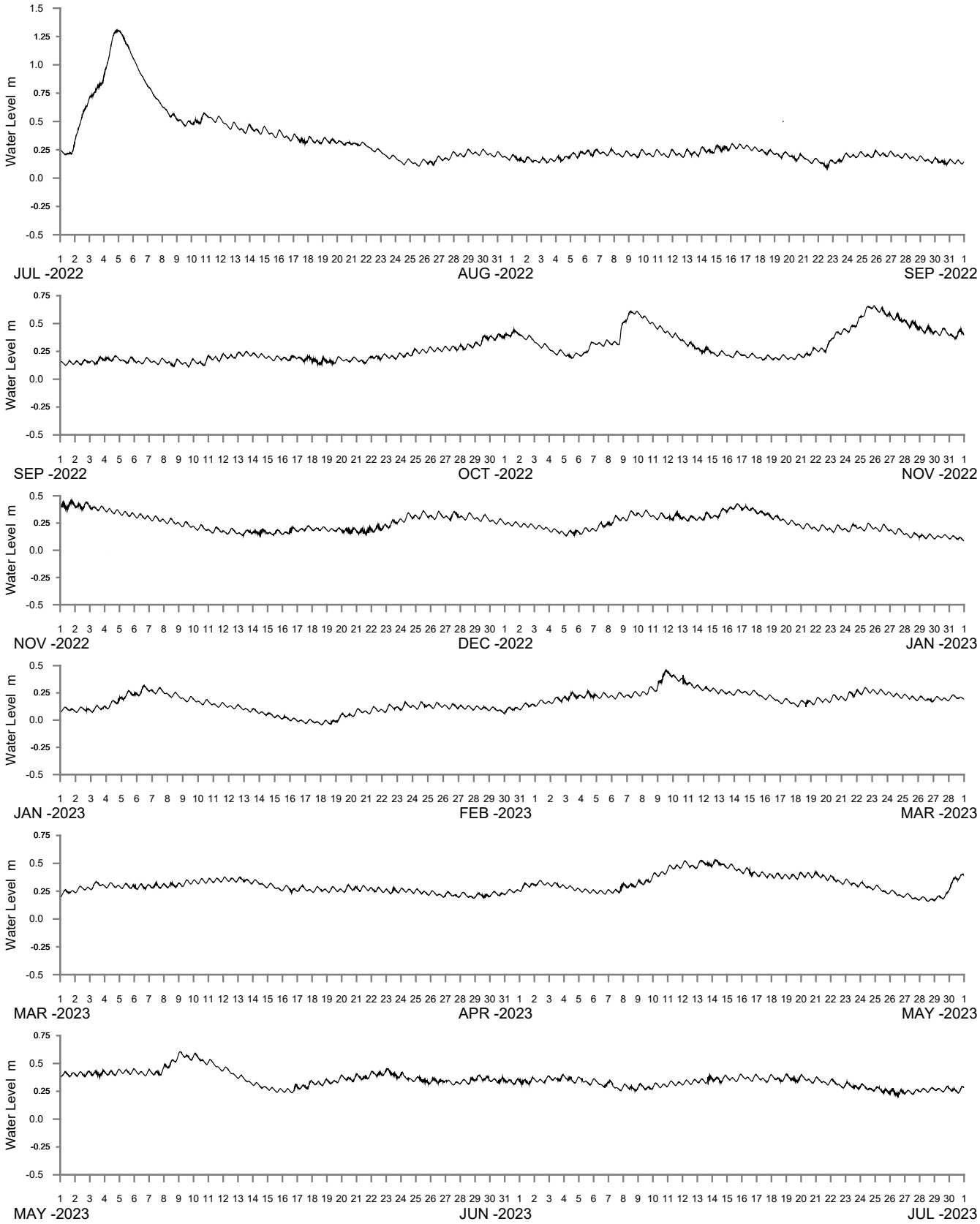
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CURRARONG CREEK AT CURRARONG CREEK
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-235



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

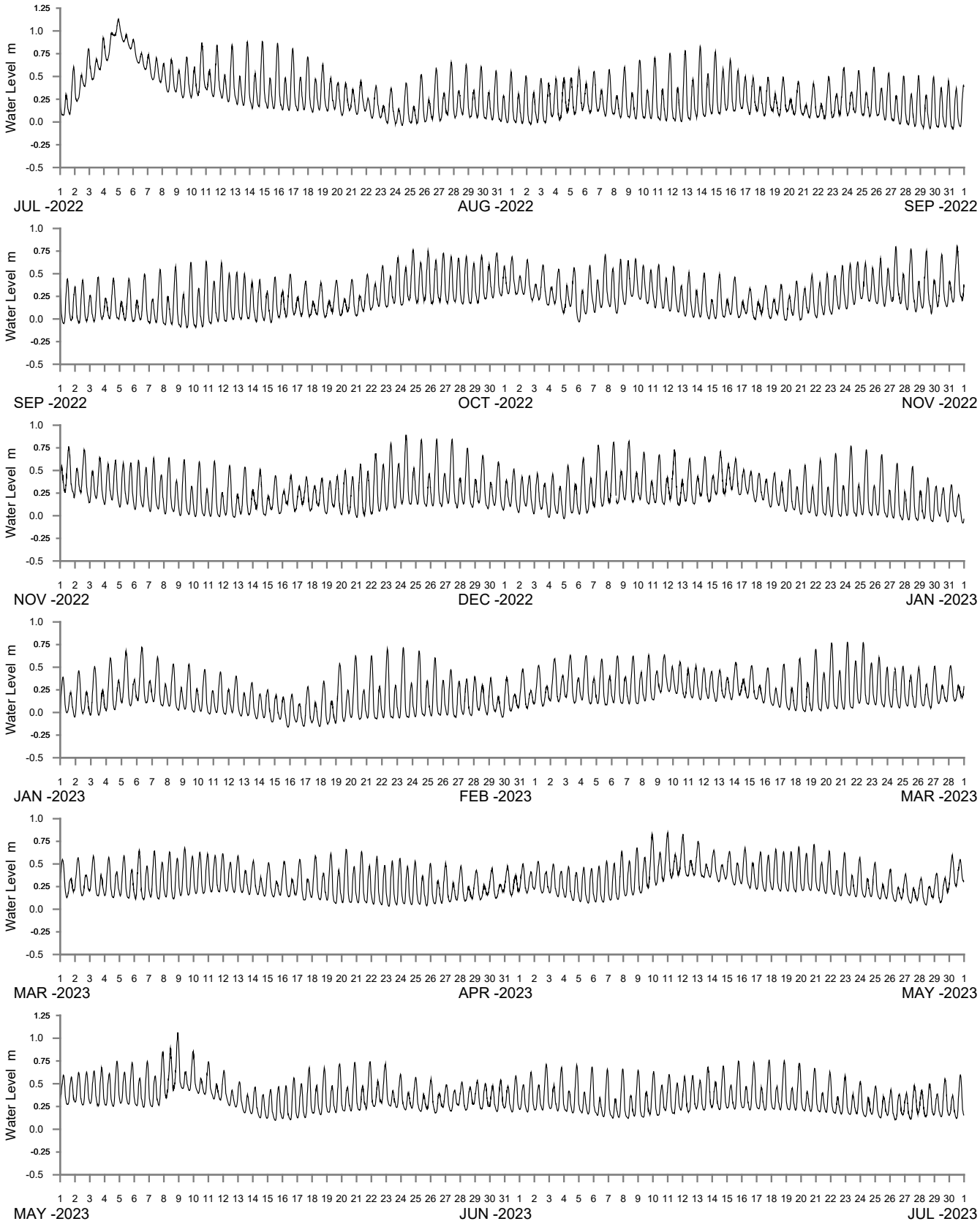
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

ST GEORGES BASIN AT ISLAND POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-236



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

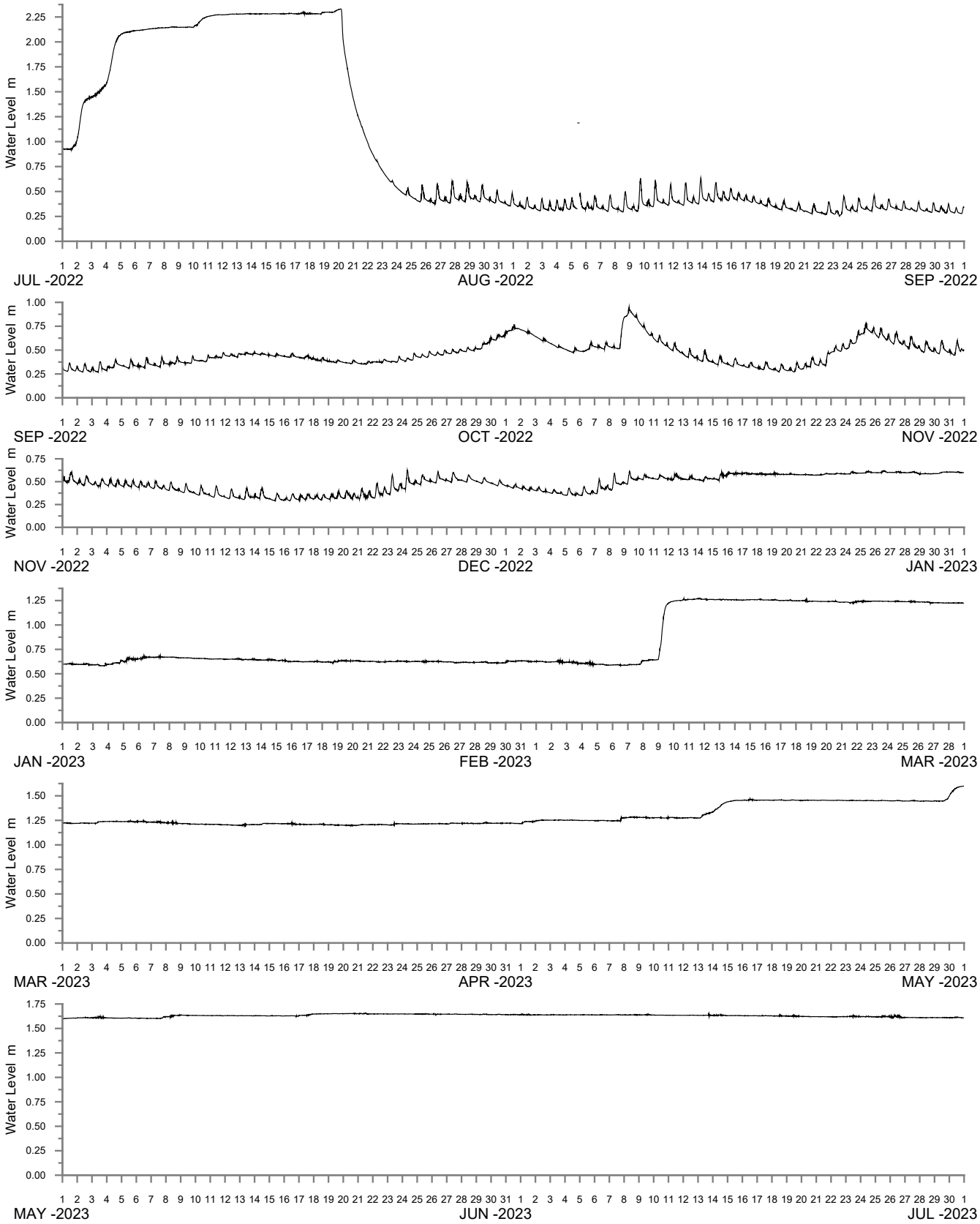
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

SUSSEX INLET AT SUSSEX INLET
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-237



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

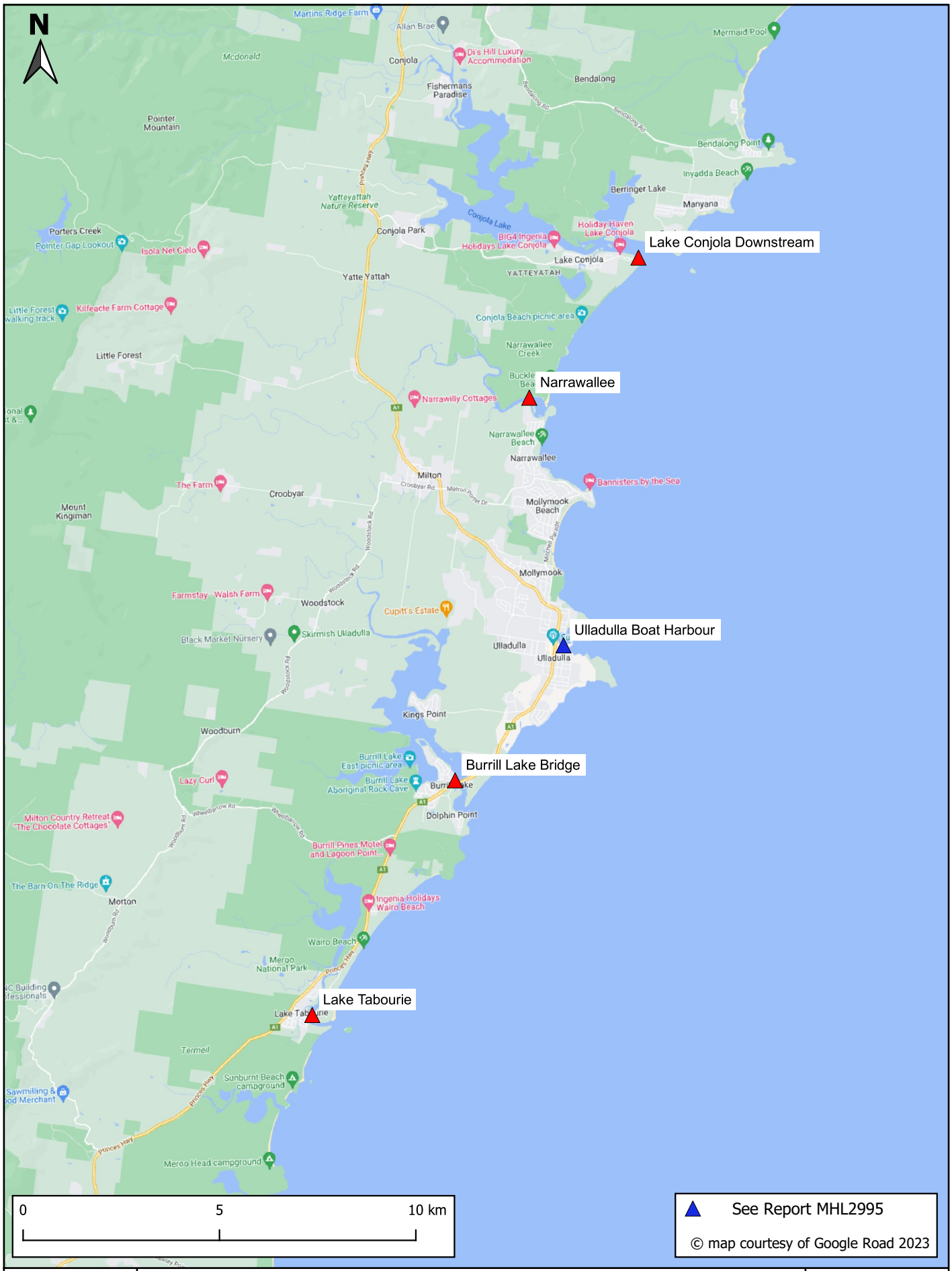
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

SWAN LAKE AT SWAN LAKE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-238

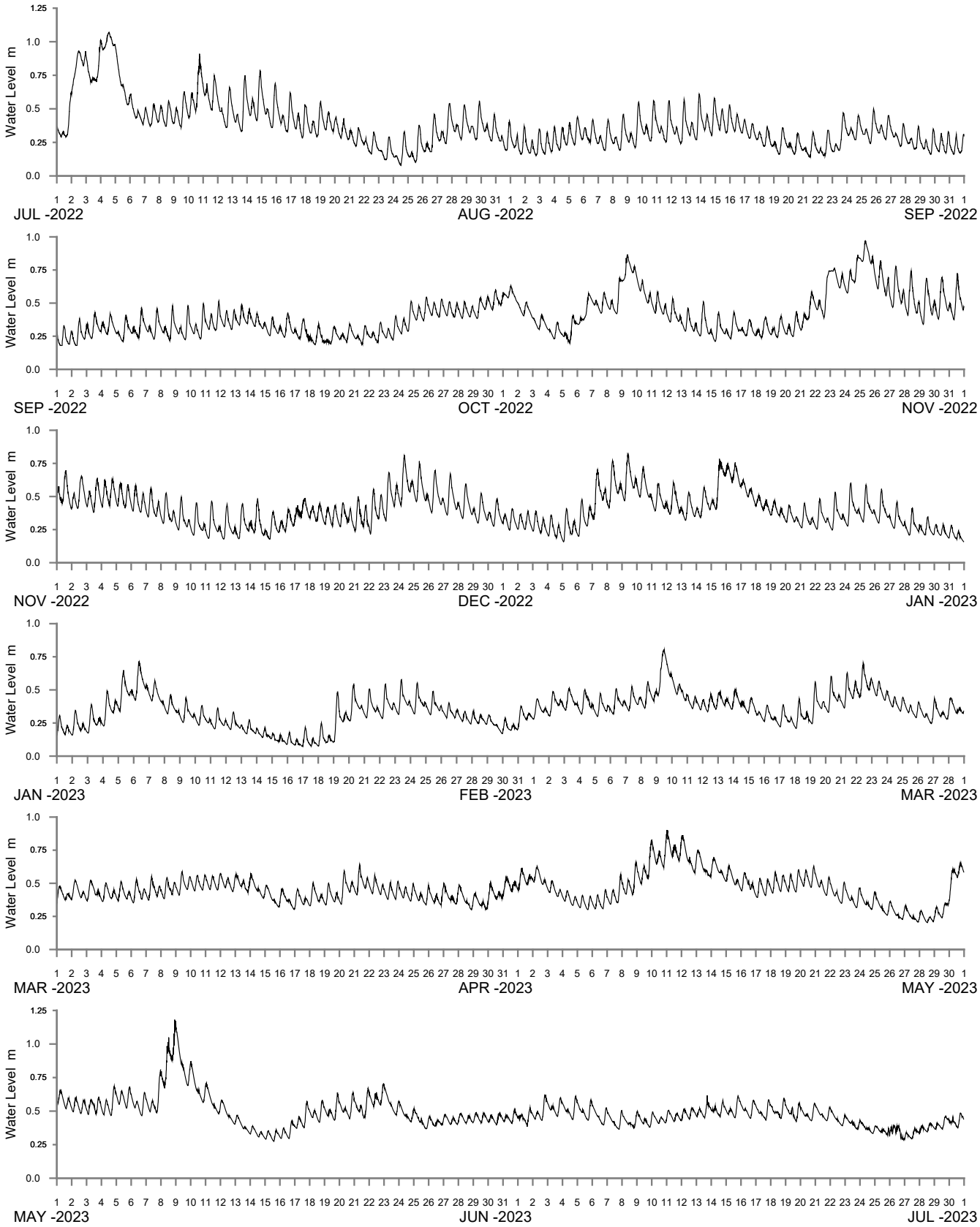


NSW GOVERNMENT

STATION LOCATIONS
ULLADULLA REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-239



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

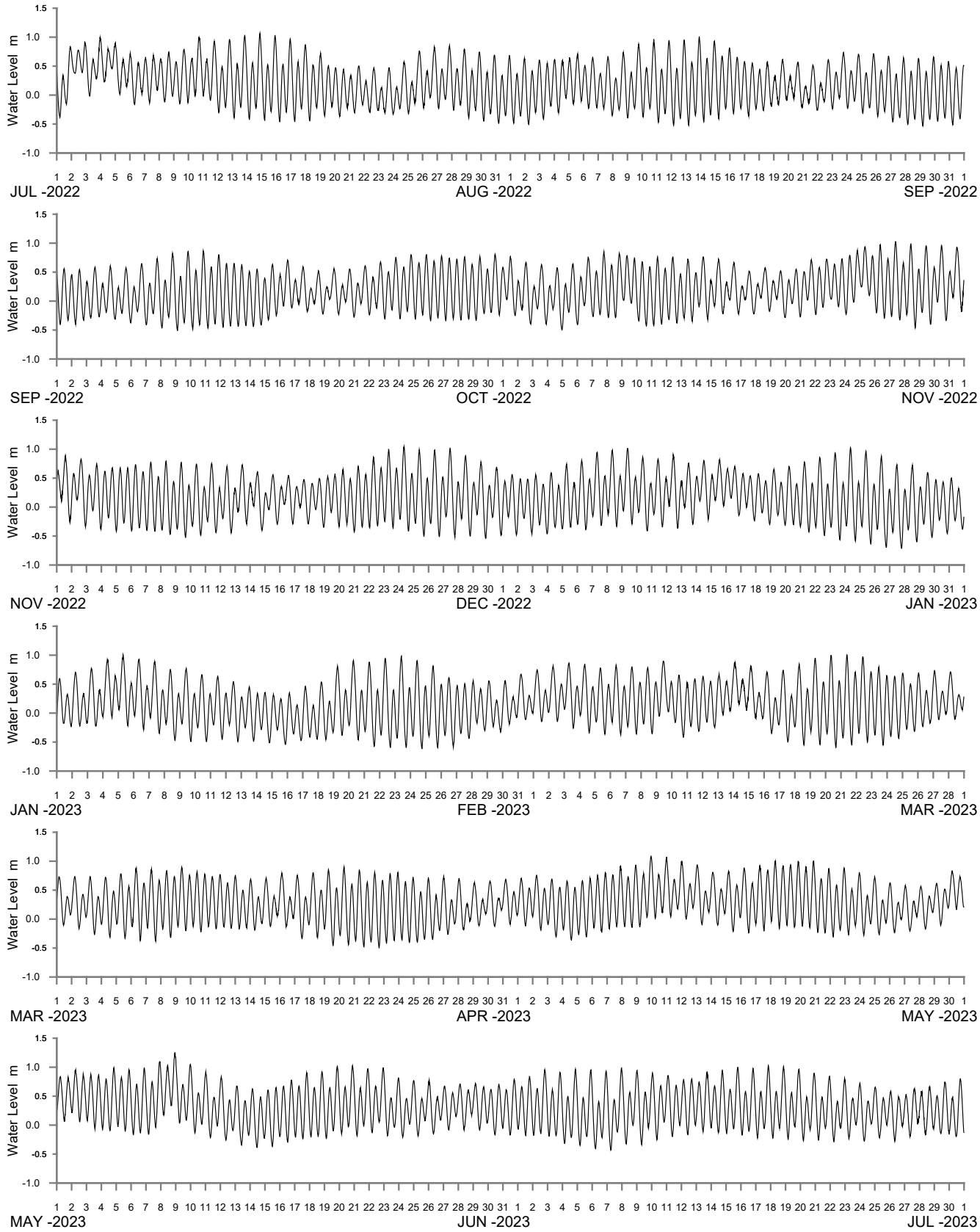
- - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LAKE CONJOLA AT LAKE CONJOLA DOWNSTREAM
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-240



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

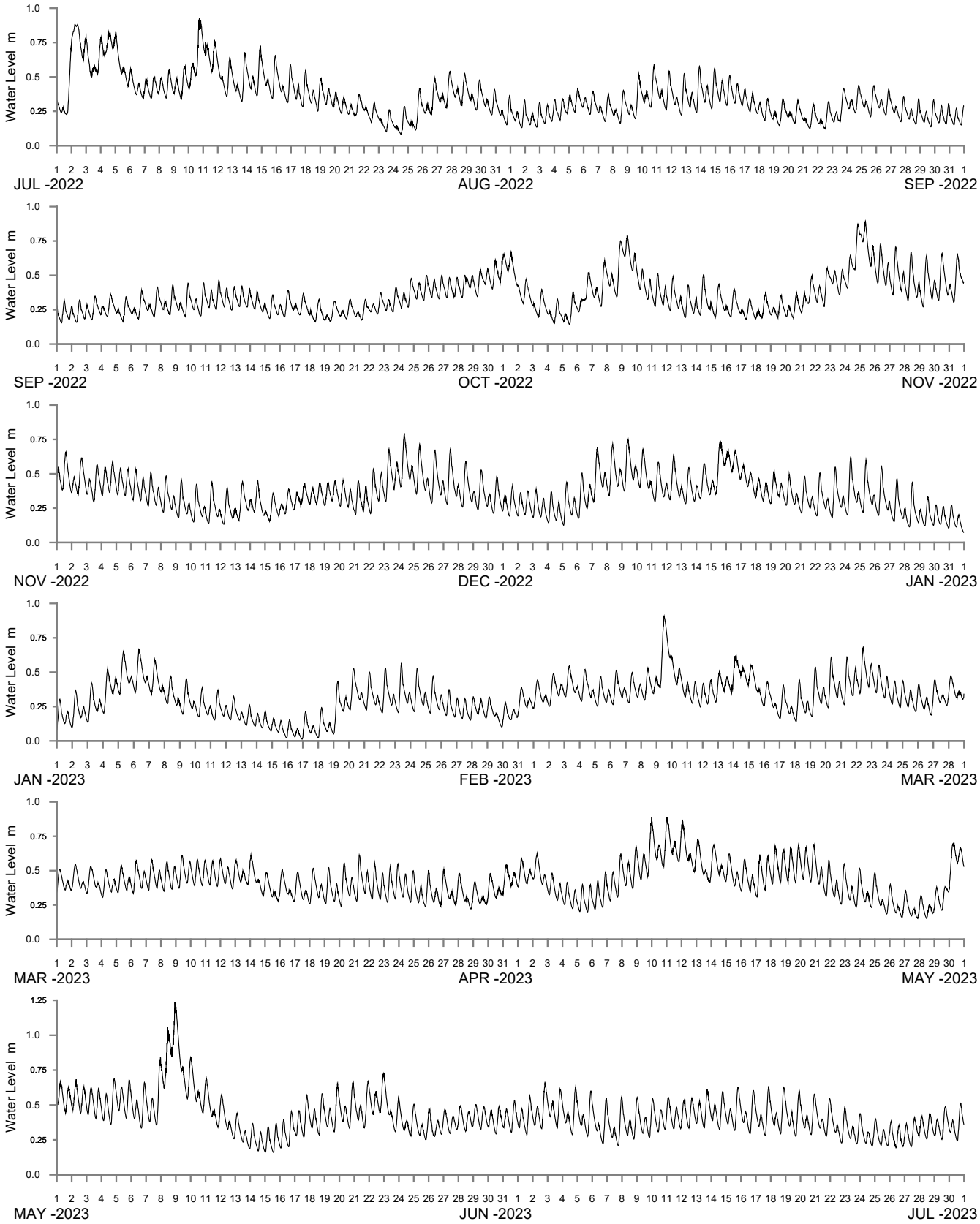
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

NARRAWALLEE INLET AT NARRAWALLEE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-241



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

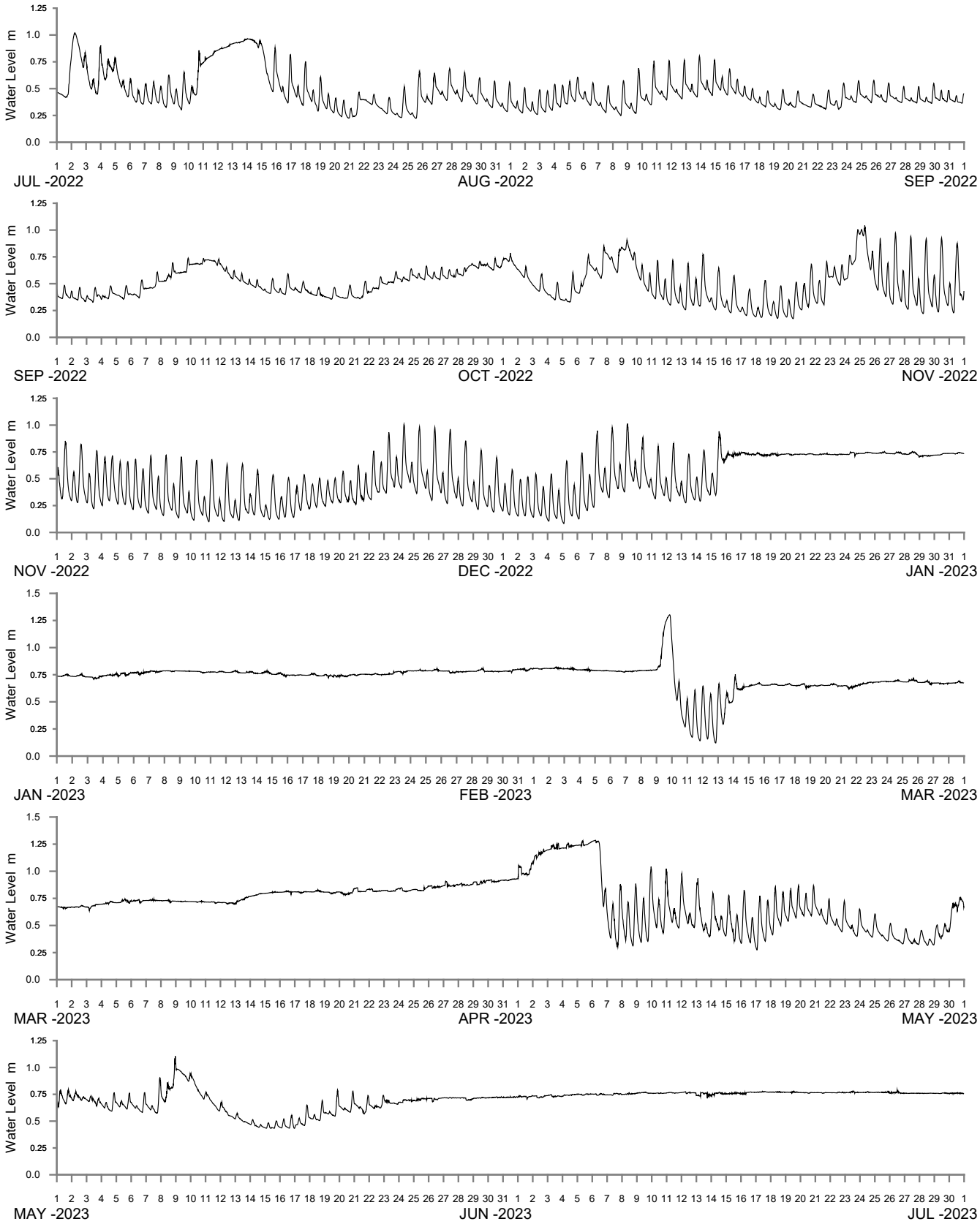
- - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BURRILL LAKE AT BURRILL LAKE BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-242



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

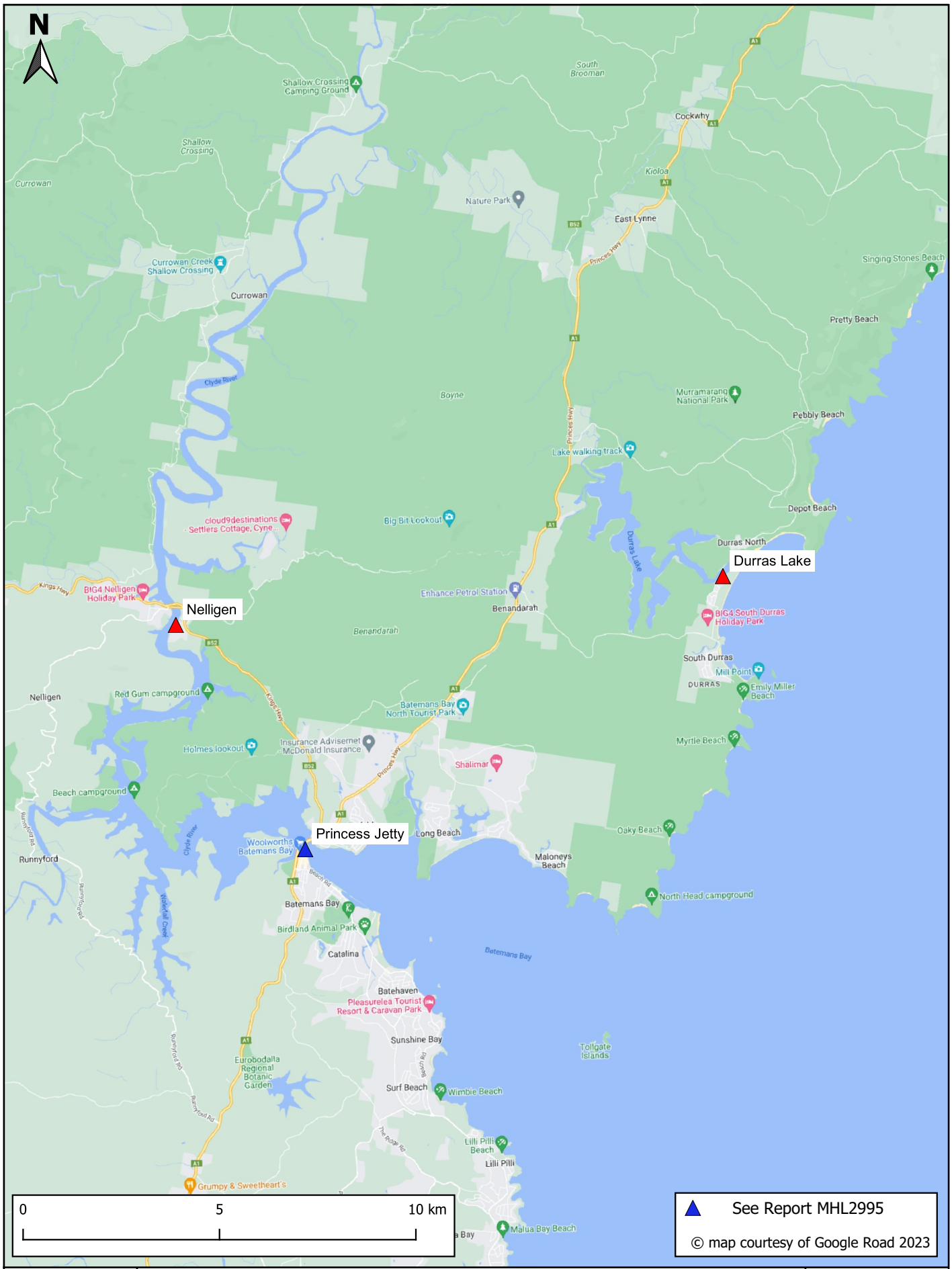
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TABOURIE LAKE AT LAKE TABOURIE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-243

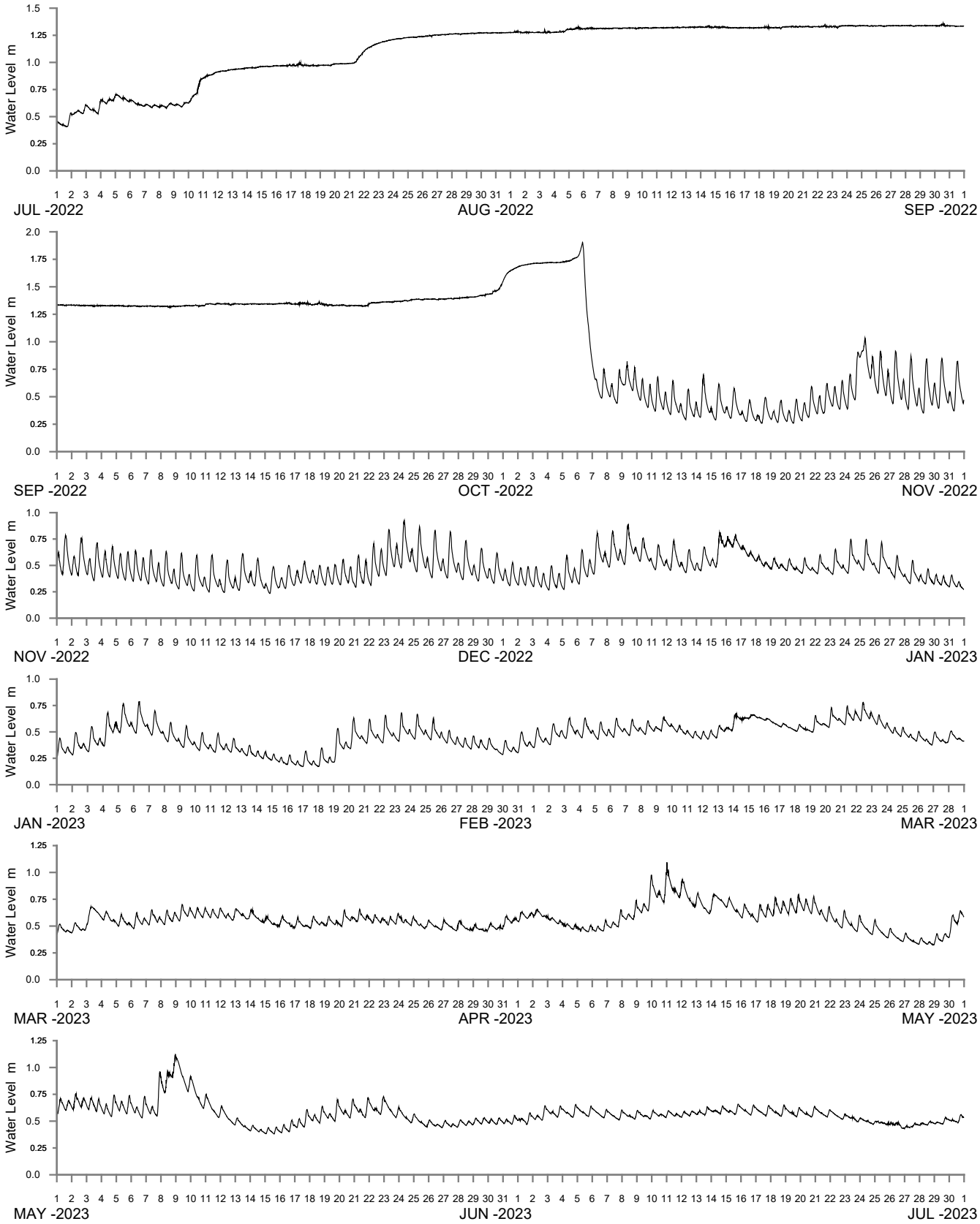


NSW GOVERNMENT

STATION LOCATIONS
BATEMANS BAY REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-244



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

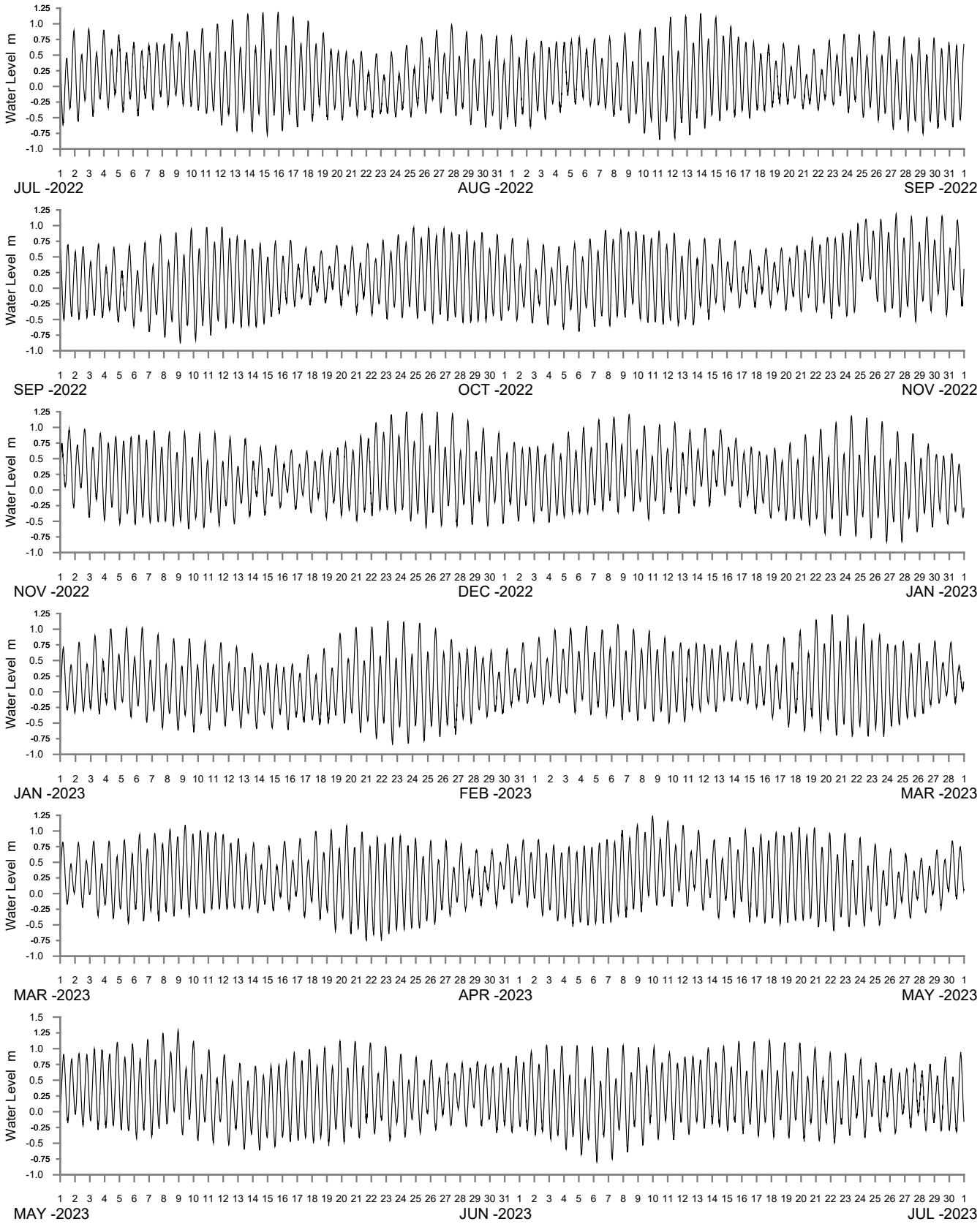
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

DURRAS LAKE AT DURRAS LAKE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-245



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

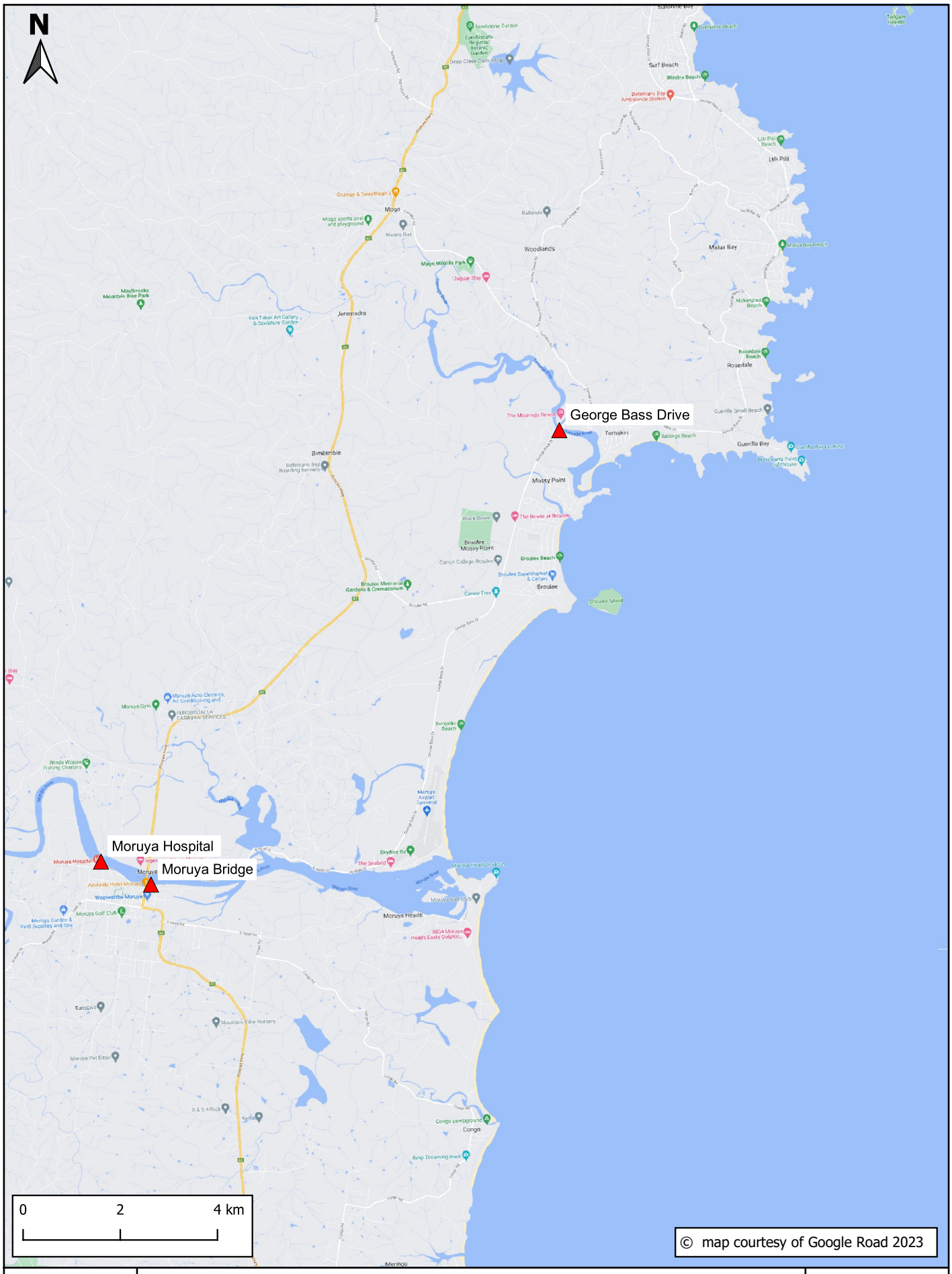
- - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

CLYDE RIVER AT NELLIGEN
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-246

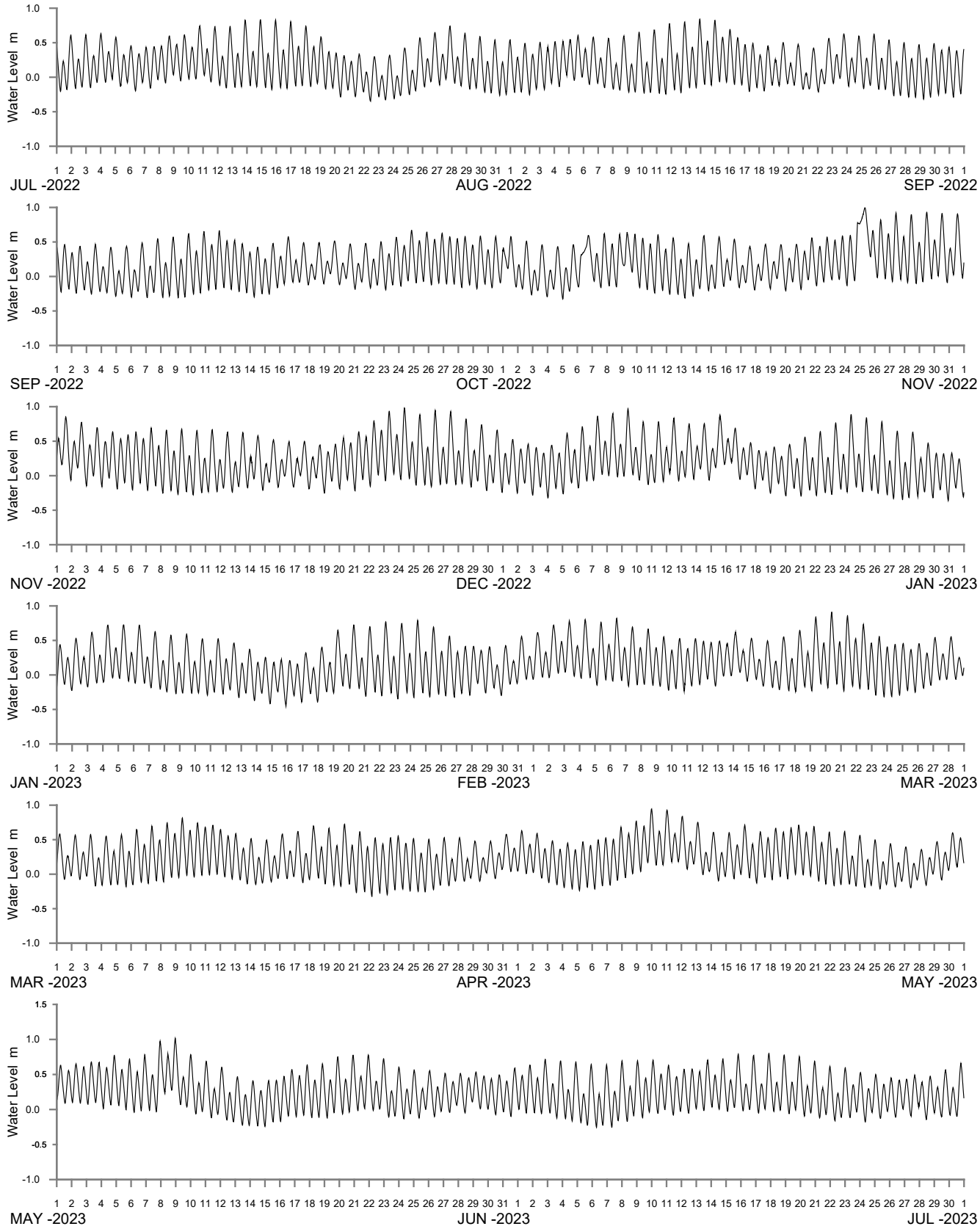


NSW GOVERNMENT

STATION LOCATIONS
MORUYA RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-247



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

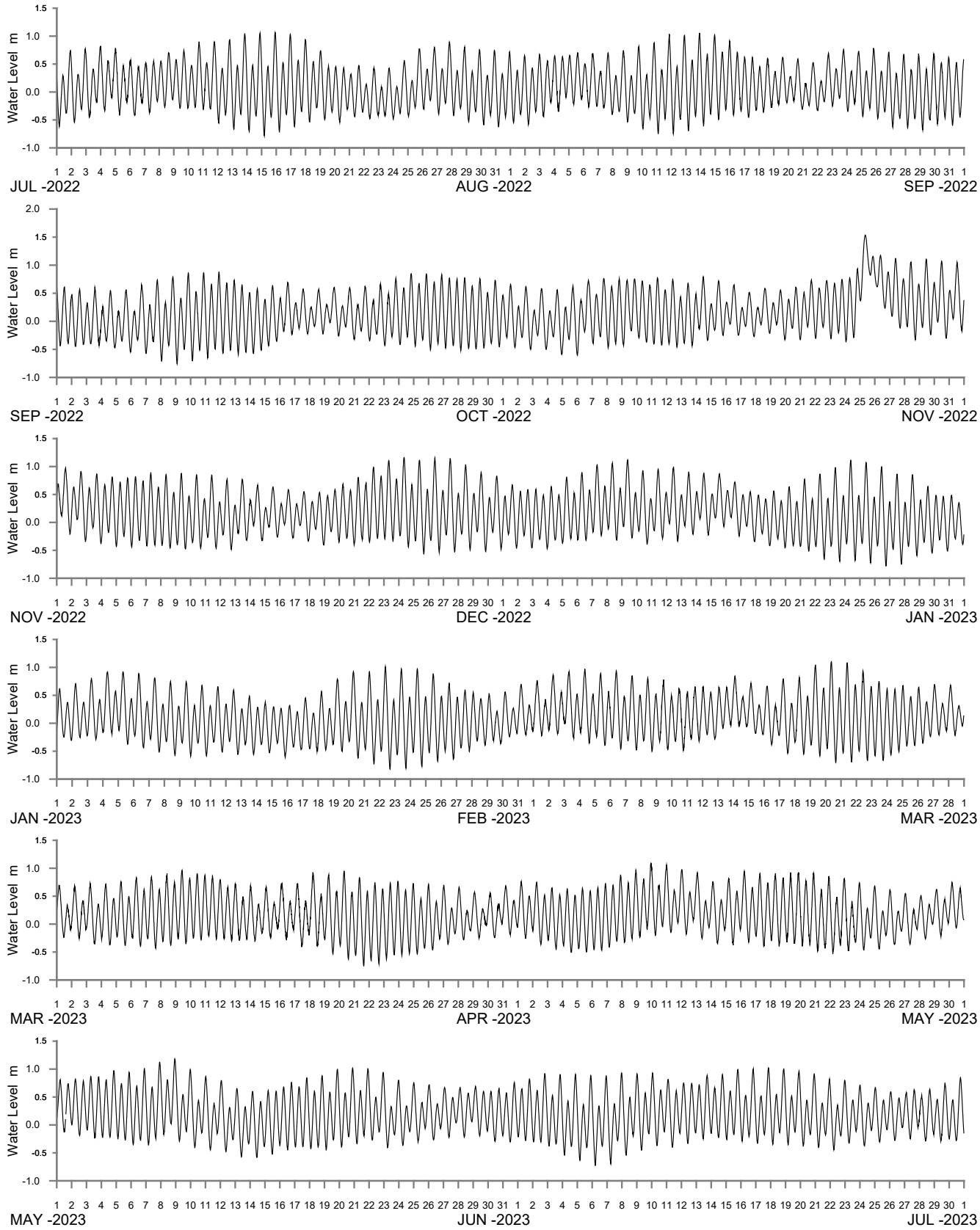
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

TOMAGA RIVER AT GEORGE BASS DRIVE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-248



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

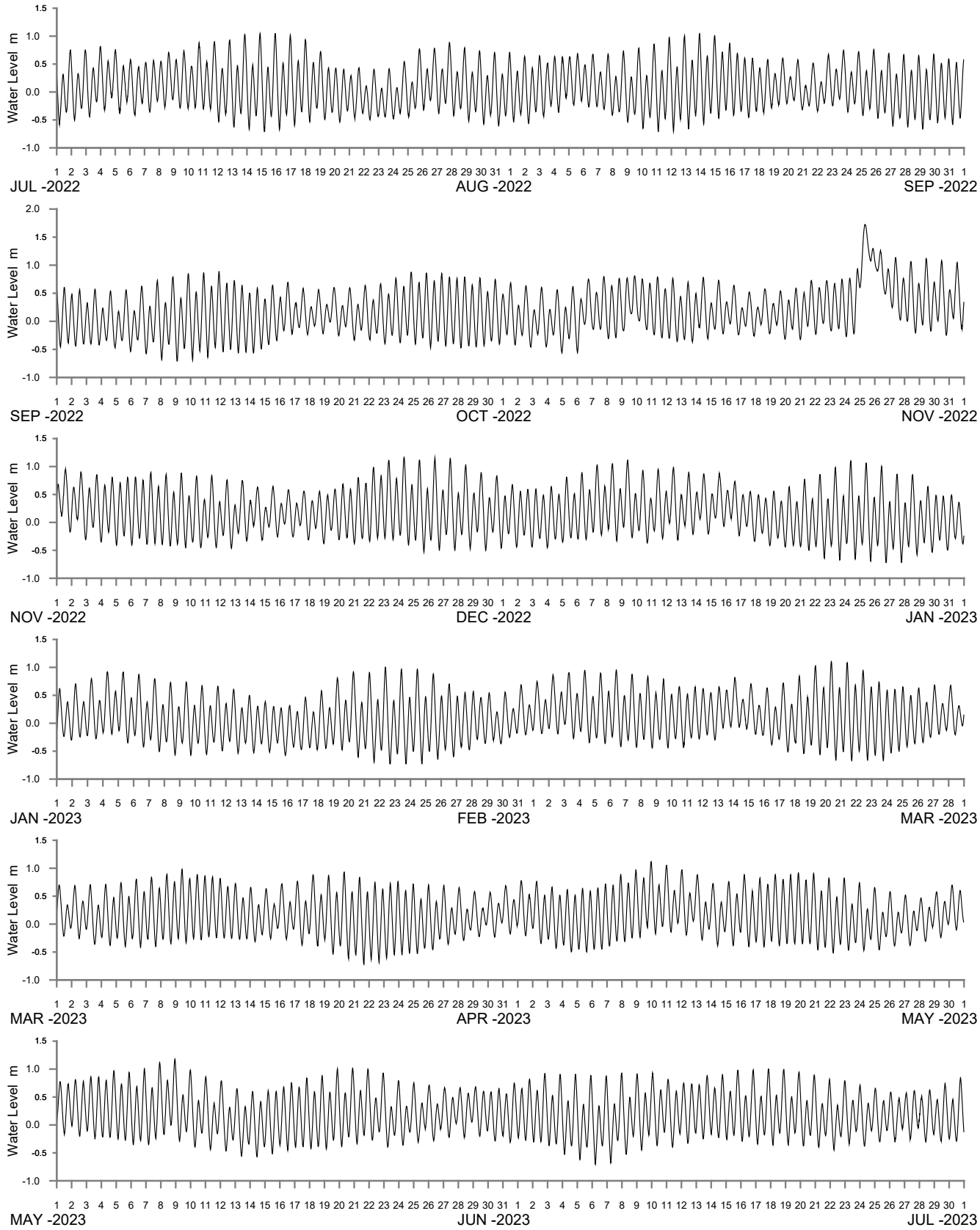
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MORUYA RIVER AT MORUYA BRIDGE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
249



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

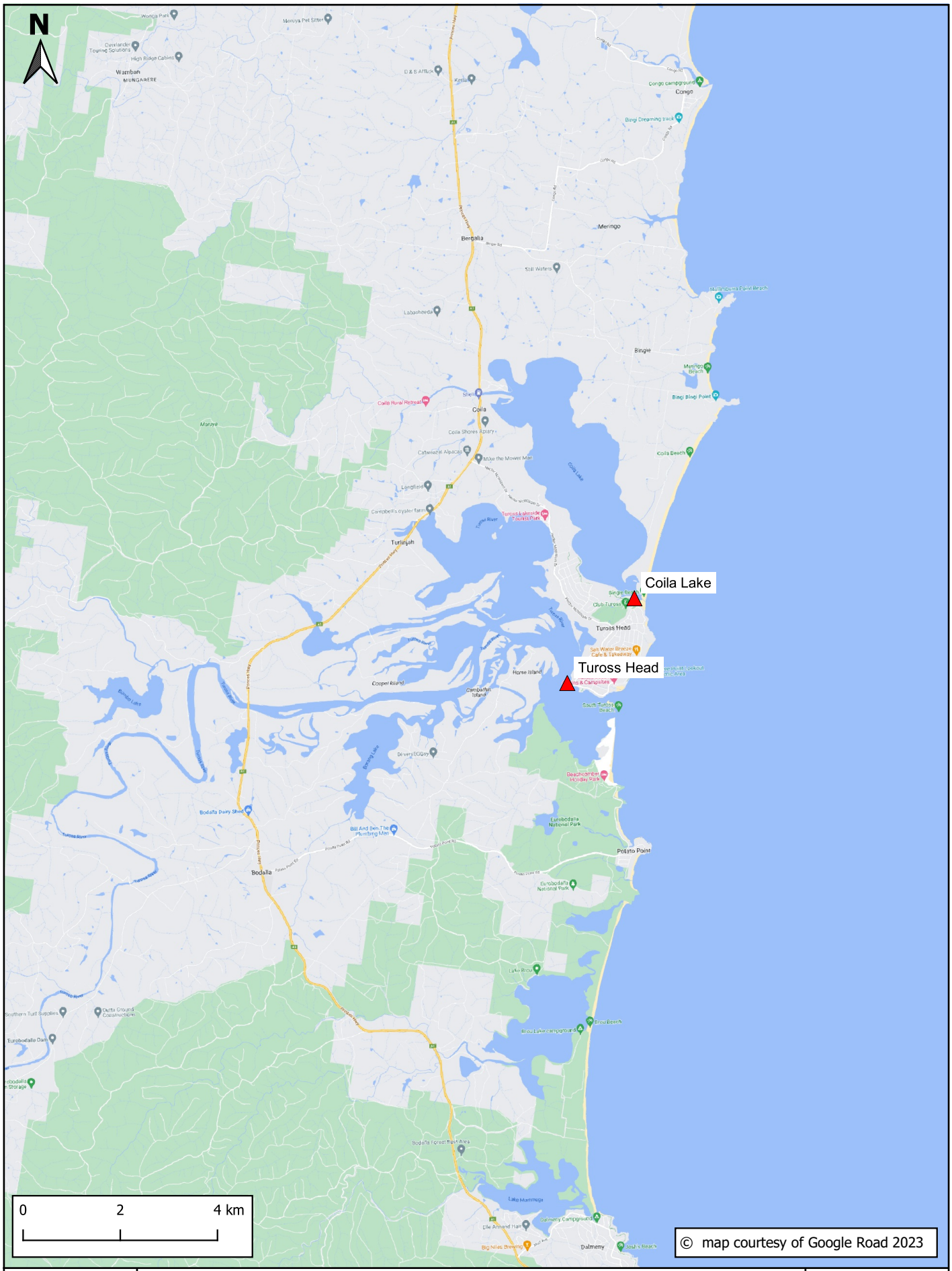
- - - - - - - - - - - - DATA LOSS

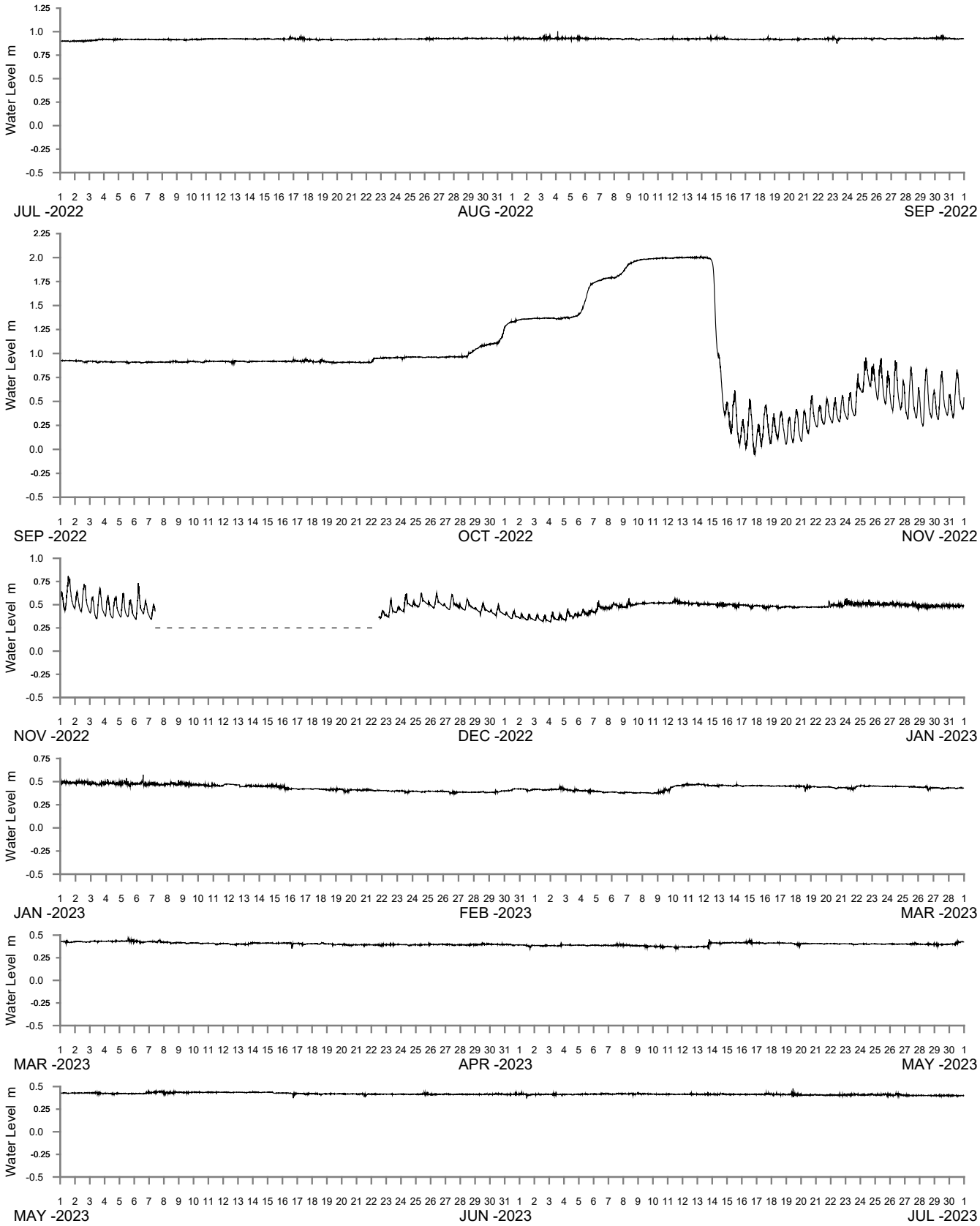
NSW GOVERNMENT

MORUYA RIVER AT MORUYA HOSPITAL
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-250


N
Coila Lake
Tuross Head
Bermagui
Merimbula
Pambula
Eden
Bega
Cobargo
Cooma
Bombala
Jindabyne
Tumbarumba
Tumut
Adaminaby
Kiandra
Cooma
Bega
Eden
Merimbula
Bermagui
Cobargo
Bombala
Tumbarumba
Tumut
Adaminaby
Kiandra
Jindabyne



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

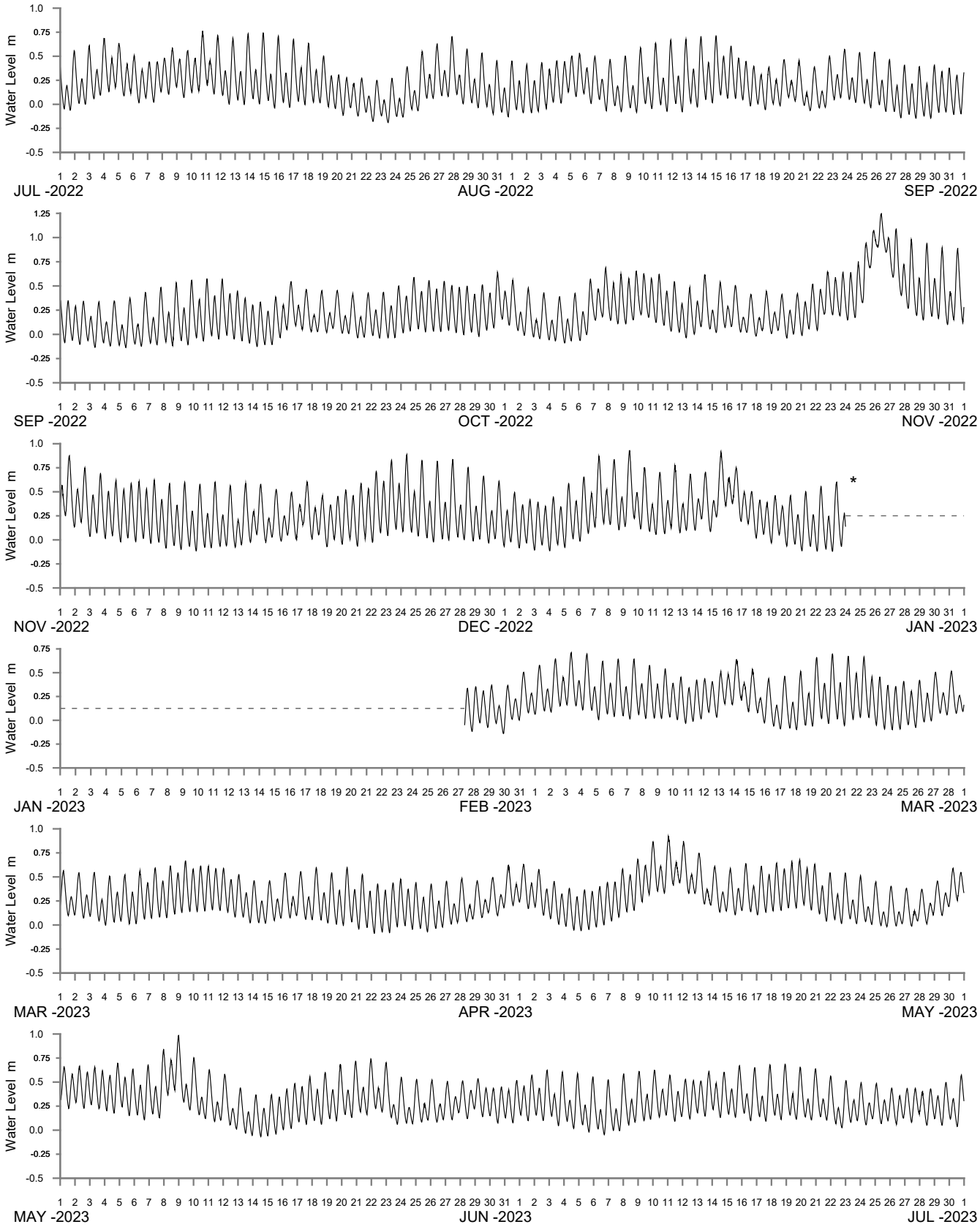
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

COILA LAKE AT COILA LAKE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-252



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - - DATA LOSS

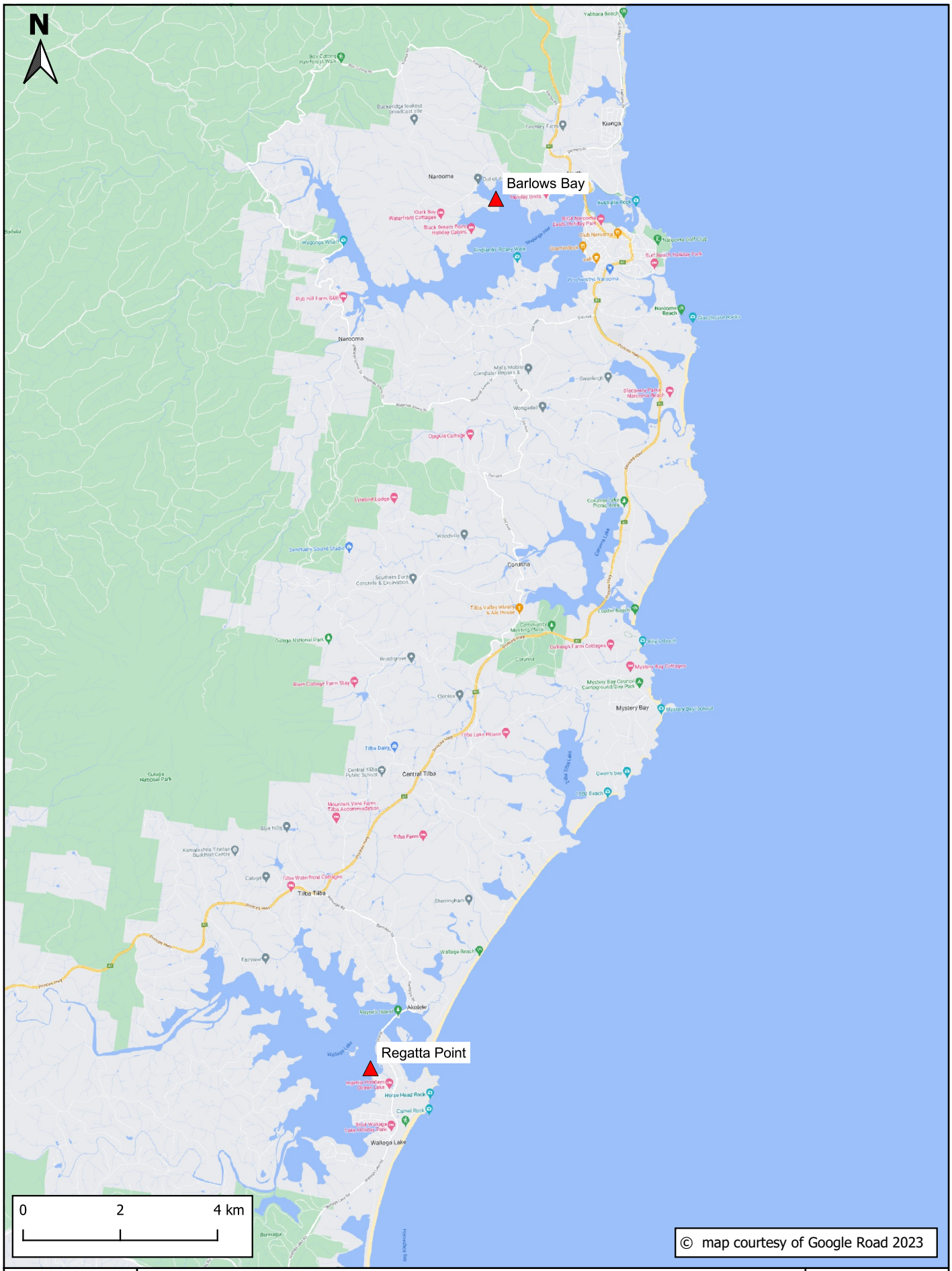
* Data loss due to faulty logger

NSW GOVERNMENT

TUROSS RIVER AT TUROSS HEAD
2022–23

Manly Hydraulics Laboratory

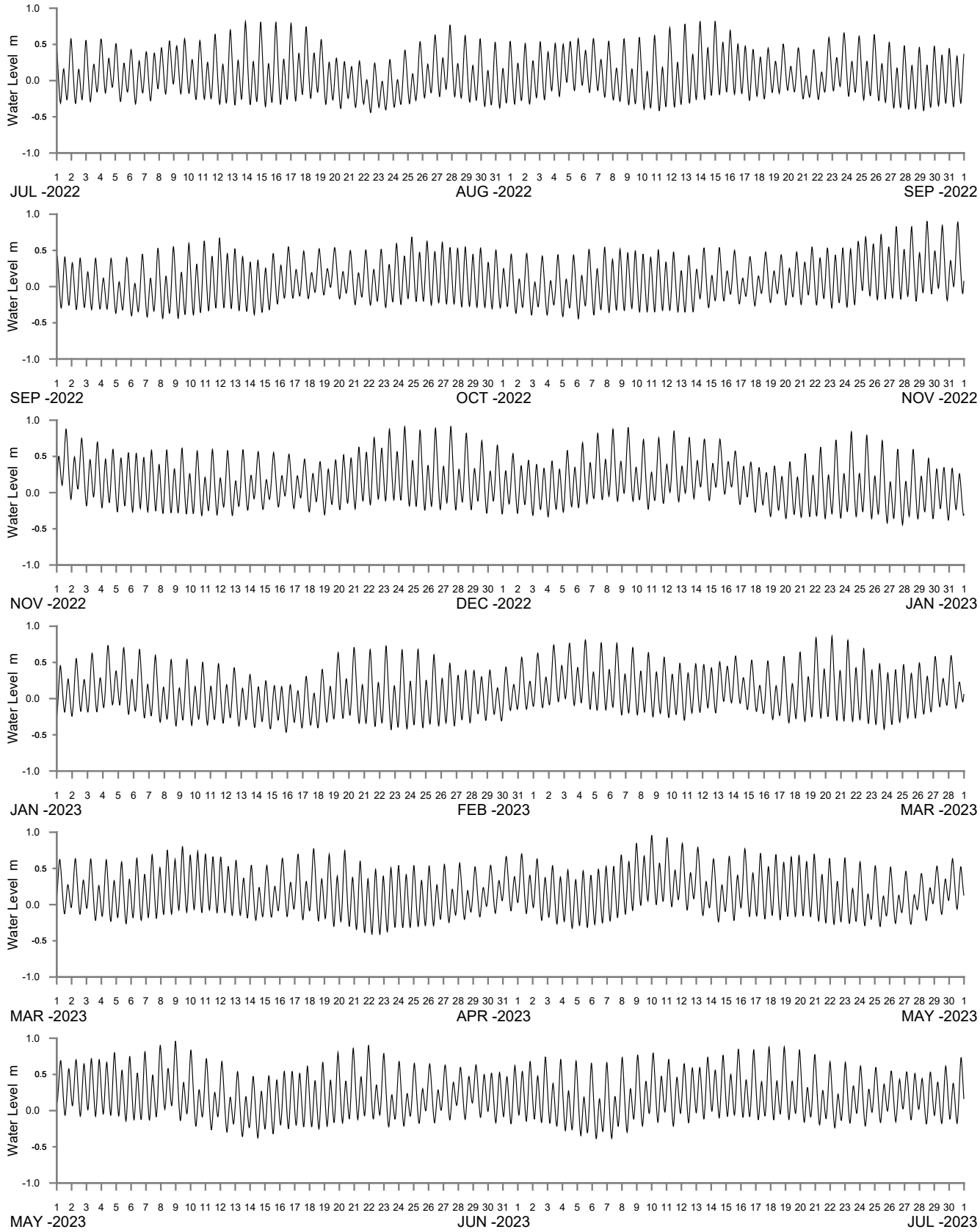
Report MHL2994
Figure
4-253



STATION LOCATIONS
WAGONGA INLET AND WALLAGA LAKE

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-254



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

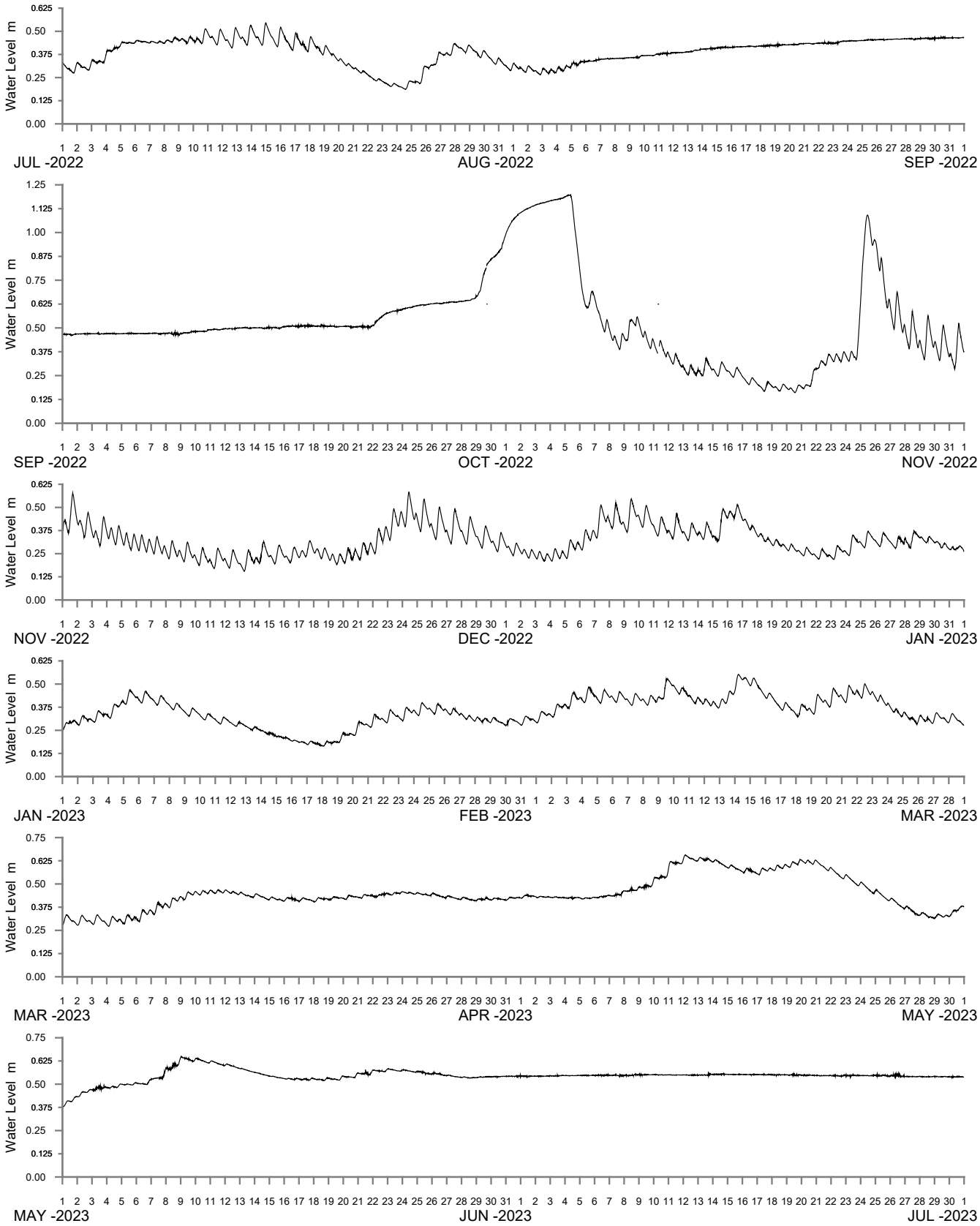
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WAGONGA INLET AT BARLOWS BAY
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-255



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

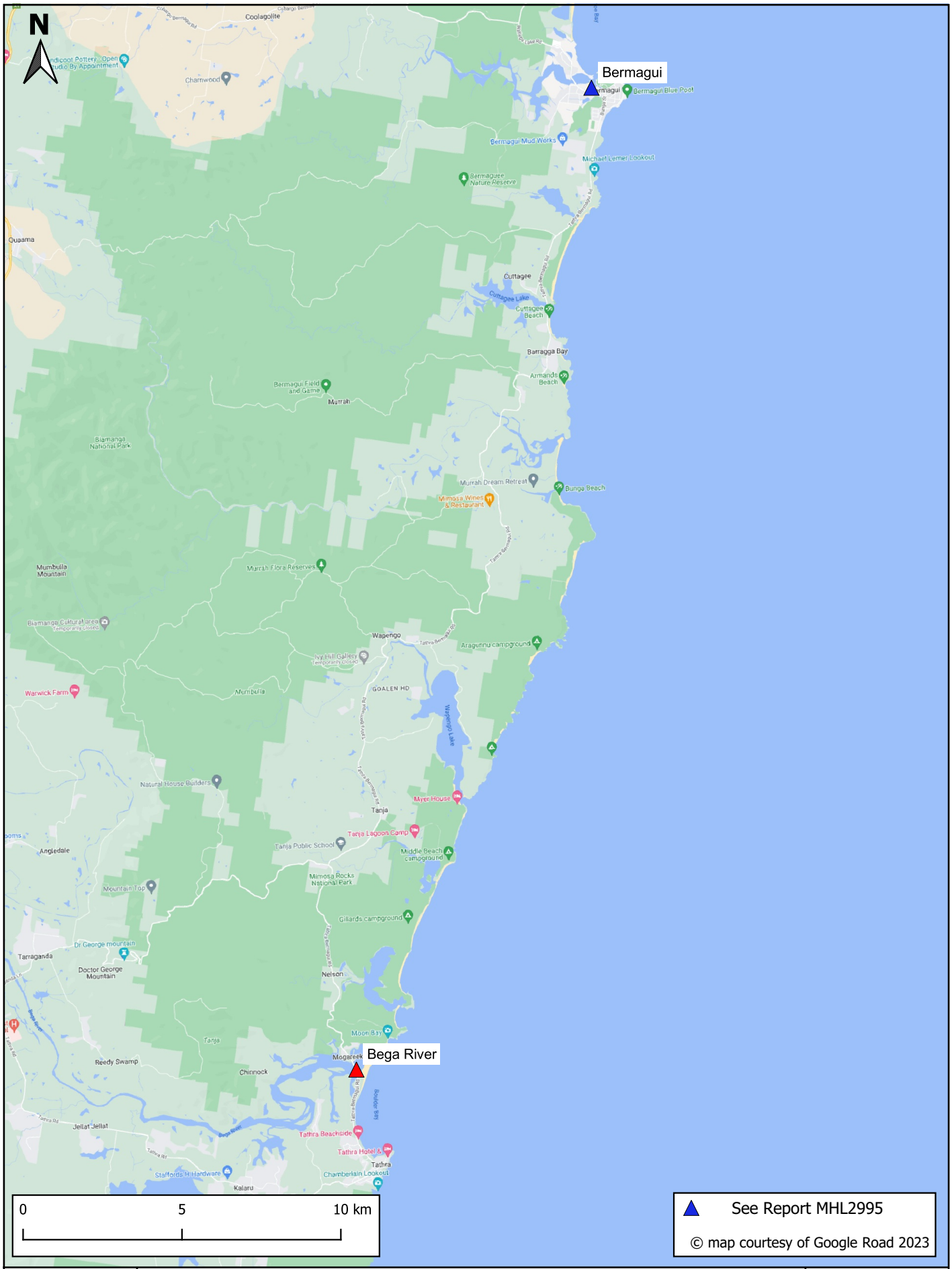
- - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WALLAGA LAKE AT REGATTA POINT
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-256

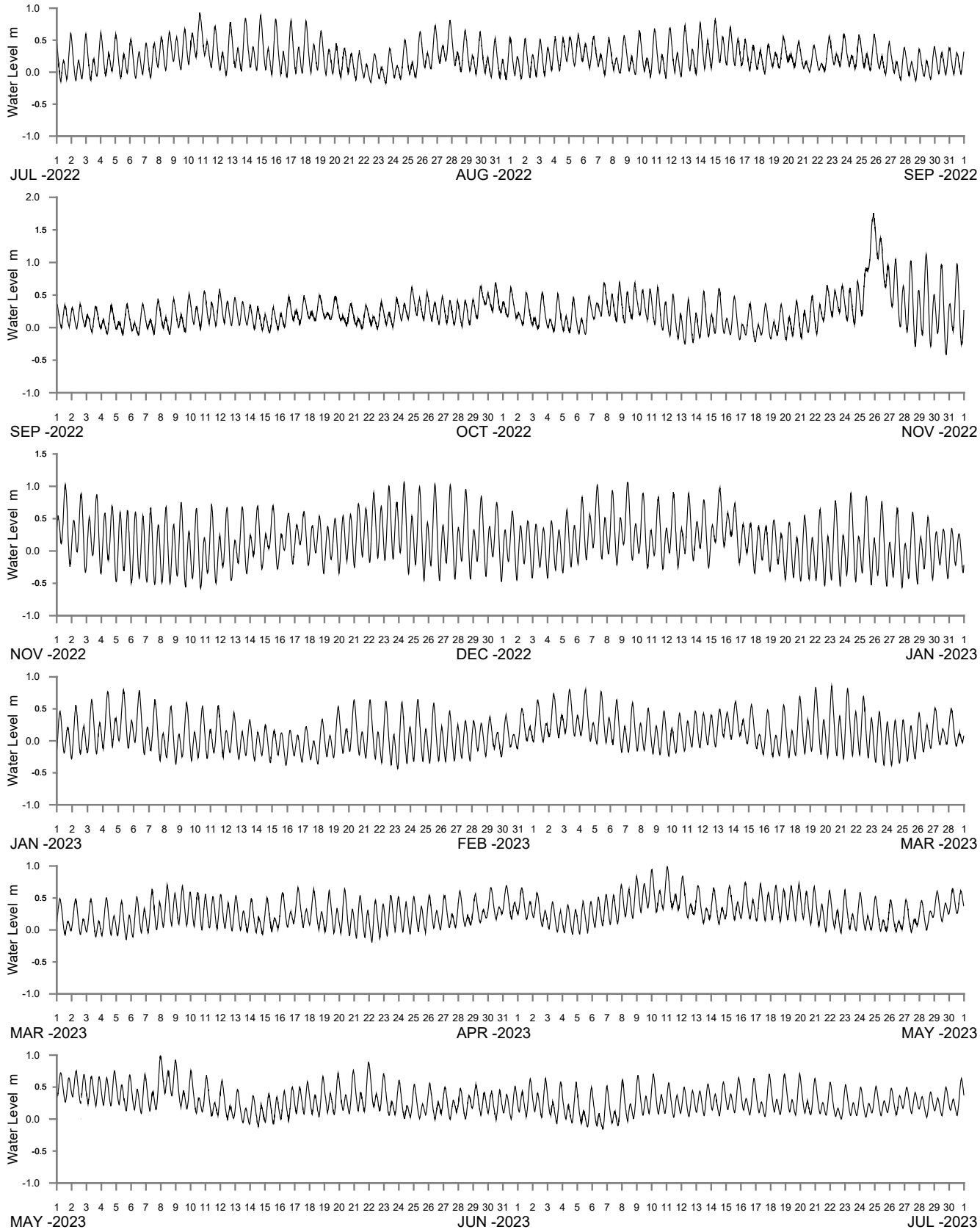


NSW GOVERNMENT

STATION LOCATIONS
BERMAGUI AND BEGA RIVER REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-257



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

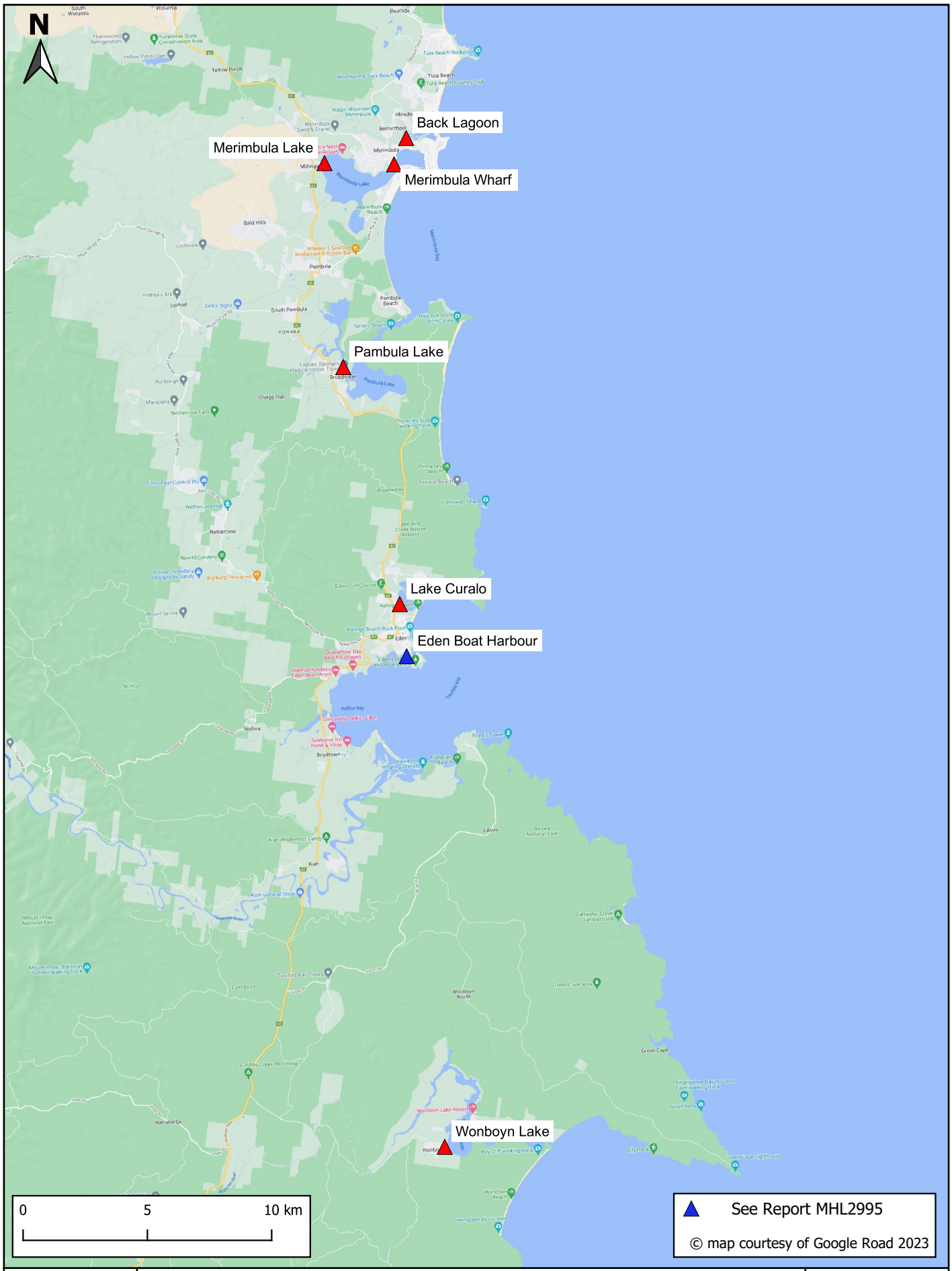
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BEGA RIVER AT BEGA RIVER
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-258

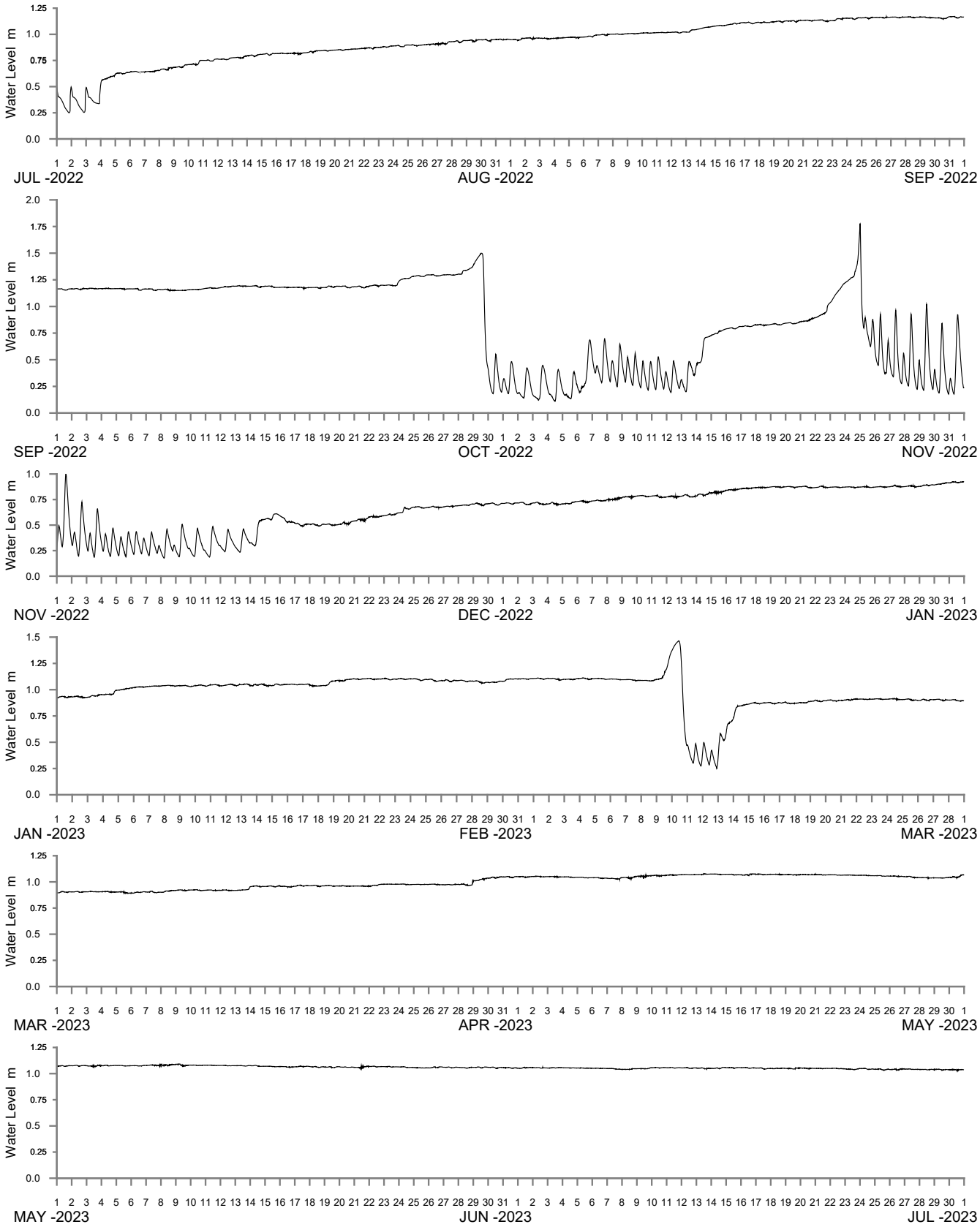


NSW GOVERNMENT

STATION LOCATIONS
EDEN REGION

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-259



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

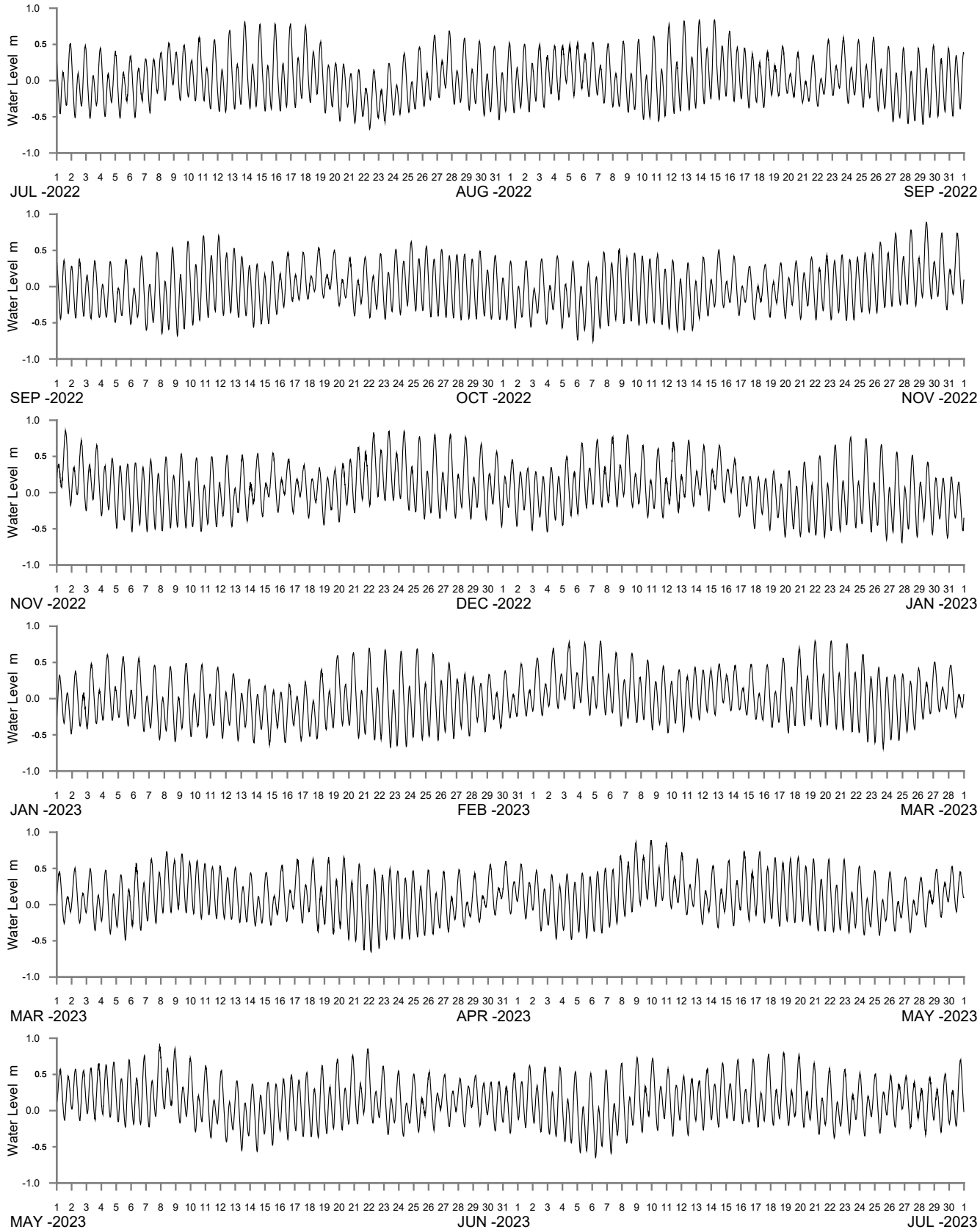
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

BACK LAGOON AT BACK LAGOON
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-260



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

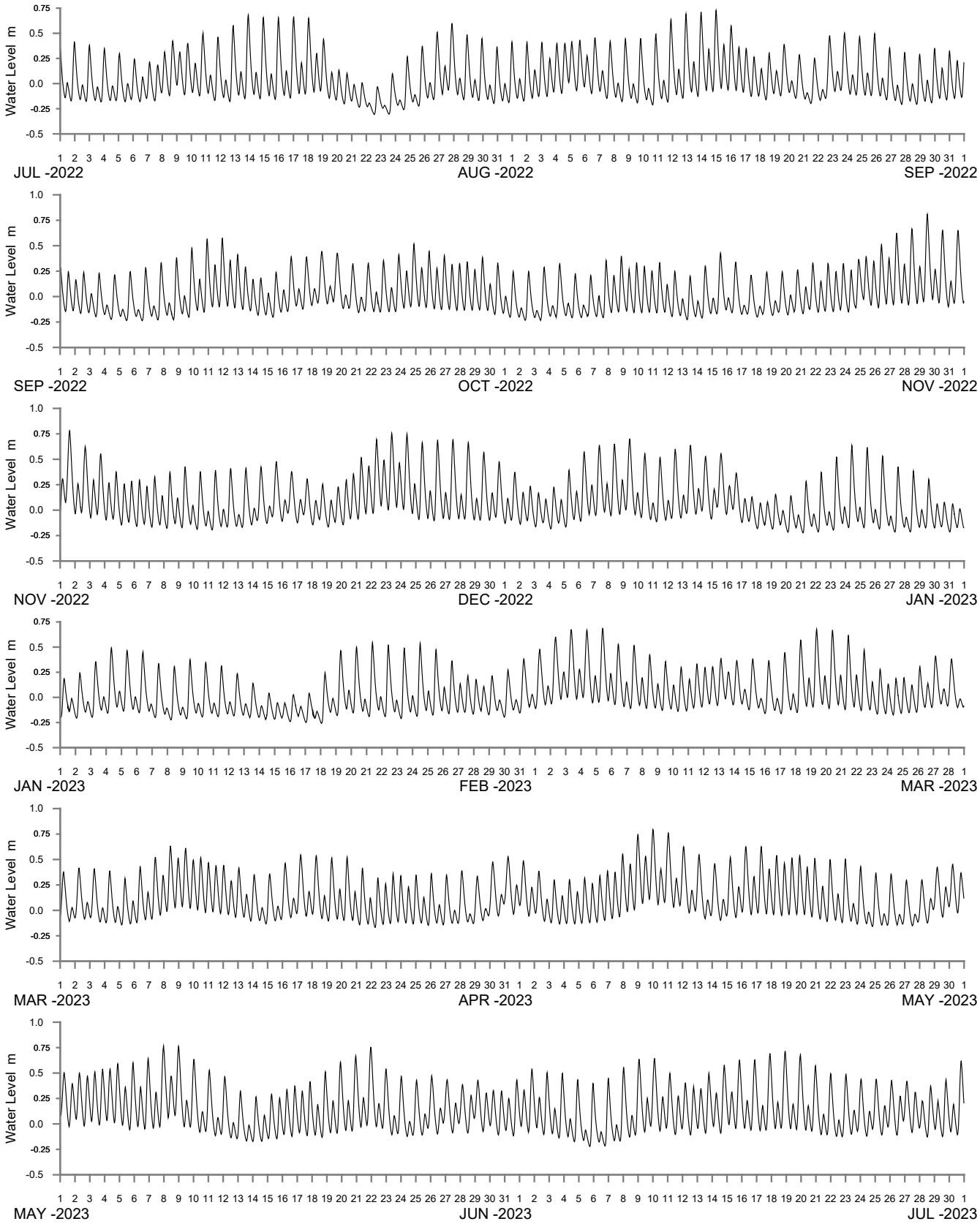
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MERIMBULA LAKE AT MERIMBULA WHARF
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-261



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

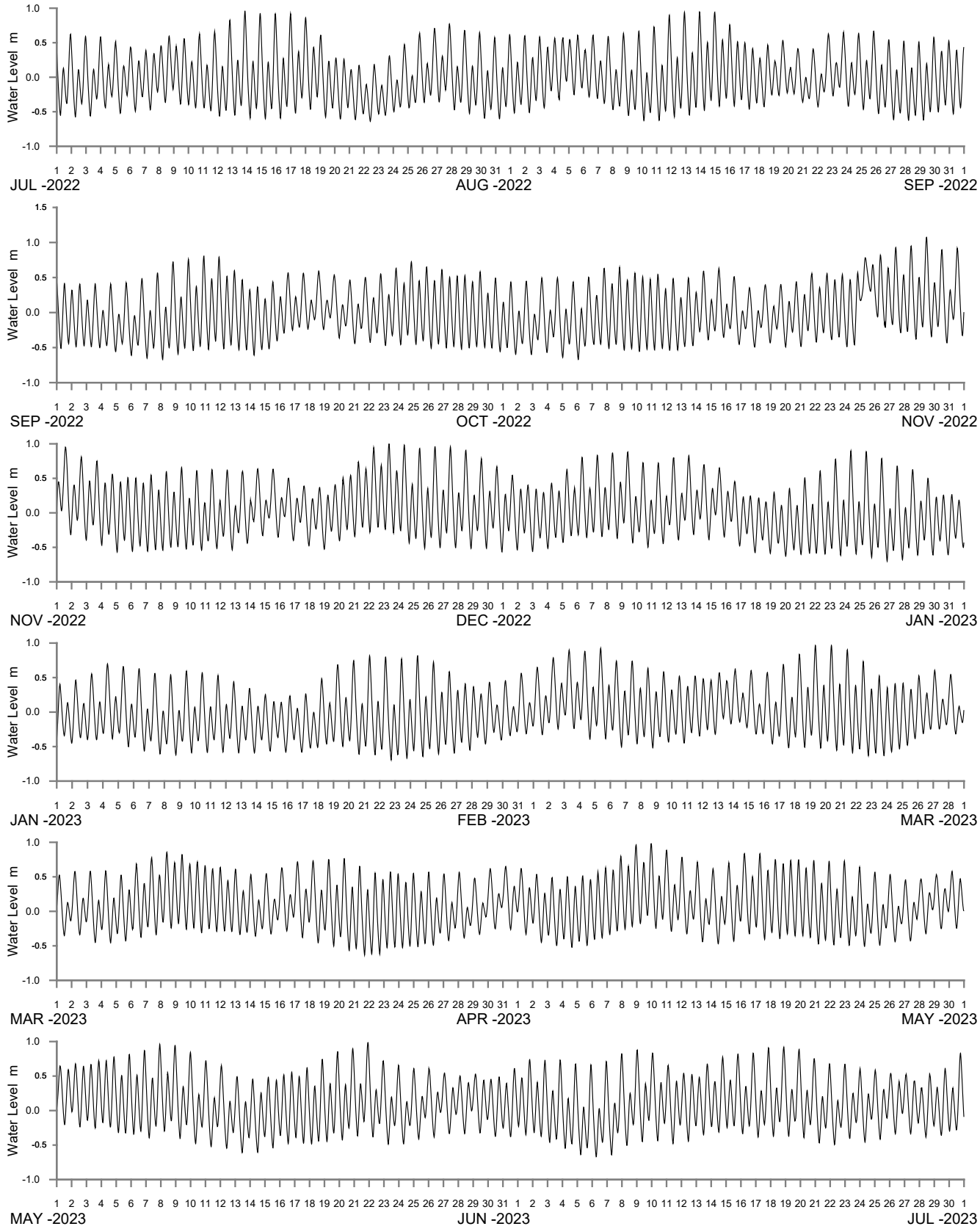
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

MERIMBULA LAKE AT MERIMBULA LAKE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-262



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

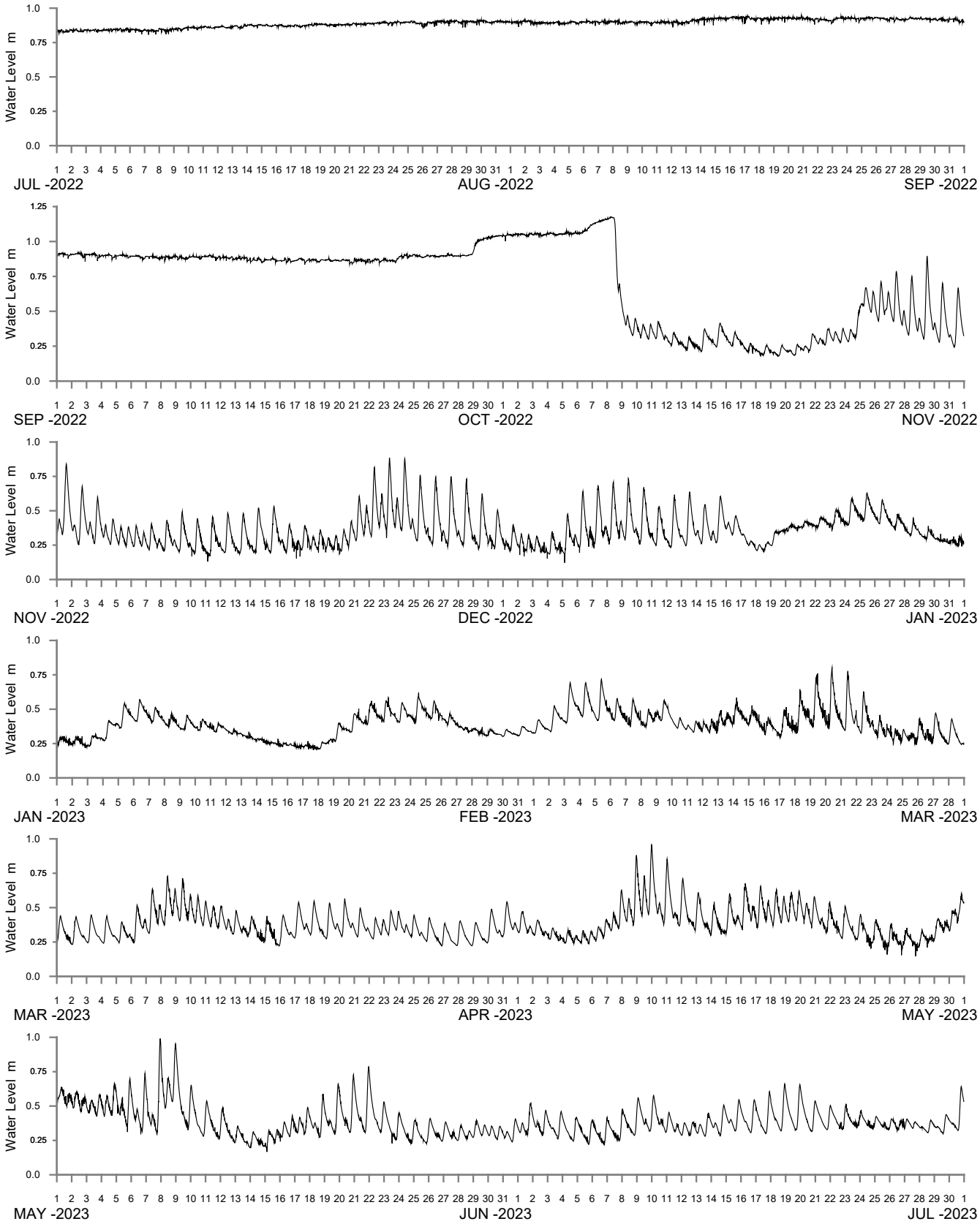
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

PAMBULA LAKE AT PAMBULA LAKE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-263



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

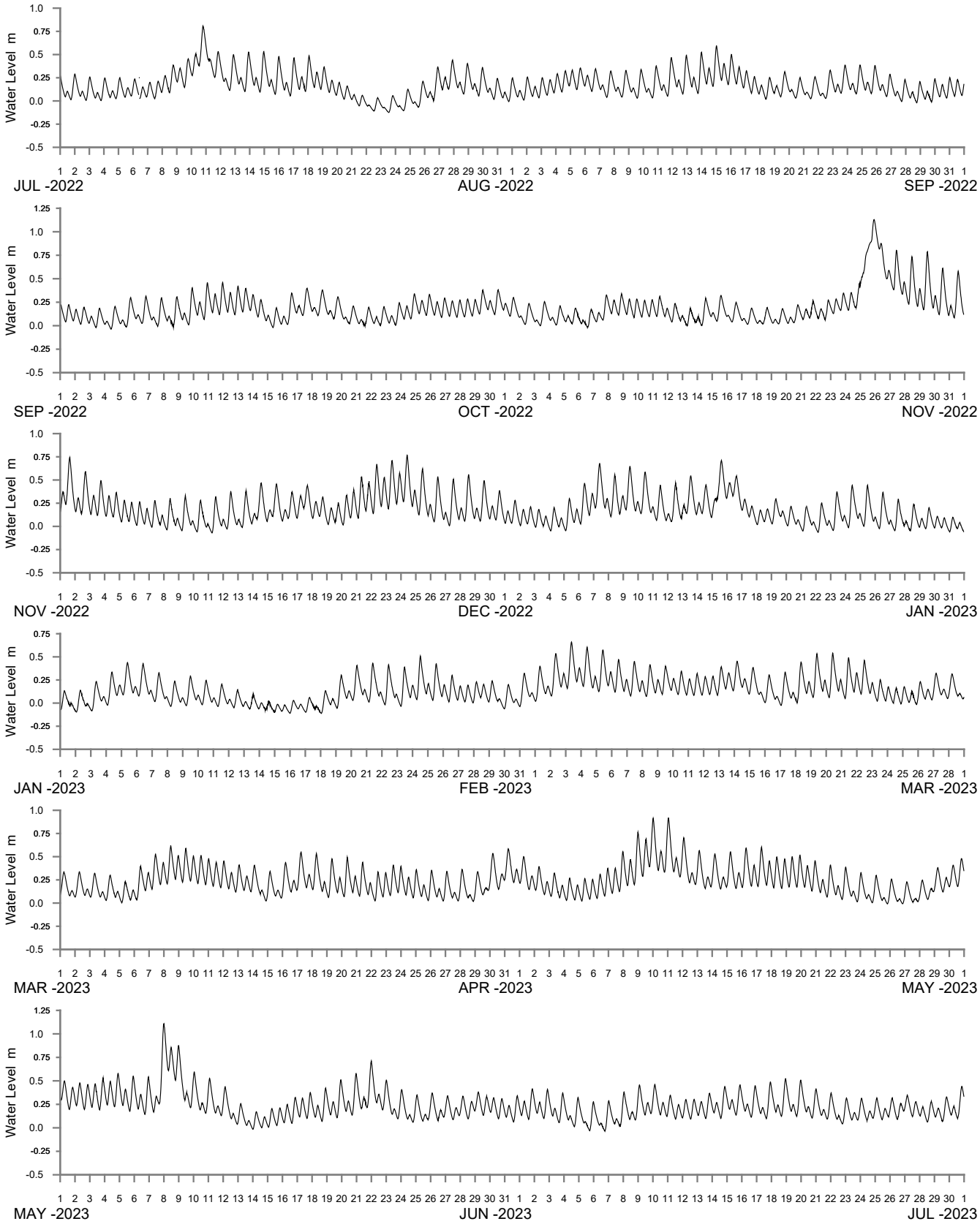
- - - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

LAKE CURALO AT LAKE CURALO
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-264



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM (1971)

- - - - - - - - - - - DATA LOSS

NSW GOVERNMENT

WONBOYN LAKE AT WONBOYN LAKE
2022–23

Manly Hydraulics Laboratory

Report MHL2994
Figure
4-265

Appendix A Digitised continuous data and discrete historical data

Table A1 Digitised continuous data

Coastal region	River/creek	Location	Period of data	AWRC*
Tweed	Broadwater	Cobaki	Dec 1987–ongoing	201448
Tweed	Terranora Inlet	Dry Dock	Dec 1987–ongoing	201428
Tweed	Tweed River	Terranora	Dec 1987–ongoing	201447
Tweed	Tweed River	Letitia 2A	Nov 1987–ongoing	201429
Tweed	Tweed River	Letitia 2B	Nov 1987–June 2008	201430
Tweed	Tweed River	Barneys Point	Mar 1987–ongoing	201426
Tweed	Bartletts Creek	Bartletts Creek	Nov 1994–Mar 1996	201454
Tweed	Leddays Creek	Leddays Creek	Dec 1994–July 1996	201452
Tweed	McLeods Drain	McLeods Drain	Nov 1994–June 1996	201436
Tweed	Tweed River	Tumbulgum	Jul 1985–ongoing	201432
Tweed	Tweed River	North Murwillumbah	Jan 1987–ongoing	201420
Tweed	Tweed River	Bray Park Weir	Nov 2002–ongoing	201455
Tweed	Tweed River	Murwillumbah Bridge	Nov 2002–ongoing	201465
Tweed	Rous River	Kynnumboon	Aug 1990–ongoing	201422
Brunswick	Mooball Creek	Mooball Creek	Feb 2021-ongoing	202435
Brunswick	Cudgen Creek	Kingscliff	May 1985–ongoing	202418
Brunswick	Cudgen Creek	Kingscliff Upstream	May 2014–ongoing	202434
Brunswick	Cudgen Creek	Cudgen Creek	May 1985–Nov 2009	202419
Brunswick	Cudgen Lake	Cudgen Lake	Nov 1993–Dec 1993	202416W
Brunswick	Belongil Creek	Belongil	Dec 1994–Dec 1996	202423
Brunswick	Cudgen Lake	Bogangar	Dec 1985–ongoing	202416
Brunswick	Marshalls Creek	Orana Bridge	Nov 2002–ongoing	202475
Brunswick	Marshalls Creek	Capricornia Canal	Mar 1997–Mar 1998	202420
Brunswick	Marshalls Creek	New Brighton	Mar 1997–Apr 1998	202421
Brunswick	Marshalls Creek	Billinudgel	Jan 1986–ongoing	202400
Brunswick	Brunswick River	Mullumbimby	Jul 1984–ongoing	202402
Brunswick	Simpsons Creek	Simpsons Creek	Apr 1998–Mar 1999	202424
Brunswick	Brunswick River	Pacific Highway Bridge	Mar 1997–Mar 1999	202422
Richmond	Lennox Head	Lake Ainsworth	Oct 1994–ongoing	203455
Richmond	Richmond River	Missingham Bridge	Nov 2003–ongoing	203465
Richmond	Richmond River	Byrnes Point	Apr 1990–ongoing	203461
Richmond	Richmond River	Wardell	Oct 2002–ongoing	203468
Richmond	Richmond River	Woodburn	Sep 1985–ongoing	203412
Richmond	Tucombil Canal	Tucombil Highway Bridge	Dec 1989–ongoing	203480
Richmond	Tucombil Canal	Tucombil Floodgate	Oct 1990–Aug 2015	203434
Richmond	Tuckean Broadwater	Tuckean	Oct 1995–Oct 1996	203477
Richmond	Evans River	Iron Gates	Dec 1992–May 1993	203475
Richmond	Evans River	Iron Gates	Apr 1997–ongoing	203475
Richmond	Evans River	Fishing Co-op	Mar 1997–ongoing	203462
Richmond	Evans River	Evans Head	Nov 1981–Aug 1984	203481
Richmond	Rocky Mouth Creek	Rocky Mouth Creek	Sep 1994–ongoing	203432
Richmond	Richmond River	Bungawalbin	Sep 2002–ongoing	203450
Richmond	Bungawalbin Creek	Bungawalbin Creek	Aug 2015–ongoing	2034133
Richmond	Richmond River	Coraki	Dec 1987–ongoing	203403
Richmond	Wilsons River	East Gundurimba	Apr 1980–ongoing	203427

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Classification: Public

Coastal region	River/creek	Location	Period of data	AWRC*
Richmond	Leycester Creek	Tuncester	Mar 1980–ongoing	203443
Richmond	Wilsons River	Woodlawn College	Mar 1980–ongoing	203402
Richmond	Wilsons Creek	Federal	Nov 1988–Sep 1995	203460
Richmond	Empire Vale Creek	Empire Vale Creek	May 1998–Oct 1999	203489
Clarence	Clarence River	Oyster Channel	Nov 2002–ongoing	204451
Clarence	Clarence River	Maclean	Jan 1990–ongoing	204410
Clarence	Clarence River	Lawrence	Nov 2002–ongoing	204453
Clarence	Clarence River	Tyndale	Nov 2002–ongoing	204465
Clarence	Clarence River	The Avenue upstream	Nov 2002–ongoing	204475
Clarence	Clarence River	The Avenue downstream	Nov 2002–ongoing	204476
Clarence	Clarence River	Roberts Creek	May 1994–May 1996	204491
Clarence	Clarence River	Brushgrove	Sep 1989–ongoing	204406
Clarence	Clarence River	Ulmarra	Sep 2002–ongoing	204480
Clarence	Clarence River	Grafton	Jul 1987–ongoing	204400
Clarence	Clarence River	Rogans Bridge	Jul 1993–ongoing	204414
Clarence	Clarence River	Tarrent Bridge	Mar 1999–Apr 2000	204415
Clarence	Palmers Channel	Palmers Island	Aug 1990–Sep 2009	204426U
Clarence	Palmers Channel	Palmers Island Bridge	Dec 2001–ongoing	204426
Clarence	Lake Wooloweyah	Lake Wooloweyah	June 2009–ongoing	204485
Bellinger	Wooli River	Wooli Entrance	Jul 1991–ongoing	205462
Bellinger	Wooli River	Wooli Caravan Park	Jul 1991–ongoing	205463
Bellinger	Corindi River	Red Rock	Feb 2004–ongoing	205450
Bellinger	Woolgoolga Lake	Woolgoolga Lake	May 2007–ongoing	205455
Bellinger	Woolgoolga Creek	Woolgoolga	Mar 1990–ongoing	205441
Bellinger	Moonee Creek	Moonee Creek	Aug 2002–ongoing	205435
Bellinger	Coffs Creek	Coffs Creek Highway Bridge	Dec 1980–ongoing	205439
Bellinger	Newports Creek	Newports Creek	Nov 1990–ongoing	205460
Bellinger	Boambee Creek	Boambee Downstream	Apr 1991–July 2007	205459
Bellinger	Boambee Creek	Boambee	Jan 1980–ongoing	205438
Bellinger	Boambee Creek	Boambee Entrance	Mar 2005–ongoing	205475
Bellinger	Bonville Creek	Bonville	Aug 2009–ongoing	205480
Bellinger	Never Never Creek	Gleniffer	Nov 1996–Nov 2003	205014
Bellinger	Bellinger River	Repton	Jun 1988–ongoing	205403
Bellinger	Bellinger River	Bellingen Downstream	Jul 1984–Mar 2001	205437
Bellinger	Bellinger River	Bellingen Bridge	July1996–ongoing	205442
Bellinger	Bellinger River	Thora	Jul 1993-May 2008	205002
Bellinger	Kalang River	Urunga	Sep 1993–ongoing	205407
Bellinger	Kalang River	Upstream Newry Island	Sep 1989–ongoing	205458
Bellinger	Kalang River	Kooroowi	May 1985–ongoing	205440
Bellinger	Deep Creek	Deep Creek	Apr 2002–ongoing	205485
Bellinger	Nambucca River	Stuarts Island	Mar 1993–Dec 2012	205465
Bellinger	Nambucca River	Stuarts Island Downstream	Nov 2008–ongoing	205466
Bellinger	Nambucca River	Macksville	May 1983–ongoing	205416
Bellinger	Taylors Arm	Utungun	Oct 1991–ongoing	205414
Bellinger	Nambucca River	Bowraville Downstream	Dec 2008–ongoing	205425
Bellinger	Warrell Creek	Warrell Creek	Feb 2010–ongoing	205490
Macleay	Boringalla Creek	Boringalla Creek	Apr 2001–ongoing	206450
Macleay	Macleay River	South West Rocks	Apr 1988–ongoing	206456
Macleay	Korogoro Creek	Hat Head	Feb 2004–ongoing	206465

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Coastal region	River/creek	Location	Period of data	AWRC*
Macleay	Saltwater Lagoon	Saltwater Lagoon	Jul 2004–ongoing	206460
Macleay	Andersons Inlet	Middle Island	Mar 1996–Dec 2006	206471
Macleay	Macleay River	Smithtown	Feb 1986–ongoing	206406
Macleay	Macleay River	Kempsey	Jul 1983–ongoing	206402
Macleay	Macleay River	Euroka Upstream	Jul 1990–Dec 2011	206458
Macleay	Macleay River	Aldavilla Downstream	Dec 2011–ongoing	206459
Hastings	Maria River	Connection Creek	Sep 1994–Oct 1995	207429
Hastings	Maria River	Green Valley	Dec 1992–ongoing	207406
Hastings	Wilsons River	Telegraph Point	Sep 1989–ongoing	207415
Hastings	Hastings River	Settlement Point	Feb 1986–ongoing	207418
Hastings	Killick Creek	Crescent Head	Apr 2001–ongoing	207452
Hastings	Hastings River	Dennis Bridge Downstream	May 1994–ongoing	207444
Hastings	Hastings River	Dennis Bridge Upstream	Mar 1994–Dec 2007	207443
Hastings	Hastings River	Wauchope Railway Bridge	Oct 1985–ongoing	207401
Hastings	Kooloonbung Creek	Kooloonbung	Dec 1985–Jan 1987	207421
Hastings	Hastings River	Lake Innes	Aug 1993–Sep 1994	207442
Hastings	Lake Cathie	Lake Cathie	Aug 1992–ongoing	207441
Camden Haven	Camden Haven River	North Haven	Oct 1986–ongoing	207423
Camden Haven	Stingray Creek	West Haven	Oct 1986–ongoing	207437
Camden Haven	Camden Haven River	Laurieton	Aug 1990–ongoing	207425
Camden Haven	Camden Haven River	Logans Crossing	Sep 1989–ongoing	207428
Camden Haven	Queens Lake	Lakewood	Dec 2001–ongoing	207475
Camden Haven	Watson Taylors Lake	Watson Taylors Lake	Dec 2001–ongoing	207480
Manning	Dingo Creek	Ashlea Bridge Downstream	Apr 2011–ongoing	208436
Manning	Manning River	Harrington	Jul 1987–ongoing	208425
Manning	Manning River	Croki	Jan 1992–ongoing	208404
Manning	Manning River	Dumaresq Island	Aug 2001–ongoing	208430
Manning	Manning River	Taree	Sep 1985–ongoing	208410
Manning	Manning River	Wingham	Jul 1989–ongoing	208400
Manning	Manning River	Killawarra	Aug 1991–Dec 1999	208004
Manning	Manning River	Mount George	Jan 1992–ongoing	208440
Manning	Scotts Creek	Scotts Creek	Oct 1998–Oct 1999	208423U
Manning	Dingo Creek	Munyaree Flat	May 1991–Oct 2009	208019
Manning	Manning River	Farquhar Inlet	Aug 1987–ongoing	208415
Karuah	Wallamba River	Tuncurry	Aug 1985–Oct 2016	209401
Karuah	Wallamba River	Tuncurry Downstream	Jun 2016-ongoing	209401D
Karuah	Wallamba River	Tuncurry Wetlands	Mar 2001–Nov 2017	209451
Karuah	Wallamba River	Wallamba Broadwater	Jul 1997–Aug 1998	209449
Karuah	Coolongolook River	Peach Tree Point	Jul 1997–Mar 1999	209448
Karuah	Wallamba River	Nabiac	Oct 1985–ongoing	209404
Karuah	Wallis Lake	Darawakh Swamp	Jul 2008–Oct 2009	209405
Karuah	Wallis Lake	Booti Island	Jul 1997–Aug 1998	209447
Karuah	Wallis Lake	Tiona	Aug 1985–Jul 2015	209403
Karuah	Wallis Lake	Pacific Palms Wharf	Oct 2013–ongoing	209406
Karuah	Smith Lake	Tarbuck Bay	May 1996–ongoing	209465
Karuah	Smith Lake	Pacific Palms	May 1995–May 1996	209466
Karuah	Myall River	Markwell	Nov 2003–Nov 2009	561104

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Coastal region	River/creek	Location	Period of data	AWRC*
Karuah	Myall River	Bulahdelah	Oct 1985–ongoing	209460
Karuah	Myall Lake	Mayers Point	Jul 1996–Mar 1998	209445
Karuah	Myall Lake	Bombah Broadwater	Jul 1996–Mar 1998	209475D
Karuah	Myall Lake	Bombah Point	Jul 2001–ongoing	209475
Karuah	Myall River	Monkey Jacket	Jul 1996–Mar 1998	209446
Karuah	Myall River	Tea Gardens upstream	Mar 1995–May 1995	209480U
Karuah	Myall River	Tea Gardens	Dec 2008–ongoing	209480
Karuah	Karuah River	Karuah	Dec 2009–ongoing	209485
Karuah	Karuah River	Mallabula Point	July 1992–ongoing	209461
Hunter	Hunter River	Stockton Bridge	Dec 1984–ongoing	210456
Hunter	Iron Bark Creek	Upstream of Flood Gate	May 1998–Oct 2004	210437U
Hunter	Hunter River	Hexham Bridge	Jun 1985–ongoing	210448
Hunter	Williams River	Raymond Terrace	Dec 1984–ongoing	210452
Hunter	Williams River	Seaham	Dec 1995–ongoing	210462
Hunter	Hunter River	Green Rocks	Dec 1984–ongoing	210432
Hunter	Paterson River	Hinton Bridge	Mar 1985–ongoing	210410
Hunter	Paterson River	Dunmore	Nov 1984–ongoing	210409
Hunter	Paterson River	Paterson Railway Bridge	Dec 1984–ongoing	210406
Hunter	Paterson River	Gostwyck	Oct 1988–ongoing	210402
Hunter	Hunter River	Morpeth	Apr 1985–ongoing	210430
Hunter	Hunter River	McKimms Corner	May 1986–ongoing	210455
Hunter	Wallis Creek	Wallis Creek Downstream	Mar 1985–ongoing	210457
Hunter	Wallis Creek	Wallis Creek Upstream	Apr 1990–ongoing	210428
Hunter	Wallis Creek	Wallis Creek	Sep 1997–Oct 1998	210428U
Hunter	Wallis Creek	Louth Park	Dec 1984–ongoing	210453
Hunter	Hunter River	Belmore Bridge	Jun 1992–ongoing	210458
Hunter	Hunter River	Bolwarra Downstream	Mar 1986–ongoing	210451
Hunter	Hunter River	Bolwarra Upstream	May 1986–Sep 2019	210459
Hunter	Hunter River	Shortland Wetland Centre	Mar 1999–Jul 2000	210483
Hunter	Hunter River	Oakhampton Railway Bridge	Dec 1995–ongoing	210475
Macquarie-Tuggerah Lakes	Lake Macquarie	Marmong Point	Jun 1986–ongoing	211460
Macquarie-Tuggerah Lakes	Cockle Creek	Cockle Railway Station	Feb 1985–ongoing	211455
Macquarie-Tuggerah Lakes	Cockle Creek	Barnsley Vale	Feb 1986–ongoing	211450
Macquarie-Tuggerah Lakes	Lake Macquarie	Belmont	May 1986–ongoing	211461
Macquarie-Tuggerah Lakes	Lake Macquarie	Swansea Channel	Mar 1996–ongoing	211462
Macquarie-Tuggerah Lakes	Dora Creek	Kalang Road	Sep 1993–ongoing	211475
Macquarie-Tuggerah Lakes	Dora Creek	Cooranbong	Jul 1990–ongoing	211470
Macquarie-Tuggerah Lakes	Stockton Creek	Morisset	Dec 1984–ongoing	211480
Macquarie-Tuggerah Lakes	Lake Macquarie	Wyee Point	Apr 2023-ongoing	2114112
Macquarie-Tuggerah Lakes	Wallarah Creek	Wallarah Creek Bridge	May 1994–ongoing	211420
Macquarie-Tuggerah Lakes	Tuggerah Lake	Toukley	Feb 1985–ongoing	211401
Macquarie-Tuggerah Lakes	Wyong River	Wyong Weir Upstream	Jul 1990–ongoing	211417

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Coastal region	River/creek	Location	Period of data	AWRC*
Macquarie-Tuggerah Lakes	Berkeley Creek	Berkeley Vale	Jul 1988–Feb 1994	211411
Macquarie-Tuggerah Lakes	Tuggerah Lake	Killarney Vale	Feb 1985–Sep 1991	211402
Macquarie-Tuggerah Lakes	Chittaway Creek	Old Chittaway Road	Sep 1994–Apr 1996	211413
Macquarie-Tuggerah Lakes	Chittaway Creek	Turpentine	Jul 1990–May 1993	211414
Macquarie-Tuggerah Lakes	Ourimbah Creek	Lees Bridge	May 1993–ongoing	211425
Macquarie-Tuggerah Lakes	Tuggerah Lake	Long Jetty	Sep 1991–ongoing	211418
Macquarie-Tuggerah Lakes	Tumbi Umbi Creek	Tumbi Umbi	Apr 1994–ongoing	211419
Hawkesbury	Narara Creek	Manns Road	Mar 1996–ongoing	211435
Hawkesbury	Wamberal Lagoon	Wamberal Lagoon	Jul 1993–ongoing	212450
Hawkesbury	Terrigal Lagoon	Terrigal Bridge	Jun 1993–ongoing	212455
Hawkesbury	Avoca Lagoon	Avoca Lagoon	Jun 1993–ongoing	212452
Hawkesbury	Cockrone Lake	Cockrone Lake	Jun 1993–ongoing	212453
Hawkesbury	Worthing Ave Creek	Erina Bridge	Feb 1996–Aug 2007	212436U
Hawkesbury	Worthing Ave Creek	Erina	Aug 2007–ongoing	212436
Hawkesbury	Erina Creek	Punt Bridge	Mar 1994–ongoing	212433
Hawkesbury	Narara Creek	Narara A/C	Jul 1988–Mar 1995	212432
Hawkesbury	Brisbane Water	Wharf Street	Aug 1985–May 1995	212421D
Hawkesbury	Brisbane Water	Ettalong	Apr 1986–ongoing	212423
Hawkesbury	Brisbane Water	Koolewong	Aug 1985–Nov 2016	212422
Hawkesbury	Brisbane Water	Koolewong 2	Jul 2016–ongoing	2124301
Hawkesbury	Hawkesbury River	Little Patonga	Jun 1986–Sep 1993	212430
Hawkesbury	Hawkesbury River	Gentlemans Halt	Oct 1986–Apr 1996	212431D
Hawkesbury	Hawkesbury River	Gunderman	Oct 1986–Jan 1992	212429U
Hawkesbury	Hawkesbury River	Spencer	Apr 1992–ongoing	212431
Hawkesbury	Hawkesbury River	Gunderman Caravan Park	Apr 1992–ongoing	212429
Hawkesbury	Hawkesbury River	Wisemans Ferry	Jun 2010–ongoing	212460
Hawkesbury	Hawkesbury River	Webbs Creek	Jun 1981–ongoing	212408
Hawkesbury	Hawkesbury River	Lower Portland	Feb 1988–Dec 1997	212407D
Hawkesbury	Hawkesbury River	Colo Junction	May 1998–ongoing	212407
Hawkesbury	Hawkesbury River	Sackville Upstream	July 1991–Aug 2011	212465
Hawkesbury	Hawkesbury River	Sackville	May1980–ongoing	212406
Hawkesbury	Hawkesbury River	Sackville Downstream	July 1991–Aug 2012	212438
Hawkesbury	Hawkesbury River	Ebenezer	Sep 1989–ongoing	212427
Hawkesbury	Hawkesbury River	Windsor	Sep 1987–ongoing	212426

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Coastal region	River/creek	Location	Period of data	AWRC*
Hawkesbury	Hawkesbury River	Freemans Reach	Apr 1980–ongoing	212410
Hawkesbury	Nepean River	Castlereagh	Nov 1981–ongoing	212404
Hawkesbury	Berowra Creek	Berowra Point	May 1995–Sep 1995	212488
Hawkesbury	Berowra Creek	Oaky Point	May 1995–Sep 1995	2124121
Hawkesbury	Berowra Creek	Berowra Waters Ferry	May 1995–Sep 1995	212487
Hawkesbury	Berowra Creek	Berowra Marina	May 1995–Sep 1995	212489
Hawkesbury	Berowra Creek	Crosslands Reserve	May 1995–Sep 1995	2124122
Sydney Coastal	Narrabeen Lagoon	Narrabeen Bridge	Aug 1994–ongoing	213422
Sydney Coastal	Narrabeen Lagoon	Middle Creek	May 1992–Jan 1994	213421D
Sydney Coastal	Narrabeen Lagoon	Narrabeen Caravan Park	Aug 1986–May 2017	213408
Sydney Coastal	Narrabeen Lagoon	Ocean Street Bridge	May 2017–ongoing	213408D
Sydney Coastal	Narrabeen Lagoon	Middle Creek Bridge	Apr 1995–ongoing	213421
Sydney Coastal	Narrabeen Lagoon	Narrabeen Creek	May 1998–Sep 2010	2134111
Sydney Coastal	Dee Why Lagoon	Dee Why	Mar 1996–ongoing	213424
Sydney Coastal	Curl Curl Lagoon	Curl Curl	Aug 1991–ongoing	213426
Sydney Coastal	Manly Lagoon	Queenscliff Bridge	Sep 1990–ongoing	213414
Sydney Coastal	Manly Lagoon	Riverview Parade	Mar 1990–ongoing	213413
Sydney Coastal	Manly Creek	Manly Dam	Jun 1990–ongoing	213412
Sydney Coastal	Haslams Creek	Haslams Creek	Jan 1992–Oct 1995	213475
Sydney Coastal	Lane Cove River	Fullers Bridge	Apr 2016–ongoing	213476
Sydney Coastal	Parramatta River	Silverwater Bridge	Apr 2012–ongoing	213435
Sydney Coastal	Cooks River	Canterbury Road	Sep 1991–ongoing	213411
Sydney Coastal	Cooks River	Tempe Bridge	Aug 1991–ongoing	213415
Sydney Coastal	Cooks River	Illawarra Road Bridge	Jul 2001–ongoing	213420
Sydney Coastal	Georges River	Como Bridge	Feb 2001–ongoing	213425
Sydney Coastal	Georges River	Picnic Point Downstream	Mar 1992–ongoing	213410D
Sydney Coastal	Georges River	Milperra	Oct 1980–ongoing	213405
Sydney Coastal	Georges River	Kelso Creek Downstream	Sep 1996–ongoing	213430
Sydney Coastal	Georges River	Kelso Creek Upstream	Sep 1996–ongoing	213430
Sydney Coastal	Prospect Creek	Lansdowne Bridge	Nov 1987–ongoing	213402
Sydney Coastal	Georges River	Lansvale	Aug 1980–ongoing	213401
Sydney Coastal	Cabramatta Creek	Irelands Bridge	Mar 1988–ongoing	213407
Sydney Coastal	Georges River	Scrivener Street	Oct 1980–ongoing	213404
Sydney Coastal	Georges River	Liverpool Weir	Jul 1980–ongoing	213400
Sydney Coastal	Woronora River	Woronora Bridge	Apr 1998–ongoing	213482
Wollongong Coastal	Towradgi Creek	Towradgi Creek Upstream	Apr 1992–ongoing	214477
Wollongong Coastal	Towradgi Creek	Towradgi Creek Downstream	Oct 2006–ongoing	214475
Wollongong Coastal	Hewitts Creek	Hewitts Creek Downstream	Oct 2001–ongoing	214411
Wollongong Coastal	Hewitts Creek	Hewitts Creek Upstream	Oct 2001–ongoing	214410
Wollongong Coastal	Hewitts Creek	Hewitts Creek Entrance	May 2005–ongoing	214408
Wollongong Coastal	Cabbage Tree Creek	Balgownie Road	Nov 2002–ongoing	214409
Wollongong Coastal	Cabbage Tree Creek	Cabbage Tree Creek Downstream	Aug 1995–ongoing	214406

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Coastal region	River/creek	Location	Period of data	AWRC*
Wollongong Coastal	Cabbage Tree Creek	Cabbage Tree Creek Upstream	Jul 2003–ongoing	214405
Wollongong Coastal	Bellambi Lake	Bellambi	Oct 2012-ongoing	214488
Wollongong Coastal	Fairy Creek	Fairy Creek Downstream	Oct 1985–ongoing	214404
Wollongong Coastal	Fairy Creek	Fairy Creek Upstream	Dec 2005–ongoing	214403
Wollongong Coastal	Byarong Creek	Byarong Creek	Jul 1993–ongoing	214420
Wollongong Coastal	Byarong Creek	Koloona Avenue Downstream	Jul 2001–ongoing	214426
Wollongong Coastal	Byarong Creek	Koloona Avenue Upstream	Jul 2001–ongoing	214425
Wollongong Coastal	American Creek	Blackmans Parade Downstream	Oct 2001–ongoing	214431
Wollongong Coastal	American Creek	Blackmans Parade Upstream	May 2003–ongoing	214430
Wollongong Coastal	Mullet Creek	Mullet Creek	Apr 1985–ongoing	214400
Wollongong Coastal	Lake Illawarra	Koonawarra Bay	Mar 1994–ongoing	214440
Wollongong Coastal	Lake Illawarra	Cudgeree Bay	Jan 1991–Nov 2020	214416
Wollongong Coastal	Lake Illawarra	Cudgeree Bay 2	Aug 2020 –ongoing	2144101
Wollongong Coastal	Lake Illawarra	Lake Illawarra Entrance	Jul 1991–Apr 2023	214417
Wollongong Coastal	Lake Illawarra	Lake Illawarra at Windang Bridge	Apr 2023–ongoing	2144107
Wollongong Coastal	Macquarie Rivulet	Princes Highway	Dec 1984–ongoing	214402
Wollongong Coastal	Minnamurra River	Minnamurra	Mar 2002–ongoing	214442
Wollongong Coastal	Lake Illawarra	Kanahooka Bay	Dec 1987–Jan 1990	214415
Wollongong Coastal	Little Lake	Little Lake	May 1992–Oct 2014	214466
Wollongong Coastal	Little Lake	Little Lake Entrance	May 2014–ongoing	214467
Wollongong Coastal	Werri Lagoon	Werri Lagoon	Aug 2002–ongoing	214445
Shoalhaven	Shoalhaven River	Shoalhaven Heads	Feb 1991–ongoing	215470
Shoalhaven	Shoalhaven River	Wharf Road	Jan 1990–Mar 2002	215425
Shoalhaven	Shoalhaven River	Hay Street	Jan 2002–ongoing	215415
Shoalhaven	Shoalhaven River	Nowra Bridge	Aug 1990–ongoing	215411
Shoalhaven	Shoalhaven River	Grady's	Feb 2006–Jan 2010	215452
Shoalhaven	Shoalhaven River	Grady's Caravan Park	Oct 2010–ongoing	215430
Shoalhaven	Crookhaven River	Greenwell Point	Dec1988–ongoing	215417
Shoalhaven	Shoalhaven River	Terara	Aug 2001–ongoing	215420

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Coastal region	River/creek	Location	Period of data	AWRC*
Shoalhaven	Wollumboola Lake	Wollumboola	Jul 1991–ongoing	215454
Shoalhaven	Crooked River	Gerroa	Feb 1999–ongoing	215410
Clyde River-Jervis Bay	Currarong Creek	Currarong Creek	Oct 1995–ongoing	216405
Clyde River-Jervis Bay	Sussex Inlet	Sussex Inlet	Nov 2000–ongoing	216412
Clyde River-Jervis Bay	St. Georges Basin	Island Point	Jul 1991–ongoing	216415
Clyde River-Jervis Bay	Lake Conjola	Lake Conjola	Sep 1992–Jul 2017	216420
Clyde River-Jervis Bay	Lake Conjola	Lake Conjola Downstream	Sep 2016–ongoing	216420D
Clyde River-Jervis Bay	Narrawallee Inlet	Narrawallee	Aug 1993–ongoing	216430
Clyde River-Jervis Bay	Swan Lake	Swan Lake	Jan 2000–ongoing	216425
Clyde River-Jervis Bay	Burrill Lake	Burrill Lake Bridge	Nov 1991–ongoing	216435
Clyde River-Jervis Bay	Lake Tabourie	Lake Tabourie	Sep 1992–ongoing	216440
Clyde River-Jervis Bay	Durras Lake	Durras Lake	Nov 2000–ongoing	216445
Clyde River-Jervis Bay	Clyde River	Nelligen	Apr 1994–ongoing	216453
Clyde River-Jervis Bay	Tomaga River	George Bass Drive	Aug 1996–ongoing	216455
Moruya	Moruya River	Quarry Wharf	May 1989–Aug 1995	217406
Moruya	Moruya River	Moruya Bridge	May 1997–ongoing	217410
Moruya	Moruya River	Moruya Hospital	Oct 1990–ongoing	217402
Tuross	Coila Lake	Coila Lake	Jan 1996–ongoing	218405
Tuross	Trunketabella Creek	Trunketabella Bridge	May 1994–Mar 1998	218412
Tuross	Tuross River	Tuross Head	May 1994–ongoing	218410
Tuross	Wagonga River	Narooma Public Wharf	Aug 1996–Aug 2008	218420
Tuross	Wagonga Inlet	Barlows Bay	Aug 1996–ongoing	218415
Bega	Wallaga Lake	Wallaga Lake	Aug 1993–Jul 2007	219404
Bega	Wallaga Lake	Meads Bay	Feb 1999–Feb 2000	219407
Bega	Wallaga Lake	Regatta Point	Oct 1993–ongoing	219405
Bega	Bega River	Bega River	Nov 2000–ongoing	219410
Towamba	Back Lagoon	Back Lagoon	Feb 2009–ongoing	219415
Towamba	Merimbula Lake	Merimbula Wharf	Mar 1991–ongoing	220410
Towamba	Merimbula Lake	Merimbula Lake	May 1991–ongoing	220405
Towamba	Curalo Lagoon	Curalo Lagoon	Mar 1996–Mar 1998	220420U
Towamba	Lake Curalo	Lake Curalo	Jun 2007–ongoing	220420
Towamba	Wonboyn River	Wonboyn River	Aug 1997–Sep 1998	220480
Towamba	Pambula Lake	Pambula Lake	Mar 1991–ongoing	220415
Towamba	Wonboyn Lake	Agnew Wharf	Aug 1997–Aug 2018	220425
Towamba	Wonboyn Lake	Wonboyn Lake	Oct 2018–ongoing	220452

* AWRC station numbers are assigned following conventions established by the Australian Water Resources Council in 1975.

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Table A2 Discrete historical data

River region name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Bellinger	Bellinger North Arm	Backwater Creek	07-Apr-1962	11-Apr-1962	205409	Yes
Bellinger	Backwater Creek	Backwater Creek	10-Jul-1962	11-Jul-1962	N/A	Yes
Bellinger	Bellinger River	Bellingen Bridge	21-Jan-1959	20-Feb-1985	205400	Yes
Bellinger	Bellinger River	Backwater Raleigh	07-Feb-1981	25-Jan-1989	205412	Yes
Bellinger	Nambucca River	Bowraville	01-Jan-1890	01-May-1977	205006	Yes
Bellinger	Coffs Creek	Coffs Harbour	08-Apr-1962	19-Dec-1988	205439	Yes
Bellinger	Bellinger River	Congarinni Bridge	08-Jan-1974	06-Feb-1989	205415	Yes
Bellinger	Bellinger River	Dairy Factory Raleigh	18-Feb-1959	24-Jan-1989	205402	Yes
Bellinger	Bellinger River	Fernmount PO	08-Apr-1962	24-Jan-1989	205401	Yes
Bellinger	Nambucca River	Franks Wharf	08-May-1980	29-Jan-1989	205414	Yes
Bellinger	Bellinger South Arm	Gauge 9	08-Apr-1962	12-Jul-1962	N/A	Yes
Bellinger	Nambucca River	Golf Club Nambucca Heads	01-Jan-1890	01-May-1977	N/A	Yes
Bellinger	Gumma Gumma Creek	Gumma Road	10-Jul-1985	09-Apr-1988	205431	Yes
Bellinger	Nambucca River	Gumma Gumma Ck Jn, 0.7km U\S	01-Jan-1890	01-May-1977	N/A	No
Bellinger	Nambucca River	Hacienda Motor Inn	09-May-1980	21-Feb-1989	205433	Yes
Bellinger	Taylors Arm	Kings Point	09-May-1980	12-Apr-1988	205436	Yes
Bellinger	Nambucca River	Lanes Bridge 5.2km D\S	01-Jan-1890	01-May-1977	N/A	No
Bellinger	Nambucca River	Lower Nambucca, Gauge 10	09-May-1980	23-May-1981	N/A	No
Bellinger	Nambucca River	Macksville	01-Mar-1894	21-Dec-1988	205416	Yes
Bellinger	Stewarts River	Midindi	10-Jul-1985	10-Jul-1985	N/A	No
Bellinger	Bellinger	North Arm Mylestom	07-Apr-1962	19-Dec-1988	205405	Yes
Bellinger	Nambucca River	Nambucca	10-May-1980	11-Oct-1982	N/A	No
Bellinger	Nambucca River	Nambucca Marine	09-Jul-1985	10-Jul-1985	205432	Yes
Bellinger	Nambucca River	Nth of Hacienda Motor Inn	01-Jan-1890	01-May-1977	N/A	No
Bellinger	Bellinger River	Paxton Raleigh	09-May-1980	03-Apr-1981	N/A	Yes
Bellinger	Nambucca River	Pacific Highway at Watt Ck	01-Jan-1890	01-May-1977	N/A	No
Bellinger	Bellinger North Arm	Repton Railway Bridge	17-Feb-1959	26-Jan-1986	205403	Yes
Bellinger	Bellinger North Arm	Repton	08-Apr-1962	27-Jan-1986	205404	No
Bellinger	Nambucca River	Showground	12-Sep-1979	10-Jul-1985	205434	Yes
Bellinger	Nambucca River	Teagues Creek	10-Apr-1985	10-Jul-1985	205418	Yes
Bellinger	Nambucca River	Tewinga School, 1.8km D/S	01-Jun-1950	01-Mar-1974	N/A	No
Bellinger	Nambucca River	Upper Tewinga	09-May-1980	05-Apr-1988	205419	Yes

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River basin name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Bellinger	Kalang River	Urunga Bridge	10-Jul-1962	25-Jan-1989	205407	Yes
Bellinger	Nambucca River	Usshers Fruit Stall	03-May-1985	10-Jul-1985	205417	Yes
Bellinger	Taylors Arm	Utungun	01-Jan-1890	01-May-1977	N/A	No
Bellinger	Kalang River	Urunga Boatshed	17-Apr-1962	27-Oct-1985	205406	Yes
Bellinger	Nambucca River	Watt Creek	09-May-1980	23-May-1981	205430	Yes
Bellinger	Woolgoolga Creek	Lakeside Caravan Park	15-Jul-1982	31-Jul-1988	205441	Yes
Bellinger	Backwater	Yellow Rock	10-Jul-1962	12-Jul-1962	N/A	No
Bellinger	Bellinger North Arm	Yellow Rock	18-Feb-1959	10-Jul-1962	205410	Yes
Clarence	Clarence River	Baryulgil	21-Feb-1954	21-Feb-1954	204900	Yes
Clarence	Clarence River	Briner Bridge	21-Jul-1965	21-Jan-1967	204407	Yes
Clarence	Clarence River	Bultitude	21-Jul-1965	12-May-1980	204407	Yes
Clarence	Clarence River	Brushgrove	01-Jan-1890	09-May-1980	204406	Yes
Clarence	Clarence River	Buccarumbi	15-Jun-1950	21-Feb-1954	204005	Yes
Clarence	Clarence River	Chaseling	21-Jul-1965	21-Mar-1967	204423	Yes
Clarence	Clarence River	Chatsworth	17-Feb-1957	11-Apr-1962	204411	No
Clarence	Clarence River	Copmanhurst	04-Feb-1890	20-Feb-1956	204903	Yes
Clarence	Orara River	Coutts Crossing	01-Mar-1946	31-Aug-1959	N/A	Yes
Clarence	Orara River	Coramba	01-Jan-1954	01-Jan-1954	N/A	Yes
Clarence	Orara River	Glenreagh	22-Jul-1950	21-Feb-1954	204906	Yes
Clarence	Clarence River	Grafton (North Street)	19-Feb-1956	10-May-1980	204401	Yes
Clarence	Coldstream River	Coldstream	24-Jan-1959	27-Jan-1959	204429	No
Clarence	Clarence River	Grafton (Prince Street)	01-Jan-1841	15-Jan-1968	204400	Yes
Clarence	Backwater	Great Marlow	01-Jan-1946	31-Jan-1967	204432	Yes
Clarence	Clarence River	Iluka	01-Jan-1945	29-Jun-1956	N/A	Yes
Clarence	Clarence River	Jackadgery	15-Jun-1950	27-Jun-1950	204004	Yes
Clarence	Clarence River	Lawrence	01-Jan-1946	02-Apr-1959	204409	Yes
Clarence	Clarence River	Maclean	08-Mar-1890	11-May-1980	204410	Yes
Clarence	Clarence River	Newbold	01-Mar-1948	30-Jun-1950	204007	Yes
Clarence	Clarence River	Nymboida	18-Jun-1950	10-Feb-1956	204001	Yes
Clarence	Clarence River	Palmers Island	14-Feb-1957	13-May-1980	204412	Yes
Clarence	Clarence River	Palmers Channel	14-Feb-1957	11-Apr-1962	204426	No
Clarence	Clarence River	Quarry	22-Jan-1959	17-Nov-1959	N/A	Yes
Clarence	Clarence River	Shark Creek Bridge	21-Jul-1965	13-May-1980	204425	Yes
Clarence	Clarence River	South Grafton	23-Mar-1953	14-Apr-1962	204402	Yes

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River basin name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Clarence	Clarence River	Sheathers	21-Jul-1965	21-Mar-1967	204413	No
Clarence	Clarence River	South Arm	22-Jan-1959	21-Feb-1959	204407	Yes
Clarence	Sportsmans Creek	No. 17	22-Jan-1959	16-Nov-1959	204408	Yes
Clarence	Clarence River	South Grafton Railway Bridge	23-Mar-1953	14-Apr-1962	204402	Yes
Clarence	Clarence River	South Grafton Common	08-Apr-1962	11-May-1980	204000	Yes
Clarence	Shark Creek	Swamp	04-Feb-1890	10-Feb-1956	204425	No
Clarence	Clarence River	Tabulam	04-Feb-1890	10-Feb-1956	204002	Yes
Clarence	Clarence River	Towgan Grange	09-Feb-1956	10-Feb-1956	204432	Yes
Clarence	Coldstream River	Tucabia	22-Feb-1953	14-Apr-1962	204403	Yes
Clarence	Clarence River	Ulmarra	15-Jun-1948	15-Nov-1959	204427	Yes
Clarence	Clarence River	Yamba	12-Jun-1945	01-Mar-1946	204454	No
Hunter	Hunter River	Belmore Bridge	08-Mar-1893	05-Jun-1974	210047	Yes
Hunter	Wollombi Creek	Bulga	13-Feb-1955	20-May-1962	210028	Yes
Hunter	Hunter River	Cummins Dam D/S	19-Feb-1962	14-Jun-1964	210400	Yes
Hunter	Hunter River	Cummins Dam U/S	11-Jun-1964	21-Mar-1978	210425	Yes
Hunter	Williams River	Dungog	02-Dec-1961	11-Jun-1964	N/A	Yes
Hunter	Paterson River	Dunmore Bridge	10-Dec-1920	20-Jan-1978	210409	No
Hunter	Hunter River	Duckenfield	19-Feb-1962	04-Feb-1971	210412	Yes
Hunter	Hunter River	East Maitland No. 1	26-Feb-1955	03-Mar-1955	N/A	No
Hunter	Hunter River	Goulbourne Grove	14-Jan-1961	29-Mar-1963	210405	Yes
Hunter	Hunter River	Green Rocks	01-Sep-1914	14-Jun-1964	210432	Yes
Hunter	Paterson River	Gostwyck	01-Jan-1990	01-Jan-1991	N/A	No
Hunter	Wollombi Creek	Hanging Rock	29-Oct-1959	31-May-1962	210051	Yes
Hunter	Tarro	Hexham Swamps	12-Sep-1960	29-Jun-1962	N/A	Yes
Hunter	Paterson River	Hinton Bridge	01-Sep-1914	15-Jan-1974	210410	Yes
Hunter	Allyn	Halton	01-Feb-1951	31-Jul-1965	N/A	Yes
Hunter	Hunter River	Hinton Hill	09-Mar-1967	10-Mar-1967	N/A	Yes
Hunter	Fishery Creek	Kurri Kurri	01-Nov-1959	31-May-1962	210053	Yes
Hunter	Hunter River	Liddesdale	07-Aug-1967	14-Jan-1968	N/A	Yes
Hunter	Paterson River	Lostock	08-Feb-1951	12-Apr-1962	N/A	Yes
Hunter	Hunter River	Louth Park	27-Jun-1949	05-Jun-1962	210454	Yes
Hunter	Hunter River	Macreas Hollow	27-Aug-1949	27-Oct-1955	N/A	Yes
Hunter	Hunter River	Millers Forest	25-Jan-1955	21-Mar-1978	210415	Yes
Hunter	Wallis Creek	Mulbring	01-Feb-1955	30-Apr-1960	N/A	Yes

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River basin name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Hunter	Hunter River	Morpeth	19-Jun-1840	23-Jan-1974	210430	Yes
Hunter	Paterson River	Mount River	01-Apr-1962	30-Jun-1964	N/A	Yes
Hunter	Hunter River	Oakhampton Power Station	25-Jan-1972	26-Jan-1972	210426	Yes
Hunter	Hunter River	Oakhampton Wards	06-Aug-1967	08-Nov-1984	210427	Yes
Hunter	Paterson River	Paterson	22-Jul-1965	07-Sep-1967	210406	Yes
Hunter	Wollombi Creek	Porters Hollow	19-Feb-1962	17-May-1962	210404	Yes
Hunter	Wollombi Creek	Payne's Crossing	29-Oct-1959	30-Apr-1960	210048	Yes
Hunter	Hunter River	Raymond Terrace	17-Jun-1930	30-Sep-1987	210419	Yes
Hunter	Wallis Creek	Richmond Vale	01-May-1962	31-May-1962	N/A	Yes
Hunter	Paterson River	Scotts Dam	01-Mar-1956	18-Oct-1985	210439	Yes
Hunter	Hunter River	Sandgate	20-Jun-1950	02-Mar-1956	210423	Yes
Hunter	Williams River	Seaham	19-Mar-1963	24-May-1981	210418	Yes
Hunter	Hunter River	Singleton	12-Feb-1913	15-Apr-1957	210001	Yes
Hunter	Paterson River	Stradbroke	09-Mar-1967	12-Dec-1982	210408	Yes
Hunter	Williams River	Tilligra	01-Apr-1931	31-May-1963	N/A	Yes
Hunter	Hunter River	Tomago	08-Jun-1950	18-Jan-1968	210422	Yes
Hunter	Wallis Creek	Trappaud Bridge	29-Aug-1952	30-May-1962	210444	Yes
Hunter	Wallis Creek	Victoria Bridge	27-Jun-1949	26-Jan-1972	210443	Yes
Hunter	Hunter River	Walka Pumping Station	03-Jan-1950	14-Jun-1964	210401	Yes
Hunter	Hunter River	West Maitland Railway Station	13-Aug-1952	20-Aug-1952	N/A	Yes
Hunter	Louth Park	West Maitland Railway Station	14-Aug-1952	20-Aug-1952	N/A	Yes
Hunter	Hunter River	Wallis Creek	08-Dec-1950	21-Feb-1962	N/A	Yes
Hunter	Paterson River	Woodville	01-Jan-1971	17-Feb-1972	N/A	No
Hunter	Wollombi Creek	Warkworth	05-Aug-1952	30-Apr-1960	210004	Yes
Hunter	Hunter River	Wyburns	01-Mar-1955	16-May-1962	210403	Yes
Hastings	Hastings River	Bains Bridge	12-Jan-1968	07-Oct-1988	207400	Yes
Hastings	Hastings River	Blackmans Point North	09-May-1950	08-Apr-1988	207406	No
Hastings	Maria River	D/S Pipers Creek Junction	08-May-1980	09-Apr-1988	207414	Yes
Hastings	Camden Haven River	Dunbogan	10-May-1980	05-May-1985	N/A	Yes
Hastings	Hastings River	Ellenborough	99-Mar-1946	99-May-1980	207004	Yes
Hastings	Hastings River	Fernbank Creek	14-Jun-1967	08-Apr-1988	207411	Yes
Hastings	Camden Haven River	Forest Oaks	04-Apr-1988	08-Apr-1988	N/A	Yes
Hastings	Maria River	Hacks Ferry	13-Jan-1968	11-May-1980	207413	Yes
Hastings	Maria River	Green Valley	11-Jun-1967	17-Mar-1979	207413	Yes

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River basin name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Hastings	Camden Haven River	Herons Creek	08-May-1980	11-Jul-1985	N/A	Yes
Hastings	Camden Haven River	Highway Herons Creek	08-May-1980	17-Apr-1988	N/A	Yes
Hastings	Camden Haven River	Kendall Road Bridge	01-Oct-1982	27-Mar-1989	N/A	Yes
Hastings	Hastings River	Kings Creek Mouth	13-Jan-1968	07-Apr-1988	207402	Yes
Hastings	Hastings River	Kings Creek	13-Jan-1968	17-Jan-1986	207409	Yes
Hastings	Backwater	Kings Creek	08-Nov-1966	04-May-1985	207410	Yes
Hastings	Camden Haven River	Laurieton Wharf	10-May-1980	11-Dec-1982	N/A	Yes
Hastings	Hastings River	Narrowgut	13-Jun-1967	12-Apr-1988	207403	Yes
Hastings	Camden Haven River	North Haven	10-May-1980	11-Oct-1982	N/A	Yes
Hastings	Hastings River	Port Macquarie	09-May-1980	11-Jul-1985	207420	Yes
Hastings	Camden Haven River	Queens Lake	09-May-1980	18-Sep-1986	N/A	Yes
Hastings	Hastings River	Railway Bridge	12-Jan-1968	06-Jul-1988	207401	Yes
Hastings	Hastings River	Rawdon Island	14-Jun-1967	06-Jul-1988	207407	Yes
Hastings	Hastings River	Rawdon Is Bridge	10-Jul-1985	10-Jul-1985	207408	No
Hastings	Hastings River	Sancrox Bridge	13-Jan-1968	11-Oct-1982	207404	Yes
Hastings	Hastings River	Settlement Point	09-May-1980	11-Jul-1985	207418	Yes
Hastings	Camden Haven River	Stewarts	09-May-1980	21-Feb-1985	N/A	Yes
Hastings	Wilson River	Telegraph Point	13-Jan-1968	30-Jan-1989	207415	Yes
Hastings	Backwater	Telegraph Point Backwater	04-May-1985	11-Jul-1985	207416	Yes
Hastings	Hastings River	Tuffins Lane	13-Jan-1968	10-Jul-1985	207412	Yes
Hastings	Hastings River	U/S Dennis Highway Bridge	13-Jan-1968	07-Nov-1984	207405	Yes
Hawkesbury	Eastern Creek	Blacktown Road	11-Jun-1964	13-Jun-1964	212036	Yes
Hawkesbury	Hawkesbury River	Bushels Lagoon	11-Jun-1964	17-Nov-1969	N/A	Yes
Hawkesbury	Grose River	Burralow	01-Apr-1950	10-Mar-1976	212291	Yes
Hawkesbury	South Creek	Clarkes	11-Jun-1964	15-Jun-1964	212033	Yes
Hawkesbury	Hawkesbury River	Cliftonville Lodge	06-Aug-1986	23-Apr-1990	212418	Yes
Hawkesbury	Bakers Lagoon	Cornwallis	30-Aug-1963	07-Mar-1971	212411	Yes
Hawkesbury	Hawkesbury River	Cornwallis	31-Jan-1958	07-Mar-1971	212401	Yes
Hawkesbury	Erina Creek	Worthing Road	20-Mar-1983	18-Dec-1992	212412	Yes
Hawkesbury	Erina Creek	Freemans Reach	01-Jan-1900	31-Dec-1999	212410	No
Hawkesbury	Erina Creek	Lingi Street	28-Apr-1985	02-Apr-1989	212424	Yes
Hawkesbury	Hawkesbury River	Lower Portland (Dagyle)	19-Nov-1961	12-Feb-1992	212417	Yes
Hawkesbury	Hawkesbury River	Lower Hawkesbury	28-Jul-1984	22-Apr-1990	212419	Yes
Hawkesbury	Erina Creek	Merit Farm	22-Mar-1983	06-Aug-1990	212416	Yes

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River basin name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Hawkesbury	Hawkesbury River	Narara	01-Mar-1979	30-Jul-1984	212411	No
Hawkesbury	Hawkesbury River	North Richmond Bridge	18-Feb-1959	01-Sep-1963	212902	Yes
Hawkesbury	Hawkesbury River	North Richmond	10-Jun-1964	09-Mar-1976	212200	No
Hawkesbury	Nepean River	Penrith	15-Jun-1952	13-Jun-1964	212201	Yes
Hawkesbury	Hawkesbury River	Pitt Town Bottoms	19-Feb-1959	02-May-1963	212405	Yes
Hawkesbury	Hawkesbury River	Port Erringhi	21-Mar-1983	16-Apr-1989	212414	Yes
Hawkesbury	Hawkesbury River	Punt Road, Pitt Town	27-Apr-1989	05-Aug-1990	212409	Yes
Hawkesbury	Hawkesbury River	Sackville Ferry	19-Nov-1961	19-Nov-1969	212406	Yes
Hawkesbury	Colo River	Upper Colo	17-Jan-1951	09-Mar-1976	212290	Yes
Hawkesbury	Nepean River	Wallacia	05-Jun-1952	13-Jun-1964	212202	Yes
Hawkesbury	Hawkesbury River	Wisemans Ferry	12-Jun-1964	7-Feb-1990	212425	Yes
Hawkesbury	Hawkesbury River	Windsor Bridge	17-Jun-1949	25-Jan-1976	212403	Yes
Hawkesbury	Erina Creek	Winani Road	30-Apr-1988	07-Feb-1990	212425	No
Hawkesbury	Hawkesbury River	Yarramundi	28-Apr-1963	19-May-1963	212400	Yes
Macquarie-Tuggerah Lakes	Ourimbah Creek	Chittaway Pt.	26-Oct-1985	07-May-1988	211407	Yes
Macquarie-Tuggerah Lakes	Jilliby Creek	Jilliby	01-Jun-1985	15-Aug-1989	211403	Yes
Macquarie-Tuggerah Lakes	Ourimbah Creek	Palmgrove	26-Oct-1985	24-Dec-1985	211406	Yes
Macquarie-Tuggerah Lakes	Wyong River	Tacoma	06-Aug-1986	06-Aug-1990	211405	Yes
Macquarie-Tuggerah Lakes	Wyong River	U/S Yarramalong	04-May-1985	26-Feb-1992	211408	Yes
Macleay	Macleay River	Austral Eden	10-May-1980	13-Jul-1985	206439	Yes
Macleay	Macleay River	Belgrave	08-May-1963	11-May-1963	206415	Yes
Macleay	Belmore River	Belmore Swamp	11-May-1980	16-Jul-1985	206452	No
Macleay	Macleay River	Cooks Lane Kempsey	31-Jan-1984	11-Jul-1985	206447	Yes
Macleay	Macleay River	Clybucca Creek	22-Feb-1954	12-Jul-1985	206411	Yes
Macleay	Macleay River	Cootbobongatti	11-May-1980	12-May-1980	206438	Yes
Macleay	Macleay River	Crescent Head	09-Feb-1956	21-Nov-1959	206410	Yes
Macleay	Macleay River	Eastern Creek	09-May-1980	12-May-1980	206416	Yes
Macleay	Macleay River	Euroka Creek	03-Apr-1981	31-Jan-1989	206431	Yes
Macleay	Macleay River	Frogmore Swamp	08-May-1980	01-Aug-1987	206449	Yes
Macleay	Macleay River	Frederickton	12-Oct-1952	12-May-1963	206403	Yes
Macleay	Macleay River	Glenrock	05-May-1963	13-Jul-1985	206413	No
Macleay	Belmore River	Gladstone Bridge	22-Feb-1953	12-Jul-1985	206405	Yes
Macleay	Macleay River	Glenrock	22-Feb-1953	12-Jul-1985	206454	No
Macleay	Macleay River	Greenhills	08-Aug-1952	18-Nov-1959	206400	Yes

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River basin name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Macleay	Macleay River	Hat Head Road	23-Feb-1954	21-Nov-1959	206445	Yes
Macleay	Macleay River	Jerseyville	22-Feb-1953	12-Jul-1985	206408	Yes
Macleay	Macleay River	Kempsey Bridge	01-May-1983	29-Jul-1984	206443	No
Macleay	Macleay River	Kinchela	12-Oct-1952	12-Jul-1985	206426	Yes
Macleay	Macleay River	Longreach Island	11-Oct-1982	11-Jul-1985	206422	Yes
Macleay	Macleay River	Low Land East Kempsey	09-May-1980	18-Jun-1986	206428	Yes
Macleay	Macleay River	New Entrance	13-Oct-1952	01-Jan-1984	206409	Yes
Macleay	Macleay River	Seven Oaks	05-Feb-1956	27-Jan-1959	206412	Yes
Macleay	Macleay River	Short St Kempsey	08-Aug-1952	17-Nov-1959	206401	Yes
Macleay	Macleay River	Sillito Swamp	23-Feb-1953	14-Jul-1985	206444	Yes
Macleay	Macleay River	Smithtown	12-Oct-1952	11-Jul-1985	206406	Yes
Macleay	Macleay River	Seven Oaks Bend	09-May-1980	11-Jul-1985	206430	Yes
Macleay	Macleay River	Spencers Creek	23-Feb-1981	11-Jul-1985	206436	Yes
Macleay	Macleay River	Stuarts Point	11-Oct-1982	03-May-1985	206425	Yes
Macleay	Macleay River	Summer Island	22-Jan-1959	11-Jul-1985	206407	Yes
Macleay	Macleay River	Seven Oaks Smithtown	31-Jan-1984	28-Mar-1989	206429	Yes
Macleay	Macleay River	Swan Pool	09-May-1980	15-Jul-1985	206433	Yes
Macleay	Macleay River	Top Frogmore	31-May-1983	28-Feb-1989	206419	Yes
Macleay	Macleay River	Traffic Bridge Kempsey	22-Feb-1953	14-May-1963	206402	Yes
Macleay	Macleay River	Upper Belmore River	23-Feb-1953	09-May-1980	206404	Yes
Macleay	Belmore River	Upper Belmore	10-May-1980	17-Jul-1985	206424	Yes
Macleay	Macleay River	Upper Kinchela Creek	09-May-1980	15-Jul-1985	206420	Yes
Manning	Manning River	Bohnock Road Bridge	07-Nov-1984	05-Feb-1990	208414	Yes
Manning	Cattai Creek	Cattai Creek Bridge	06-Oct-1982	04-Feb-1990	208405	Yes
Manning	Lansdowne River	Coopernook	12-Nov-1959	06-Feb-1990	208418	Yes
Manning	Manning River	Croki	20-Mar-1978	05-Feb-1990	208404	No
Manning	Manning River	Cundle Flat P.O.	07-Aug-1952	01-Mar-1956	208900	Yes
Manning	Dawson River	Dawson River	04-Feb-1990	04-Feb-1990	208422	Yes
Manning	Dickensons Creek	Dickensons Creek	11-Oct-1982	06-Feb-1990	208416	Yes
Manning	Manning River	Downstream Dumaresq Island	10-May-1980	04-Feb-1990	208403	Yes
Manning	Manning River	Cundletown	03-Apr-1981	07-Feb-1990	208412	Yes
Manning	Manning River	Farquhar Inlet	31-Jan-1984	31-Jan-1984	208415	Yes
Manning	Ghinni Creek	Ghinni Creek	08-Apr-1962	06-Feb-1990	208421	Yes
Manning	Gloucester River	Gloucester Pol.	14-Aug-1952	24-Feb-1955	208020	Yes

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River basin name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Manning	Manning River	Harrington	01-Feb-1929	30-Jun-1930	N/A	Yes
Manning	Nowendoc River	Knorrit Flat No. 8	01-Feb-1954	02-Mar-1956	N/A	No
Manning	Manning River	Manning Point	12-Oct-1982	05-Feb-1990	208406	Yes
Manning	Manning River	Macquarie Street, Taree	30-Jan-1984	05-Feb-1990	208409	Yes
Manning	Manning River	Mount George	01-Feb-1929	02-Mar-1956	208901	Yes
Manning	Manning River	Pampoolah	10-May-1980	06-Feb-1990	208413	No
Manning	Pipeclay Canal	Pipeclay Canal	04-Feb-1900	04-Feb-1990	208420	No
Manning	Manning River	Pulteney Street, Taree	01-Feb-1929	02-Mar-1956	208407	Yes
Manning	Scotts Creek	Scotts Creek	11-May-1980	04-Feb-1990	208423	Yes
Manning	Cattai Creek	Tappin Creek Junction	10-May-1980	06-Feb-1990	208419	Yes
Manning	Manning River	Tinonee	10-May-1980	05-Feb-1990	208411	Yes
Manning	Manning River	Taree Estate	10-May-1980	04-Feb-1990	208401	Yes
Manning	Lansdowne River	Upper Lansdowne	10-May-1959	05-Feb-1990	208417	No
Manning	Manning River	Wingham Bight Bridge	01-Feb-1929	05-Feb-1990	208400	Yes
Richmond	Richmond River	Apps	07-Mar-1987	04-Apr-1989	203424	Yes
Richmond	Richmond River	Ballina	25-Jan-1951	01-Mar-1957	203421	Yes
Richmond	Richmond River	Backwater Gauge	01-Mar-1955	31-Jun-1967	203438	Yes
Richmond	Richmond River	Behind Power Station	10-Mar-1870	11-May-1980	N/A	No
Richmond	Richmond River	Bagotville	23-Jan-1955	27-Apr-1989	203414	Yes
Richmond	Rocky Mouth Creek	Bridge	12-Jul-1954	02-Nov-1972	203433	No
Richmond	Richmond River	Buckendoon Lane	19-Jun-1972	29-Oct-1972	N/A	Yes
Richmond	Richmond River	Bently	10-Jul-1962	11-Jul-1962	N/A	Yes
Richmond	Richmond River	Bangalow	21-Feb-1954	10-Jul-1962	N/A	Yes
Richmond	Bungawalbin Creek	Bungawalbin Junction	01-Jul-1921	04-Nov-1972	203409	Yes
Richmond	Bungawalbin Creek	Boggy Creek	03-Jun-1945	09-Feb-1956	203405	Yes
Richmond	Richmond River	Broadwater	01-Feb-1921	27-Apr-1989	203414	No
Richmond	Bungawalbin Creek	Bungawalbin Flat	21-Jul-1965	05-Nov-1972	N/A	Yes
Richmond	Richmond River	Casino (Pump Station)	01-Nov-1917	20-Feb-1971	203451	Yes
Richmond	Richmond River	Cliffords Gauge	27-Jan-1974	29-Jan-1974	N/A	Yes
Richmond	Richmond River	Coraki	10-Mar-1870	11-May-1980	203403	Yes
Richmond	Richmond River	Cannon Point	02-Mar-1975	07-Mar-1975	N/A	Yes
Richmond	Richmond River	Codrington	01-Jan-1887	06-Jun-1974	203431	Yes
Richmond	Richmond River	Casino (Bridge)	20-Feb-1954	23-Jul-1965	203452	Yes
Richmond	Emigrant Creek	Cumbalum	10-Mar-1870	11-May-1980	203442	No

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River basin name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Richmond	Richmond North Arm	Dolbys	11-Feb-1954	10-Mar-1956	203448	No
Richmond	Richmond River	Dungarubba	29-Mar-1955	04-Nov-1972	203410	Yes
Richmond	Richmond River	Eltham	10-Jul-1962	11-Jul-1962	N/A	Yes
Richmond	Richmond River	Empire Vale Creek	13-Dec-1955	21-Jul-1959	203418	Yes
Richmond	Backwater	Empire Vale Ck.	19-Jul-1965	22-Jul-1965	N/A	Yes
Richmond	Richmond River	Evans Head	09-Apr-1988	09-Apr-1988	N/A	No
Richmond	Richmond River	Fabridam	13-Feb-1972	30-Oct-1972	N/A	Yes
Richmond	Bora Creek	Flood	24-Jan-1953	06-Jul-1967	203408	Yes
Richmond	Richmond River	Green Ridge	11-Feb-1954	18-Jan-1962	203430	Yes
Richmond	Richmond River	Gundurimba	01-Jan-1887	03-Feb-1990	203427	Yes
Richmond	Rocky Mouth Creek	Hillview	20-Feb-1954	17-Feb-1972	203432	Yes
Richmond	Evans River	Irongate Downstream	20-Feb-1954	25-Jan-1959	203400	Yes
Richmond	Richmond River	Irvington	01-Nov-1917	01-Feb-1956	N/A	Yes
Richmond	Evans River	Irongate Upstream	20-Feb-1954	25-Jan-1959	203400	Yes
Richmond	Richmond River	Woodburn	01-Jan-1887	28-Apr-1989	203412	Yes
Richmond	Richmond River	Kilgin School	13-Feb-1972	30-Jan-1974	N/A	Yes
Richmond	Richmond River	Kyogle	20-Feb-1954	22-Jul-1965	N/A	Yes
Richmond	Wilsons River	Lismore	01-Jan-1887	03-Feb-1990	203904	Yes
Richmond	Chiliots Creek	Lower Teven	10-Mar-1870	11-May-1980	N/A	No
Richmond	Richmond River	Marom Creek	02-Mar-1975	02-Apr-1989	N/A	Yes
Richmond	Richmond River	Meerschaum Vale	06-Mar-1987	02-Apr-1989	N/A	Yes
Richmond	Bungawalbin Creek	Moonum Hill	24-Jan-1953	04-Apr-1989	203404	Yes
Richmond	Richmond River	Nashua	10-Jul-1962	11-Jul-1962	N/A	Yes
Richmond	Leycester Creek	Nimbin Road	20-Feb-1954	11-Jul-1962	203401	Yes
Richmond	Sandy Creek	No. 2	20-Feb-1953	09-Aug-1958	203407	Yes
Richmond	North Creek	Bridge	13-Feb-1972	03-Nov-1972	N/A	Yes
Richmond	Richmond River	Pimlico Drainage	11-Feb-1972	11-May-1980	N/A	No
Richmond	Wilsons River	Lismore Powerhouse	28-Oct-1972	23-Jan-1979	203440	Yes
Richmond	Richmond River	Power Station Lismore	28-Oct-1972	25-Jan-1979	N/A	No
Richmond	Backwater Gauge	Richmond	18-Mar-1967	31-Jun-1967	N/A	Yes
Richmond	Richmond River	Riley's Hill	19-Jun-1950	05-Apr-1989	203413	Yes
Richmond	Wilsons River	Ruthven	11-Feb-1976	06-Mar-1976	N/A	Yes
Richmond	Pelican Creek	Ruthven	02-Mar-1975	06-Mar-1976	N/A	Yes
Richmond	Richmond River	Sandy Creek	24-Jan-1953	09-Jul-1967	203424	No

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River basin name	River/creek	Station	Data start	Data finish	AWRC*	Full record digitised#
Richmond	Richmond River	Seelim Drain	20-Feb-1953	12-Aug-1958	203423	Yes
Richmond	Sandy Creek	Sandy Creek	28-Mar-1955	10-Mar-1956	203406	Yes
Richmond	Richmond River	South Ruthven	26-Jan-1974	06-Mar-1975	N/A	Yes
Richmond	Boundary Creek	Spencers Backwater	13-Dec-1955	31-Oct-1972	203439	Yes
Richmond	Wilsons River	South Ruthven	11-Feb-1976	06-Mar-1976	N/A	Yes
Richmond	Richmond River	Tatham	01-Nov-1917	31-Oct-1972	203435	Yes
Richmond	Richmond River	Tuckarumba	27-Aug-1957	31-Oct-1972	203429	Yes
Richmond	Leycester Creek	Tuncester	10-May-1980	06-Apr-1990	203443	Yes
Richmond	Richmond River	Teven Creek	16-Jan-1972	15-Mar-1974	203436	Yes
Richmond	Tucombil Canal	Mouth (Sharpes)	01-Jun-1953	29-Feb-1956	203433	Yes
Richmond	Tucombil Canal	Tucombil Floodgate Mouth	12-Feb-1954	29-Apr-1989	203434	Yes
Richmond	Tucombil Canal	Tucombil Highway Bridge	01-Mar-1937	10-Nov-1972	203411	No
Richmond	Richmond River	Wardell	01-Jan-1887	04-Nov-1972	203416	Yes
Richmond	Wilsons River	Woodlawn College	22-Jan-1955	03-Feb-1990	203402	Yes
Richmond	Wilsons River	Wyrallah	01-Jan-1887	06-Apr-1990	203428	Yes
Tweed	Tweed River	Bakers Byangum	14-Jun-1952	26-Apr-1989	201404	Yes
Tweed	Tweed River	Blackwater Environ	22-Feb-1953	22-Feb-1956	201414	Yes
Tweed	North Arm Tweed River	Commercial Road	14-Jun-1952	14-Jul-1954	201410	Yes
Tweed	Tweed River	Eungella	19-Feb-1954	28-Mar-1955	201001	Yes
Tweed	Tweed River	Kynn Bridge No. 3	14-Jun-1952	18-Mar-1967	201406	Yes
Tweed	Tweed River	Murwillumbah	30-Apr-1955	02-May-1956	201420	Yes
Tweed	North Arm Tweed River	Murwillumbah Lavender Ck	20-Feb-1953	14-Jul-1954	201411	Yes
Tweed	Tweed River	Norco Factory	22-Feb-1953	14-Jul-1954	201419	Yes
Tweed	Tweed River	No. 5	22-Feb-1953	14-Jul-1954	201427	Yes
Tweed	Tweed River	North Wharf	20-Feb-1953	24-Mar-1953	201418	Yes
Tweed	Tweed River	Power Station	19-Jan-1938	11-Jun-1945	201405	Yes
Tweed	Tweed River	Salmons Farm	30-Apr-1955	03-May-1956	201415	Yes
Tweed	Tweed River	South Murwillumbah	20-Feb-1953	14-Jul-1954	201416	Yes
Tweed	North Arm Tweed River	Tygalgah (Smiths)	14-Jun-1952	15-Jun-1952	201409	Yes
Tweed	Tweed River	The Bluff	20-Feb-1953	14-Jul-1954	201417	Yes
Tweed	North Arm Tweed River	Tygalgah (Browns)	14-Jun-1952	11-Jun-1966	201408	Yes

* AWRC station numbers are assigned following conventions established by the Australian Water Resources Council in 1975.
# Full digitised records are available for stations marked as *Yes*. Early records are not available in digitised form for stations marked as *No*.

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Appendix B Glossary of terms

The following glossary of terms defines common terms used across MHL publications referenced in Appendix C.

Amplitude (H)	One-half of the difference in height between consecutive high water and low water, hence half the tide range.
Automatic tide gauge	An instrument that automatically registers the rise and fall of the tide. In some instruments, the registration is accomplished by recording the heights at regular time intervals in digital format.
Benchmark (BM)	A fixed physical object or mark used as reference for a vertical datum. A tidal benchmark is one near a tide station to which the tide staff and tidal datums are referred. A primary benchmark is the principal (or only) mark of a group of tidal benchmarks to which the tide staff and tidal datums are referred.
Chart datum	The datum to which soundings on a chart are referred. It is usually taken to correspond to a low-water elevation, and its depression below mean sea level is represented by the symbol Z.
Constituent	One of the harmonic elements in a mathematical expression for the tide-producing force and in corresponding formulas for the tide or tidal current. Each constituent represents a periodic change or variation in the relative positions of the earth, moon and sun. A single constituent is usually written in the form y = A cos (at + á), in which *y* is a function of time as expressed by the symbol *t* and is reckoned from a specific origin. The coefficient *A* is called the amplitude of the constituent and is a measure of its relative importance. The angle (at + á) changes uniformly and its value at any time is called the phase of the constituent. The speed of the constituent is the rate of change in its phase and is represented by the symbol a in the formula. The quantity *a* is the phase of the constituent at the initial instant from which the time is reckoned. The period of the constituent is the time required for the phase to change through 360° and is the cycle of the astronomical condition represented by the constituent.
Digital Recorder (or logger)	An electronic recorder system which stores the information in accessible form, for example, on tape or solid state memory.
Digitise	To translate analog information into digital form i.e. a series of numeric data readable by, and stored within, a digital computer.
Diurnal	Having a period or cycle of approximately one tidal day. Thus, the tide is said to be diurnal when only one high water and one low water occur during a tidal day, and the tidal current is said to be diurnal when there is a single flood and a single ebb period of a reversing current in the tidal day. A rotary current is diurnal if it changes its direction through all points of the compass once each tidal day. A diurnal constituent is one which has a single period in the constituent day. The symbol for such a constituent is the subscript *1*.

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Encoder	A device that translates tidal movement into computer readable data.
Estuary	An embayment of the coast in which fresh river water entering at its head mixes with the relatively saline ocean water. When tidal action is the dominant mixing agent it is usually termed a tidal estuary. Also, the lower reaches and mouth of a river emptying directly into the sea where tidal mixing takes place. The latter is sometimes called a river estuary.
Extreme High Water	The highest elevation reached by the sea as recorded by a tide gauge during a given period.
Extreme Low Water	The lowest elevation reached by the sea as recorded by a tide gauge during a given period.
Floatwell	A stilling well in which the float of a float-actuated gauge operates.
Gas purged pressure gauge	A type of tide gauge in which gas, usually nitrogen, is emitted from a submerged tube at a constant rate. Fluctuations in hydrostatic pressure due to changes in tidal height modify the emission rate for recording.
Harmonic analysis	Process of measuring or calculating the relative amplitudes and frequencies of all the significant harmonic components present in a given wave form.
Harmonic prediction	Method of predicting tides by combining the harmonic constituents into a single tidal curve. The work is usually performed by electronic digital computer.
Head	The difference in water level at either end of a strait, channel, inlet, etc.
High Water (HW)	The maximum height reached by a rising tide. The high water is due to the periodic tidal forces and the effects of meteorological, hydrologic, and/or oceanographic conditions. For tidal datum computational purposes, the maximum height is not considered a high water unless it contains a tidal high water.
High water mark	A line or mark left upon tide flats, beach, or alongshore objects indicating the elevation of the intrusion of high water. The mark may be a line of oil or scum on alongshore objects, or a more or less continuous deposit of fine shell or debris on the foreshore or berm. This mark is physical evidence of the general height reached by wave runup at recent high waters. It should not be confused with the Mean High Water Line or Mean Higher High Water Line.
Higher High Water (HHW)	The highest of the high waters (or single high water) of any specified tidal day due to the declination A_I effects of the moon and sun.
Higher Low Water (HLW)	The highest of the low waters of any specified tidal day due to the declination A_I effects of the moon and sun.
Highest Astronomical Tide (HAT)	The highest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions; this level will not be reached every year. HAT is not the extreme level which can be reached as storm surges may cause considerably higher levels to occur.
Hydrographic datum	A datum used for referencing depths of water and the heights of predicted tides or water level observations. Same as *chart datum*. See *Datum*.

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Indian Spring Low Water	A datum originated by Professor G. H. Darwin when investigating the tides of India. It is an elevation depressed below mean sea level by an amount equal to the sum of the amplitudes of the harmonic constituents M_2, S_2, K_1, and O_1.
Inverse barometer effect	The inverse response of sea level to changes in atmospheric pressure. A static reduction of 1.005 mb in atmospheric pressure will cause a stationary rise of 1 cm in sea level.
K_1	Lunisolar diurnal constituent. This constituent, with O_1, expresses the effect of the moon's declination. They account for diurnal inequality and, at extremes, diurnal tides. With P_1, it expresses the effect of the sun's declination. Speed = T + h = 15.041,068,6° per solar hour.
Lambda	Smaller lunar evectional constituent. This constituent, with V_2, U_2, and (S_2), modulates the amplitude and frequency of M_2 for the effects of variation in solar attraction of the moon. This attraction results in a slight pear-shaped lunar ellipse and a difference in lunar orbital speed between motion toward and away from the sun. Although (S_2) has the same speed as S_2, its amplitude is extremely small. Speed = 2T - s + p = 29.455,625,3° per solar hour.
Low Water (LW)	The minimum height reached by a falling tide. The low water is due to the periodic tidal forces and the effects of meteorological, hydrologic, and/or oceanographic conditions. For tidal datum computational purposes, the minimum height is not considered a low water unless it contains a tidal low water.
Lower High Water (LHW)	The lowest of the high waters of any specified tidal day due to the declination A_l effects of the moon and sun.
Lower Low Water (LLW)	The lowest of the low waters (or single low water) of any specified tidal day due to the declination A_l effects of the moon and sun.
Lowest Astronomical Tide (LAT)	The lowest level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions; this level will not be reached every year. LAT is not the extreme level which can be reached as storm surges may cause considerably lower levels to occur.
Lunar tide	That part of the tide on the earth due solely to the moon as distinguished from that part due to the sun.
Magnetic tape	Recording tape on which (numeric) data may be stored.
M_2	Principal lunar semi-diurnal constituent. This constituent represents the rotation of the Earth with respect to the Moon. Speed = 2T - 2s + 2h = 28.984,104,2° per solar hour.
Mean High Water (MHW)	A tidal datum. The average of Mean High Water Spring and Mean High Water Neap.
Mean High Water Springs (MHWS), Mean Low Water Springs (MLWS)	The height of MHWS is the average, throughout a year when the average maximum declination of the moon is 23.5º, of the heights of two successive high waters during those periods of 24 hours (approximately once a fortnight) when the range of the tide is the greatest. The height of MLWS is the average height obtained by the two successive low waters during the same periods.
Mean High Water Neaps (MHWN),	The height of MHWN is the average, throughout a year, as defined above, of two successive high waters during those periods of 24 hours

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Mean Low Water Neaps (MLWN)	(approximately once a fortnight) when the range of the tide is least. The height of MLWN is the average height obtained by the two successive low waters during the same periods.
Mean Range of Tide (Mn)	The difference in height between Mean High Water and Mean Low Water.
Modem	A device allowing a computer to be accessed over a telephone line.
Neap tides	Tides of decreased range or tidal currents of decreased speed occurring semi-monthly as the result of the moon being in quadrature. The neap range (Np) of the tide is the average range occurring at the time of neap tides and is most conveniently computed from the harmonic constants. It is smaller than the mean range where the type of tide is either semi-diurnal or mixed and is of no practical significance where the type of tide is predominantly diurnal. The average height of the high waters of the neap tide is called Neap High Water or High Water Neaps (MHWN) and the average height of the corresponding low waters is called Neap Low Water or Low Water Neaps (MLWN).
O_1	Lunar diurnal constituent. See K_1. Speed = T - 2s + h = 13.943,035,6° per solar hour.
Phase	1. Any recurring aspect of a periodic phenomenon, such as new moon, high water, flood strength, etc. 2. A particular instant of a periodic function expressed in angular measure and reckoned from the time of its maximum value, the entire period of the function being taken as 360°. The maximum and minimum of a harmonic constituent have phase values of 0° and 180°, respectively.
Pressure sensor	A pressure transducer sensing device for water level measurement. A relative transducer is vented to the atmosphere and pressure readings are made relative to atmospheric pressure. An absolute transducer measures the pressure at its location. The readings are then corrected for barometric pressure taken at the surface.
Range of tide	The difference in height between consecutive high and low waters. The mean range is the difference in height between mean high water and mean low water. The great diurnal range or diurnal range is the difference in height between mean higher high water and mean lower low water.
Relative mean sea level change	A local change in mean sea level relative to a network of benchmarks established in the most stable and permanent material available (bedrock, if possible) on the land adjacent to the tide station location. A change in relative mean sea level may be composed of both an absolute mean sea level change component and a vertical land movement change component, together.
S_2	Principal solar semi-diurnal constituent. This constituent represents the rotation of the Earth with respect to the Sun. Speed = 2T = 30.000,000,0° per solar hour.

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Seiche	A stationary wave usually caused by strong winds and/or changes in barometric pressure. It is found in lakes, semi-enclosed bodies of water, and in areas of the open ocean. The period of a seiche in an enclosed rectangular body of water is usually represented by the formula: Period (T) = 2L / square root (gd) in which L is the length, d the average depth of the body of water, and g the acceleration of gravity.
Semi-diurnal	Having a period or cycle of approximately one-half of a tidal day. The predominant type of tide throughout the world is semi-diurnal, with two high waters and two low waters each tidal day. The tidal current is said to be semi-diurnal when there are two flood and two ebb periods each day. A semi-diurnal constituent has two maxima and two minima each constituent day, and its symbol is the subscript 2.
Shallow water constituent	A short-period harmonic term introduced into the formula of tidal (or tidal current) constituents to take account of the change in the form of a tide wave resulting from shallow water conditions. Shallow water constituents include the overtides and compound tides.
Slack water (Slack)	The state of a tidal current when its speed is near zero, especially the moment when a reversing current changes direction and its speed is zero. The term also is applied to the entire period of low speed near the time of turning of the current when it is too weak to be of any practical importance in navigation. The relation of the time of slack water to the tidal phases varies in different localities. For a perfect standing tidal wave, slack water occurs at the time of high and of low water, while for a perfect progressive tidal wave, slack occurs midway between high and low water.
Solar tide	1. The part of the tide that is due to the tide-producing force of the sun. 2. The observed tide in areas where the solar tide is dominant. This condition provides for phase repetition at about the same time each solar day.
Solid state	An electronic device composed of components with no moving parts – in this instance, using the electronic properties of solids, as in transistors, semi-conductors and integrated circuits.
Spring High Water	Same as Mean High Water Springs (MHWS). See Spring Tides.
Spring Low Water	Same as Mean Low Water Springs (MLWS). See Spring Tides and Mean Low Water Springs.
Spring tides	Tides of increased range or tidal currents of increased speed occurring semi-monthly as the result of the moon being new or full. The spring range (Sg) of tide is the average range occurring at the time of spring tides and is most conveniently computed from the harmonic constants. It is larger than the mean range where the type of tide is either semi- diurnal or mixed, and is of no practical significance where the type of tide is predominantly diurnal. The average height of the high waters of the spring tides is called Spring High Water or Mean High Water Springs (MHWS) and the average height of the corresponding low waters is called Spring Low Water or Mean Low Water Springs (MLWS).

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Storm surge	The local change in the elevation of the ocean along a shore due to a storm. The storm surge is measured by subtracting the astronomic tidal elevation from the total elevation. It typically has a duration of a few hours. Since wind generated waves ride on top of the storm surge (and are not included in the definition), the total instantaneous elevation may greatly exceed the predicted storm surge plus astronomic tide. It is potentially catastrophic, especially on low-lying coasts with gently sloping offshore topography.
Telemeter	Transmit data to a distant receiving station via a telephone line or by telegraphic means.
Tidal characteristics	Principally, those features relating to the time, range, and type of tide.
Tidal constants	Tidal relations that remain practically constant for any particular locality. Tidal constants are classified as harmonic and non-harmonic. The harmonic constants consist of the amplitudes and epochs of the harmonic constituents, and the non-harmonic constants include the ranges and intervals derived directly from the high and low water observations.
Tidal current	A horizontal movement of the water caused by gravitational interactions between the Sun, Moon and Earth. The horizontal component of the particulate motion of a tidal wave. Part of the same general movement of the sea that is manifested in the vertical rise and fall called tide.
Tide	The periodic rise and fall of the water resulting from gravitational interactions between Sun, Moon and Earth. The vertical component of the particulate motion of a tidal wave. Although the accompanying horizontal movement of the water is part of the same phenomenon, it is preferable to designate this motion as tidal current.
Tide curve	A graphic representation of the rise and fall of the tide in which time is usually represented by the abscissa and height by the ordinate. For a semi-diurnal tide with little diurnal inequality, the graphic representation approximates a cosine curve.
Tide (water level) gauge	An instrument for measuring the rise and fall of the tide (water level).
Tide tables	Tables which give daily predictions of the times and heights of high and low waters. These predictions are usually supplemented by tidal differences and constants through which predictions can be obtained for numerous other locations.
Tsunami	A shallow water progressive wave, potentially catastrophic, caused by an underwater earthquake or volcano.
Universal Time (UTC)	Same as Greenwich Mean Time (GMT).
Z_0	Symbol recommended by the International Hydrographic Organisation to represent the elevation of mean sea level above chart datum.

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Appendix C Other publications of interest

Data reports

MHL annual estuary and river water levels summaries available:

MHL Report Nos. 555 (87–88), 564 (88–89), 582 (89–90), 601 (90–91), 625 (91–92), 659 (92–93), 698 (93–94), 731 (94–95), 778 (95–96), 875 (96–97), 947 (97–98), 1014 (98–99), 1070 (99–00), 1130 (00–01), 1206 (01–02), 1276 (02–03), 1346 (03–04), 1422 (04–05), 1511 (05–06), 1763 (06–07), 1847 (07–08), 1932 (08–09), 2009 (09–10), 2088 (10–11), 2157 (11–12), 2218 (12–13), 2291 (13–14), 2383 (14–15), 2474 (15–16), 2573 (16–17), 2617 (17–18), 2692 (18–19), 2769 (19–20), 2855 (20–21), 2906 (21-22).

MHL annual ocean tide levels and coastal air pressure summaries available:

MHL Report Nos. 515 (86–87), 544 (87–88), 563 (88–89), 585 (89–90), 602 (90–91), 628 (91–92), 658 (92–93), 697 (93–94), 732 (94–95), 777 (95–96), 876 (96–97), 947 (97–98), 1013 (98–99), 1069 (99–00, 1129 (00–01), 1205 (01–02), 1277 (02–03), 1347 (03–04), 1423 (04–05), 1512 (05–06), 1764 (06–07), 1848 (07–08), 1933 (08–09), 2010 (09–10), 2089 (10–11), 2158 (11–12), 2219 (12–13), 2292 (13–14), 2384 (14–15), 2475 (15–16), 2574 (16–17), 2618 (17–18), 2693 (18–19), 2770 (19–20), 2856 (20–21), 2907 (21-22).

MHL annual coastal rainfall summaries available:

MHL Report Nos. 610 (90–91), .624 (91–92), 660 (92–93), 699 (93–94), 730 (94–95), 776 (95–96), 874 (96–97), 946 (97–98), 1015 (98–99), 1071 (99–00), 1131 (00–01), 1207 (01–02), 1278 (02–03), 1348 (03–04), 1424 (04–05), 1513 (05–06), 1765 (06–07), 1849 (07–08), 1934 (08–09), 2011 (09–10), 2090 (10–11), 2159 (11–12), 2220 (12–13), 2293 (13–14), 2385 (14–15), 2476 (15–16), 2575 (16–17), 2619 (17–18), 2694 (18–19), 2771 (19–20), 2857 (20–21), 2908 (21-22).

MHL annual wave climate summaries available:

MHL Report Nos. 547 (87–88), 560 (88–89), 581 (89–90), 600 (90–91), 627 (91–92), 655 (92–93), 695 (93–94), 733 (94–95), 779 (95–96), 877 (96–97), 948 (97–98), 1016 (98–99), 1072 (99–00), 1132 (00–01), 1208 (01–02), 1279 (02–03), 1349 (03–04), 1425 (04–05), 1514 (05–06),1766 (06–07), 1850 (07–08), 1935 (08–09), 2012 (09–10), 2091 (10–11), 2160 (11–12), 2221 (12–13), 2294 (13–14), 2386 (14–15), 2477 (15–16), 2576 (16–17), 2620 (17–18), 2695 (18–19), 2772 (19–20), 2858 (20–21), 2909 (21-22).

Frequency distribution analysis

Manly Hydraulics Laboratory 2014, *OEH NSW Water Level Frequency Distribution Analysis*, MHL Report 2100, March 2014.

Network reports

Manly Hydraulics Laboratory 2005, *Review of Automatic Water Level Recorder Network*, MHL Report 1419, October 2005.

Manly Hydraulics Laboratory 2019, *Review of NSW OEH Automatic Water Level Recorder Network 2019*, MHL Report 2546, March 2019.

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Flood reports

Manly Hydraulics Laboratory 2013, *NSW North Coast Flood Summary January–March 2013,* MHL Report 2202, May 2013.

Manly Hydraulics Laboratory 2015, *NSW Hunter and Central Coast Flood Summary April–May 2015,* MHL Report 2364, June 2015.

Manly Hydraulics Laboratory 2016, *NSW South Coast Flood Summary August 2015,* MHL Report 2367, September 2016.

Manly Hydraulics Laboratory 2017, *NSW North Coast Flood Summary March 2017*, MHL Report 2535, May 2017.

Manly Hydraulics Laboratory 2020, *NSW Coastal Flood Summary February 2020*, MHL Report 2752, July 2020.

Manly Hydraulics Laboratory 2021, *NSW Coastal Flood Summary March 2021*, MHL Report 2809, July 2021.

Manly Hydraulics Laboratory 2022, *North Coastal Flood Summary February/March 2022,* MHL Report 2880, June 2022.

Manly Hydraulics Laboratory 2022, *Brunswick, Wilsons and Richmond Rivers Flood Summary March/April 2022*, MHL Report 2895, August 2022.

Manly Hydraulics Laboratory 2023, *NSW Coast Flood Summary February/March 2022*, MHL Report 2936, August 2023

Harmonic analysis and tidal planes

Manly Hydraulics Laboratory 1994, *The Harmonic Analysis of NSW Tide Gauge Network, Volumes 1 and 2,* Report No. MHL604.

Department of Public Works and Services 2003, *DLWC NSW Tidal Planes Data Compilation 2001 – Volume 1 Tidal Plane Analyses*, Manly Hydraulics Laboratory, Report No. 1098.

Department of Public Works and Services 2002, *DLWC NSW Tidal Planes Data Compilation 2001 – Volume 2 Tidal Phase Analyses*, Manly Hydraulics Laboratory, Report No. 1098.

Manly Hydraulics Laboratory 2005, *Investigation into Tidal Planes Compilation – NSW Tidal Planes Data Compilation Stage 3*, MHL Report 1269, November 2005.

Manly Hydraulics Laboratory 2012, *OEH NSW Tidal Planes*, MHL Report 2053, October 2012.

Manly Hydraulics Laboratory 2023, *NSW Tidal Planes Analysis 2001–2020 Harmonic Analysis*, MHL Report 2786, April 2023.

Mean sea level

Intergovernmental Oceanographic Commission of UNESCO 1985, *Manual on Sea Level Measurement and Interpretation*, IOC Manuals and Guides, No. 14.

Intergovernmental Oceanographic Commission of UNESCO 1986, *Global Sea-level Observing System (GLOSS) Implementation Plan* 1985–1990, IOC/INF-663.

NSW Committee on Tides and Mean Sea Level 1990, *The Role of the NSW Committee on Tides and Mean Sea Level*.

National Mapping Council, Permanent Committee on Tides and Mean Sea Level (PCTMSL), *Tide Gauge Survey Information.*

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Anomalies and storm surge analysis

Manly Hydraulics Laboratory 1991, *Storm Surges Monitored Along the NSW Coast March–April 1990,* Report No. MHL591.

Manly Hydraulics Laboratory 2008, *South Coast NSW Tide-Storm Surge Analysis,* MHL Report 1618, December 2008.

Manly Hydraulics Laboratory 2011, *NSW Ocean Water Levels,* MHL Report 1881, March 2011.

Manly Hydraulic Laboratory 2018, *NSW Extreme Ocean Water Levels*, MHL Report 2236, November 2018.

University of Queensland, 2010, *Tropical Cyclone 'Roger' Storm Surge Assessment*, Research Report CE162, J. Stewart, D. Callaghan and P. Nielsen, July 2010.

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Appendix D Data quality control process

The collected water level data is edited and quality coded in accordance with MHL quality control processes established for the *DCCEEW BC contract for the collection, archiving and dissemination of NSW coastal and flood data.* The approach exceeds the fundamental requirements of the *National Industry Guidelines for Hydrometric Monitoring* and other relevant guidelines such as the *Australian Tides Manual Special Publication No. 9*.

A numerical quality code is assigned to the dataset to describe the quality of individual observations and indicate the measurement uncertainty. **Figure D1** Overview of the water level data quality control process illustrates the two-step process applied by a data analyst and data reviewer:

1. Raw data adjustments using available in-field verification, calibration and secondary data type observations.
2. Comparison with independent data sources to enable its dissemination.

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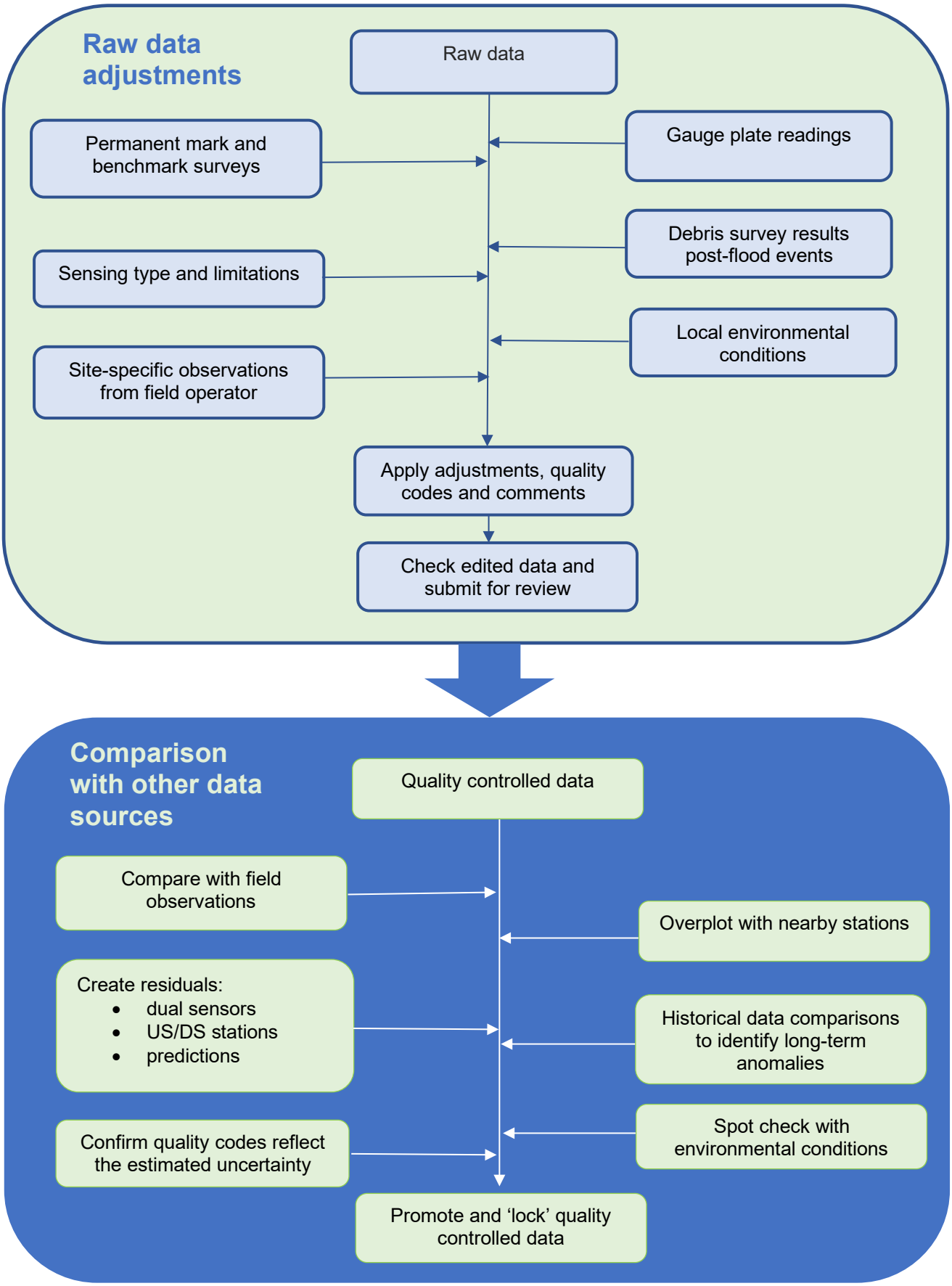

Figure D1 Overview of the water level data quality control process

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A series of station maintenance procedures is periodically carried out to ensure data quality and maximise data recovery according to an agreed maintenance regime, including;

- scheduled site visits to obtain observer (live status) readings and verify logged data, as well as identify any site-specific monitoring issues, including but not limited to environmental conditions such as wind speed and direction, state of the tide (either ebb or flood flow), water conditions and amplitude of wave action at the site.
- Water level sensors are calibrated or verified as appropriate to the sensing type in accordance with MHL's work instructions.
- Station gauge plates are re-surveyed to available reference permanent marks and local benchmarks.

Based on the periodic observer readings, calibration/verification and survey results, data is edited and assigned a quality code. A raw dataset directly recovered from the logger is always retained as read-only and a secondary dataset contains the processed time series and associated quality coding. **Table D1** lists detailed data quality code descriptions.

Table D1 DCCEEW BC water level quality code descriptions

Quality code	Description	Post-processed uncertainty estimation*
55	Records processed to	±0.02 m
100	Data from previous MHL database, processed to	±0.02 m
105	Records processed to	±0.05 m
150	Uncoded – data not yet quality controlled	Raw data from the instrument with only preliminary quality checks performed
161, 162	Dry sensor	Sensor out of water with flow/with no flow
208	Records processed to greater than	>±0.05 m
1, 204, 205, 206, 207, 255	Data loss/data missing	

* A quality code is assigned based on infield status verification checks, survey and instrument calibrations including *an indication* of measurement uncertainty. Site-specific measurement uncertainty estimates with defined confidence limits can be quantified using statistical techniques on request.

Water level data editing may involve various standard hydrometric techniques including:

- Applying offsets when there is a sudden movement of the orifice in the water column, bank slump or deposition of silt during an event.
- Time shifts e.g. correction to eastern standard time (EST).
- Spike removal of false readings for known reasons.
- Linear transformations when drift over time occurs e.g. gradual deposition of silt, bio-fouling due to marine growth in lower estuarine areas, drift in sensor readings or gauge plate movement identified in surveys.
- Applying factors (vertical plane modification) due to change in calibration slope inputs or sensing is impeded by physical factors.

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- Applying inversions due to incorrect device inputs when setting the level.
- Removing data that does not meet the required standards.
- Limited interpolation (gap filling) between logged points; this is generally no more than 1 hour in duration using typical exhibited patterns and not at the peak or trough of a tidal station (this technique is not used for sub-15 minute logging intervals).
- Applying quality codes and comments tagged to the time series data. Comments include a description of what edits and codes have been applied and why.

The data is only adjusted with thorough consideration and evaluation of sensor type and capability, observer readings, survey and calibration results, site-specific performance issues, environmental conditions, relationship with nearby stations and comparison with tidal predictions.

Prior to archiving, the quality controlled data are checked by the data analyst and then submitted to the data custodian for approval, which includes the following steps:

- Compare adjusted time series data with field operator gauge plate readings, post-flood debris line surveys and comments on conditions.
- Confirm survey adjustment or calibration results are applied as required.
- Overplot data with adjacent upstream and downstream river/estuary stations or ocean tide stations and inspect the data at a detailed scale to identify any gaps or anomalies.
- Any significant residuals between level data traces (water level absolute differences and changes in trend differences) can reveal datum shifts and drifts, survey issues, timing issues and erroneous readings. Data trace residuals are created and reviewed between:
  - dual sensors at the same site (if available)
  - upstream/downstream stations with residual inspection over short periods and long periods (e.g. specific events and 4 weeks, 6 months, 1 year, 5 years, 10 years).
  - the prediction (if available) and actual.
- Use secondary available environmental data such as rainfall and wind (speed and direction) to explain influences on water level measurement due to inflows and wind waves.
- Compare monthly means and accumulations with nearby stations over 10 to 20 years to identify any long-term trends that need to be corrected e.g. gauge plate and permanent mark subsidence from underground mining.

Once all issues are resolved, the quality controlled data is promoted and ‘locked’ such that no further changes can be applied.

The data should always be interpreted for its application taking into account the quality codes that have been applied. Advice from the data custodian should be sought to assist with any interpretation of data and quality codes, as well as any other required data quality descriptors.

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Measurement uncertainty note:

At this stage, the water level measurement uncertainty is an indicative description only (quality code) applied to the post-processed data based on the aforementioned field techniques and site-specific environmental conditions. MHL is progressively refining measurement uncertainty estimates using *JCGM 100:2008 Guide to Expression of Uncertainty in Measurement (GUM)* approaches to strengthen quantifiable measurement uncertainty estimates within defined confidence limits.

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