Manly Hydraulics Laboratory

NSW ESTUARY AND RIVER WATER LEVELS ANNUAL SUMMARY 2018–2019

Report MHL2692
November 2019

Prepared for:

NSW Department of Planning, Industry and Environment
Climate Change and Sustainability Division

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Foreword

Manly Hydraulics Laboratory (MHL) is a business unit within the Water Group of NSW Department of Planning, Industry and Environment[1]. The NSW water level database has been developed to support a number of programs associated with coastal, floodplain and estuary management for the Climate Change and Sustainability Division[2] of NSW Department of Planning, Industry and Environment. The monitoring service is available to local government and other organisations, both in Australia and overseas.

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 2018 to 30 June 2019. MHL maintains the automatic recording stations and catalogues the data collected.

This summary provides information on how to access the data and additional data output types that are available on request.

Requests for further information should be directed to:

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Manly Hydraulics Laboratory	WWW	:	http://www.mhl.nsw.gov.au/
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[1] From 1 July 2019, Manly Hydraulics Laboratory is part of the newly formed Department of Planning, Industry and Environment.

[2] Formerly NSW Office of Environment and Heritage (OEH).

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Executive summary

The NSW estuary and river water level annual summary 2018–2019 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 2018 to 30 June 2019.

During this period, the overall data capture across the network for data, with a quality code of 162 or better, was 97.8%

This report contains:

- a brief description of the estuary and river water level measurement program
- guidelines of how to use this report
- information on how to access the database
- a description of significant developments which occurred in 2018–2019
- a list of all stations for which MHL collected water level data in 2018–2019 (Table 4)
- 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 which outlines some of the data analysis suites and presentation formats available
- Appendix C, a glossary of terms
- Appendix D, a list of other publications which may be of interest.

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Contents

FOREWORD I

EXECUTIVE SUMMARY II

1. WATER LEVEL MONITORING PROGRAM 1

2. HOW TO USE THIS REPORT 2

3. HOW TO ACCESS THE DATA 3

4. SIGNIFICANT EVENTS AND DEVELOPMENTS 4

4.1 Significant events 4

4.2 Station upgrades 4

4.3 Data provision 8

5. WATER LEVEL MONITORING SUMMARY 9

5.1 Data capture performance 9

5.2 Interpretation of data 9

5.3 Water level monitoring summary 10

APPENDICES

Appendix A Digitised continuous data and discrete historical data A1

Appendix B Sample outputs B1

Appendix C Glossary of terms C1

Appendix D Other publications of interest D1

TABLES

Table 1 2018–2019 flood warnings 4

Table 2 2018–2019 station upgrades 5

Table 3 MHL data quality code descriptions 9

Table 4 Index of figures 10

Table 5 Summary of adjustment from AHD to local datum 21

Table 6 Index of Appendix B figures 22

Table A1 Digitised continuous data A2

Table A2 Discrete historical data A10

1. Water level monitoring program

This report presents the thirty-fourth year of water level data collected by Manly Hydraulics Laboratory (MHL). 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 Section 5 Station Location Maps). This network consists of over 220 permanent stations funded by the Climate Change and Sustainability Division (CCSD), NSW Department of Planning, Industry and Environment, and over 100 short-term client-based project sites featuring site-specific systems of water level and water quality sensing. 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. Each system functions as follows:

- Gas purge pressure system: the water level is determined by a pressurised constant flow of air through a line to a fixed point in the water column known as the orifice. The pressure in the line builds up to the same pressure as the water at that depth. This pressure is measured by the pressure sensor and converted into a water level by the data logger. The system relies on the principle that water depth is proportional to pressure. The system is shown in Figure 1.
- Solid state Floatwell: the water level is sensed by a float connected to a shaft encoder. The system is shown in Figure 2.
- Submersible water level transducer: the water level is determined by a vented pressure sensor and converted into a water level by the data logger. The system is shown in Figure 3.
- Ultrasonic/radar distance measuring units: pulses are transmitted from the transducer towards the water and are reflected by the water back to the transducer. The elapsed time from emission to reception of the signals is dependent on the distance and hence the water level can then be determined. The system is shown in Figure 4.

Data is transferred to the NSW Government Data Centre and to MHL's data server using a variety of telemetry techniques including internet protocol (IP), landline telephone, cellular networks and Event-reporting Radio Telemetry System (ERTS). The incoming raw data is then available to external users to view online in tables or plots, as schematised in Figure 5. The upper image displays the existing data transfer process, while the lower image displays the new data transfer process which stations are currently being updated to.

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.

Data is backed up daily and archived to offline storage at regular intervals.

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2. How to use this report

This report aims to streamline access to MHL's services and to the water level database.

The NSW coastal zone has been divided into geographic regions based on river systems. Location maps display the station locations and the annual plots confirm the availability and suitability of data for the particular period of interest. Maps and plots for the regions covered by this report are as follows:

- Tweed
- Coffs Harbour
- Hunter
- Metropolitan
- South Coast.

All the data appearing in this report are recorded in Australian Eastern Standard Time (EST). 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.

Appendix B provides examples of data analysis and presentation formats available from MHL. Available water level related products include:

- graphical plots (see Figures B1, B3 and B4)
- time series data (see Figure B2)
- flood analyses (see Figures B5)
- tidal analyses (see Figures B6, B7)
- frequency analysis (see Figures B8, B9)
- catchment rainfall and level comparisons (see Figure B10)
- MHLFIT flood intelligence tool (see Figure B11)
- sample water quality plots (see Figure B12).

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3. How to access the data

MHL provides a full online data access service via the internet for its clients, and a restricted 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 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.

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4. Significant events and developments

4.1 Significant events

No major flood events occurred during 2018–2019.

In December 2018, a moderate flood warning was issued by the Bureau of Meteorology (BoM) for Orara River at Coutts Crossing.

Flood warnings as described by the NSW State Emergency Service's (SES) NSW flood classification scale during 2018–2019 were issued as listed below in Table 1.

Table 1 2018–2019 flood warnings

River/estuary system	Date	NSW SES classification
Orara River	December 2018	Moderate

The NSW SES defines the level of flooding as follows:

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 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.

4.2 Station upgrades

A number of water level stations had significant infrastructure upgrade works undertaken. Some of these upgrades were the result of a network-wide audit to improve data reliability, safety of field operators and performance of stations during flood events. Details of these upgrades are shown in Table 2. Stations are listed based on locality from north to south. This aligns with Table 4 *Index of figures* in Section 5.

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Table 2 2018–2019 station upgrades

Station name	Date	Issue			Comments
		Data quality/ capture	WHS	Cloud data transfer/ hosting	
Bungawalbin Creek	Jun-19	✓		✓	Installed new sensor. Station upgraded to Cloud data transfer/hosting and high frequency transfer, replacing legacy systems.
Coraki	Jun-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
East Gundurimba	Jun-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Wooli Entrance	Mar-19	✓			Installed new copper orifice line.
Woolgoolga Lake	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Coffs Creek Highway Bridge	Sep-18	✓			Installed new aluminium orifice pipe.
Newports Creek	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Boambee Entrance	Mar-19	✓			Installed new copper orifice line, replaced connecting pipe.
Urunga	Mar-19	✓			Cut out 4m of rusting orifice and replaced with aluminium pipe.
Upstream Newry Island	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Deep Creek	Mar-19	✓			Orifice line and instrument housing replaced.
Boringalla Creek	Jan-19	✓			Installed new pipe structure to hold box and sensor housing, the previous one rusted.
	Jun-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Saltwater Lagoon	Jun-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Crescent Head	Jun-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Dennis Bridge Downstream	May-19	✓			Replaced logger, upgraded 4-20mA radar to a SDI12 radar.
Wauchope Railway Bridge	Dec-18	✓			Replaced logger, modem, battery and solar regulator after lightning strike.
Lake Cathie	Jun-19	✓		✓	Replaced logger, station upgraded to Cloud data transfer/hosting and high frequency transfer, replacing legacy systems.

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Station name	Date	Issue			Comments
		Data quality/ capture	WHS	Cloud data transfer/ hosting	
West Haven	Sep-18	✓			Installed new primary gauge post and plate (0-1m)
	Jun-19			✓	Station upgraded to Cloud data transfer /hosting and high frequency transfer, replacing legacy systems.
Laurieton	Jan-19	✓			Terminals and cabling corroded, replaced battery and all cables in logger and regulator.
Lakewood	Jun-19	✓			Primary gauge plate rusted, replaced with new plate.
Harrington	Sep-18	✓			Site temporarily decommissioned for sign repair by council. Re-installed site with new cabinet, rewired cabinet, new pressure transducer sensor and new pipework that houses sensor.
Croki	Jun-19			✓	Station upgraded to Cloud data transfer /hosting and high frequency transfer, replacing legacy systems.
Taree	Sep-18	✓			Installed new latch and lock.
Mount George	Jun-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Farquhar Inlet	Nov-18	✓			New gauge plate.
Pacific Palms Wharf	Aug-18	✓			Replaced sensor and logger, uploaded new program.
	Dec-18	✓			Replaced sensor.
Raymond Terrace	Aug-18	✓			New HS-23 bubble unit, regulator, transient barriers, orifice line and gas chamber orifice.
Green Rocks	Jun-19	✓			New HS-23 bubble unit and 0-2m gauge post and plates.
Hinton	Jan-19	✓			New HS-23 bubble unit, new -0.5-1m gauge post and plate.
Wallis Creek Upstream	Nov-18	✓			New -0.5 to 1m gauge post. Lowered and secured orifice.
Cockle Railway Station	Dec-18	✓			New orifice line and gas chamber orifice, gauge post and new -0.5-1m plates.
Barnsley Vale	Dec-18			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Long Jetty	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Tumbi Umbi	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Erina	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Gunderman Caravan Park	Jun-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.

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Station name	Date	Issue			Comments
		Data quality/ capture	WHS	Cloud data transfer/ hosting	
Wisemans Ferry	Mar-19	✓			Replaced pressure transducer sensor.
	May-19			✓	Station upgraded to Cloud data transfer /hosting and high frequency transfer, replacing legacy systems.
Hewitts Creek Entrance	Feb-19	✓			Installed new orifice.
Towradgi Creek US	Feb-19	✓			Installed new 2-3m gauge post and plate.
Towradgi Creek DS	Feb-19	✓			Installed new 2-3m gauge post and plate.
Cabbage Tree Creek US	Feb-19	✓			Installed new 6-7m gauge post and plate.
Cabbage Tree Creek DS	Feb-19	✓			Installed new 6-7m gauge post and plate.
Blackmans Parade US	Apr-19	✓		✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems, upgraded water level sensor.
Blackmans Parade DS	Apr-19	✓		✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems, upgraded water level sensor from Vega bar 14 to WL3100.
Mullet Creek	Feb-19	✓			Installed new gauge post and plate from 1m to 5m.
	Apr-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Cudgeree Bay	Jan-19	✓			Installed new 1-2m gauge post and plate.
Lake Conjola Downstream	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Narrawallee	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Burrill Lake Bridge	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Lake Tabourie	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
Durras Lake	May-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.
George Bass Drive	May-19	✓			Replaced gas purge sensor with pressure transducer.
Back Lagoon	Feb-19			✓	Station upgraded to Cloud data transfer/ hosting and high frequency transfer, replacing legacy systems.

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Station name	Date	Issue			Comments
		Data quality/ capture	WHS	Cloud data transfer/ hosting	
Merimbula Wharf	Nov-18	✓	✓		Installed bluetooth communication to reduce boat work.
Merimbula Lake	Nov-18	✓	✓		Installed bluetooth communication to reduce boat work.
Agnew Wharf	Aug-18	✓			Station decommissioned at land owner's request.
Wonboyn Lake	Oct-18	✓		✓	New station installed, with Cloud data transfer/hosting and high frequency transfer, replacing legacy systems.

4.3 Data provision

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

- the public webpages of MHL, CCSD and BoM, providing near real-time access to a limited sample of data
- email correspondence and file transfer protocol (FTP)
- 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: https://mhlfit.net.

Water level data is provided to CCSD and the SES through the following methods:

- CCSD 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.

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 NSW Roads and Maritime Services.

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

During 2018–2019:

- MHL received in excess of 75,000 visits per month to its website
- MHL served in excess of 152,000 webpage hits per month to customers and to the public
- approximately 1.8 million individual webpage hits were recorded from the public (excluding customers) in 2018–2019.

5. Water level monitoring summary

5.1 Data capture performance

Water level data presented by MHL is collected, analysed and subjected to a strict quality assurance process in accordance with MHL's internal standards and work instructions. This process results in a quality code which is assigned to all water level data, as described in Table 3 below. Access to site and time specific station records, with quality codes is described in Section 3.

During 2018–2019, the overall data capture across the network, for data with a quality code of 162 or better, was 97.8%. Table 4 *Index of figures* provides data capture percentages for each river and estuary network. Missing or poor quality data 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 gauging stations.

Automatic recorded water level data is typically recorded to a resolution that is higher than the actual level of certainty. A sensor may record data to three decimal places (measured in metres). However, due to systematic and random uncertainties involved in the collection of the data and the environment, data values may only be accurate to two decimal places. These uncertainties are accounted for through MHL's quality control and quality assurance processes.

Table 3 MHL data quality code descriptions

Quality code		Water level*
55	Records processed to	±20 mm
100	Data from previous MHL database, processed to	±20 mm
105	Records processed to	±50 mm
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	>±50 mm
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.

5.2 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’, upstream of tidal influence or behind weirs, and dominated by dramatic water level fluctuations during low frequency flood events).

Review by the reader of MHL2100 concurrently with this publication, and familiarity with environmental factors in interpretation of the presented data, is recommended to assist interpretation for the station of interest.

Report MHL2546 *Review of NSW OEH Automatic Water Level Recorder Network* (March 2019) provides metadata including the operating history and equipment at each automatic water level recorder currently operated and maintained by MHL.

Refer to Report MHL2693 *NSW Ocean and River Entrance Tidal Levels Annual Summary 2018–2019*, for annual water level data at ocean tide classified sites.

5.3 Water level monitoring summary

This section documents locality maps and quality assured water level monitoring summaries for each station. Table 4 and Table 6 provide indexes to the figures presented.

Table 4 Index of figures

	Figure
Typical gas purge station	1
Typical solid state Floatwell station	2
Typical submersible water level station	3
Typical radar/ultrasonic station	4
Data transfer schematic – existing and design state	5

River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Tweed River Region						93.2	6
Broadwater	Cobaki	201448	56	549344	6883128	AHD		7
Terranora Inlet	Dry Dock	201428	56	550715	6881235	AHD		8
Tweed River	Terranora	201447	56	548955	6880384	AHD		9
Tweed River	Tweed Entrance South	201472	56	554109	6883772			*
Tweed River	Letitia 2A	201429	56	554309	6882407	AHD		10
Tweed River	Barneys Point	201426	56	554110	6877710	AHD		11
Tweed River	Tumbulgum	201432	56	545172	6871999	AHD		12
Tweed River	North Murwillumbah	201420	56	539329	6866467	AHD		13
Tweed River	Bray Park Weir	201455	56	536209	6864484	AHD		14

River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Tweed River	Murwillumbah Bridge	201465	56	539219	6866353	AHD		15
Rous River	Kynnumboon	201422	56	538179	6867895	AHD		16
Cudgen Lake	Bogangar	202416	56	554698	6866441	AHD		17
Cudgen Creek	Kingscliff	202418	56	557030	6873280	AHD		18
Station Locality Map	Brunswick River Region						100.0	19
Marshalls Creek	Orana Bridge	202475	56	553611	6845534	AHD		20
Marshalls Creek	Billinudgel	202400	56	551554	6847116	AHD		21
Brunswick River	Brunswick Heads	202403	56	554078	6843182			*
Brunswick River	Mullumbimby	202402	56	548580	6841766	AHD		22
Station Locality Map	Richmond River Region						99.5	23
Lennox Head	Lake Ainsworth	203455	56	557863	6816160	AHD		24
Richmond River	Ballina Breakwall	203425	56	556992	6805681			*
Richmond River	Missingham Bridge	203465	56	556161	6806420	AHD		25
Richmond River	Byrnes Point	203461	56	551362	6805886	AHD		26
Richmond River	Wardell	203468	56	545282	6797087	AHD		27
Richmond River	Woodburn	203412	56	533496	6784089	AHD		28
Evans River	Evans River Fishing Co-op	203462	56	542250	6778375	AHD		29
Evans River	Iron Gates	203475	56	539700	6778241	AHD		30
Tucombil Canal	Tucombil Highway Bridge	203480	56	532949	6782596	AHD		31
Rocky Mouth Creek	Rocky Mouth Creek	203432	56	531748	6781331	AHD		32
Richmond River	Bungawalbin	203450	56	527031	6788276	AHD		33
Bungawalbin Creek	Bungawalbin Creek	2034133	56	516561	6776508	AHD		34
Richmond River	Coraki	203403	56	527981	6793775	AHD		35
Wilsons River	East Gundurimba	203427	56	526034	6809079	AHD		36
Leycester Creek	Tuncester	203443	56	523441	6814619	AHD		37
Wilsons River	Woodlawn College	203402	56	529528	6815751	AHD		38
Station Locality Map	Clarence River Region						94.0	39
Clarence River	Yamba	204454	56	535118	6744433			*

River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Tasman Sea	Lord Howe Island	240402	57	505521	6512362			*
Clarence River	Oyster Channel	204451	56	530468	6744254	AHD		40
Clarence River	Maclean	204410	56	518999	6741473	AHD		41
Clarence River	Lawrence	204453	56	510259	6736948	AHD		42
Clarence River	Tyndale	204465	56	512580	6729227	AHD		43
Clarence River	The Avenue Upstream	204475	56	507150	6714123	AHD		44
Clarence River	The Avenue Downstream	204476	56	507174	6714140	AHD		45
Clarence River	Brushgrove	204406	56	507508	6729089	AHD		46
Clarence River	Ulmarra	204480	56	502596	6722105	AHD		47
Clarence River	Grafton	204400	56	493388	6715141	AHD		48
Clarence River	Rogans Bridge	204414	56	488813	6723401	AHD		49
Palmers Channel	Palmers Island Bridge	204426	56	525780	6744108	AHD		50
Lake Wooloweyah	Lake Wooloweyah	204485	56	533141	6739053	AHD		51
Station Locality Map	Woolgoolga Region						98.1	52
Wooli River	Wooli Entrance	205462	56	525680	6693338	AHD		53
Wooli River	Wooli Caravan Park	205463	56	524551	6697797	AHD		54
Corindi River	Red Rock	205450	56	521919	6683065	AHD		55
Woolgoolga Lake	Woolgoolga Lake	205455	56	519091	6669486	AHD		56
Woolgoolga Creek	Woolgoolga	205441	56	515783	6668247	CTF		57
Moonee Creek	Moonee Creek	205435	56	514953	6658959	AHD		58
Station Locality Map	Coffs Harbour Region						98.6	59
Tasman Sea	Coffs Harbour	205470	56	514052	6647645			*
Coffs Creek	Coffs Creek Highway Bridge	205439	56	511160	6648716	AHD		60
Newports Creek	Newports Creek	205460	56	510016	6645652	AHD		61
Boambee Creek	Boambee	205438	56	507834	6643805	AHD		62
Boambee Creek	Boambee Entrance	205475	56	509896	6642068	AHD		63
Station Locality Map	Bellinger River Region						98.4	64
Bonville Creek	Bonville	205480	56	503975	6640378	AHD		65
Bellinger River	Repton	205403	56	502358	6632218	AHD		66
Bellinger River	Bellingen Bridge	205442	56	490336	6631224	AHD		67
Kalang River	Urunga	205407	56	501233	6626813	AHD		68
Kalang River	Upstream Newry Island	205458	56	497966	6625223	AHD		69
Kalang River	Kooroowi	205440	56	482967	6629647	AD		70

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Nambucca River Region						99.8	71
Deep Creek	Deep Creek	205485	56	500253	6613431	AHD		72
Nambucca River	Stuarts Island Downstream	205466	56	499519	6608564	AHD		73
Nambucca River	Macksville	205416	56	492382	6602967	AHD		74
Taylors Arm	Utungun	205414	56	485800	6600344	AHD		75
Nambucca River	Bowraville Downstream	205425	56	486768	6608695	AHD		76
Warrell Creek	Warrell Creek	205490	56	491986	6600076	AHD		77
Station Locality Map	Macleay River Region						100.0	78
Boringalla Creek	Boringalla Creek~	206450	56	496445	6586064	AHD		79
Macleay River	South West Rocks	206456	56	501638	6582579	AHD		80
Korogoro Creek	Hat Head	206465	56	505462	6563993	AHD		81
Saltwater Lagoon	Saltwater Lagoon	206460	56	506119	6582610	AHD		82
Macleay River	Smithtown	206406	56	494960	6568643	AHD		83
Macleay River	Kempsey	206402	56	485137	6561355	AHD		84
Macleay River	Aldavilla Downstream	206459	56	479318	6561231	AHD		85
Killick Creek	Crescent Head	207452	56	497704	6549628	AHD		86
Station Locality Map	Hastings River Region						96.9	87
Maria River	Green Valley	207406	56	486416	6540068	AHD		88
Wilson River	Telegraph Point	207415	56	481082	6534512	AHD		89
Port Macquarie	Port Macquarie	207420	56	491554	6523090			*
Hastings River	Settlement Point	207418	56	490636	6525312	AHD		90
Hastings River	Dennis Bridge Downstream	207444	56	482995	6525235	AHD		91
Hastings River	Wauchope Railway Bridge	207401	56	474995	6520192	AHD		92
Station Locality Map	Camden Haven Region						100.0	93
Lake Cathie	Lake Cathie	207441	56	486162	6509679	AHD		94
Camden Haven River	North Haven	207423	56	483134	6499413	AHD		95
Stingray Creek	West Haven	207437	56	480664	6499768	AHD		96
Camden Haven River	Laurieton	207425	56	480923	6497744	AHD		97
Camden Haven River	Logans Crossing	207428	56	470913	6502295	LWRD		98
Queens Lake	Lakewood	207475	56	477455	6500578	AHD		99
Watson Taylors Lake	Watson Taylors Lake	207480	56	475578	6491082	AHD		100

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Manning River Region						96.3	101
Tasman Sea	Crowdy Head Boat Harbour	208471	56	476348	6477414			*
Manning River	Harrington	208425	56	470255	6473391	AHD		102
Manning River	Croki	208404	56	461589	6473115	AHD		103
Manning River	Dumaresq Island	208430	56	454329	6470475	AHD		104
Manning River	Taree	208410	56	448687	6468633	AHD		105
Manning River	Wingham	208400	56	440559	6473212	AHD		106
Manning River	Mount George	208440	56	419229	6472262	LWRD		107
Dingo Creek	Ashlea Bridge Downstream	208436	56	433875	6476673	AD		108
Manning River	Farquhar Inlet	208415	56	461745	6466021	AHD		109
Station Locality Map	Great Lakes Region						99.5	110
Wallis Lake Entrance	Forster	209402	56	453635	6440173			*
Wallamba River	Tuncurry Downstream	209401D	56	450568	6442279	AHD		111
Wallamba River	Nabiac	209404	56	436831	6446432	AHD		112
Wallis Lake	Pacific Palms Wharf	209406	56	455401	6422551	AHD		113
Smiths Lake	Tarbuck Bay	209465	56	451548	6417906	AHD		114
Myall River	Bulahdelah	209460	56	425442	6413407	AHD		115
Myall River	Bombah Point	209475	56	434682	6403309	AHD		116
Station Locality Map	Port Stephens Region						100.0	117
Myall River	Tea Gardens	209480	56	421723	6385111	AHD		118
Karuah River	Karuah	209485	56	403411	6386503	AHD		119
Karuah River	Mallabula Point	209461	56	407770	6379228	AHD		120
Port Stephens	Shoal Bay	209474	56	422749	6379489			*
Station Locality Map	Hunter River Region						99.8	121
Hunter River	Stockton Bridge	210456	56	386238	6360819	AHD		122
Hunter River	Hexham Bridge	210448	56	376568	6368156	AHD		123
Williams River	Raymond Terrace	210452	56	382357	6375355	AHD		124
Williams River	Seaham	210462	56	381105	6385316	AHD		125
Hunter River	Green Rocks	210432	56	377459	6378142	AHD		126
Hunter River	Morpeth	210430	56	371590	6378484	AHD		127
Hunter River	McKimms Corner	210455	56	368191	6378929	AHD		128
Hunter River	Belmore Bridge	210458	56	364492	6377780	AHD		129

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Hunter River	Bolwarra Downstream	210451	56	365591	6380224	AHD		130
Hunter River	Bolwarra Upstream	210459	56	365828	6381130	AHD		131
Hunter River	Oakhampton Railway Bridge	210475	56	365866	6381600	AHD		132
Station Locality Map	Paterson River Region						99.5	133
Paterson River	Hinton Bridge	210410	56	373306	6379619	AHD		134
Paterson River	Dunmore	210409	56	369277	6383252	AHD		135
Paterson River	Paterson Railway Bridge	210406	56	370303	6392399	AHD		136
Paterson River	Gostwyck	210402	56	369088	6396074	AHD		137
Station Locality Map	Wallis Creek Region						95.1	138
Wallis Creek	Wallis Creek Upstream	210428	56	366420	6376950	AHD		139
Wallis Creek	Wallis Creek Downstream	210457	56	366440	6376997	AHD		140
Wallis Creek	Louth Park	210453	56	363251	6373693	AHD		141
Station Locality Map	Lake Macquarie Region						99.5	142
Lake Macquarie	Marmong Point	211460	56	370992	6350370	AHD		143
Cockle Creek	Cockle Railway Station	211455	56	371189	6354213	AHD		144
Cockle Creek	Barnsley Vale	211450	56	369036	6354808	AHD		145
Lake Macquarie	Belmont	211461	56	374287	6343446	AHD		146
Lake Macquarie	Swansea Channel	211462	56	373155	6338270	AHD		147
Dora Creek	Kalang Road	211475	56	358900	6338978	AHD		148
Dora Creek	Cooranbong	211470	56	355446	6339055	AHD		149
Stockton Creek	Morisset	211480	56	357710	6336566	AHD		150
Station Locality Map	Tuggerah Lakes Region						100.0	151
Wallarah Creek	Wallarah Creek Bridge	211420	56	360913	6323587	AHD		152
Tuggerah Lake	Toukley	211401	56	362599	6318531	AHD		153
Wyong River	Wyong Weir Upstream	211417	56	351596	6316778	AHD		154
Ourimbah Creek	Lees Bridge	211425	56	353684	6311538	AHD		155
Tuggerah Lake	Long Jetty	211418	56	358757	6308079	AHD		156
Tumbi Umbi Creek	Tumbi Umbi	211419	56	355321	6307480	AHD		157

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Brisbane Water Region						99.3	158
Narara Creek	Manns Road	211435	56	345890	6302955	AHD		159
Wamberal Lagoon	Wamberal Lagoon	212450	56	355526	6300283	AHD		160
Terrigal Lagoon	Terrigal Bridge	212455	56	355079	6298683	AHD		161
Avoca Lagoon	Avoca Lagoon	212452	56	354079	6296162	AHD		162
Cockrone Lake	Cockrone Lake	212453	56	353841	6292959	AHD		163
Worthing Ave Creek	Erina	212436	56	350150	6299610	AHD		164
Erina Creek	Punt Bridge	212433	56	347514	6298928	AHD		165
Brisbane Water	Ettalong	212423	56	346015	6290156	AHD		166
Brisbane Water	Koolewong 2	2124301	56	344273	6295029	AHD		167
Station Locality Map	Hawkesbury River Region						97.3	168
Hawkesbury River	Patonga	212440	56	339822	6286295			*
Hawkesbury River	Spencer	212431	56	327772	6296497	AHD		169
Hawkesbury River	Gunderman Caravan Park	212429	56	319440	6298151	AHD		170
Hawkesbury River	Wisemans Ferry	212460	56	312963	6304569	AHD		171
Hawkesbury River	Webbs Creek	212408	56	312331	6303939	AHD		172
Hawkesbury River	Colo Junction	212407	56	303223	6298183	AHD		173
Hawkesbury River	Sackville	212406	56	303203	6292012	AHD		174
Hawkesbury River	Ebenezer	212427	56	304388	6286030	AHD		175
Hawkesbury River	Windsor	212426	56	297588	6279514	AHD		176
Hawkesbury River	Freemans Reach	212410	56	294009	6283328	AHD		177
Nepean River	Castlereagh	212404	56	284495	6275964	AHD		178
Station Locality Map	Sydney North Region						86.6	179
Narrabeen Lagoon	Ocean Street Bridge	213408D	56	342897	6269396	AHD		180
Narrabeen Lagoon	Narrabeen Bridge	213422	56	342174	6268454	AHD		181
Dee Why Lagoon	Dee Why	213424	56	342725	6264718	AHD		182
Curl Curl Lagoon	Curl Curl	213426	56	342098	6262458	AHD		183
Manly Lagoon	Riverview Parade	213413	56	340504	6260456	AHD		184
Manly Lagoon	Queenscliff Bridge	213414	56	340963	6260561	AHD		185

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Lane Cove River	Fullers Bridge	213476	56	329370	6259278	AHD		186
Port Jackson	Sydney	213470	56	338842	6255833			*
Station Locality Map	Parramatta River and Cooks River Region						98.5	187
Parramatta River	Silverwater Bridge	213435	56	319683	6255592	AHD		188
Cooks River	Canterbury Road	213411	56	325944	6245849	AHD		189
Cooks River	Illawarra Road Bridge	213420	56	328303	6244862	AHD		190
Cooks River	Tempe Bridge	213415	56	329694	6244231	AHD		191
Station Locality Map	Georges River Region						98.9	192
Georges River	Picnic Point Downstream	213410D	56	315269	6237999	AHD		193
Georges River	Como Bridge	213425	56	321829	6236499	AHD		194
Georges River	Milperra	213405	56	313222	6244042	AHD		195
Prospect Creek	Lansdowne Bridge	213402	56	312039	6248143	AHD		196
Georges River	Lansvale	213401	56	311150	6247099	AHD		197
Cabramatta Creek	Irelands Bridge	213407	56	309832	6246486	AHD		198
Georges River	Scrivener Street	213404	56	309137	6244541	AHD		199
Georges River	Liverpool Weir	213400	56	308514	6244022	AHD		200
Port Hacking	Bundeena	214452	56	329394	6227133			*
Station Locality Map	Wollongong Region						100.0	201
Hewitts Creek	Hewitts Creek Upstream	214410	56	308179	6200428	AHD		202
Hewitts Creek	Hewitts Creek Downstream	214411	56	308179	6200428	AHD		203
Hewitts Creek	Hewitts Creek Entrance	214408	56	308991	6199982	AHD		204
Cabbage Tree Creek	Balgownie Road	214409	56	305367	6192700	AHD		205
Bellambi Lake	Bellambi	214488	56	308722	6194180	AHD		206
Towradgi Creek	Towradgi Creek Upstream	214477	56	307608	6193627	AHD		207
Towradgi Creek	Towradgi Creek Downstream	214475	56	307608	6193627	AHD		208
Cabbage Tree Creek	Cabbage Tree Creek Upstream	214405	56	306275	6191832	AHD		209
Cabbage Tree Creek	Cabbage Tree Creek Downstream	214406	56	306275	6191832	AHD		210
Fairy Creek	Fairy Creek Upstream	214403	56	306351	6189967	AHD		211

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Fairy Creek	Fairy Creek Downstream	214404	56	306351	6189967	AHD		212
Byarong Creek	Byarong Creek	214420	56	303773	6186987	AHD		213
Byarong Creek	Koloona Avenue Upstream	214425	56	302909	6189424	AHD		214
Byarong Creek	Koloona Avenue Downstream	214426	56	302909	6189424	AHD		215
American Creek	Blackmans Parade Upstream	214430	56	301043	6185312	AHD		216
American Creek	Blackmans Parade Downstream	214431	56	301043	6185312	AHD		217
Station Locality Map	Lake Illawarra Region						94.4	218
Mullet Creek	Mullet Creek	214400	56	298397	6182420	AHD		219
Lake Illawarra	Koonawarra Bay	214440	56	300464	6179788	AHD		220
Lake Illawarra	Cudgeree Bay	214416	56	303934	6177233	AHD		221
Lake Illawarra	Lake Illawarra Entrance	214417	56	304579	6176195	AHD		222
Macquarie Rivulet	Princes Highway	214402	56	296808	6174979	AHD		223
Little Lake	Little Lake Entrance	214467	56	304250	6173571	AHD		224
Station Locality Map	Kiama Region						100.0	225
Minnamurra River	Minnamurra	214442	56	303031	6167146	AHD		226
Werri Lagoon	Werri Lagoon	214445	56	301816	6155035	AHD		227
Crooked River	Gerroa	215410	56	299419	6150158	AHD		228
Station Locality Map	Shoalhaven River Region						99.6	229
Shoalhaven River	Shoalhaven Heads	215470	56	293877	6140761	AHD		230
Shoalhaven River	Hay Street	215415	56	292468	6140163	AHD		231
Shoalhaven River	Terara	215420	56	283258	6139535	AHD		232
Shoalhaven River	Nowra Bridge	215411	56	280834	6139287	AHD		233
Shoalhaven River	Grady's Caravan Park	215430	56	268094	6138339	AHD		234
Crookhaven River	Crookhaven Heads	215408	56	295288	6135156			*
Crookhaven River	Greenwell Point	215417	56	293199	6134901	AHD		235
Wollumboola Lake	Wollumboola	215454	56	295853	6131507	AHD		236

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River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Jervis Bay Region						98.7	237
Currarong Creek	Currarong Creek	216405	56	301142	6122850	AHD		238
Jervis Bay	Jervis Bay	216470	56	291092	6111027			*
St Georges Basin	Island Point	216415	56	280748	6113511	AHD		239
Sussex Inlet	Sussex Inlet	216412	56	280903	6105512	AHD		240
Swan Lake	Swan Lake	216425	56	277905	6102577	AHD		241
Station Locality Map	Ulladulla Region						100.0	242
Lake Conjola	Lake Conjola Downstream	216420D	56	272446	6094316	AHD		243
Narrawallee Inlet	Narrawallee	216430	56	269839	6090673	AHD		244
Tasman Sea	Ulladulla Boat Harbour	216471	56	270710	6084368			*
Burrill Lake	Burrill Lake Bridge	216435	56	267949	6080931	AHD		245
Lake Tabourie	Lake Tabourie	216440	56	264310	6074957	AHD		246
Station Locality Map	Batemans Bay Region						100.0	247
Durras Lake	Durras Lake	216445	56	255304	6052185	AHD		248
Clyde River	Nelligen	216453	56	241369	6050944	AHD		249
Clyde River	Princess Jetty	216410	56	244664	6045231			*
Station Locality Map	Moruya River Region						90.4	250
Tomaga River	George Bass Drive	216455	56	245110	6031671	AHD		251
Moruya River	Moruya Bridge	217410	56	236703	6022317	AHD		252
Moruya River	Moruya Hospital	217402	56	235673	6022790	AHD		253
Station Locality Map	Coila and Tuross Lakes						94.6	254
Coila Lake	Coila Lake	218405	56	242279	6006865	AHD		255
Tuross River	Tuross Head	218410	56	240898	6005120	AHD		256
Station Locality Map	Wagonga Inlet and Wallaga Lake						93.9	257
Wagonga Inlet	Barlows Bay	218415	56	239464	5988955	AHD		258
Wallaga Lake	Regatta Point	219405	56	236881	5971060	AHD		259
Station Locality Map	Bermagui and Bega River Region						100.0	260
Bermagui Harbour	Bermagui	219470	56	237453	5964777			*
Bega River	Bega River	219410	55	766022	5933969	AHD		261

River/estuary system	Station name	Station no	MGA zone	Easting	Northing	Datum	Data capture%^	Figure
Station Locality Map	Eden Region						99.0	262
Back Lagoon	Back Lagoon	219415	55	759851	5914073	AHD		263
Merimbula Lake	Merimbula Wharf	220410	55	759296	5913048	AHD		264
Merimbula Lake	Merimbula Lake	220405	55	756507	5913260	AHD		265
Pambula Lake	Pambula Lake	220415	55	756744	5905022	AHD		266
Tasman Sea	Eden Boat Harbour	220470	55	758557	5893267			*
Lake Curalo	Lake Curalo	220420	55	758414	5895364	AHD		267
Wonboyn Lake	Agnew Wharf	220425	55	759146	5873220	AHD		268
Wonboyn Lake	Wonboyn Lake	220452	55	758839	5873472	AHD		269

* See Report MHL2693 NSW Ocean and River Entrance Tidal Levels Annual Summary 2018–2019

^ Data capture percentages do not include ocean tide stations

~ Boringalla Creek station has been previously known as Borirgala Creek. The update to the spelling is based on information provided by the NSW Geographical Names Board in October 2019.

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

Water level readings for all the estuaries are available in AHD with the exception of Logans Crossing and Mount George, which are in the local water resources datum (LWRD); Kooroowi and 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 5. AHD levels were calculated circa 1990 for MHL by NSW Public Works Survey, using 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 5 Summary of adjustment from AHD to local datum

River/estuary	Station	Local datum *	Adjustment AHD 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
Wyong River	Wyong Weir Upstream	WC	-0.930
Parramatta River	Silverwater Bridge	ZFD	+0.925
Georges River	Liverpool Weir	WC	-2.762

*TRHD - Tweed River Hydro Datum, BRFMD - Brunswick River Flood Mitigation Datum, RRVD - Richmond River Valley Datum, PSHD - Port Stephens Hydro Datum, WC – Weir Crest Datum, ZFD – Zero Fort Denison

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Table 6 Index of Appendix B figures

Sample water level data outputs	Figure
Standard Water Level Plot	B1
Standard Water Level Printout	B2
Predicted Versus Actual Water Level	B3
Typical Flood Hydrograph	B4
Flood Level Statistics	B5
Tidal Plane Analysis: Harmonic Constituents	B6
Typical Tidal Plane Analysis	B7
Frequency Distribution Analysis	B8
Typical Frequency Distribution Plots	B9
Rainfall-Water Level Correlation	B10
MHLFIT Flood Intelligence Tool	B11
Sample Water Quality Plots	B12

© Crown 2019

TYPICAL GAS PURGE STATION

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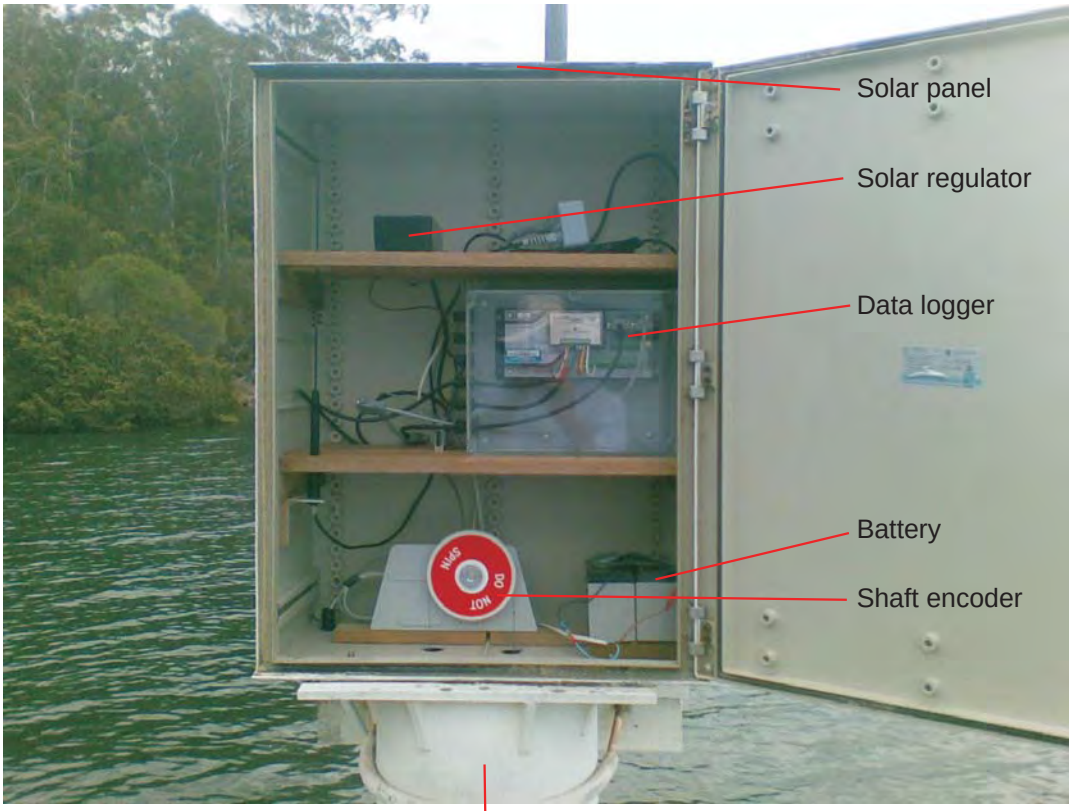
Figure 1

DRAWING 2696-01.cdr



300mm diameter PVC stilling well - inside is a float
(150mm diameter) and a counterweight (200g)

NSW GOVERNMENT

TYPICAL SOLID STATE FLOATWELL STATION

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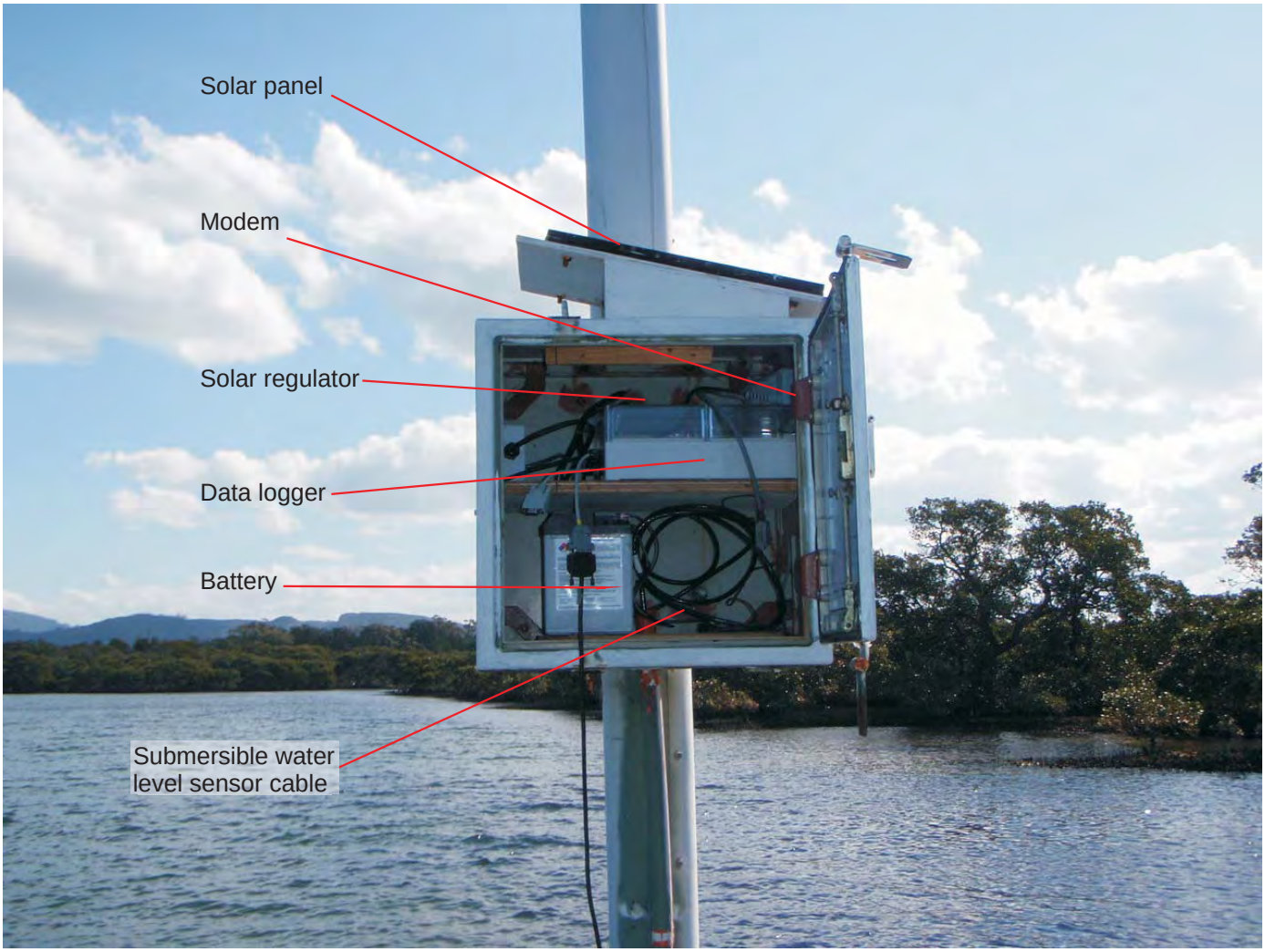
Figure

2

DRAWING 2696-02.cdr



NSW GOVERNMENT

TYPICAL SUBMERSIBLE WATER LEVEL STATION

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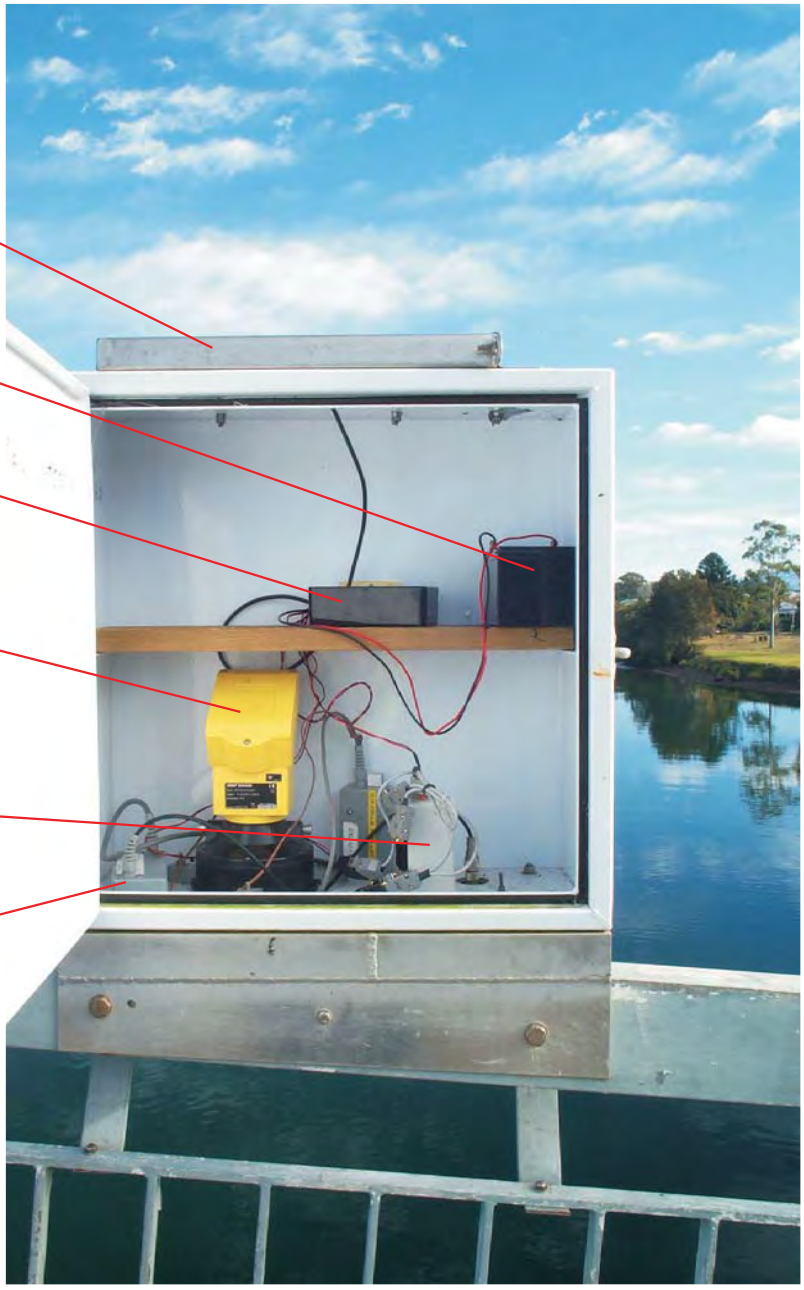
Figure 3

DRAWING 2696-03.cdr



NSW GOVERNMENT

TYPICAL RADAR/ULTRASONIC STATION

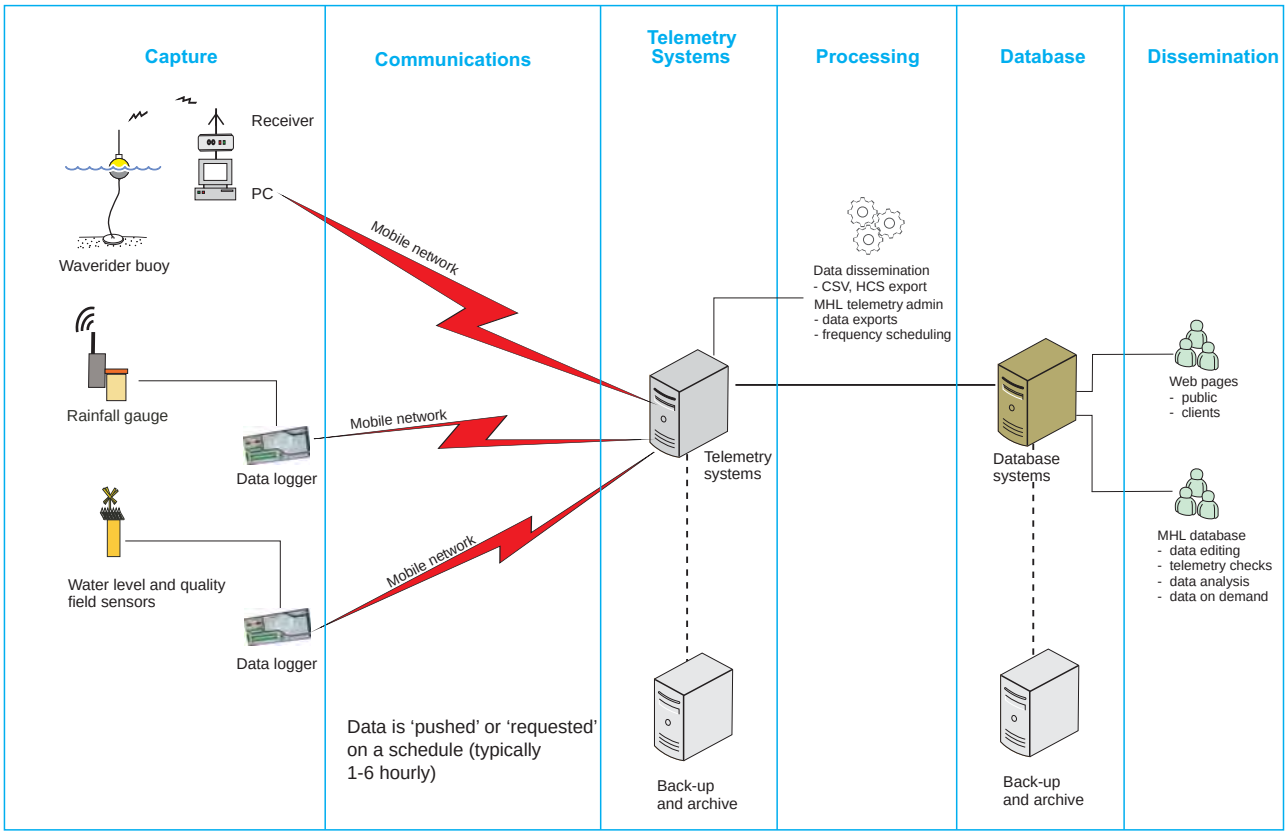
Manly Hydraulics Laboratory

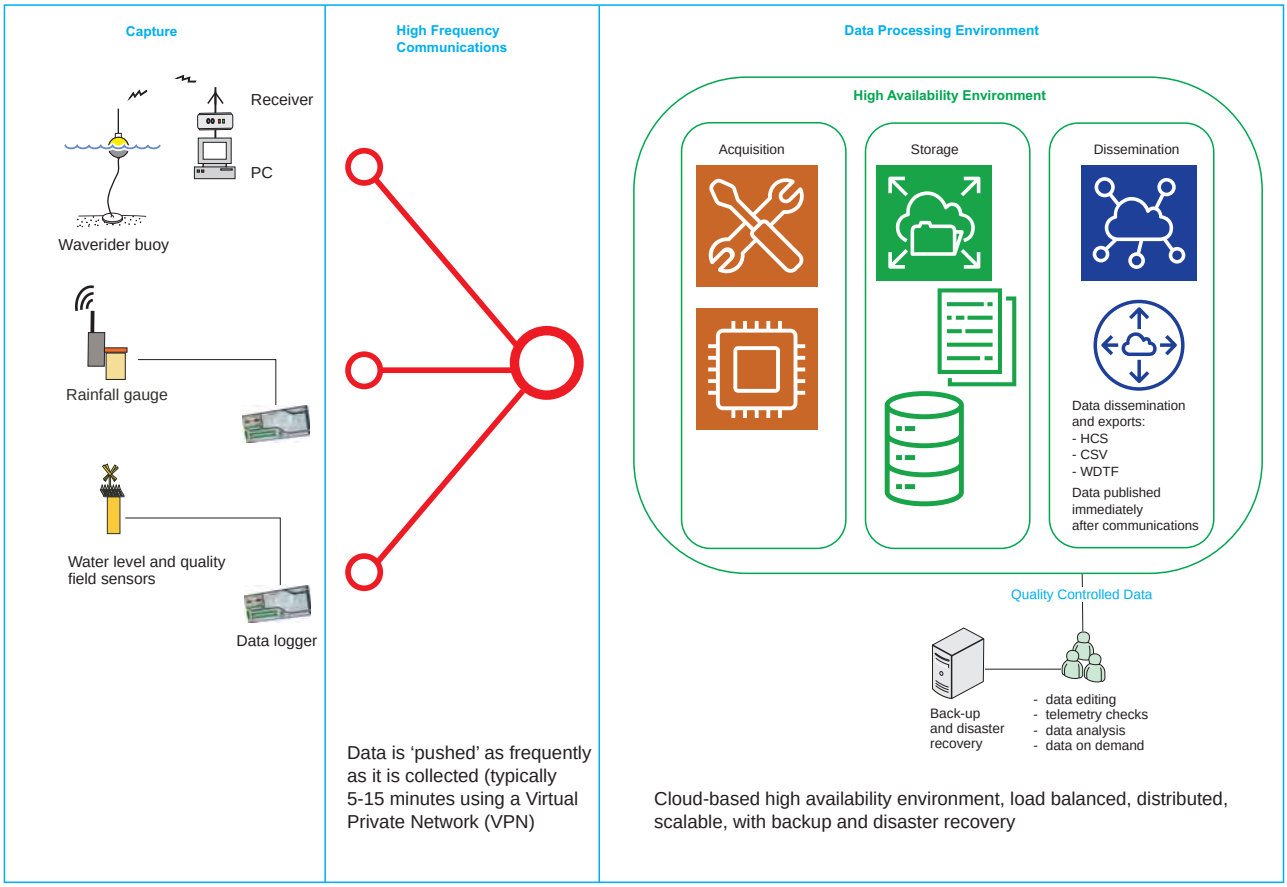
Report MHL2692

Figure

4

DRAWING 2696-04.cdr





NSW GOVERNMENT

DATA TRANSFER SCHEMATIC
EXISTING (upper) AND DESIGN STATE (lower)

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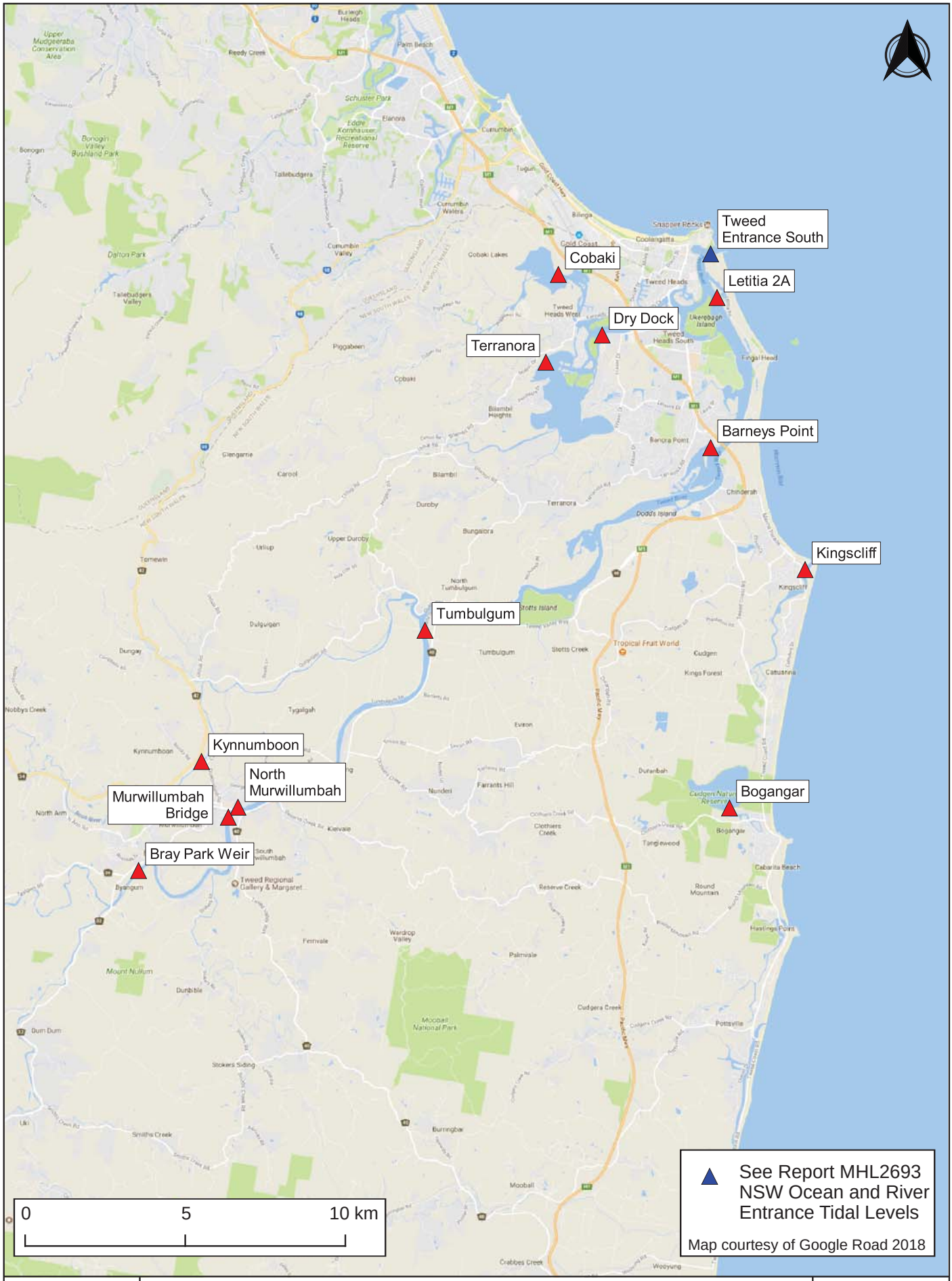
Figure 5

DRAWING 2696-05.cdr



NSW GOVERNMENT

STATION LOCATIONS
TWEED RIVER REGION

Manly Hydraulics Laboratory

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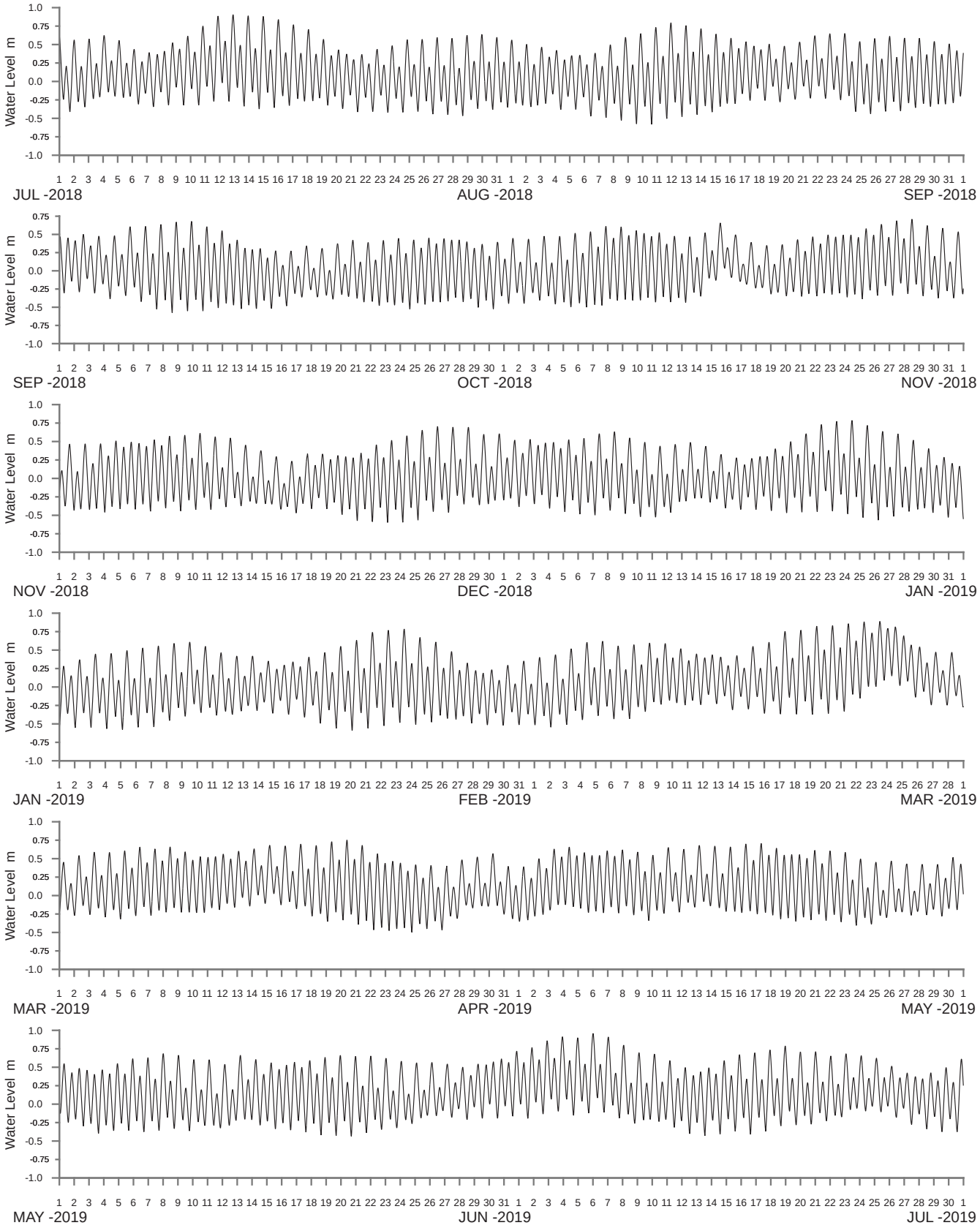
Figure
6

DRAWING 2692-06.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

BROADWATER AT COBAKI
2018–2019

Manly Hydraulics Laboratory

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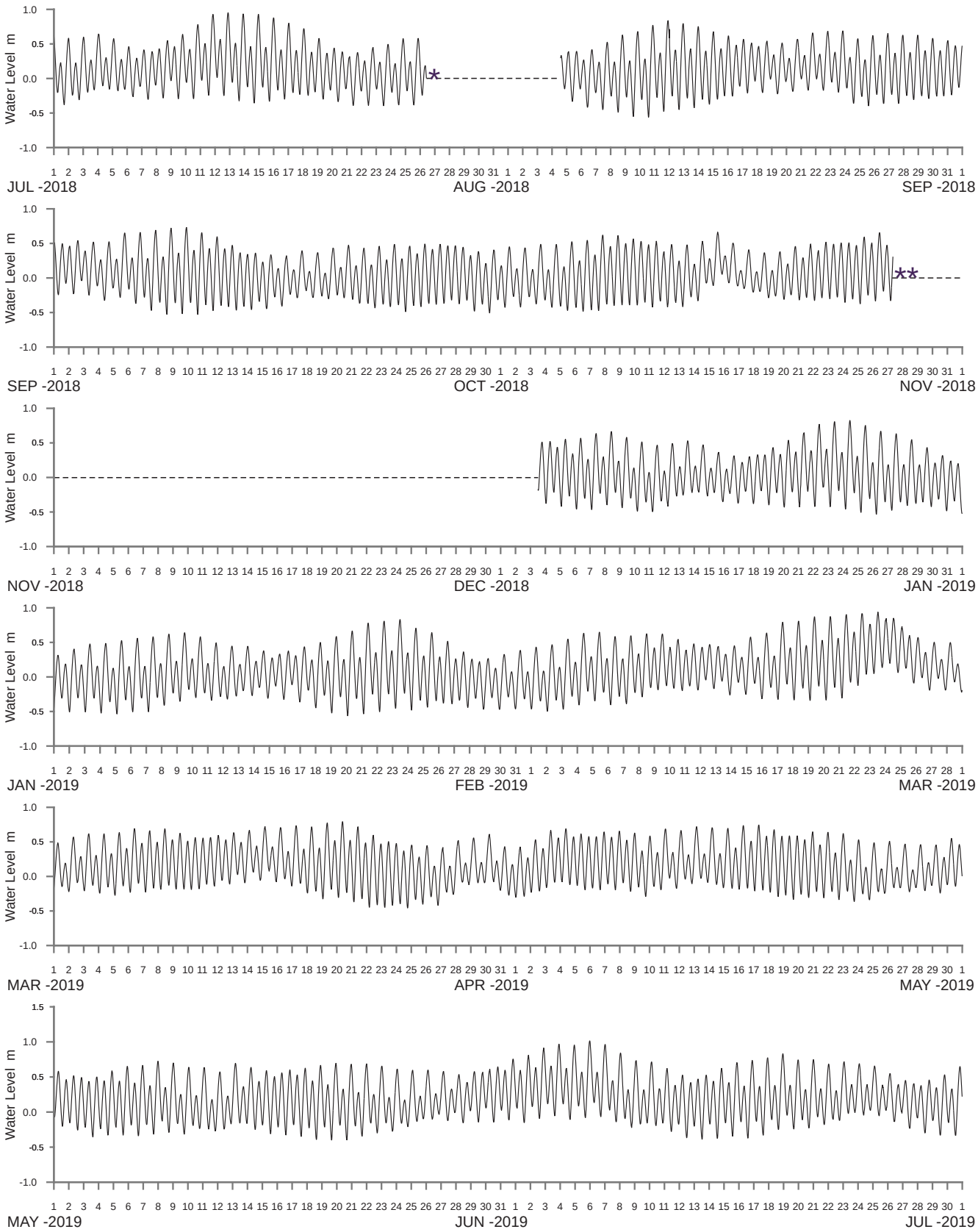
Figure
7

DRAWING 2692-07.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to shaft encoder failure **Data loss due to floatwell malfunction

NSW GOVERNMENT

TERRANORA INLET AT DRY DOCK
2018–2019

Manly Hydraulics Laboratory

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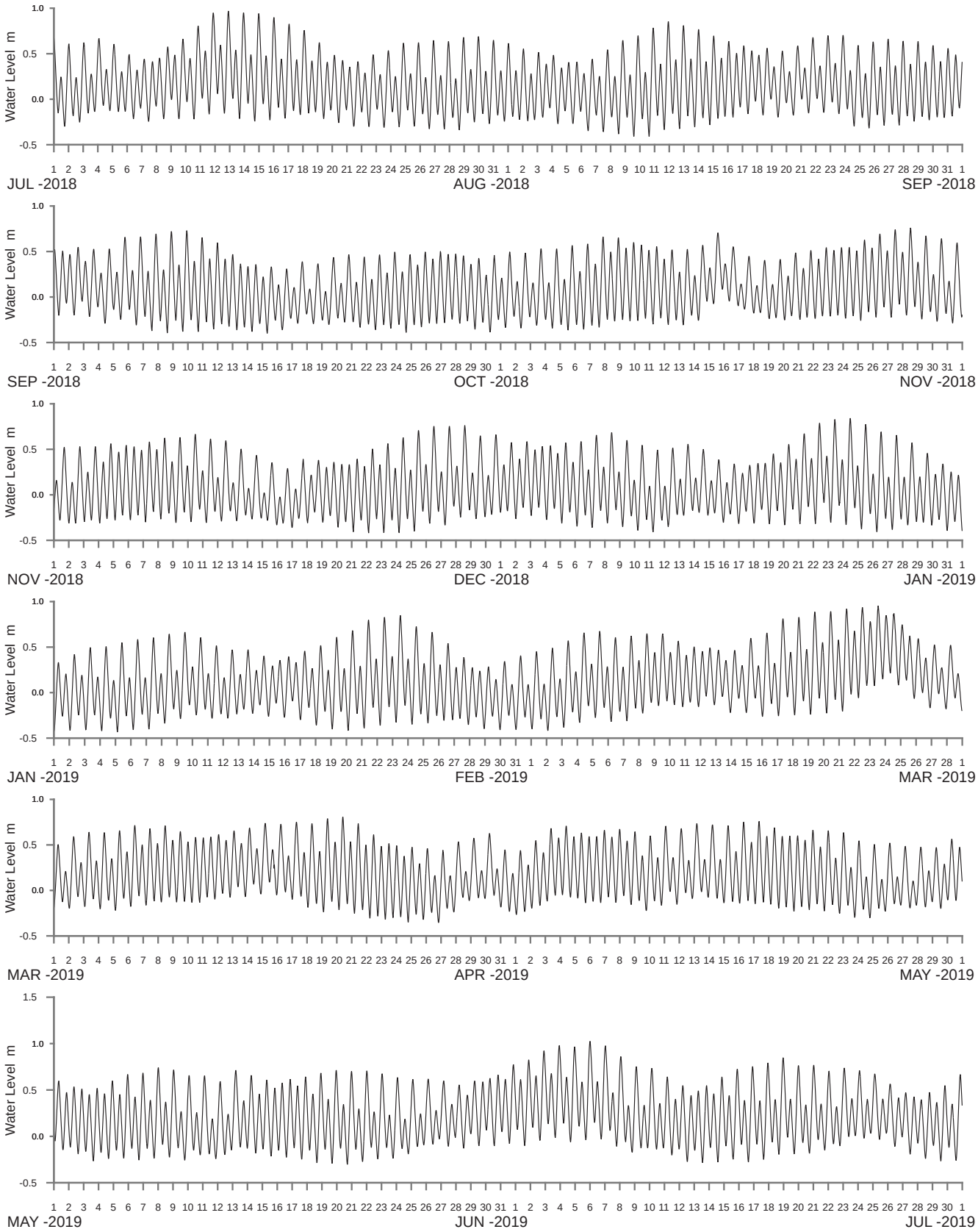
Figure 8

DRAWING 2692-08.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

TERRANORA INLET AT TERRANORA
2018–2019

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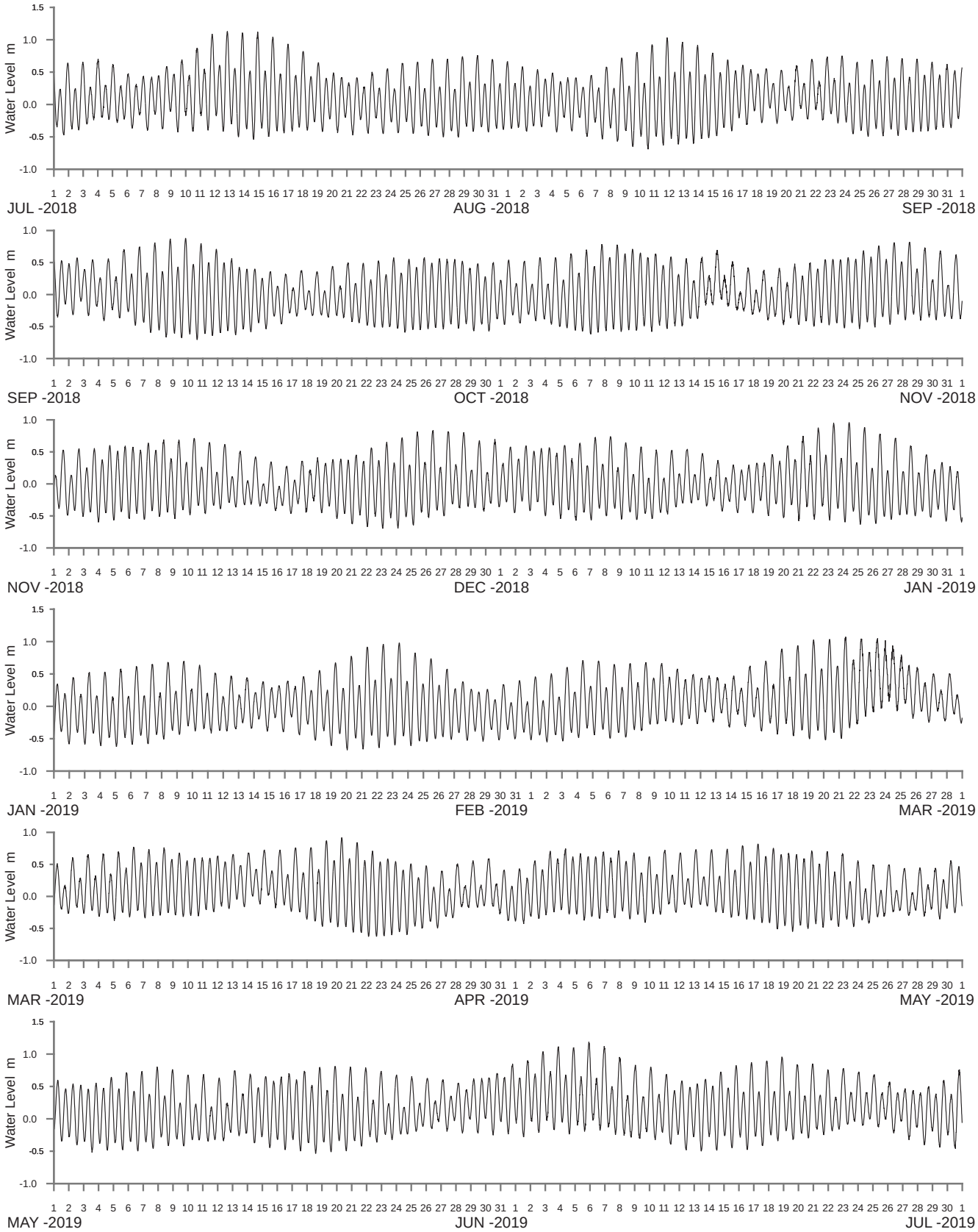
Figure 9

DRAWING 2692-09.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

TWEED RIVER AT LETITIA 2A
2018–2019

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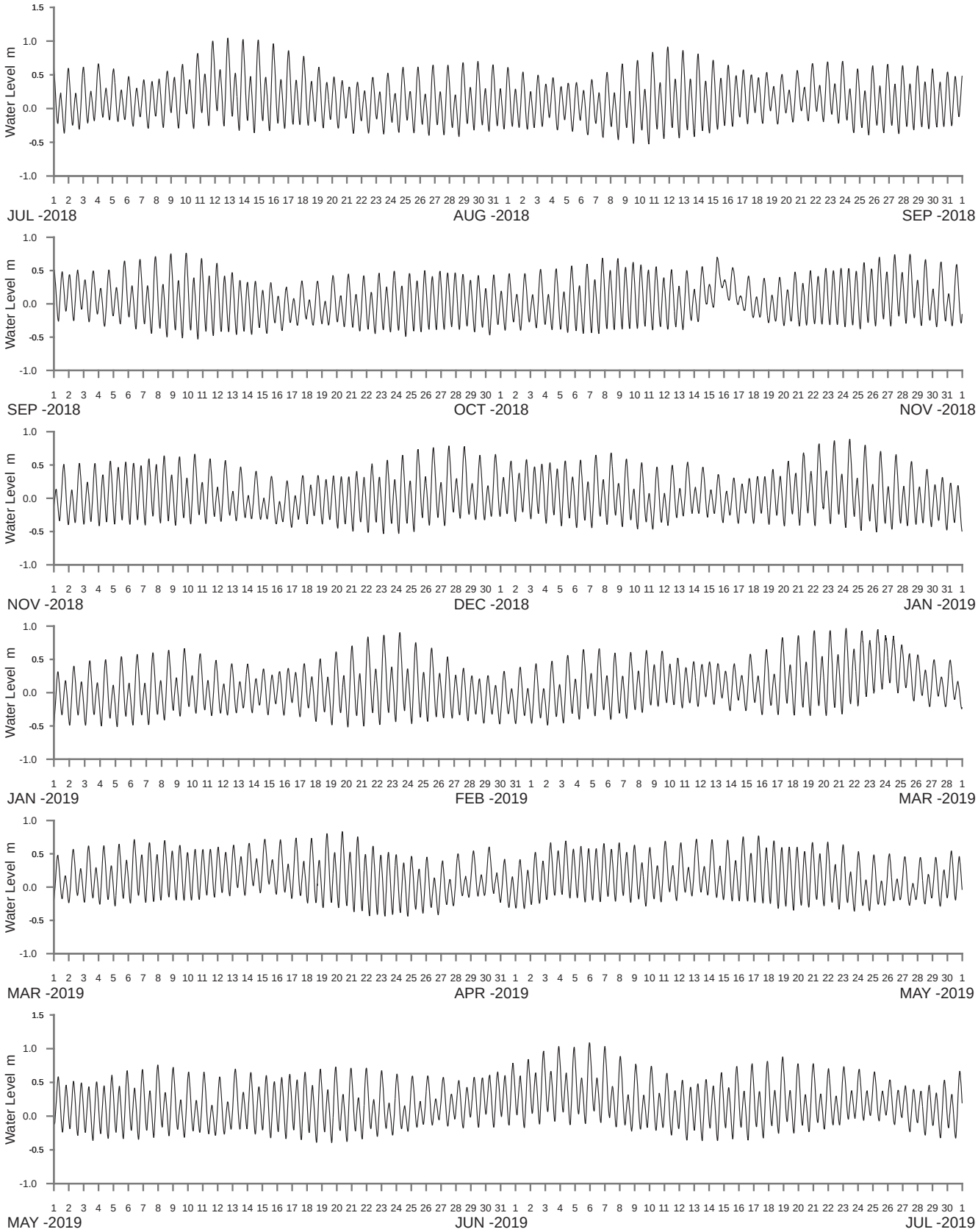
Figure
10

DRAWING 2692-10.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

TWEED RIVER AT BARNEYS POINT
2018–2019

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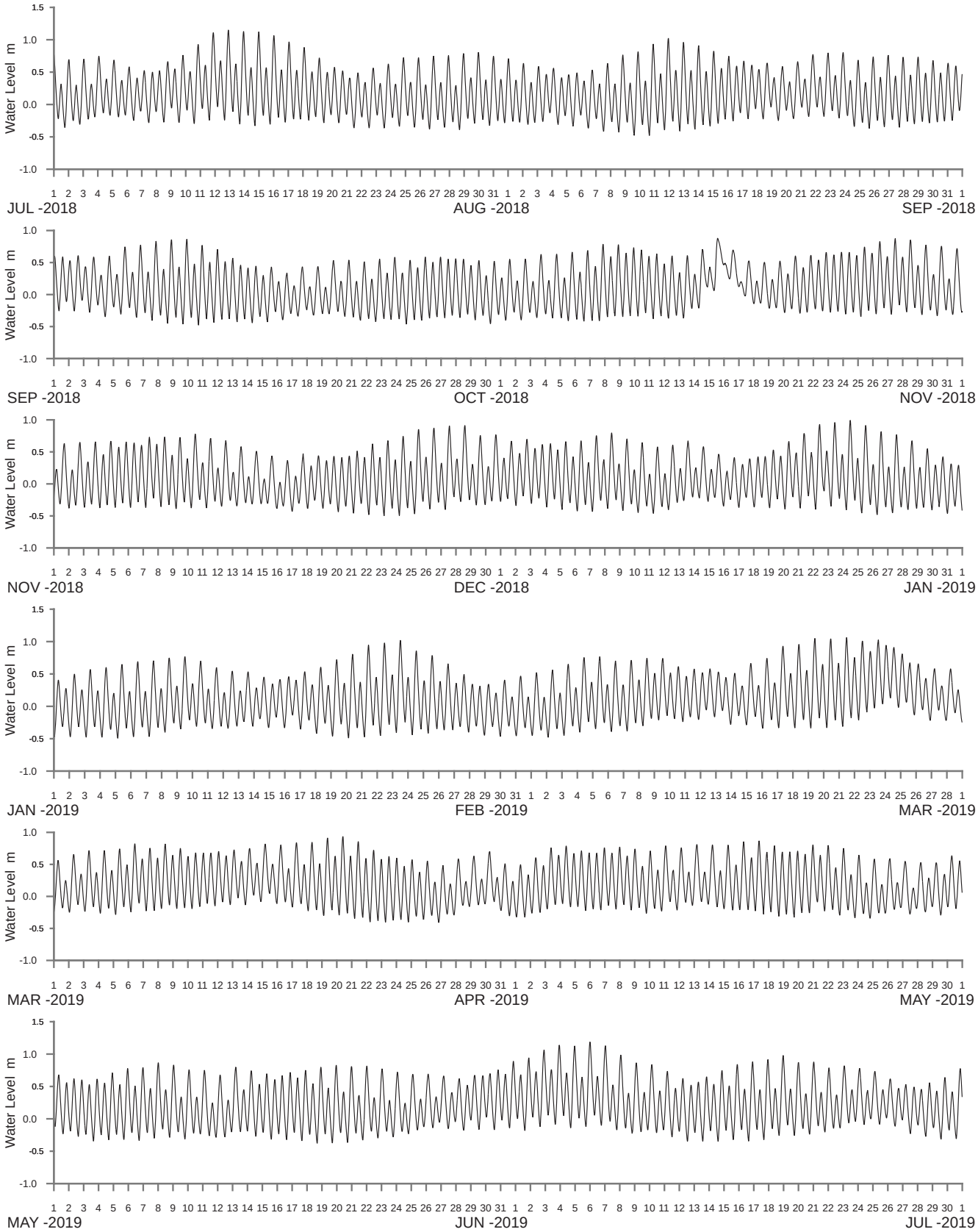
Figure
11

DRAWING 2692-11.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

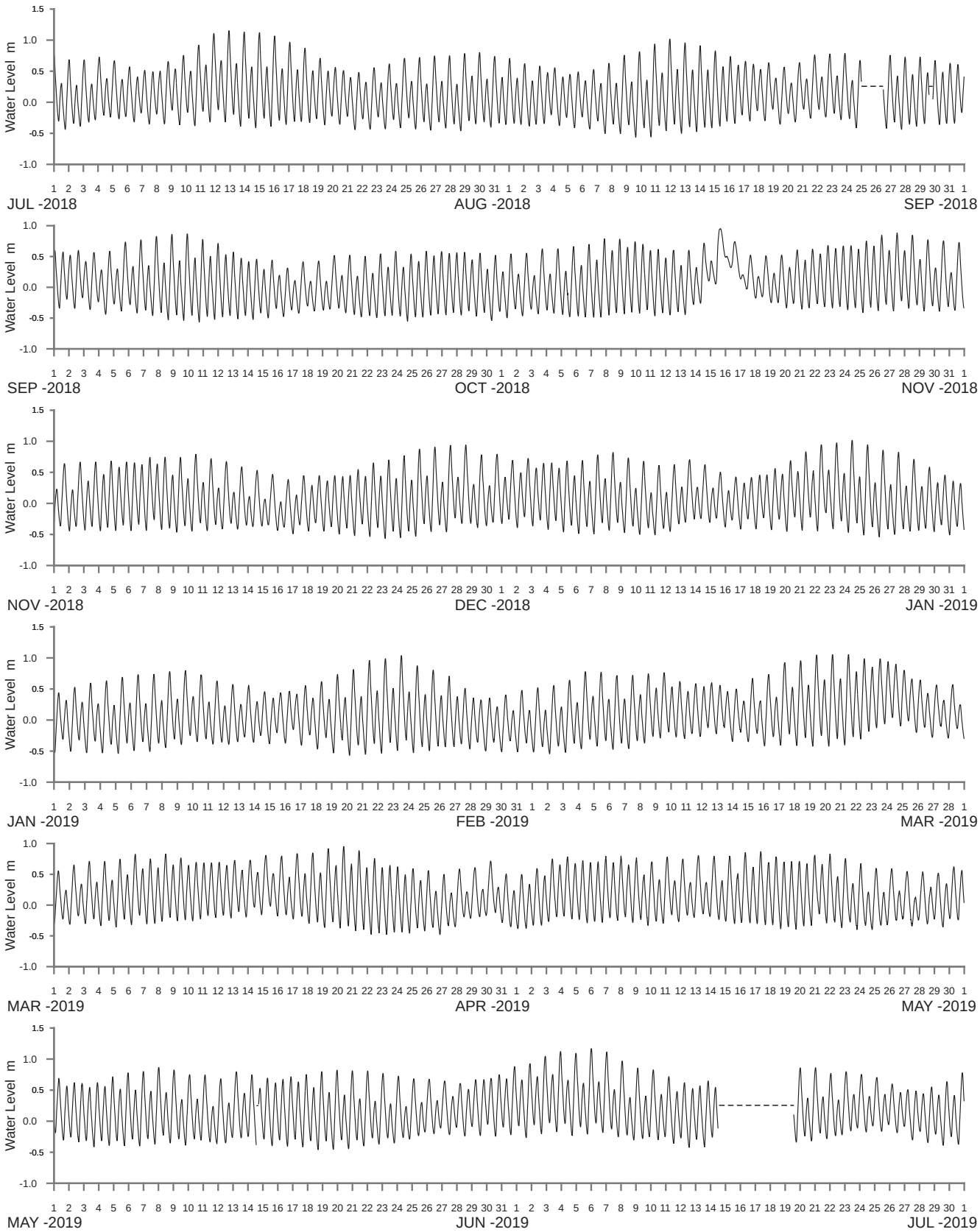
TWEED RIVER AT TUMBULGUM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
12

DRAWING 2692-12.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

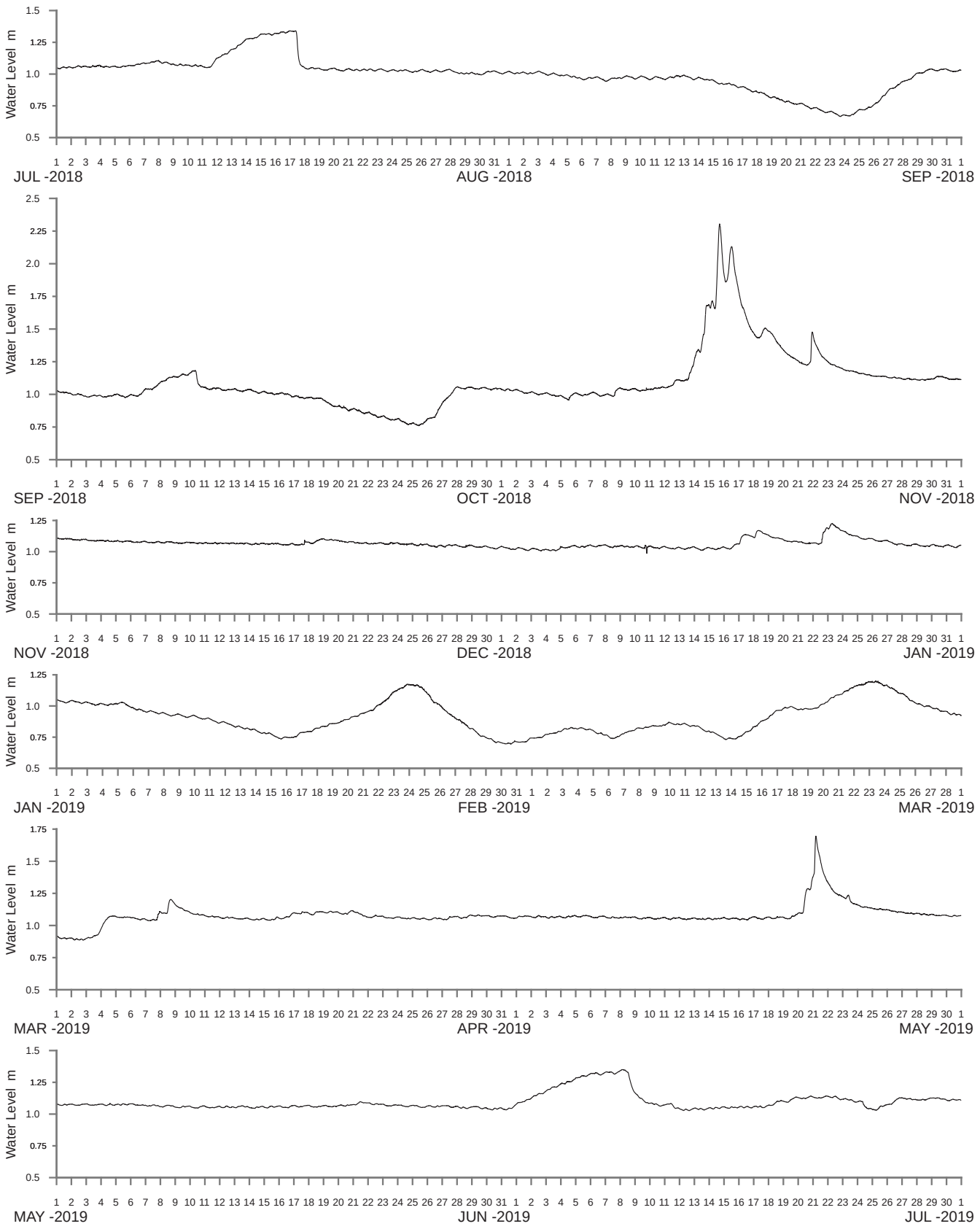
TWEED RIVER AT NORTH MURWILLUMBAH
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
13

DRAWING 2692-13.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

Weir crest height is approximately 1m AHD

NSW GOVERNMENT

TWEED RIVER AT BRAY PARK WEIR
2018–2019

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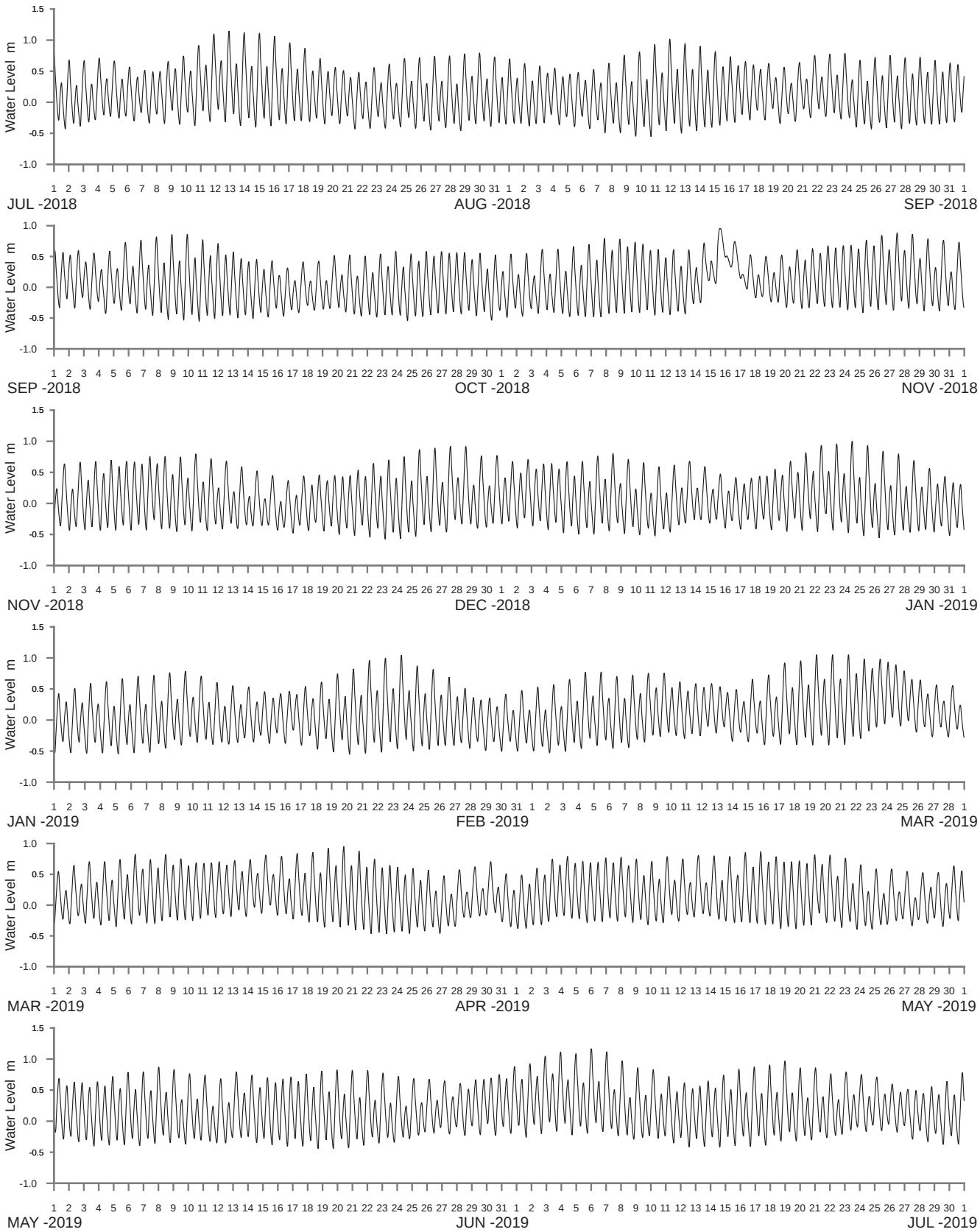
Report MHL2692

Figure 14

DRAWING 2692-14.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

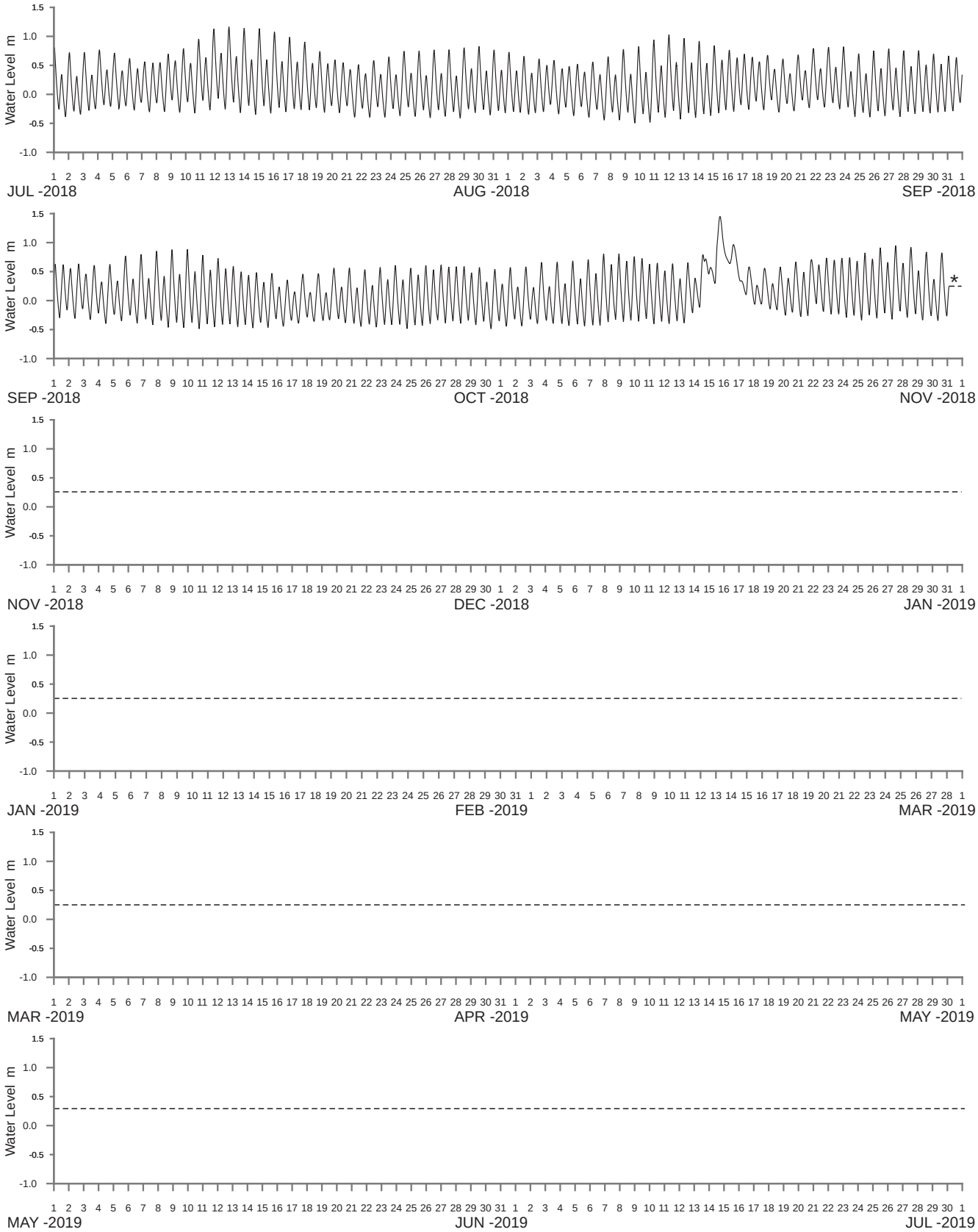
TWEED RIVER AT MURWILLUMBAH BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 15

DRAWING 2692-15.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Radar station damaged during truck accident. Reinstallation delayed due to bridge repair work.

NSW GOVERNMENT

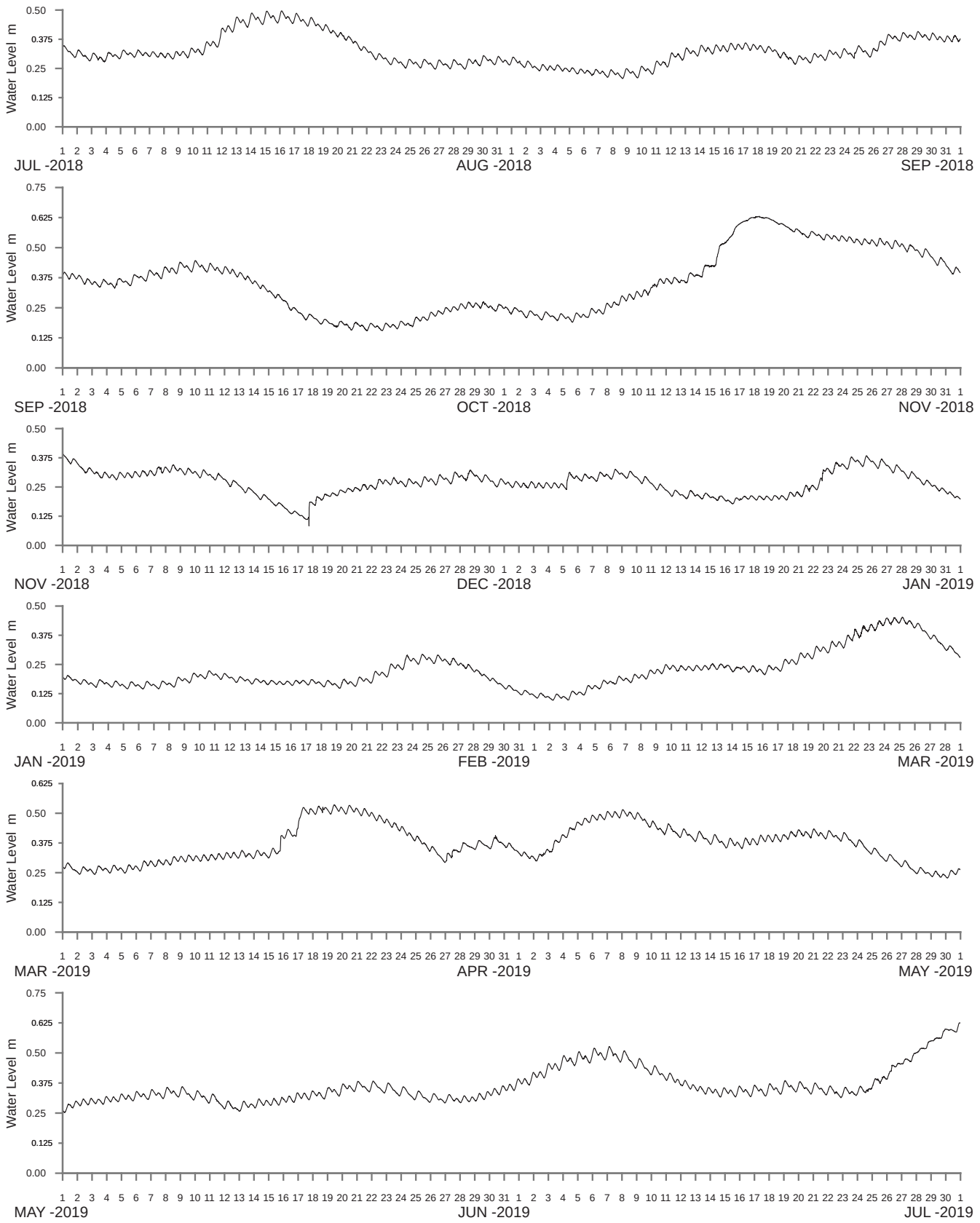
ROUS RIVER AT KYNNUMBOON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 16

DRAWING 2692-16.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

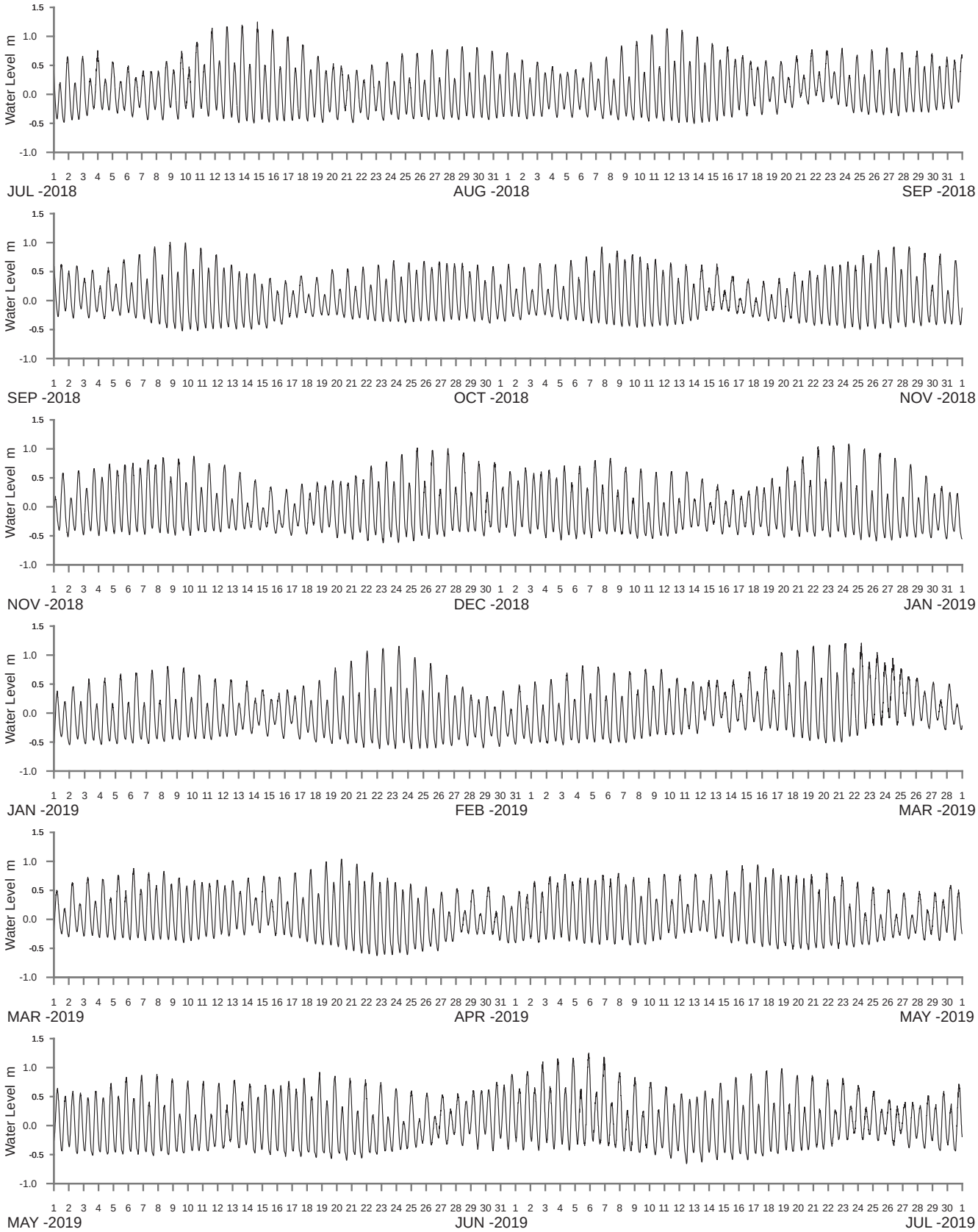
CUDGEN LAKE AT BOGANGAR
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 17

DRAWING 2692-17.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

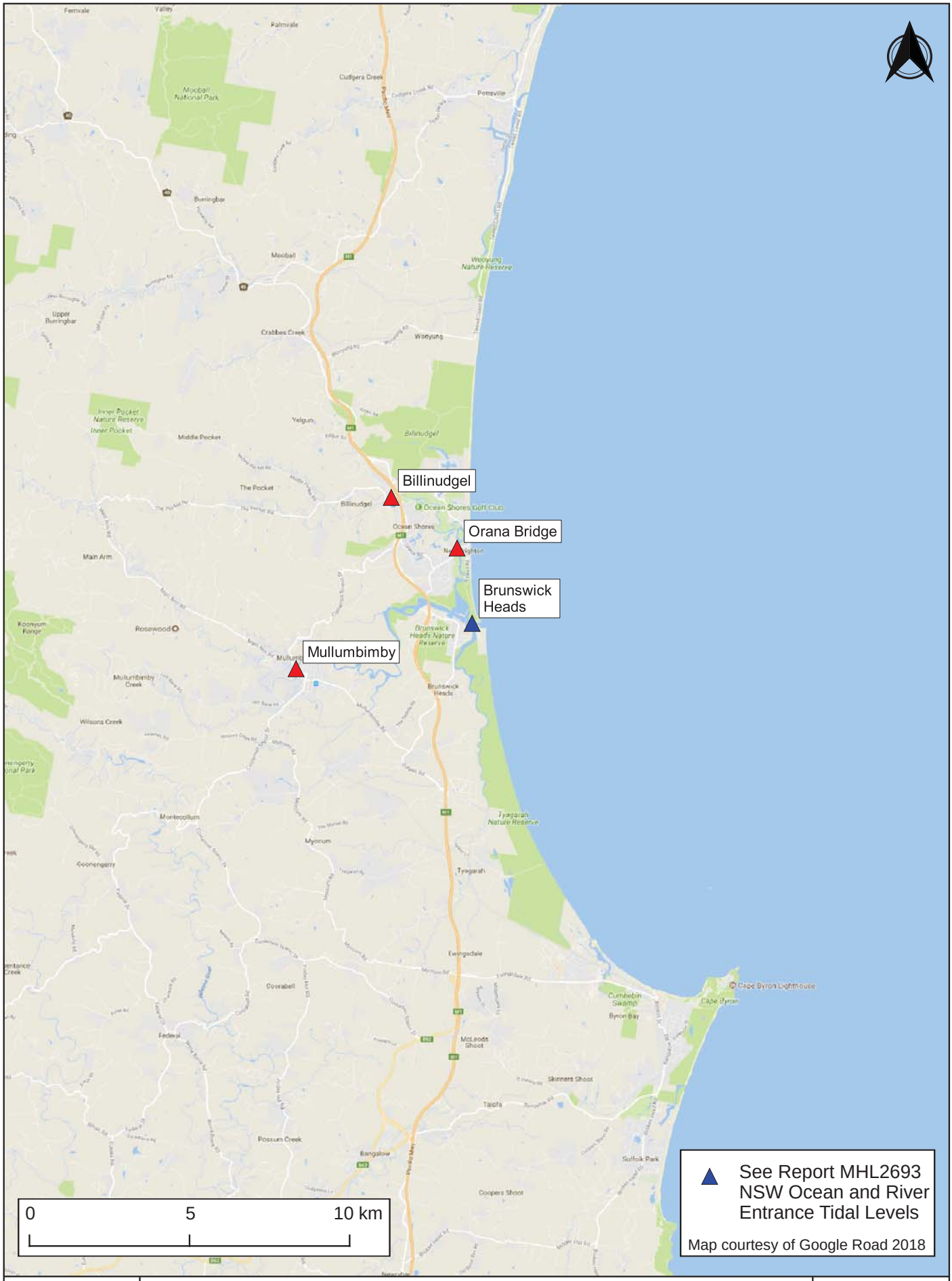
CUDGEN CREEK AT KINGSCLIFF
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
18

DRAWING 2692-18.cdr



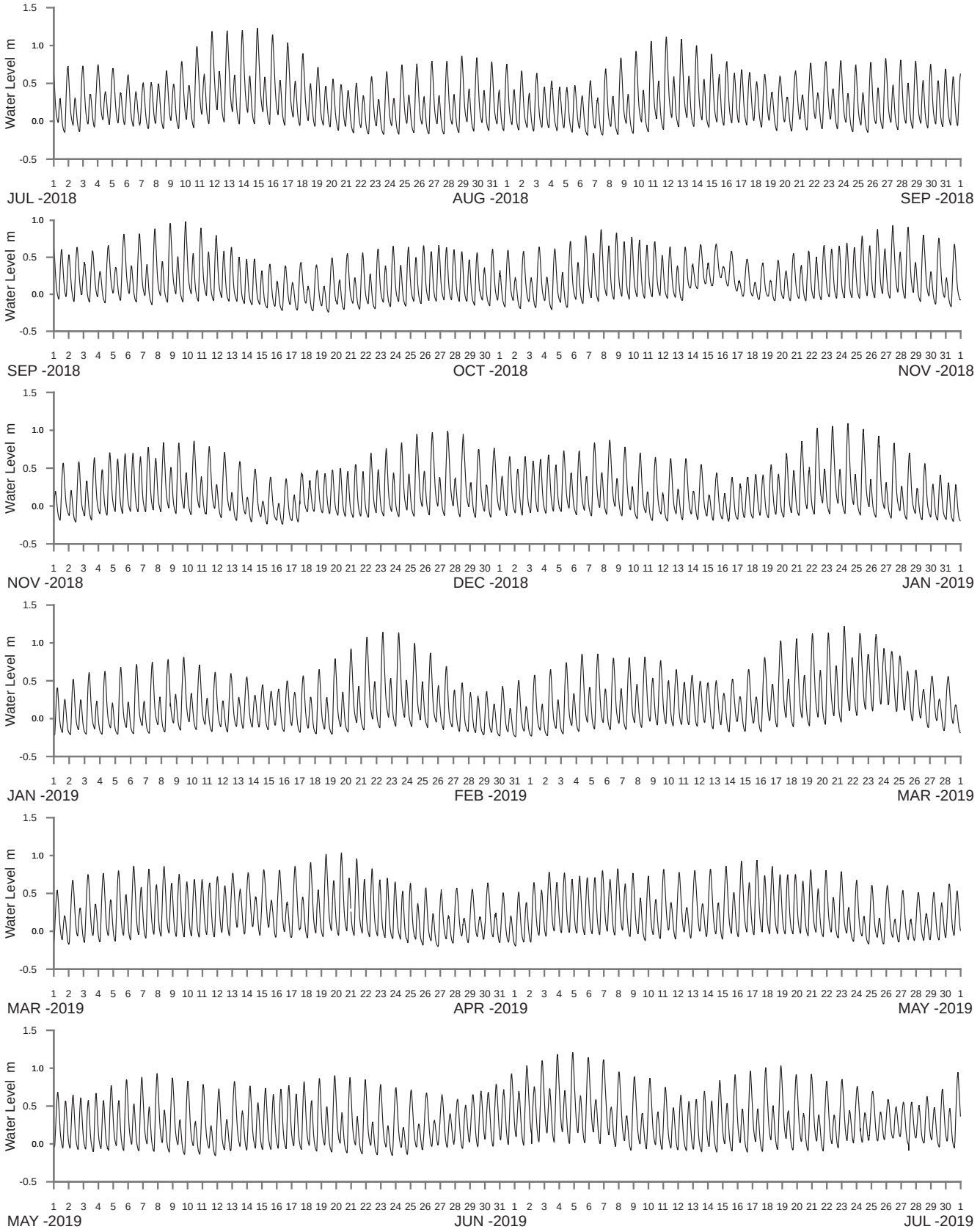
NSW GOVERNMENT

STATION LOCATIONS
BRUNSWICK RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
19

DRAWING 2692-19.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

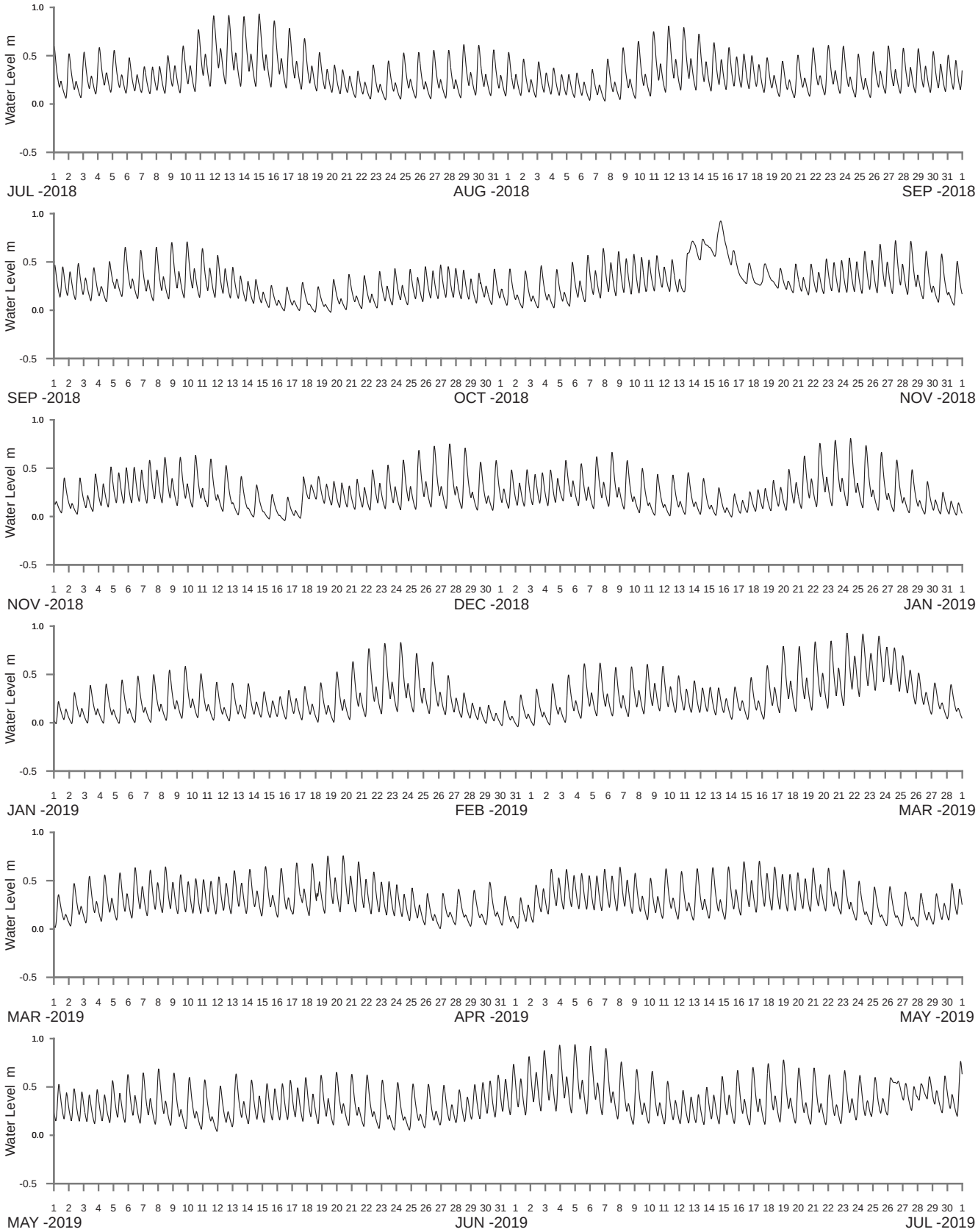
MARSHALLS CREEK AT ORANA BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
20

DRAWING 2692-20.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

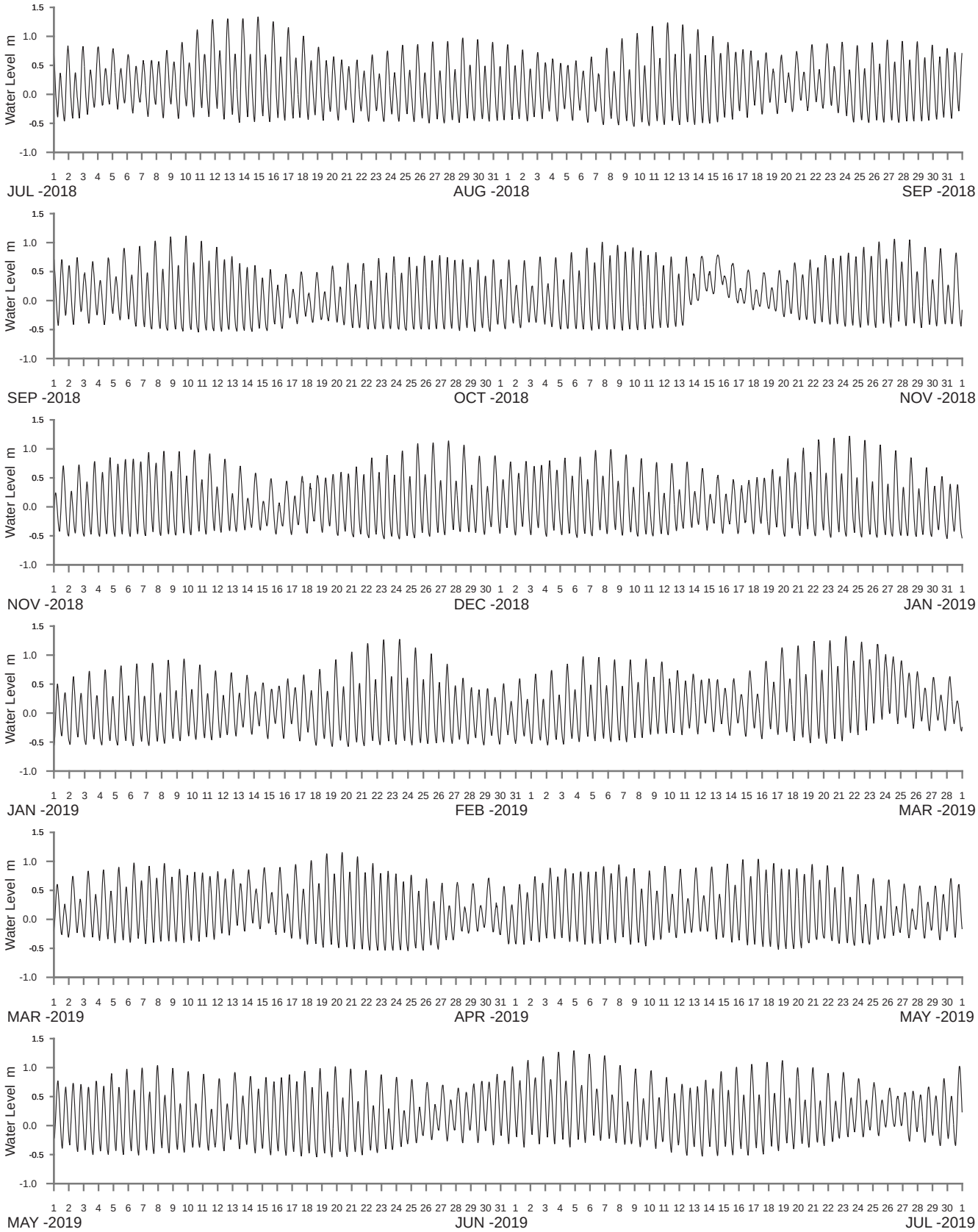
MARSHALLS CREEK AT BILLINUDGEL
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
21

DRAWING 2692-21.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

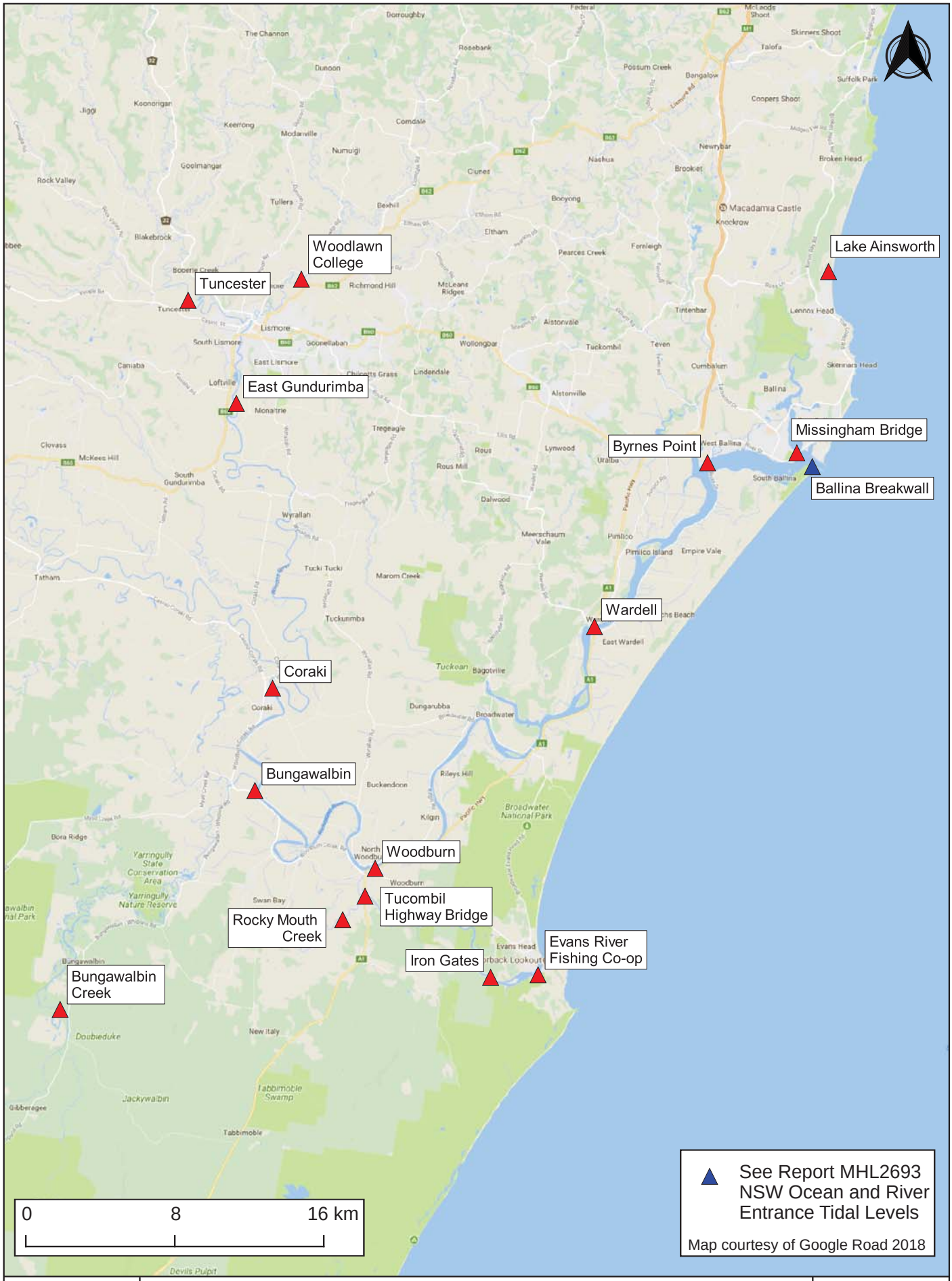
BRUNSWICK RIVER AT MULLUMBIMBY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
22

DRAWING 2692-22.cdr



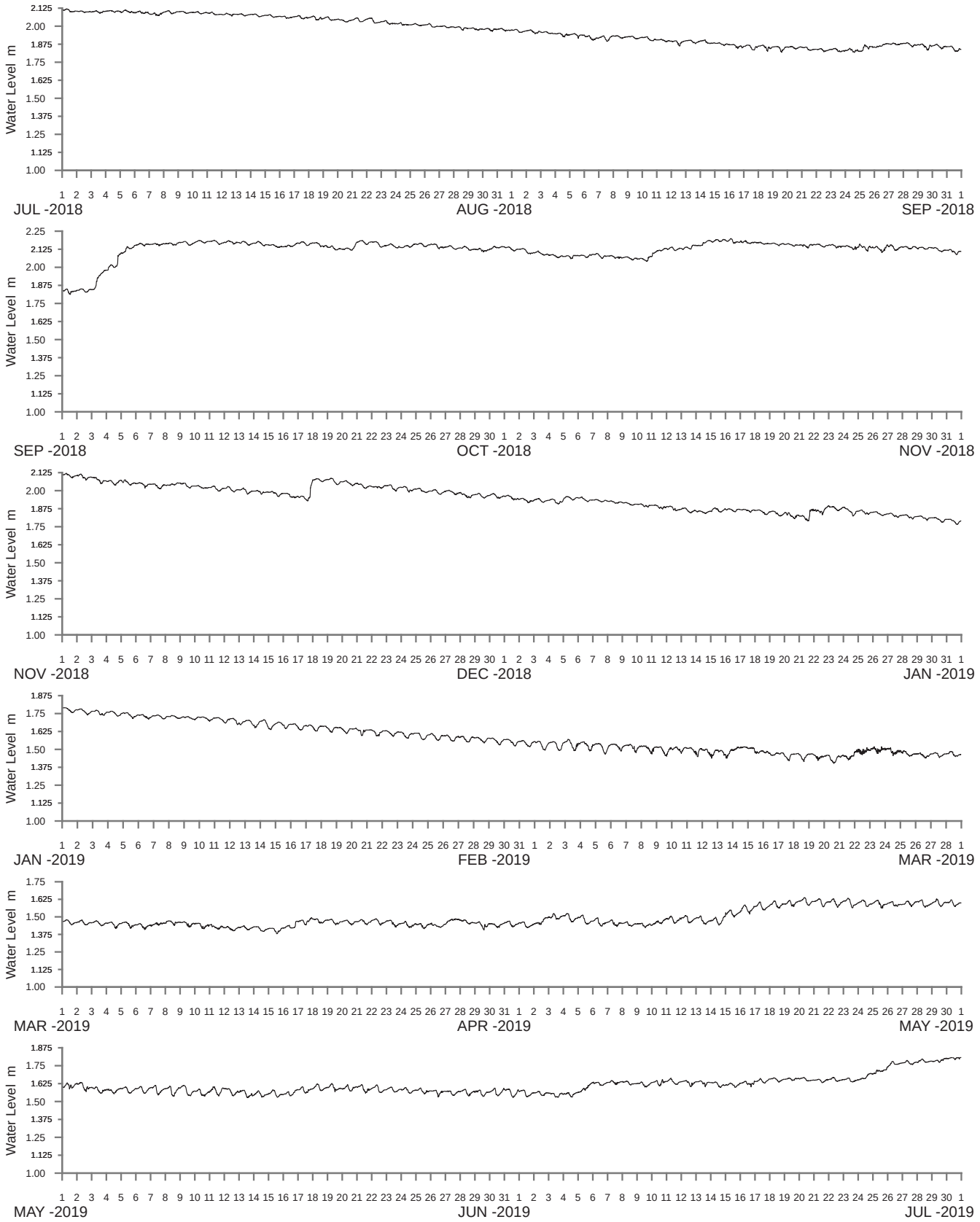
NSW GOVERNMENT

STATION LOCATIONS
RICHMOND RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
23

DRAWING 2692-23.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

LENNOX HEAD AT LAKE AINSWORTH
2018–2019

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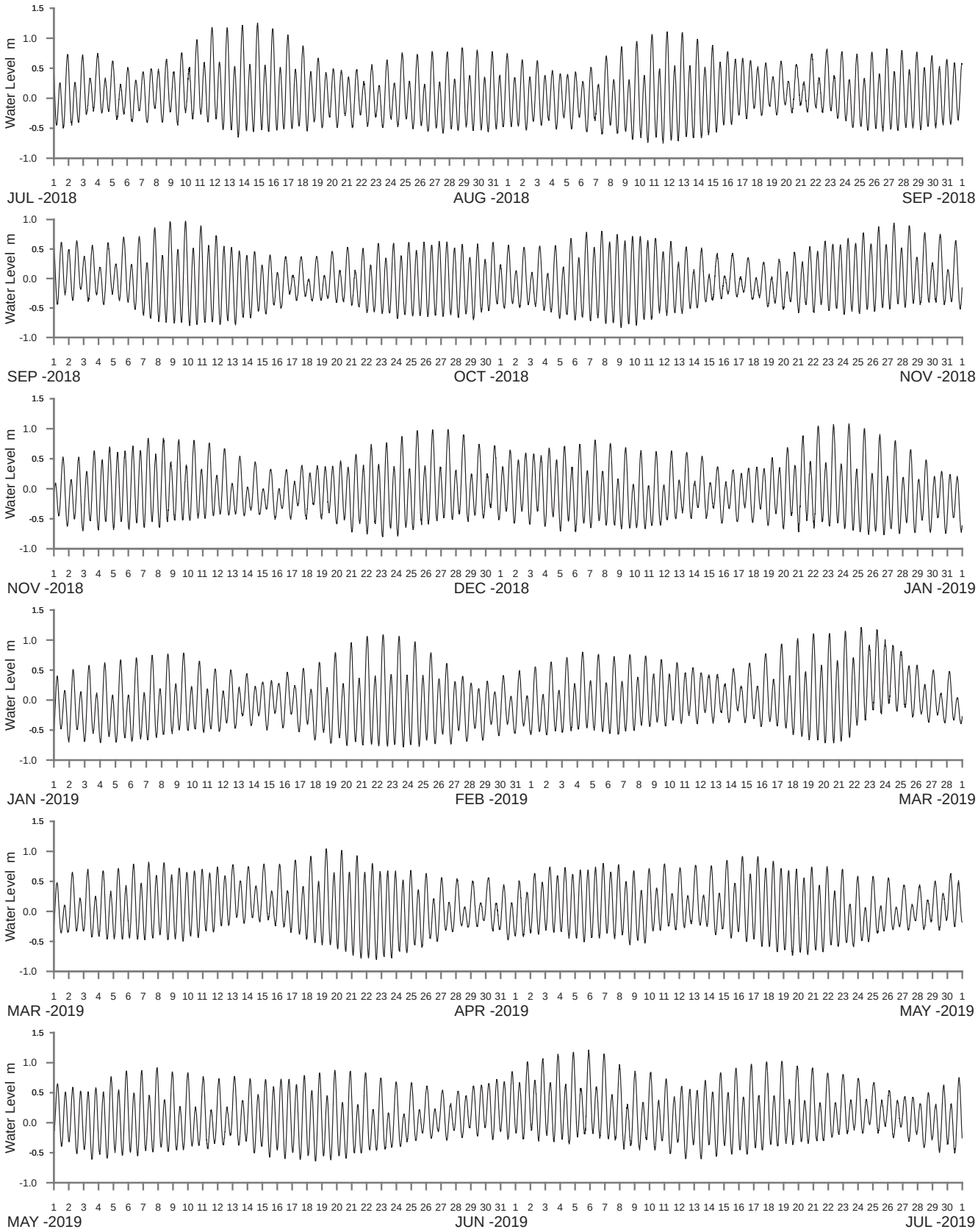
Figure
24

DRAWING 2692-24.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

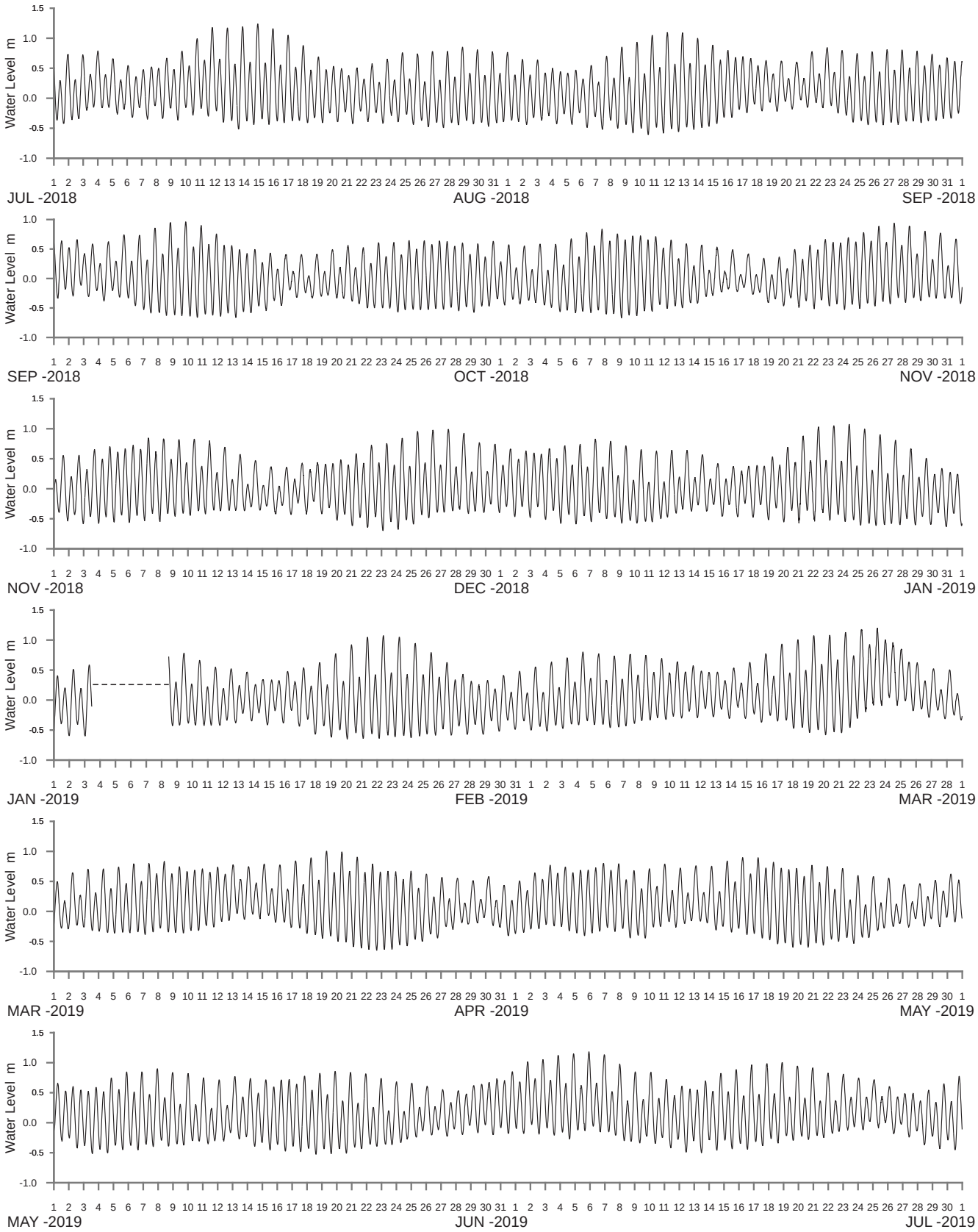
RICHMOND RIVER AT MISSINGHAM BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
25

DRAWING 2692-25.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

RICHMOND RIVER AT BYRNES POINT
2018–2019

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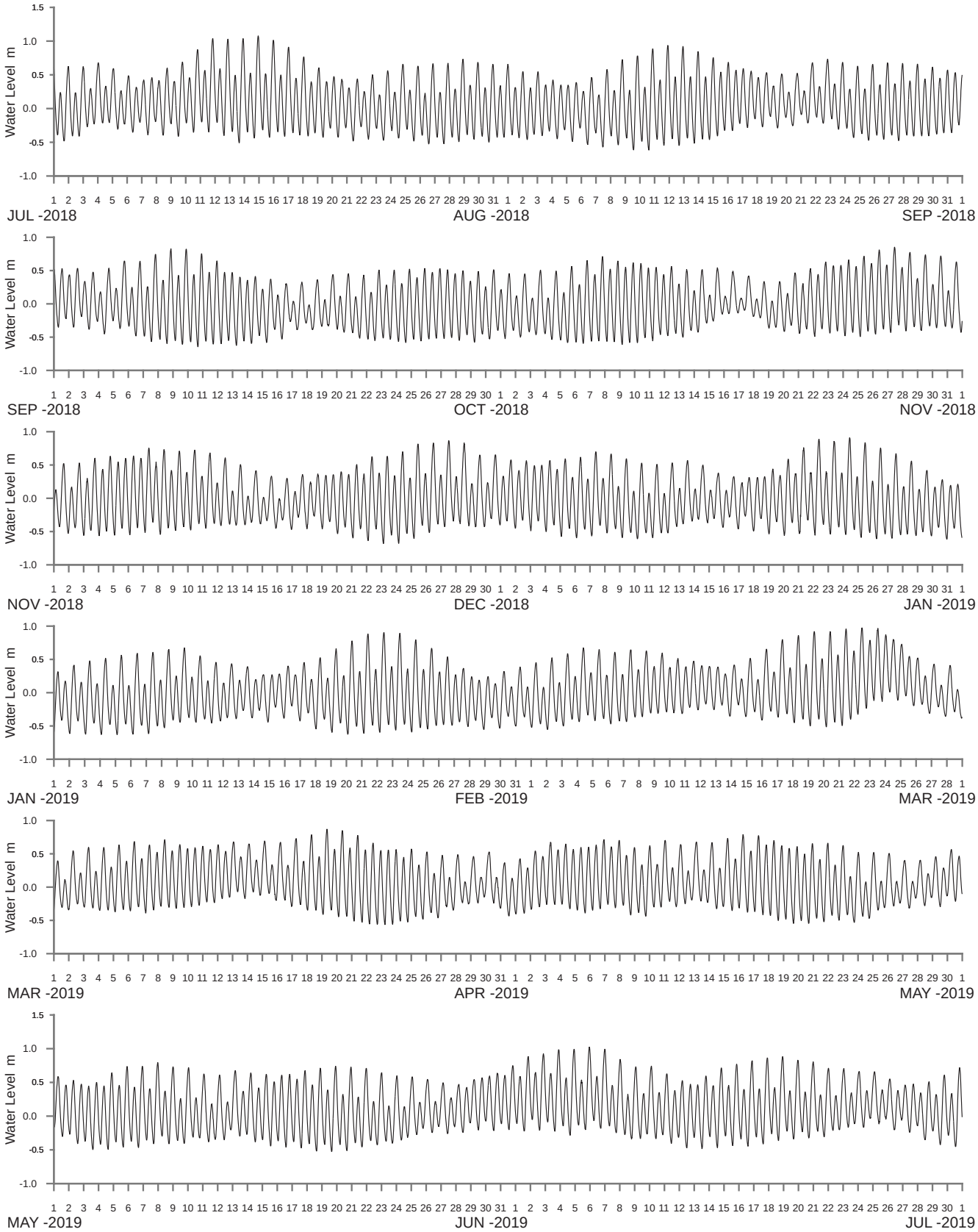
Figure
26

DRAWING 2692-26.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

RICHMOND RIVER AT WARDELL
2018–2019

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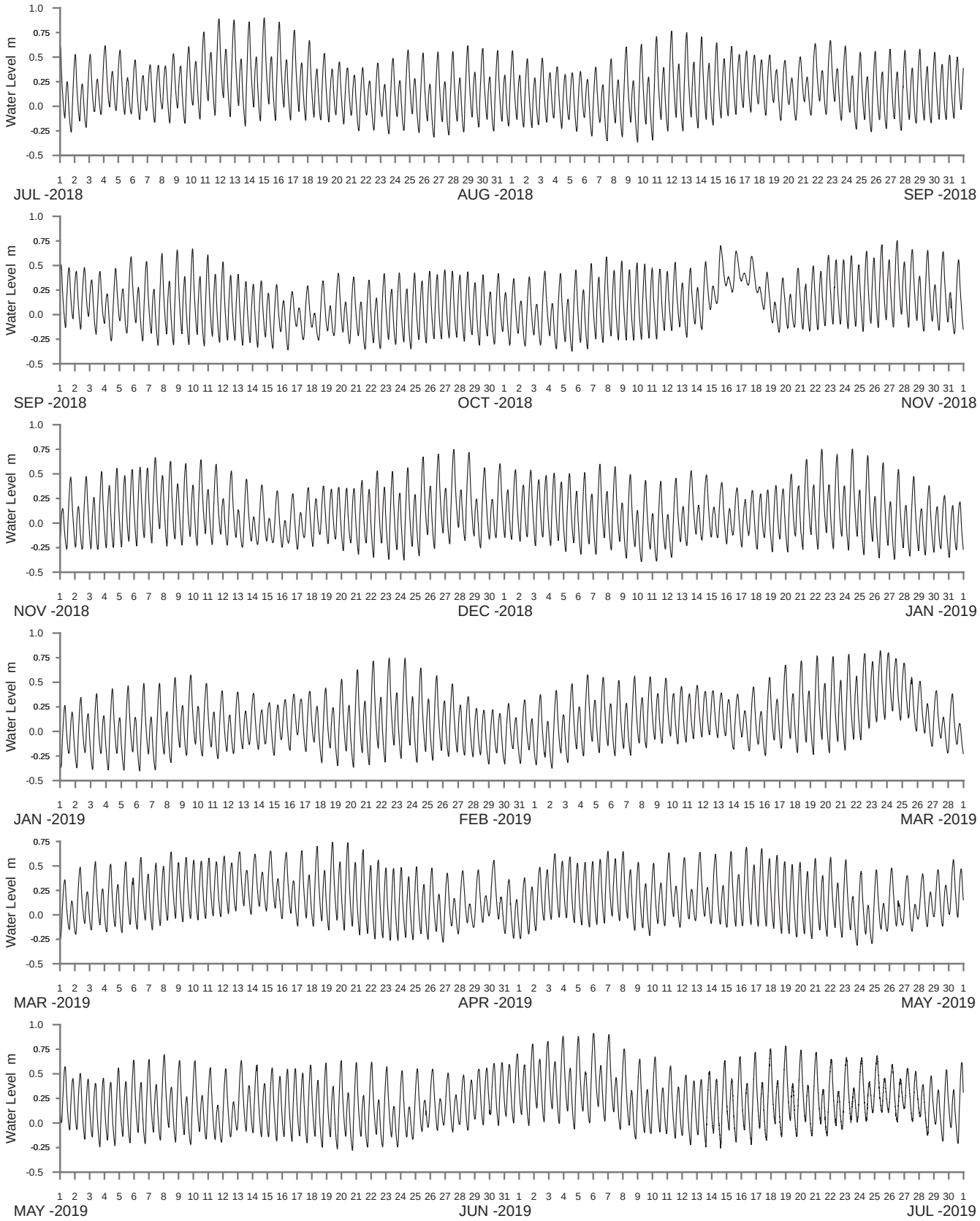
Report MHL2692

Figure
27

DRAWING 2692-27.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

RICHMOND RIVER AT WOODBURN
2018–2019

Manly Hydraulics Laboratory

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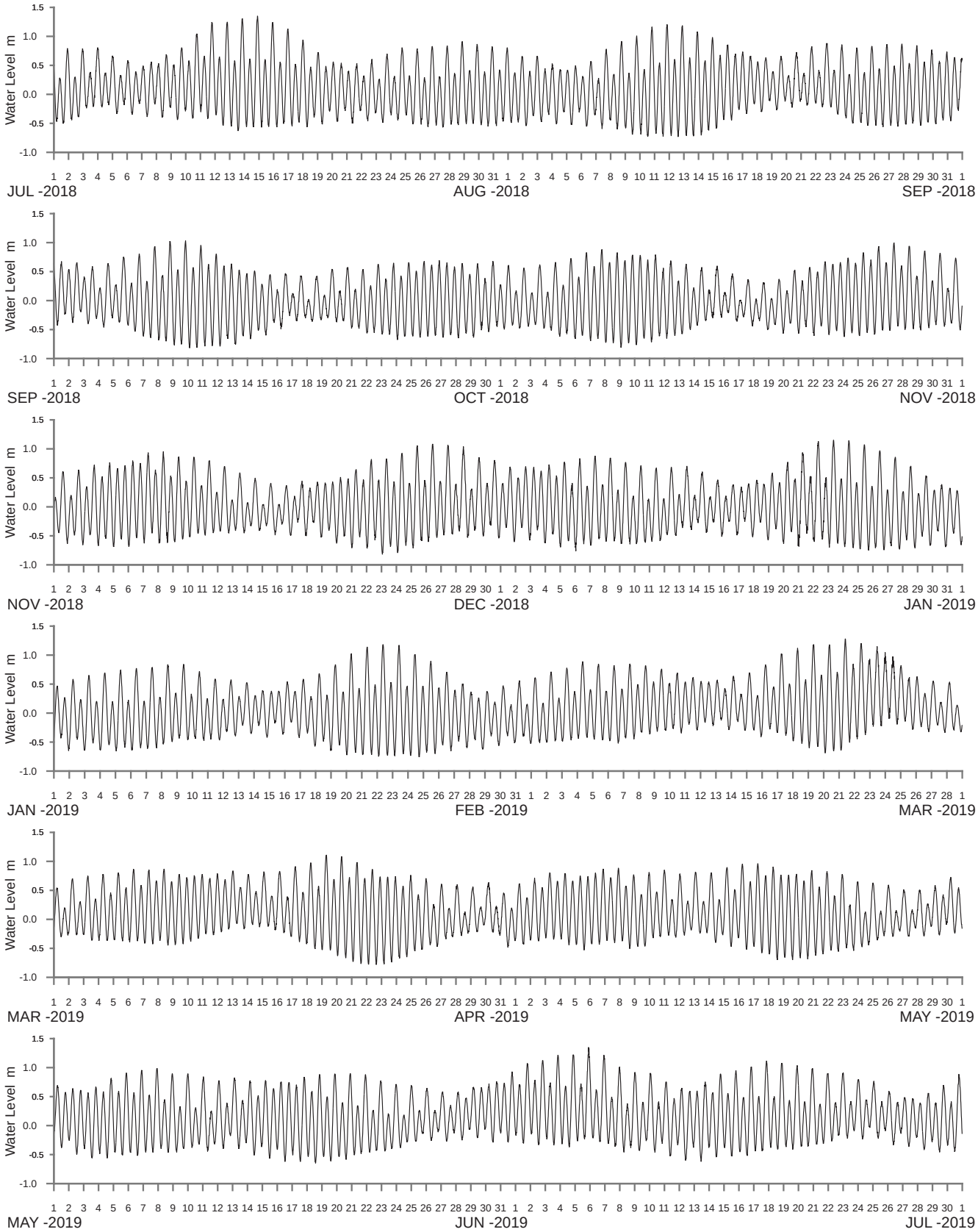
Figure
28

DRAWING 2692-28.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

EVANS RIVER AT EVANS RIVER FISHING CO-OP
2018–2019

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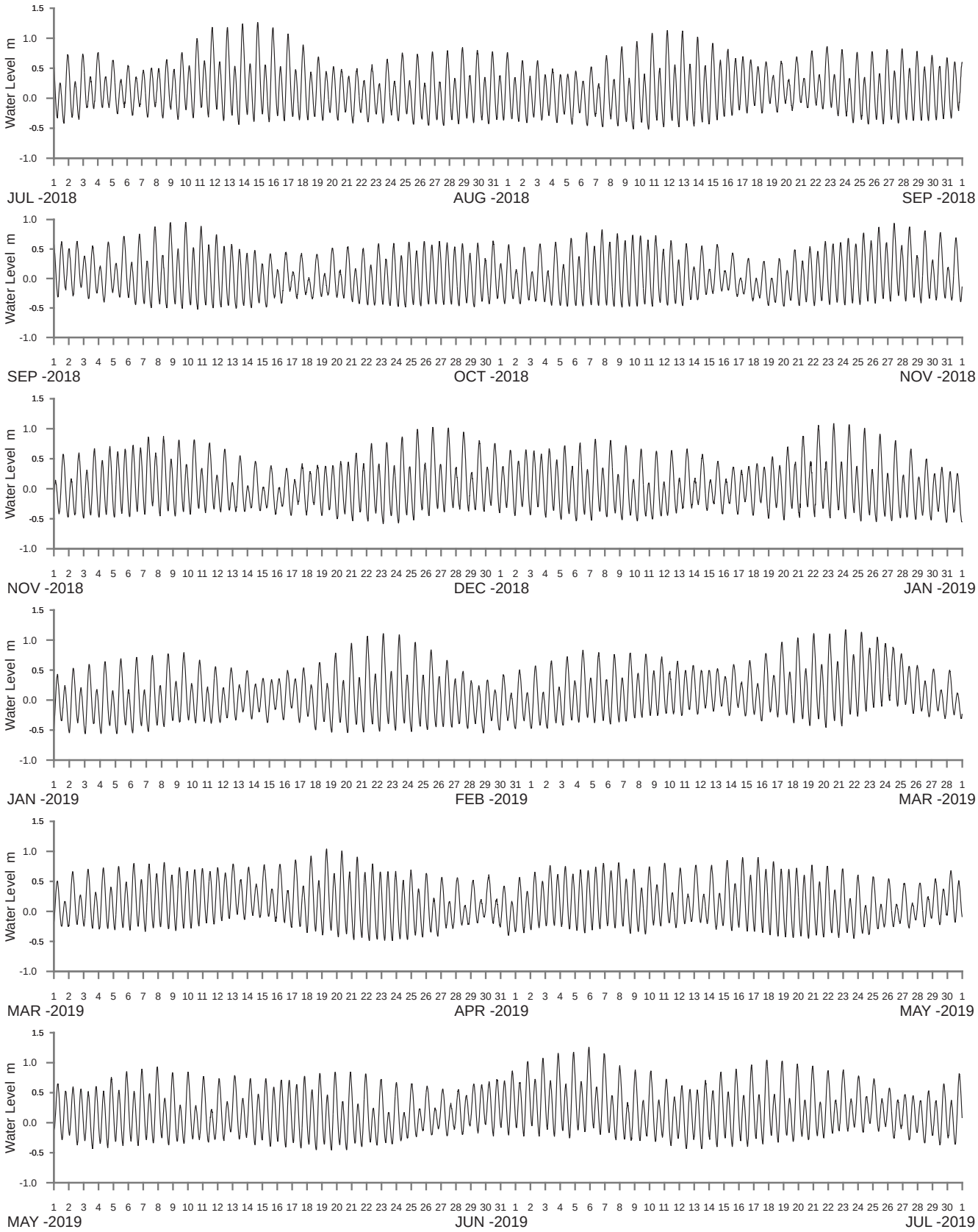
Figure 29

DRAWING 2692-29.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

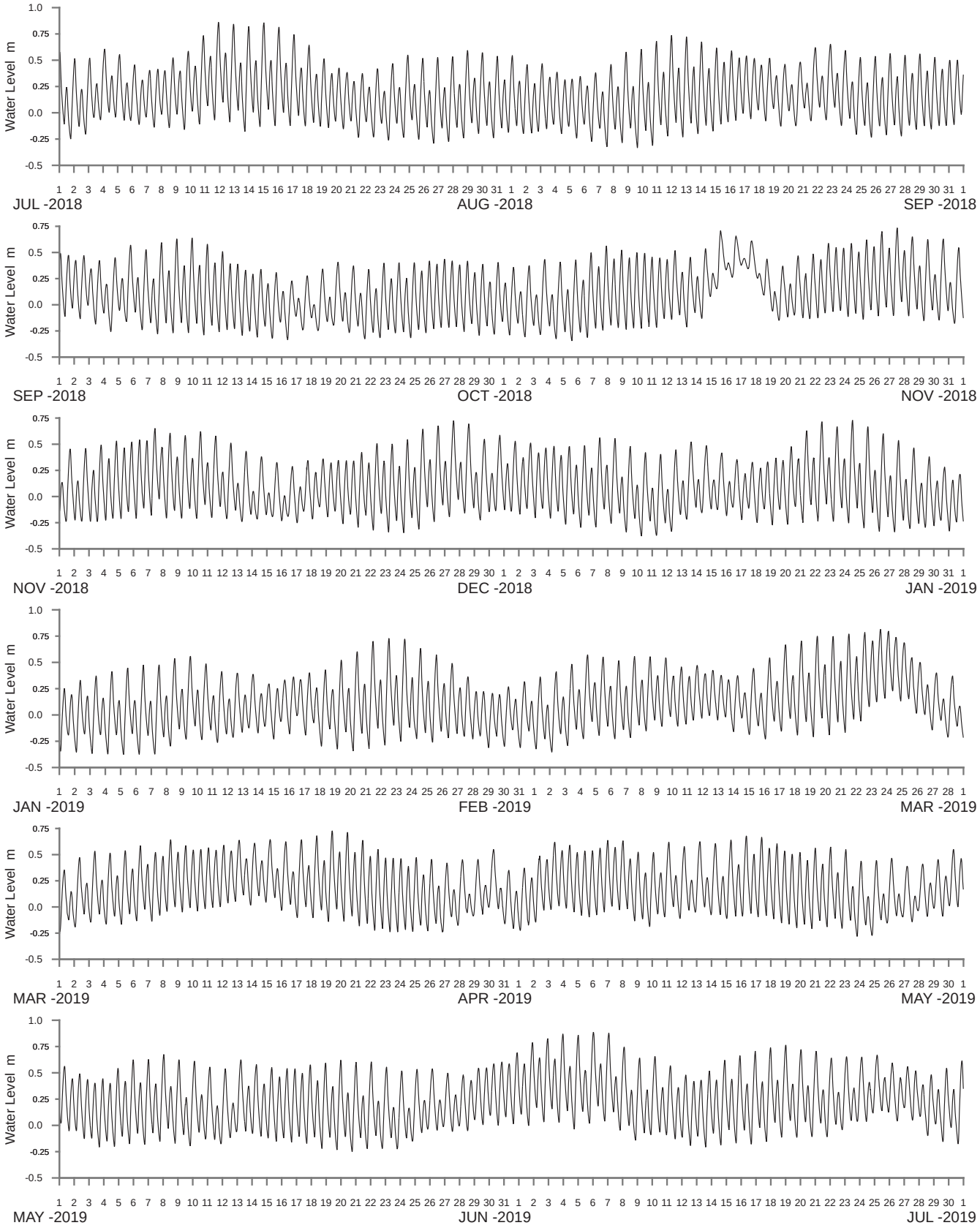
EVANS RIVER AT IRON GATES
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
30

DRAWING 2692-30.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

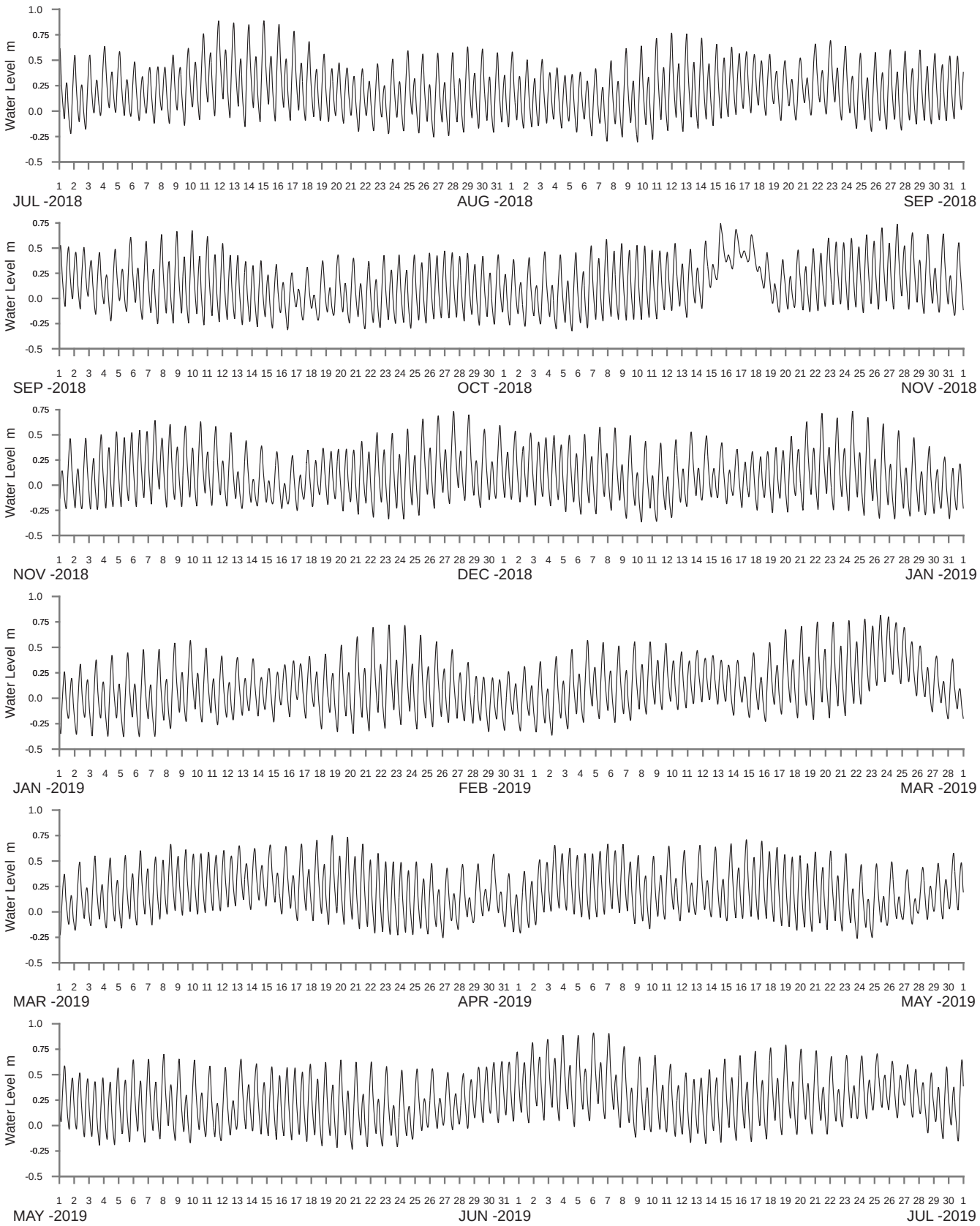
TUCOMBIL CANAL AT TUCOMBIL HIGHWAY BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 31

DRAWING 2692-31.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

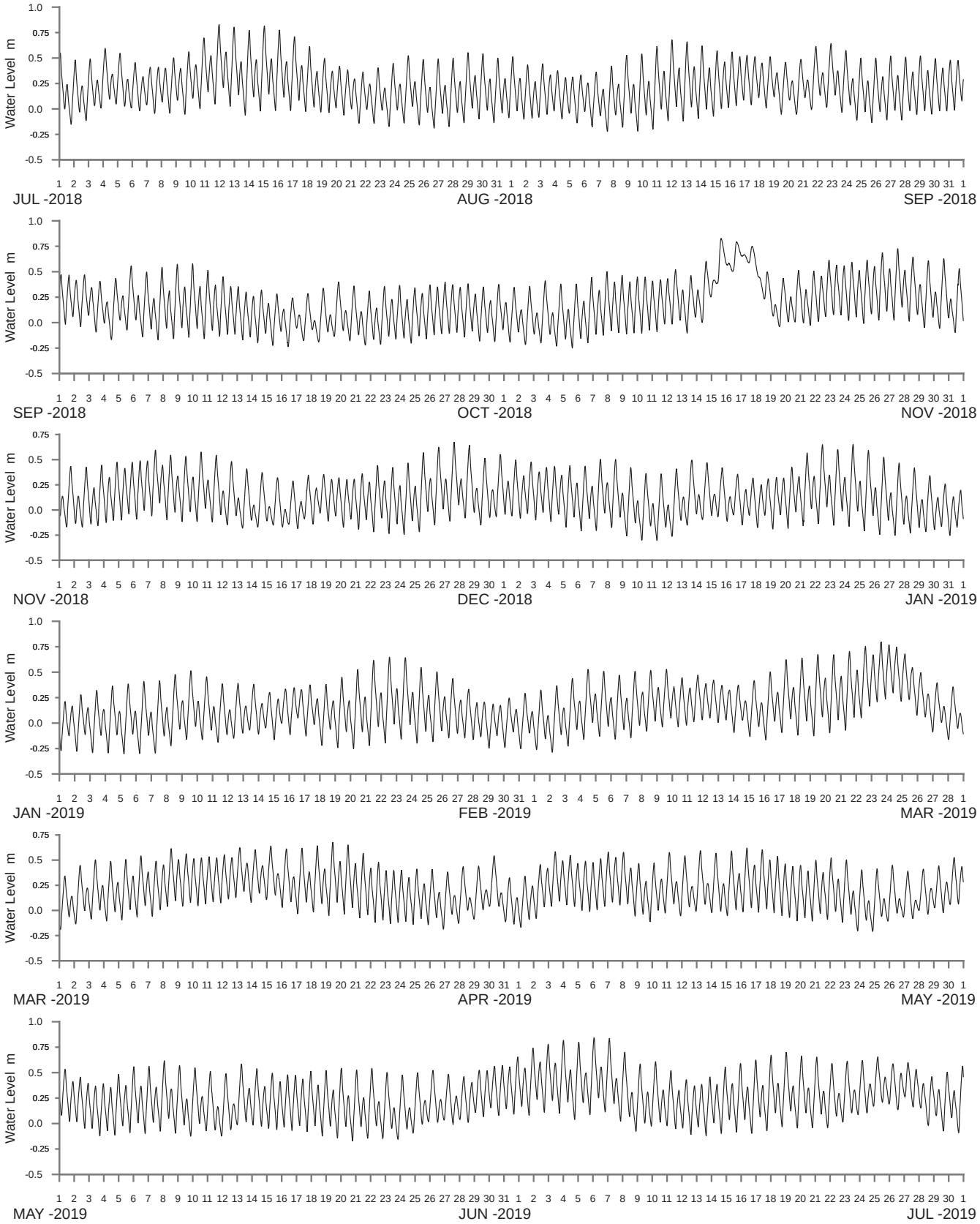
ROCKY MOUTH CREEK AT ROCKY MOUTH CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 32

DRAWING 2692-32.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

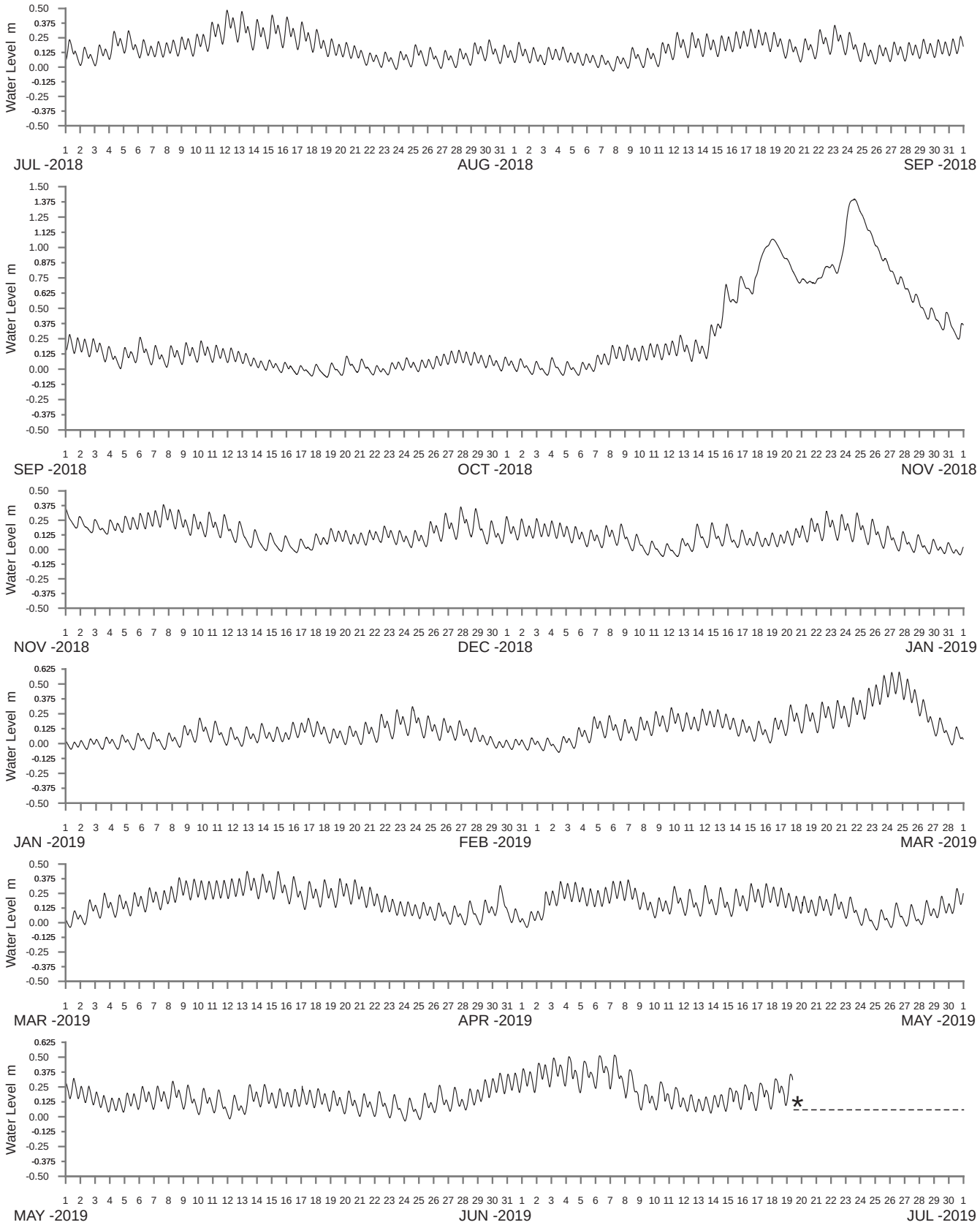
RICHMOND RIVER AT BUNGAWALBIN
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
33

DRAWING 2692-33.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to logger port issue

NSW GOVERNMENT

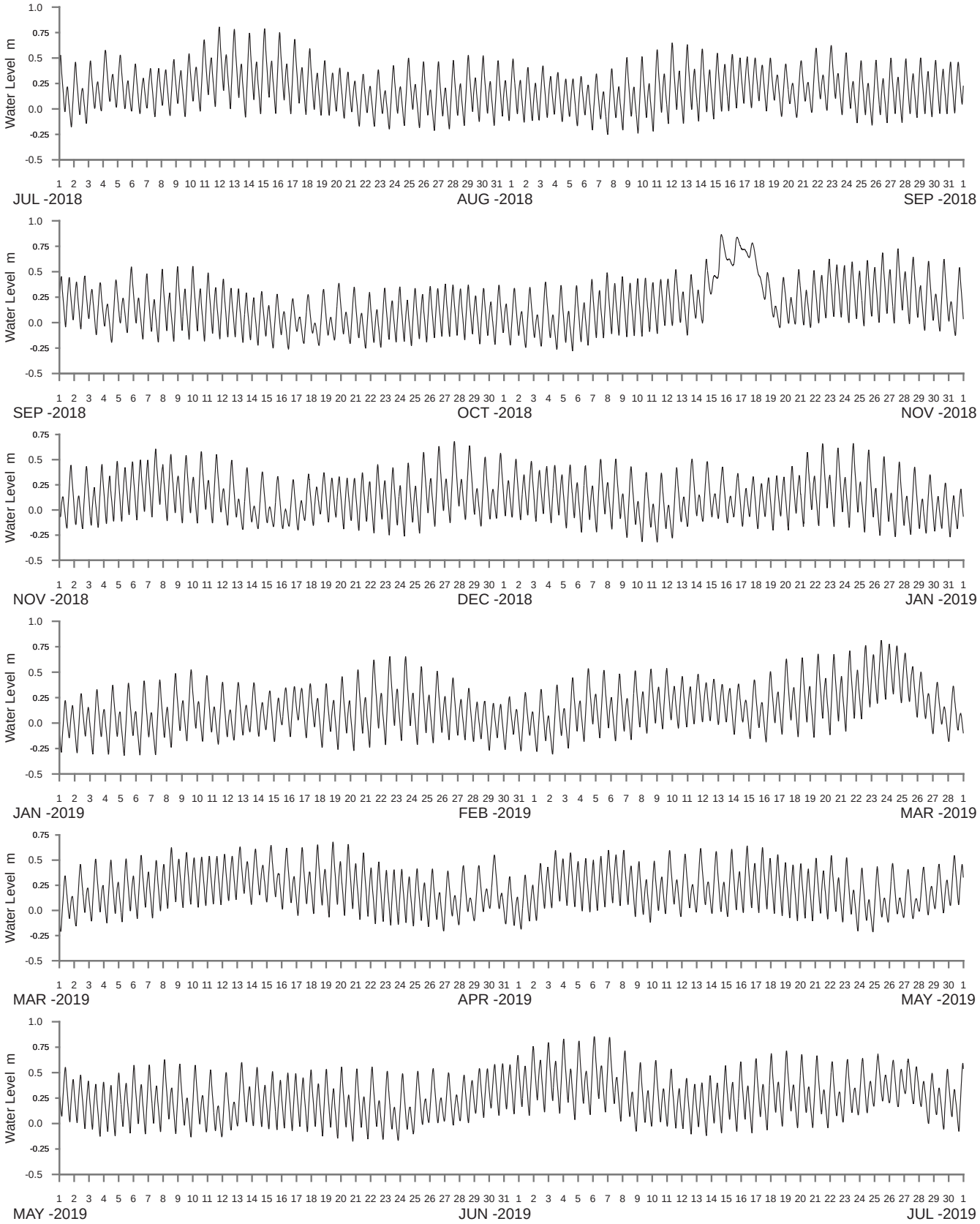
BUNGAWALBIN CREEK AT BUNGAWALBIN CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 34

DRAWING 2692-34.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

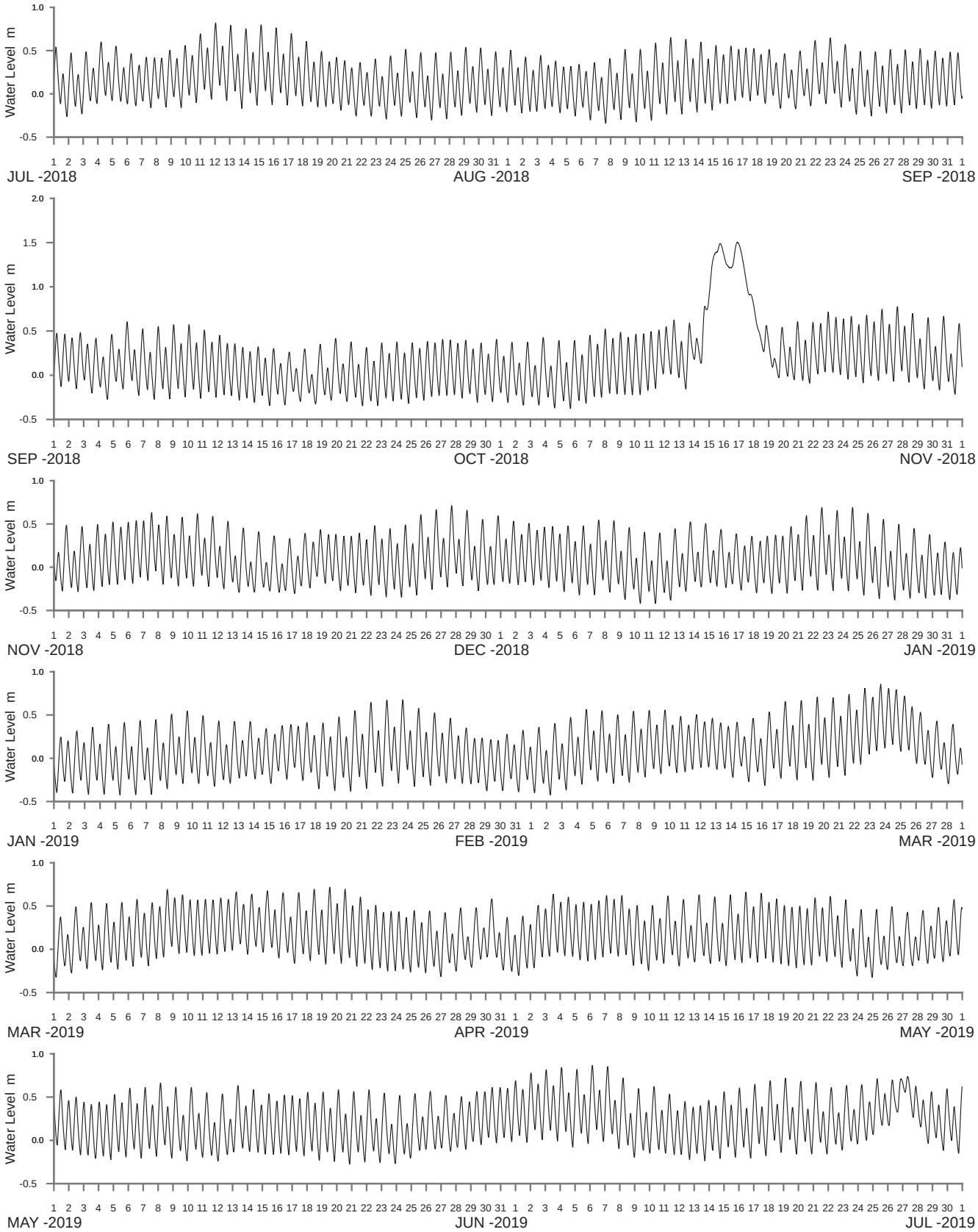
RICHMOND RIVER AT CORAKI
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
35

DRAWING 2692-35.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

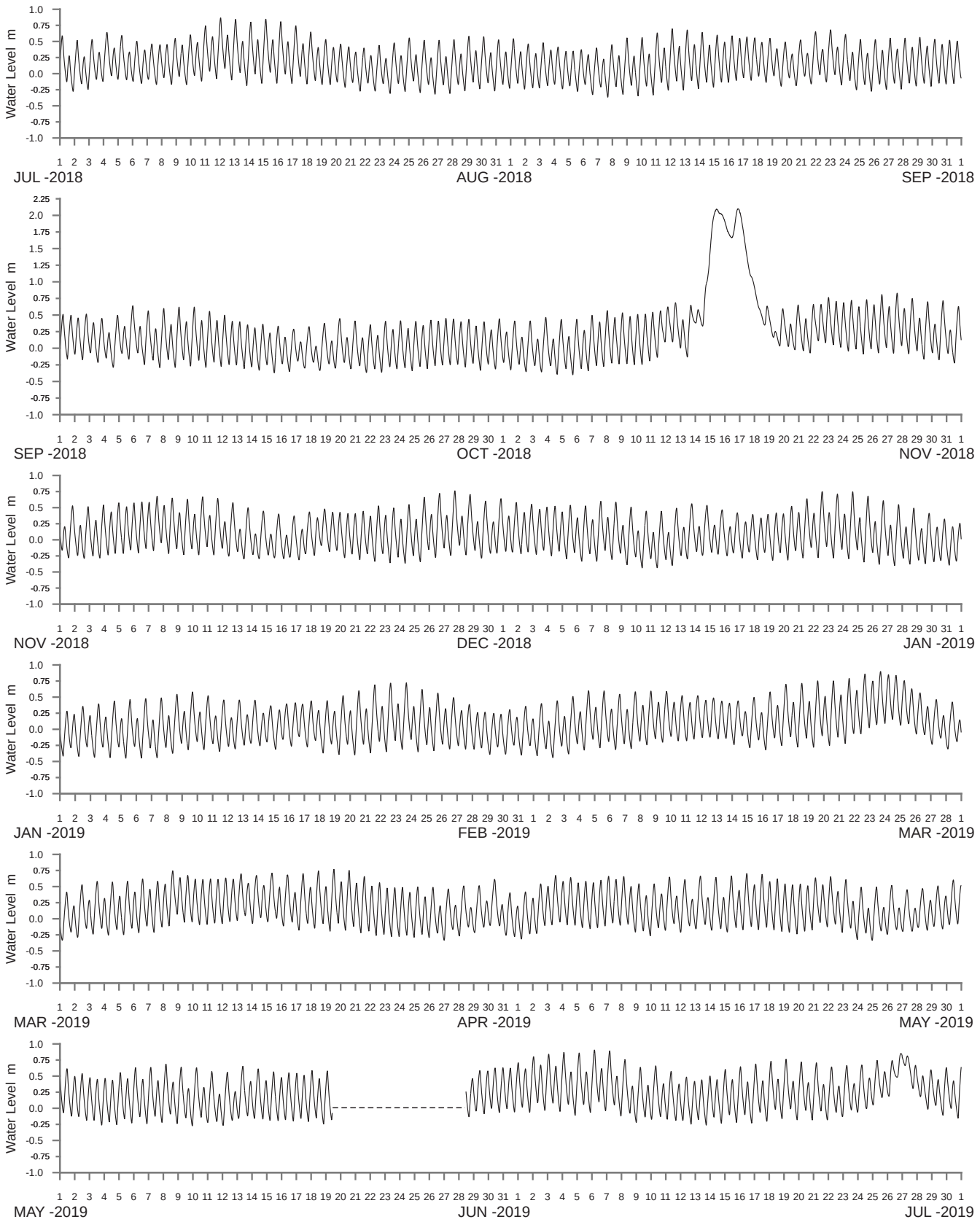
WILSONS RIVER AT EAST GUNDURIMBA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
36

DRAWING 2692-36.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

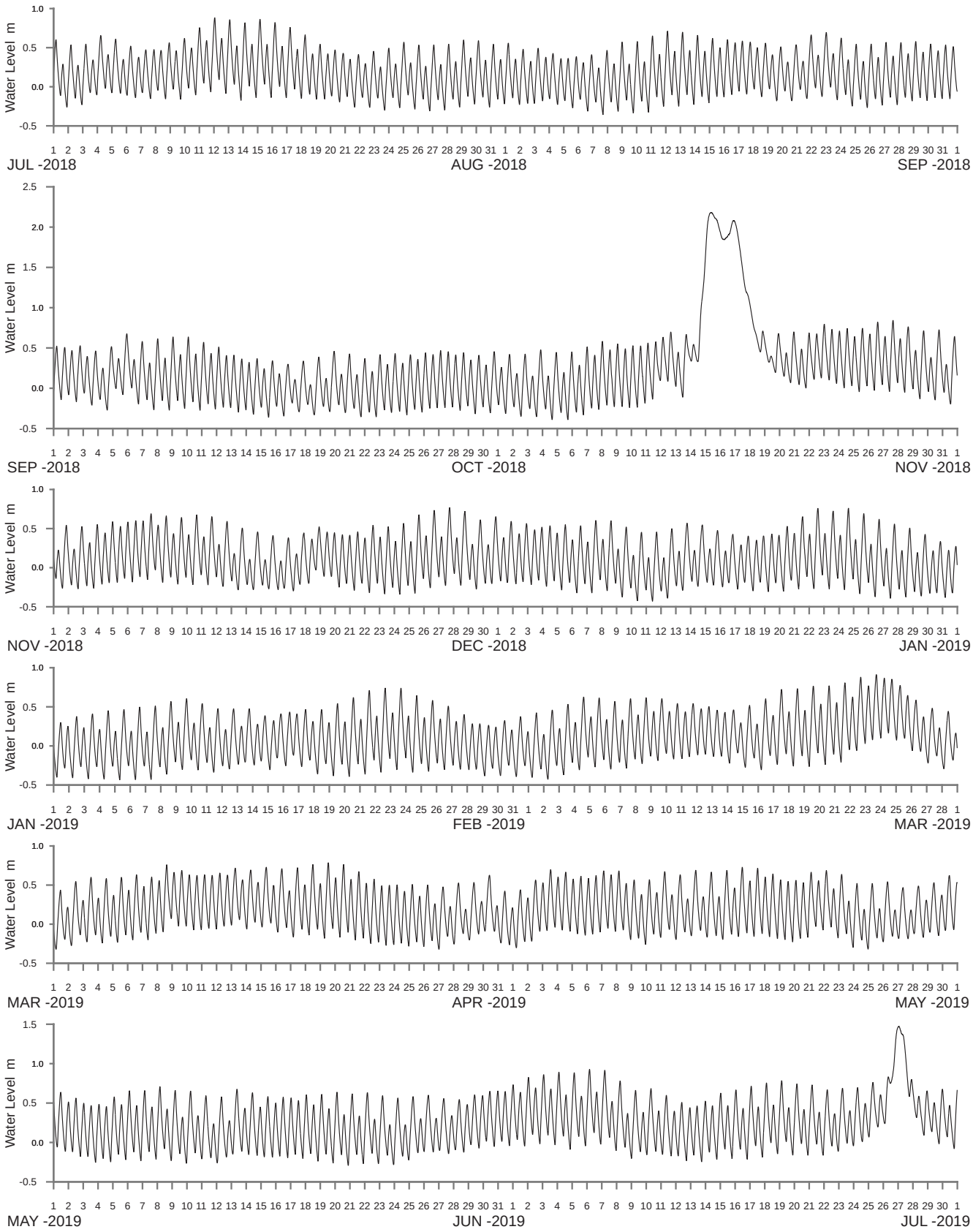
LEYCESTER CREEK AT TUNCESTER
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
37

DRAWING 2692-37.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

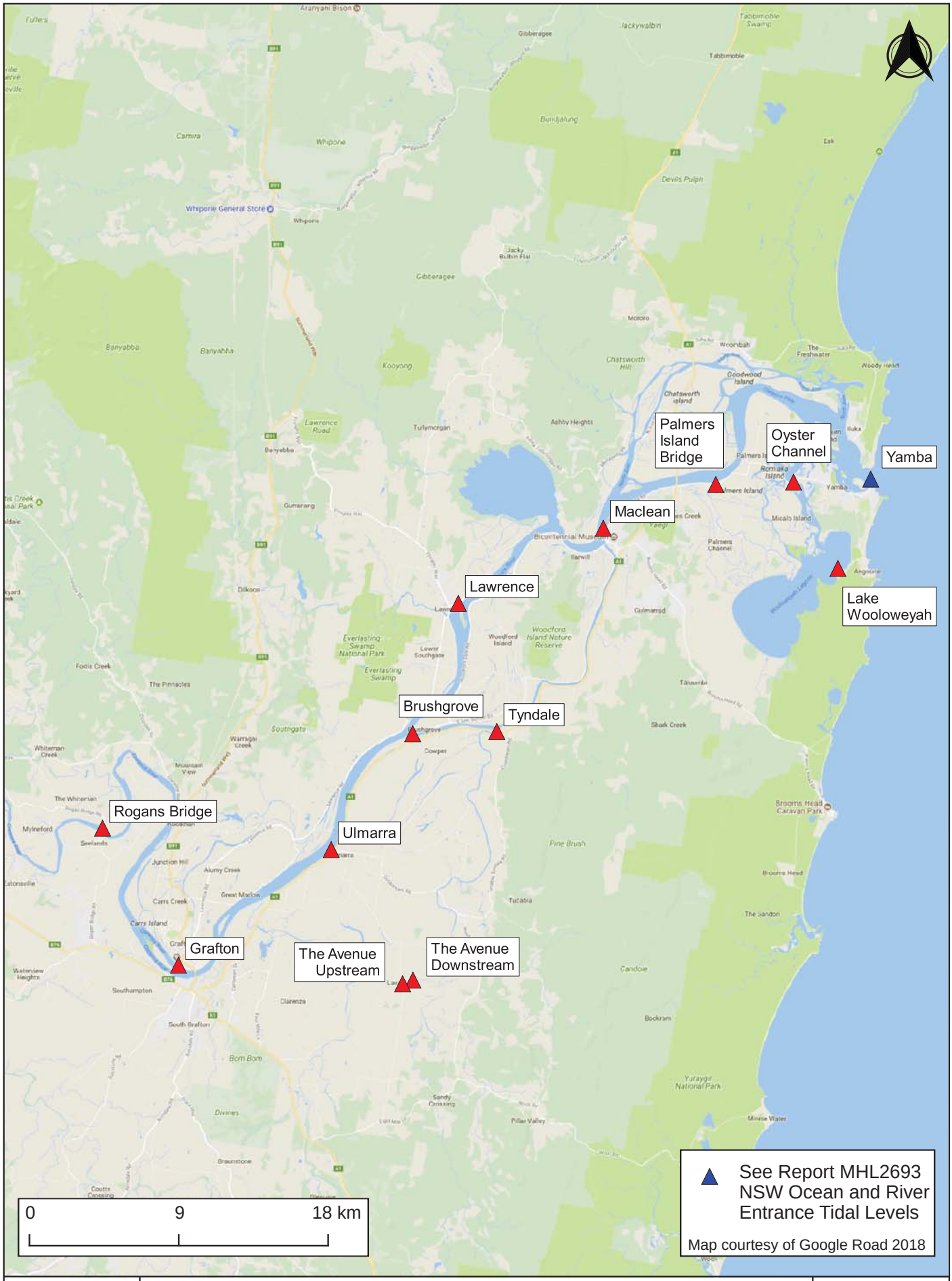
WILSONS RIVER AT WOODLAWN COLLEGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
38

DRAWING 2692-38.cdr



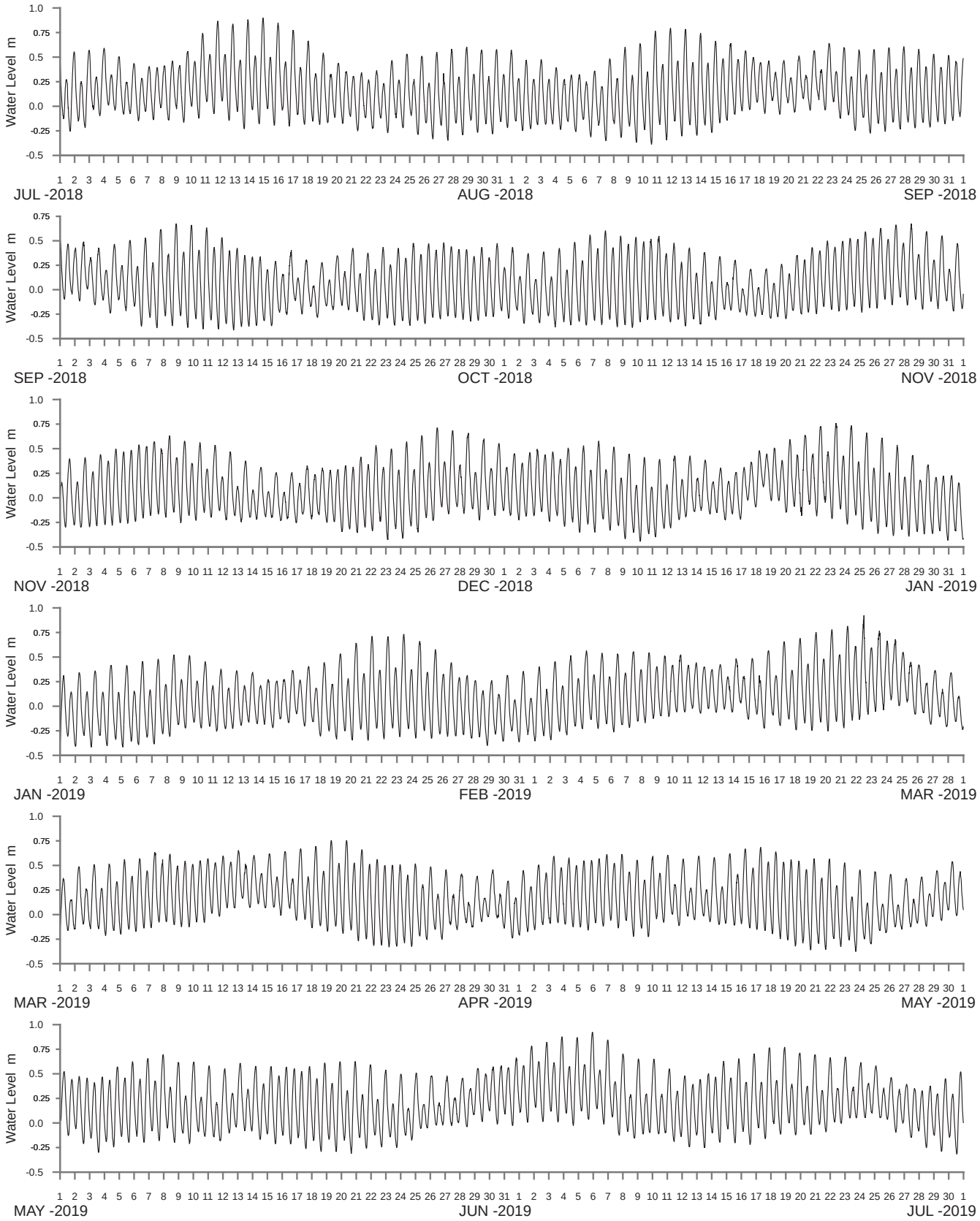
NSW GOVERNMENT

STATION LOCATIONS
CLARENCE RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
39

DRAWING 2692-39.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

CLARENCE RIVER AT OYSTER CHANNEL
2018–2019

Manly Hydraulics Laboratory

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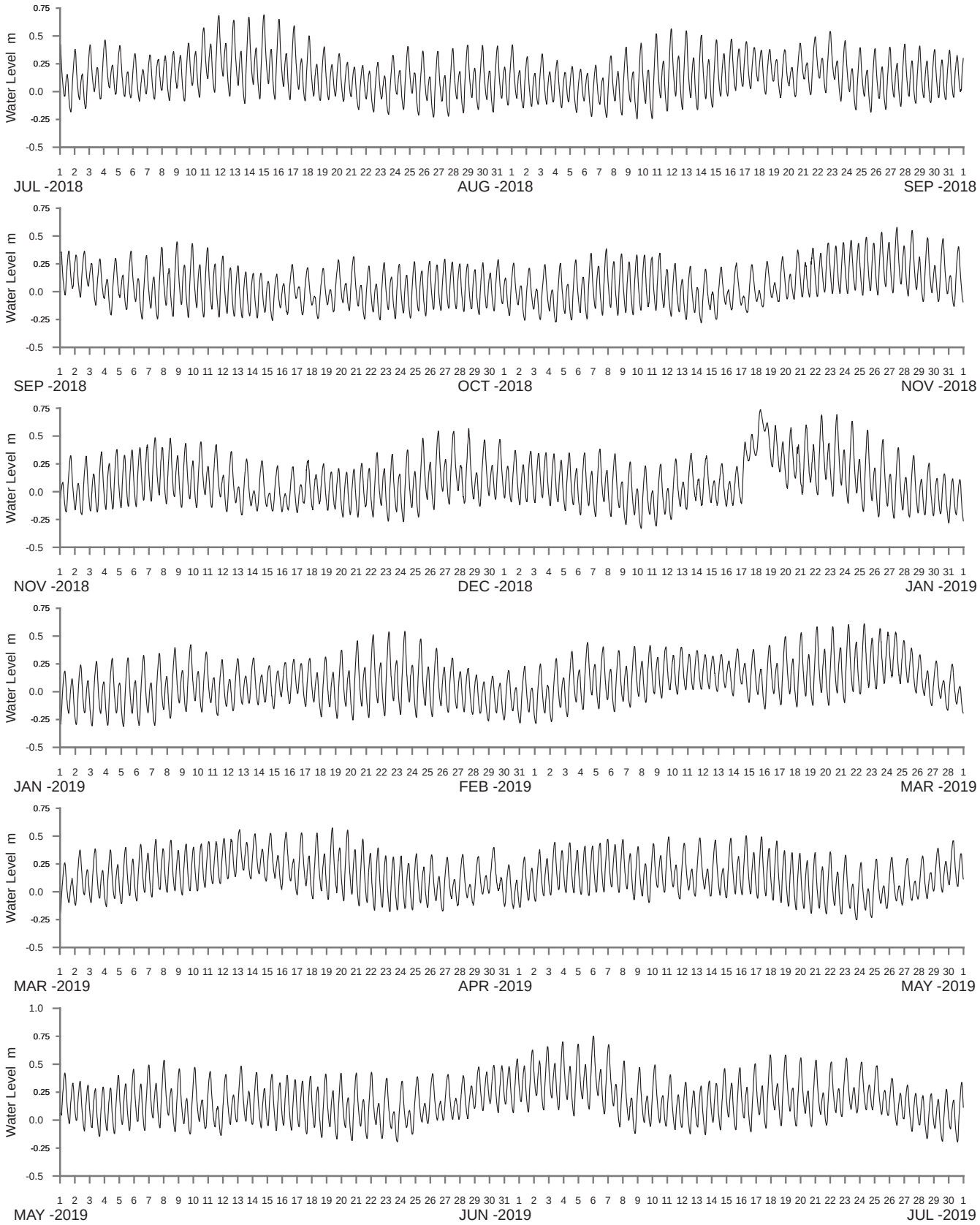
Figure
40

DRAWING 2692-40.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

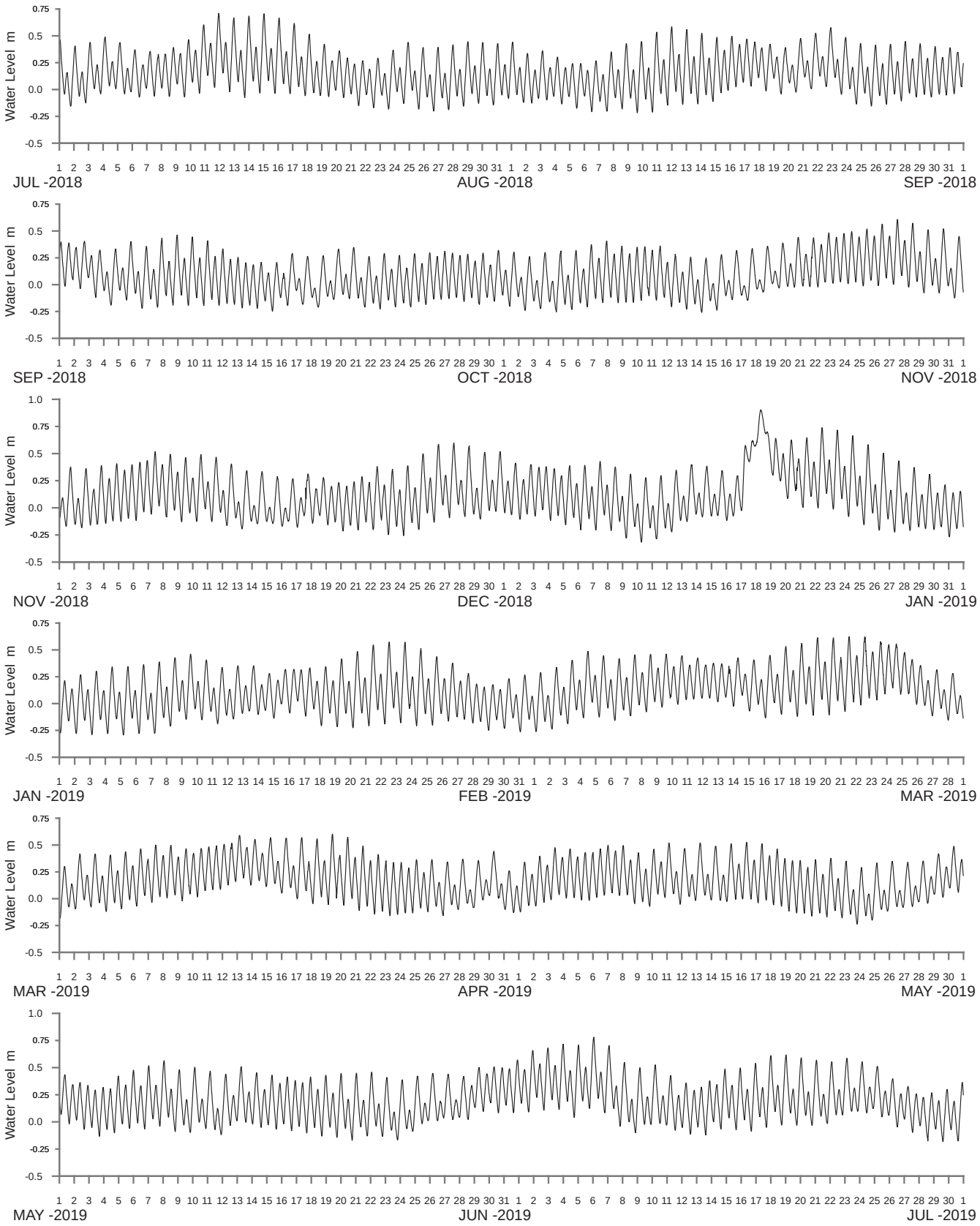
CLARENCE RIVER AT MACLEAN
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
41

DRAWING 2692-41.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

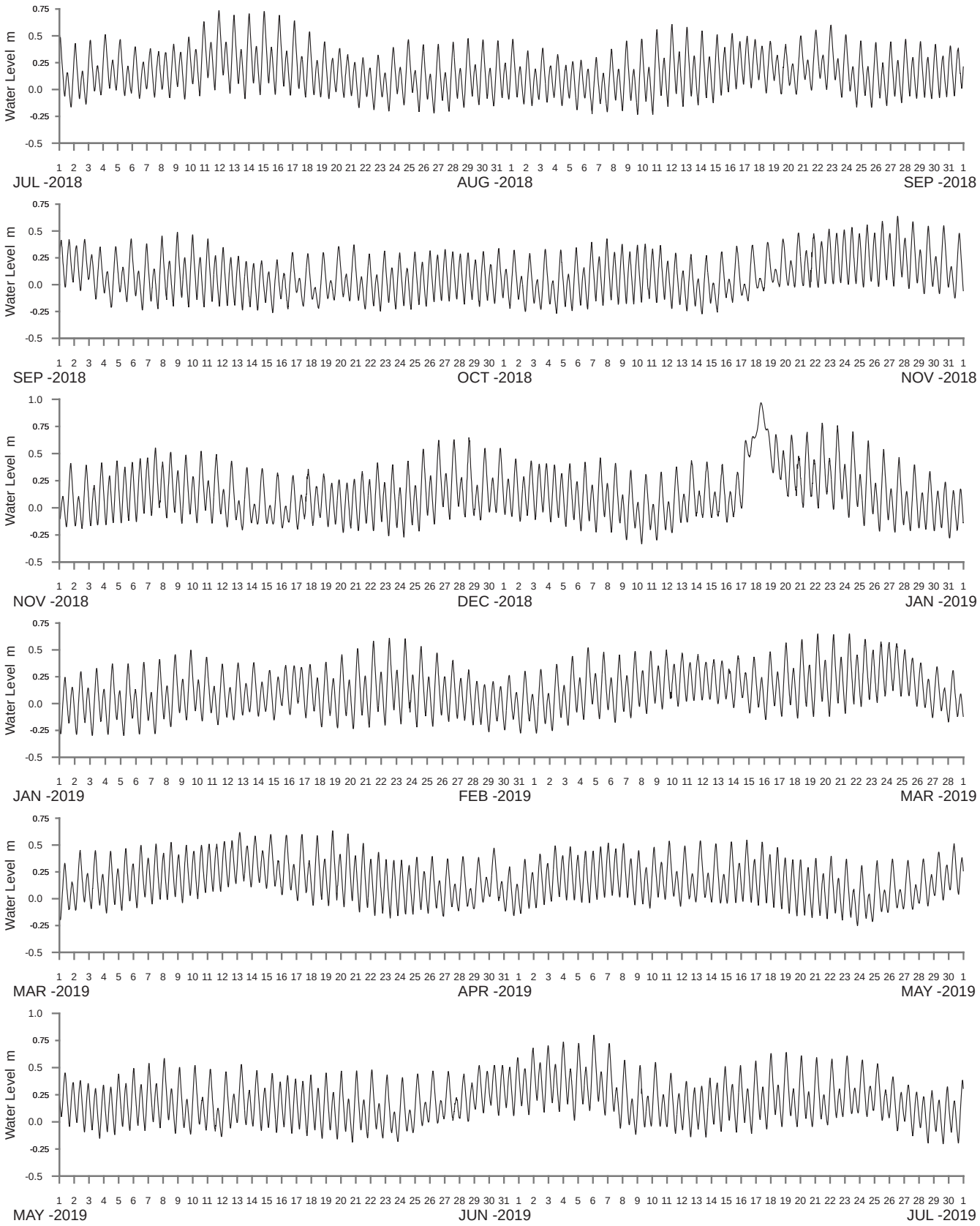
CLARENCE RIVER AT LAWRENCE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 42

DRAWING 2692-42.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

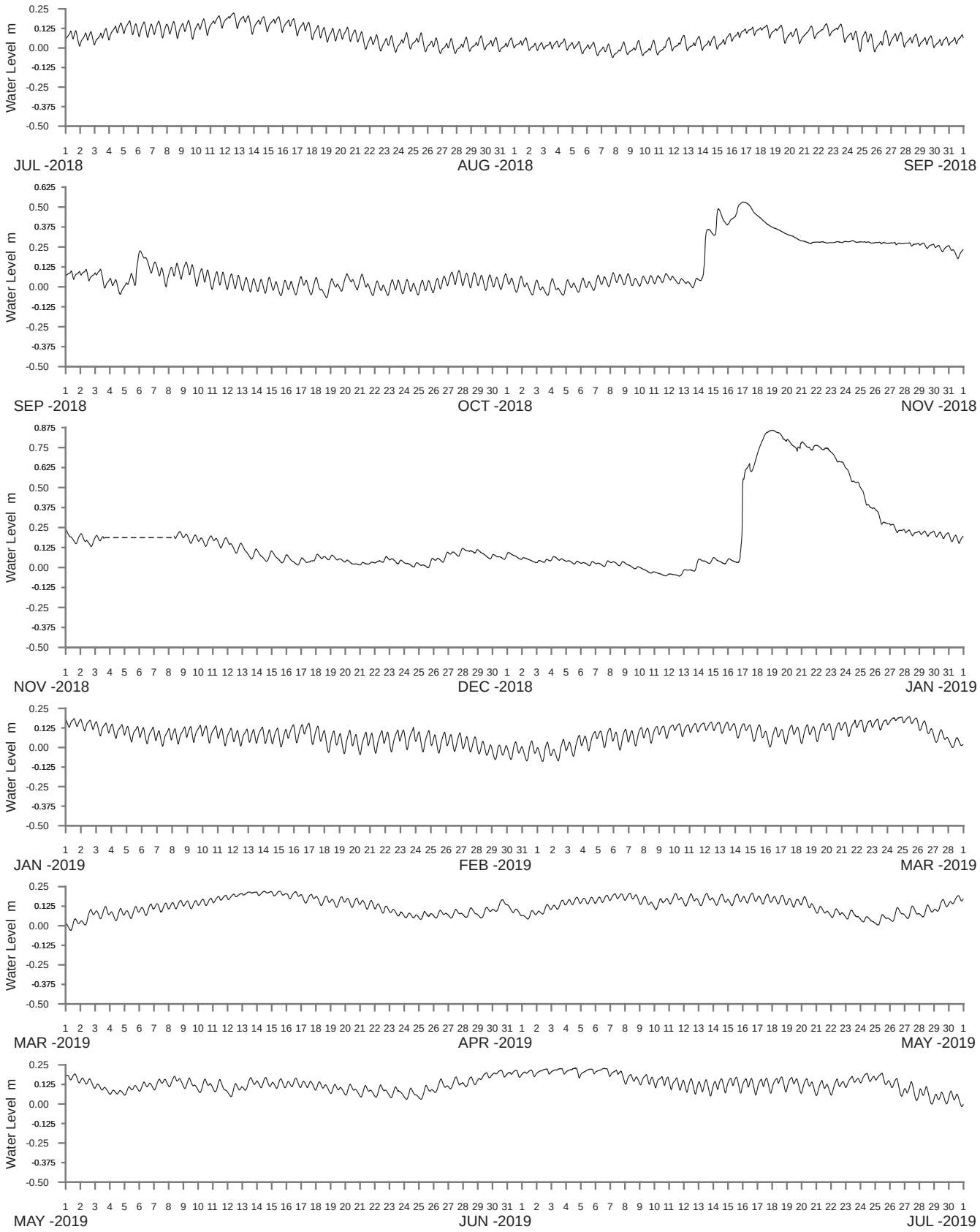
CLARENCE RIVER AT TYNEDALE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
43

DRAWING 2692-43.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

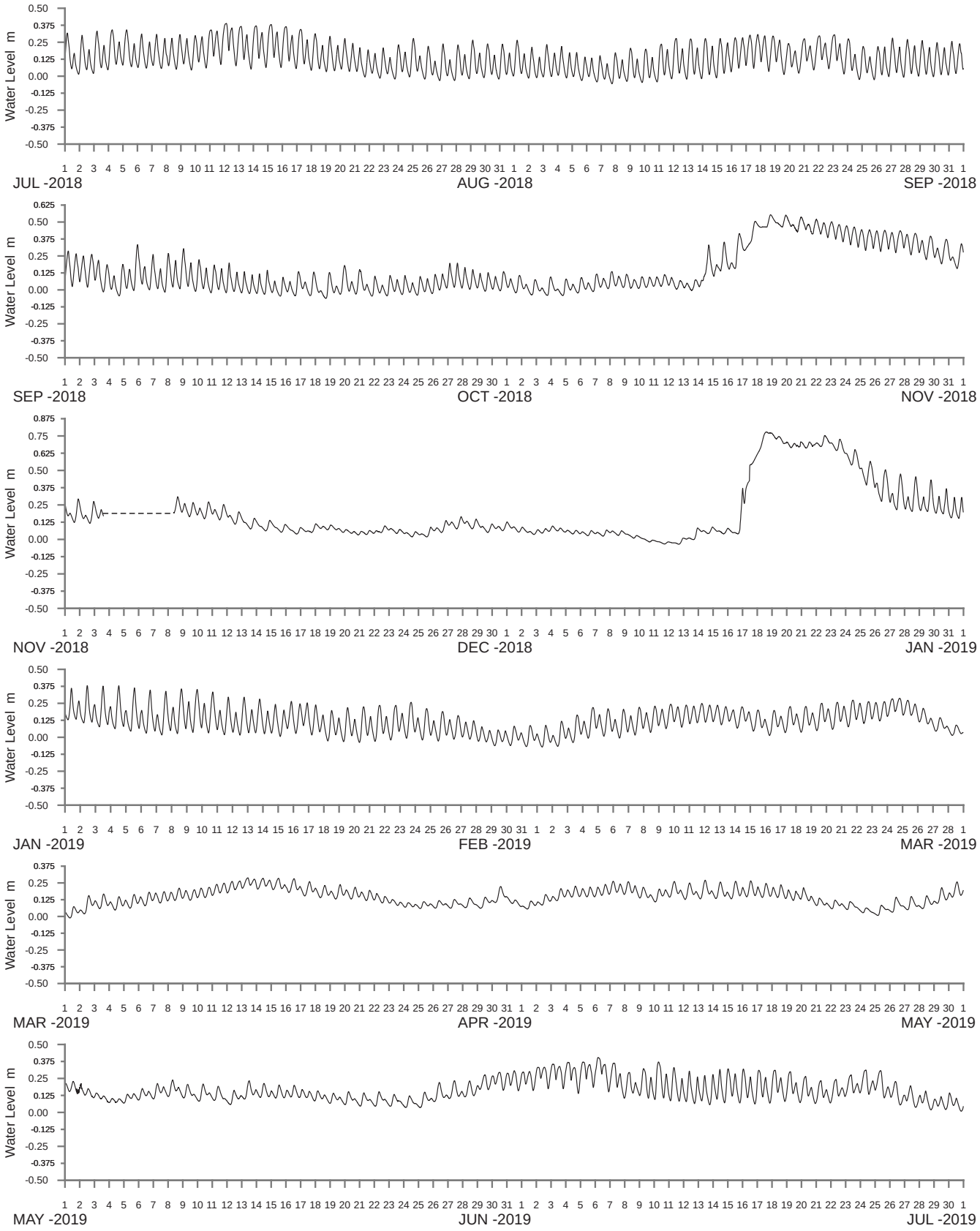
CLARENCE RIVER AT THE AVENUE UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 44

DRAWING 2692-44.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

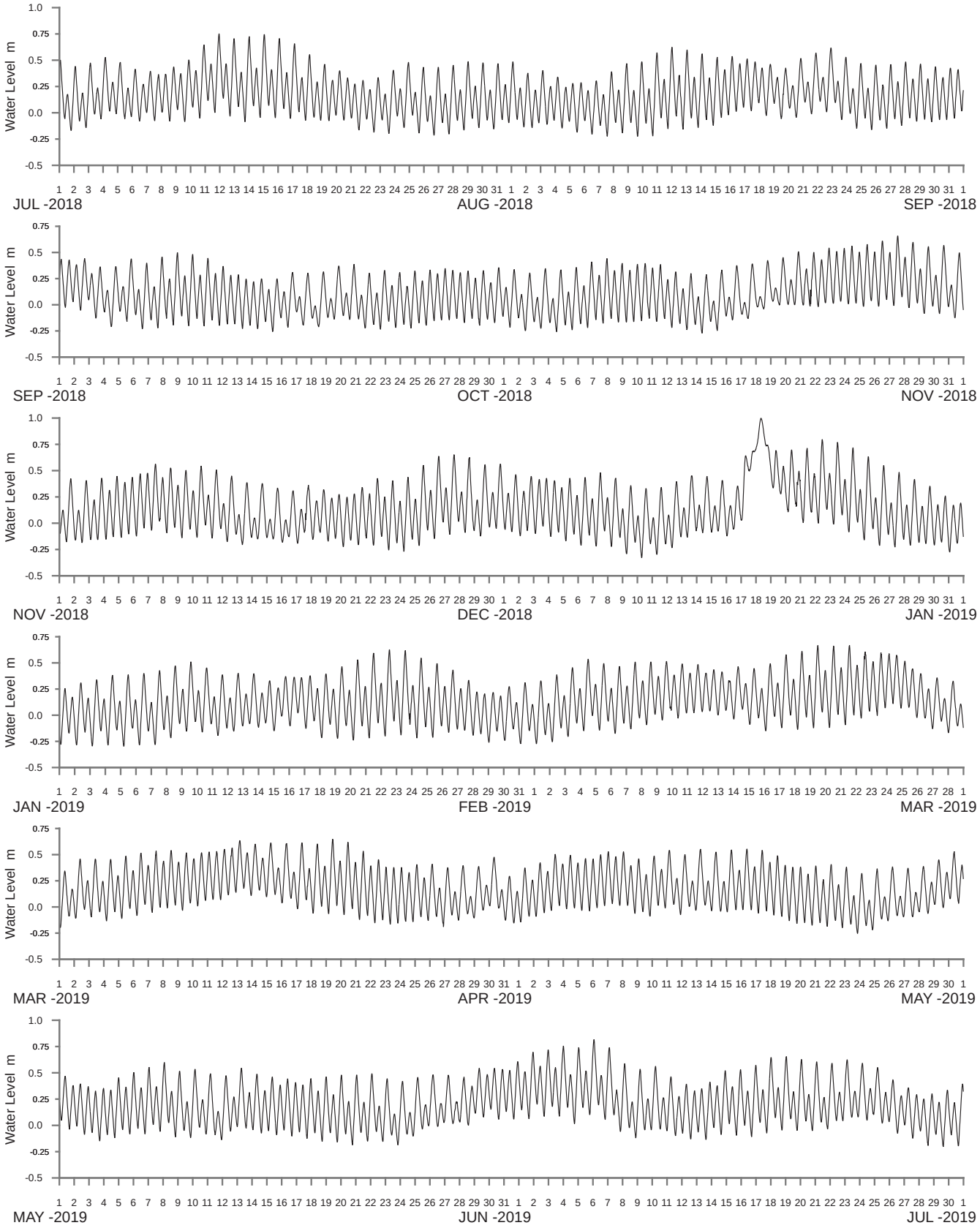
CLARENCE RIVER AT THE AVENUE DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 45

DRAWING 2692-45.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

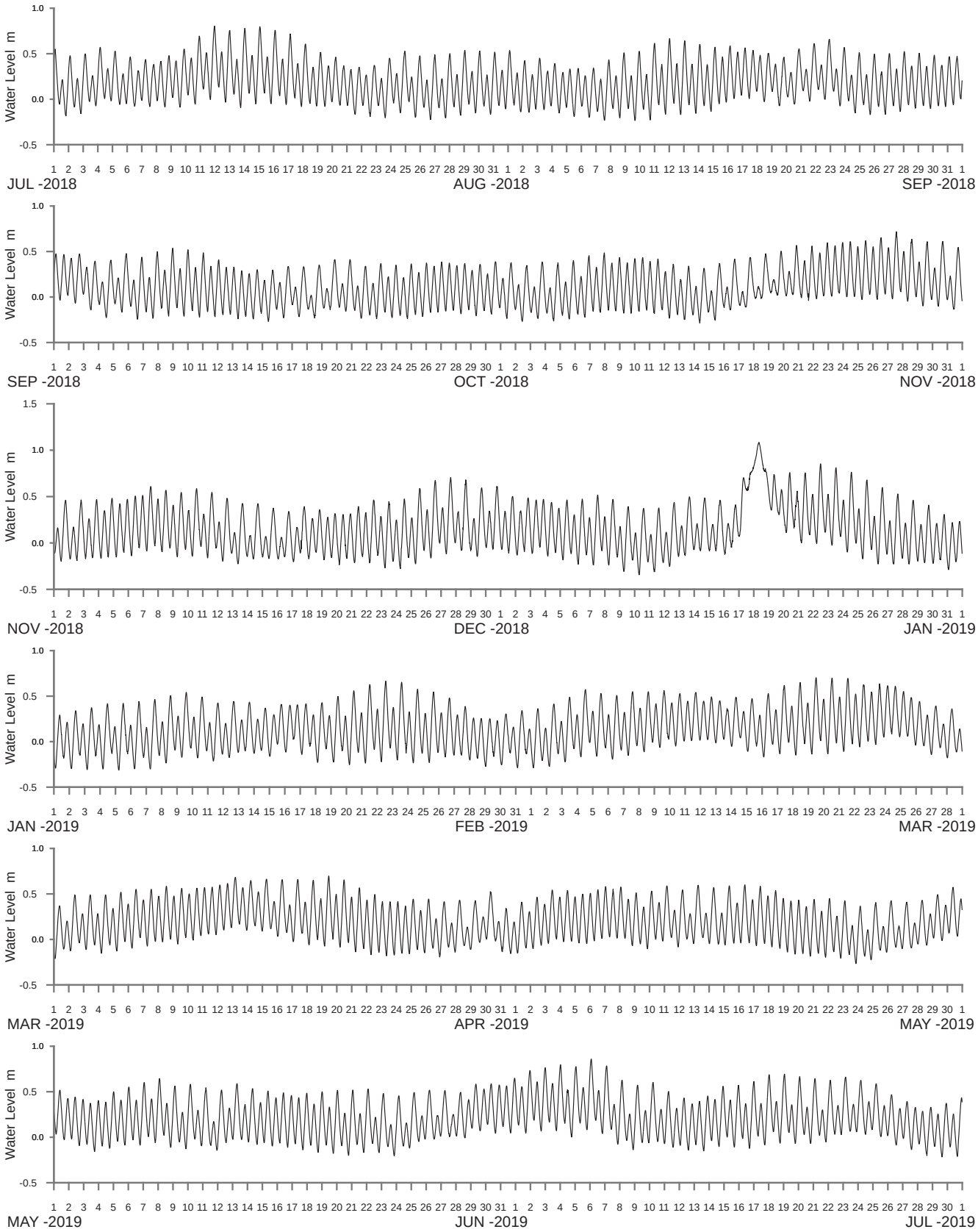
CLARENCE RIVER AT BRUSHGROVE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
46

DRAWING 2692-46.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

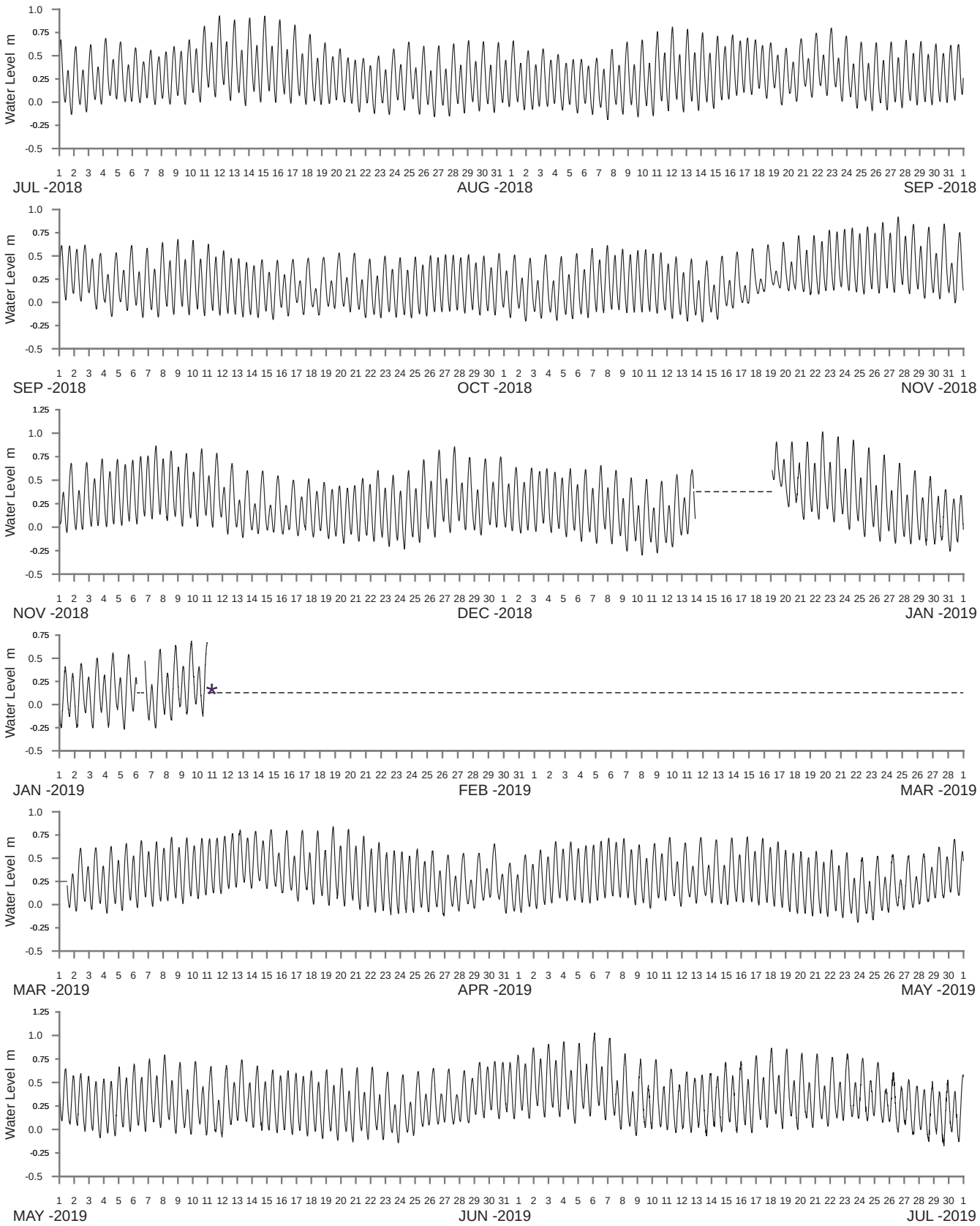
CLARENCE RIVER AT ULMARRA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 47

DRAWING 2692-47.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Uncertainty >±50mm due to siltation

NSW GOVERNMENT

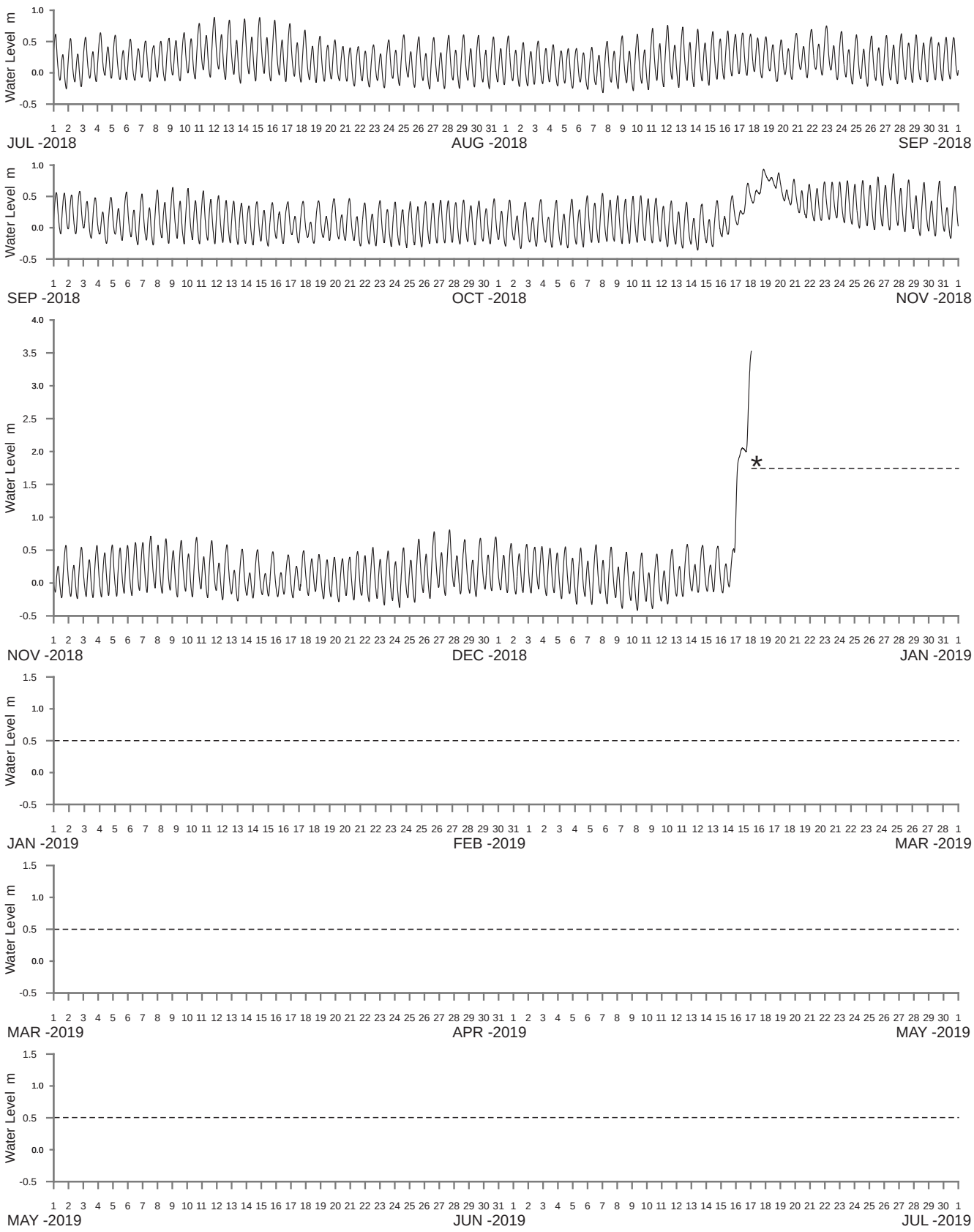
CLARENCE RIVER AT GRAFTON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 48

DRAWING 2692-48.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Uncertainty >±50mm due to siltation

NSW GOVERNMENT

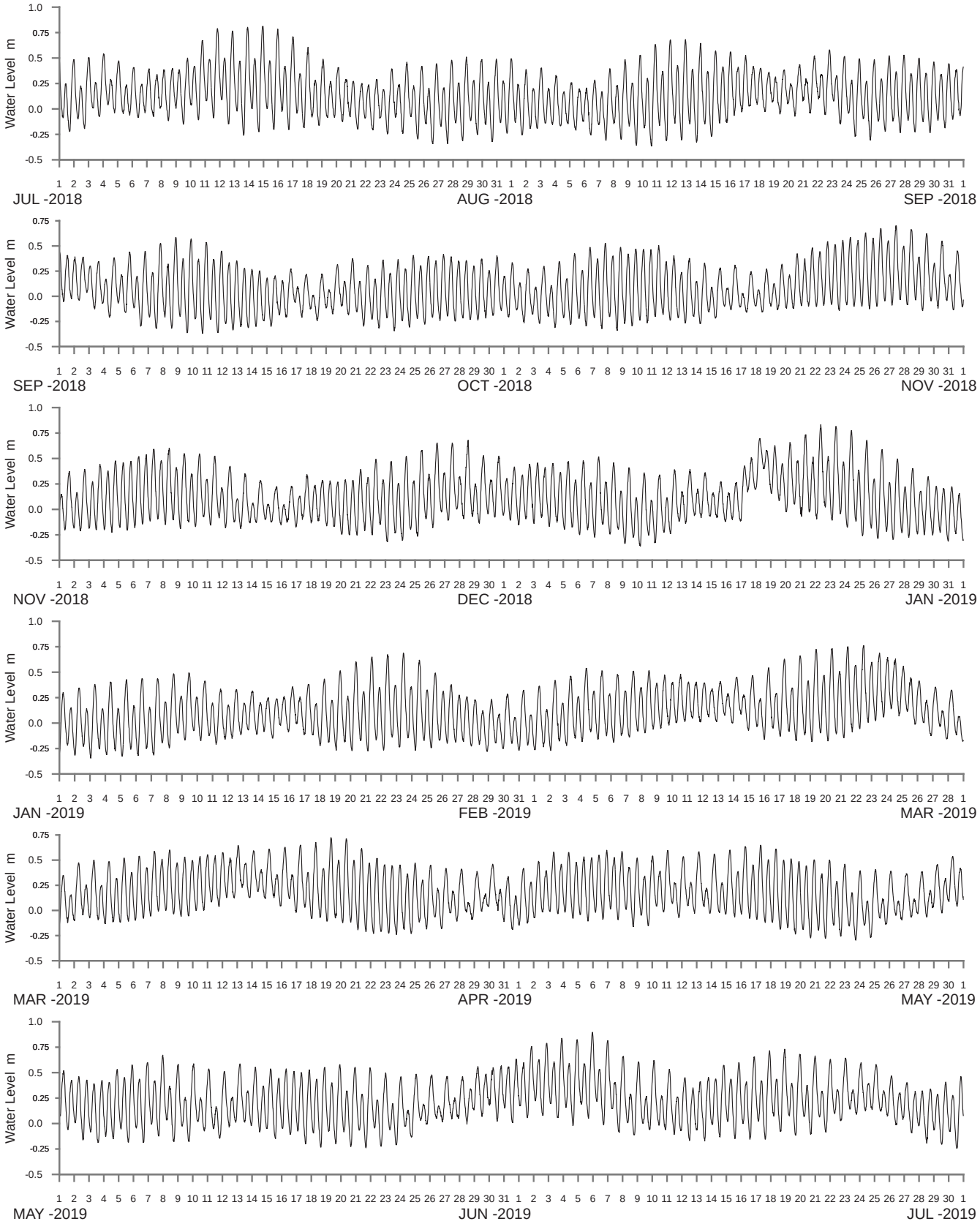
CLARENCE RIVER AT ROGANS BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 49

DRAWING 2692-49.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

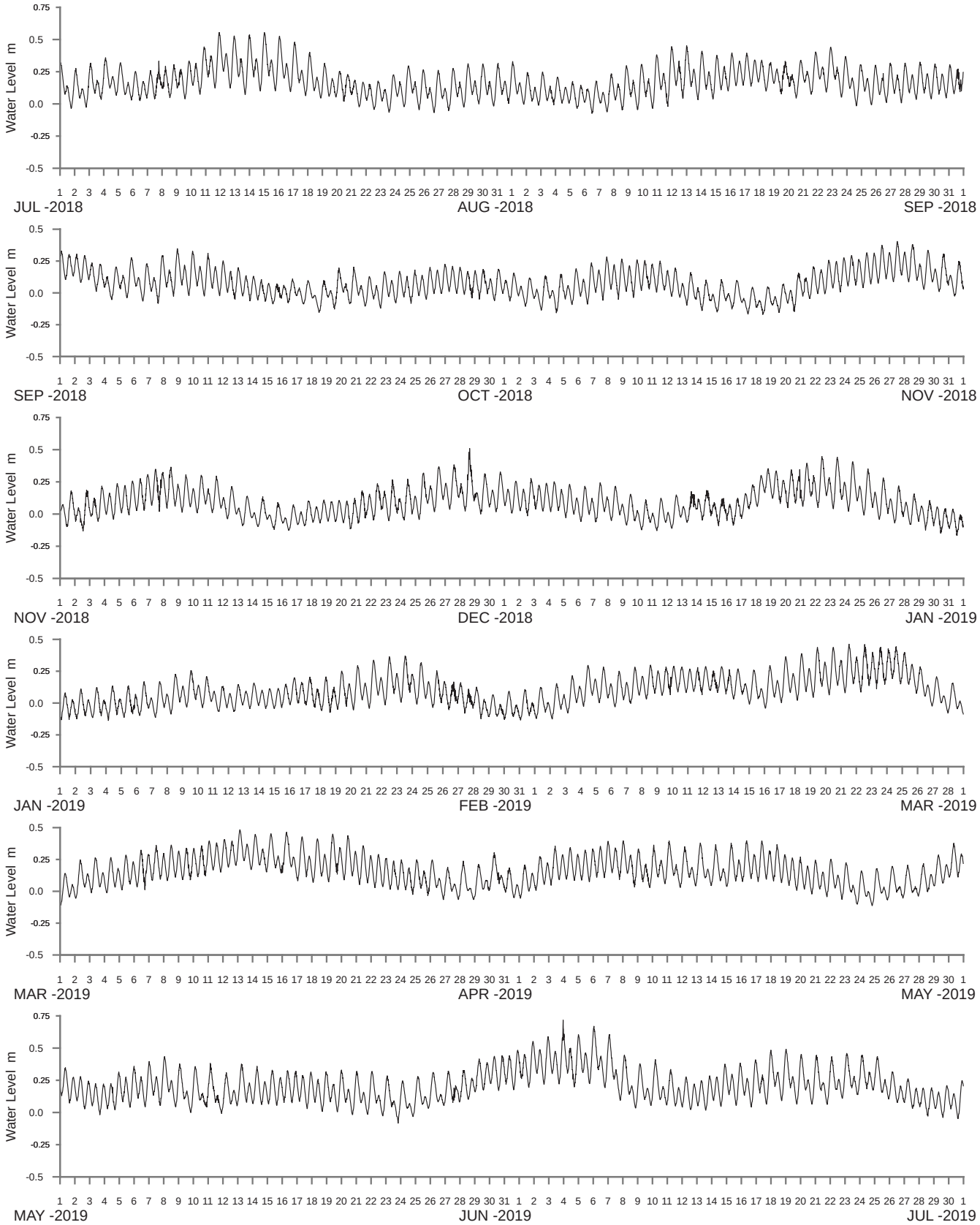
PALMERS CHANNEL AT PALMERS ISLAND BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
50

DRAWING 2692-50.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

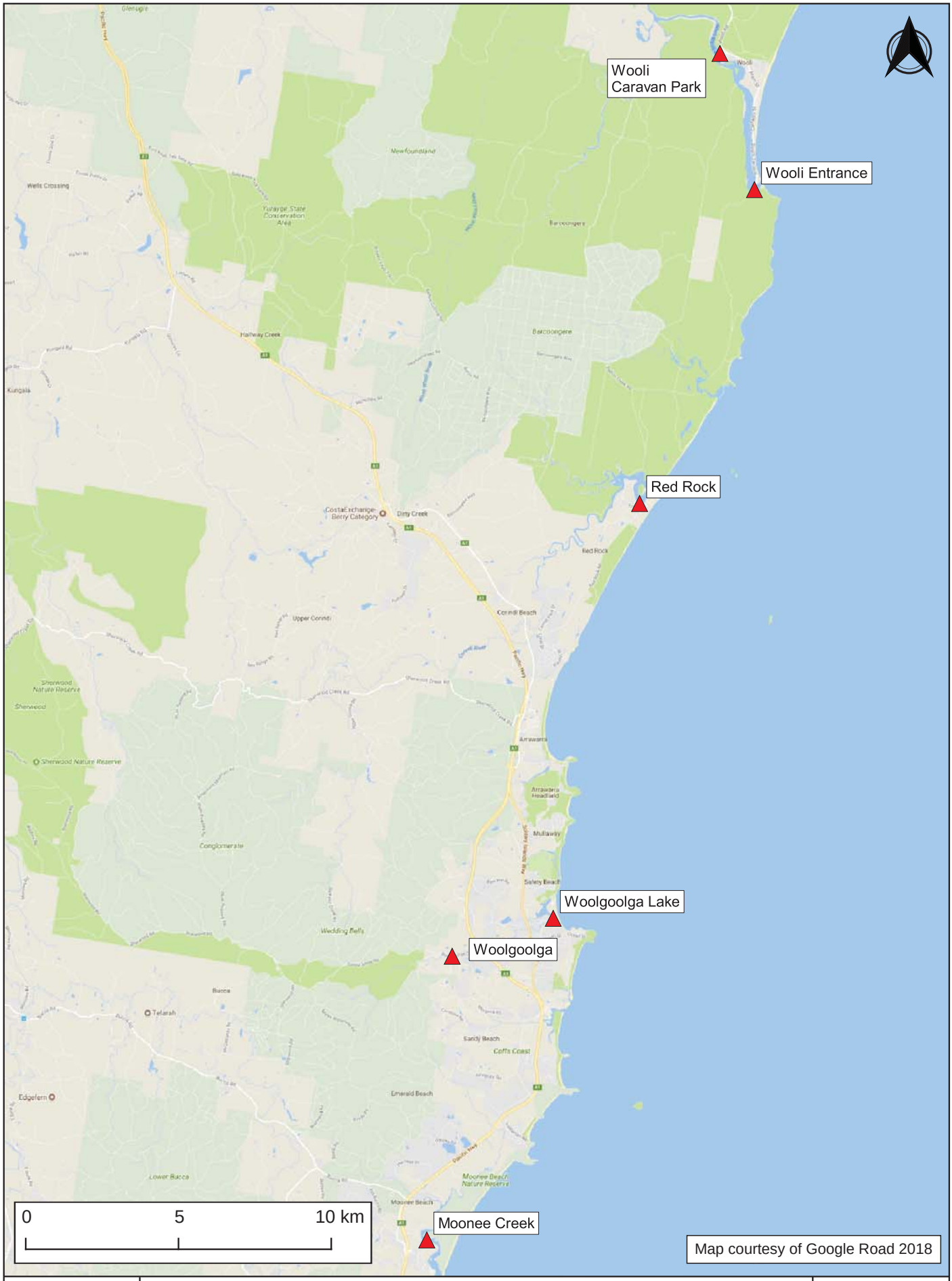
LAKE WOOLOWEYAH AT LAKE WOOLOWEYAH
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 51

DRAWING 2692-51.cdr



NSW GOVERNMENT

STATION LOCATIONS
WOOLGOOLGA REGION

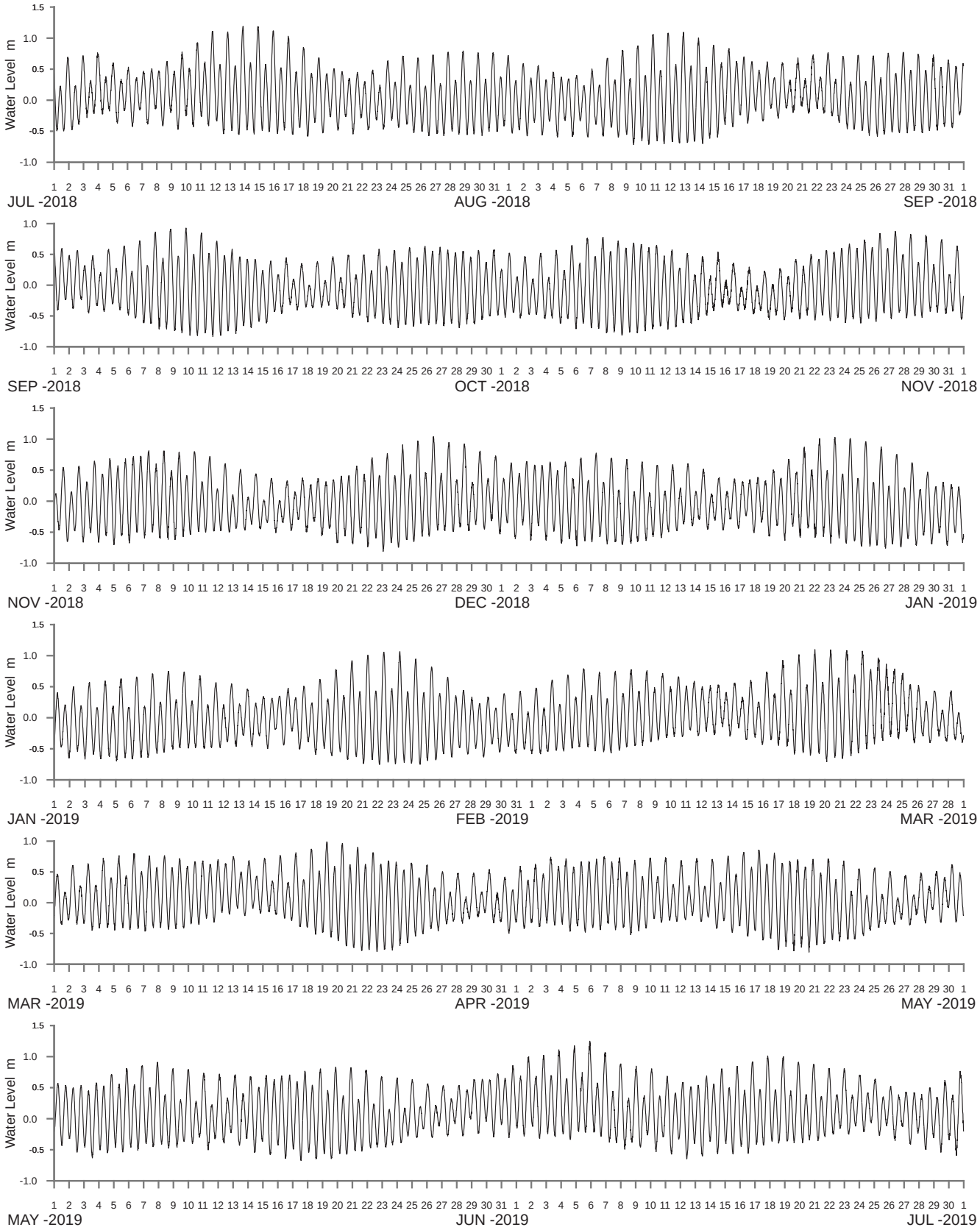
Manly Hydraulics Laboratory

Report MHL2692

Figure

52

DRAWING 2692-52.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

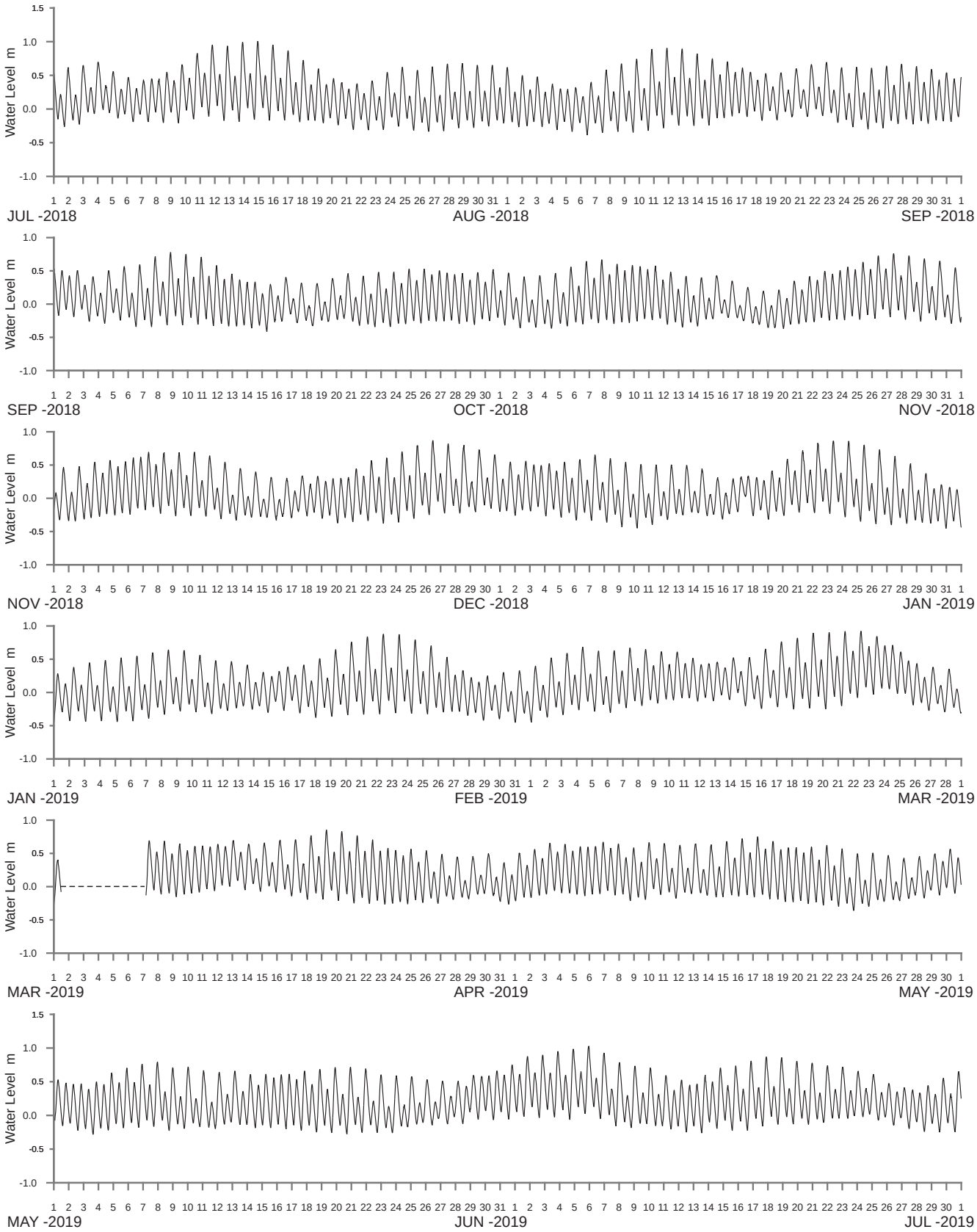
WOOLI RIVER AT WOOLI ENTRANCE
2018-2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
53

DRAWING 2692-53.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

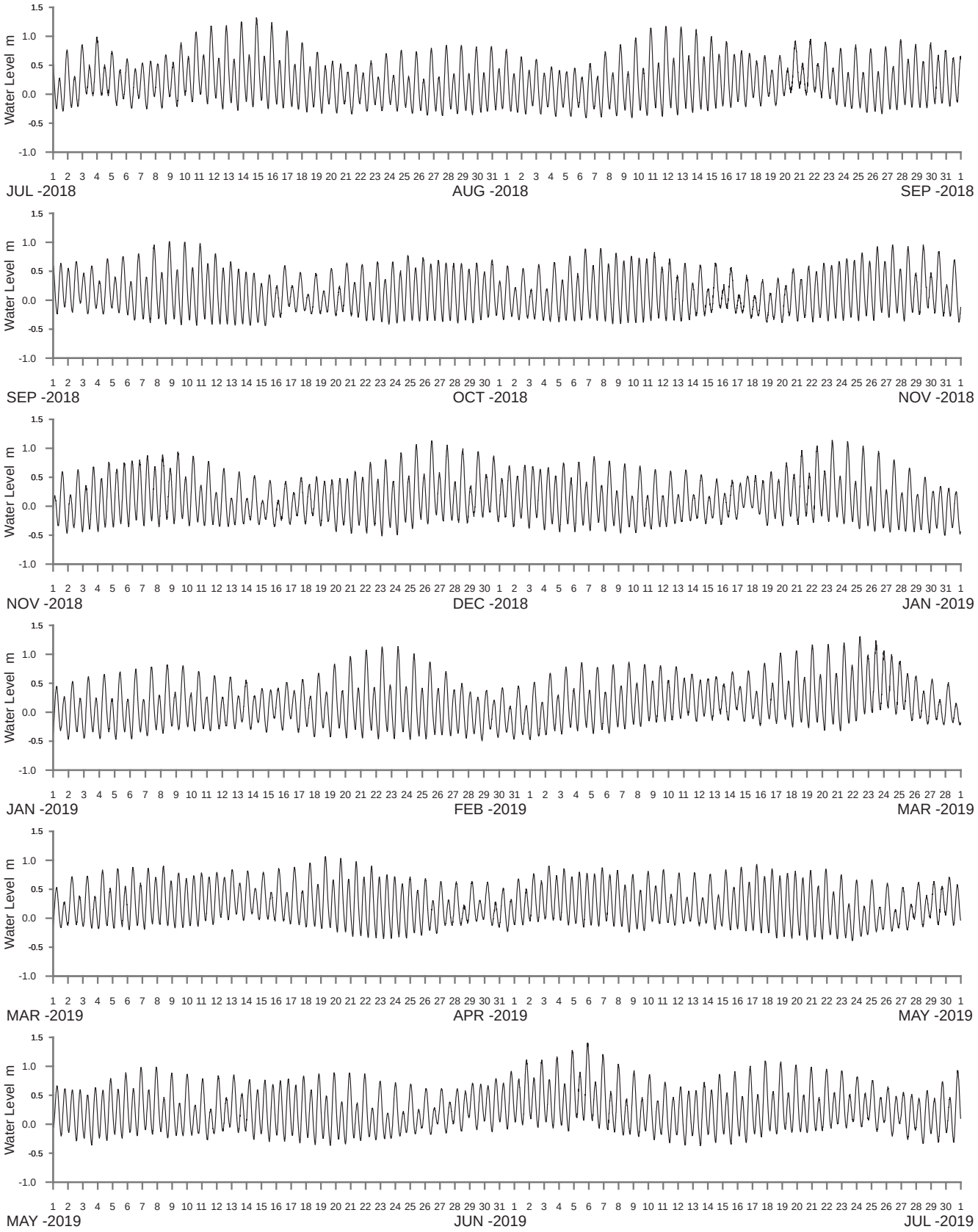
WOOLI RIVER AT WOOLI CARAVAN PARK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
54

DRAWING 2692-54.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

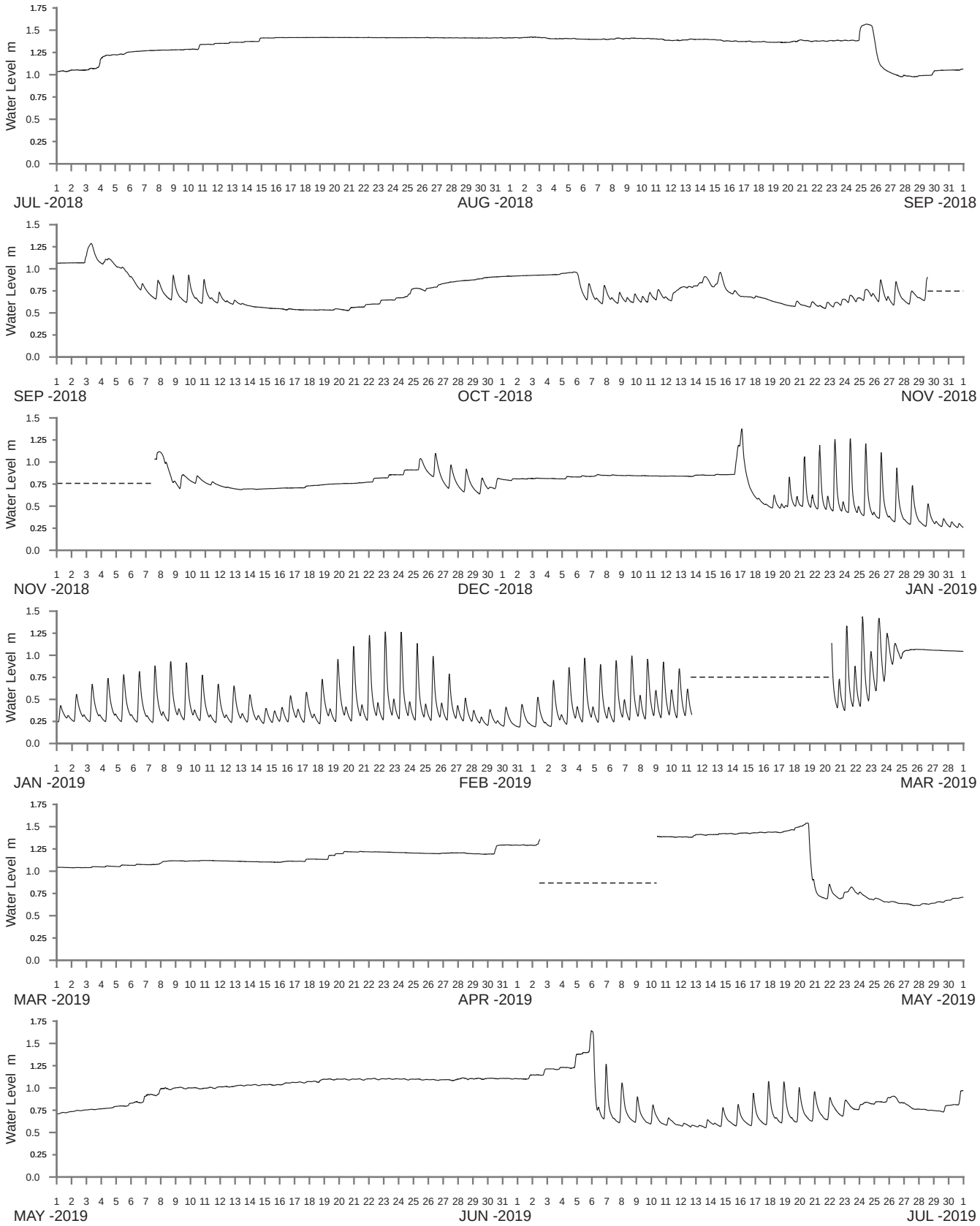
CORINDI RIVER AT RED ROCK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
55

DRAWING 2692-55.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

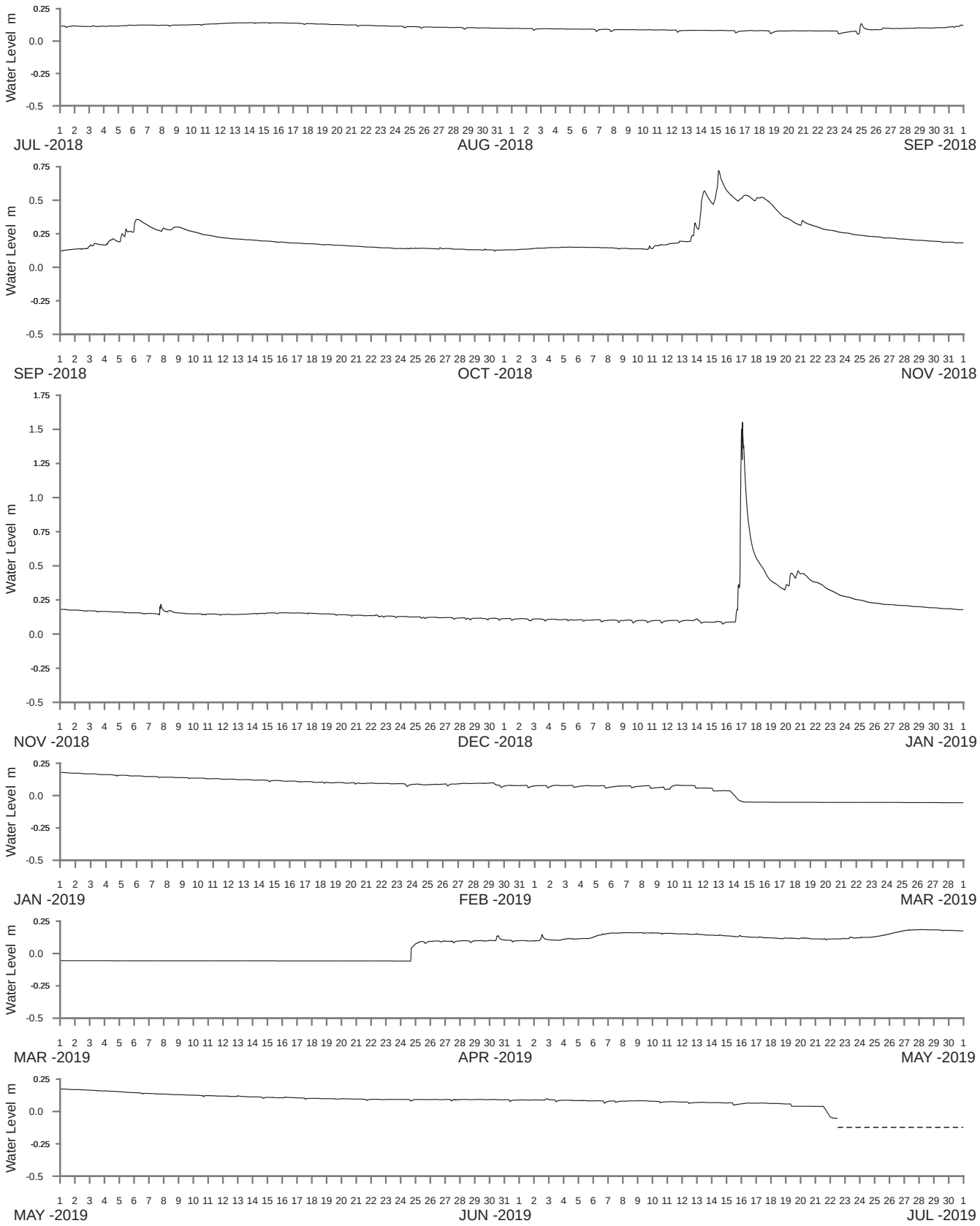
WOOLGOOLGA LAKE AT WOOLGOOLGA LAKE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 56

DRAWING 2692-56.cdr



WATER LEVEL REFERENCED TO CTF OF CONTROL STRUCTURE

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

NSW GOVERNMENT

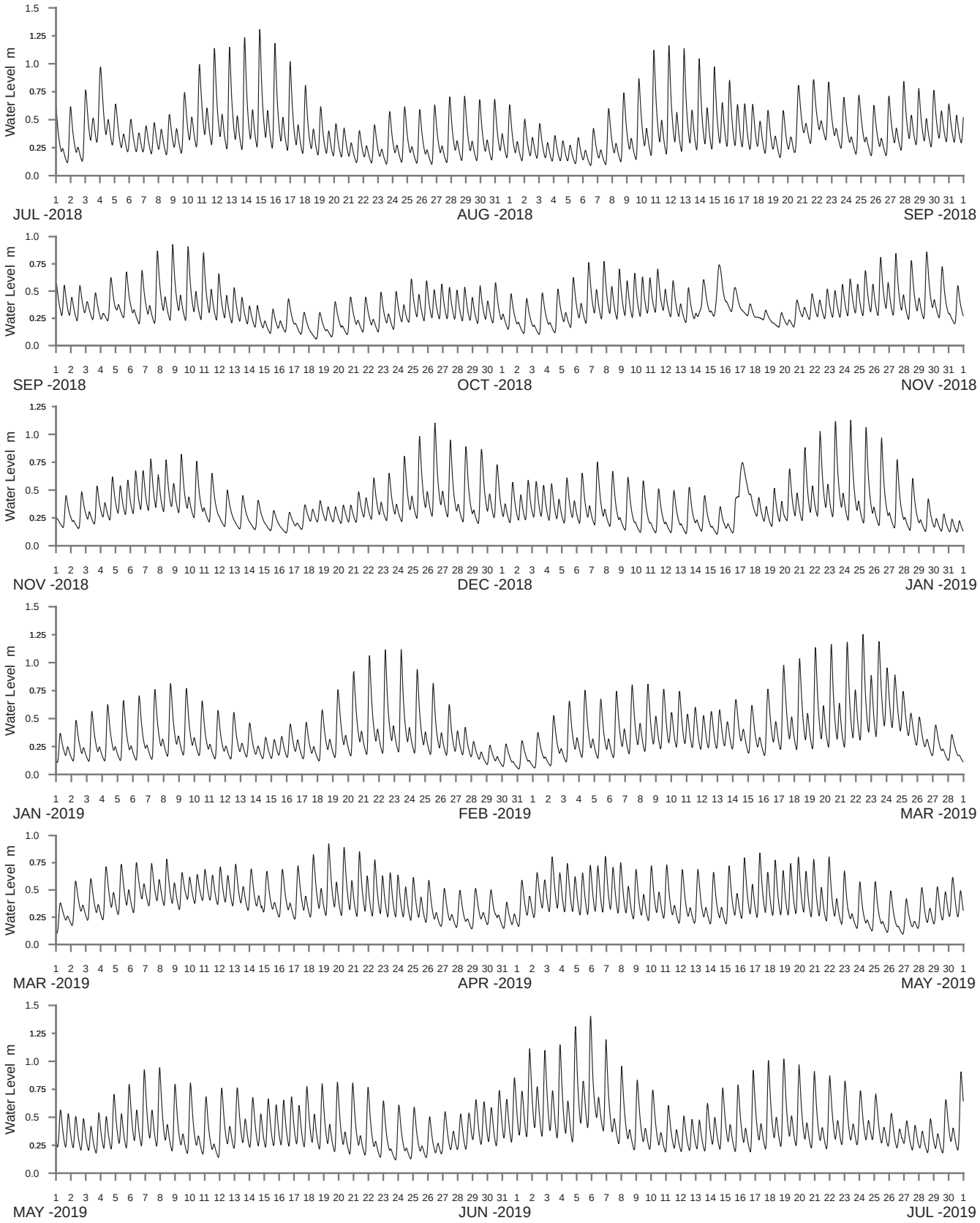
WOOLGOOLGA CREEK AT WOOLGOOLGA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 57

DRAWING 2692-57.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

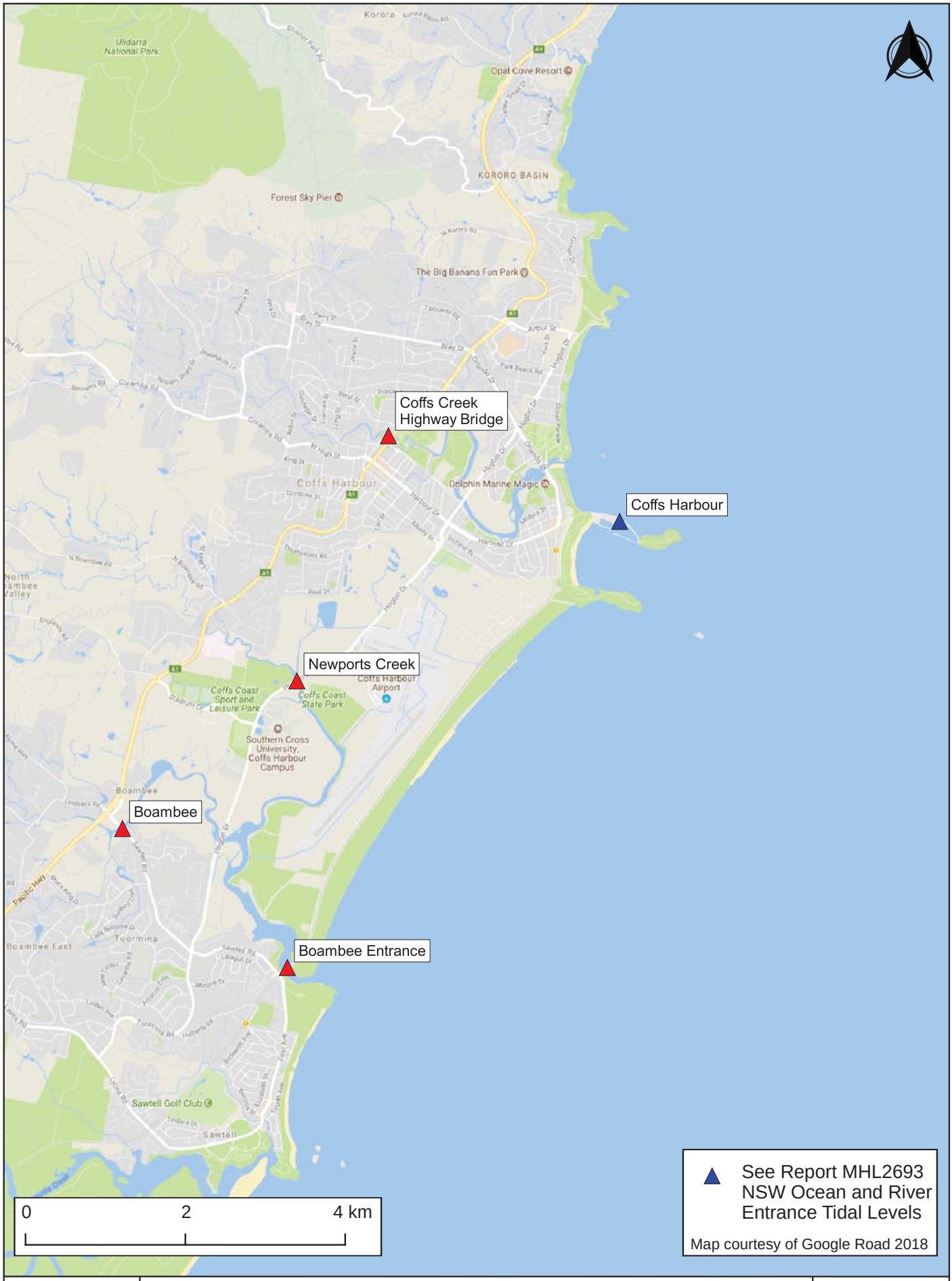
MOONEE CREEK AT MOONEE CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 58

DRAWING 2692-58.cdr



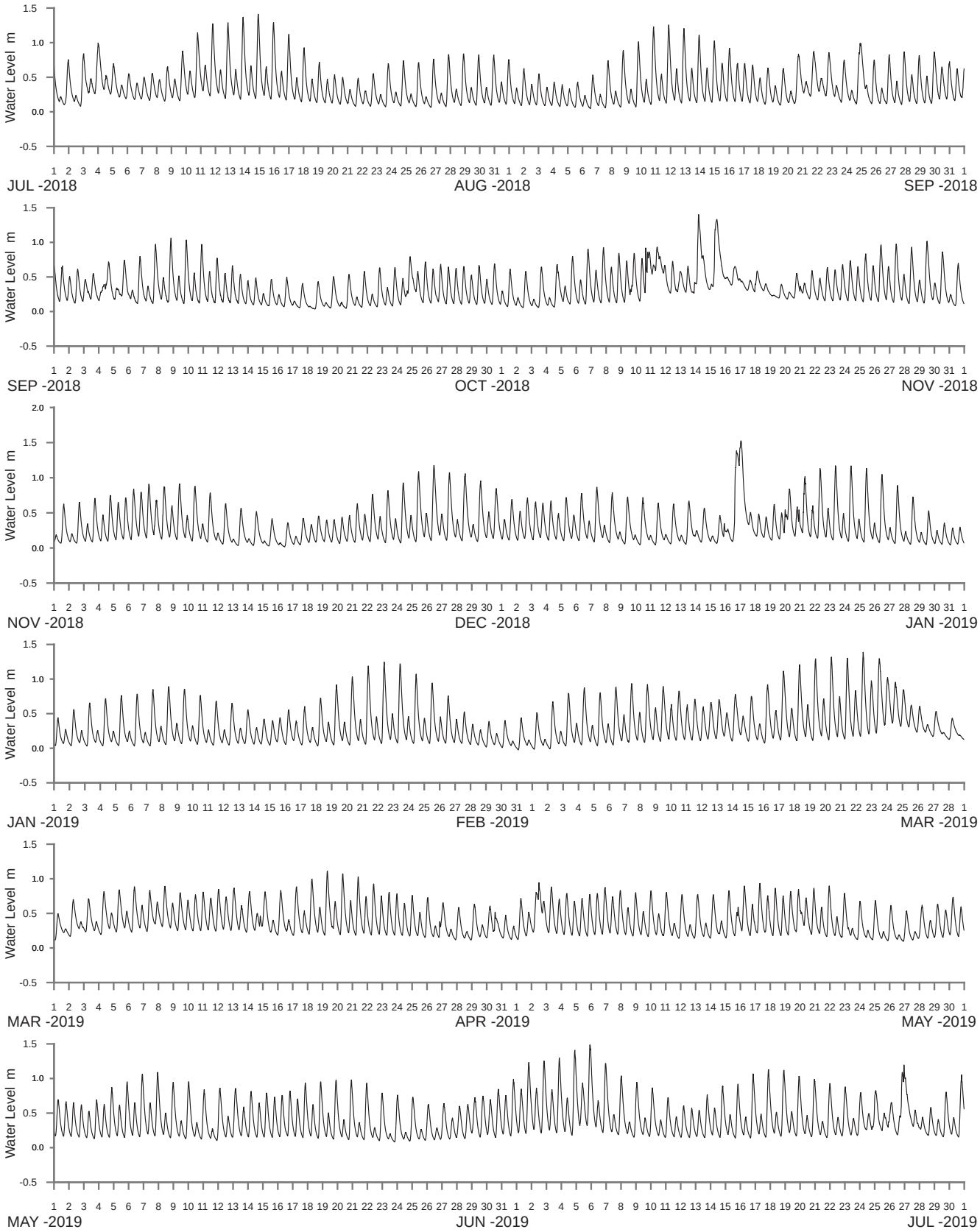
NSW GOVERNMENT

STATION LOCATIONS
COFFS HARBOUR REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
59

DRAWING 2692-59.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

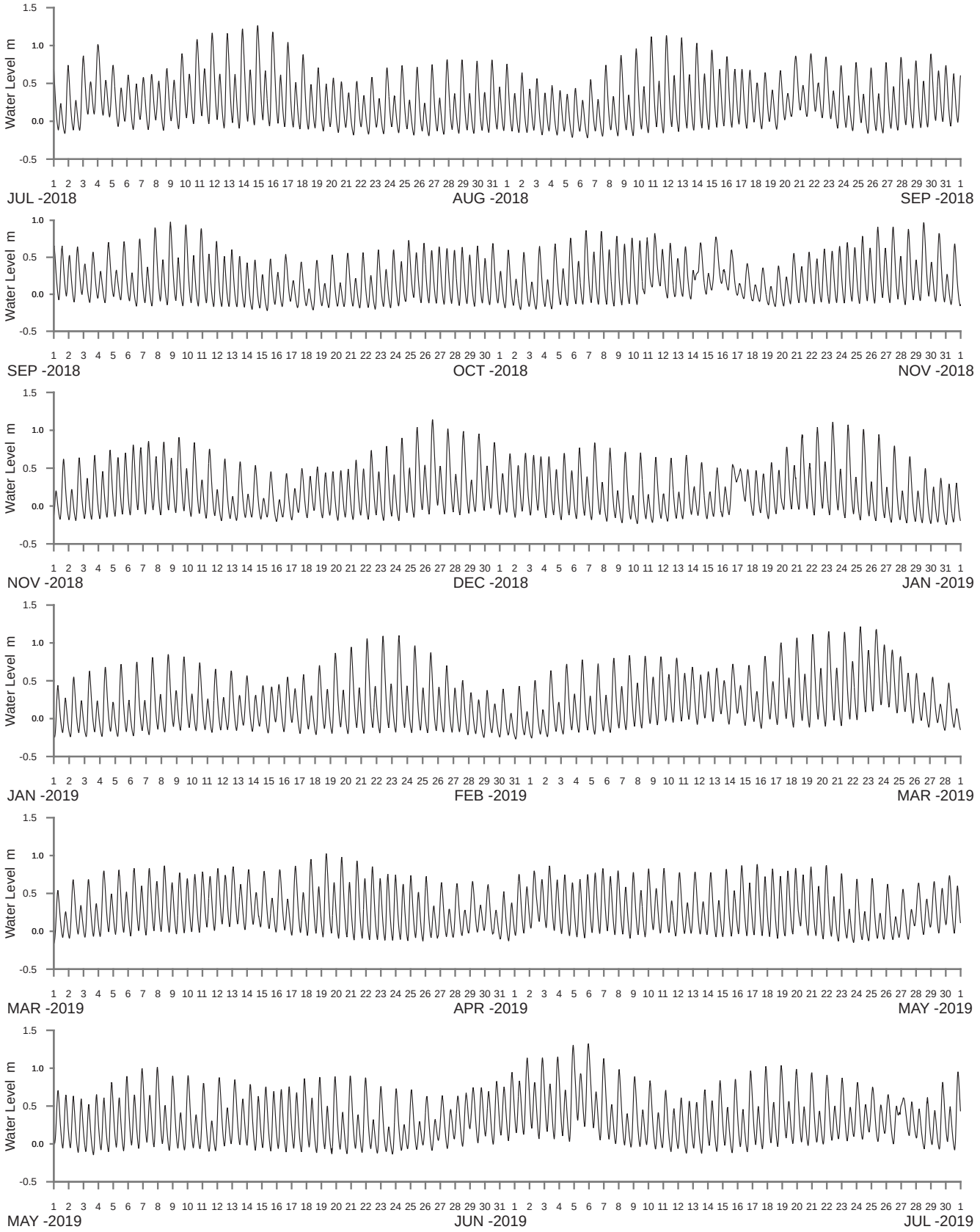
COFFS CREEK AT COFFS CREEK HIGHWAY BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
60

DRAWING 2692-60.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

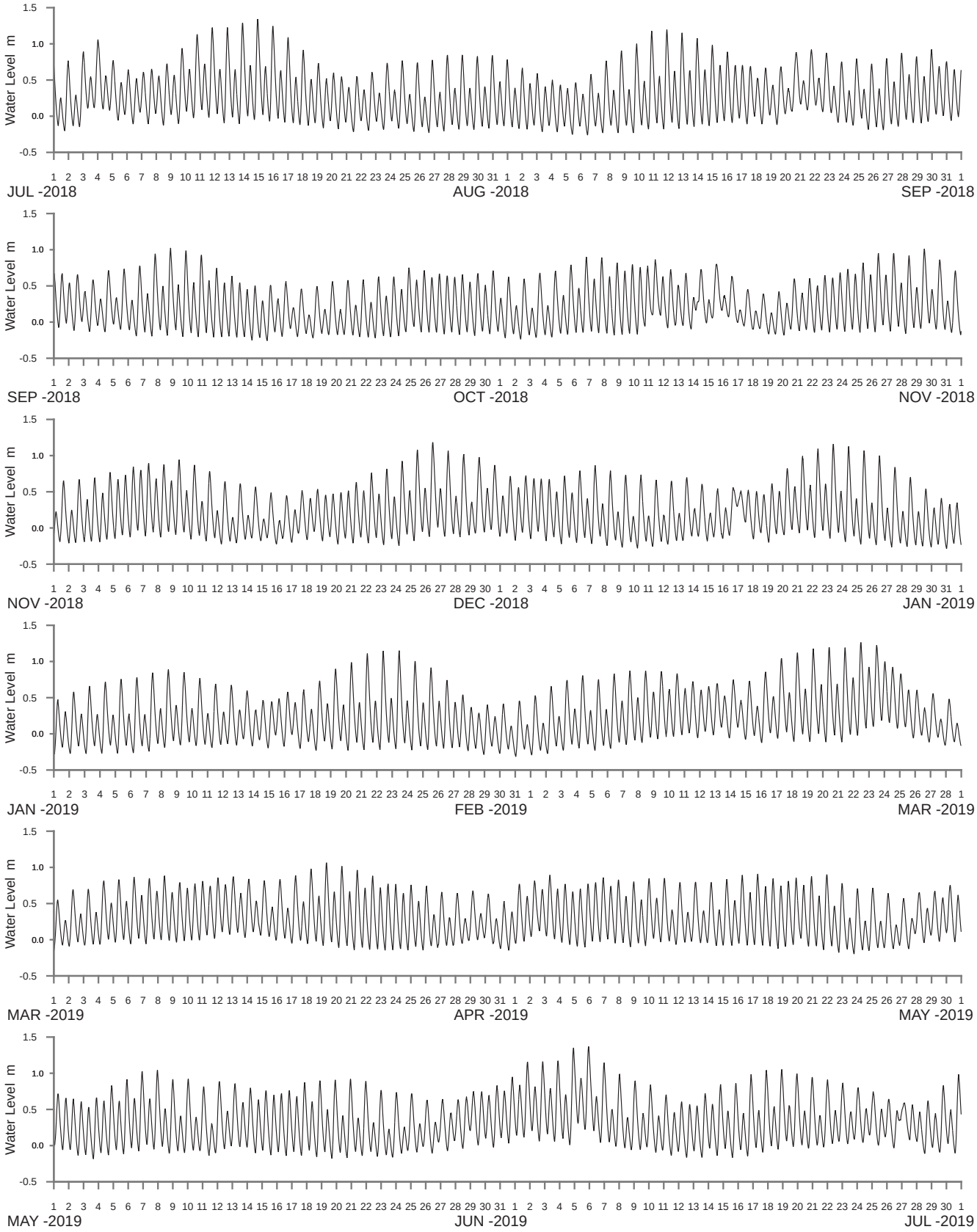
NEWPORTS CREEK AT NEWPORTS CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
61

DRAWING 2692-61.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

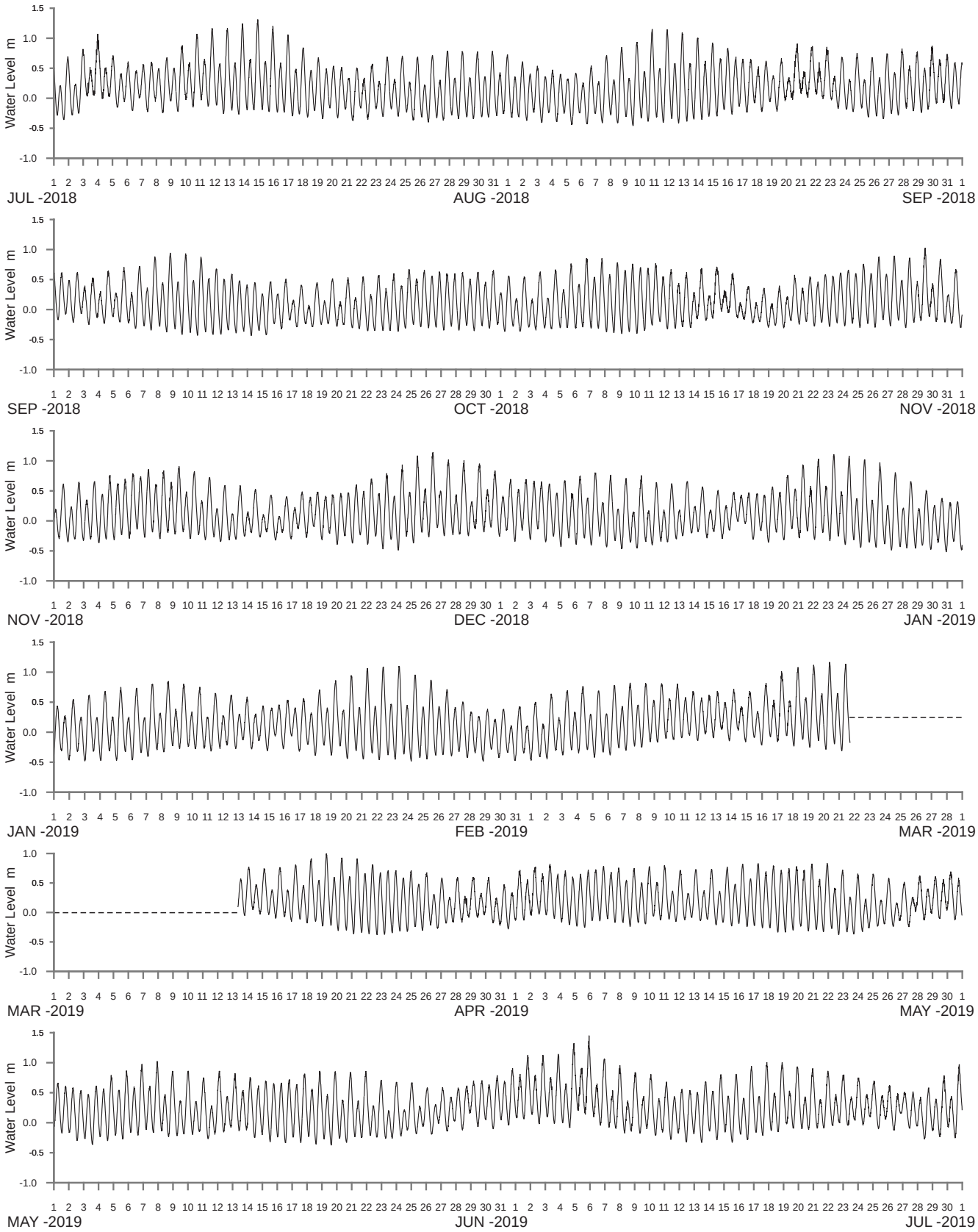
BOAMBEE CREEK AT BOAMBEE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
62

DRAWING 2692-62.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

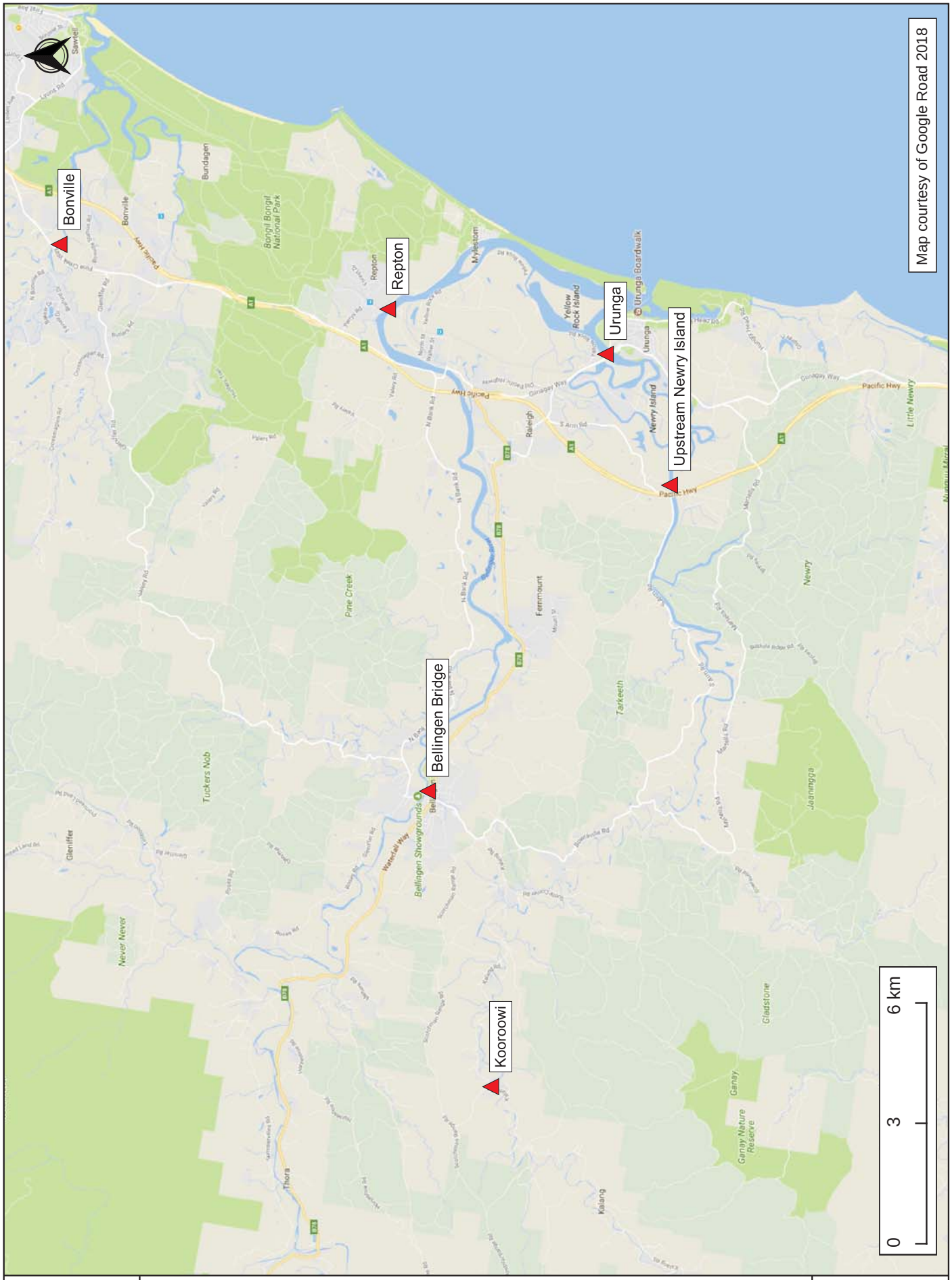
BOAMBEE CREEK AT BOAMBEE ENTRANCE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
63

DRAWING 2692-63.cdr



NSW GOVERNMENT

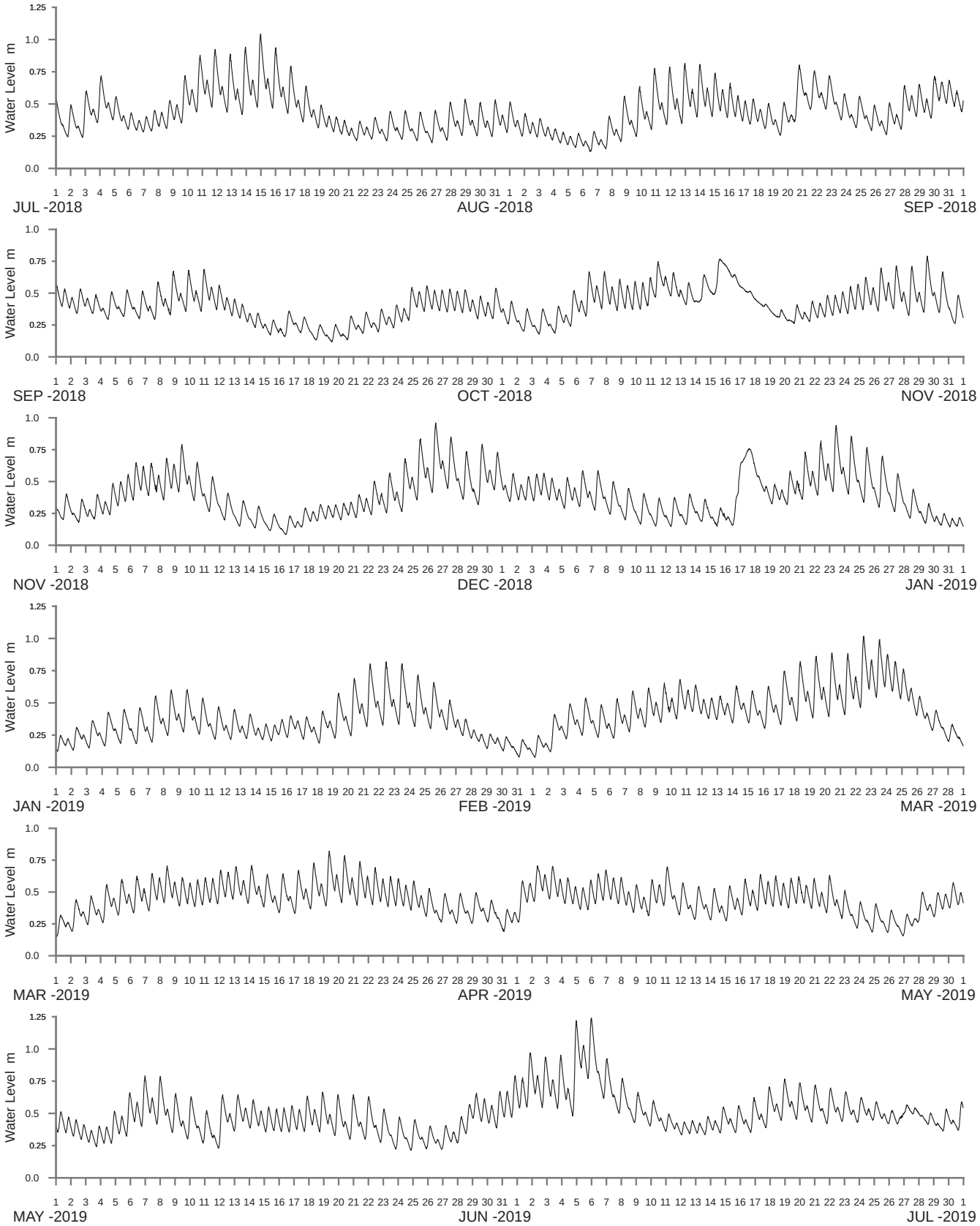
STATION LOCATIONS
BELLINGER RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 64

DRAWING 2692-64.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

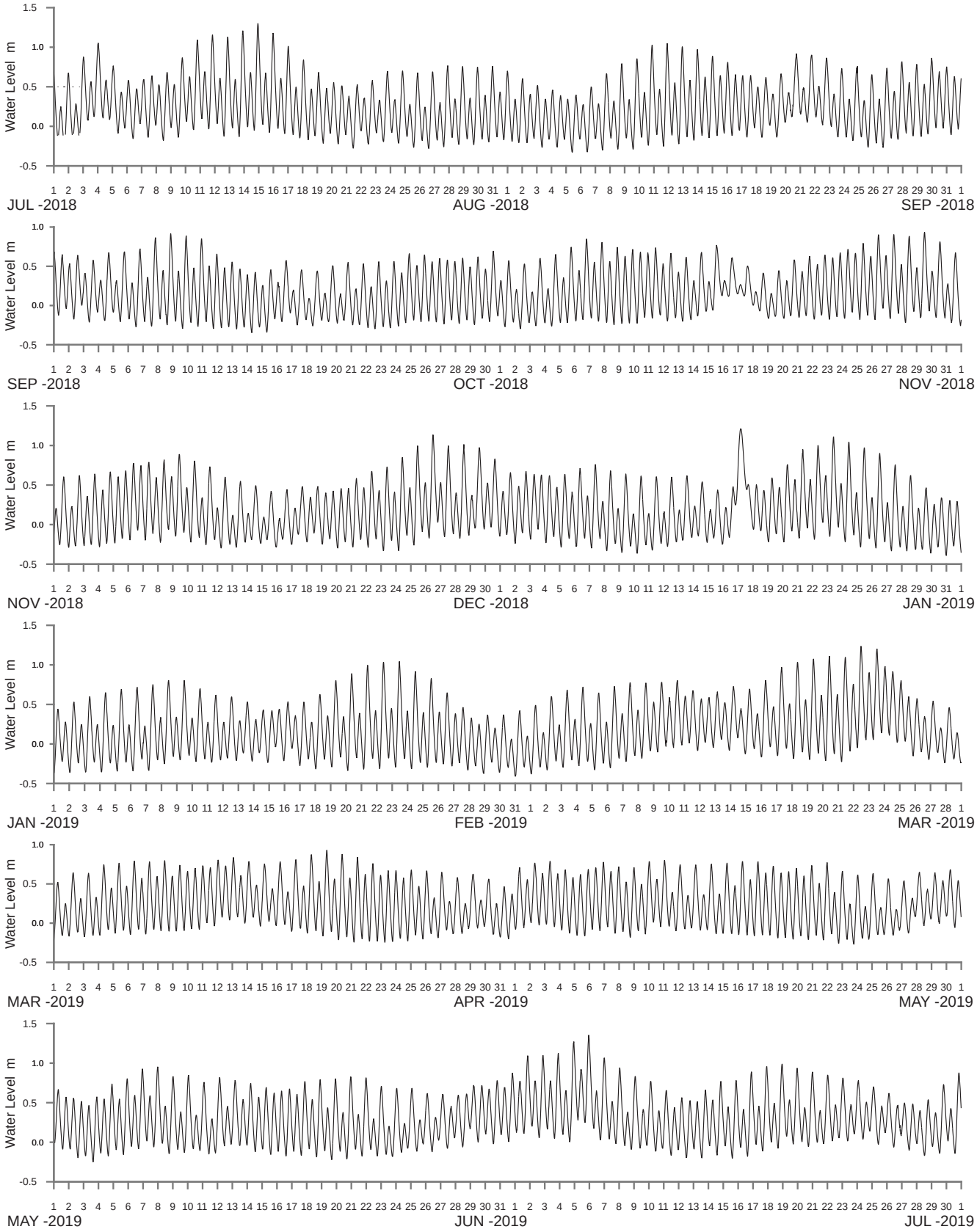
BONVILLE CREEK AT BONVILLE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 65

DRAWING 2692-65.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

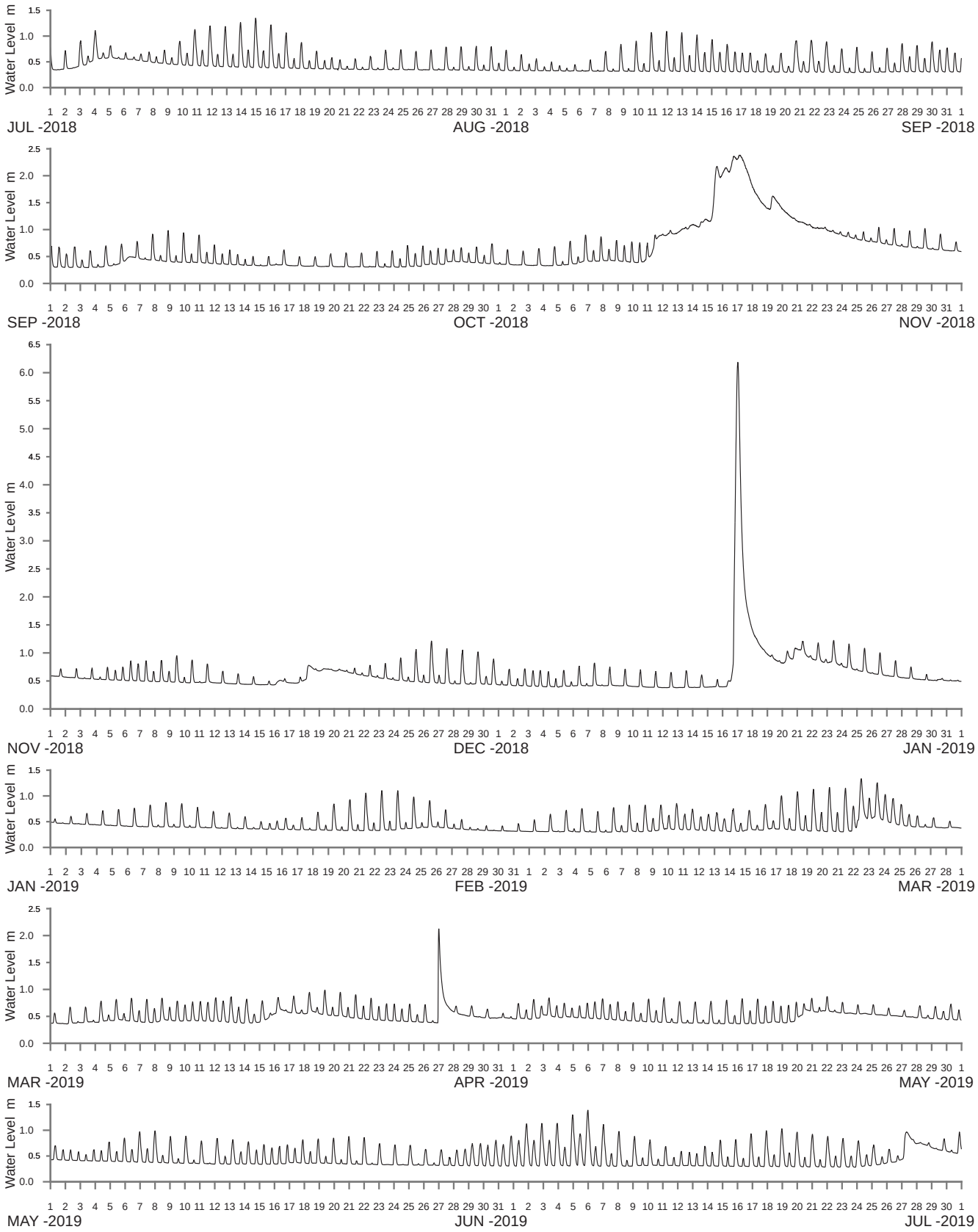
BELLINGER RIVER AT REPTON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
66

DRAWING 2692-66.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

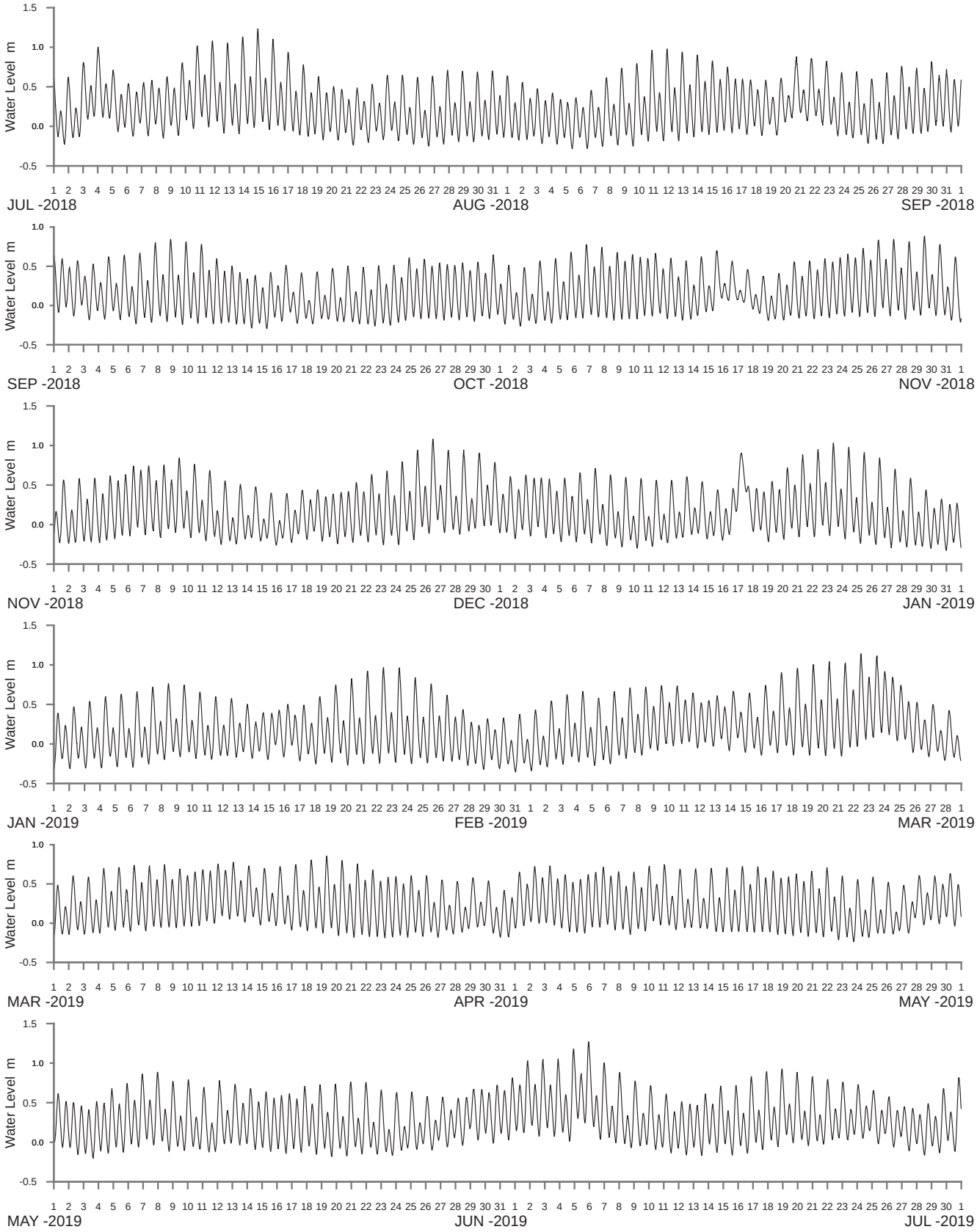
BELLINGER RIVER AT BELLINGEN BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
67

DRAWING 2692-67.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

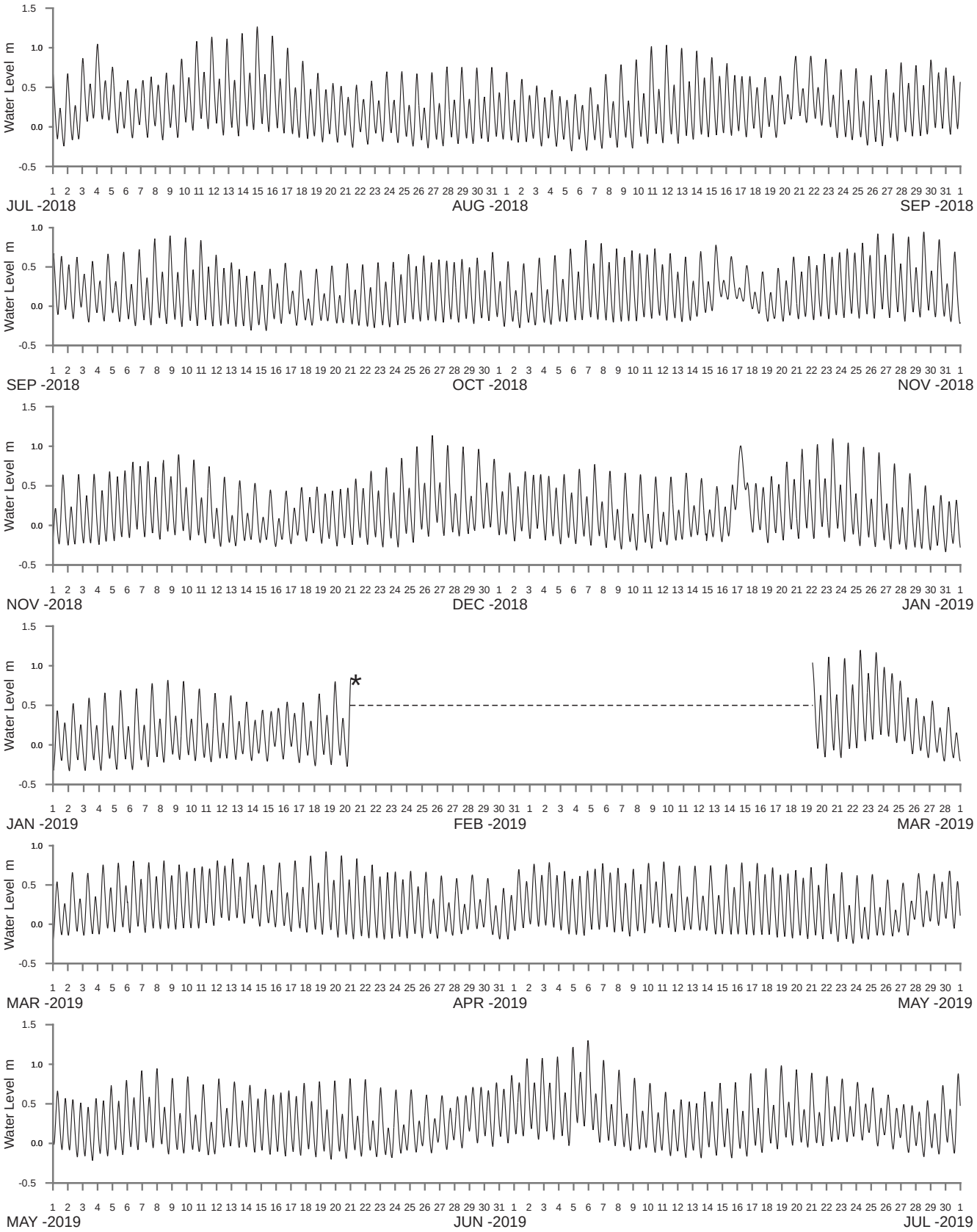
KALANG RIVER AT URUNGA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
68

DRAWING 2692-68.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to station vandalised

NSW GOVERNMENT

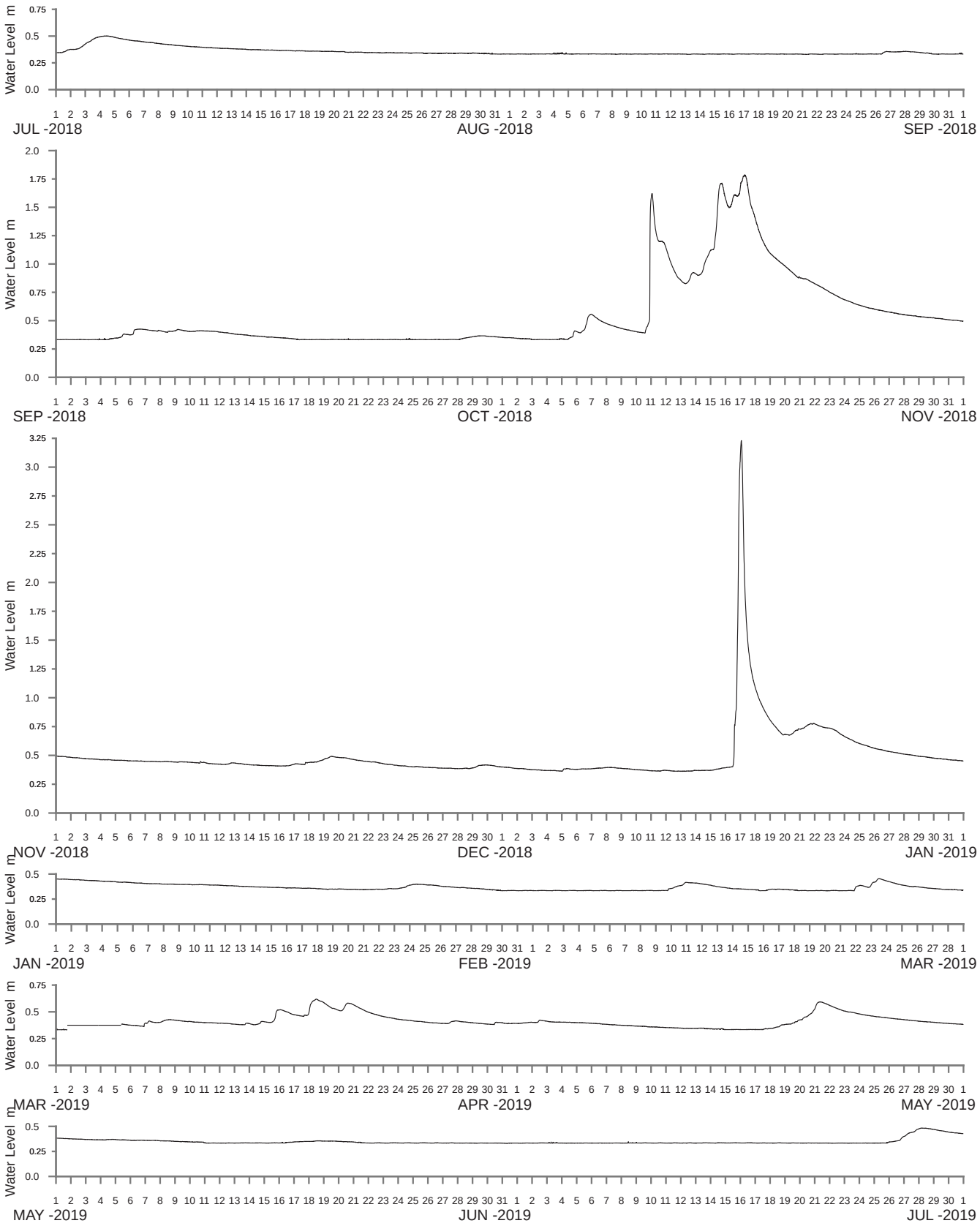
KALANG RIVER AT UPSTREAM NEWRY ISLAND
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 69

DRAWING 2692-69.cdr



WATER LEVEL REFERENCED TO ASSUMED DATUM

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

NSW GOVERNMENT

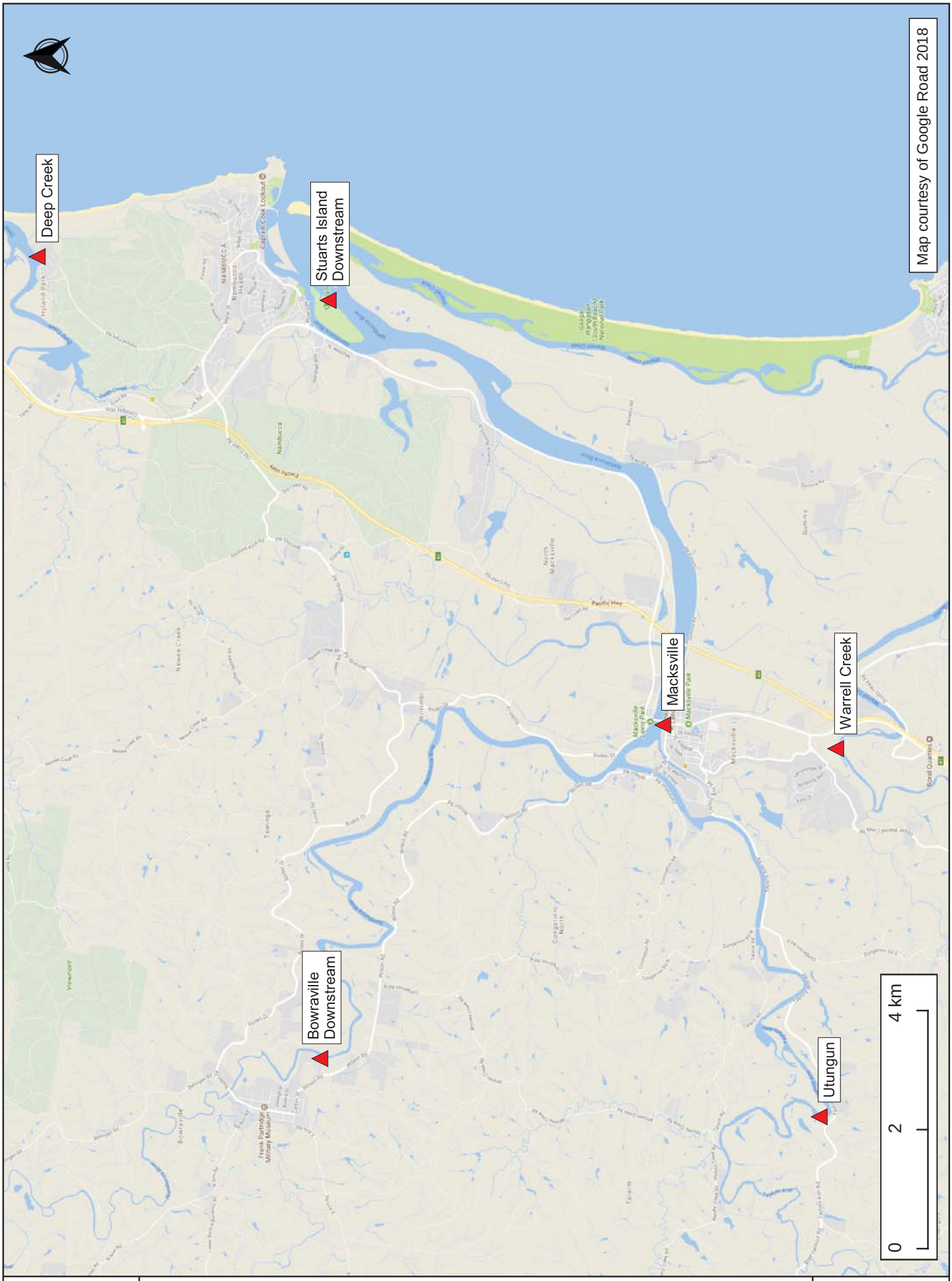
KALANG RIVER AT KOOROOWI
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 70

DRAWING 2692-70.cdr



NSW GOVERNMENT

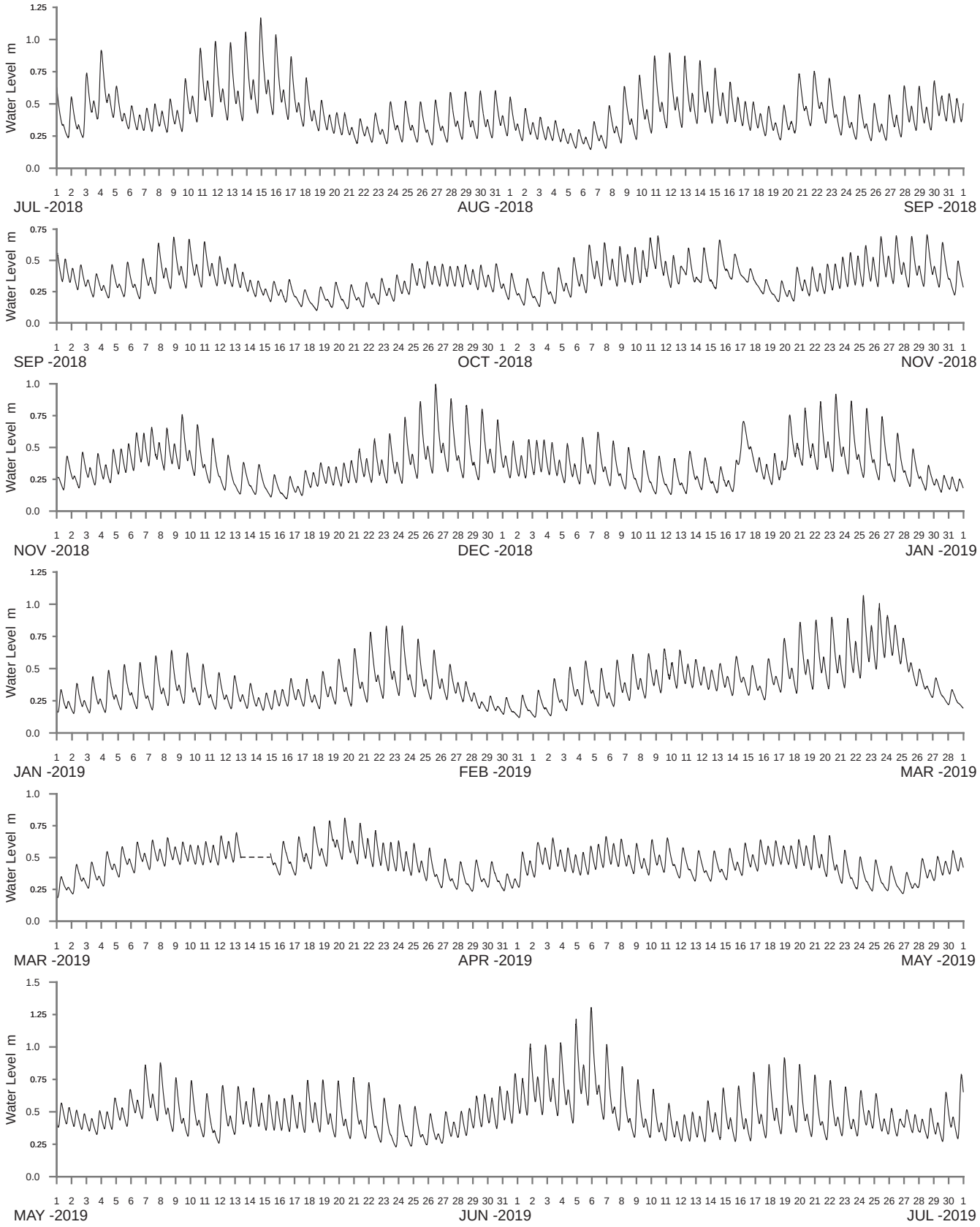
STATION LOCATIONS
NAMBUCCA RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 71

DRAWING 2692-71.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

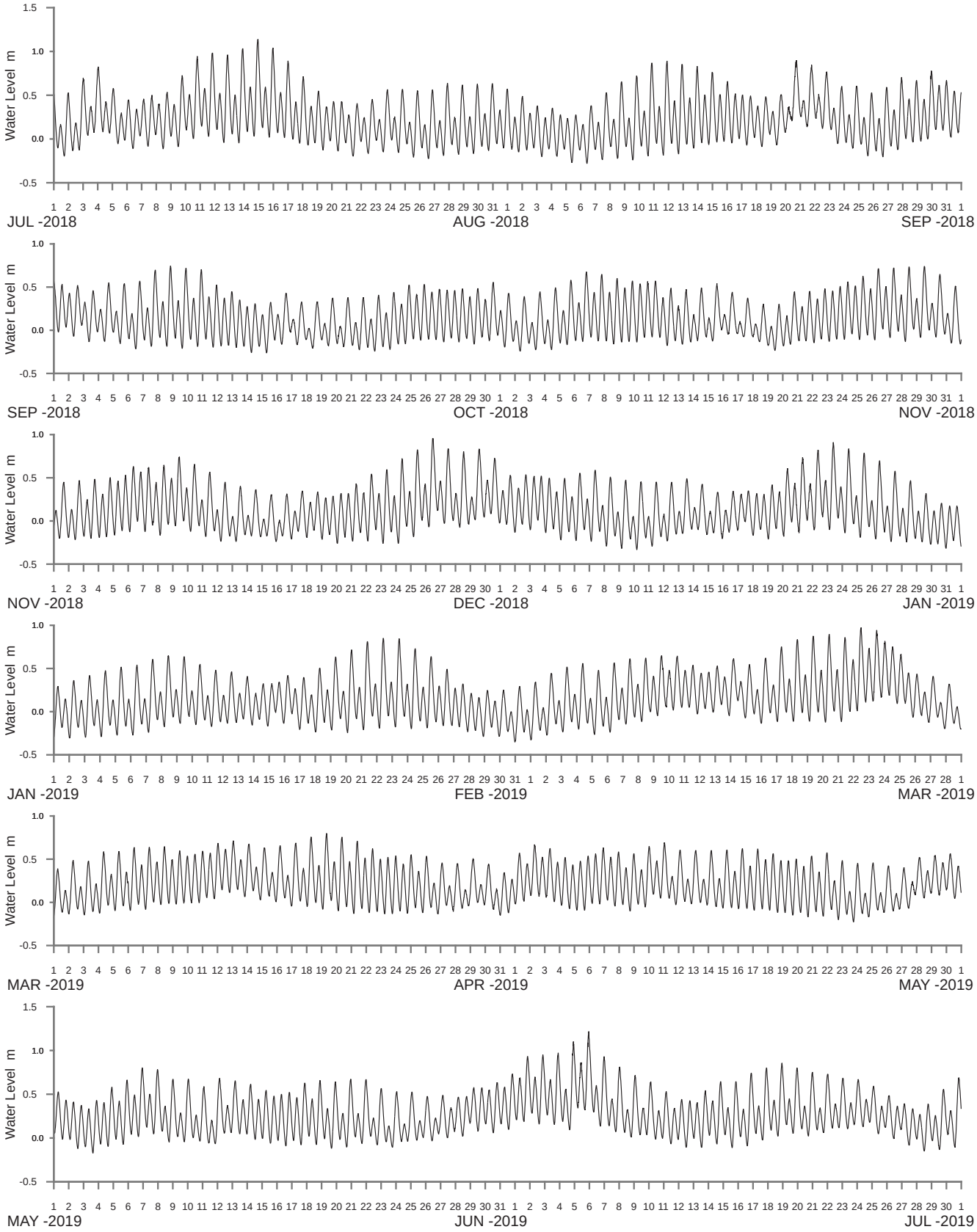
DEEP CREEK AT DEEP CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
72

DRAWING 2692-72.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

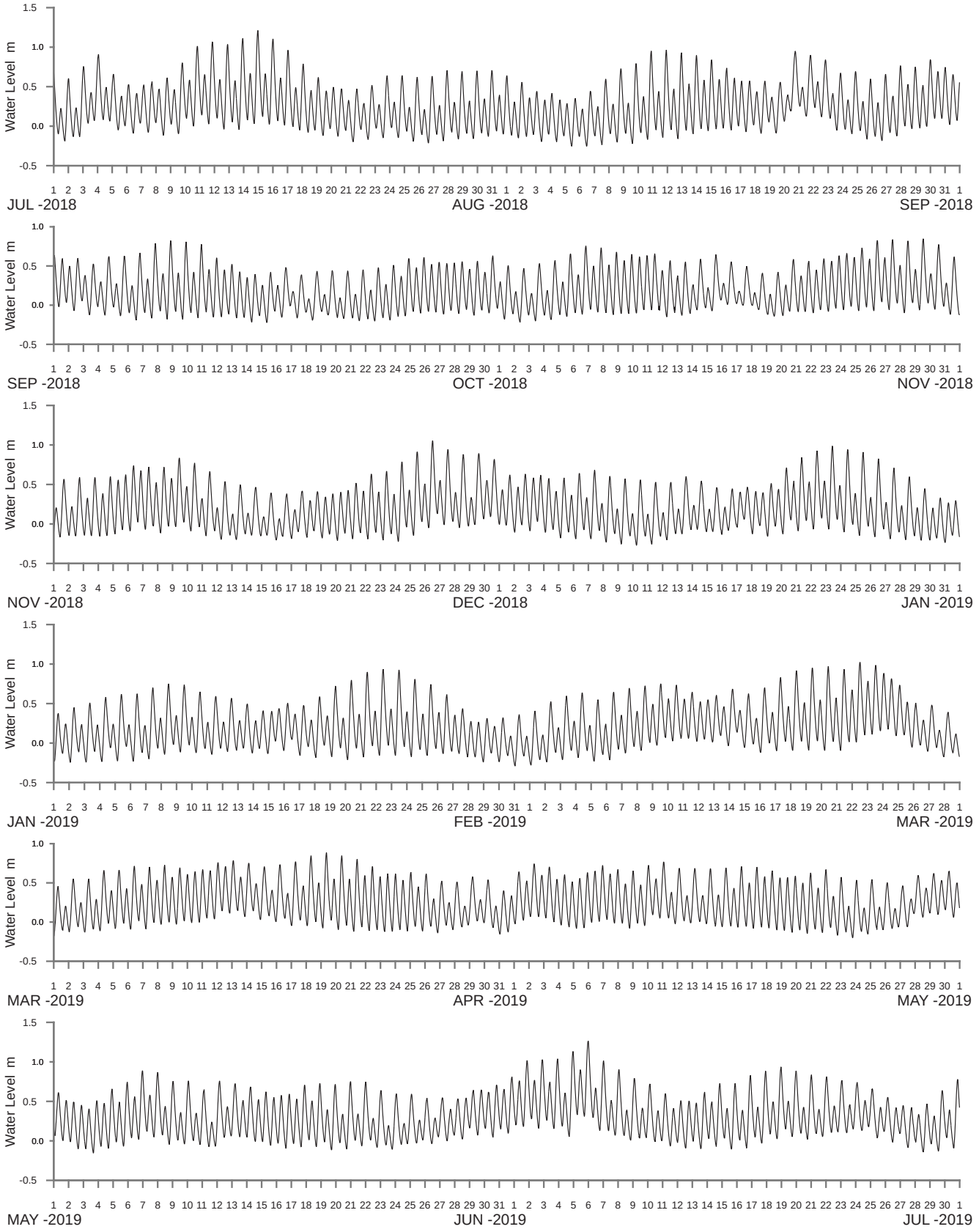
NAMBUCCA RIVER AT STUARTS ISLAND DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
73

DRAWING 2692-73.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

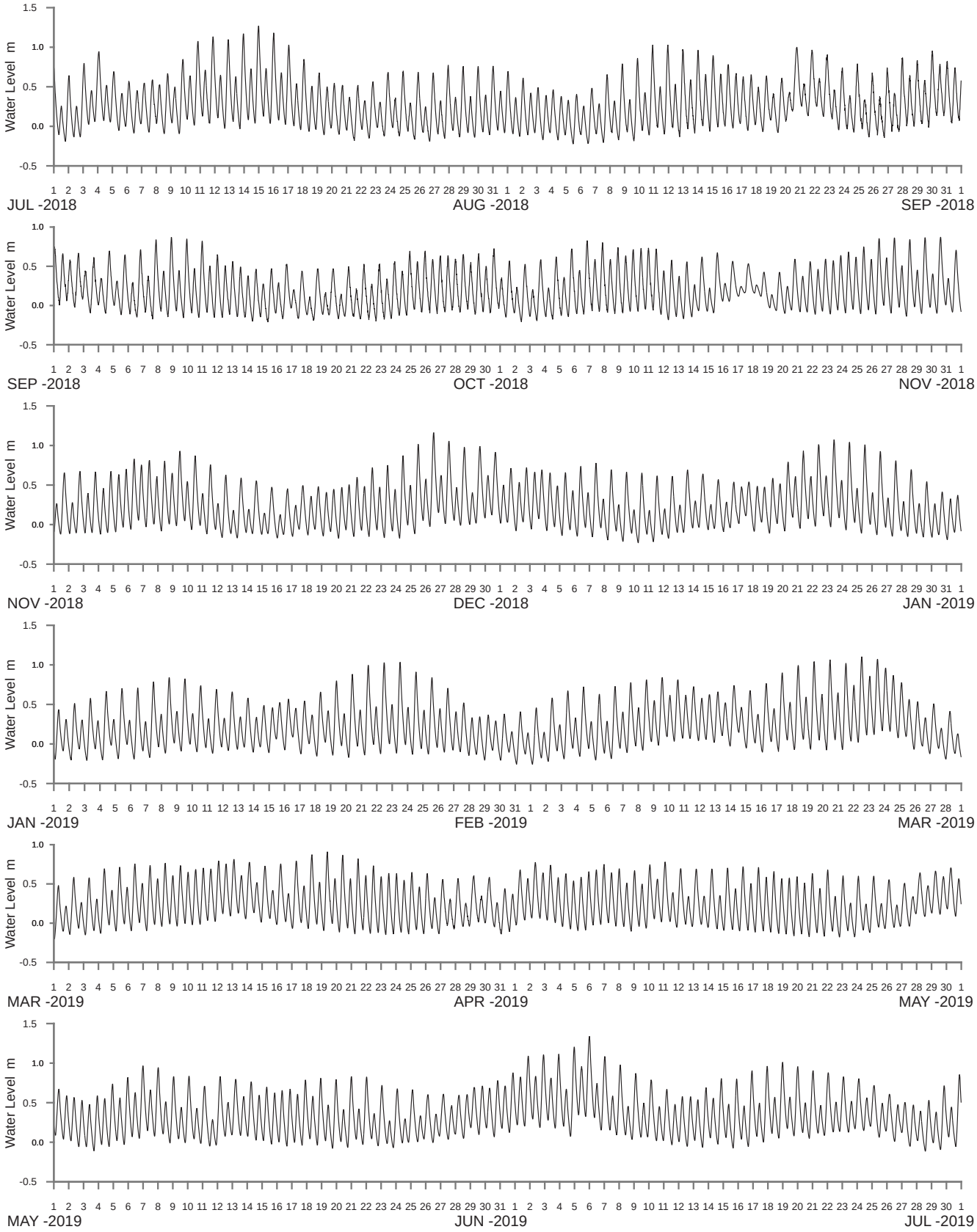
NAMBUCCA RIVER AT MACKSVILLE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
74

DRAWING 2692-74.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

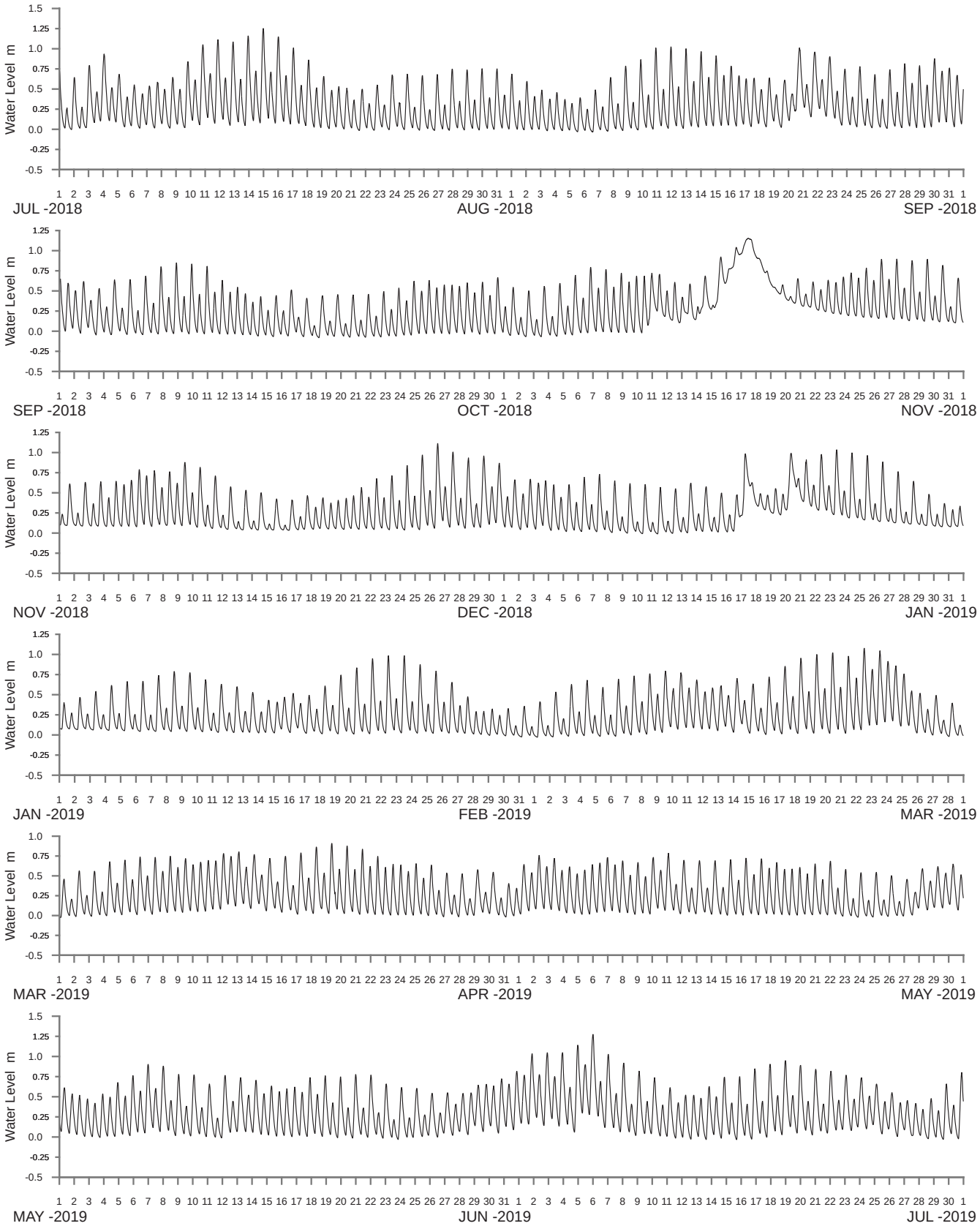
TAYLORS ARM AT UTUNGUN
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
75

DRAWING 2692-75.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

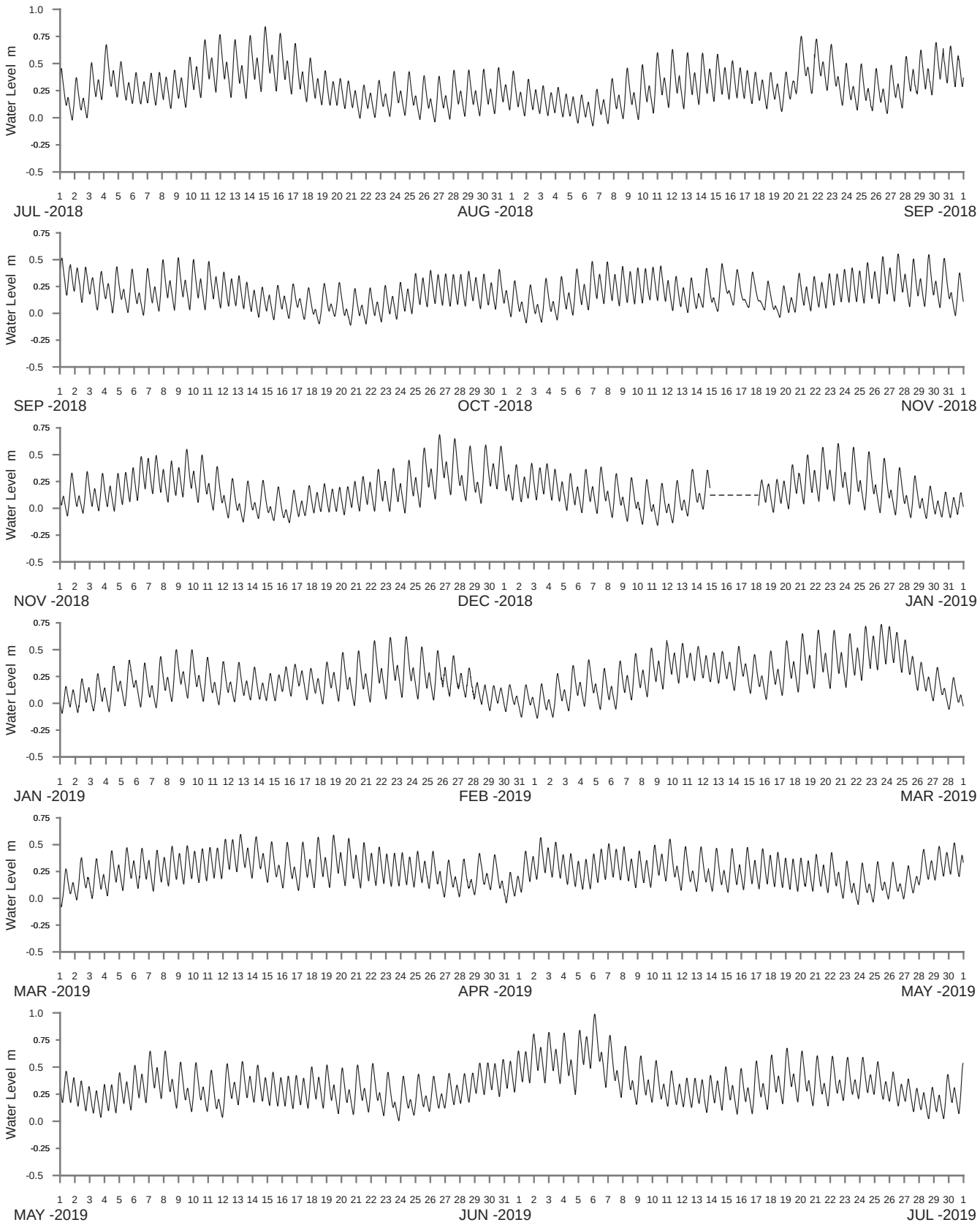
NAMBUCCA RIVER AT BOWRAVILLE DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
76

DRAWING 2692-76.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

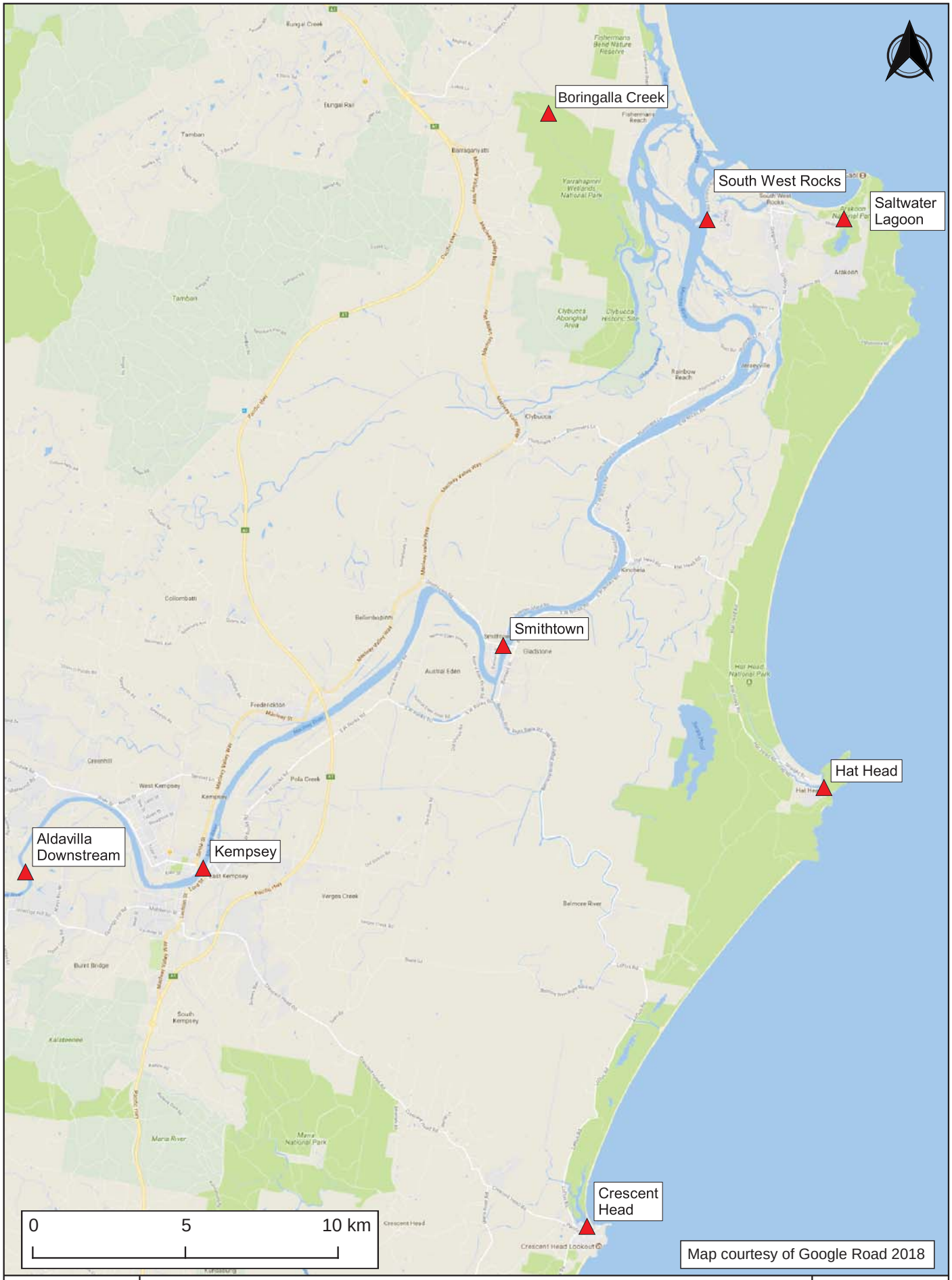
WARRELL CREEK AT WARRELL CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
77

DRAWING 2692-77.cdr



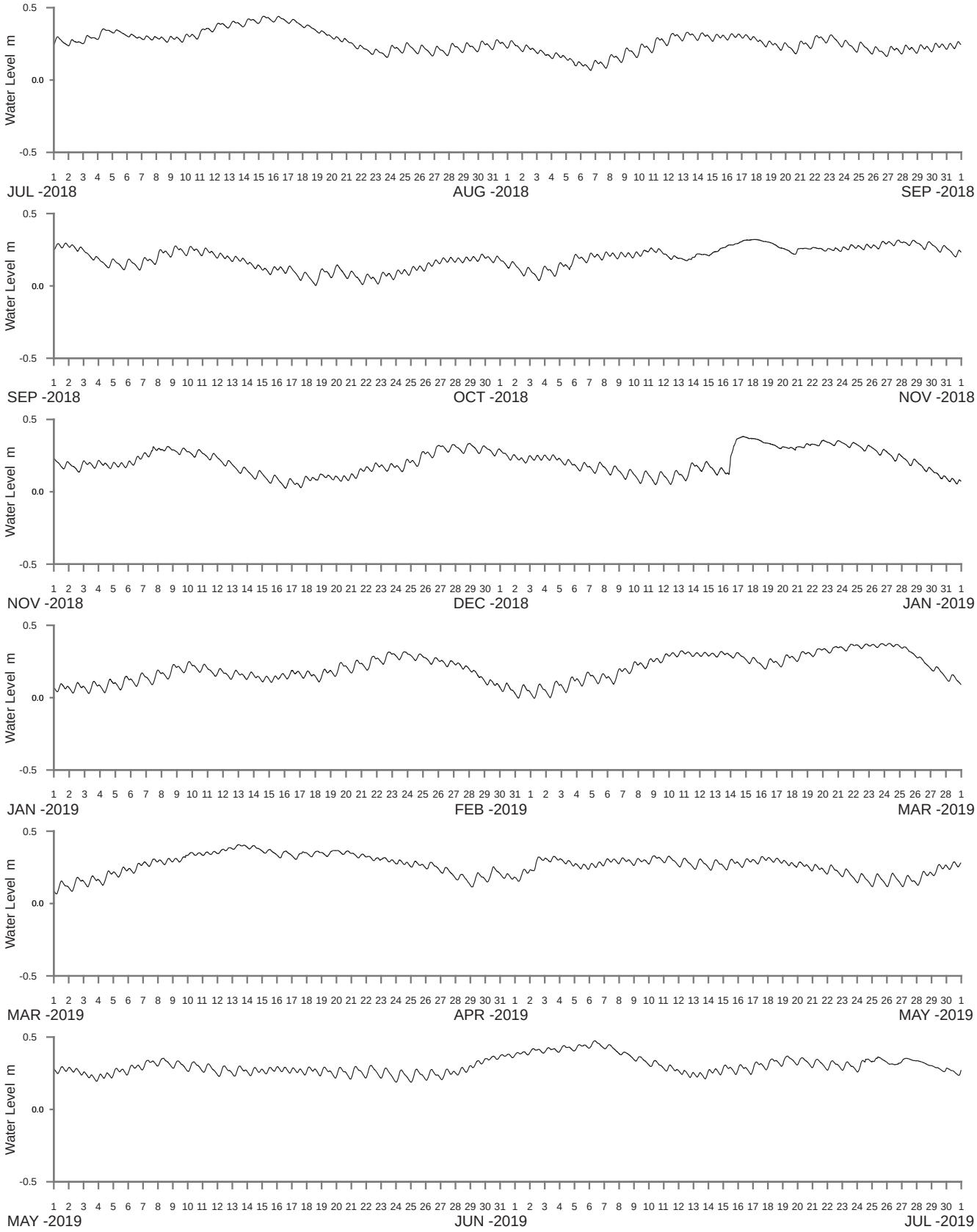
STATION LOCATIONS
MACLEAY RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 78

DRAWING 2692-78.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

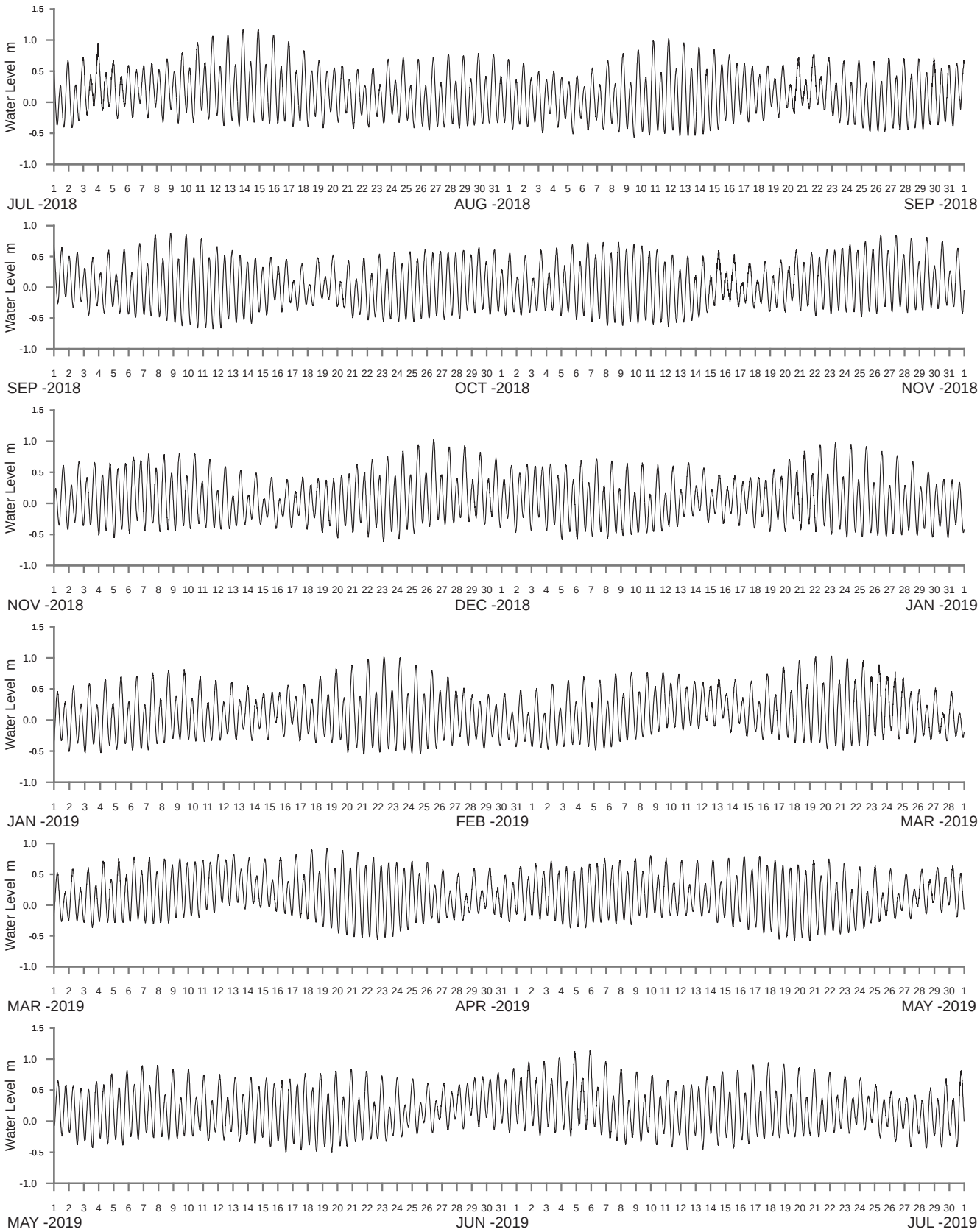
BORINGALLA CREEK AT BORINGALLA CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
79

DRAWING 2692-79.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

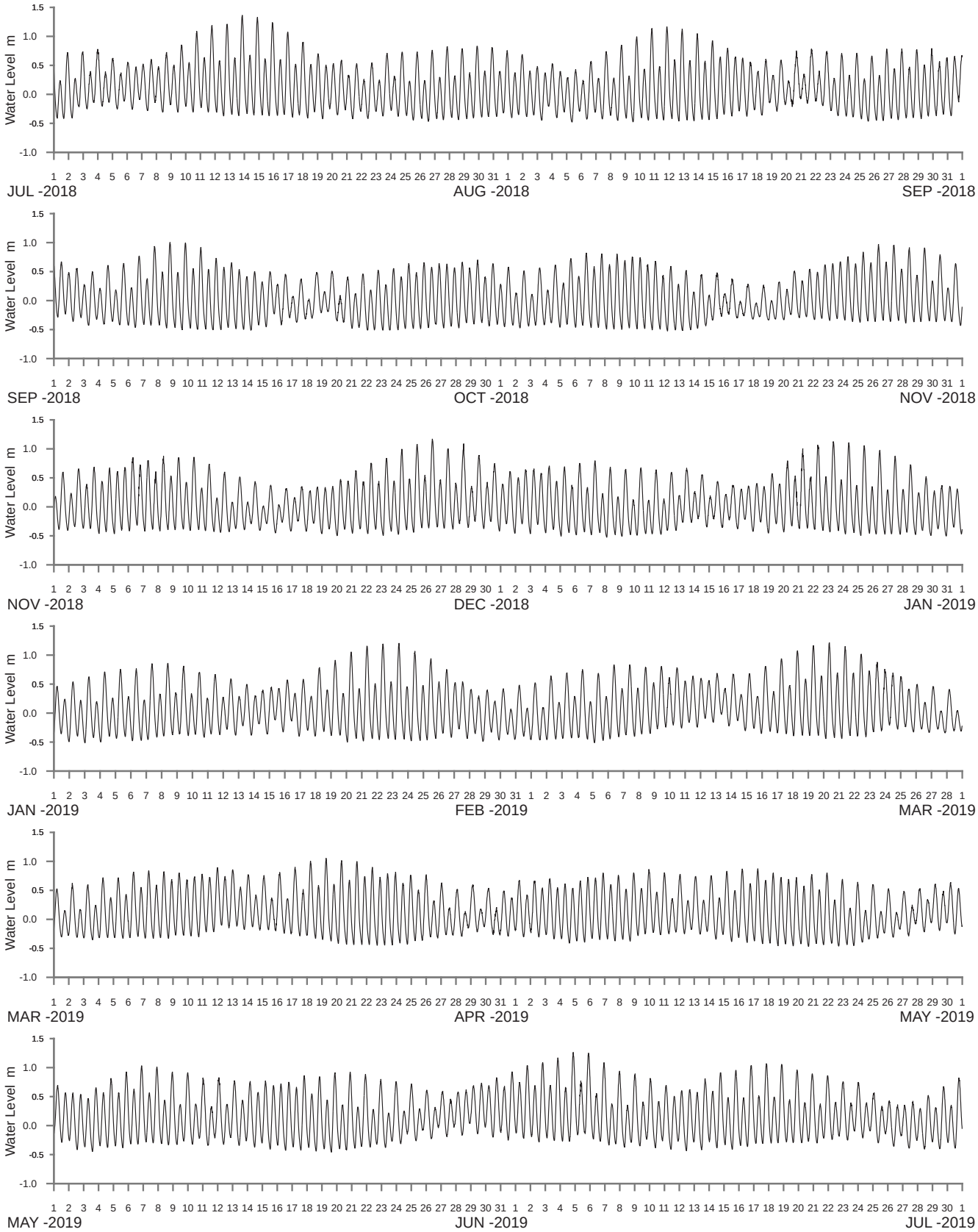
MACLEAY RIVER AT SOUTH WEST ROCKS
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 80

DRAWING 2692-80.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

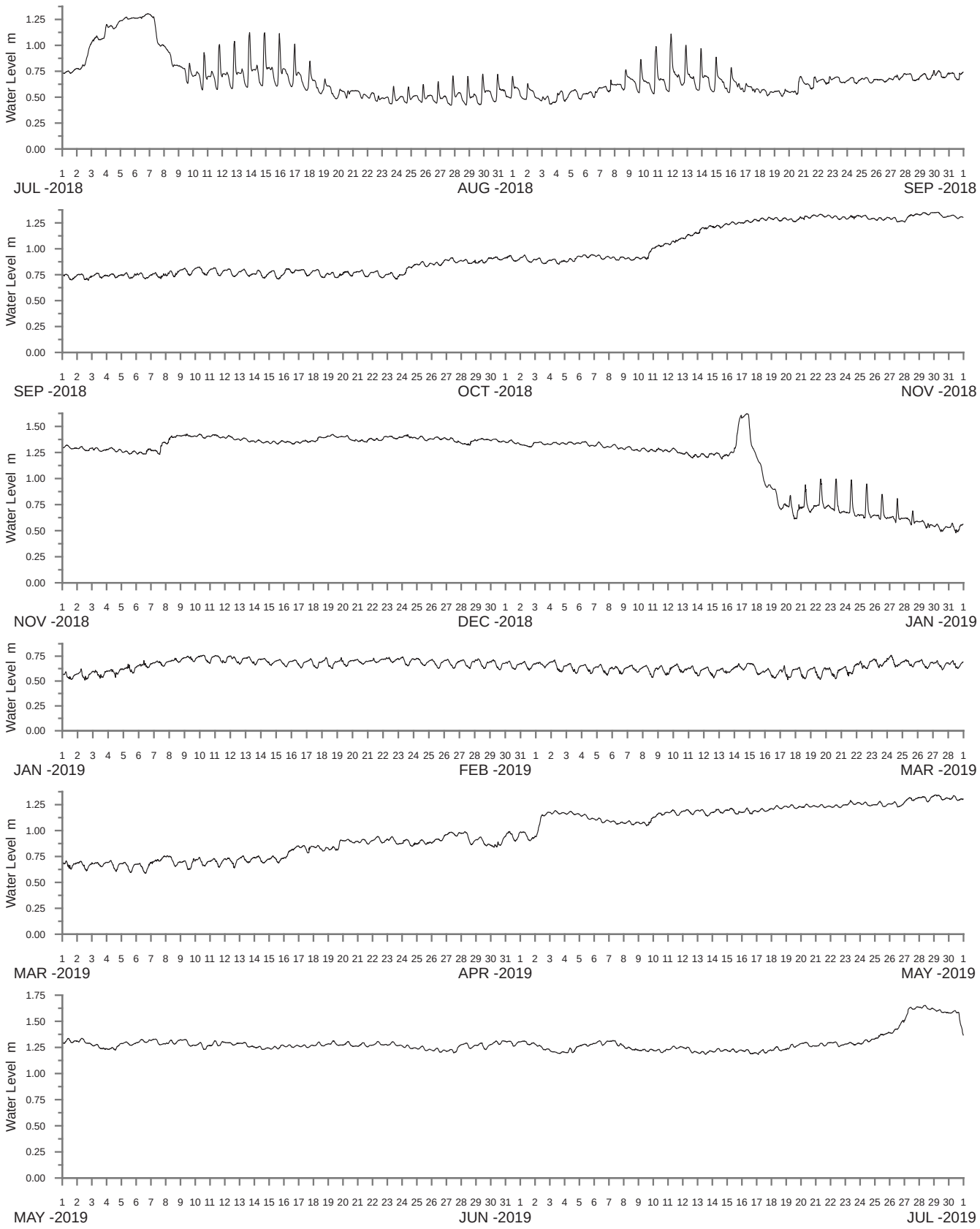
KOROGORO CREEK AT HAT HEAD
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
81

DRAWING 2692-81.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

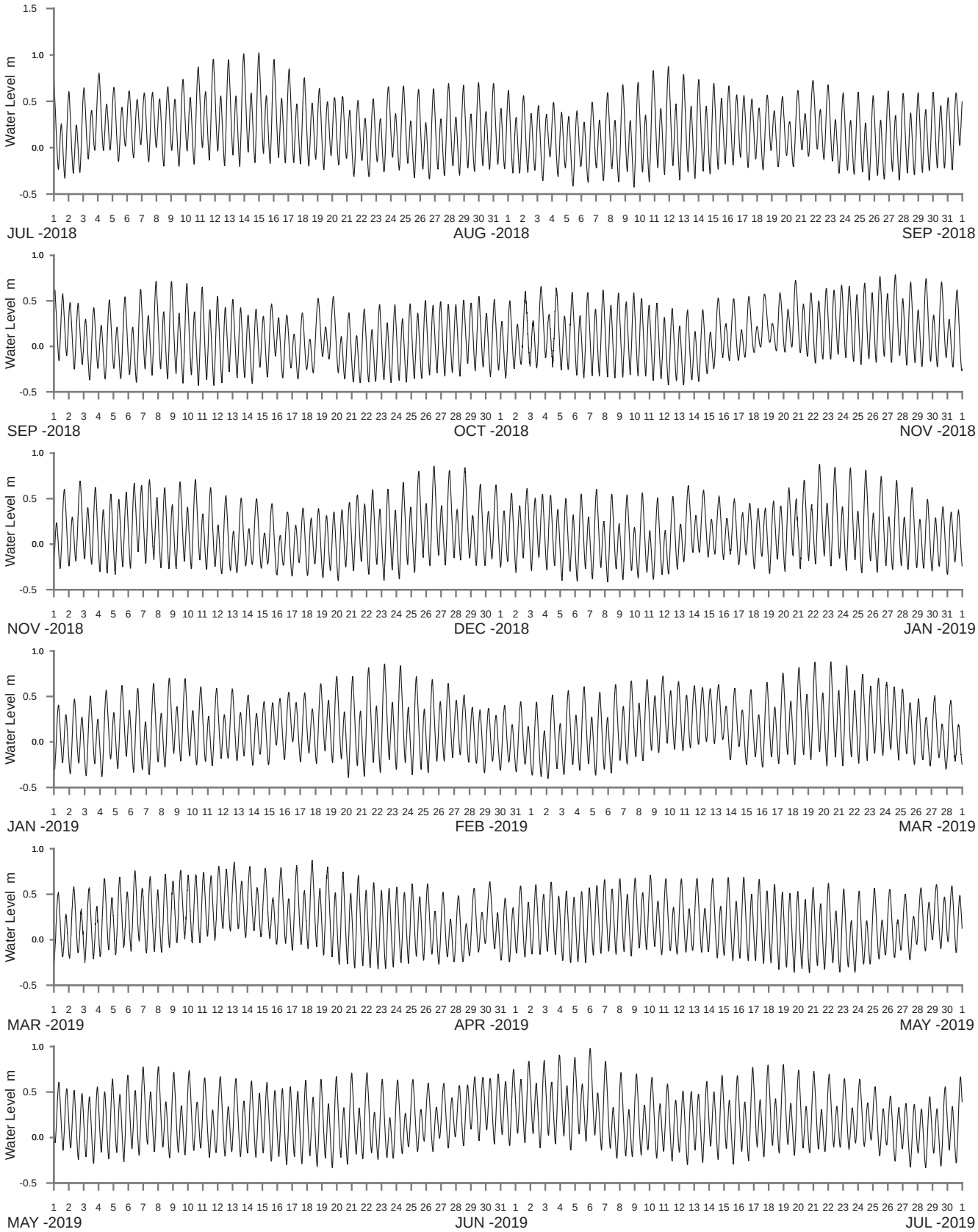
SALTWATER LAGOON AT SALTWATER LAGOON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 82

DRAWING 2692-82.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

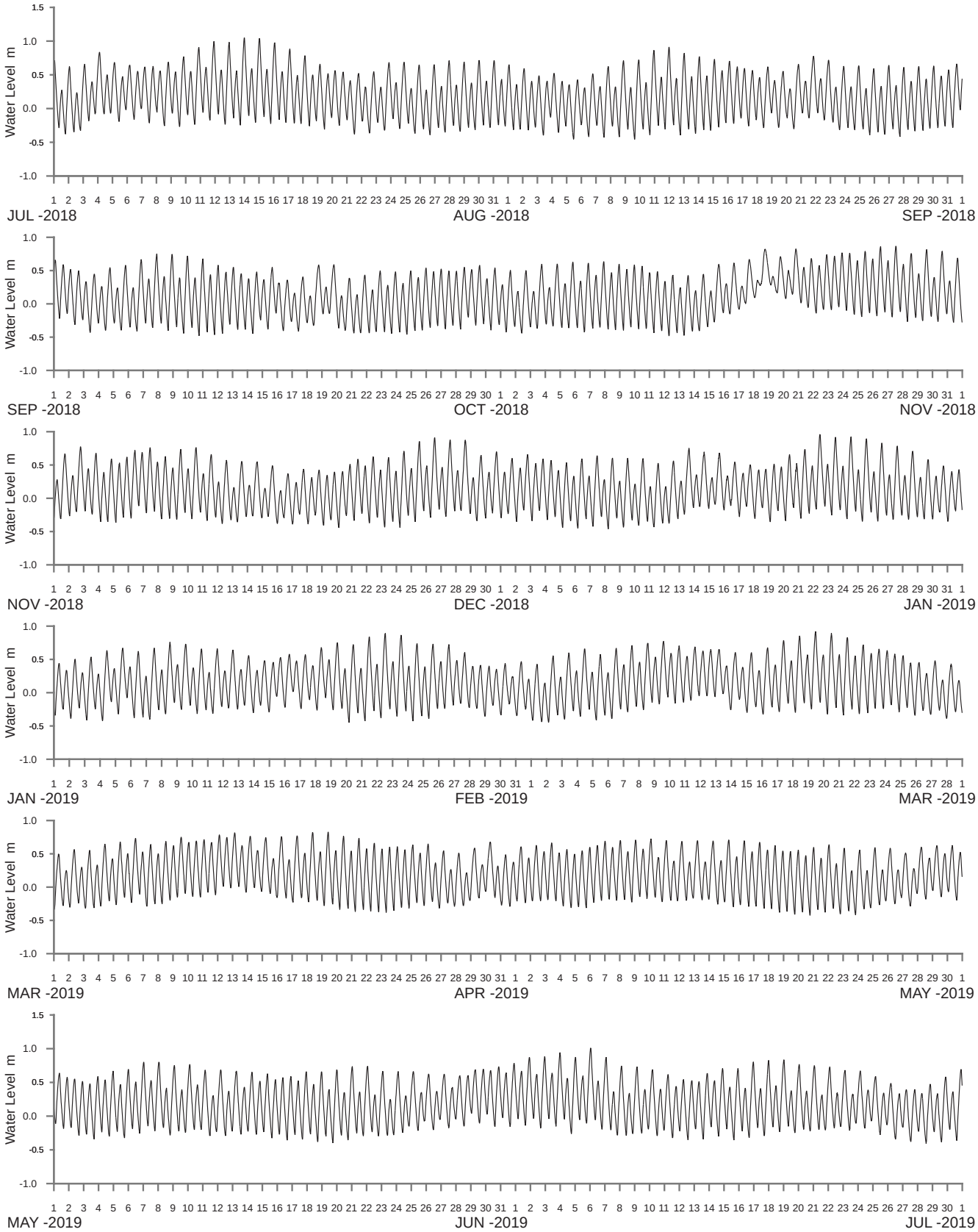
MACLEAY RIVER AT SMITHTOWN
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
83

DRAWING 2692-83.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

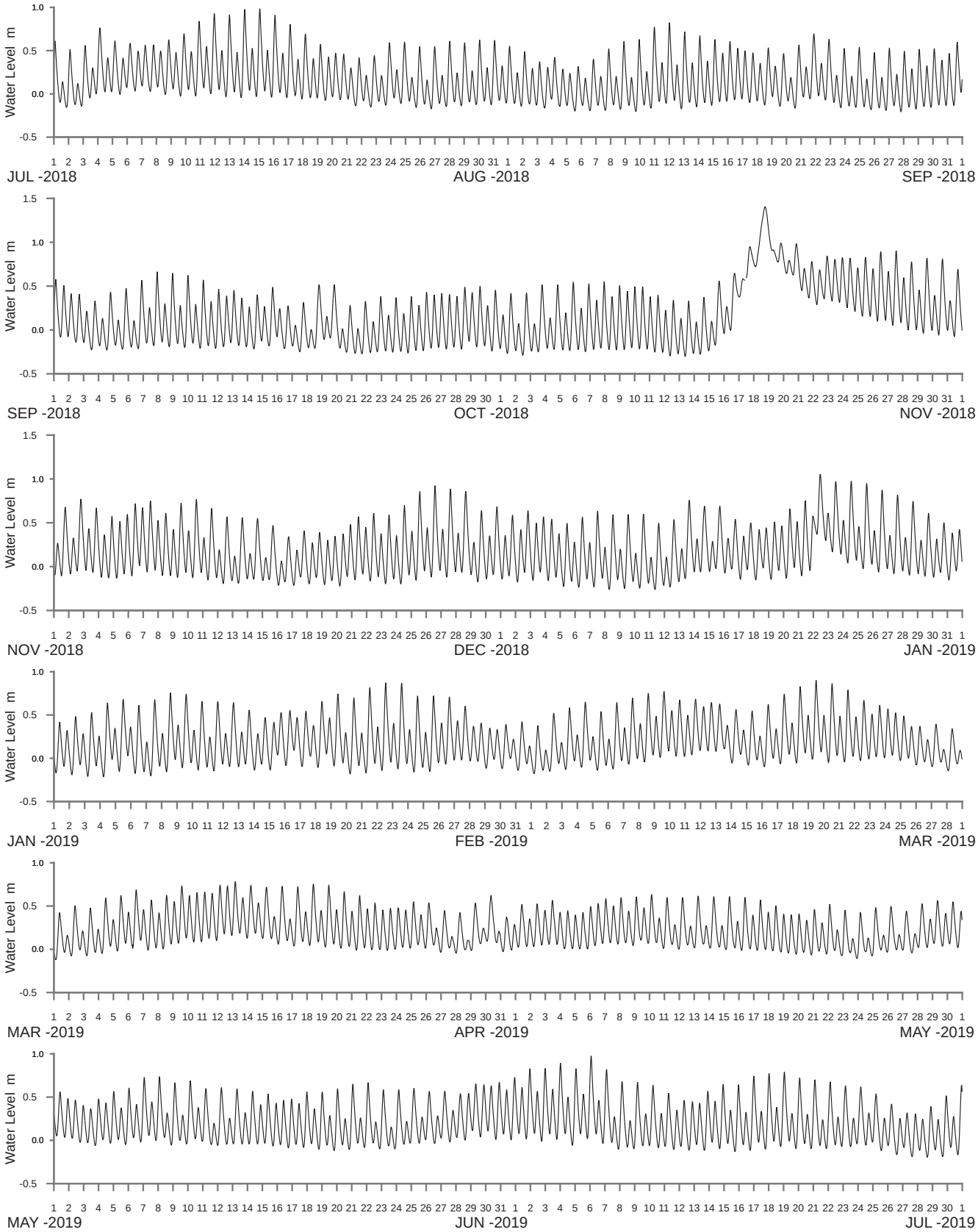
MACLEAY RIVER AT KEMPSEY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 84

DRAWING 2692-84.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

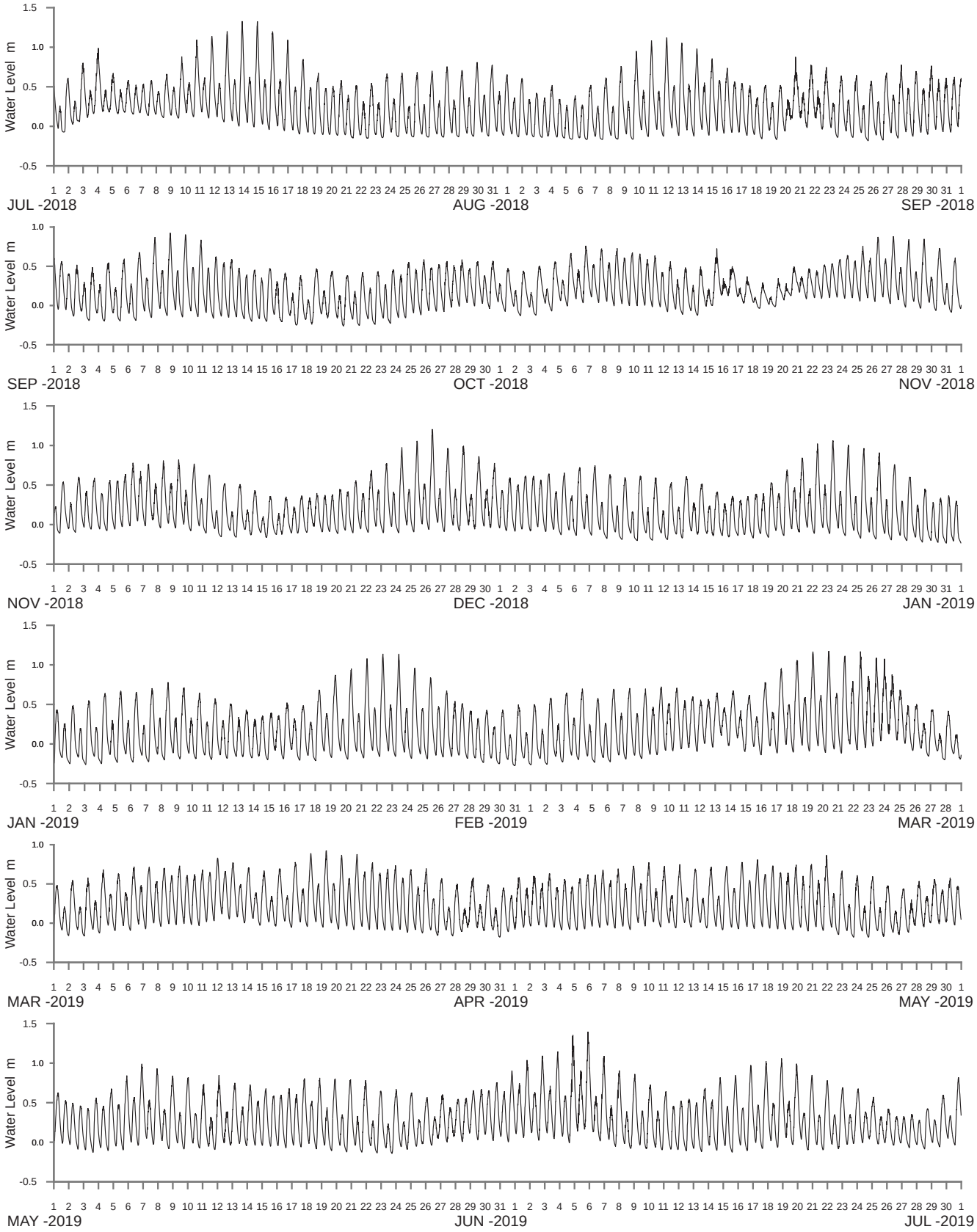
MACLEAY RIVER AT ALDAVILLA DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
85

DRAWING 2692-85.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

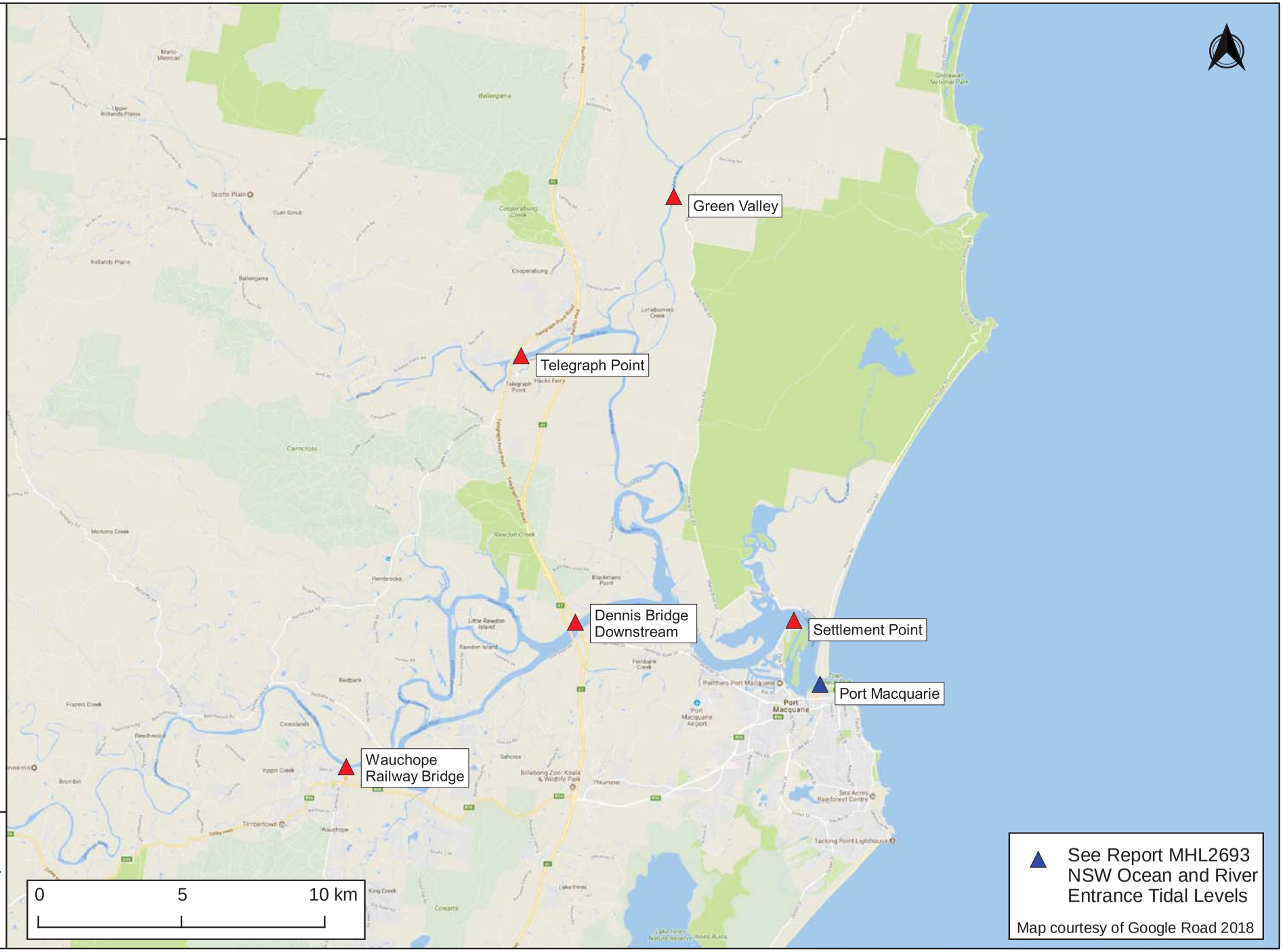
KILLICK CREEK AT CRESCENT HEAD
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
86

DRAWING 2692-86.cdr



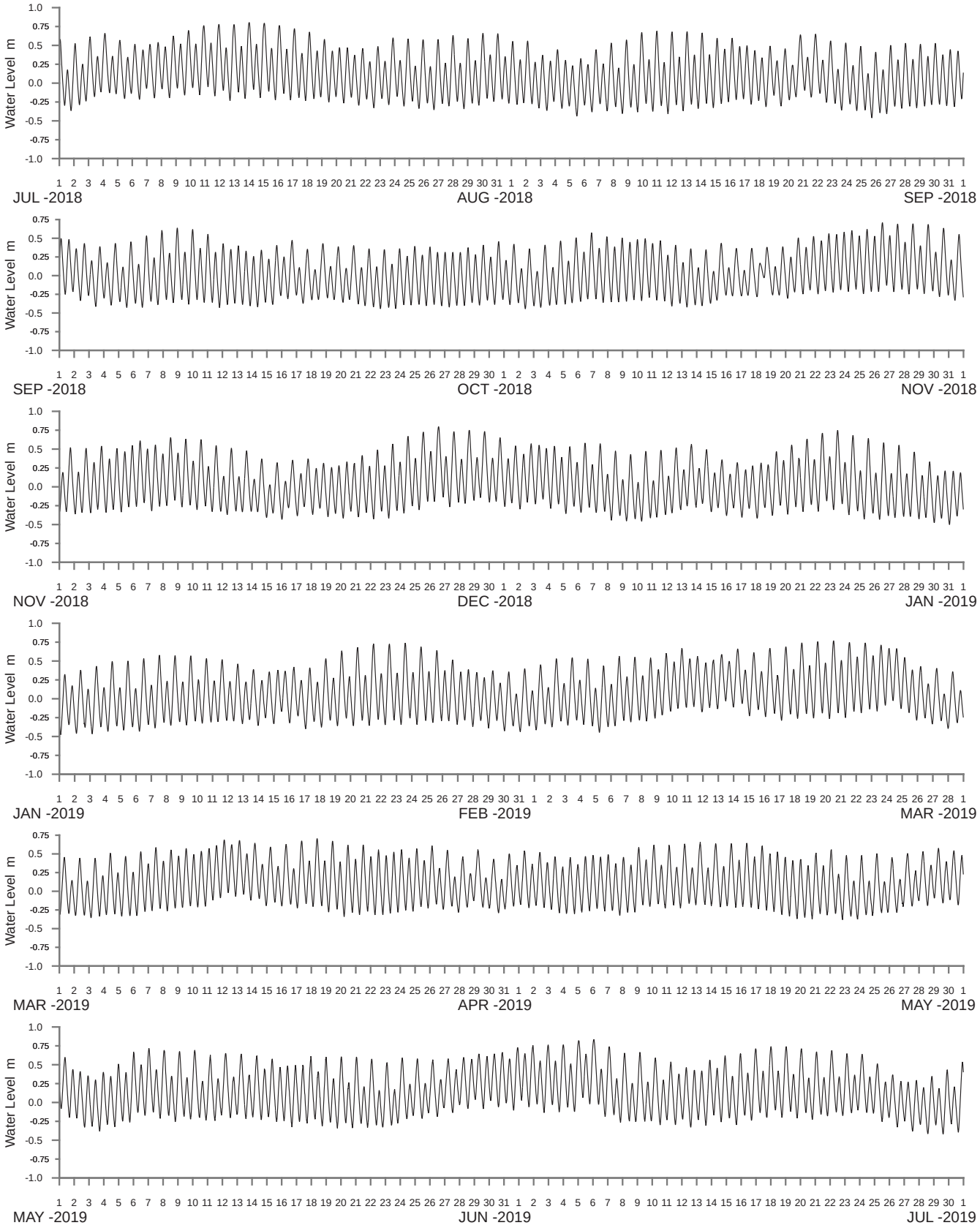
NSW GOVERNMENT

STATION LOCATIONS
HASTINGS RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
87

DRAWING 2692-87.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

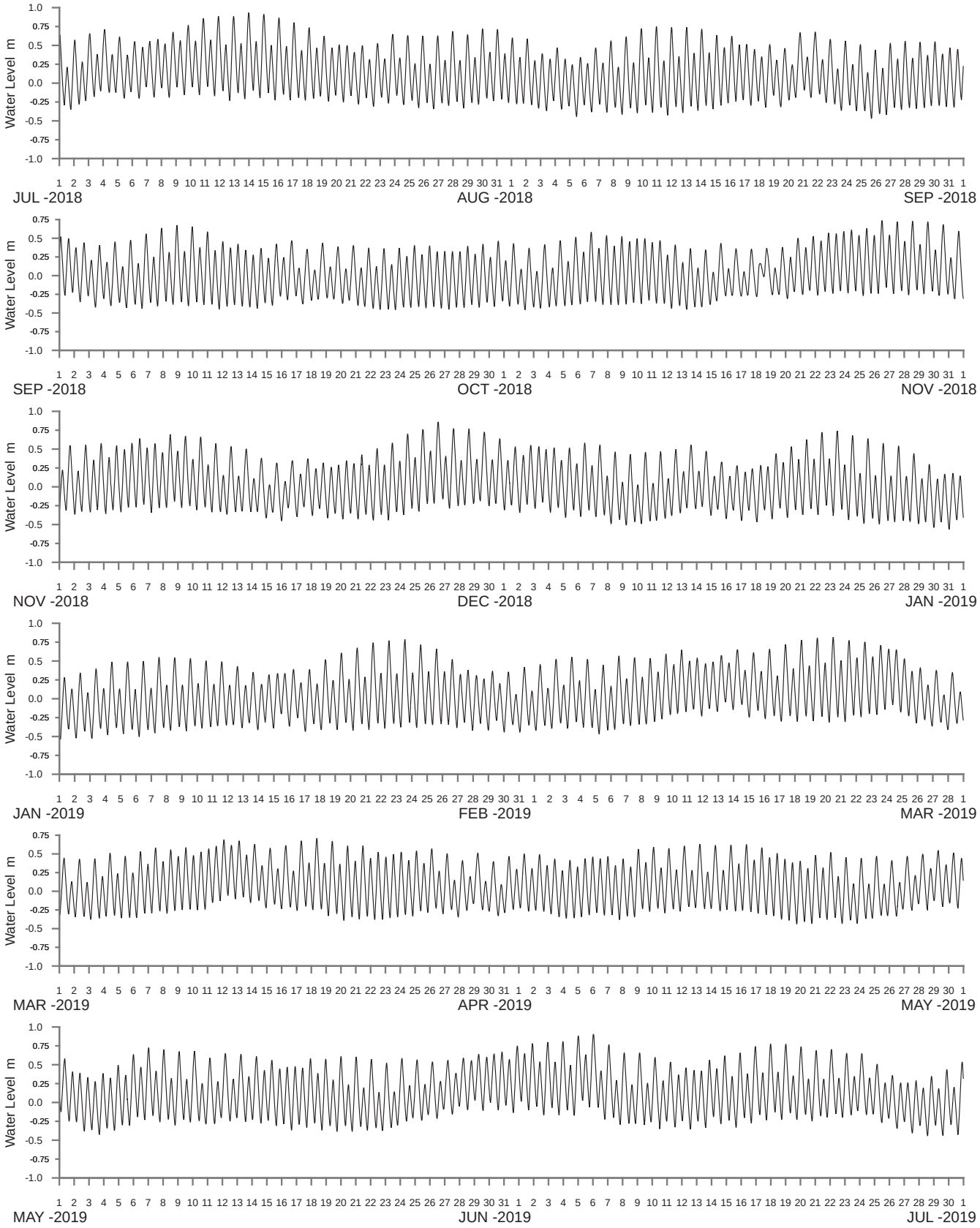
MARIA RIVER AT GREEN VALLEY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
88

DRAWING 2692-88.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

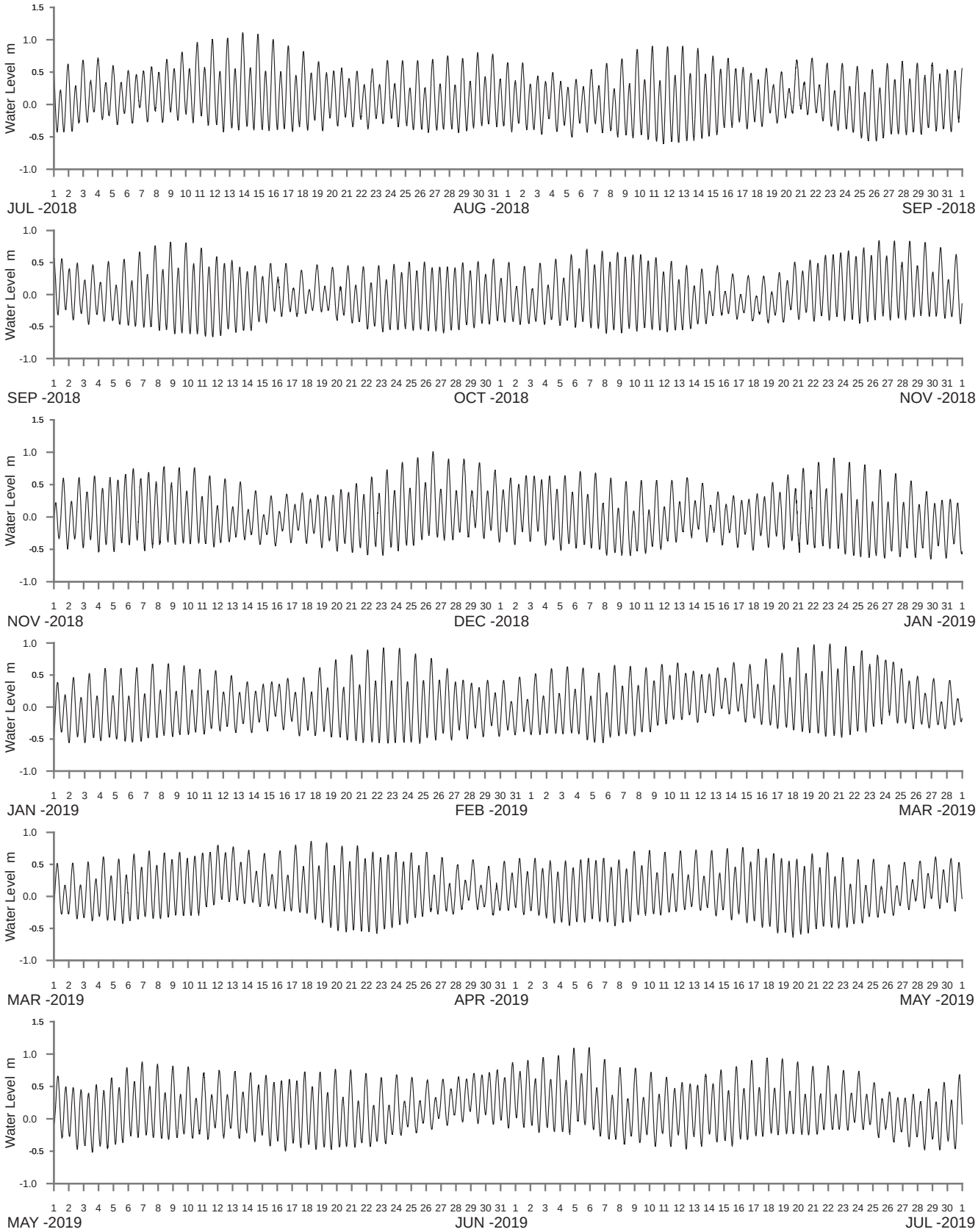
WILSONS RIVER AT TELEGRAPH POINT
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
89

DRAWING 2692-89.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

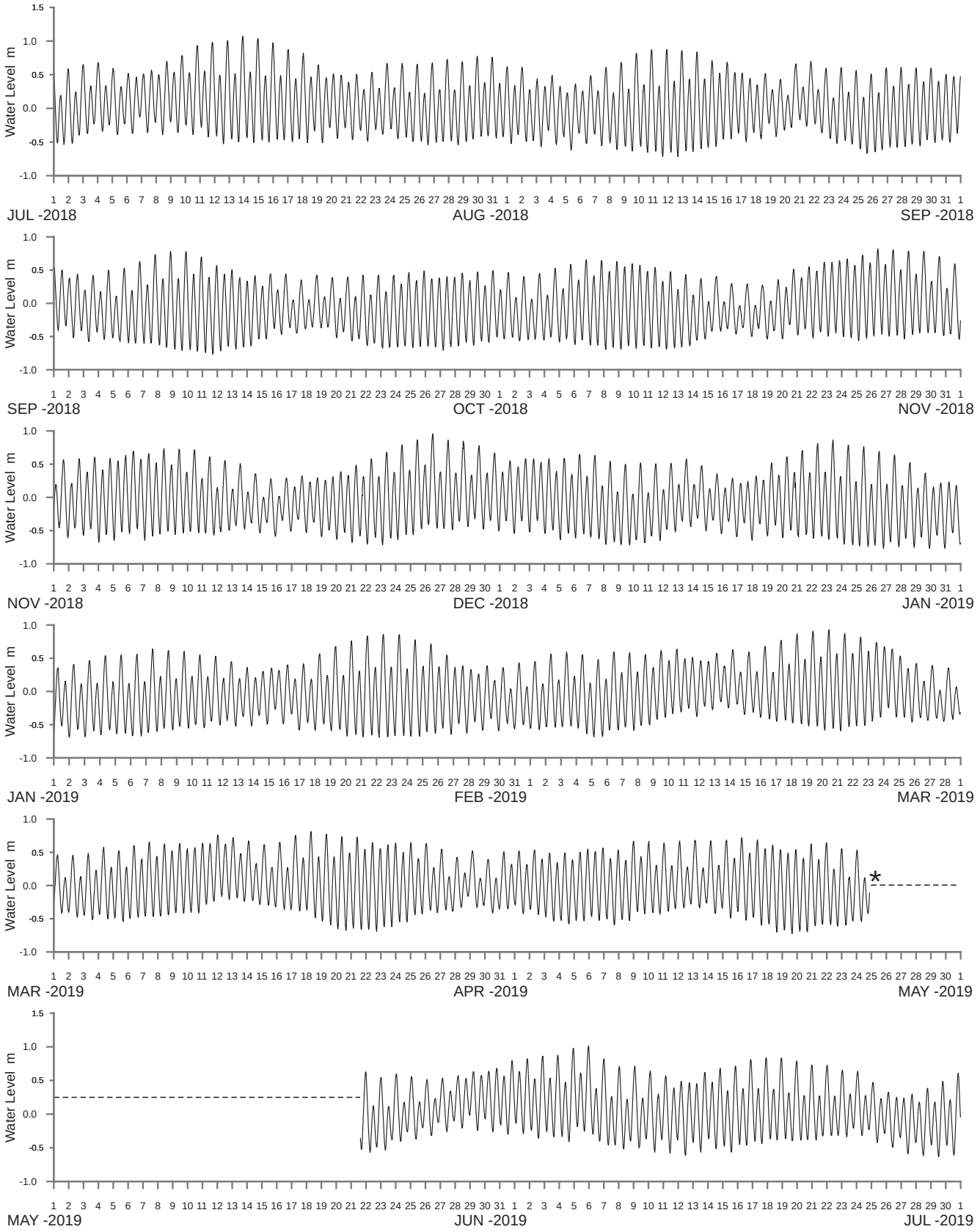
HASTINGS RIVER AT SETTLEMENT POINT
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
90

DRAWING 2692-90.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to lightning strike

NSW GOVERNMENT

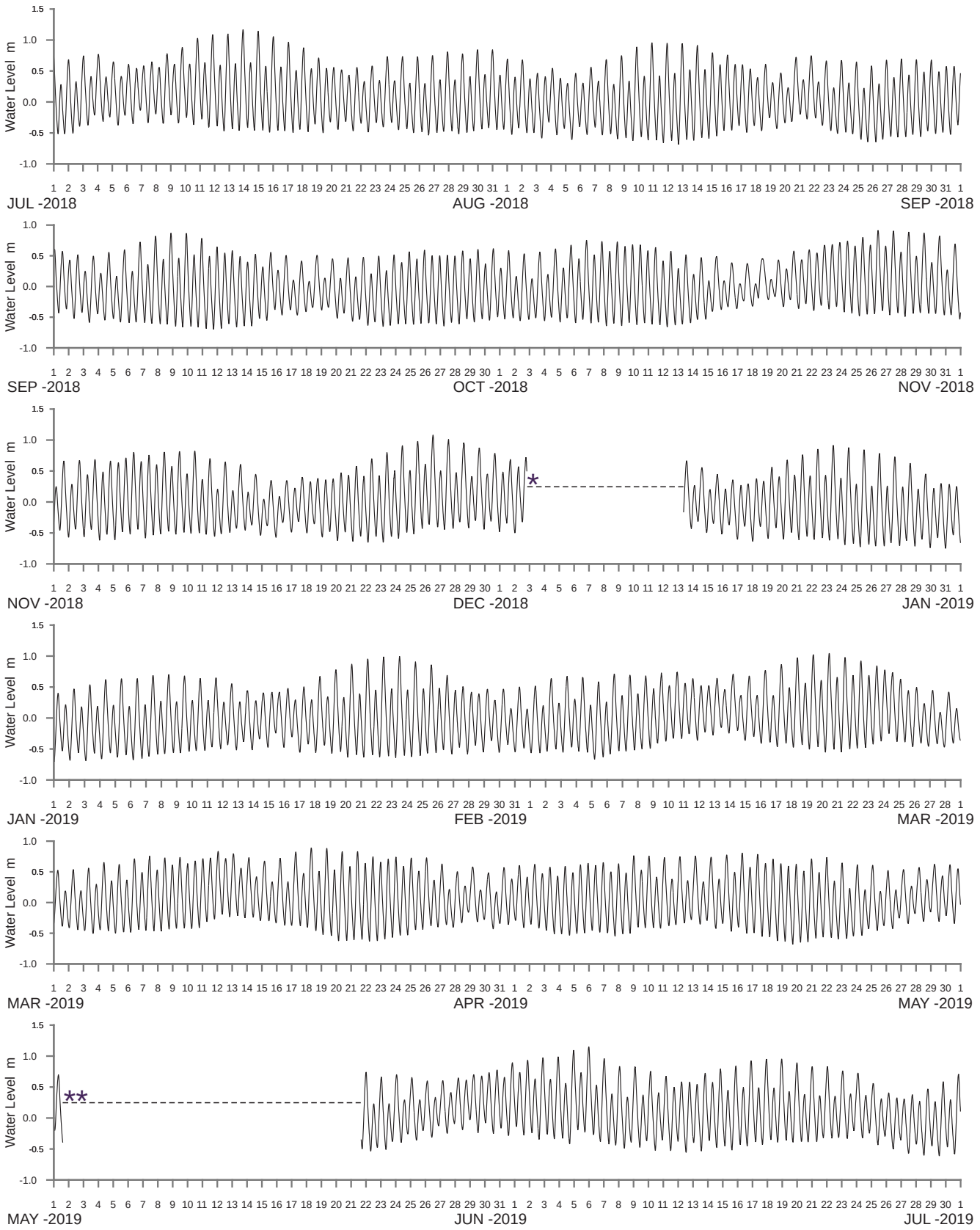
HASTINGS RIVER AT DENNIS BRIDGE DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 91

DRAWING 2692-91.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to lightning strike **Data loss due to low gas

NSW GOVERNMENT

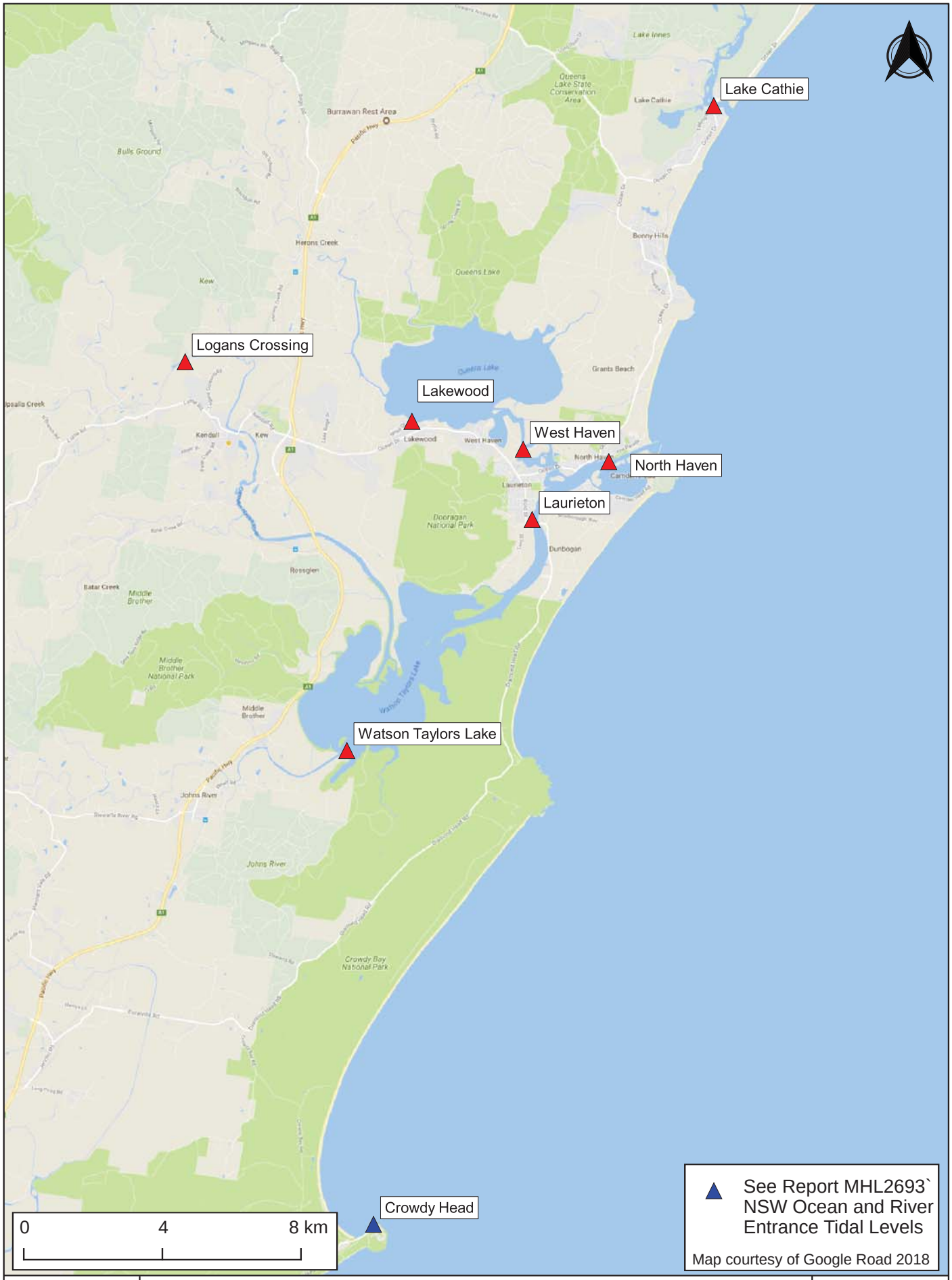
HASTINGS RIVER AT WAUCHOPE RAILWAY BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 92

DRAWING 2692-92.cdr



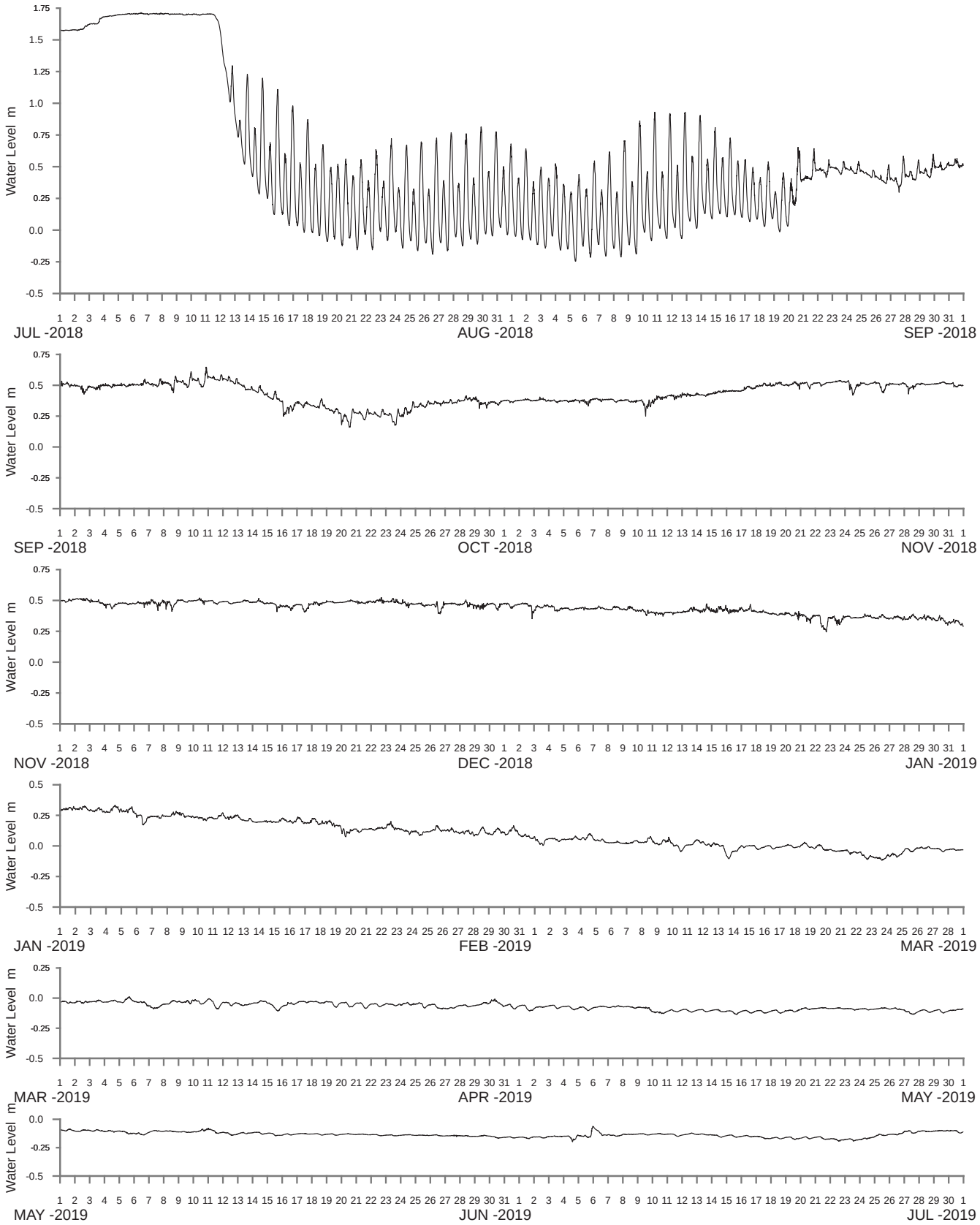
NSW GOVERNMENT

STATION LOCATIONS
CAMDEN HAVEN REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
93

DRAWING 2692-93.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

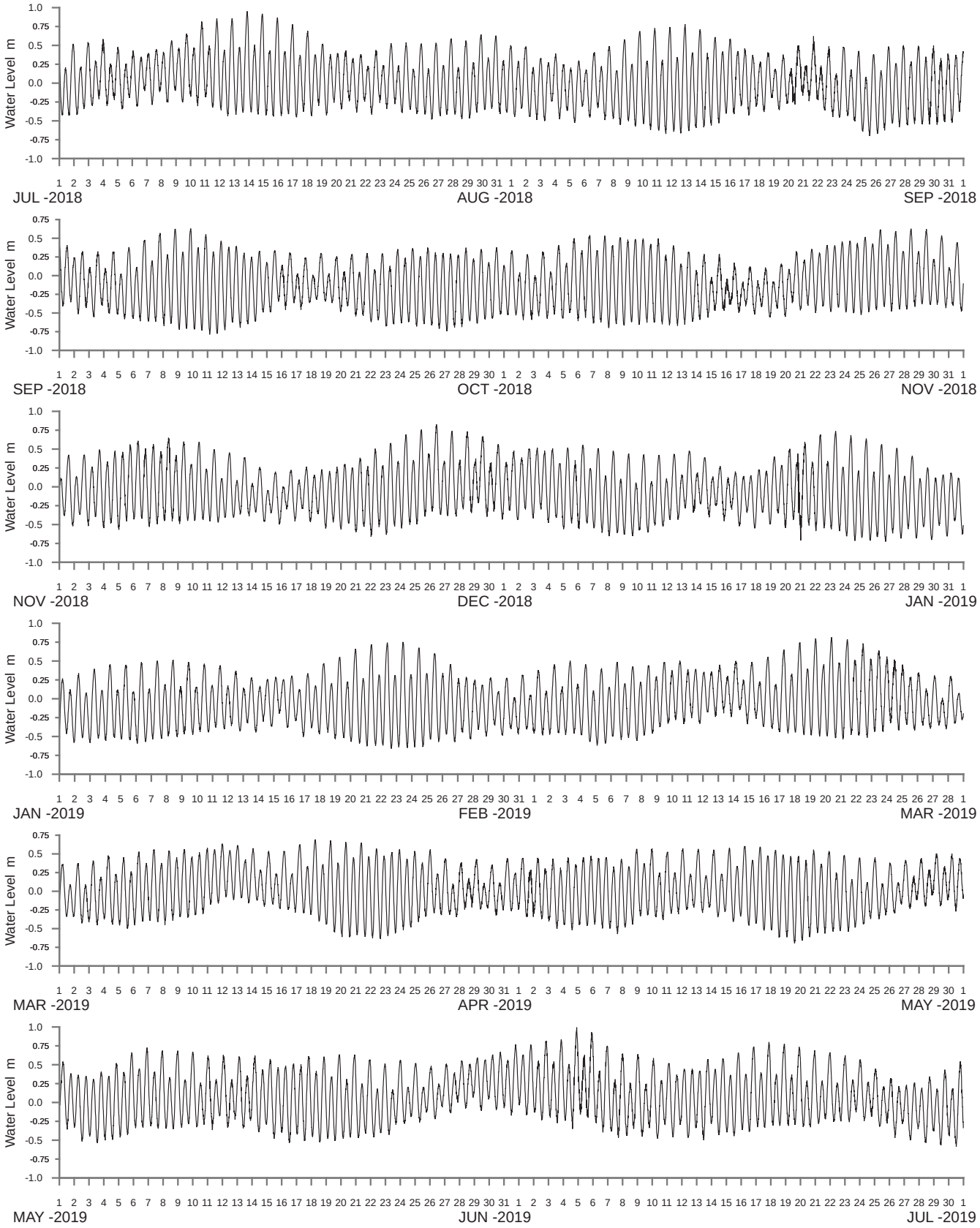
LAKE CATHIE AT LAKE CATHIE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 94

DRAWING 2692-94.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

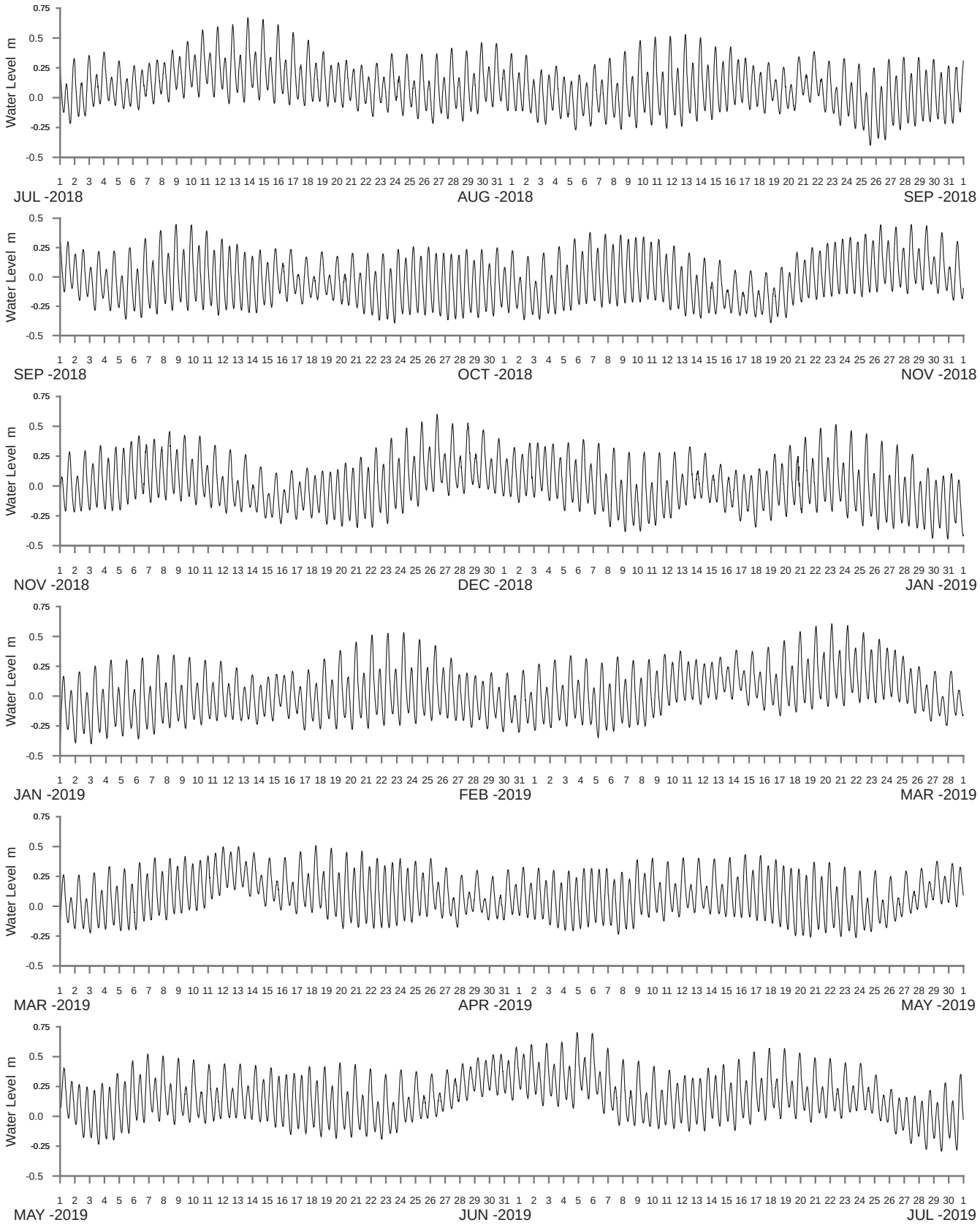
CAMDEN HAVEN RIVER AT NORTH HAVEN
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
95

DRAWING 2692-95.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

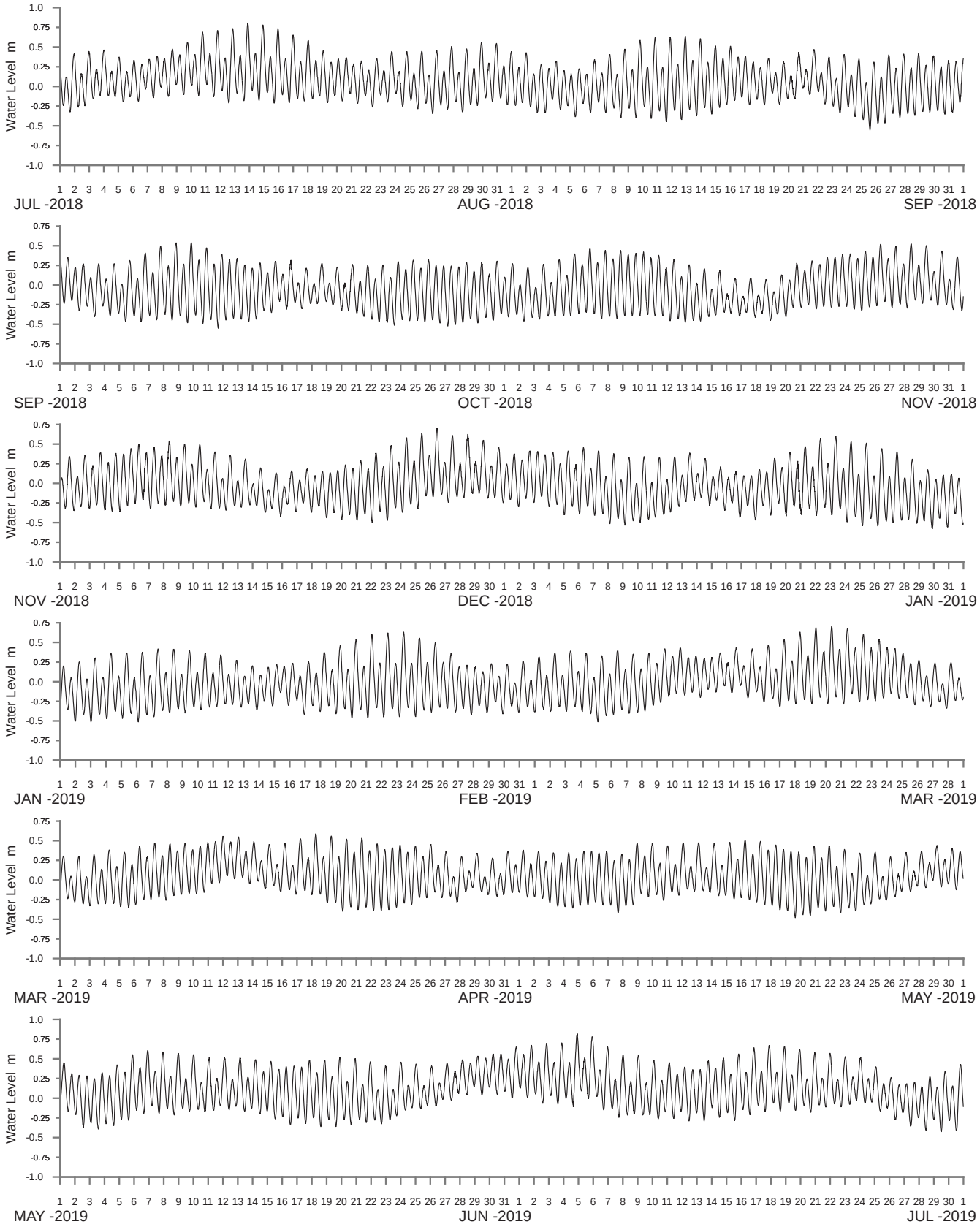
STINGRAY CREEK AT WEST HAVEN
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
96

DRAWING 2692-96.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

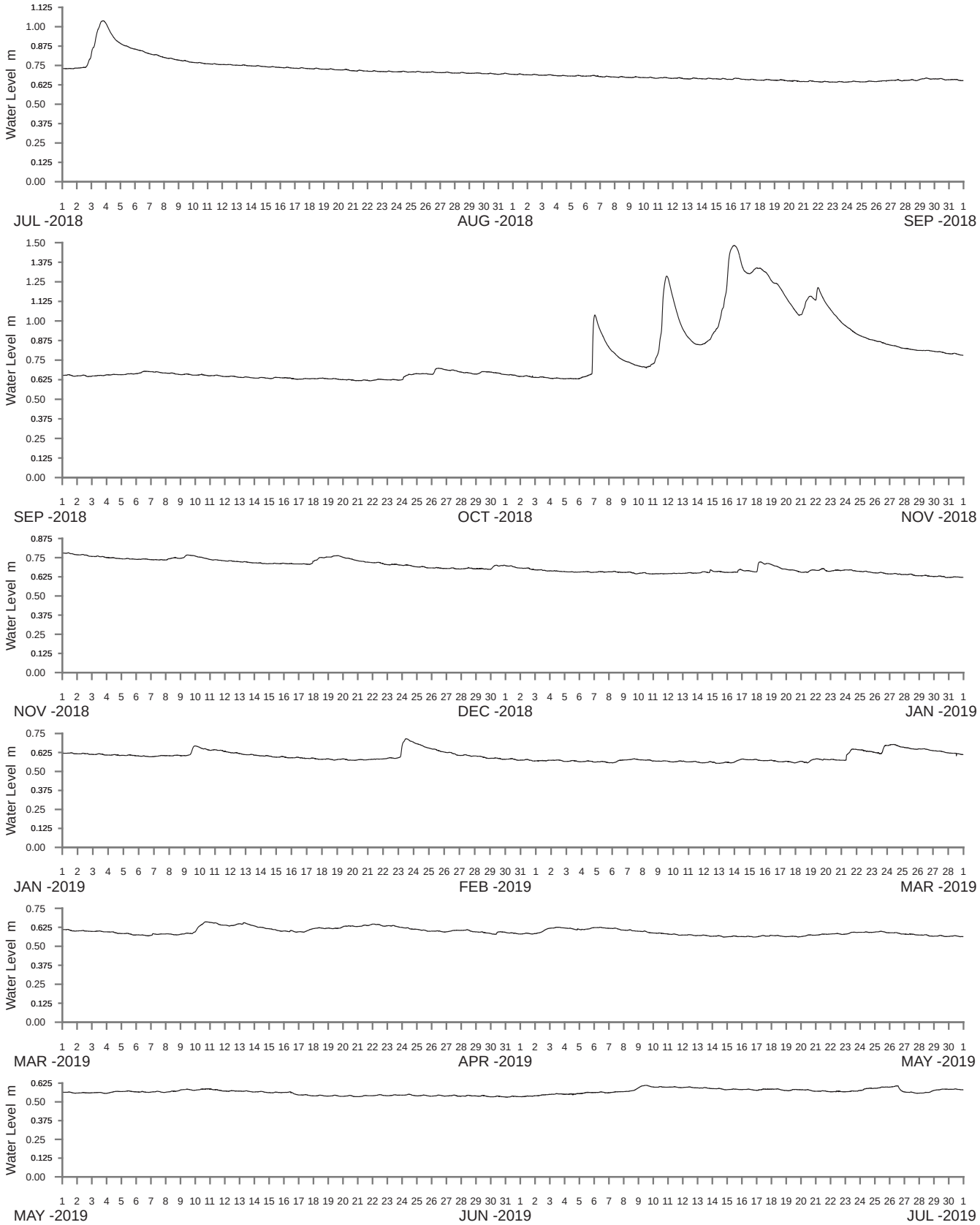
CAMDEN HAVEN RIVER AT LAURIETON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
97

DRAWING 2692-97.cdr



WATER LEVEL REFERENCED TO LOCAL WATER RESOURCES DATUM

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

NSW GOVERNMENT

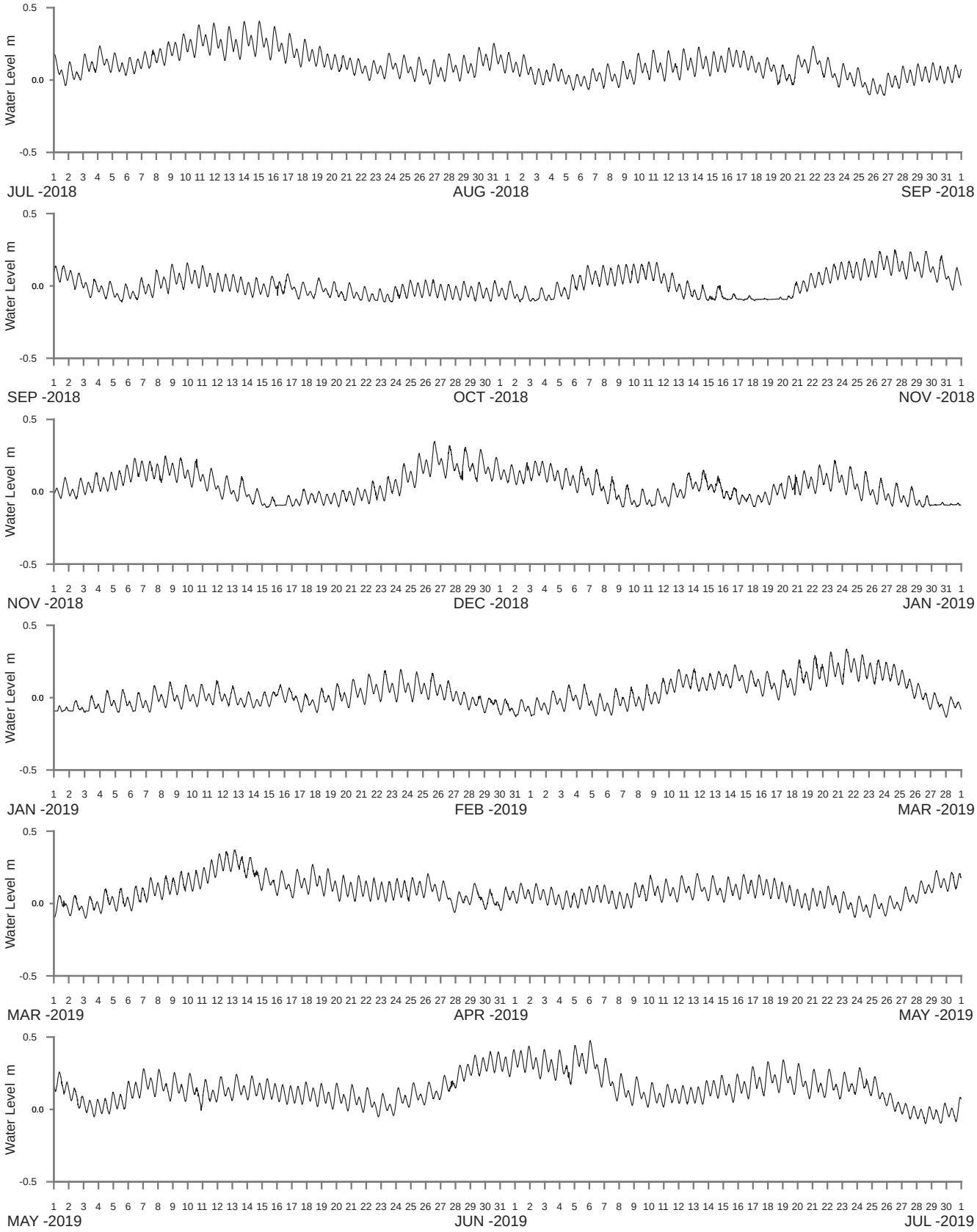
CAMDEN HAVEN RIVER AT LOGANS CROSSING
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 98

DRAWING 2692-98.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

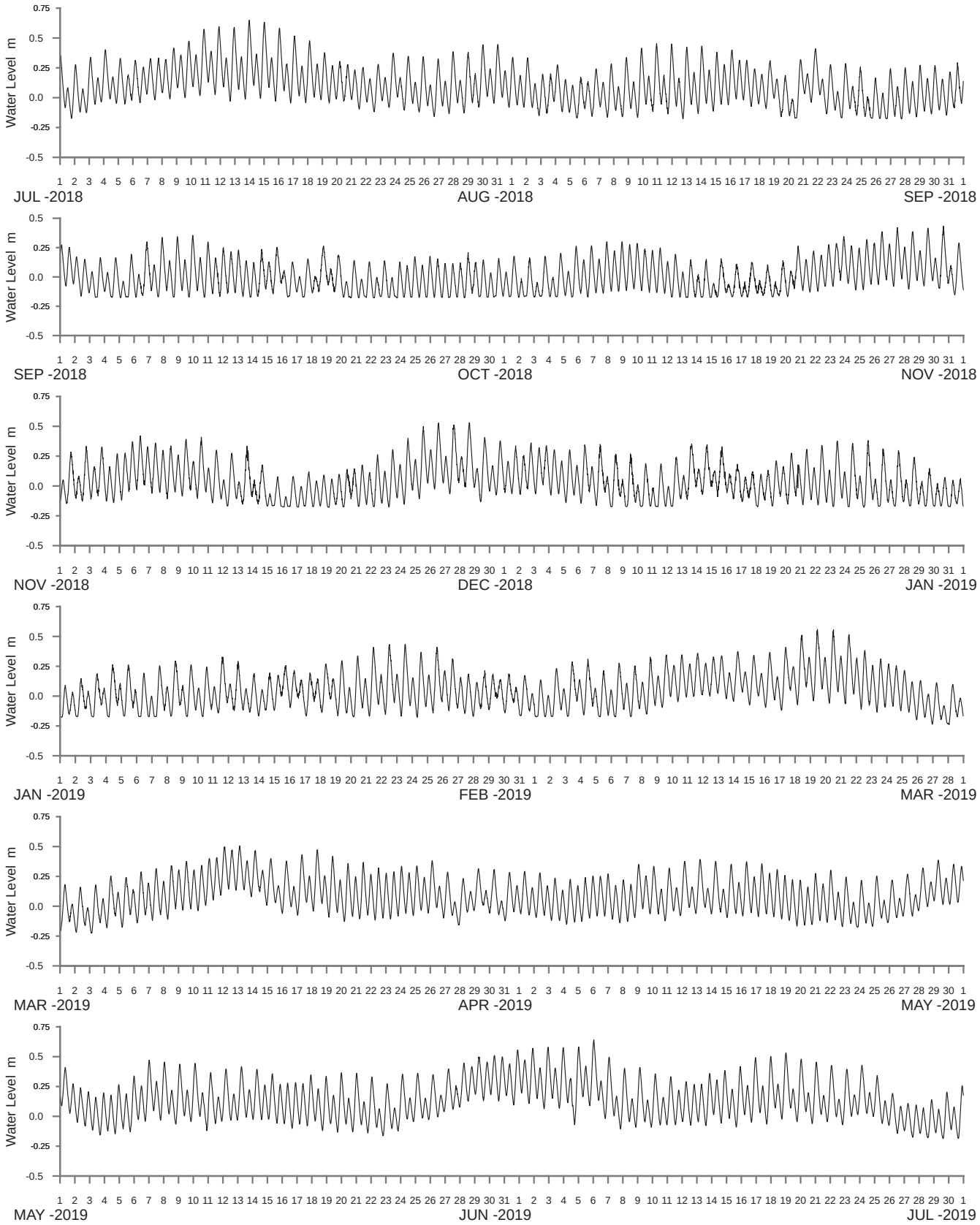
QUEENS LAKE AT LAKEWOOD
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
99

DRAWING 2692-99.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

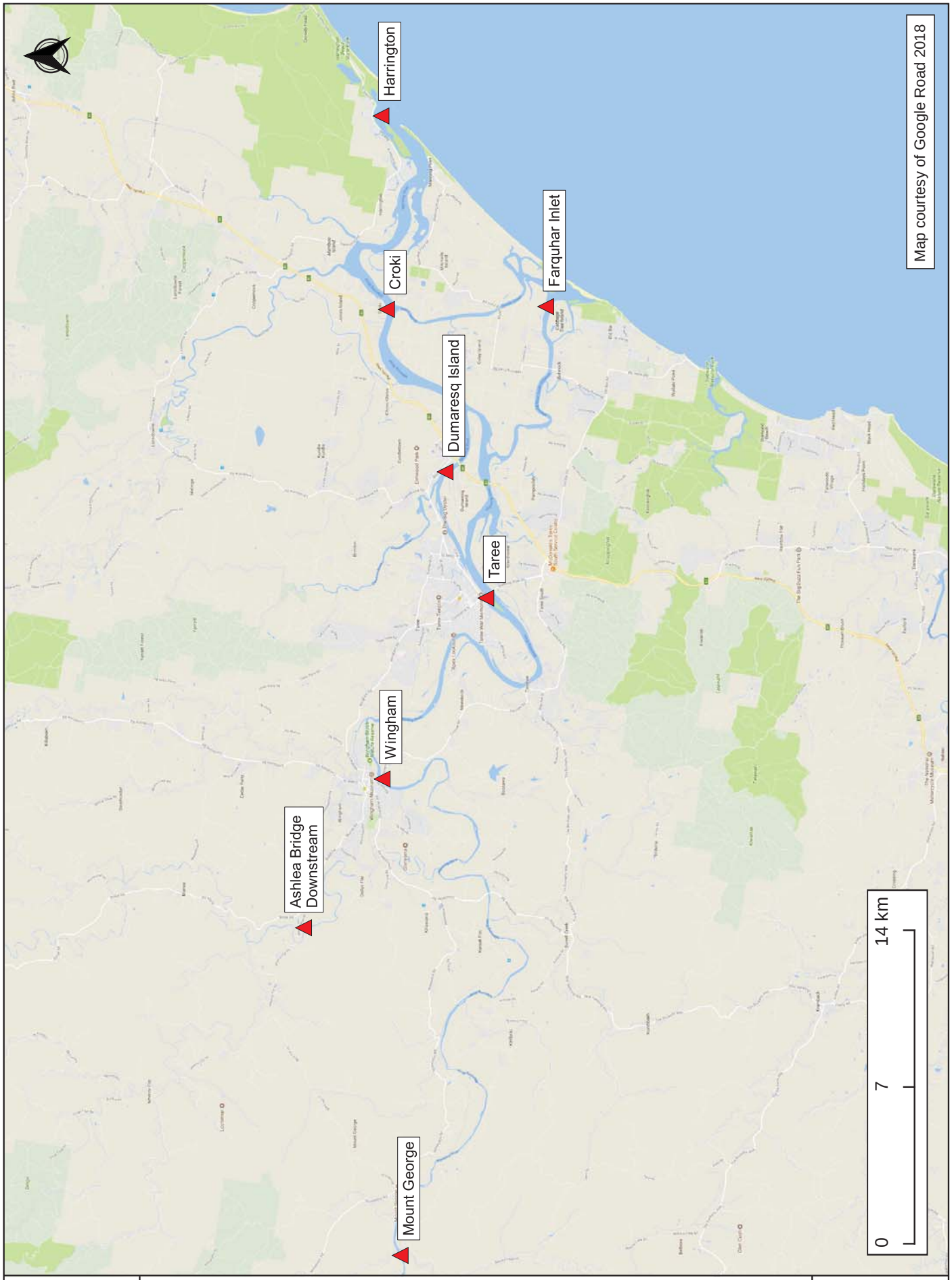
WATSON TAYLORS LAKE AT WATSON TAYLORS LAKE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
100

DRAWING 2692-100.cdr



NSW GOVERNMENT

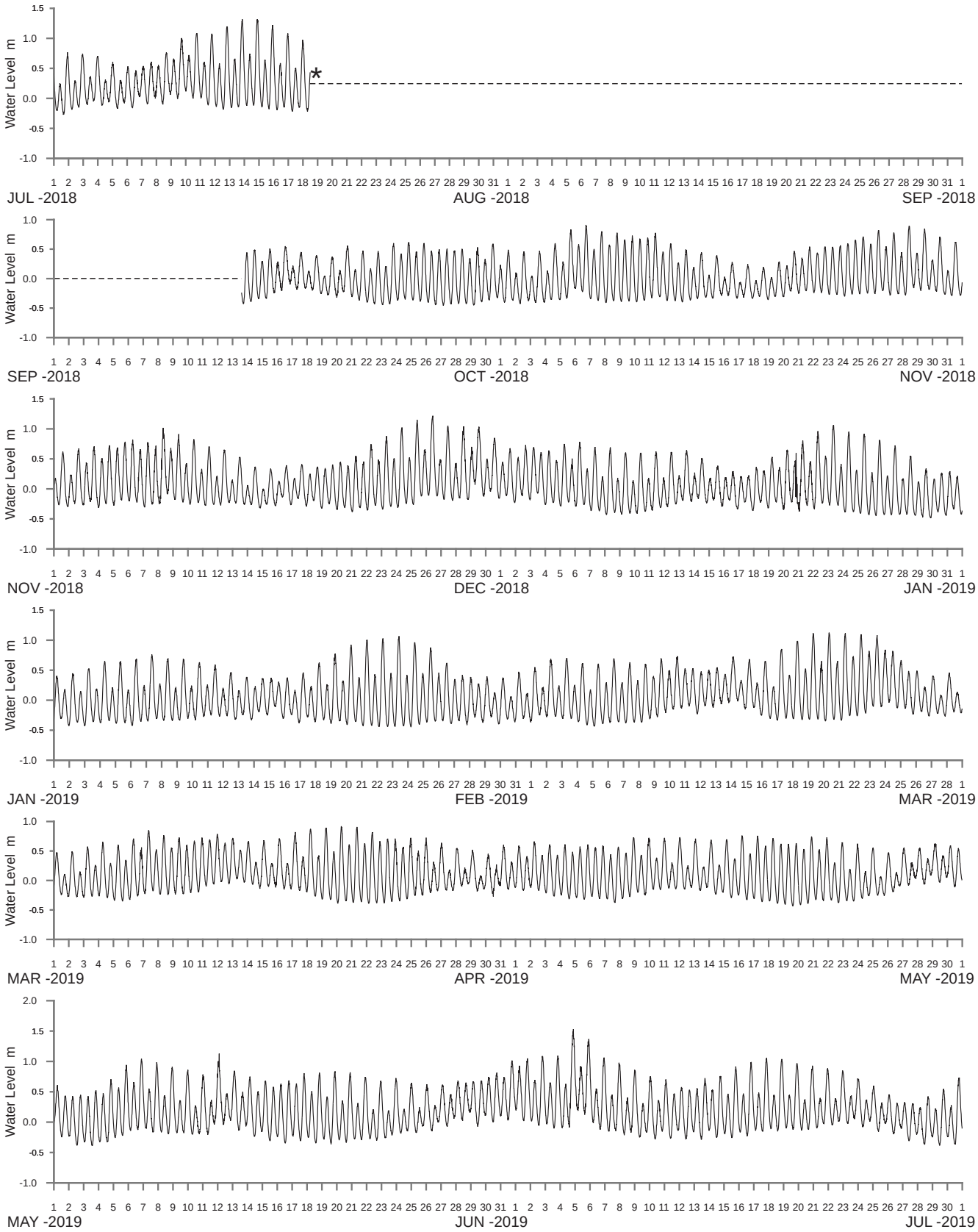
STATION LOCATIONS
MANNING RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 101

DRAWING 2692-101.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Station temporarily decommissioned due to sign pole repair on which the instrumentation housing is attached

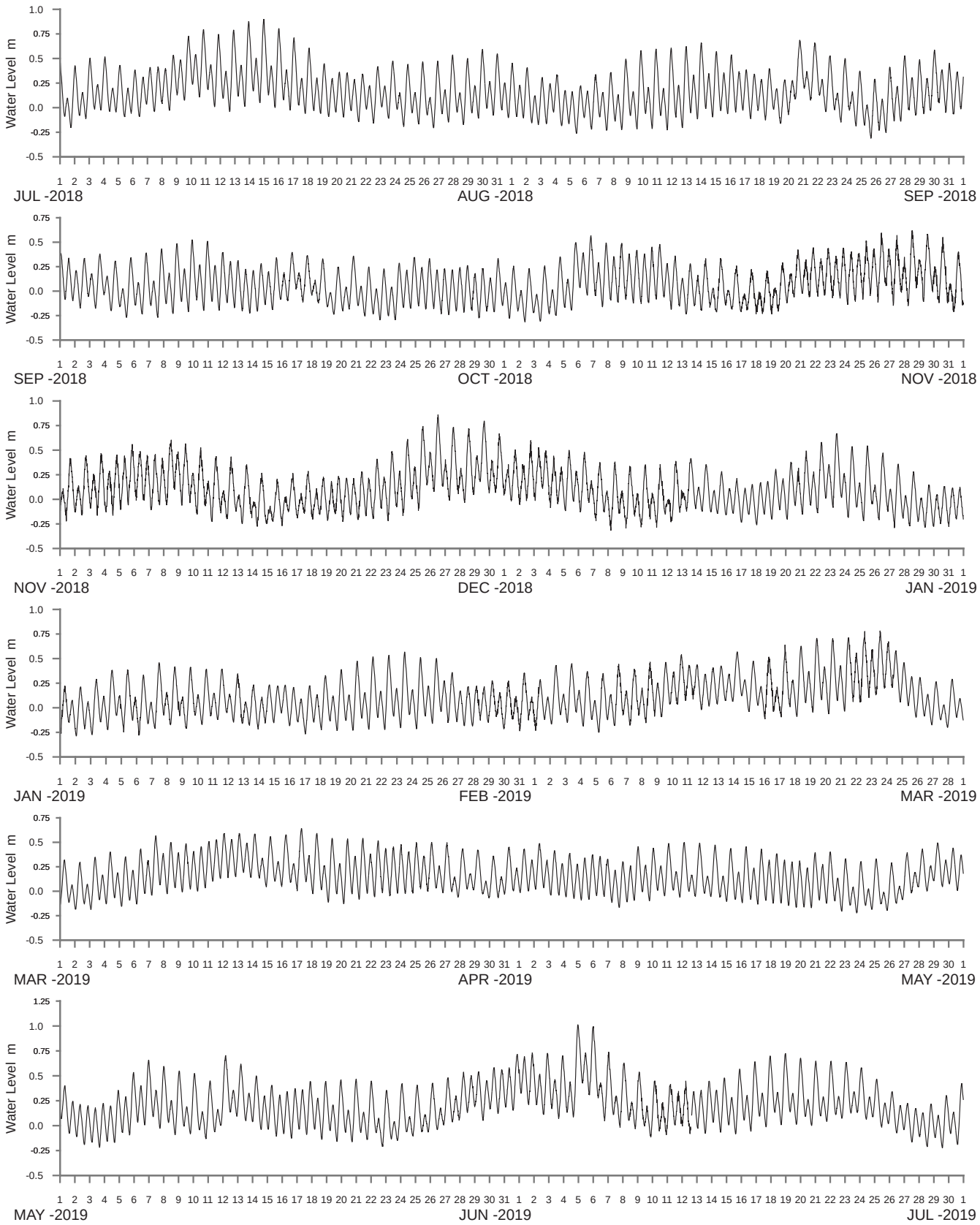
NSW GOVERNMENT

MANNING RIVER AT HARRINGTON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692
Figure
102

DRAWING 2692-102.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

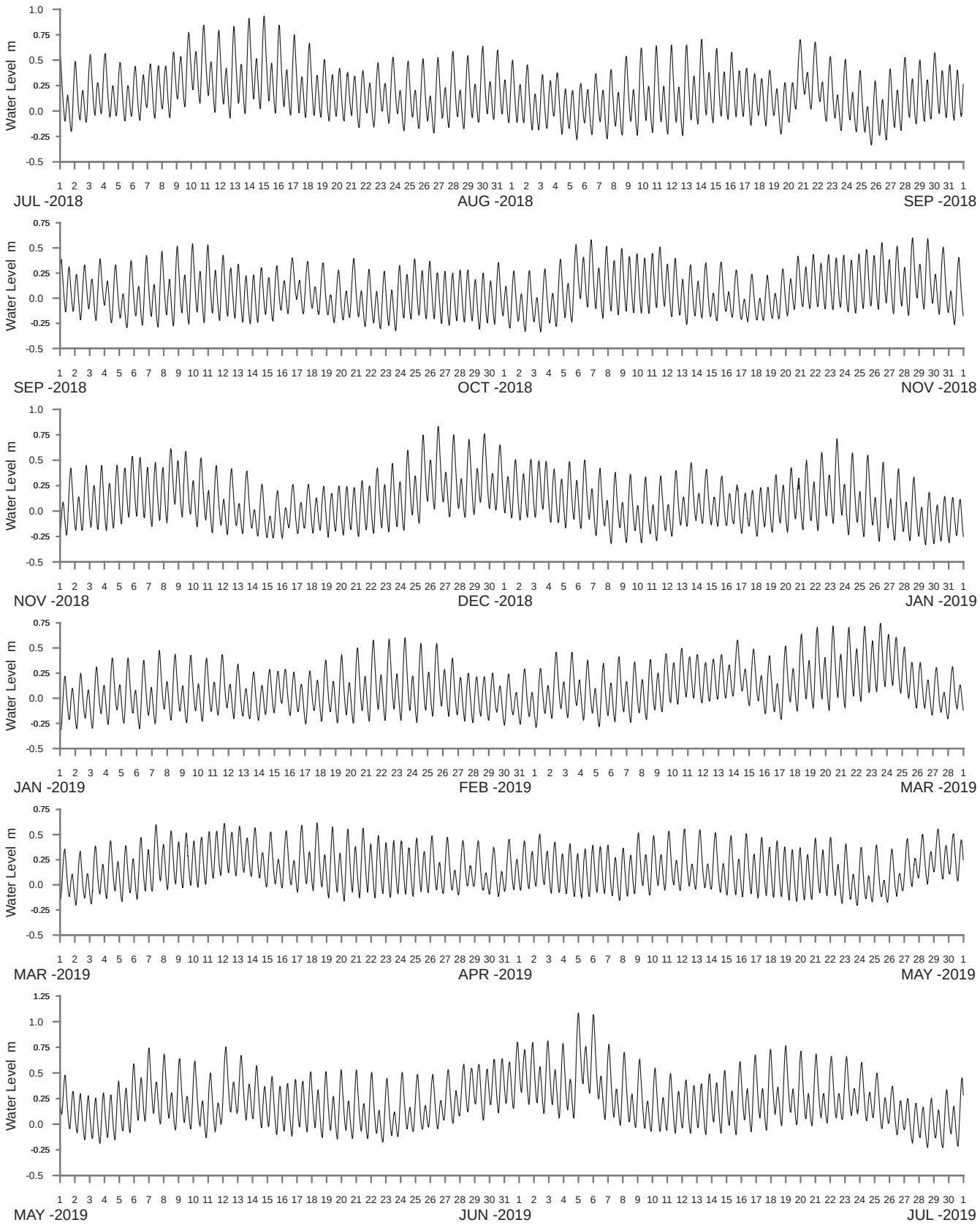
MANNING RIVER AT CROKI
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
103

DRAWING 2692-103.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

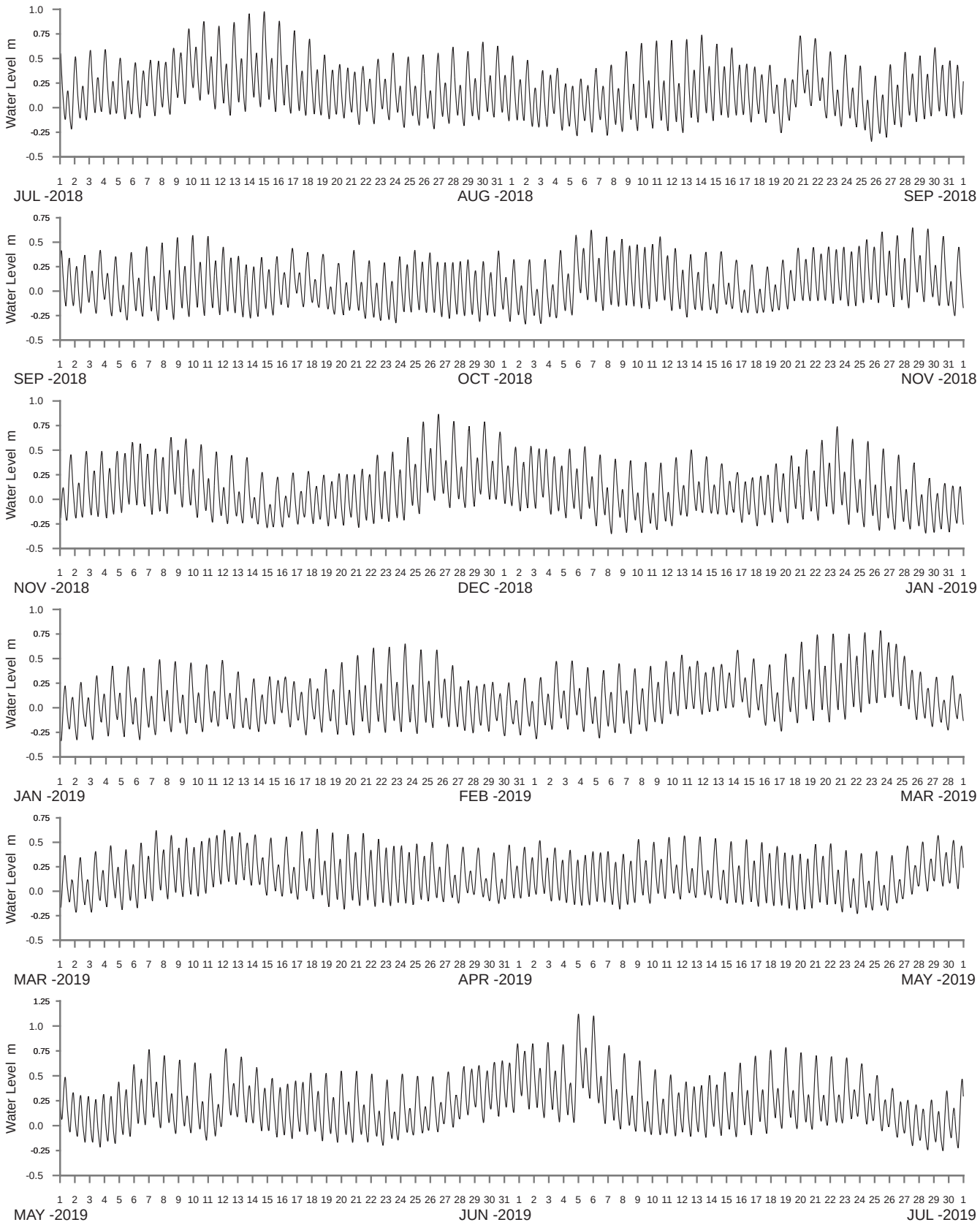
MANNING RIVER AT DUMARESQ ISLAND
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
104

DRAWING 2692-104.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

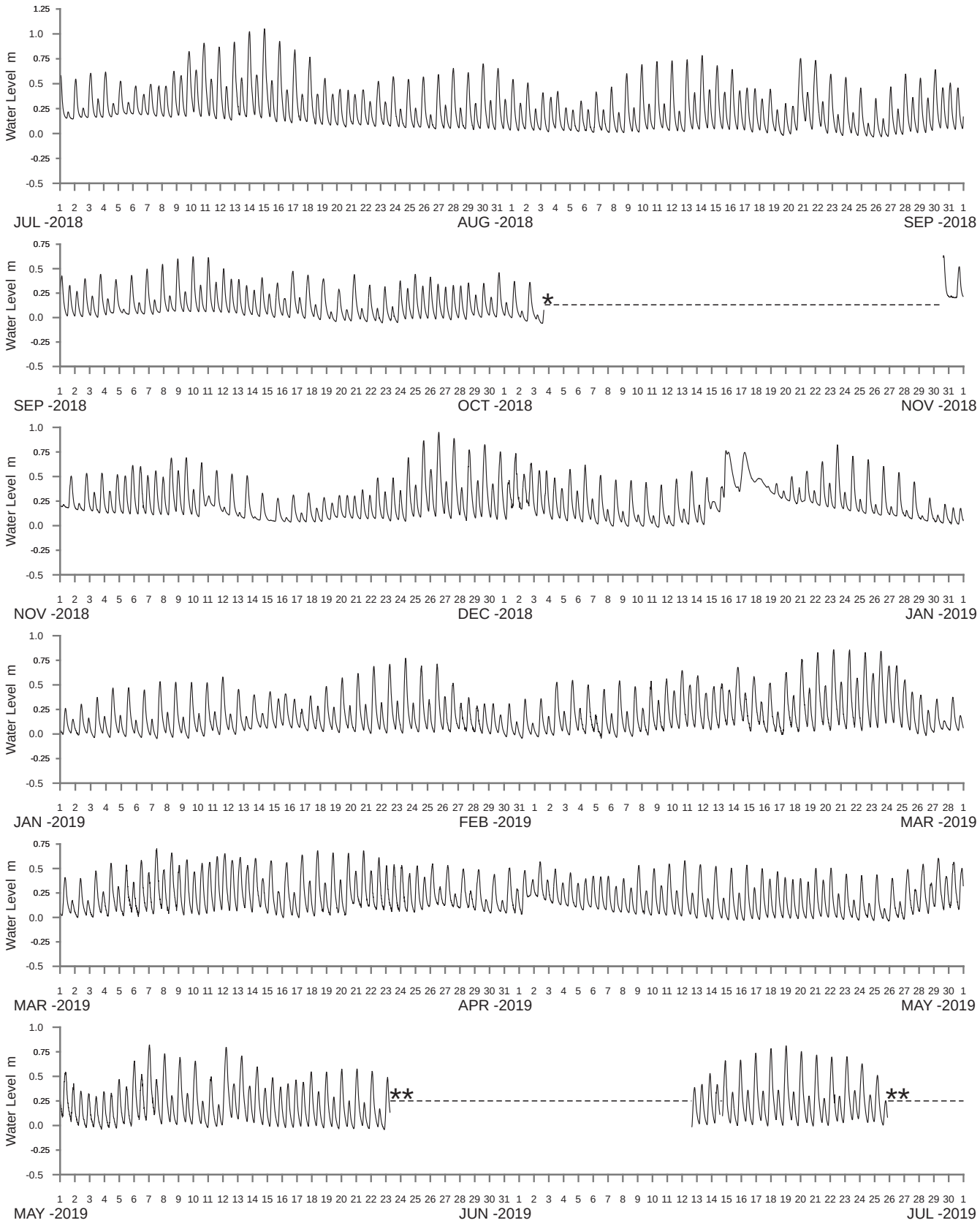
MANNING RIVER AT TAREE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
105

DRAWING 2692-105.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to compressor battery failure **Data loss due to rusted pipe at end of orifice

NSW GOVERNMENT

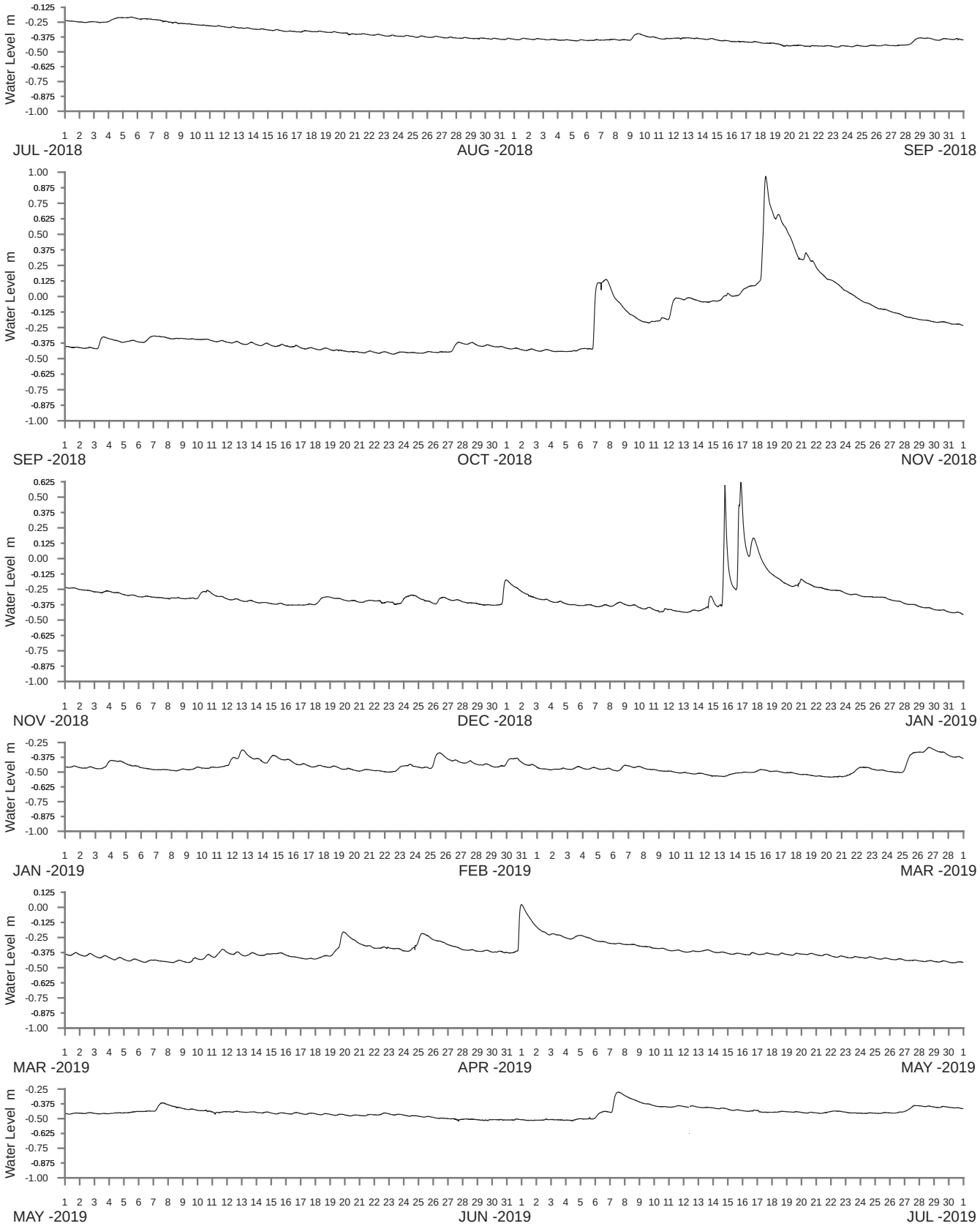
MANNING RIVER AT WINGHAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 106

DRAWING 2692-106.cdr



WATER LEVEL REFERENCED TO LOCAL WATER RESOURCES DATUM

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

NSW GOVERNMENT

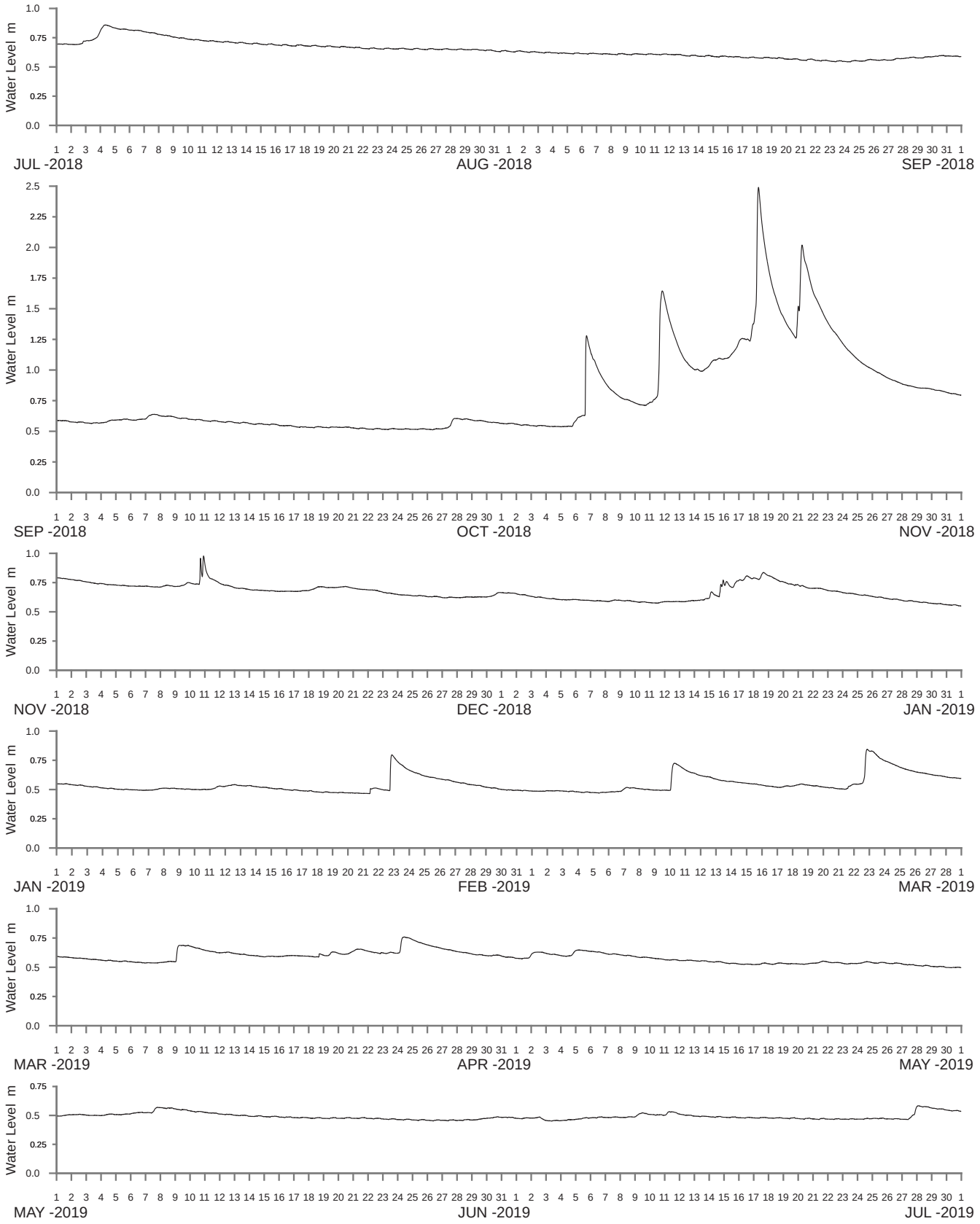
MANNING RIVER AT MOUNT GEORGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
107

DRAWING 2692-107.cdr



WATER LEVEL REFERENCED TO ASSUMED DATUM

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

NSW GOVERNMENT

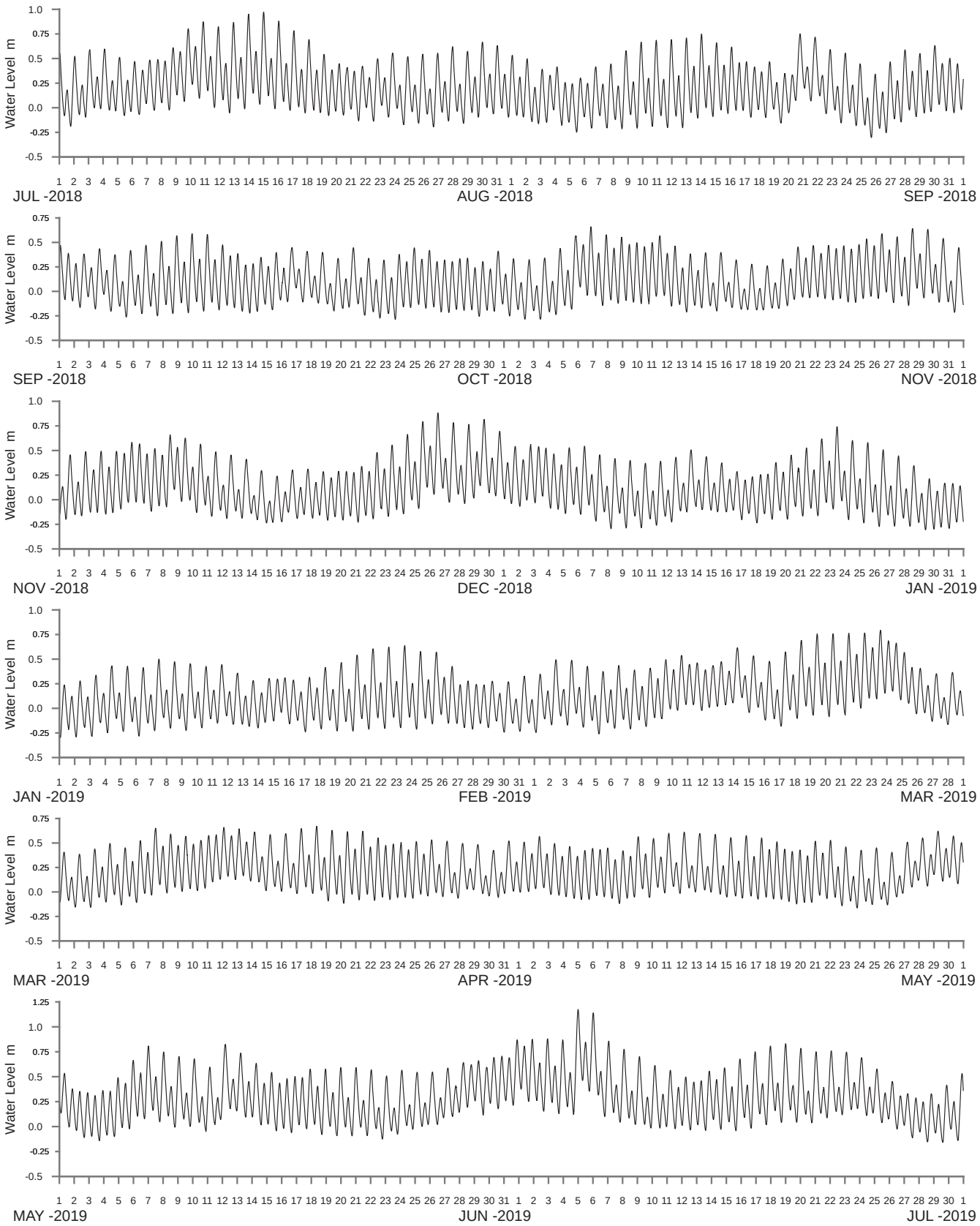
DINGO CREEK AT ASHLEA BRIDGE DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 108

DRAWING 2692-108.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

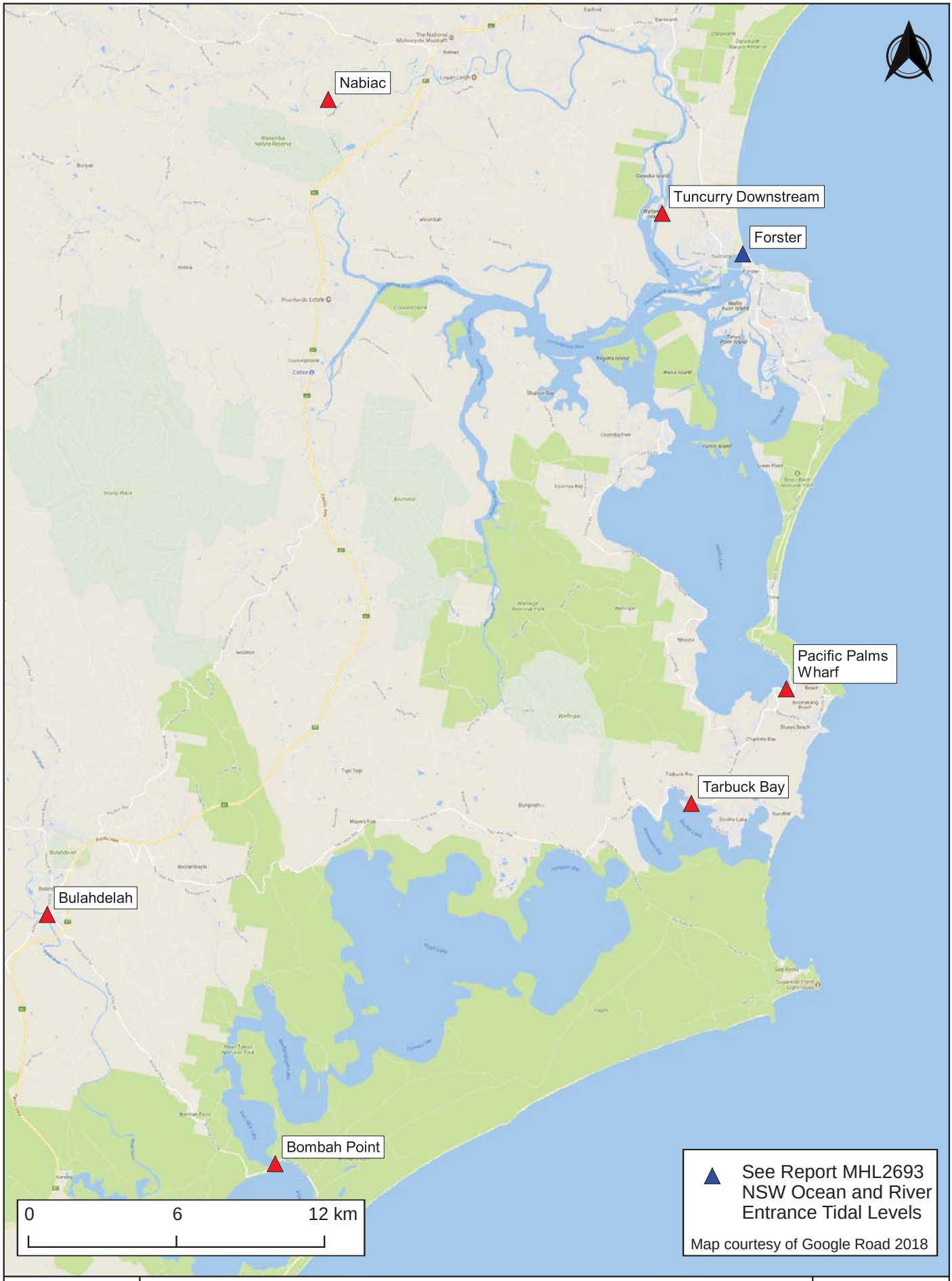
MANNING RIVER AT FARQUHAR INLET
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
109

DRAWING 2692-109.cdr



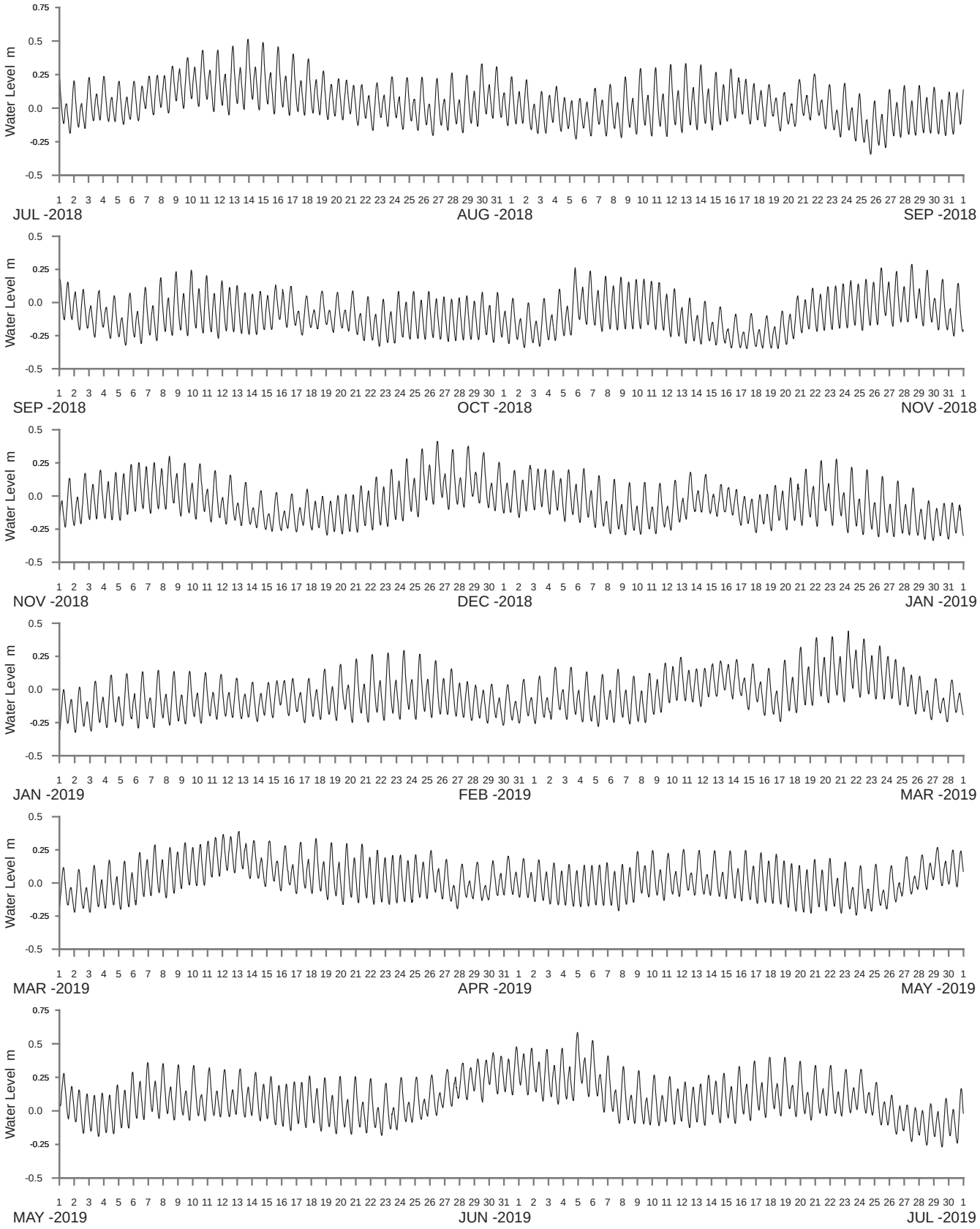
NSW GOVERNMENT

STATION LOCATIONS
GREAT LAKES REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
110

DRAWING 2692-110.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

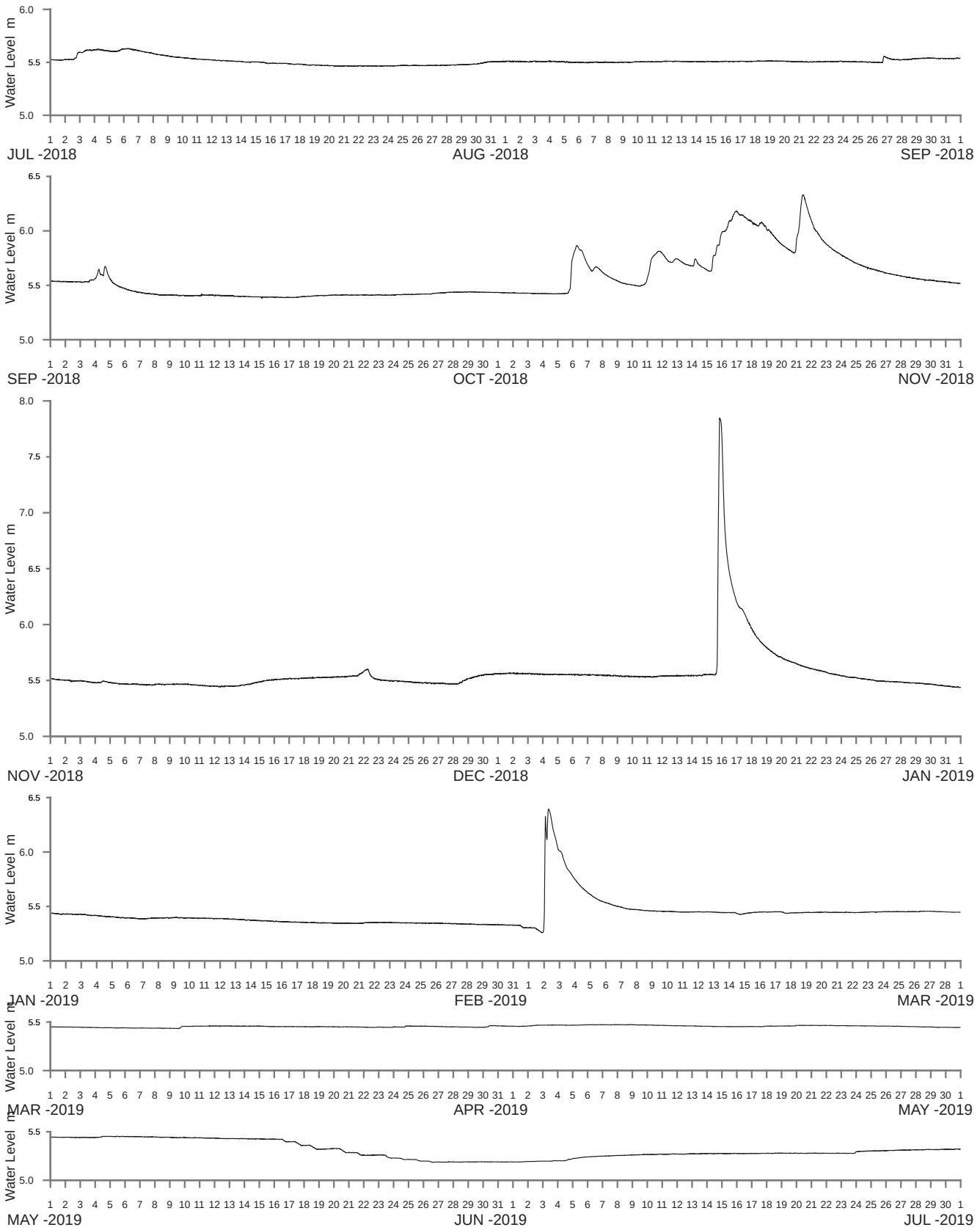
WALLAMBA RIVER AT TUNCURRY DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 111

DRAWING 2692-111.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

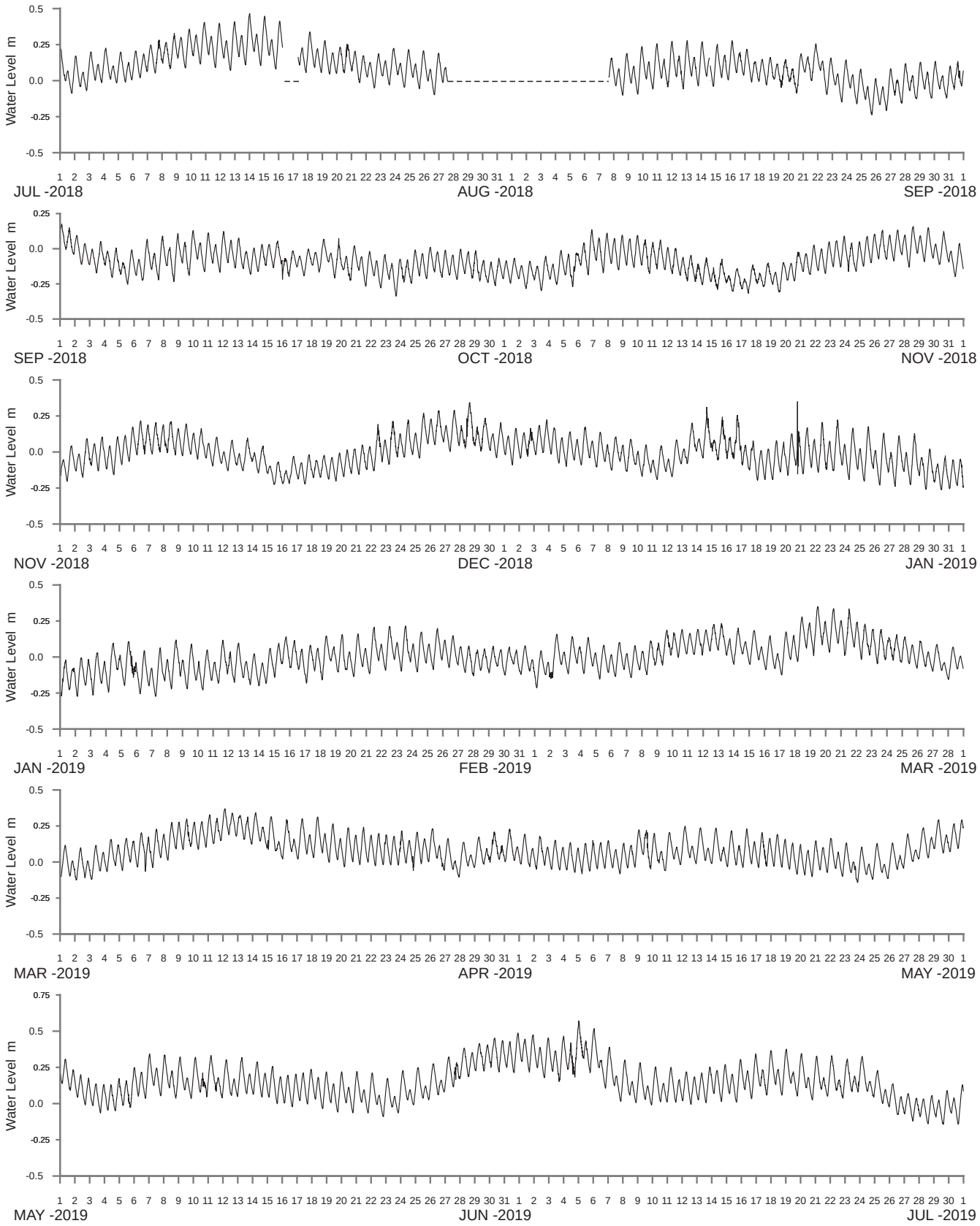
WALLAMBA RIVER AT NABIAC
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 112

DRAWING 2692-112.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

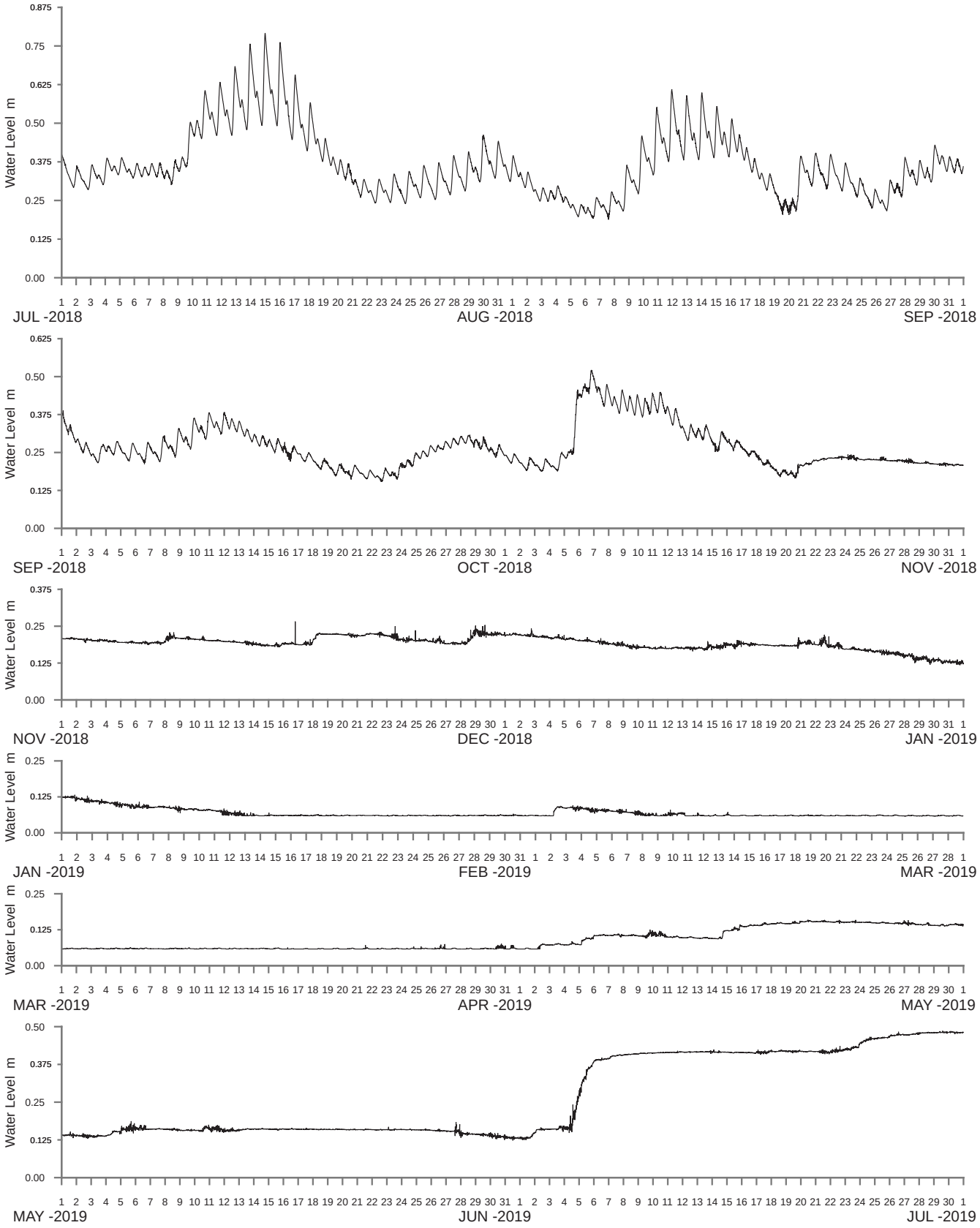
WALLIS LAKES AT PACIFIC PALMS WHARF
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
113

DRAWING 2692-113.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

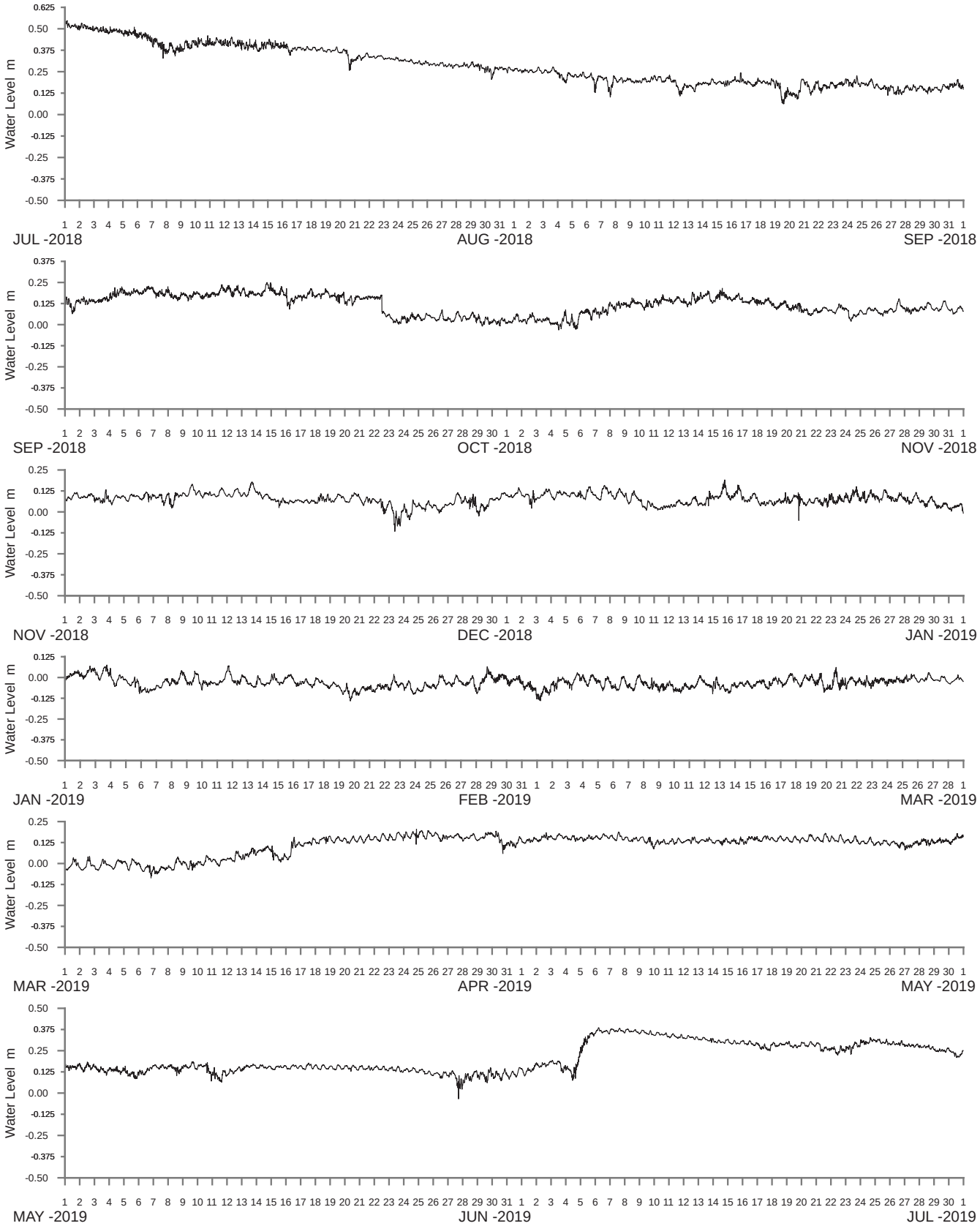
SMITHS LAKE AT TARBUCK BAY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 114

DRAWING 2692-114.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

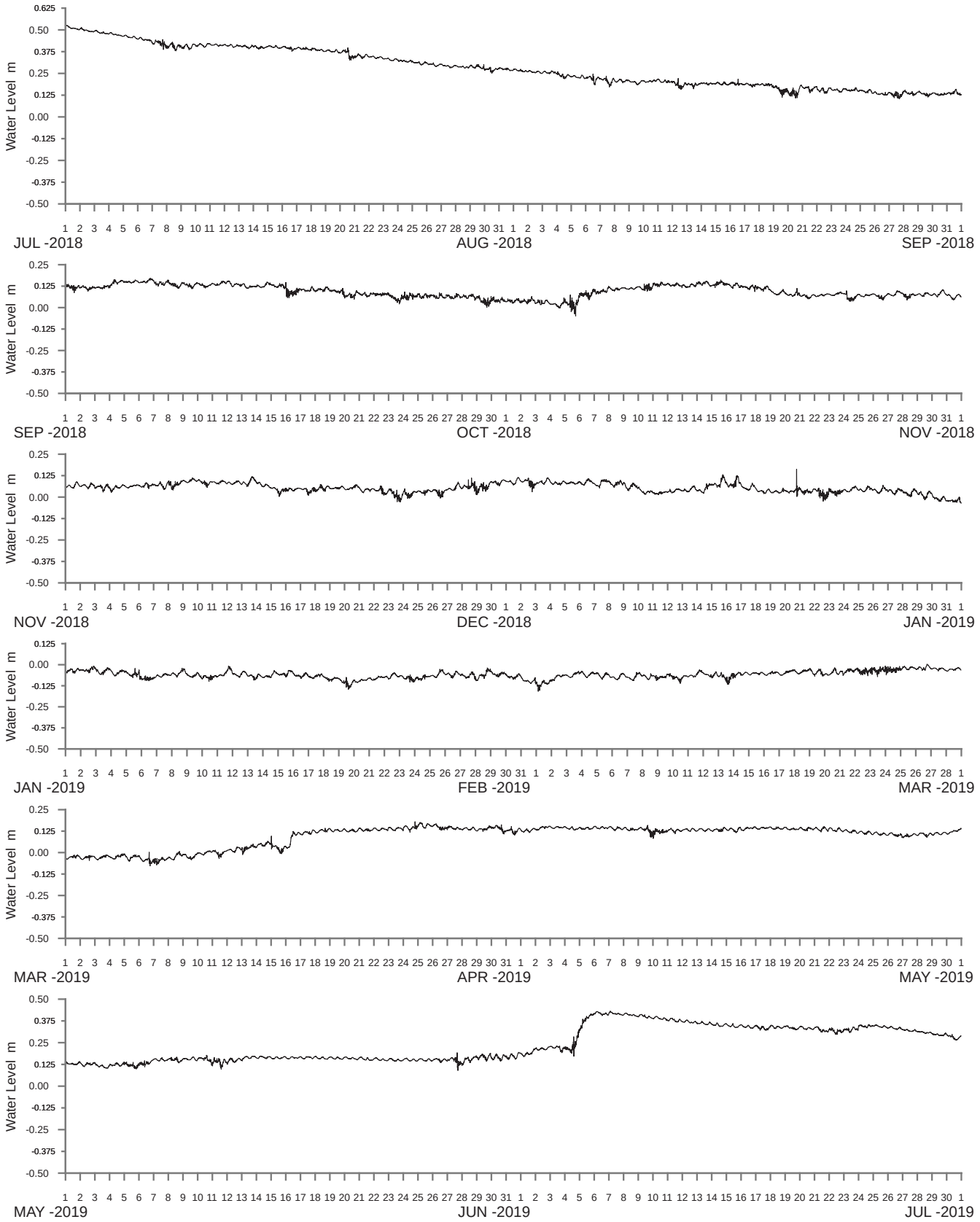
MYALL RIVER AT BULAHDELAH
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 115

DRAWING 2692-115.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

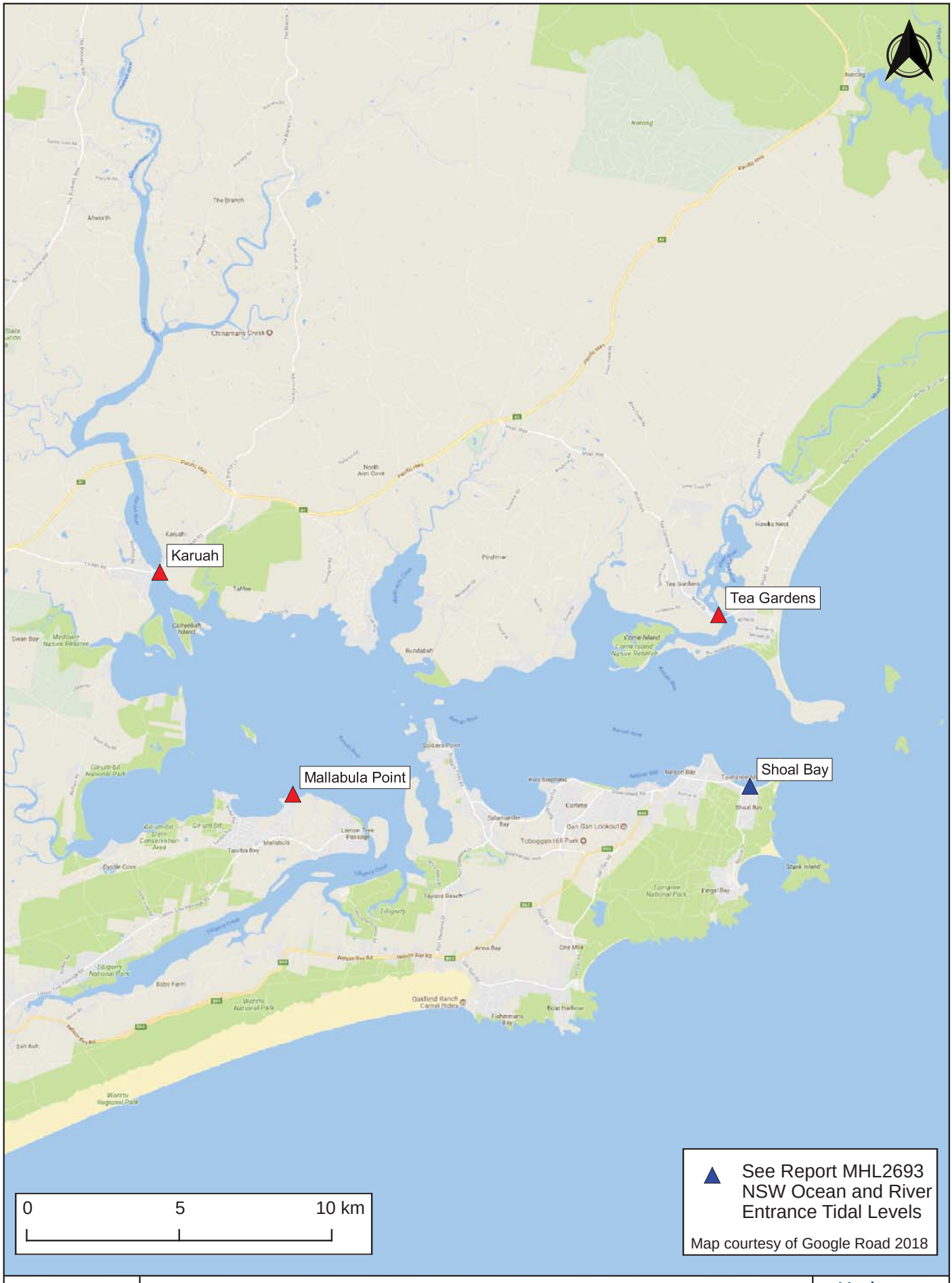
MYALL RIVER AT BOMBAH POINT
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 116

DRAWING 2692-116.cdr



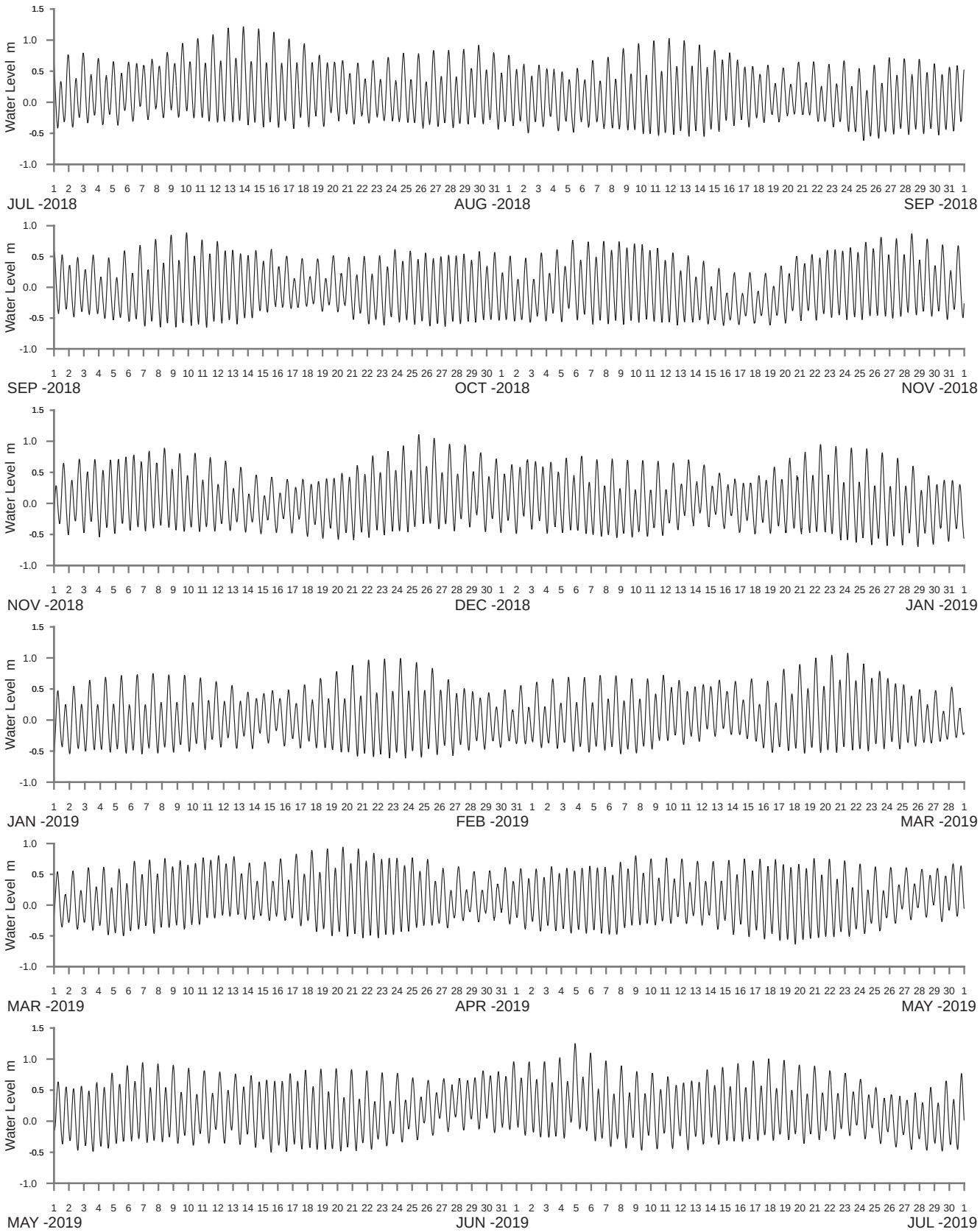
NSW GOVERNMENT

STATION LOCATIONS
PORT STEPHENS REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
117

DRAWING 2692-117.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

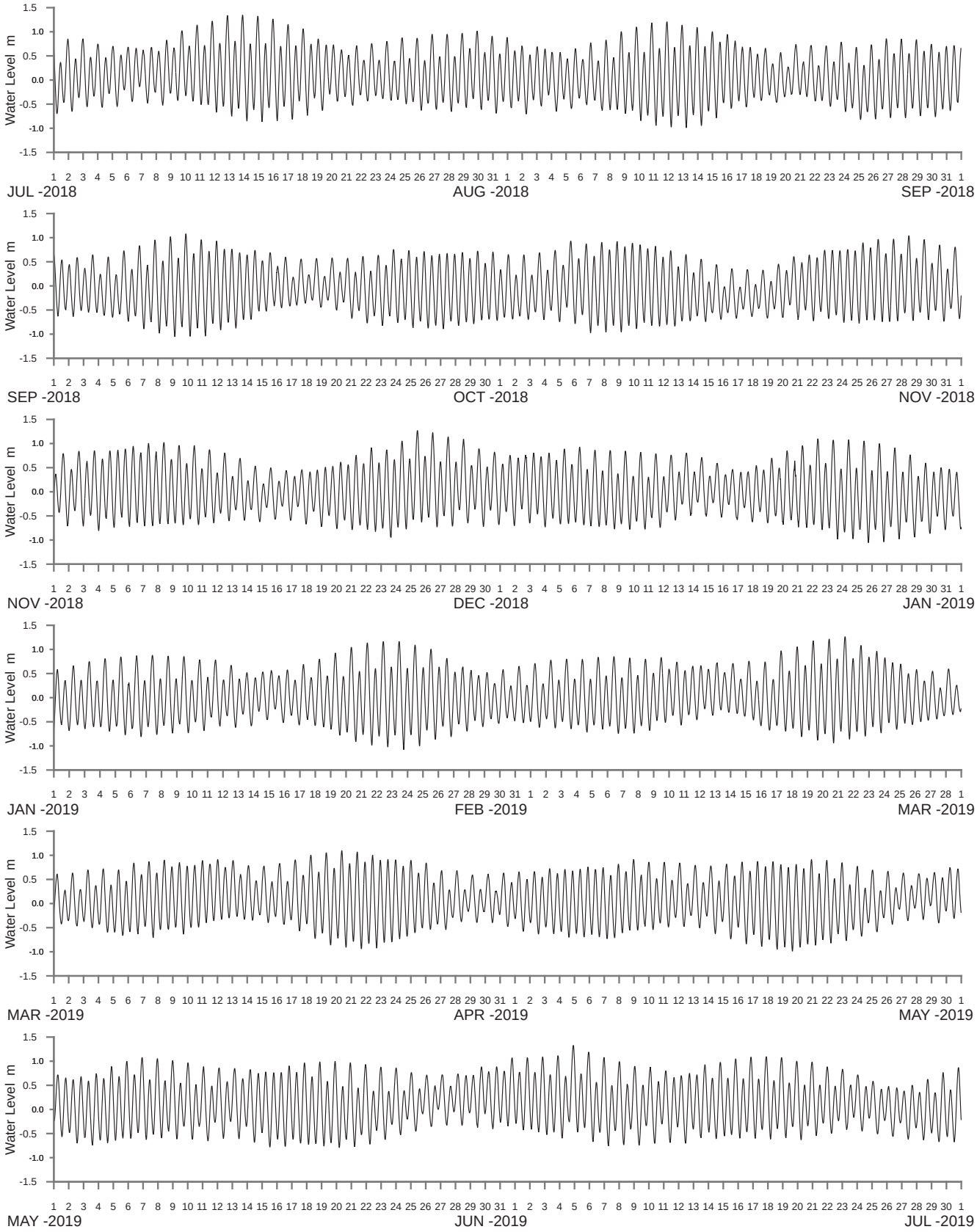
MYALL RIVER AT TEA GARDENS
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
118

DRAWING 2692-118.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

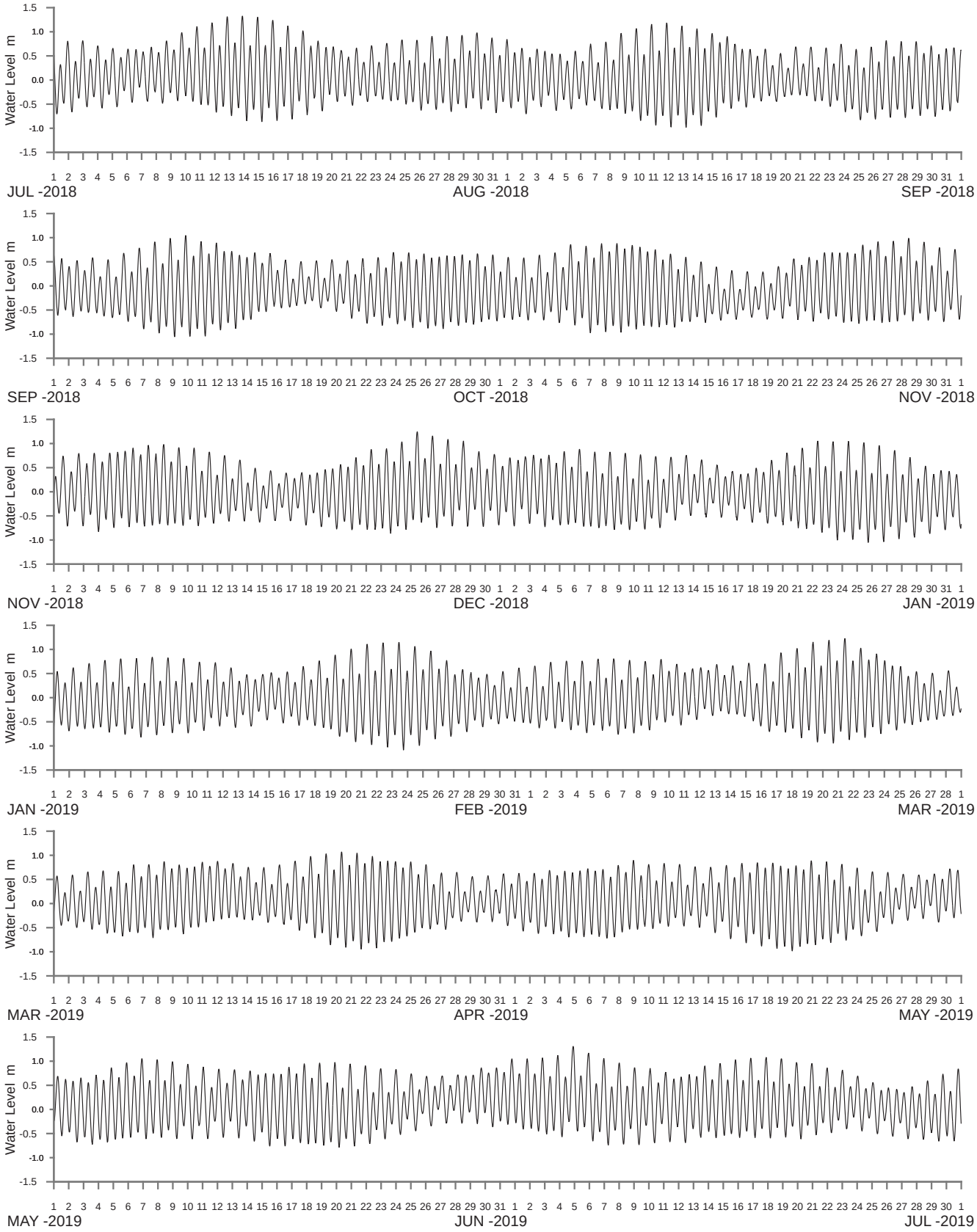
KARUAH RIVER AT KARUAH
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 119

DRAWING 2692-119.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

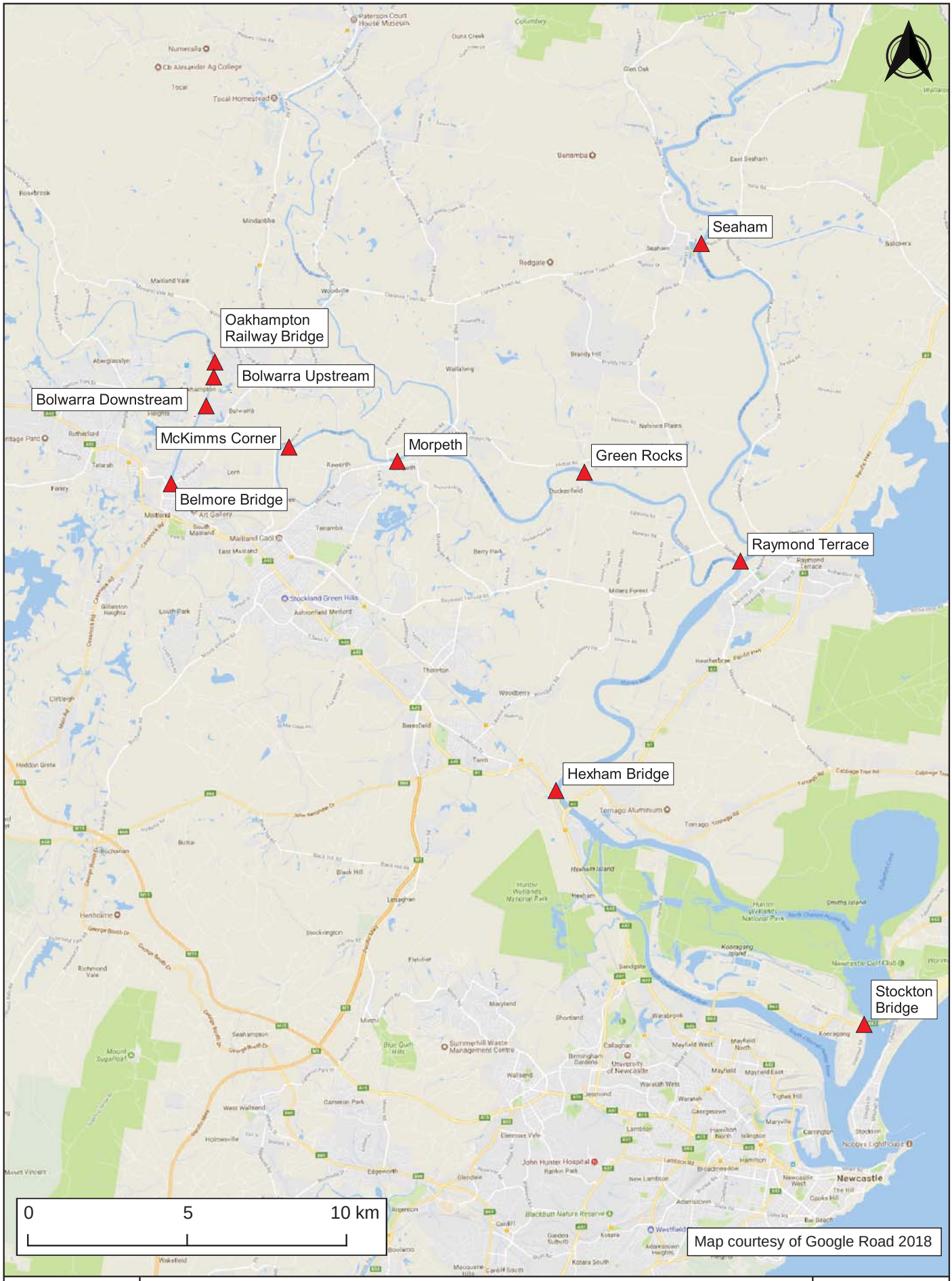
KARUAH RIVER AT MALLABULLA POINT
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
120

DRAWING 2692-120.cdr



NSW GOVERNMENT

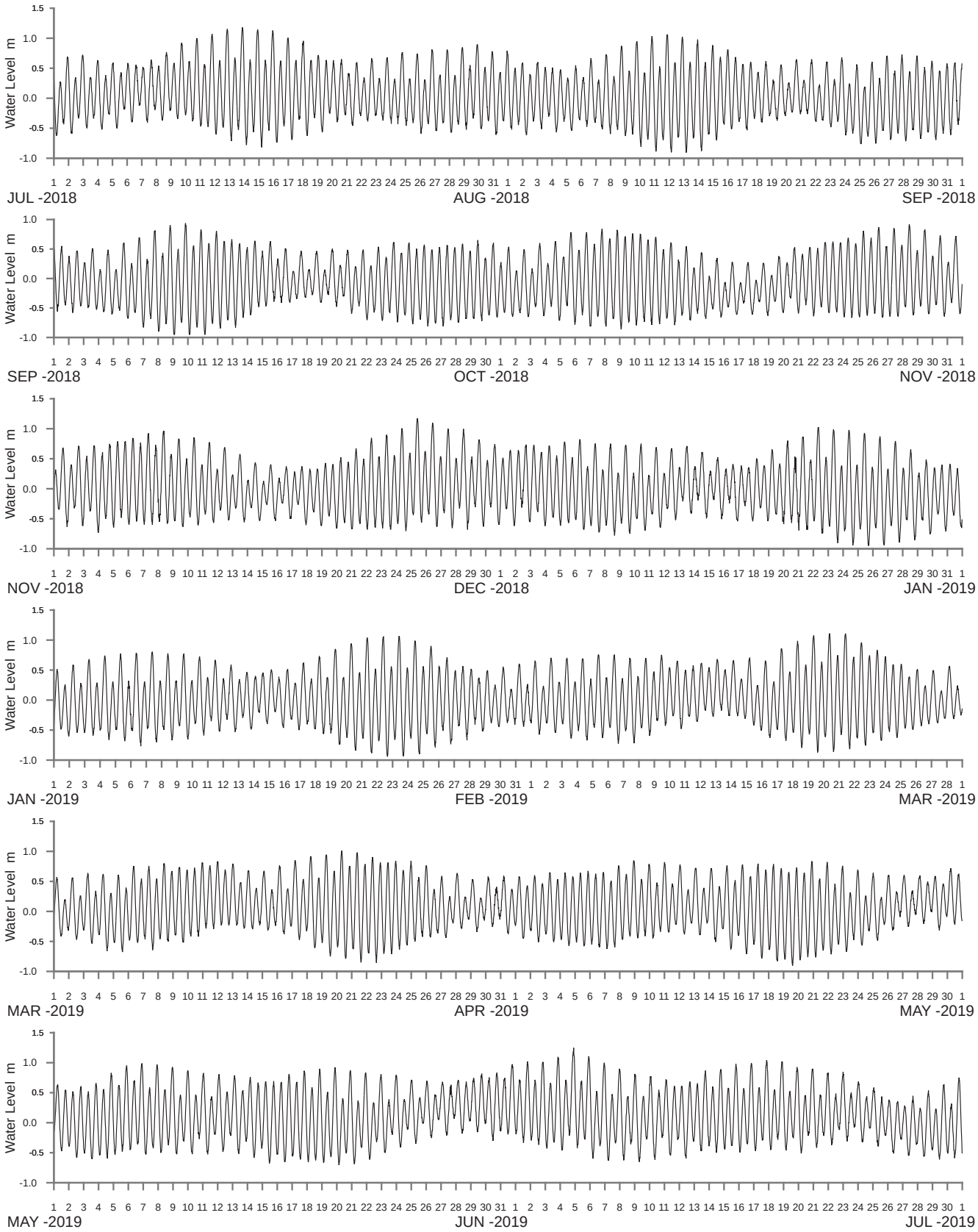
STATION LOCATIONS
HUNTER RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 121

DRAWING 2692-121.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

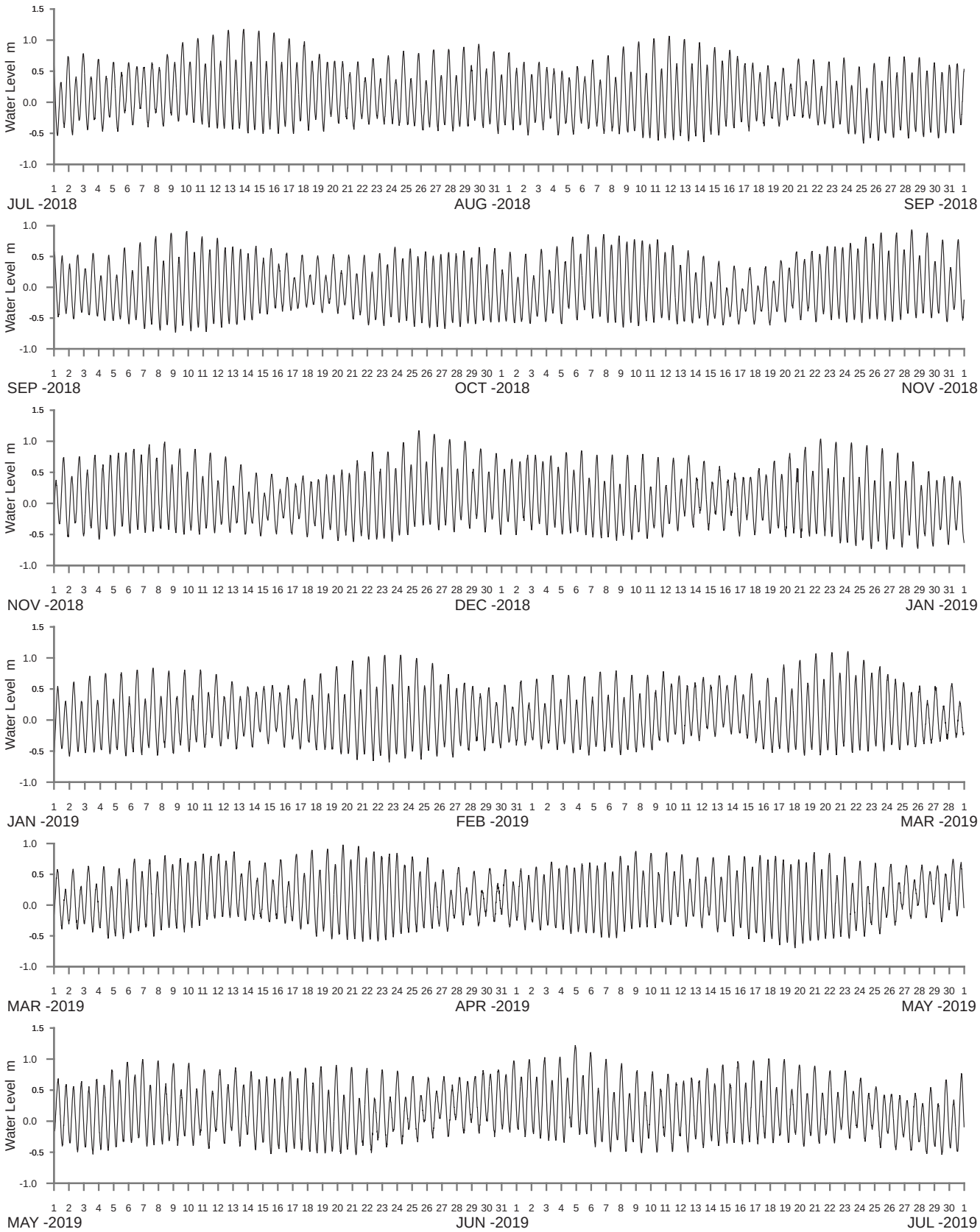
HUNTER RIVER AT STOCKTON BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
122

DRAWING 2692-122.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

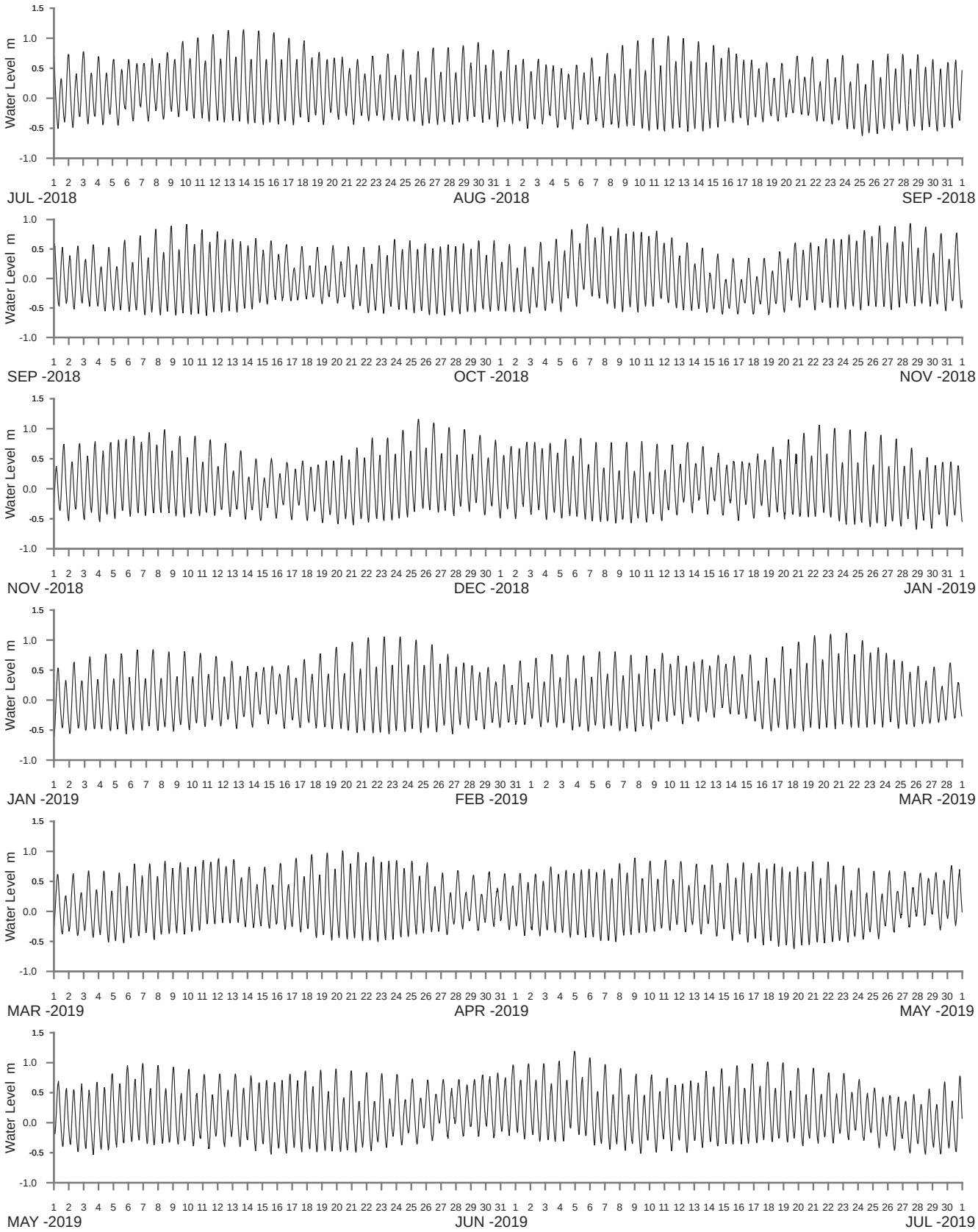
HUNTER RIVER AT HEXHAM BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
123

DRAWING 2692-123.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

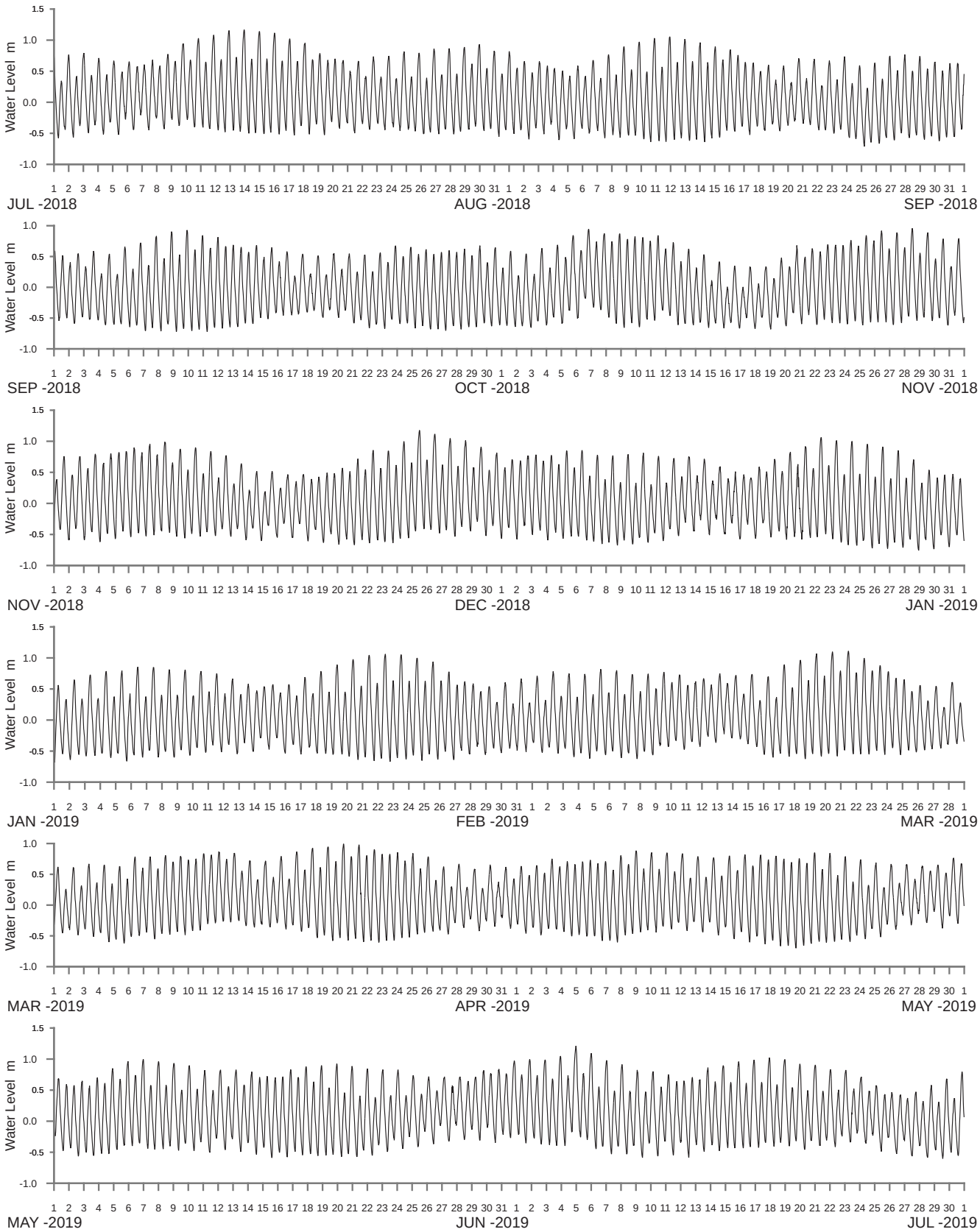
WILLIAMS RIVER AT RAYMOND TERRACE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
124

DRAWING 2692-124.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

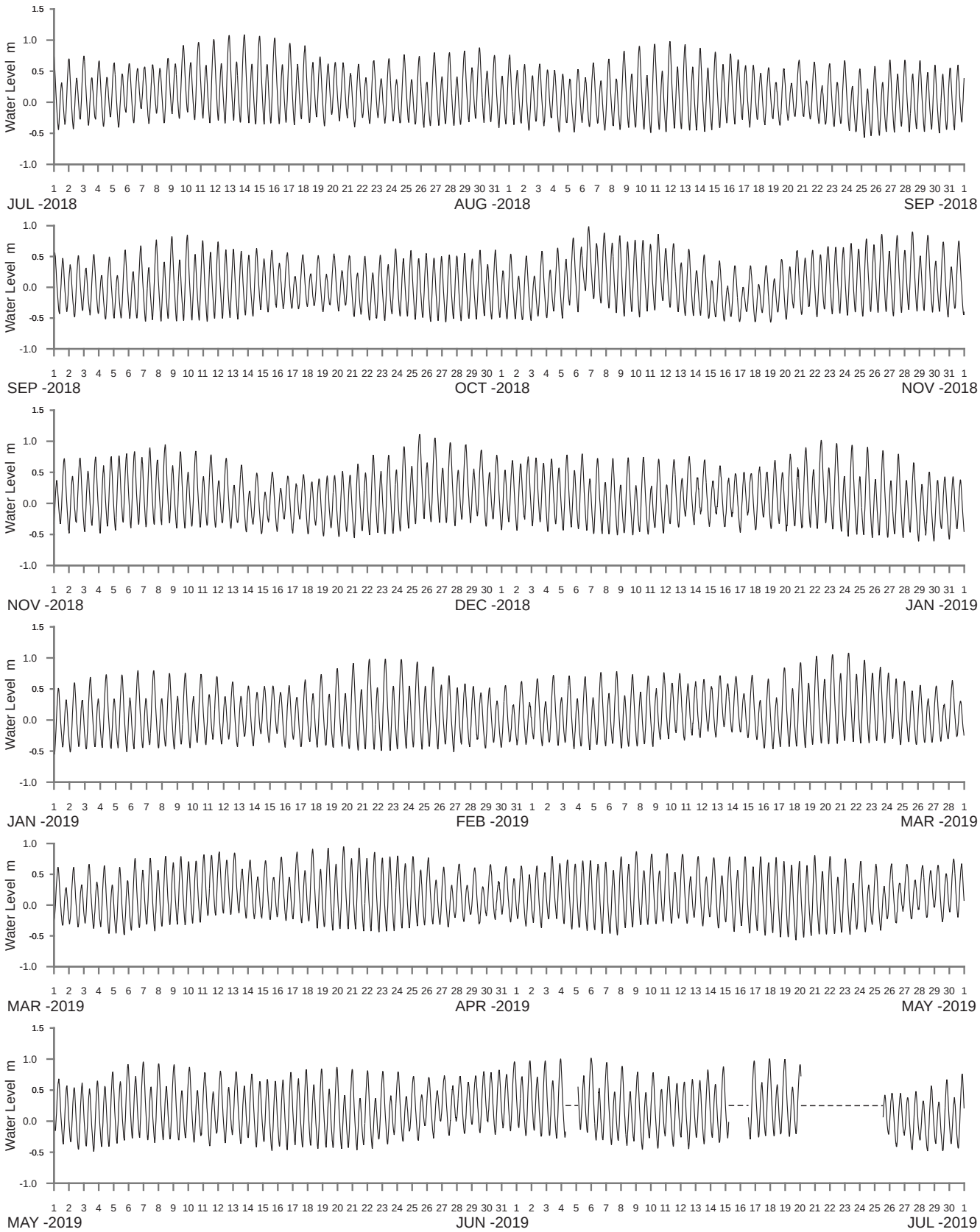
WILLIAMS RIVER AT SEAHAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
125

DRAWING 2692-125.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

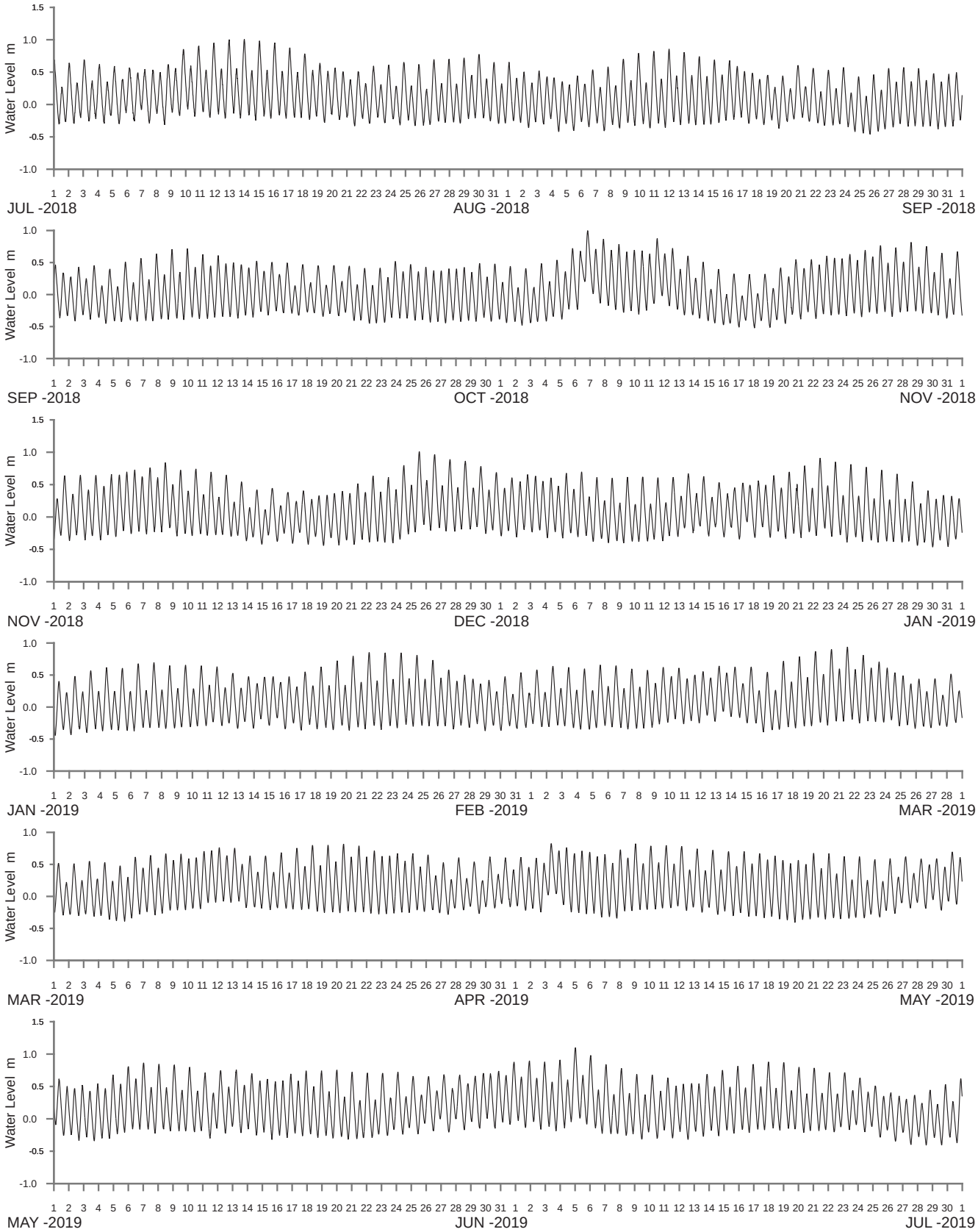
HUNTER RIVER AT GREEN ROCKS
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
126

DRAWING 2692-126.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

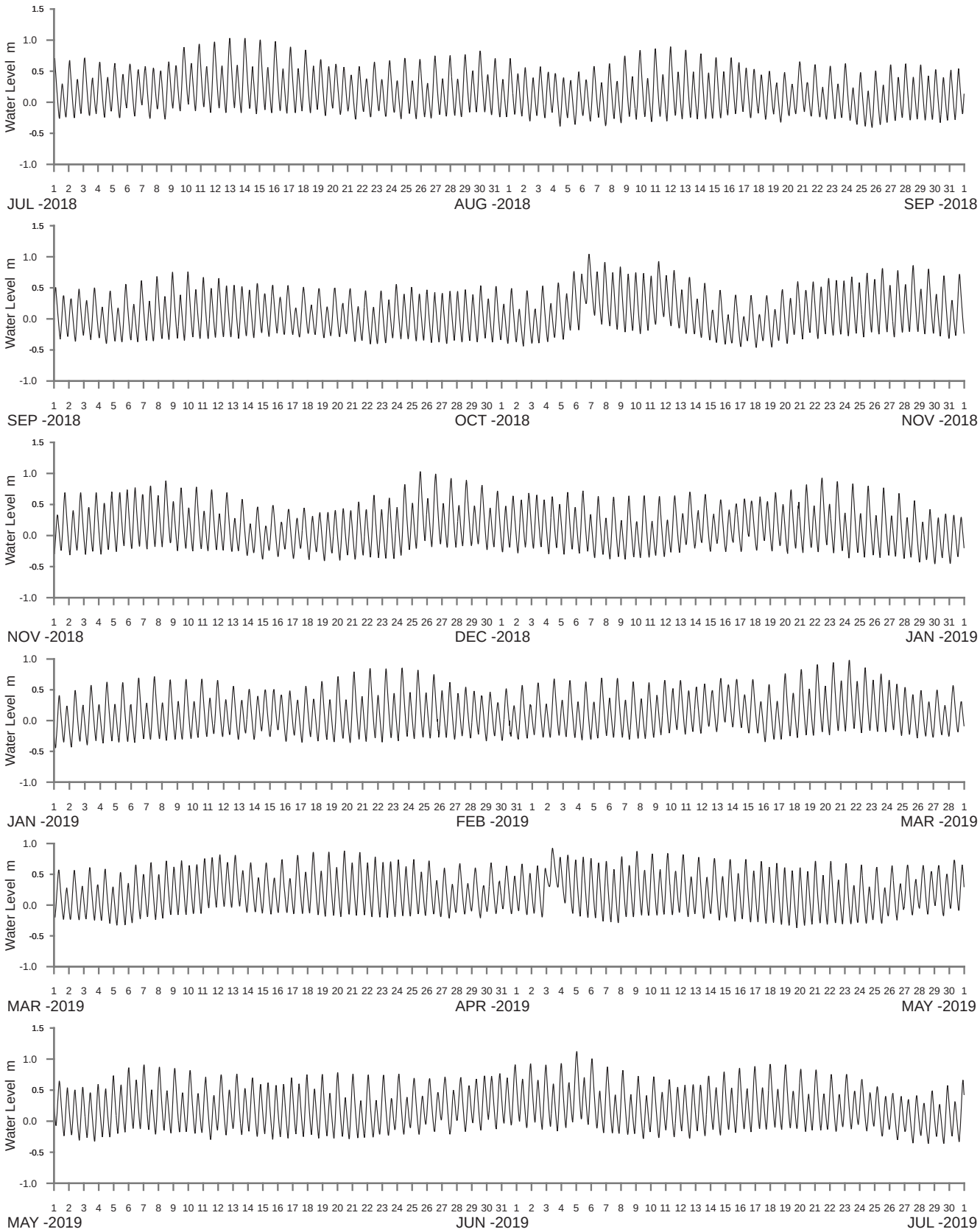
HUNTER RIVER AT MORPETH
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
127

DRAWING 2692-127.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

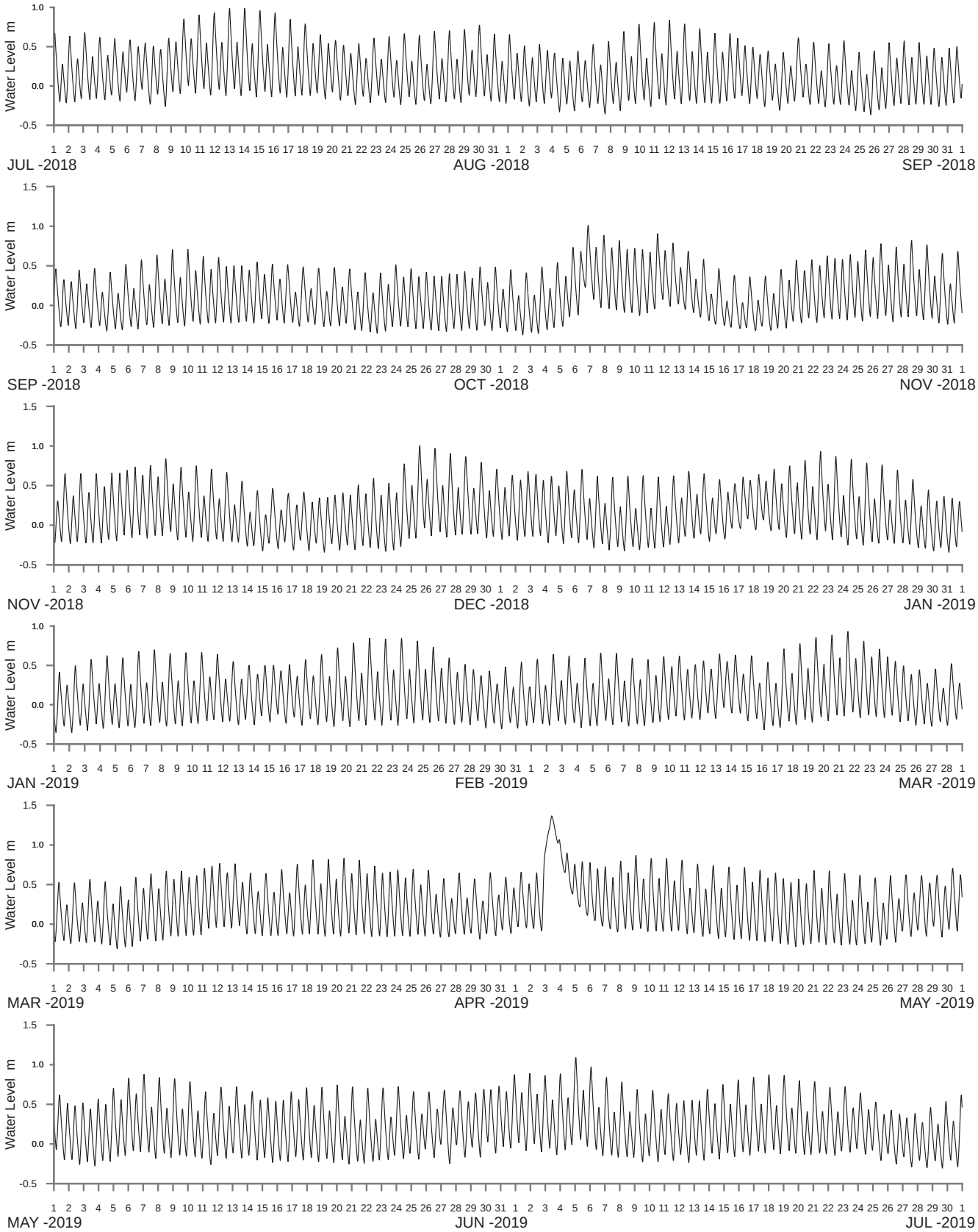
HUNTER RIVER AT McKIMMS CORNER
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
128

DRAWING 2692-128.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

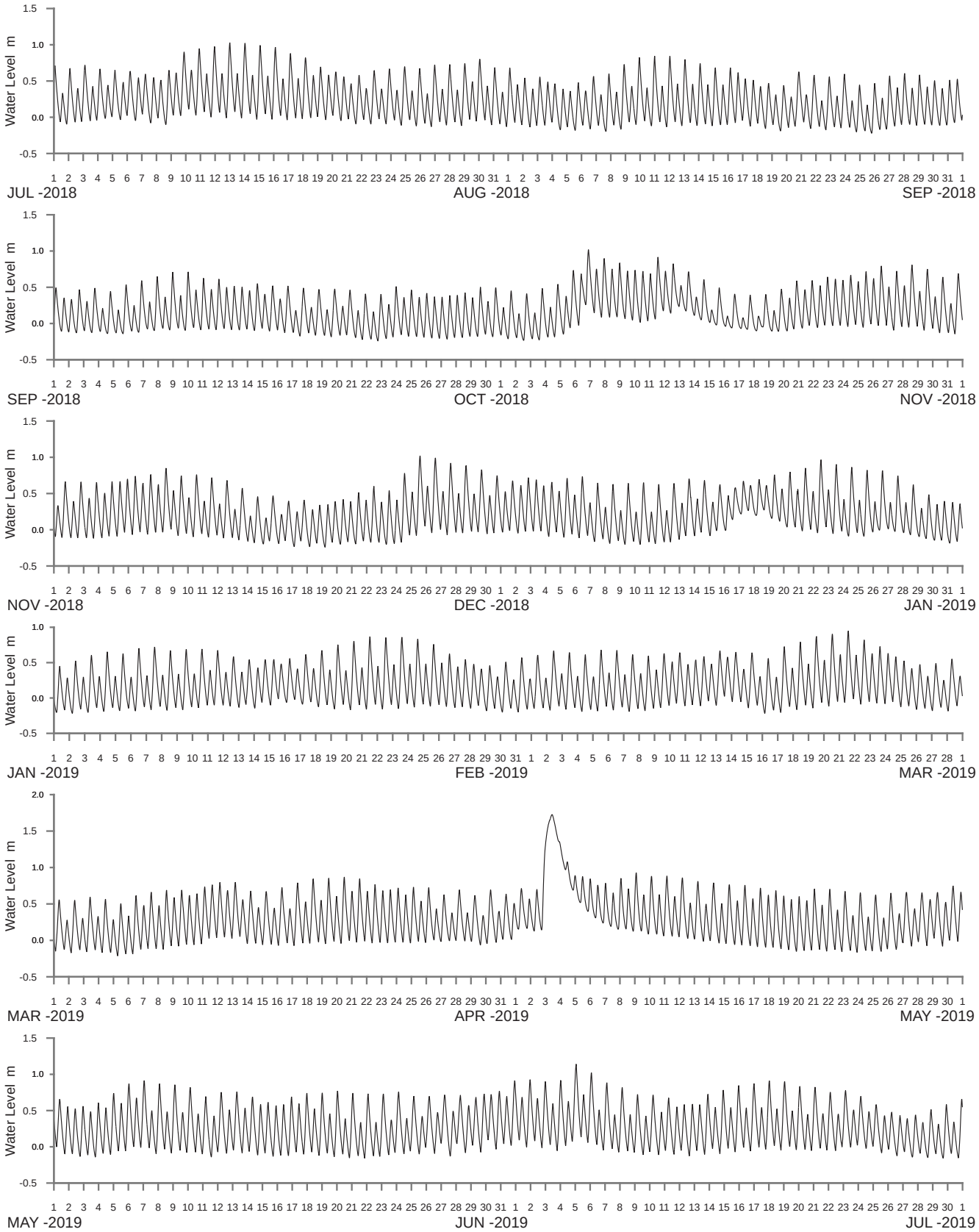
HUNTER RIVER AT BELMORE BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
129

DRAWING 2692-129.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

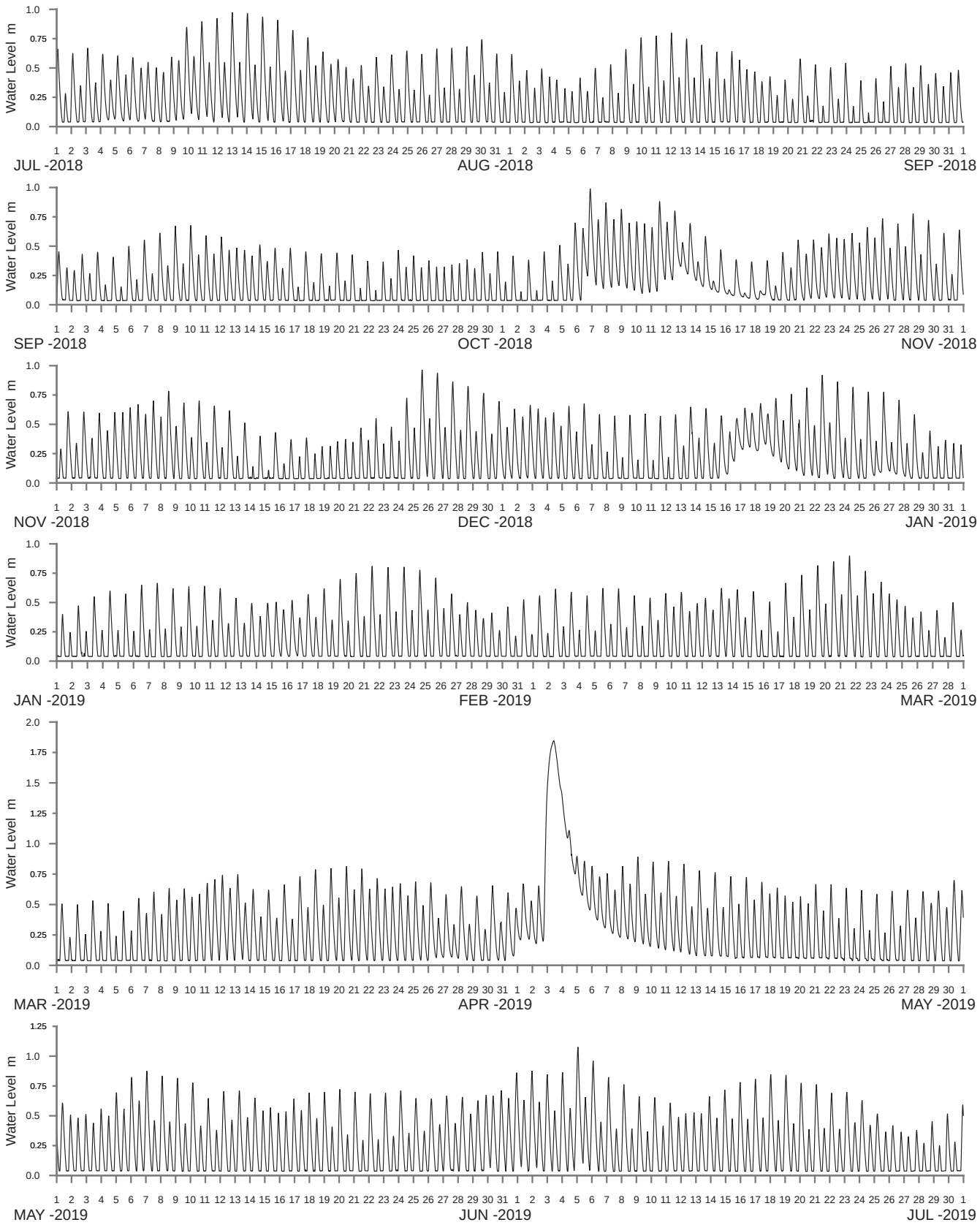
HUNTER RIVER AT BOLWARRA DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
130

DRAWING 2692-130.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

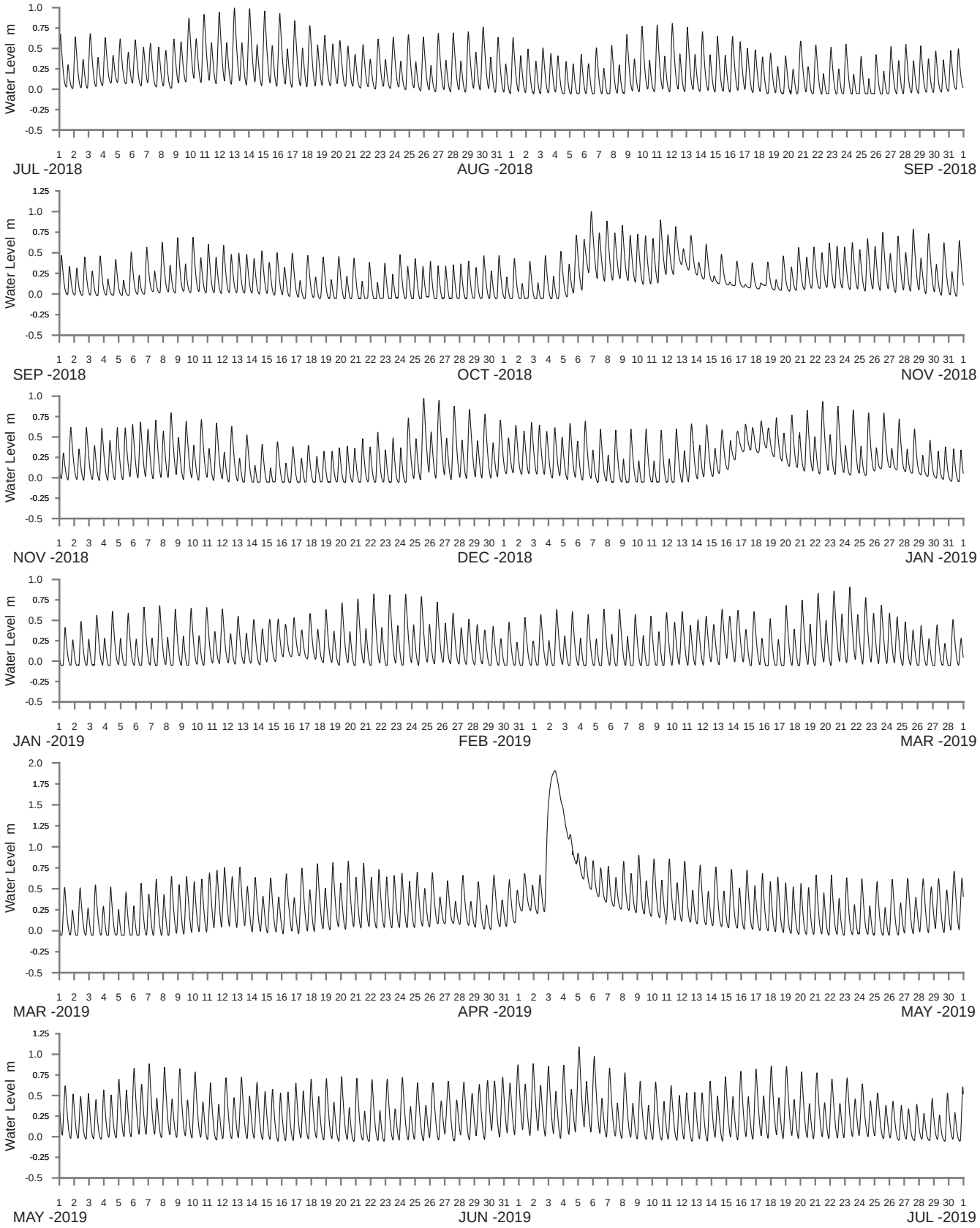
HUNTER RIVER AT BOLWARRA UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
131

DRAWING 2692-131.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

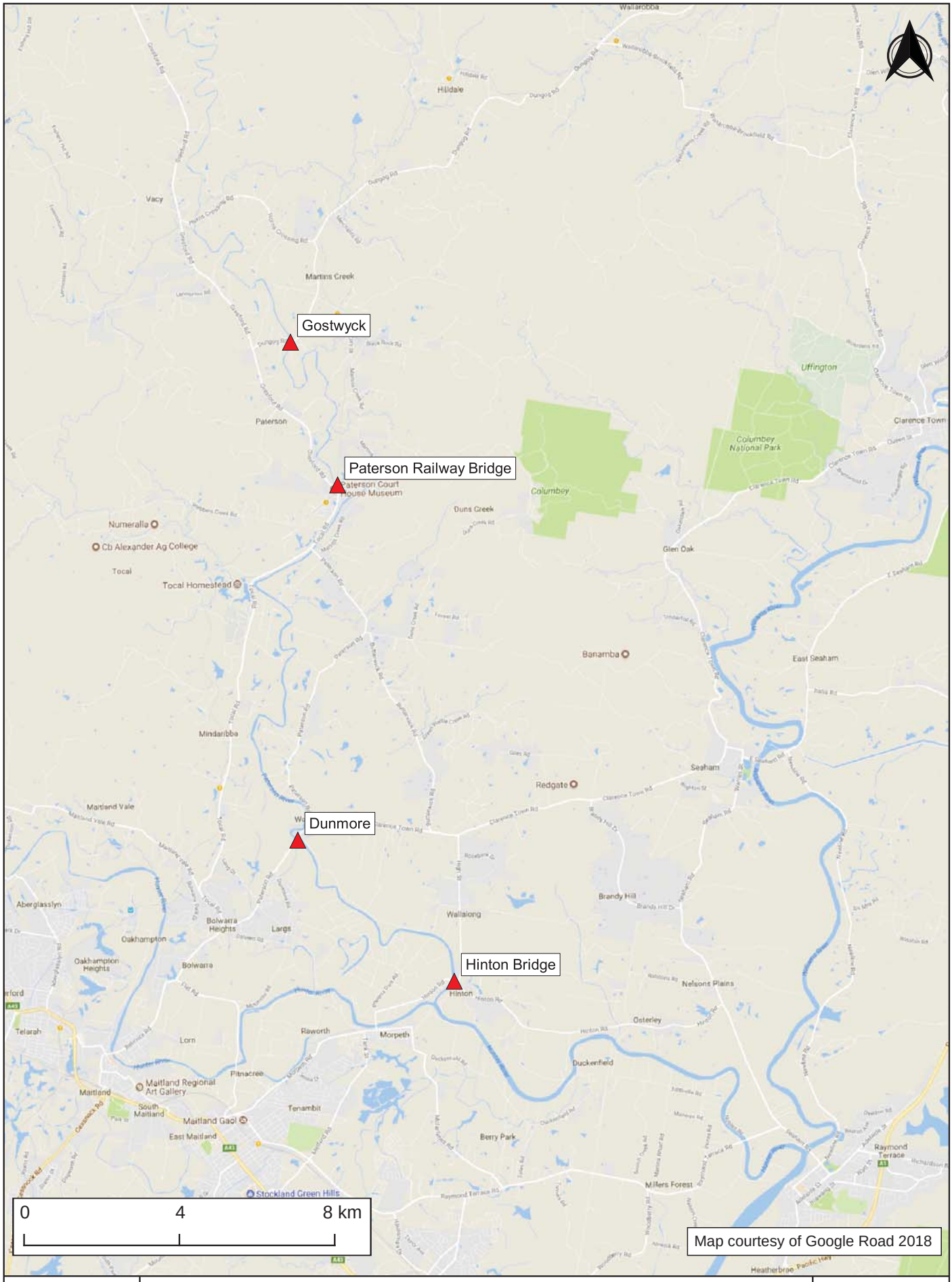
HUNTER RIVER AT OAKHAMPTON RAILWAY BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
132

DRAWING 2692-132.cdr



Map courtesy of Google Road 2018

NSW GOVERNMENT

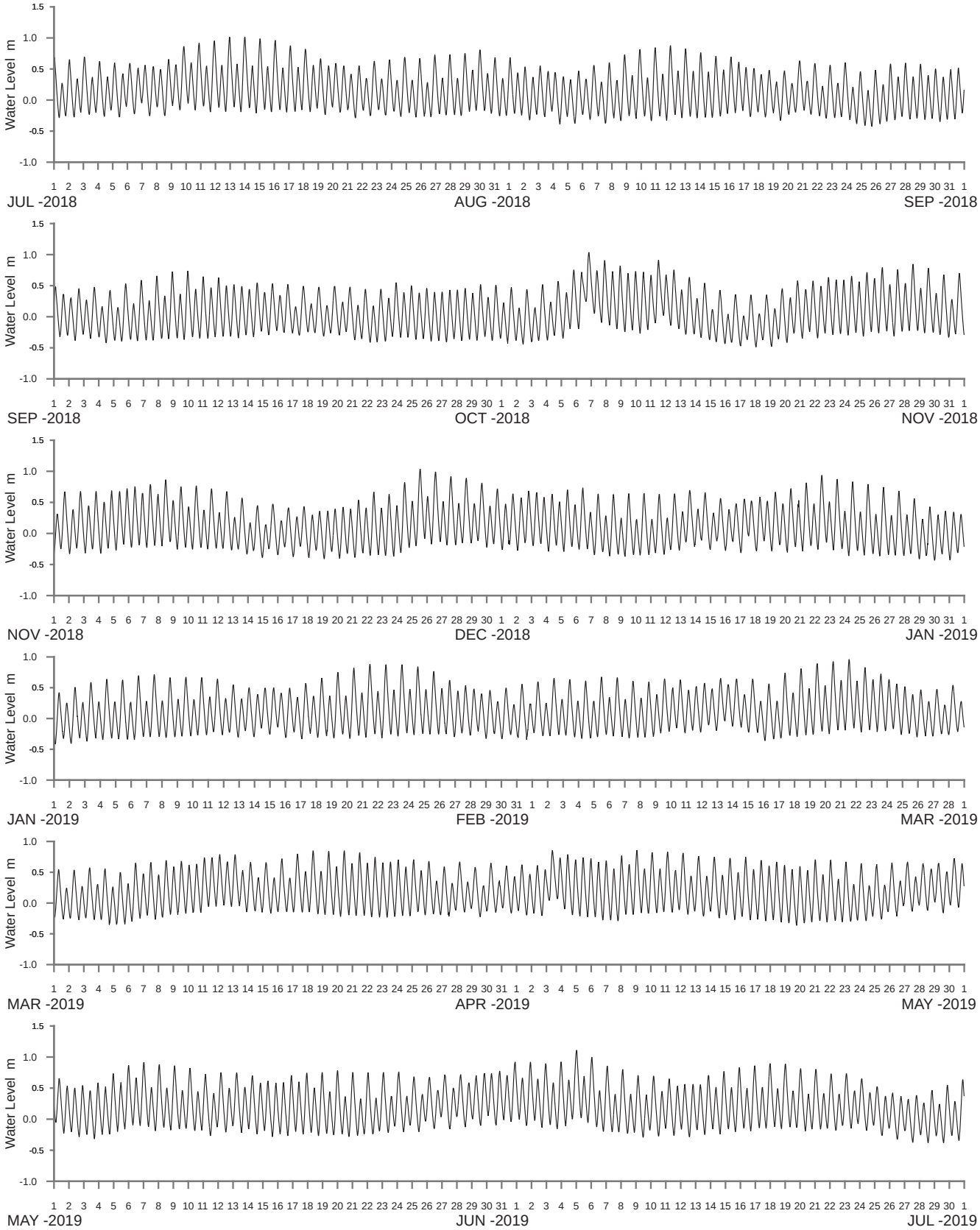
STATION LOCATIONS
PATERSON RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 133

DRAWING 2692-133.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

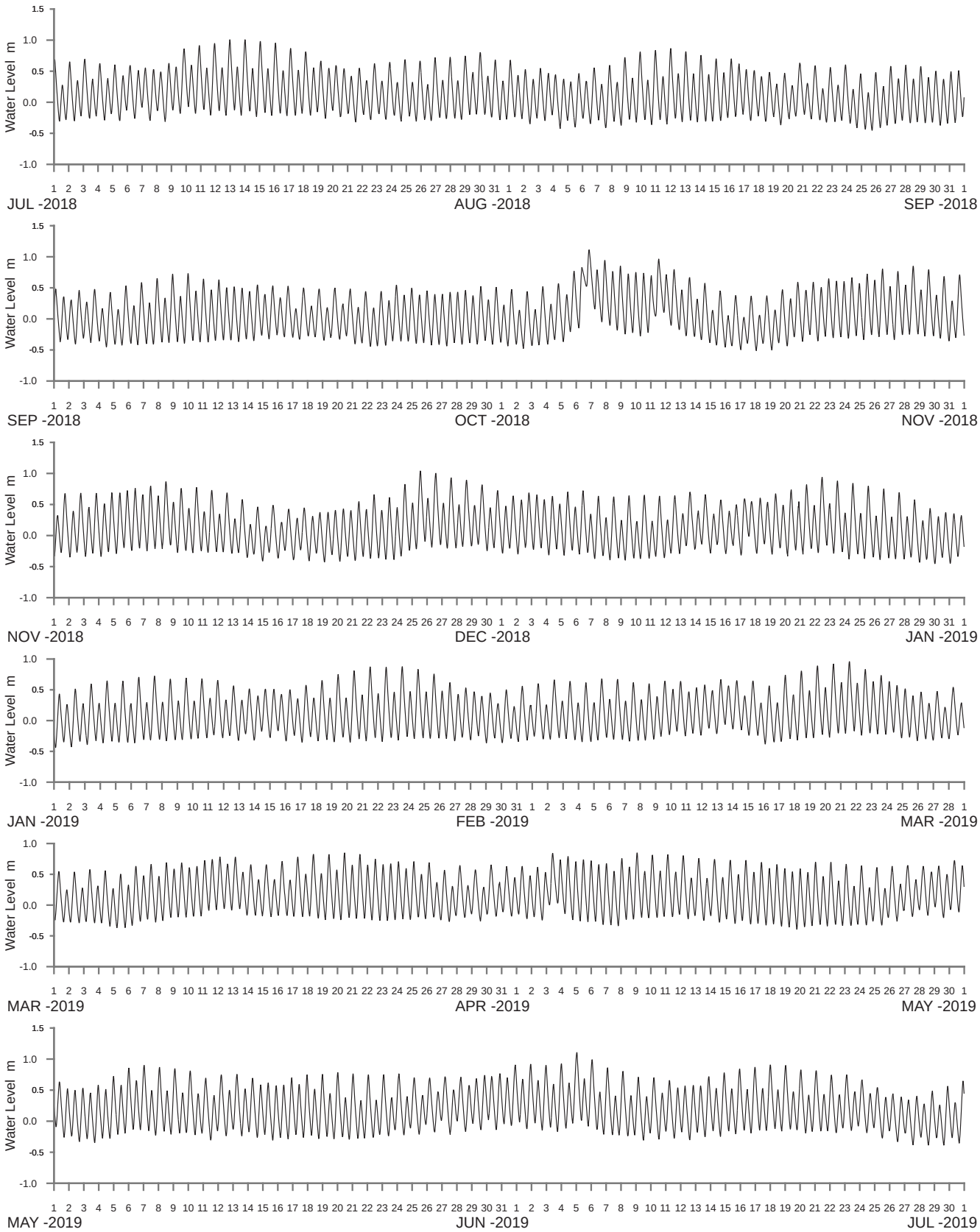
PATERSON RIVER AT HINTON BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
134

DRAWING 2692-134.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

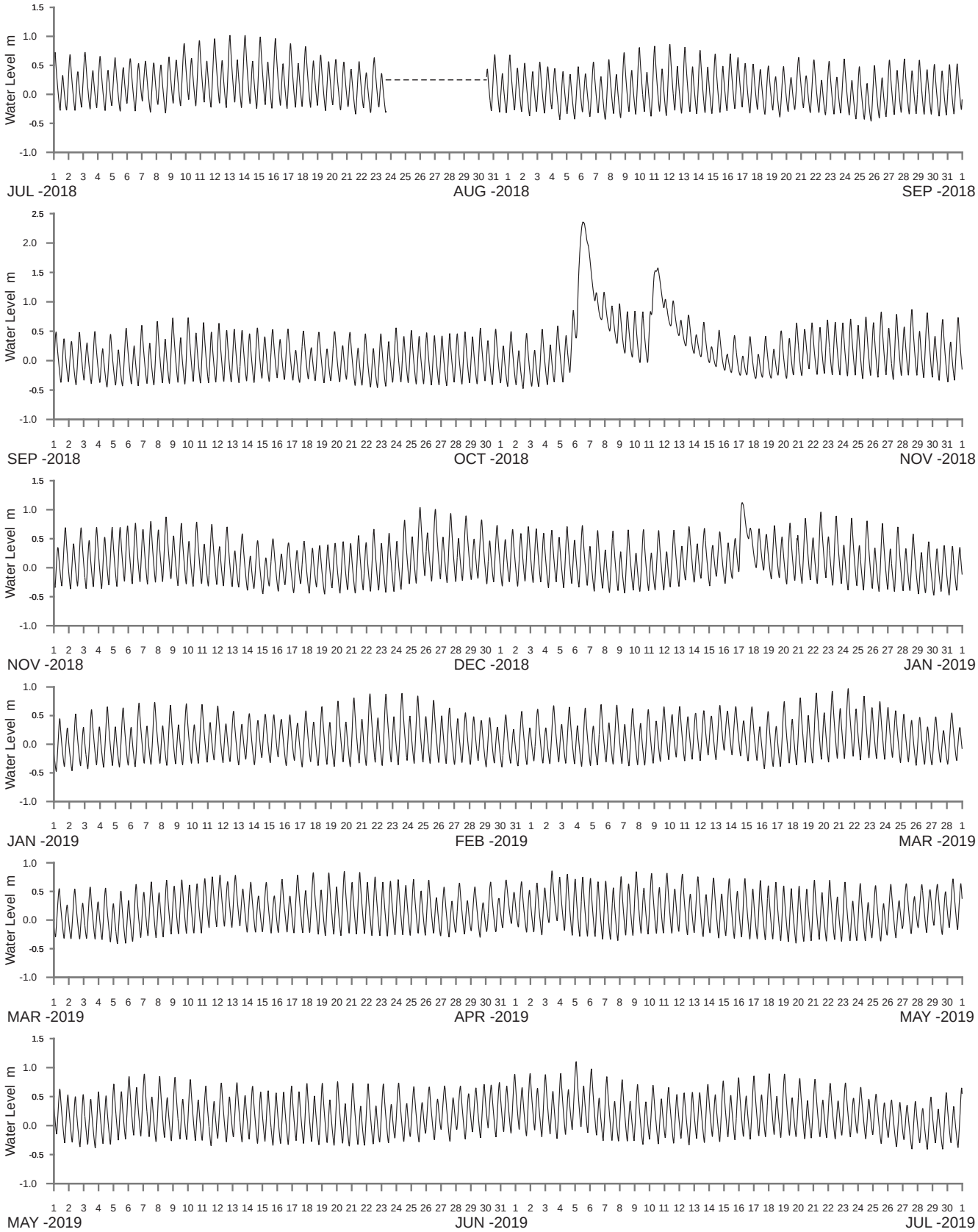
PATERSON RIVER AT DUNMORE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
135

DRAWING 2692-135.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

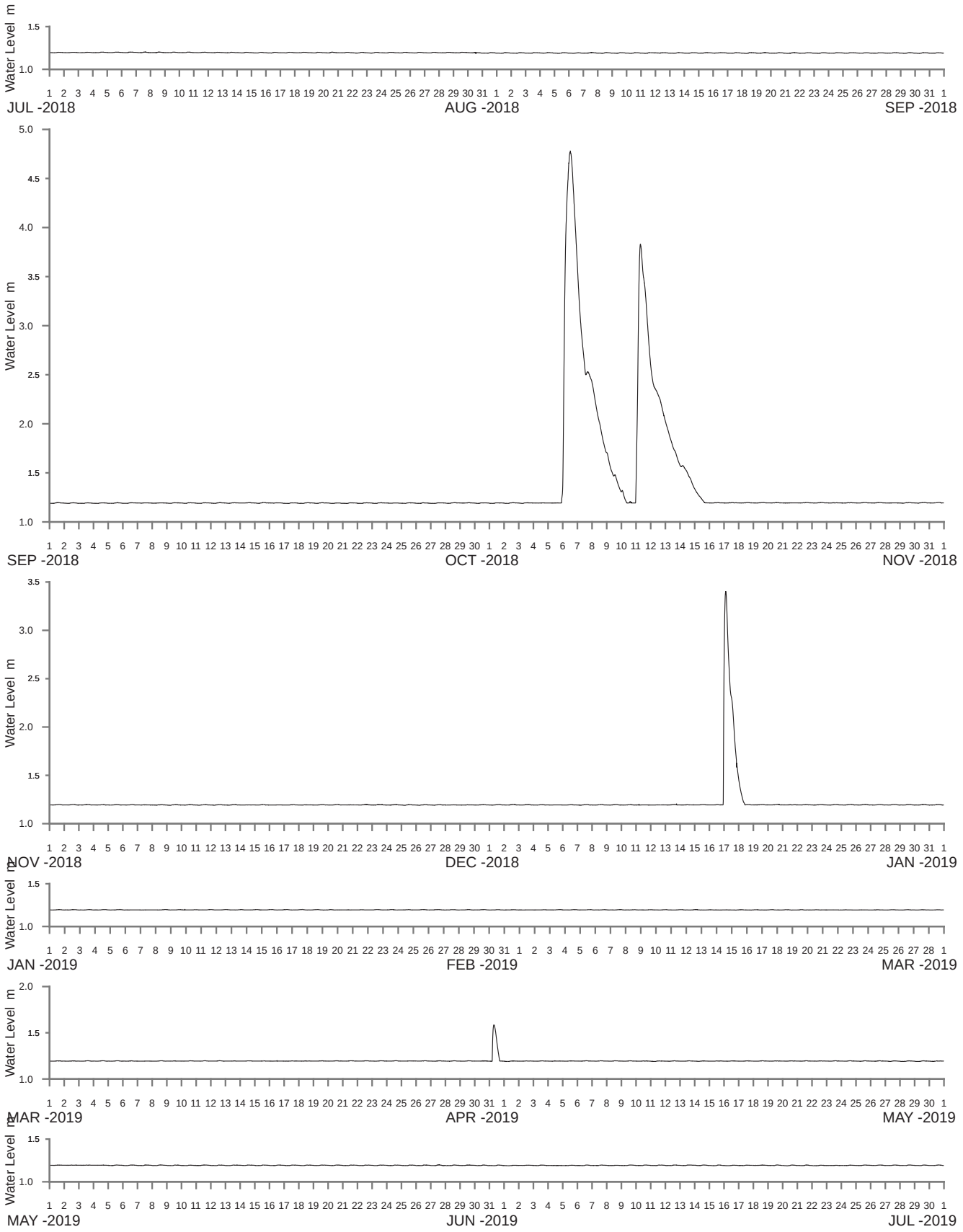
PATERSON RIVER AT PATERSON RAILWAY BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
136

DRAWING 2692-136.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

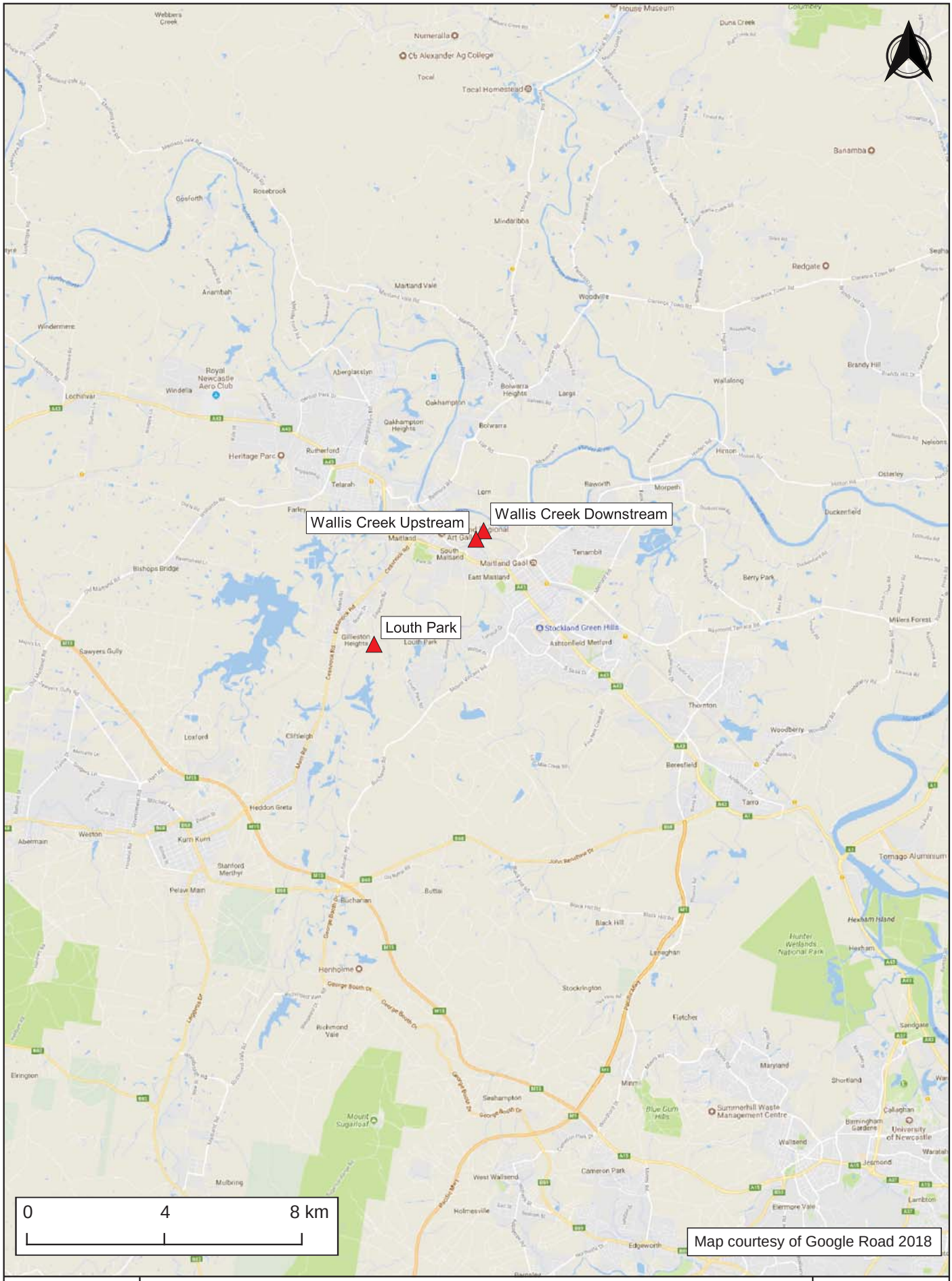
PATERSON RIVER AT GOSTWYCK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 137

DRAWING 2692-137.cdr



NSW GOVERNMENT

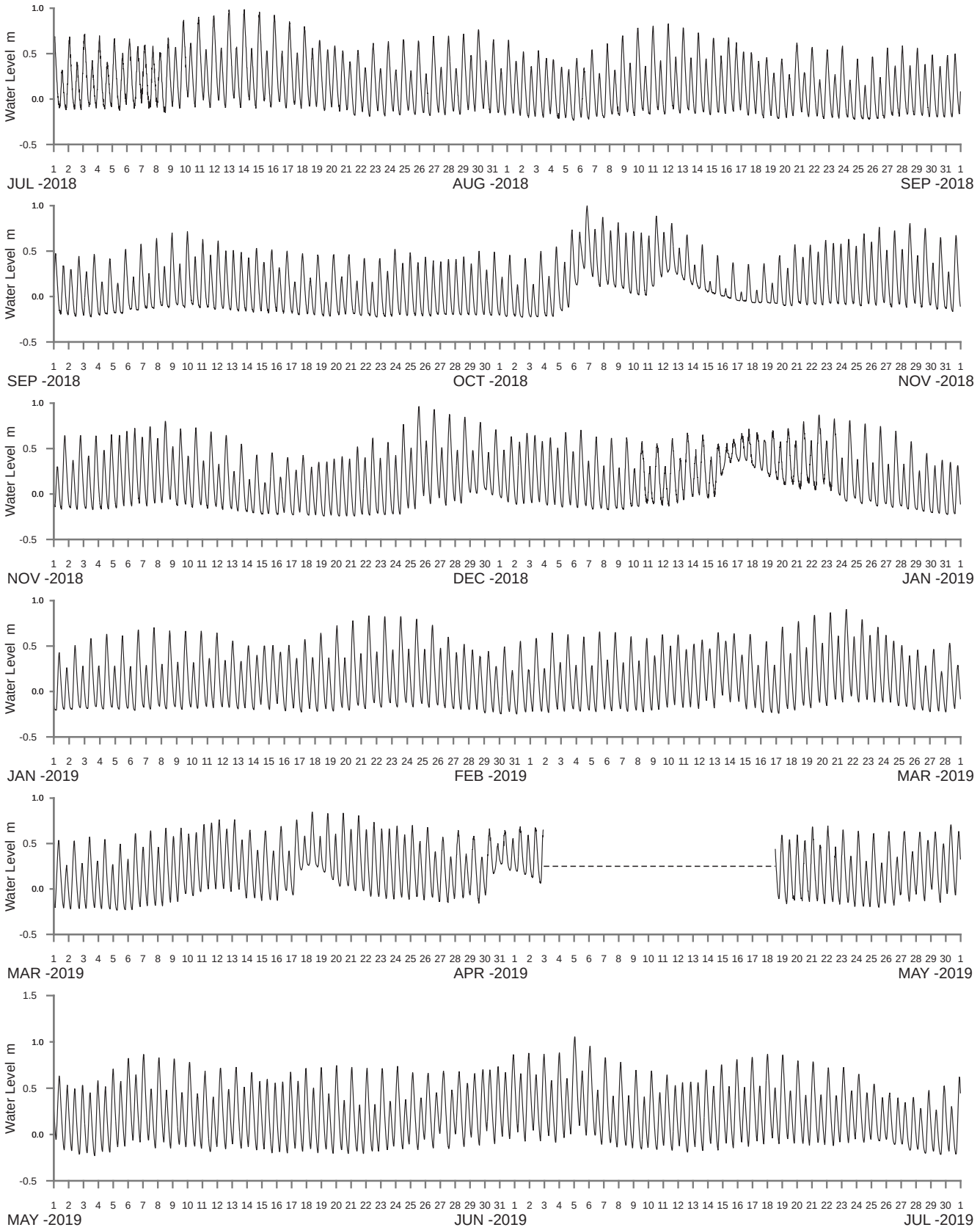
STATION LOCATIONS
WALLIS CREEK REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure
138

DRAWING 2692-138.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

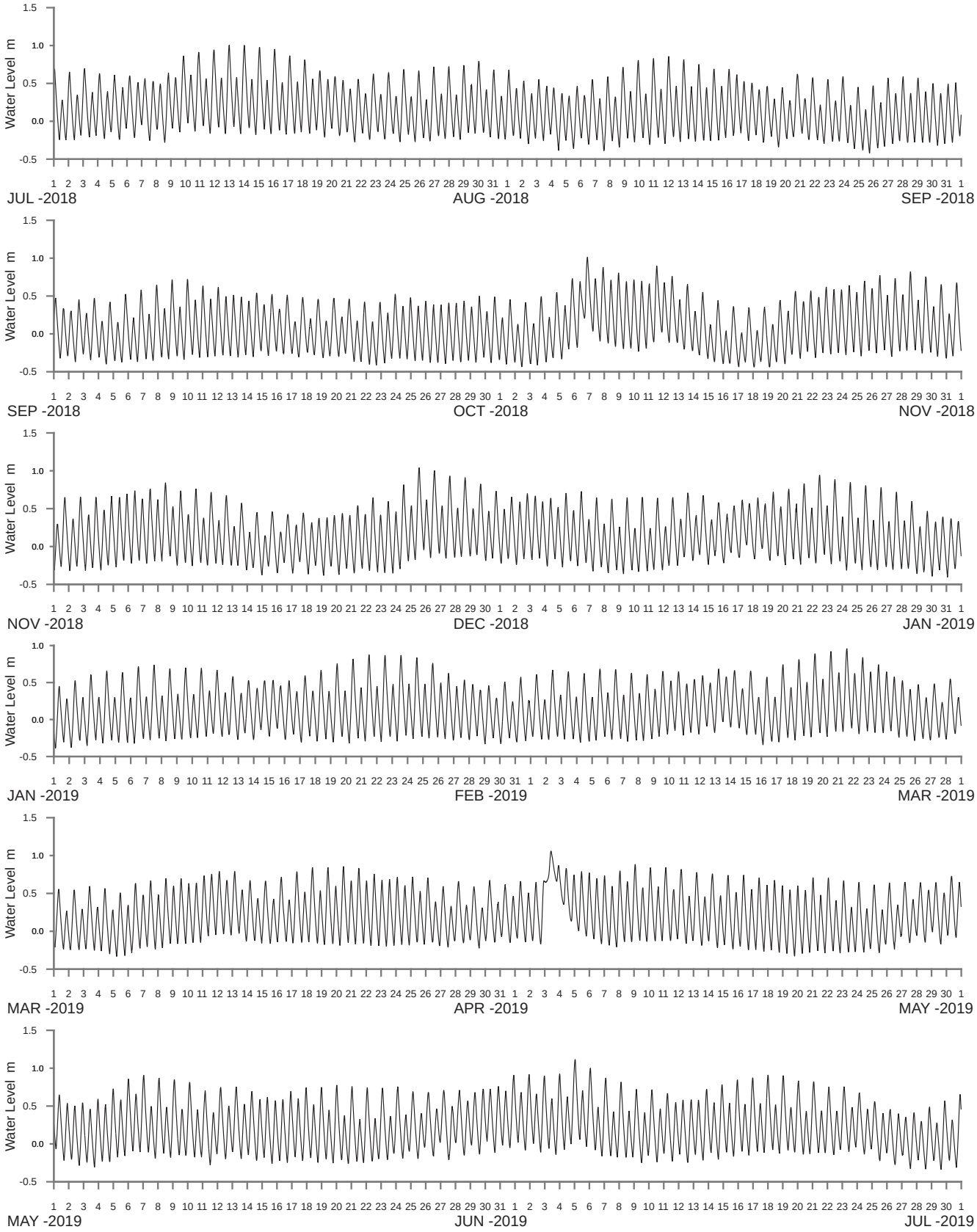
WALLIS CREEK AT WALLIS CREEK UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
139

DRAWING 2692-139.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

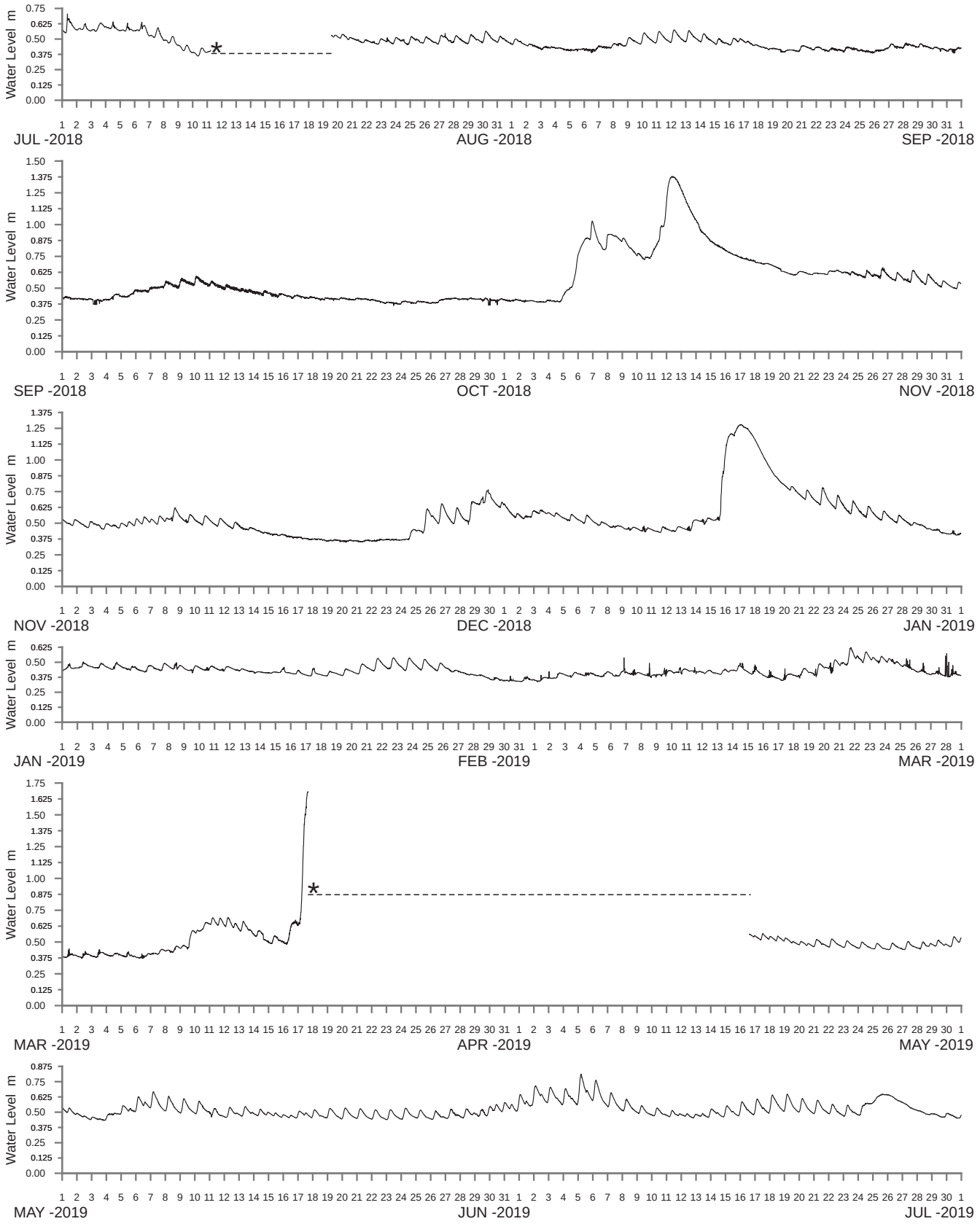
WALLIS CREEK AT WALLIS CREEK DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
140

DRAWING 2692-140.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to gas leak

NSW GOVERNMENT

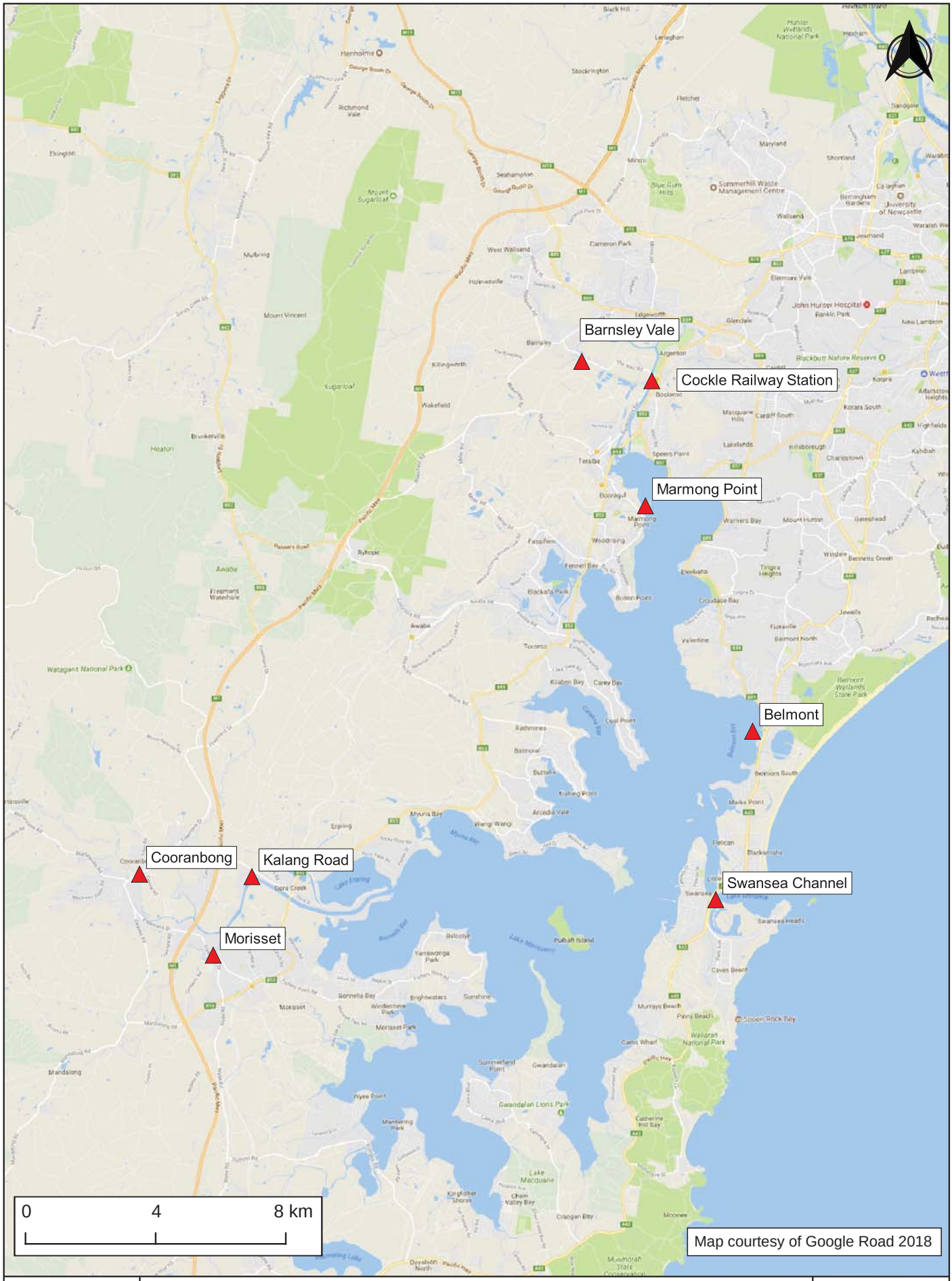
WALLIS CREEK AT LOUTH PARK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 141

DRAWING 2692-141.cdr



NSW GOVERNMENT

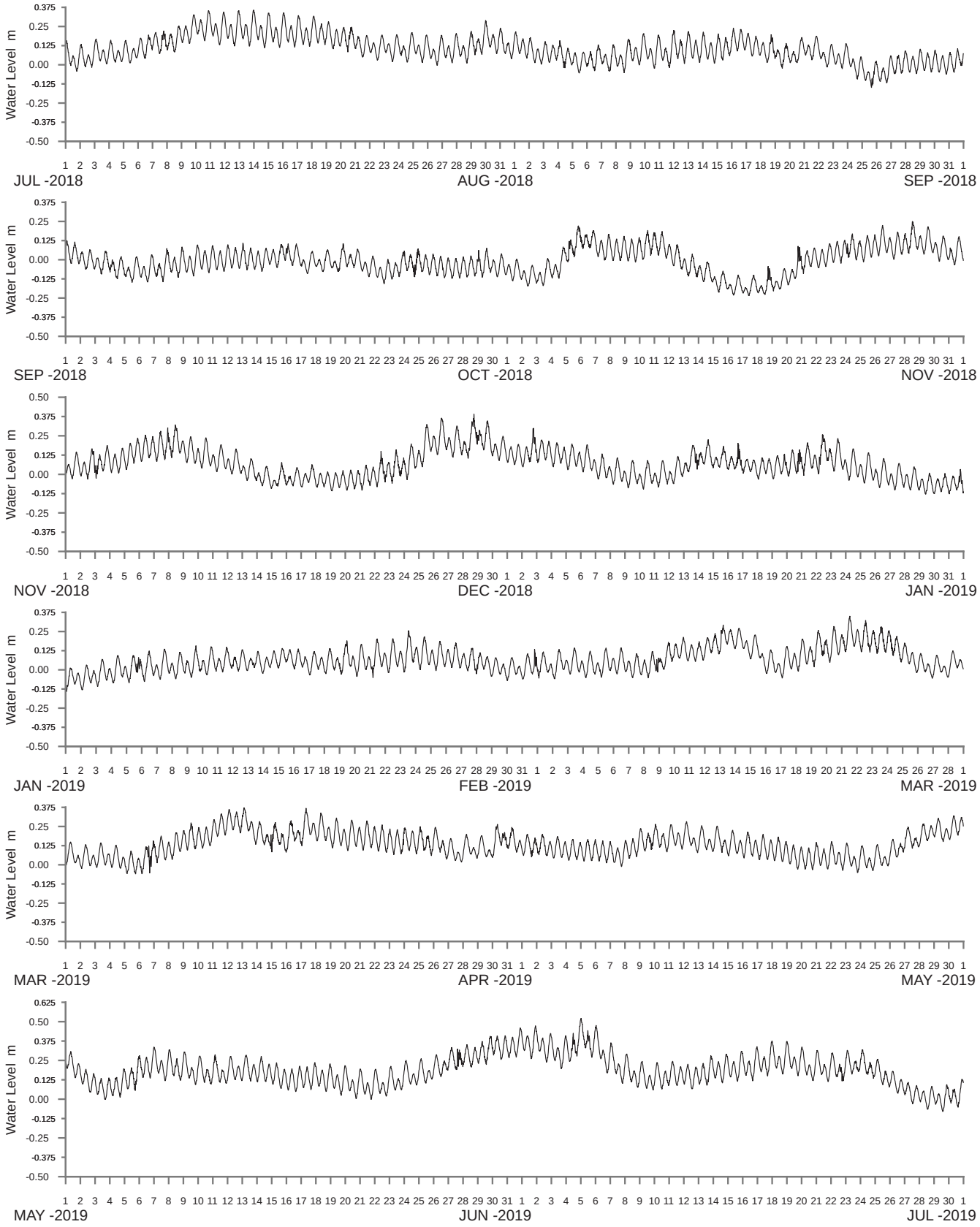
STATION LOCATIONS
LAKE MACQUARIE REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 142

DRAWING 2692-142.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

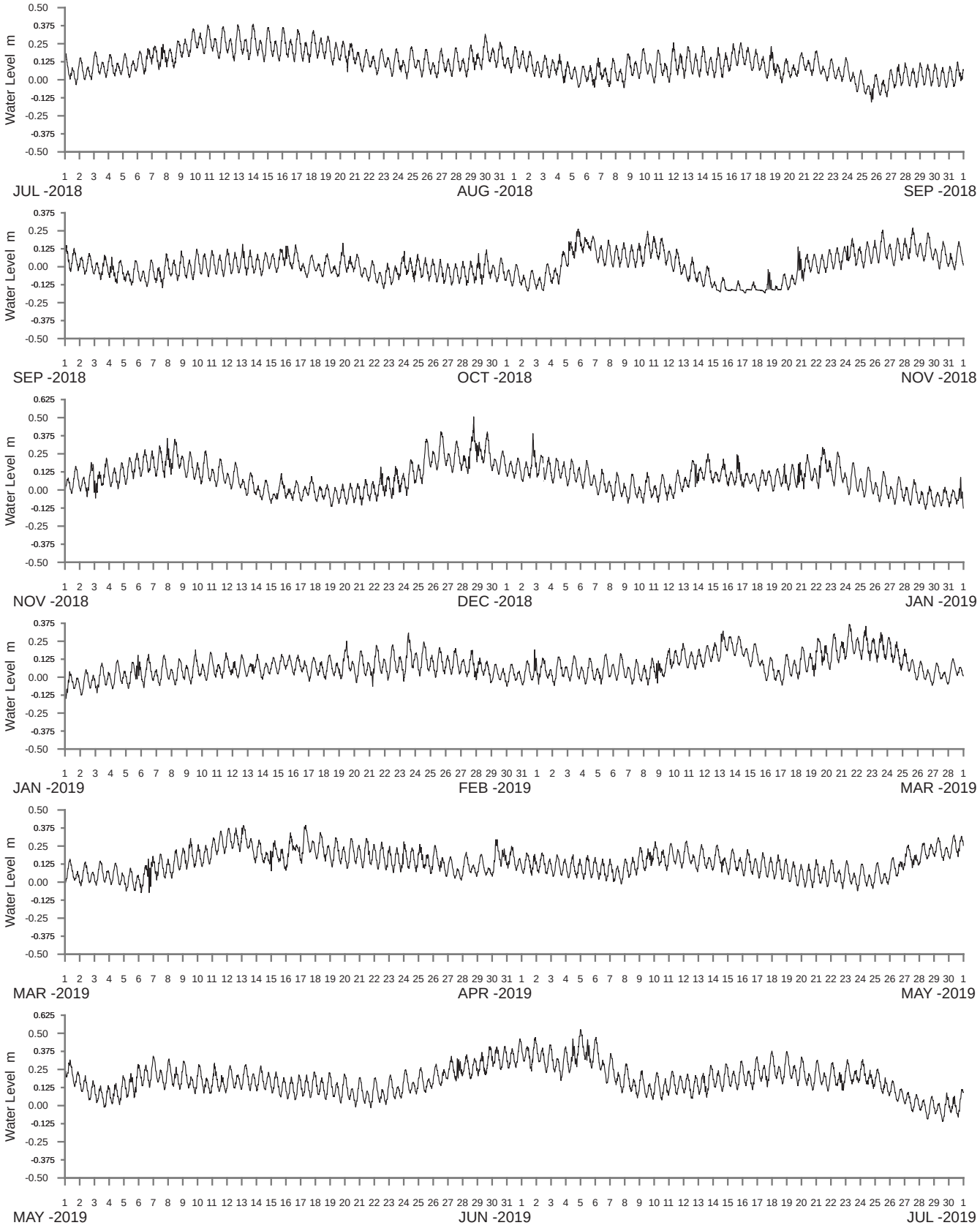
LAKE MACQUARIE AT MARMONG POINT
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
143

DRAWING 2692-143.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

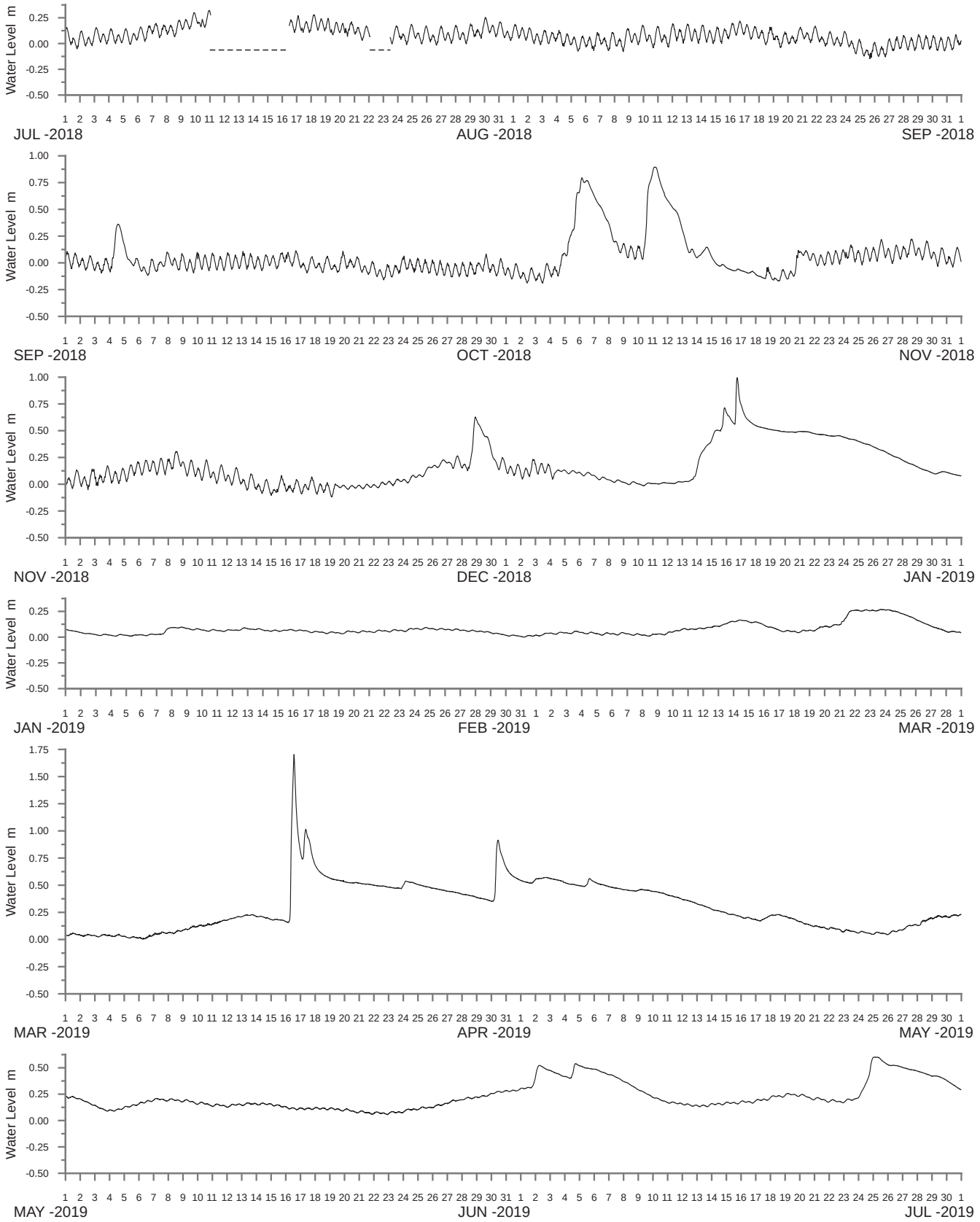
COCKLE CREEK AT COCKLE RAILWAY STATION
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
144

DRAWING 2692-144.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

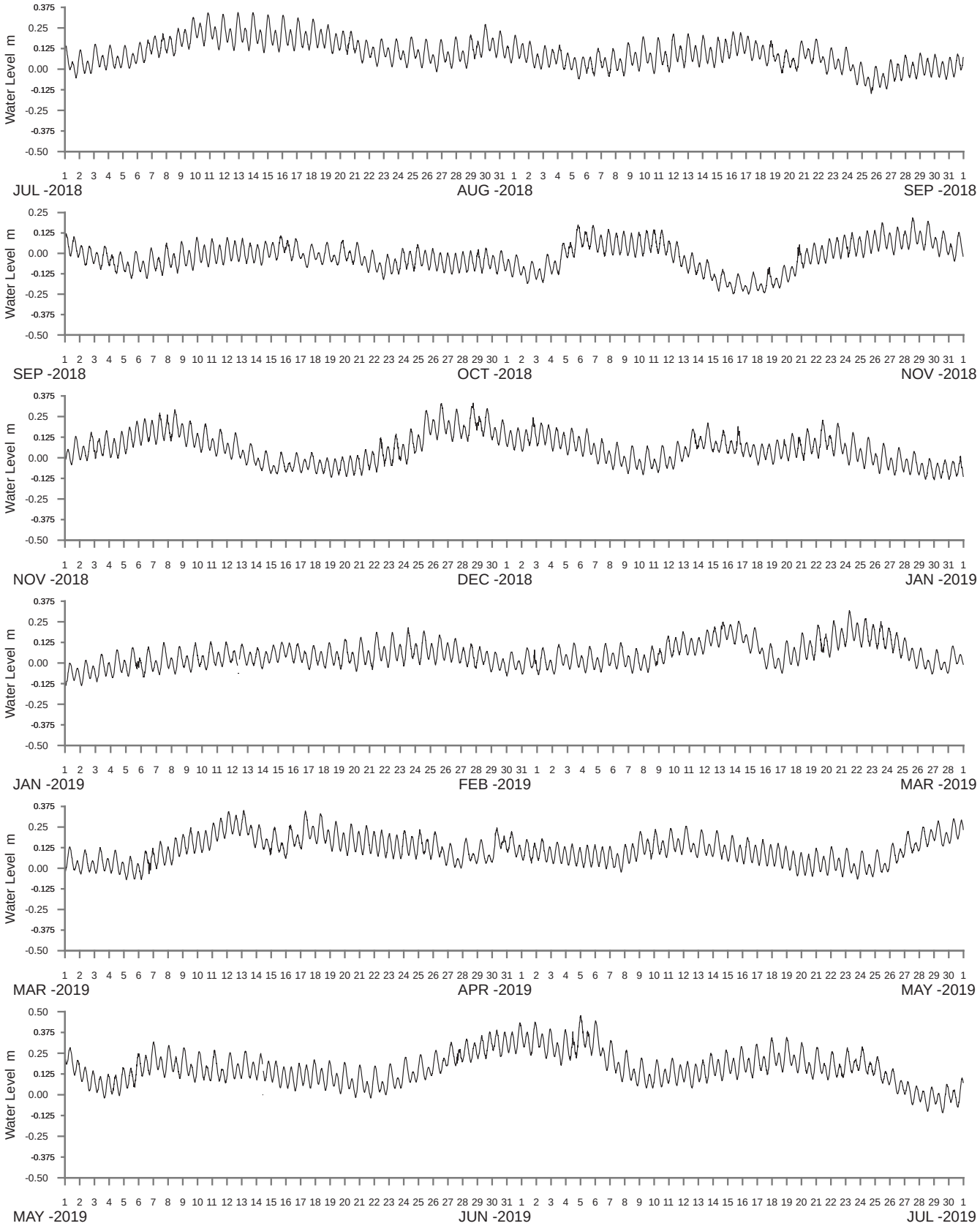
COCKLE CREEK AT BARNSLEY VALE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
145

DRAWING 2692-145.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

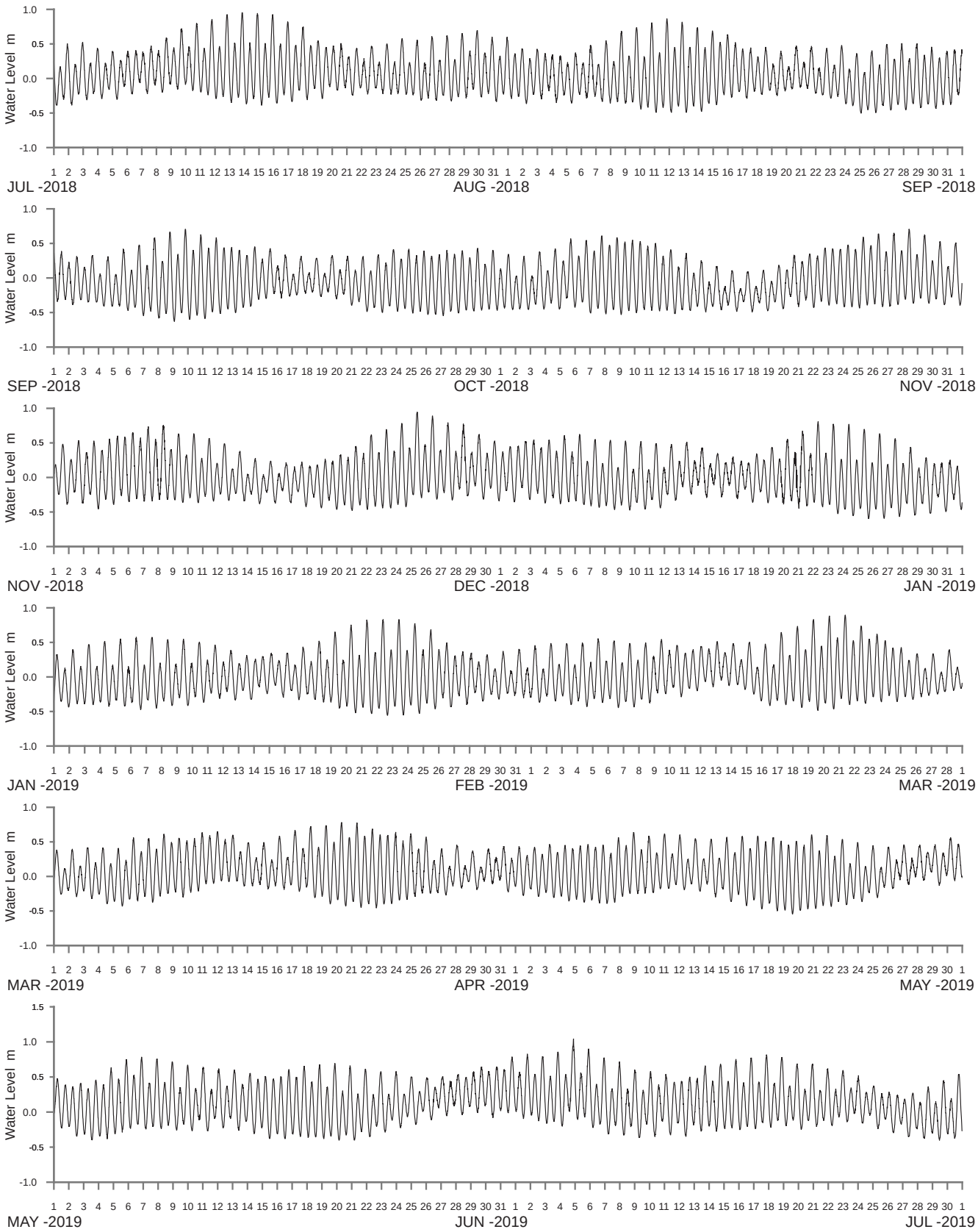
LAKE MACQUARIE AT BELMONT
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
146

DRAWING 2692-146.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

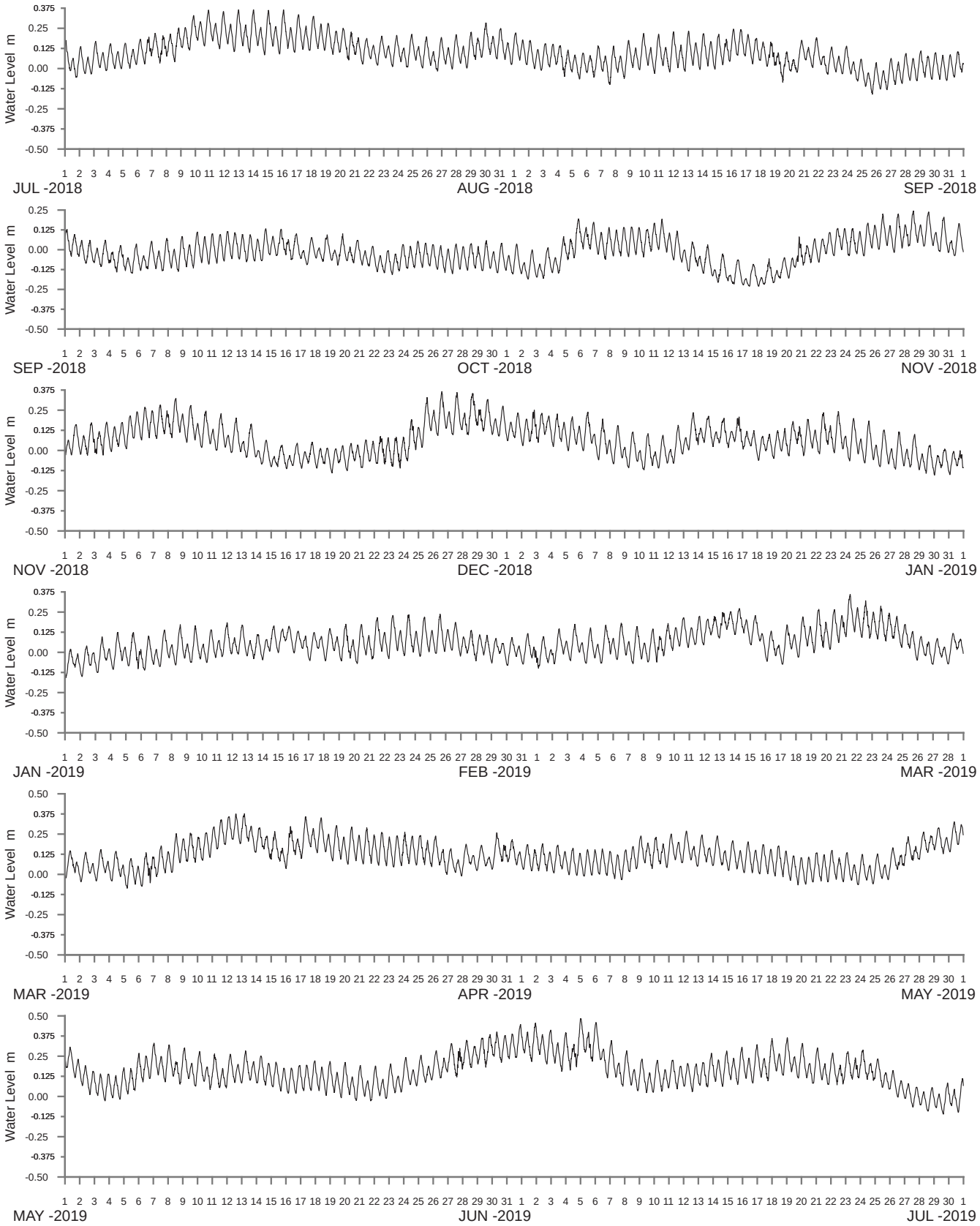
LAKE MACQUARIE AT SWANSEA CHANNEL
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
147

DRAWING 2692-147.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

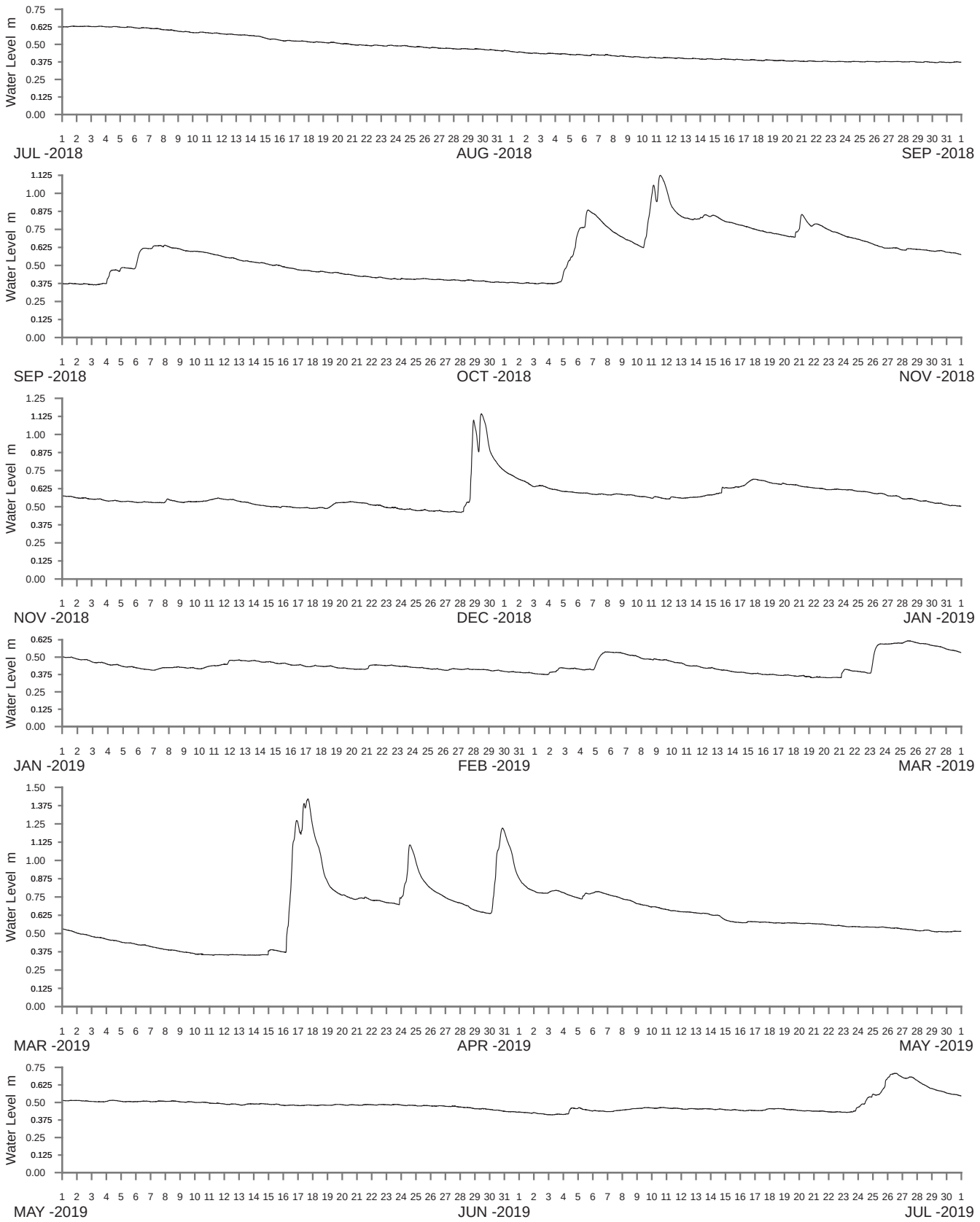
DORA CREEK AT KALANG ROAD
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
148

DRAWING 2692-148.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

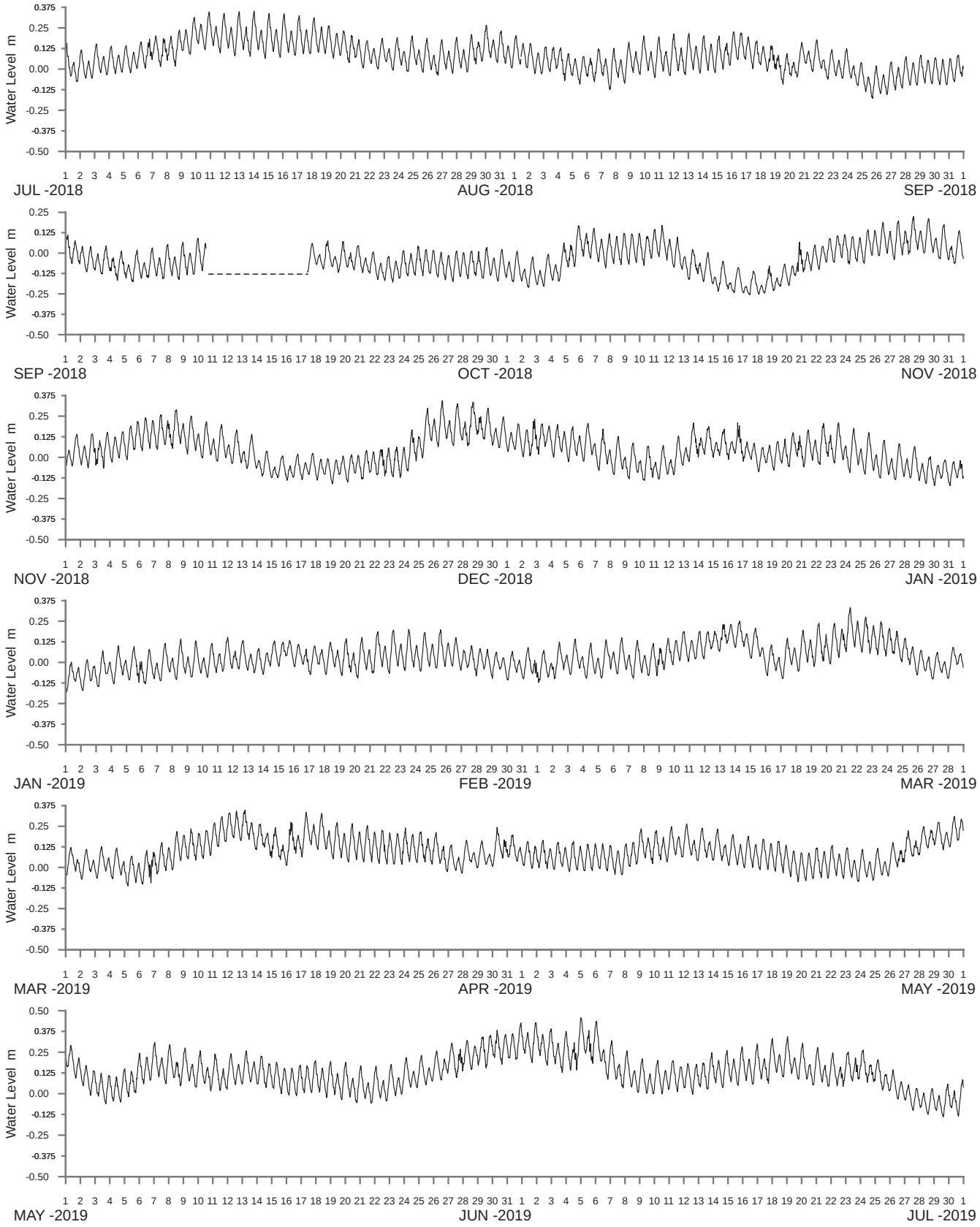
DORA CREEK AT COORANBONG
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 149

DRAWING 2692-149.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

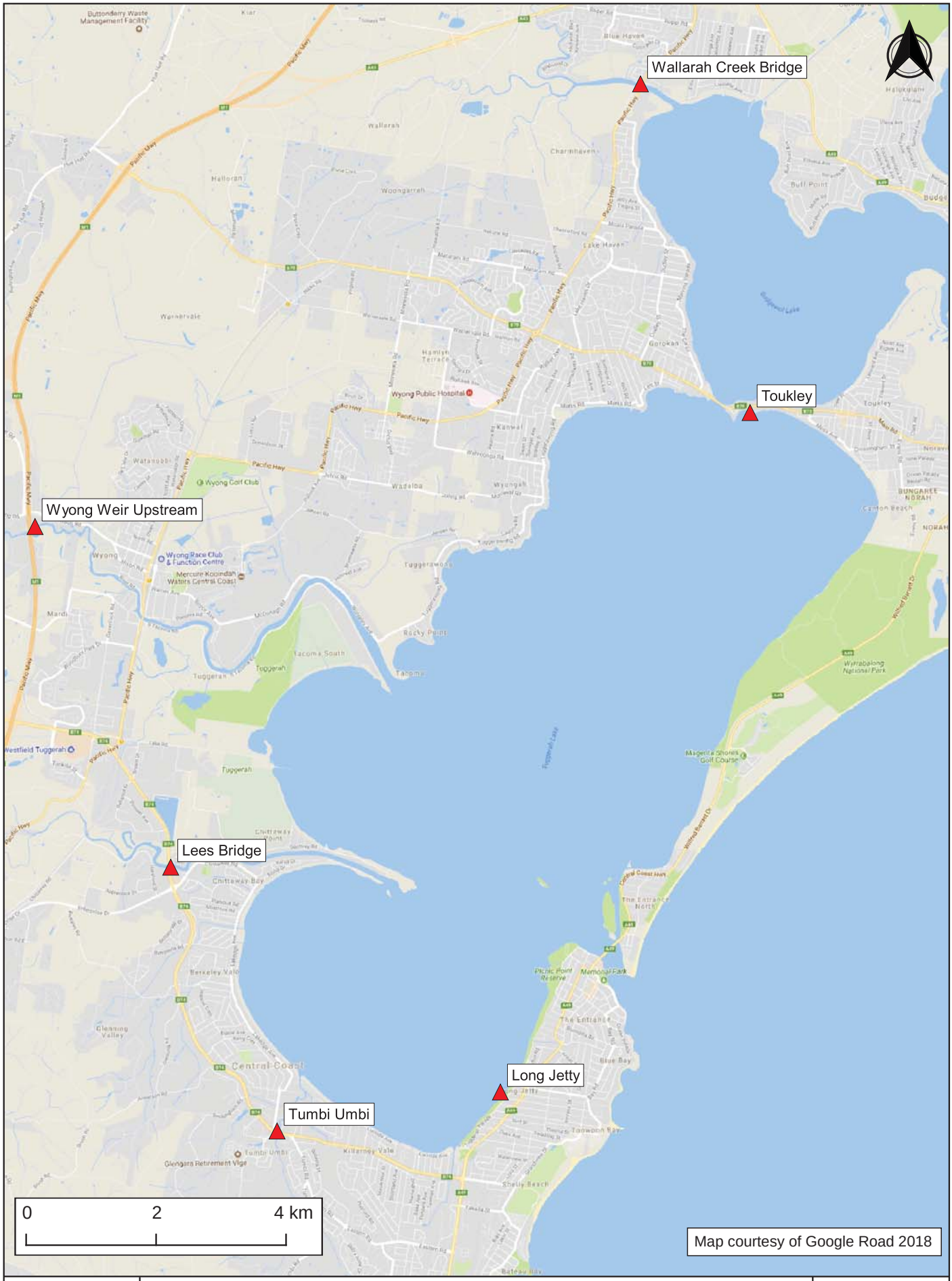
STOCKTON CREEK AT MORISSET
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
150

DRAWING 2692-150.cdr



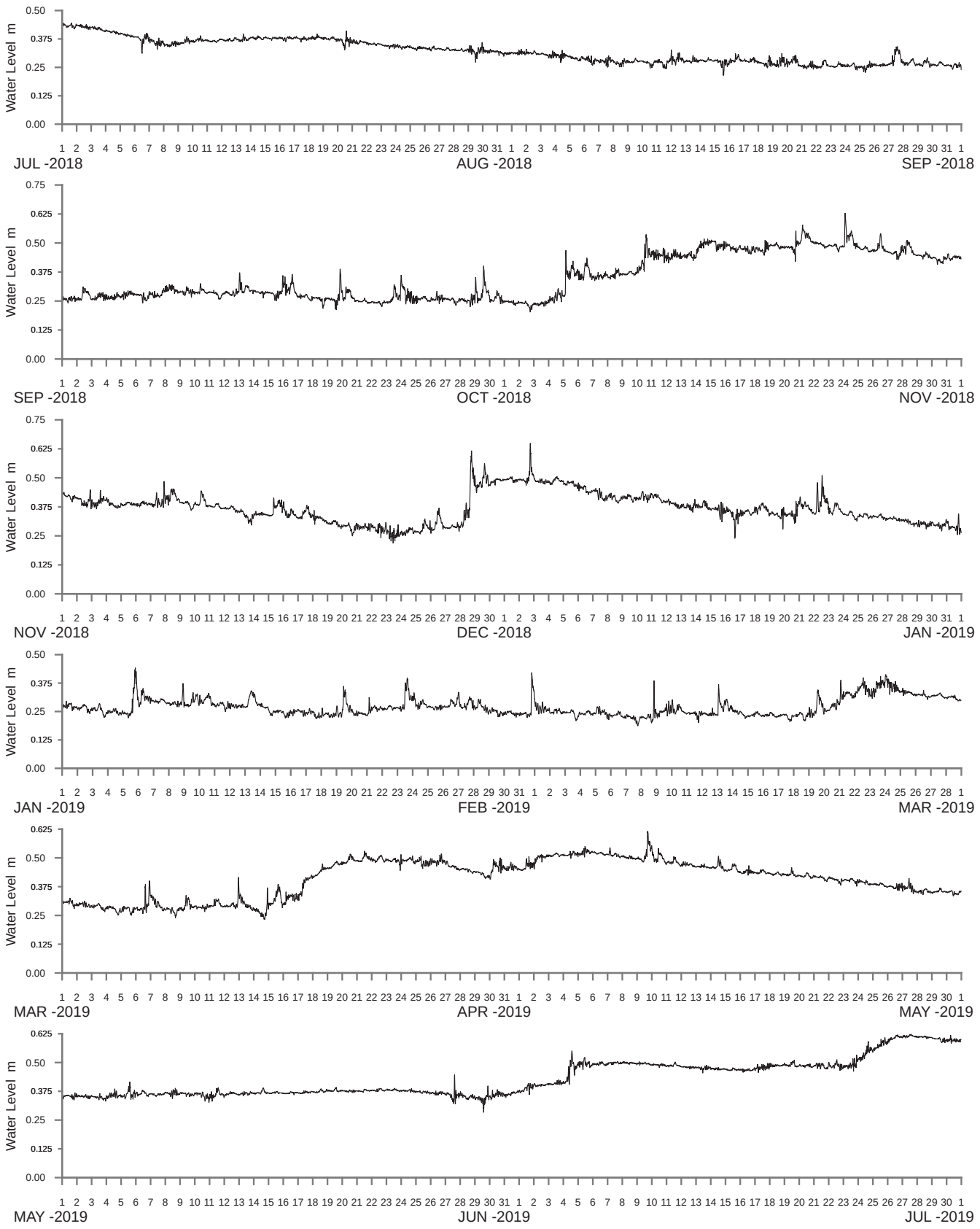
STATION LOCATIONS
TUGGERAH LAKES REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 151

DRAWING 2692-151.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

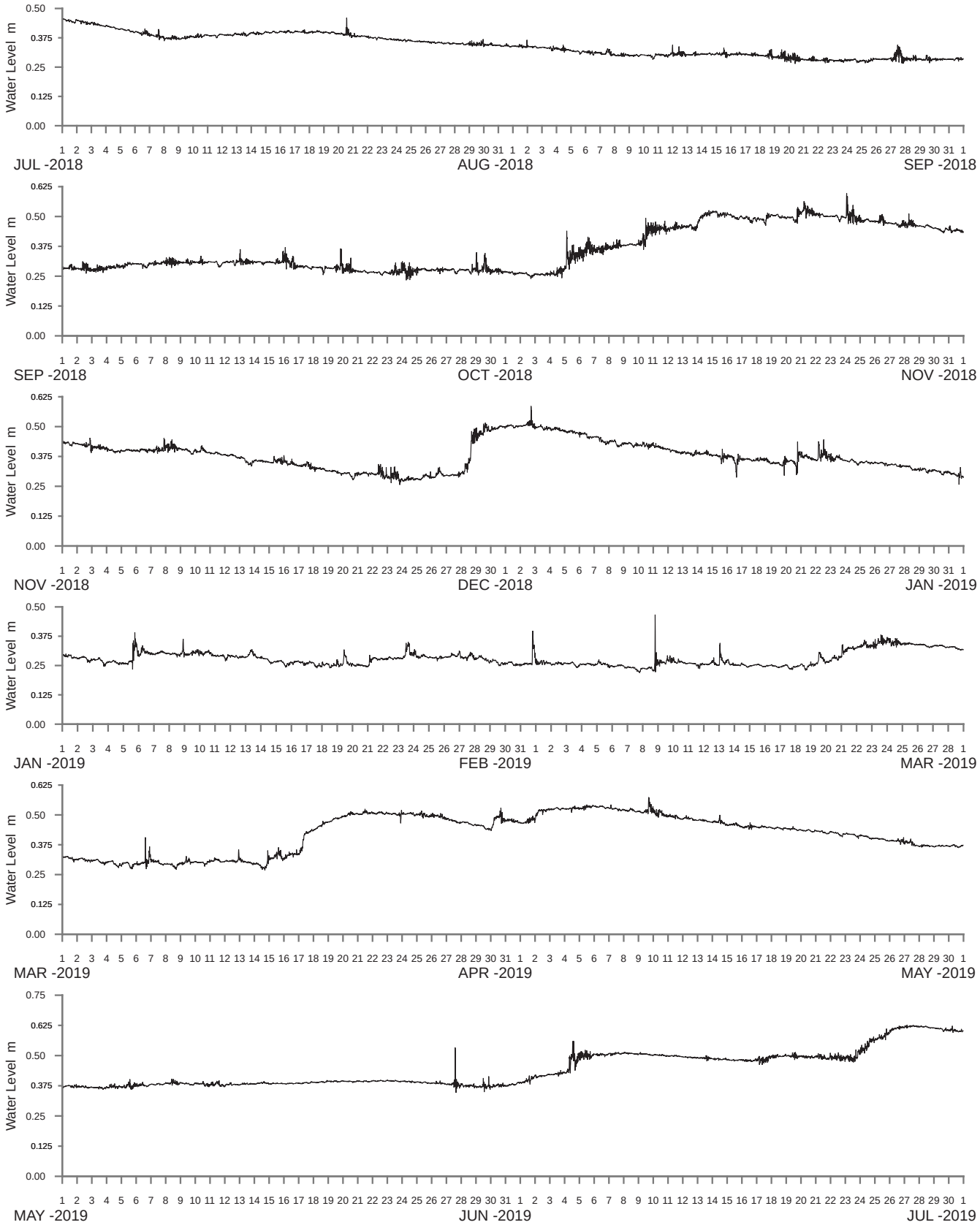
WALLARAH CREEK AT WALLARAH CREEK BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
152

DRAWING 2692-152.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

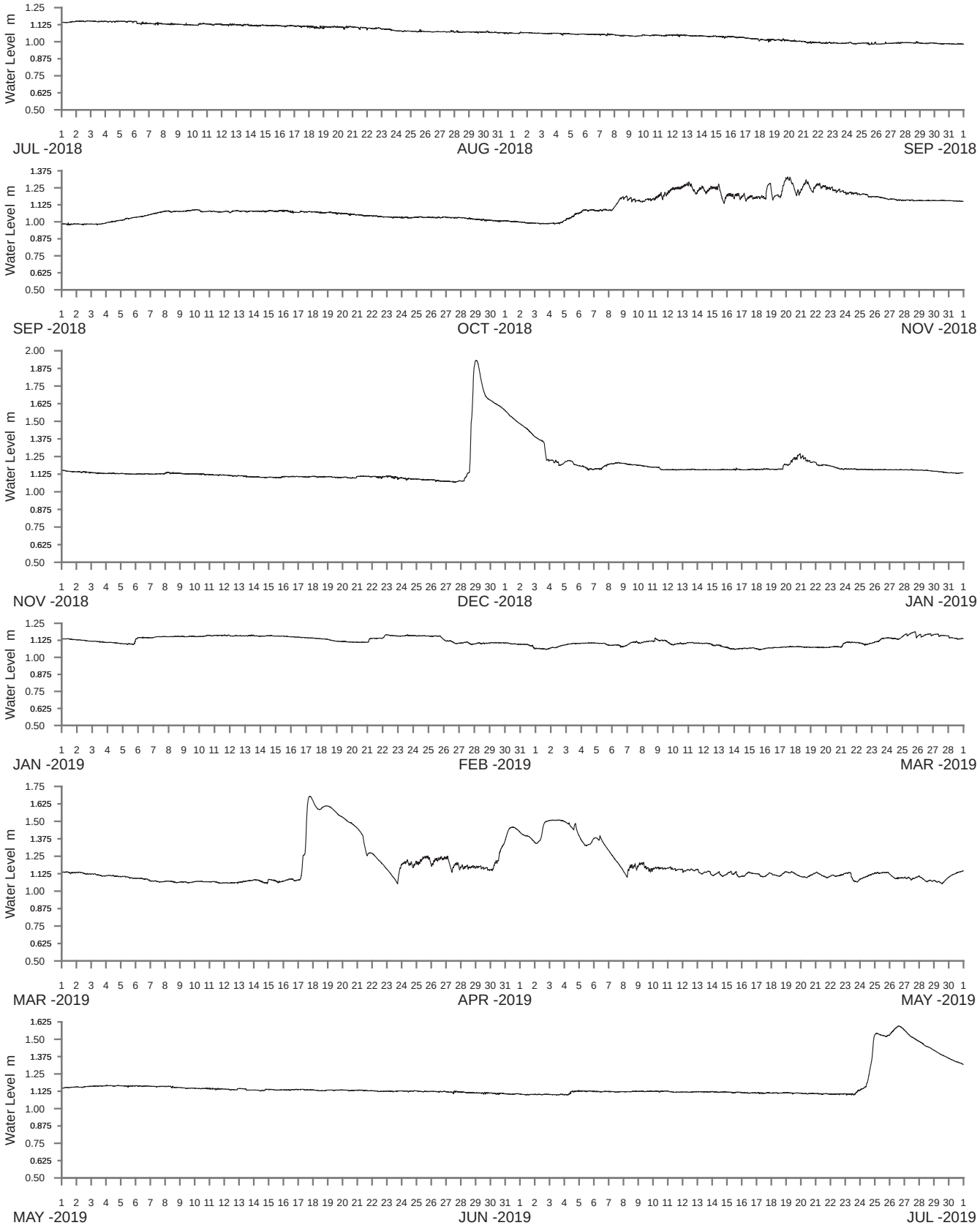
TUGGERAH LAKE AT TOUKLEY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
153

DRAWING 2692-153.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

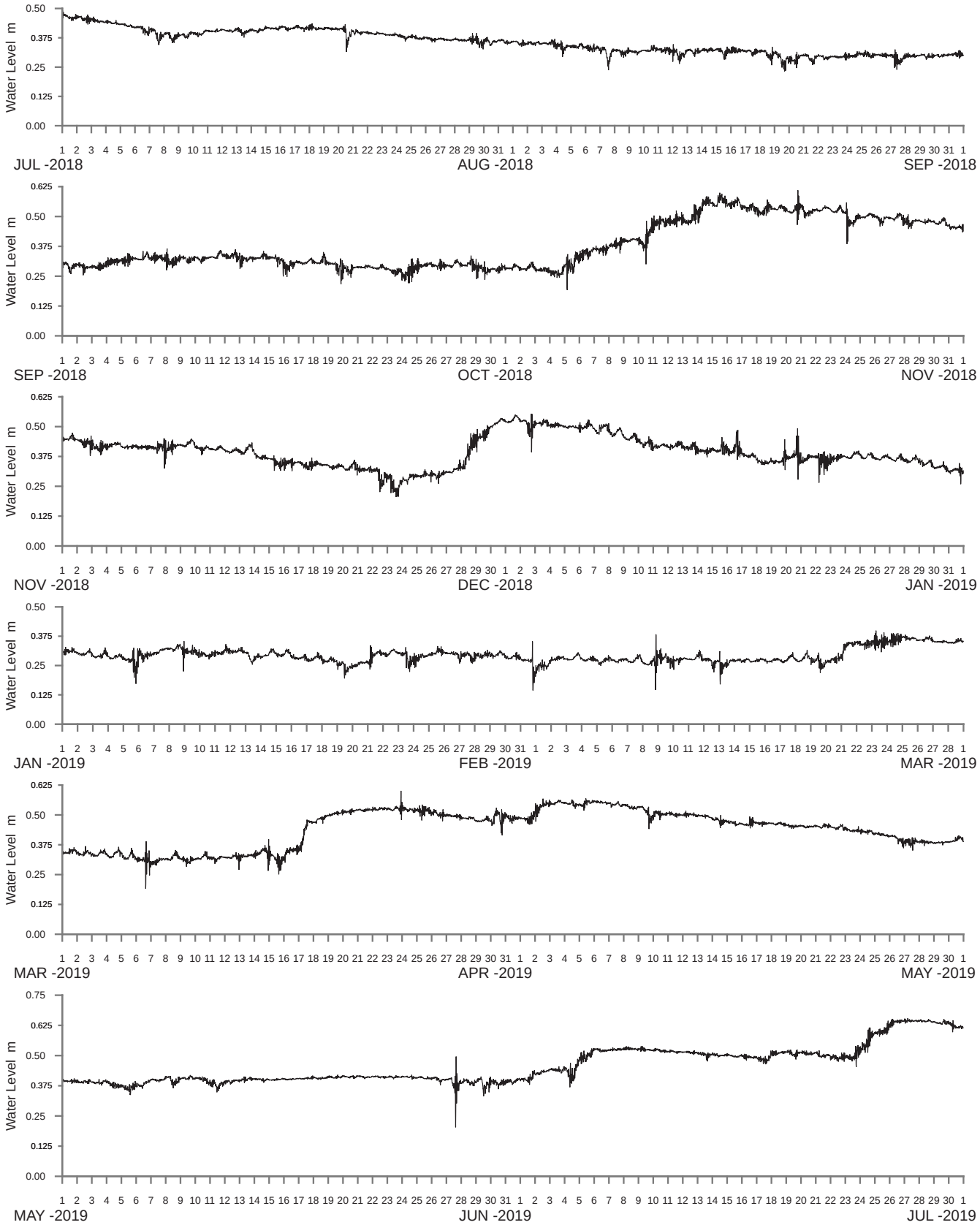
WYONG RIVER AT WYONG WEIR UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
154

DRAWING 2692-154.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

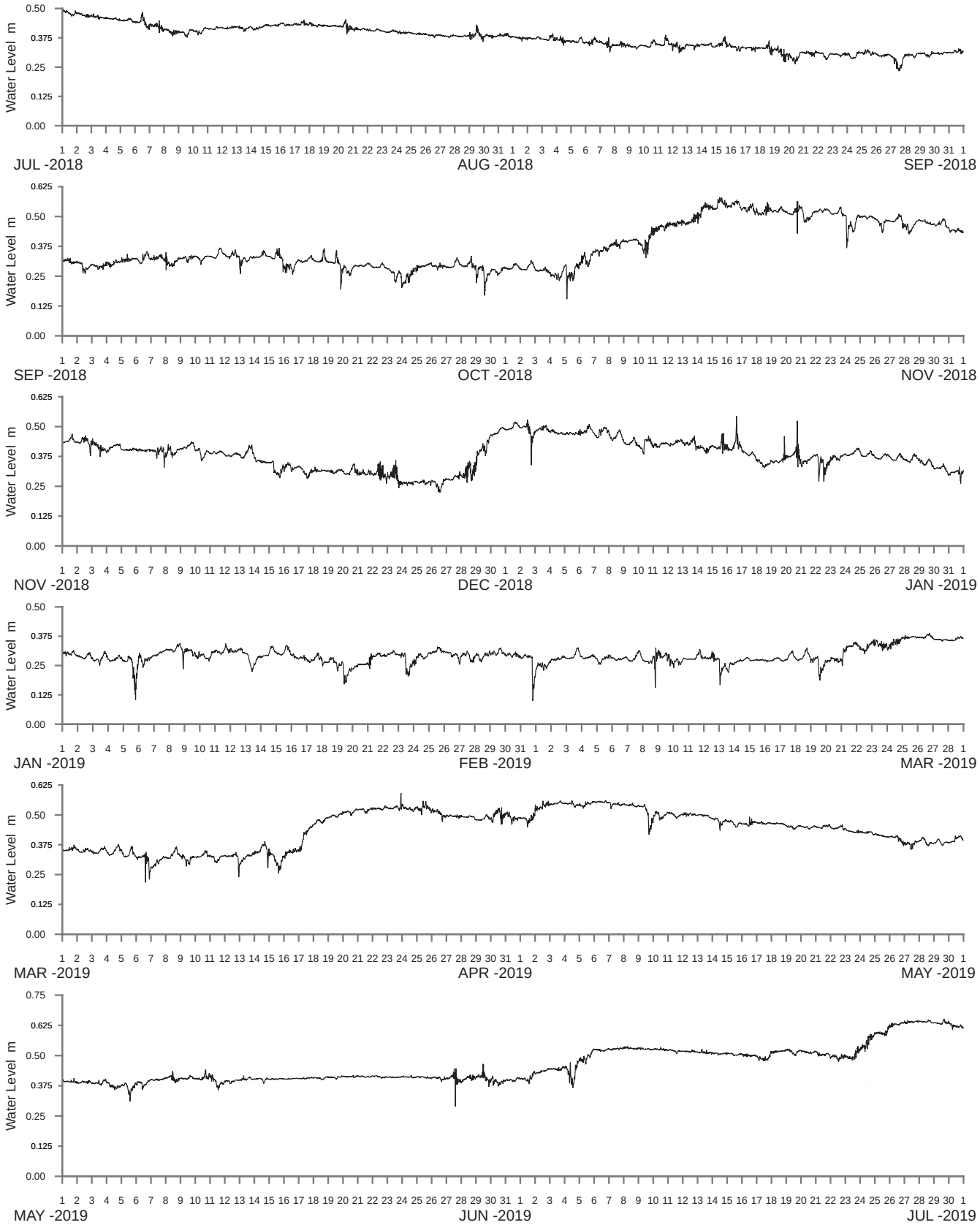
OURIMBAH CREEK AT LEES BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
155

DRAWING 2692-155.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

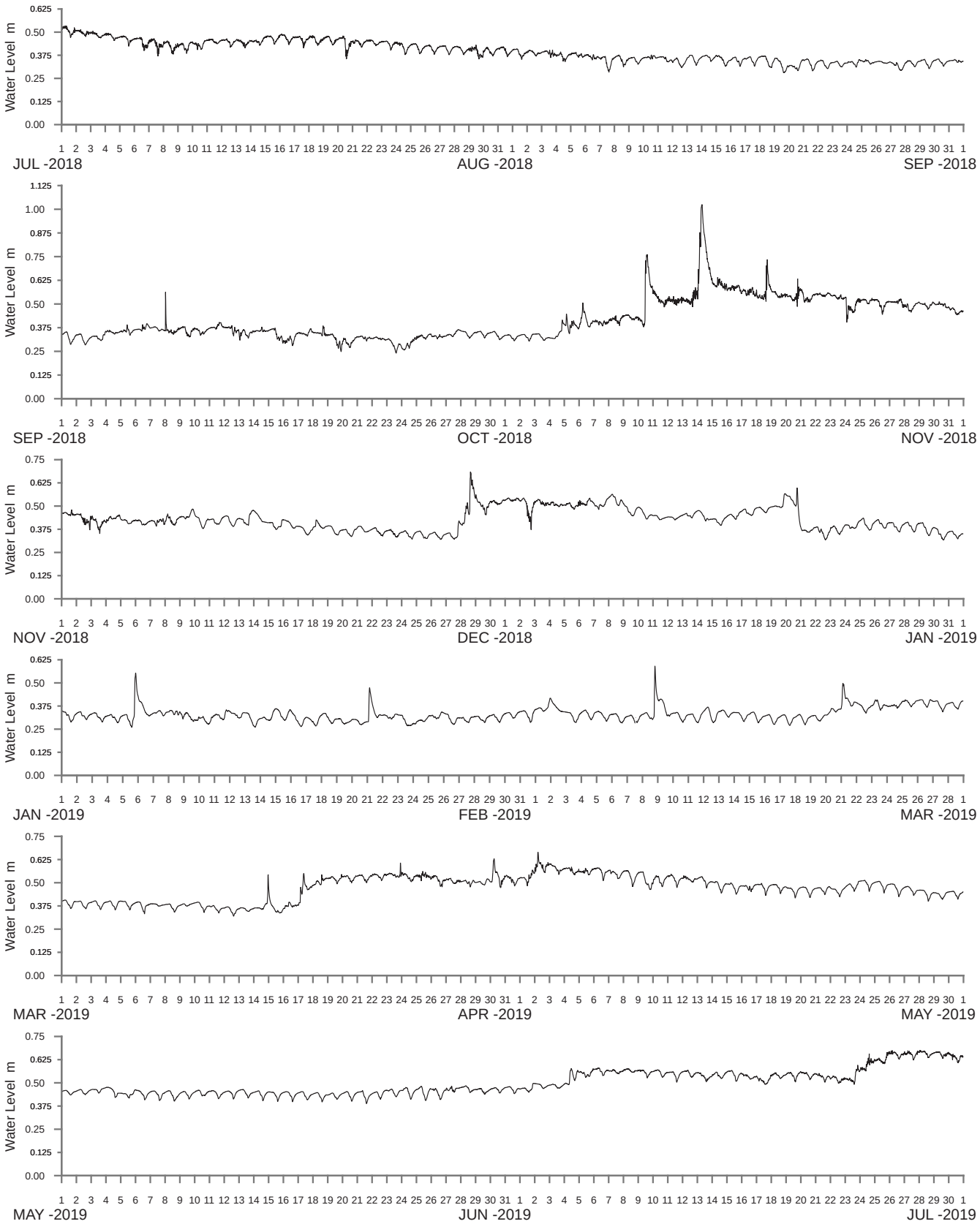
TUGGERAH LAKE AT LONG JETTY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
156

DRAWING 2692-156.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

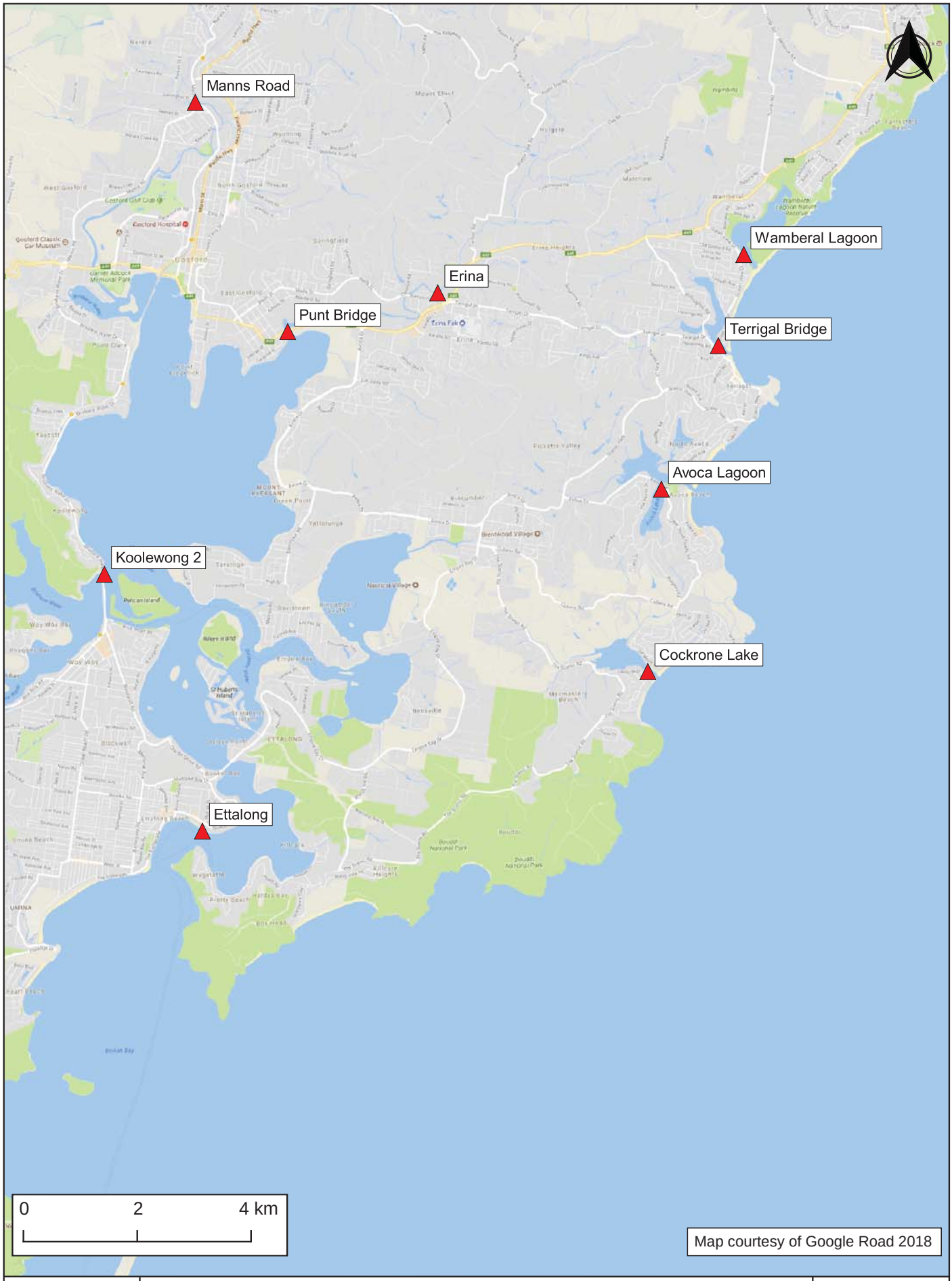
TUMBI UMBI CREEK AT TUMBI UMBI
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 157

DRAWING 2692-157.cdr



NSW GOVERNMENT

STATION LOCATIONS
BRISBANE WATER REGION

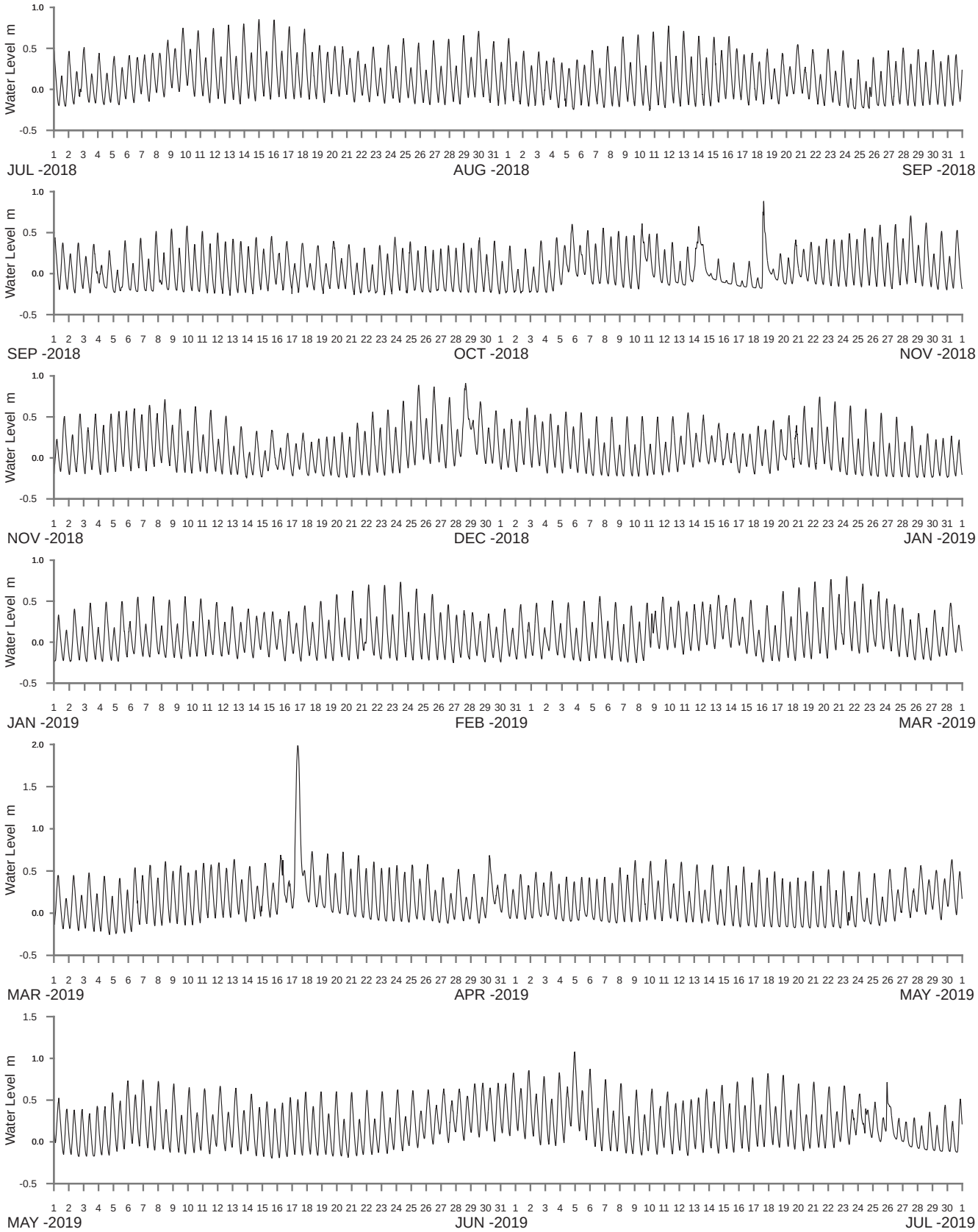
Manly Hydraulics Laboratory

Report MHL2692

Figure

158

DRAWING 2692-158.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

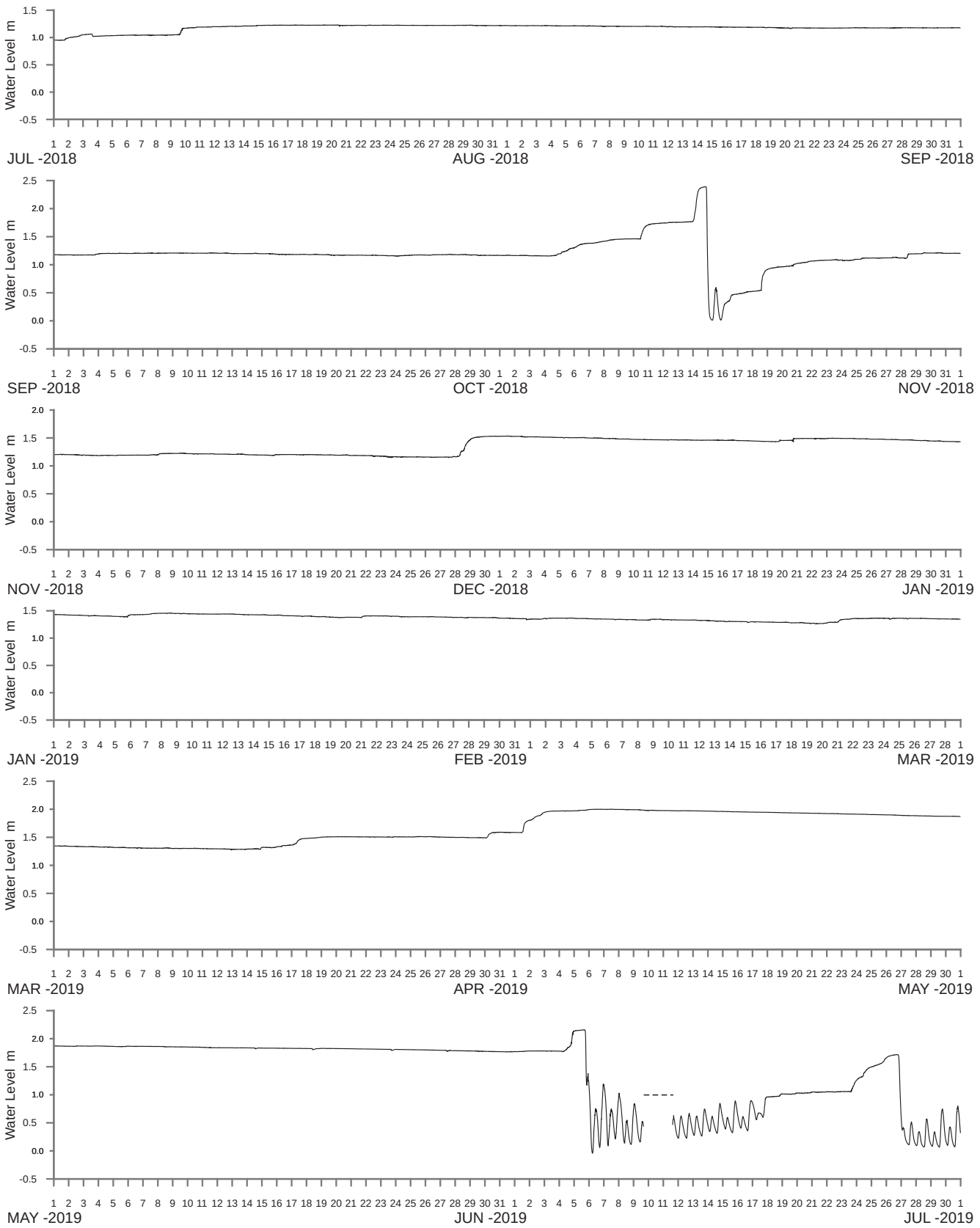
NARARA CREEK AT MANNS ROAD
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
159

DRAWING 2692-159.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

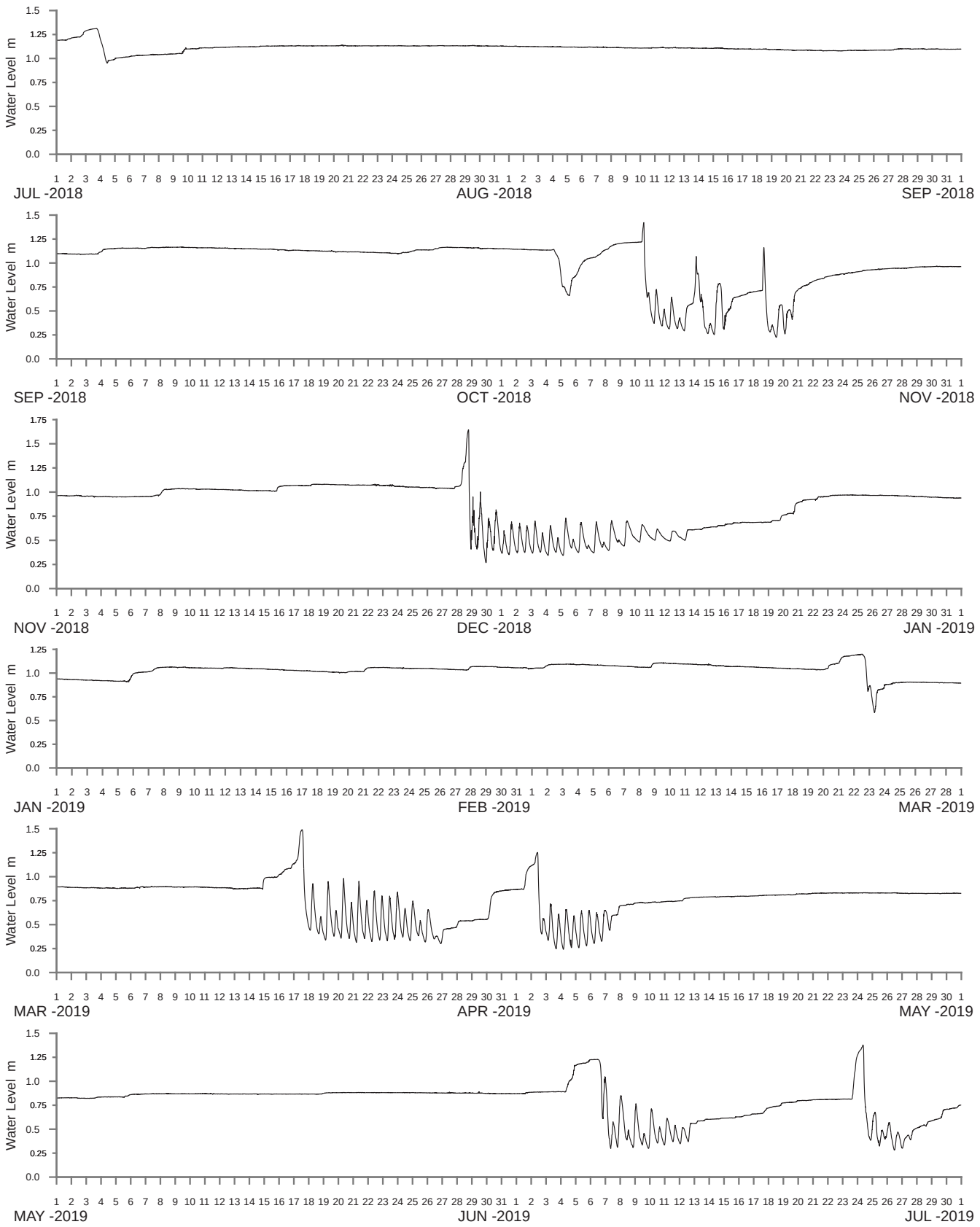
WAMBERAL LAGOON AT WAMBERAL LAGOON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
160

DRAWING 2692-160.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

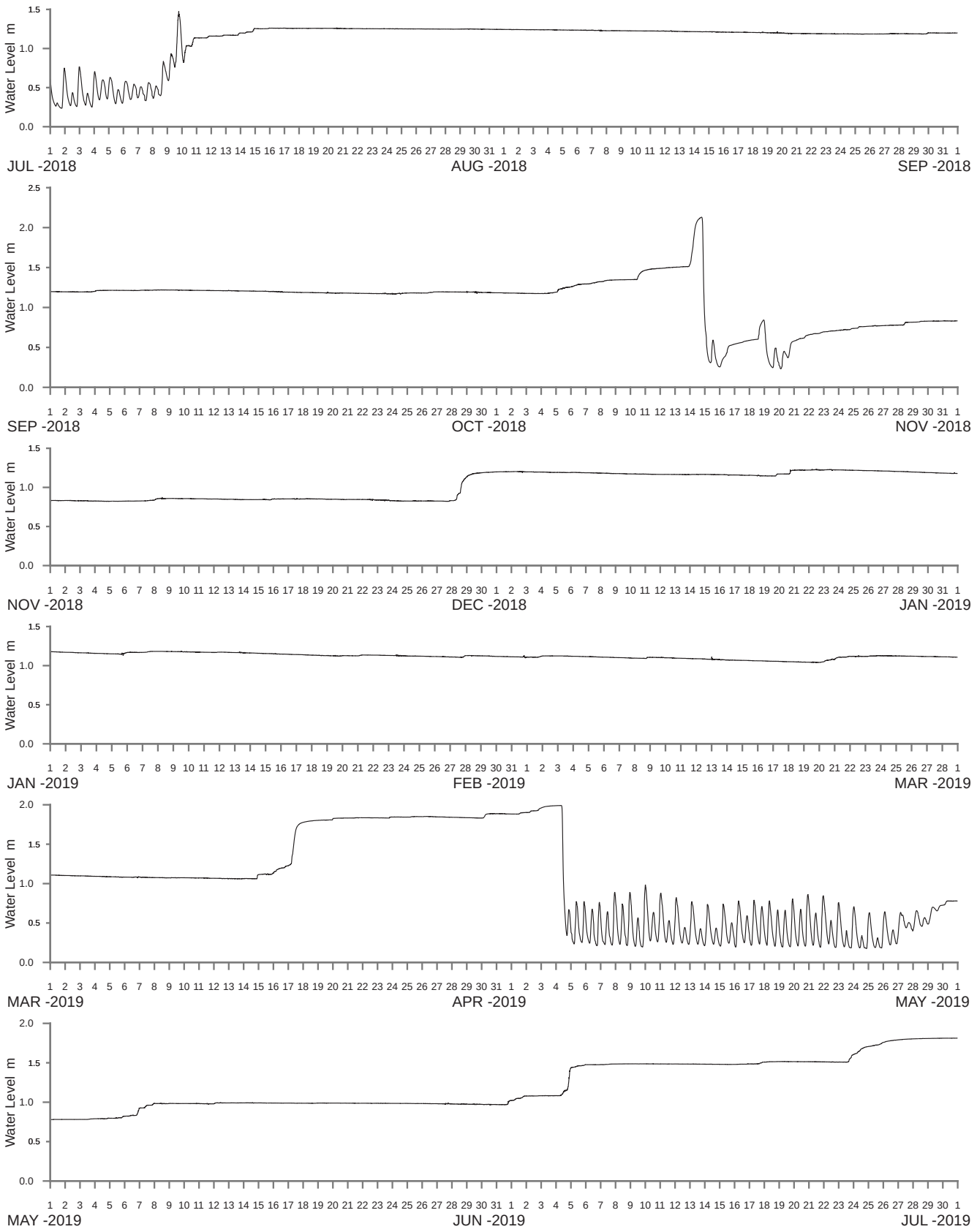
TERRIGAL LAGOON AT TERRIGAL BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
161

DRAWING 2692-161.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

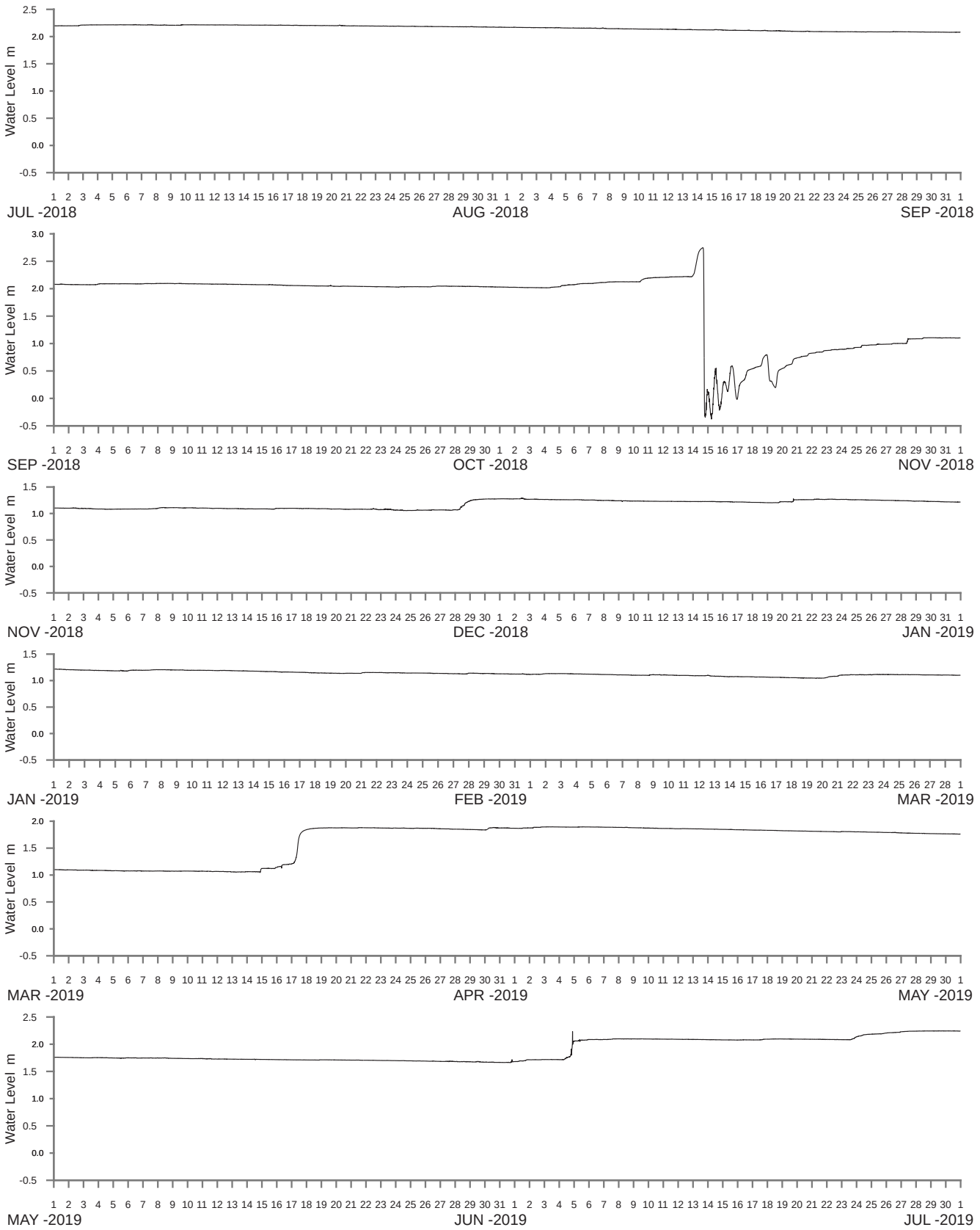
AVOCA LAGOON AT AVOCA LAGOON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
162

DRAWING 2692-162.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

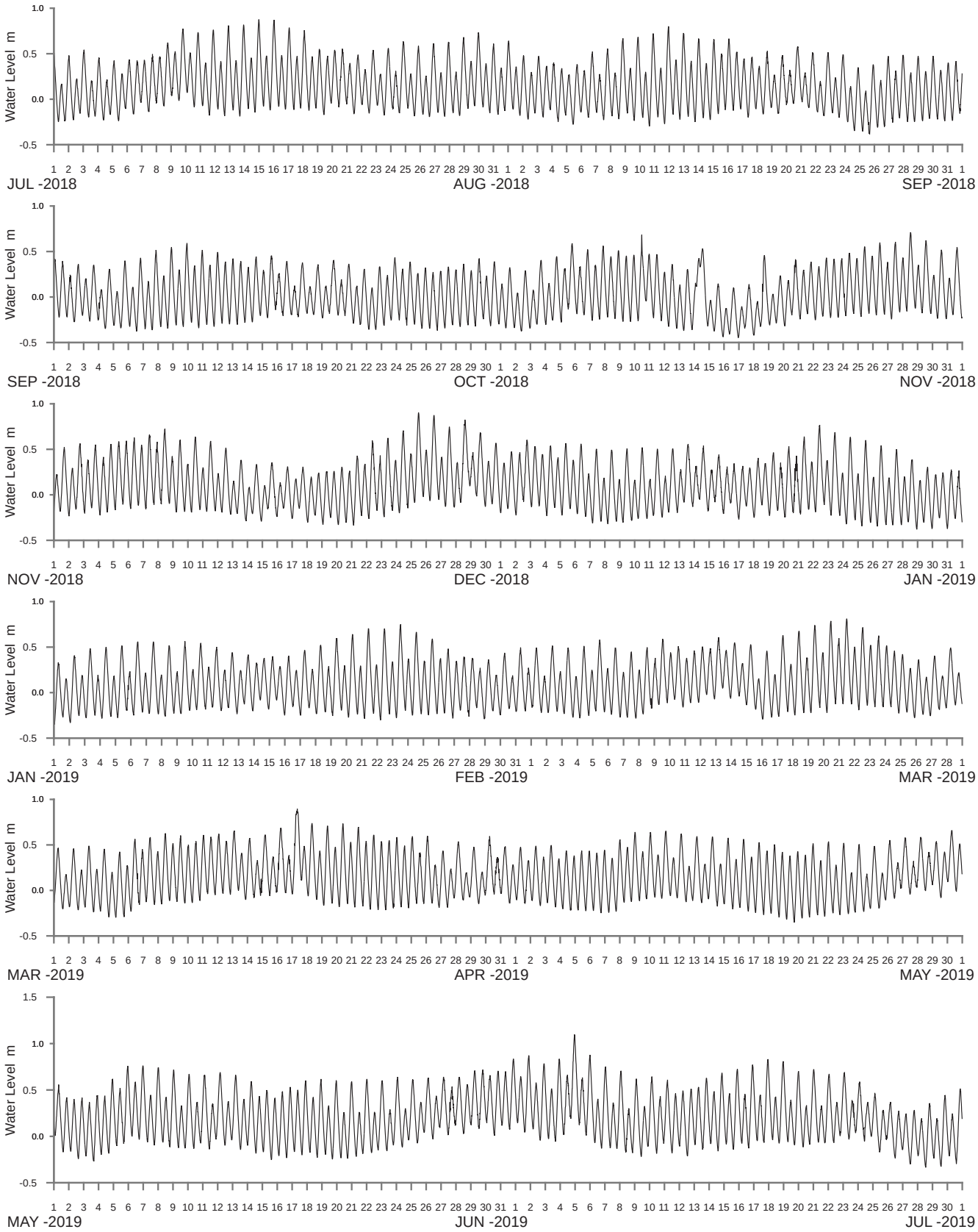
COCKRONE LAKE AT COCKRONE LAKE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
163

DRAWING 2692-163.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

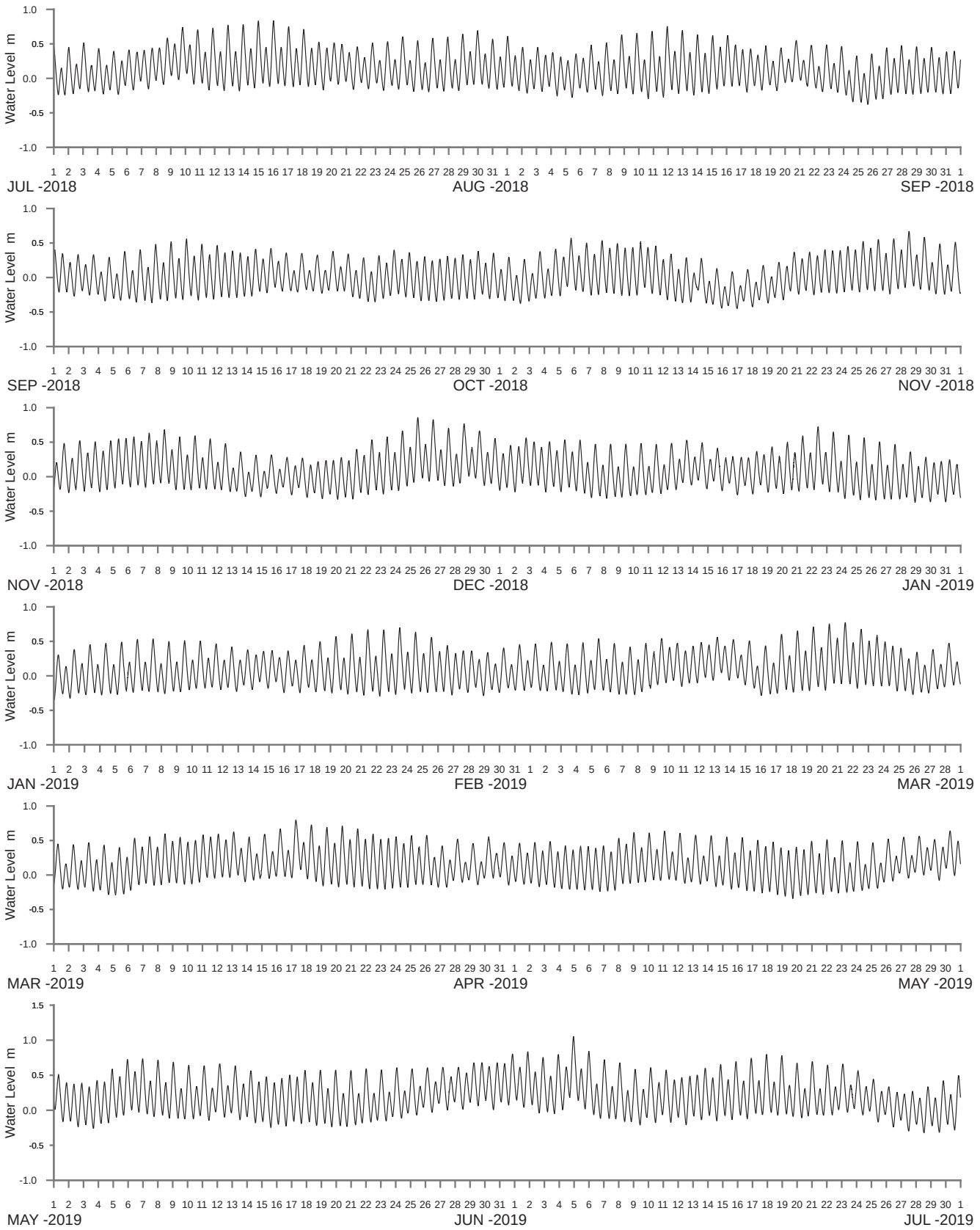
ERINA CREEK AT ERINA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
164

DRAWING 2692-164.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

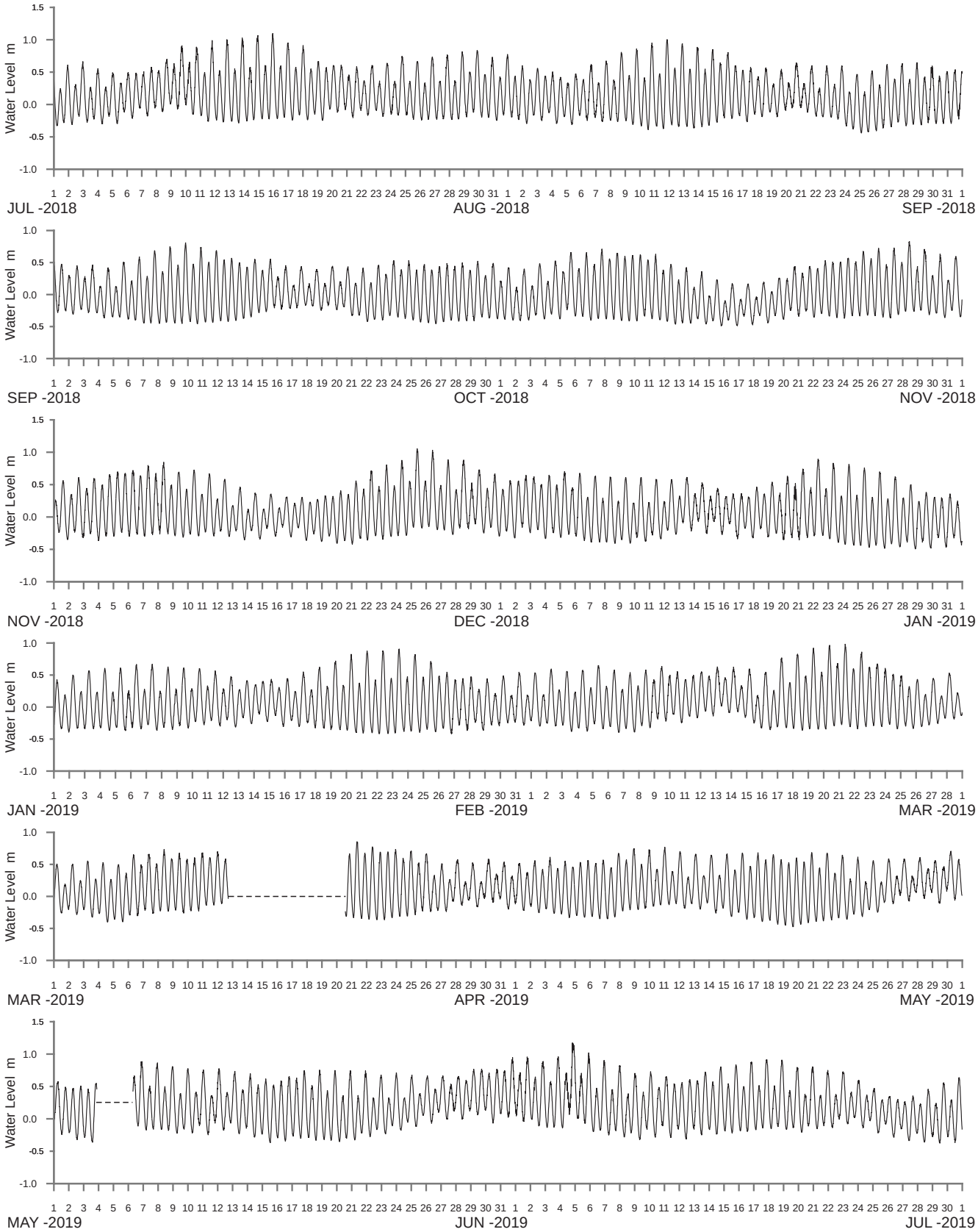
ERINA CREEK AT PUNT BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
165

DRAWING 2692-165.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

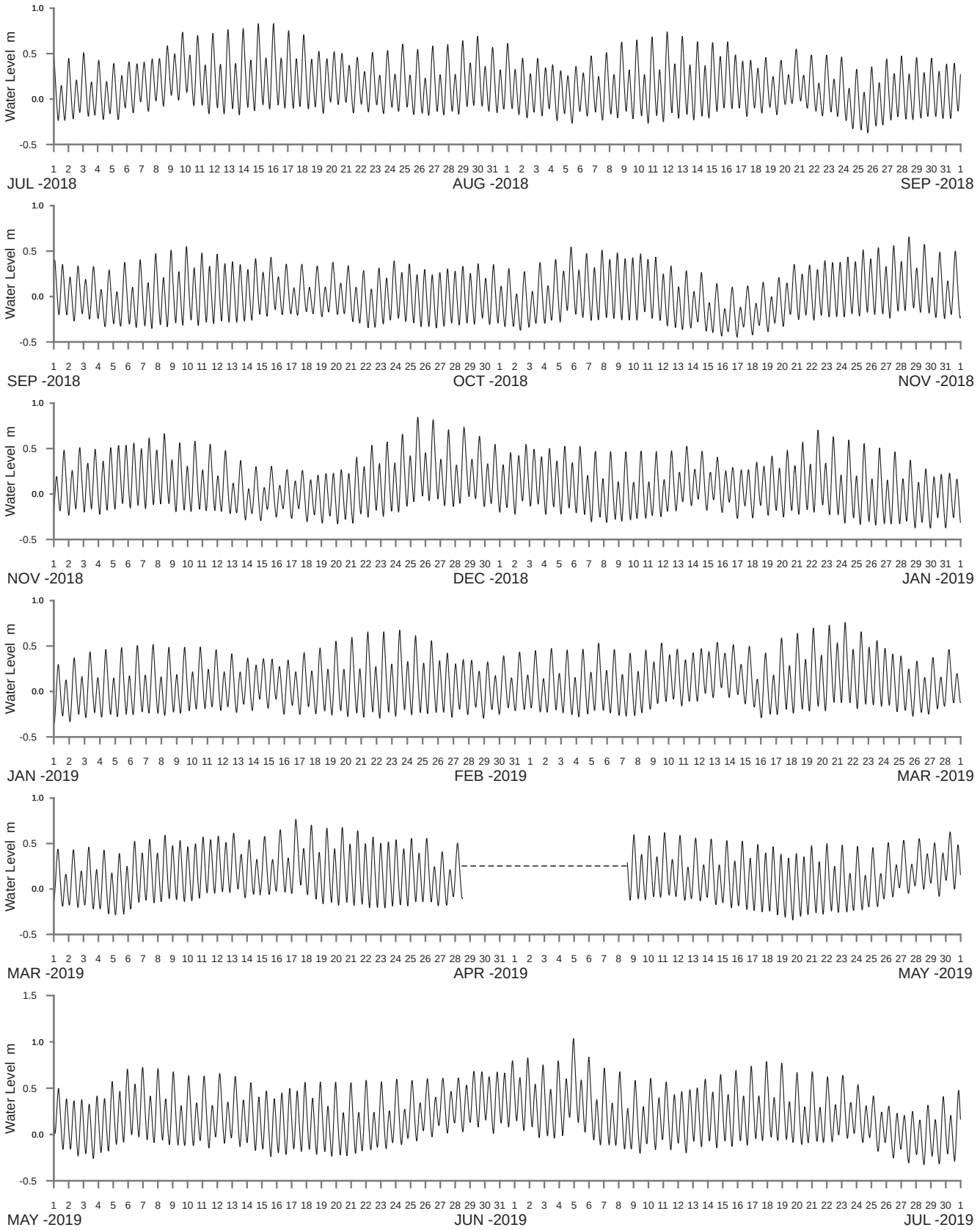
BRISBANE WATER AT ETTALONG
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
166

DRAWING 2692-166.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

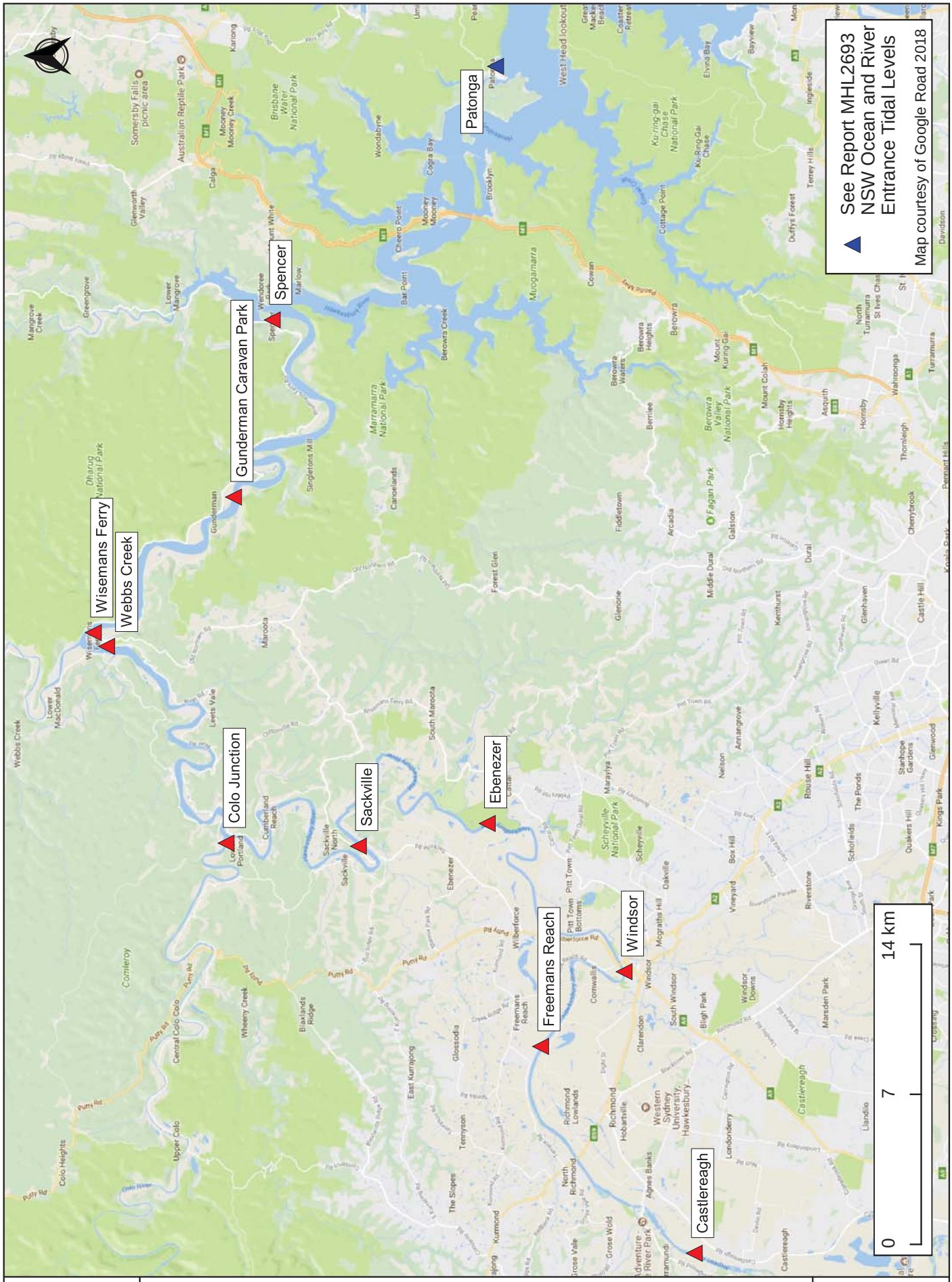
BRISBANE WATER AT KOOLEWONG 2
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
167

DRAWING 2692-167.cdr



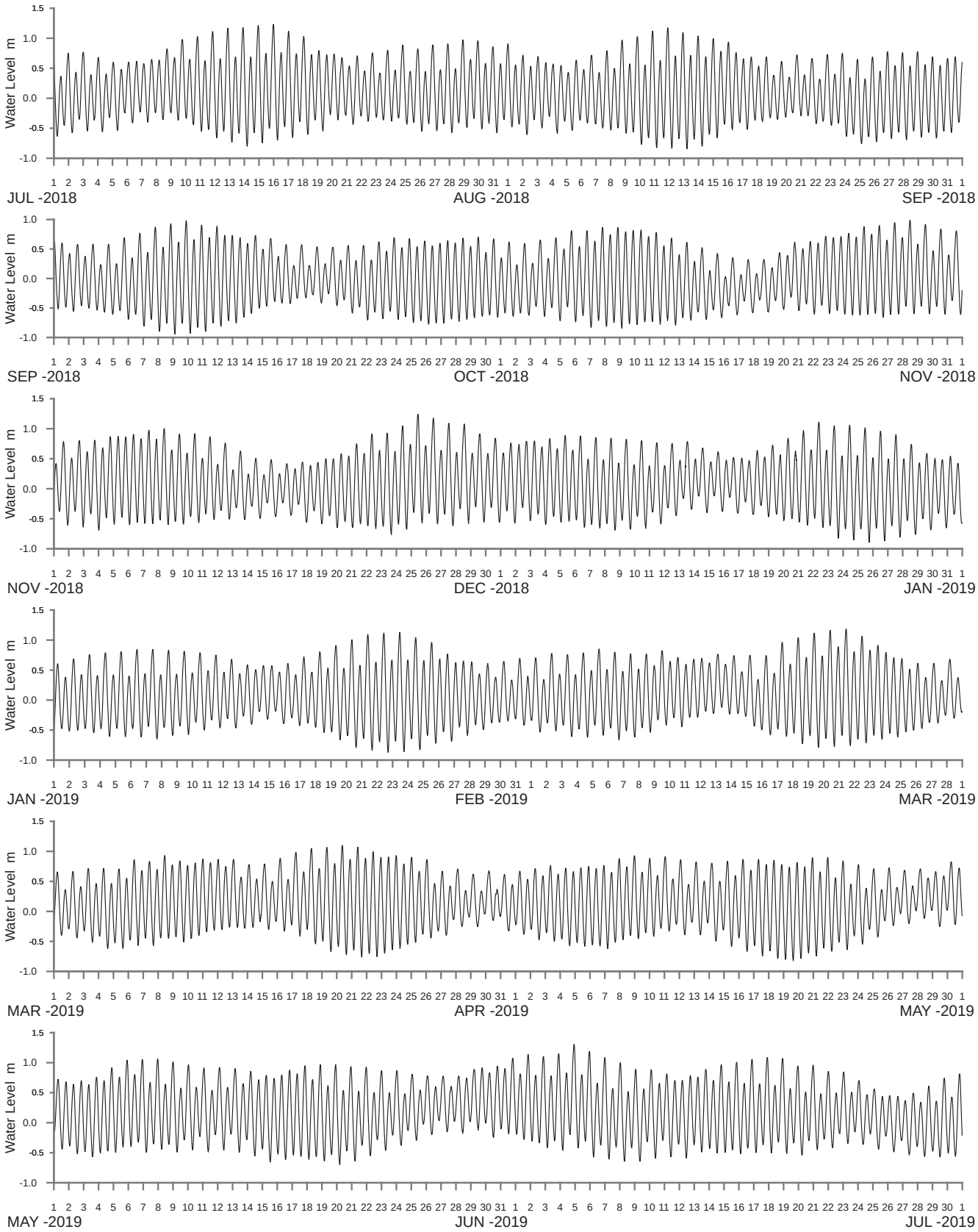
NSW GOVERNMENT

STATION LOCATIONS
HAWKESBURY RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
168

DRAWING 2692-168.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

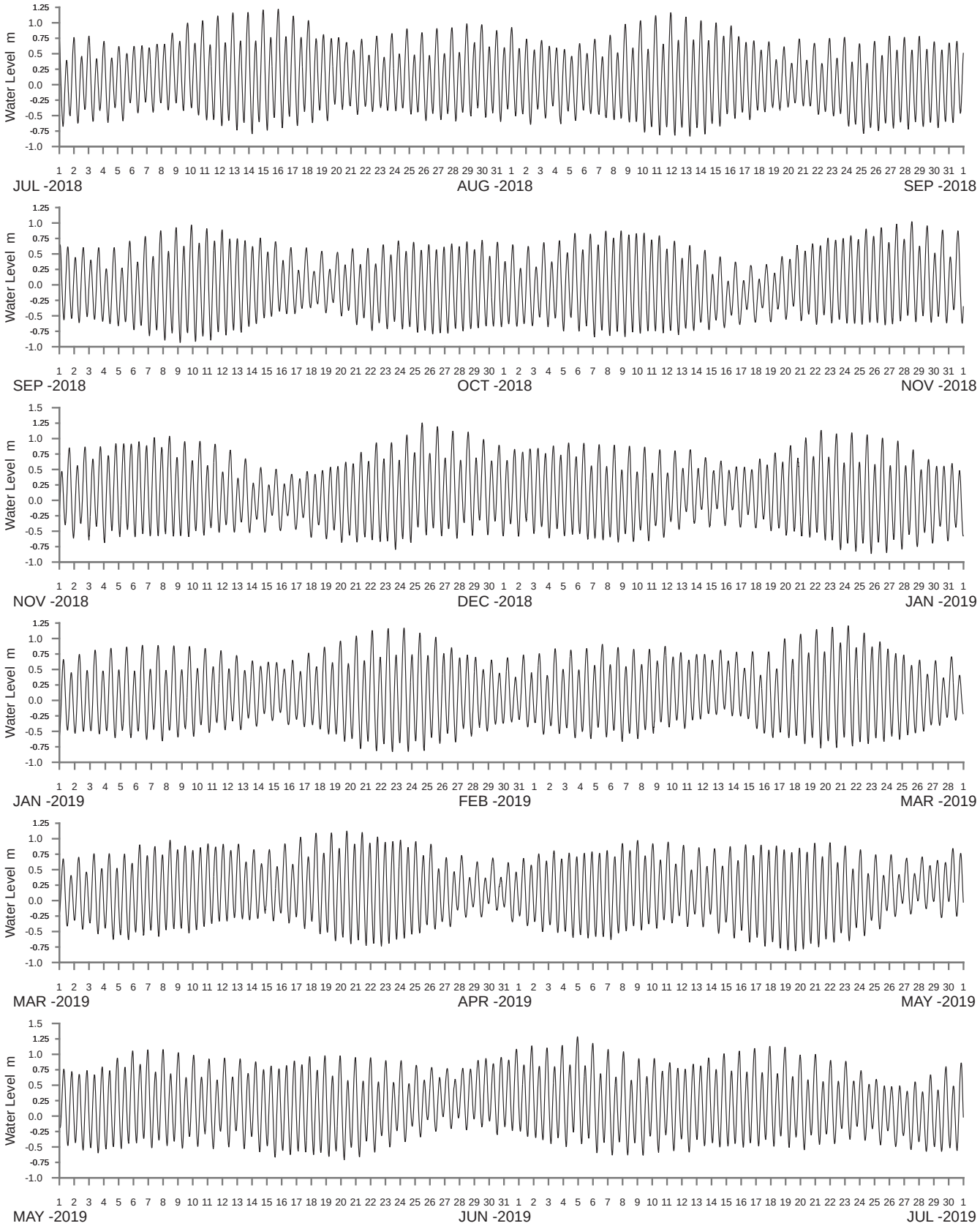
HAWKESBURY RIVER AT SPENCER
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
169

DRAWING 2692-169.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

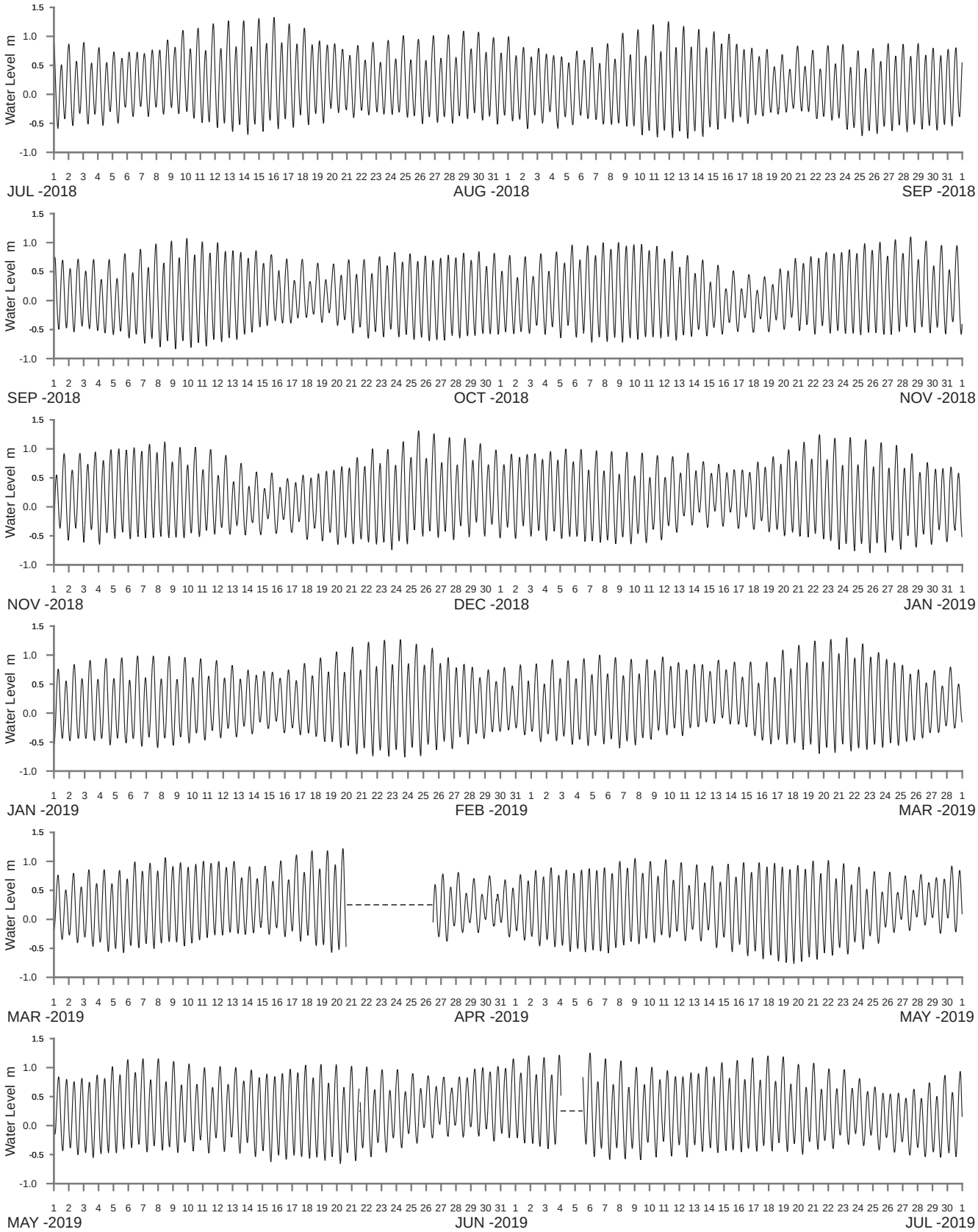
HAWKESBURY RIVER AT GUNDERMAN CARAVAN PARK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
170

DRAWING 2692-170.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

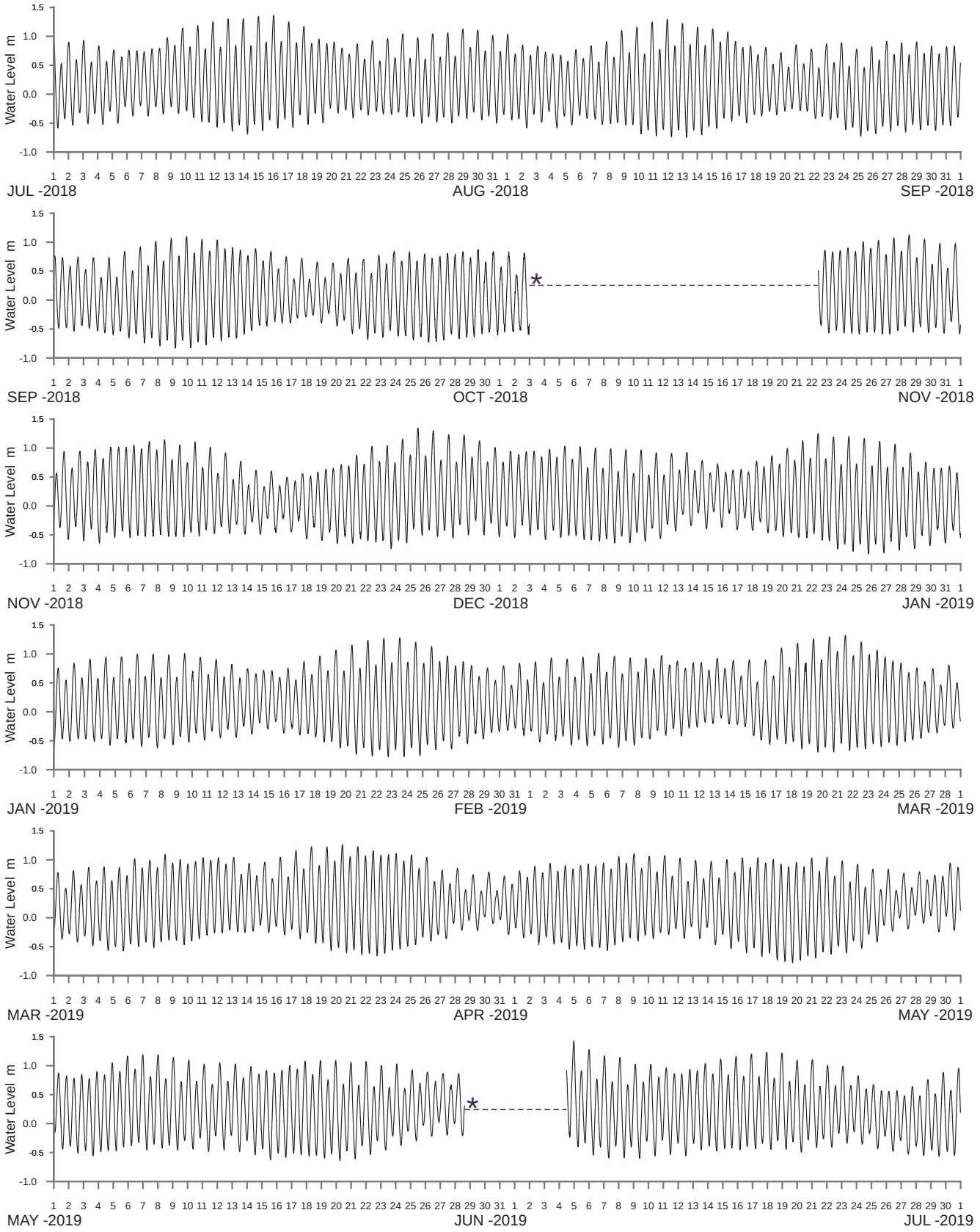
HAWKESBURY RIVER AT WISEMANS FERRY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
171

DRAWING 2692-171.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to low gas

NSW GOVERNMENT

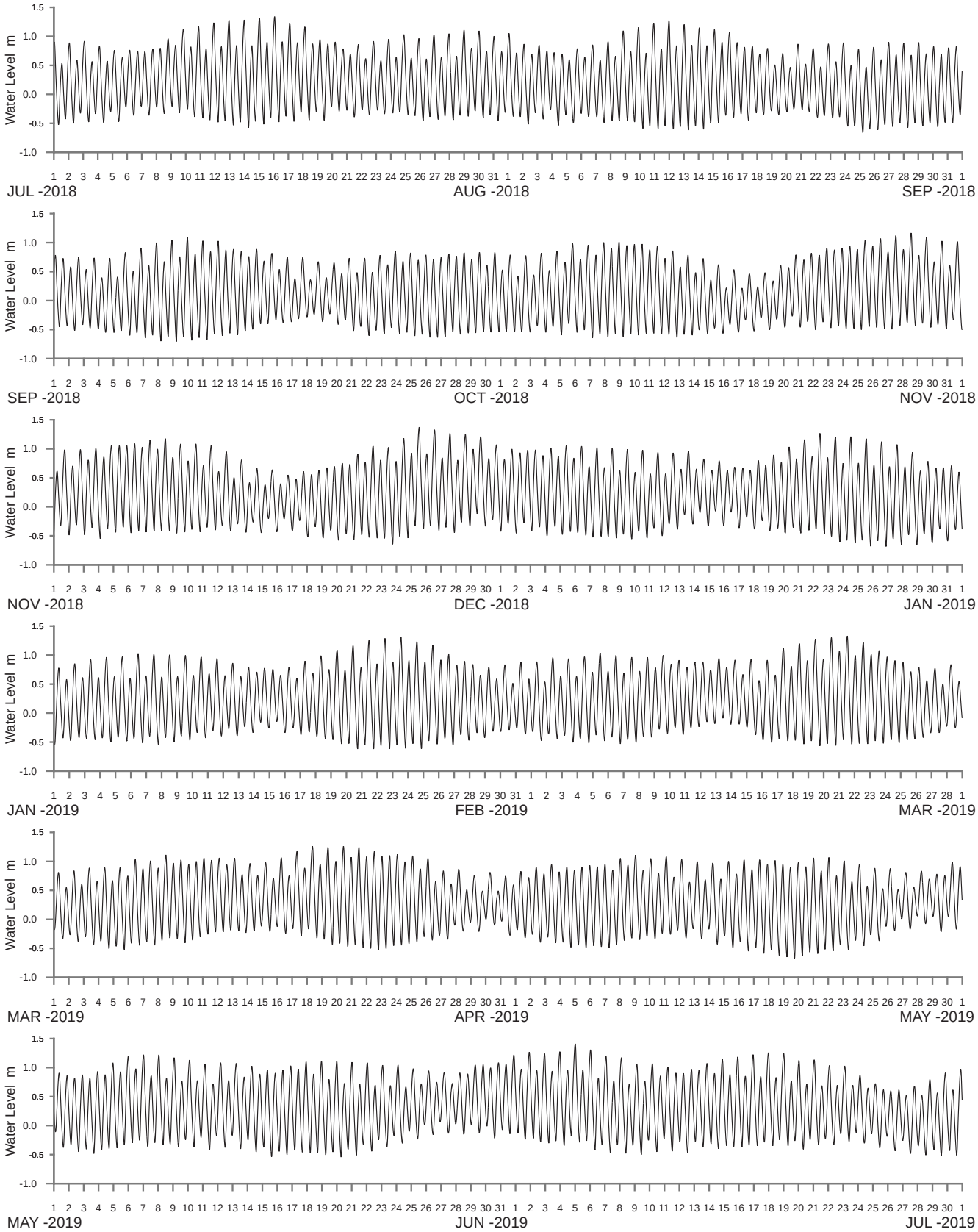
HAWKESBURY RIVER AT WEBBS CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 172

DRAWING 2692-172.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

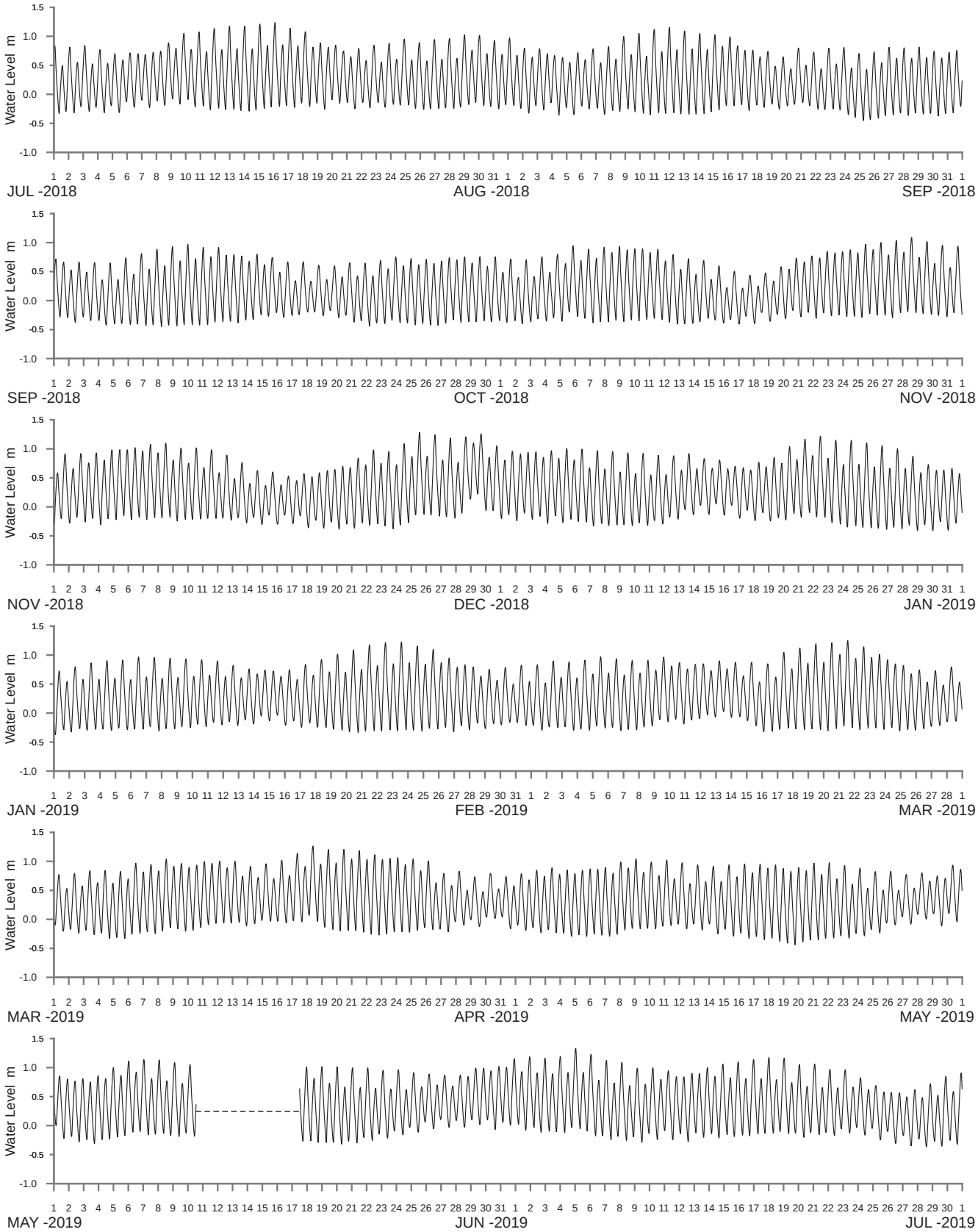
HAWKESBURY RIVER AT COLO JUNCTION
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
173

DRAWING 2692-173.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

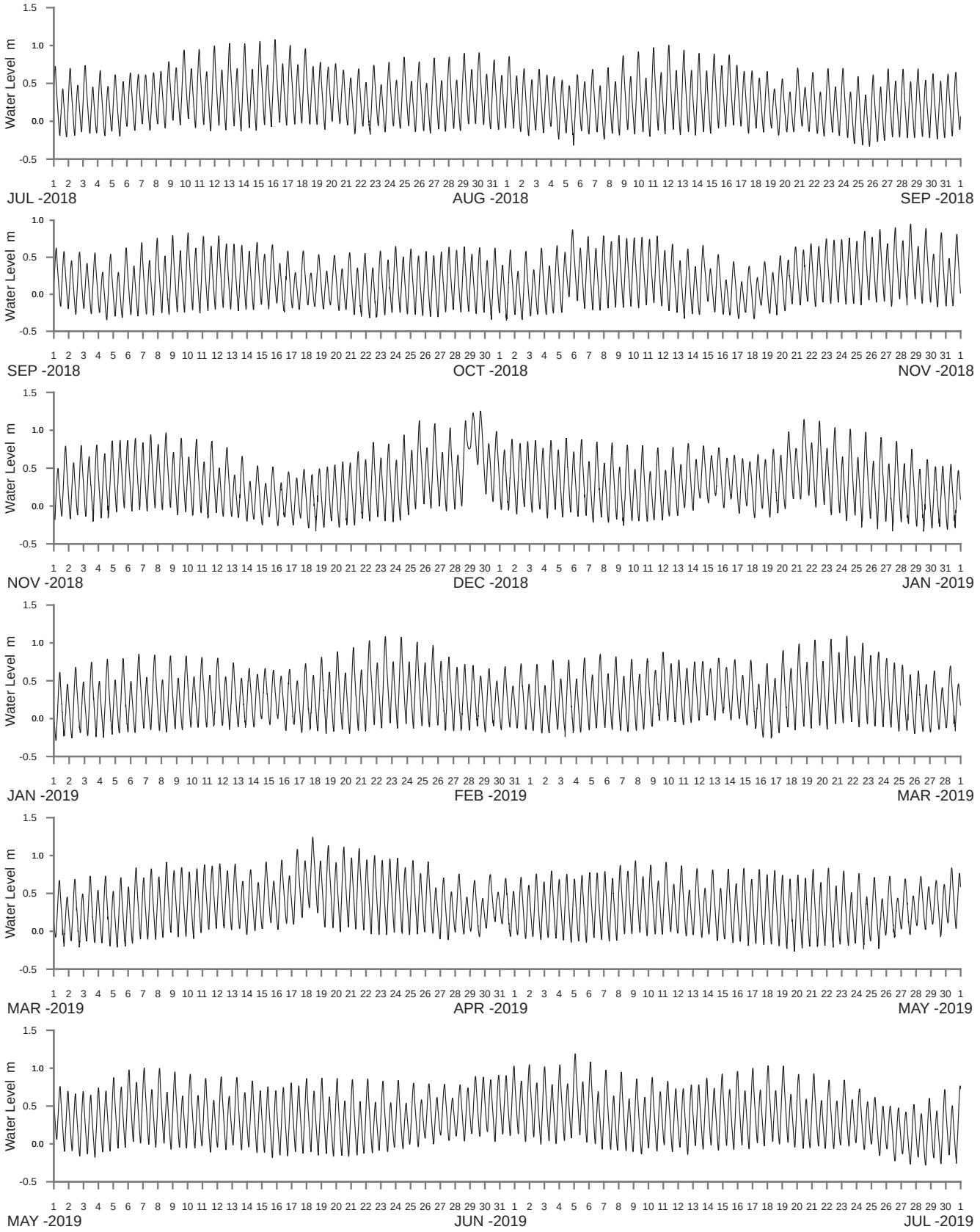
HAWKESBURY RIVER AT SACKVILLE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
174

DRAWING 2692-174.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

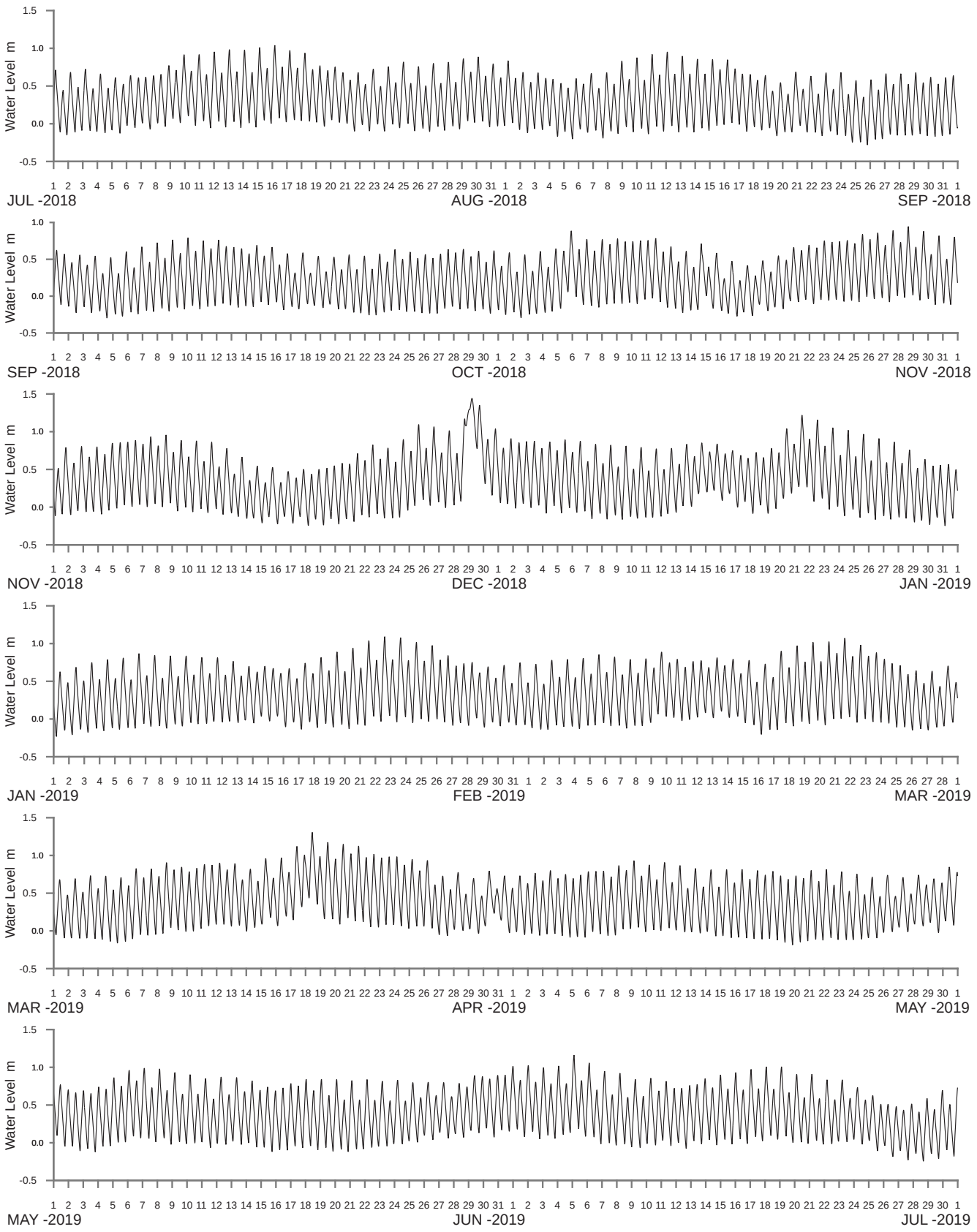
HAWKESBURY RIVER AT EBENEZER
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
175

DRAWING 2692-175.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

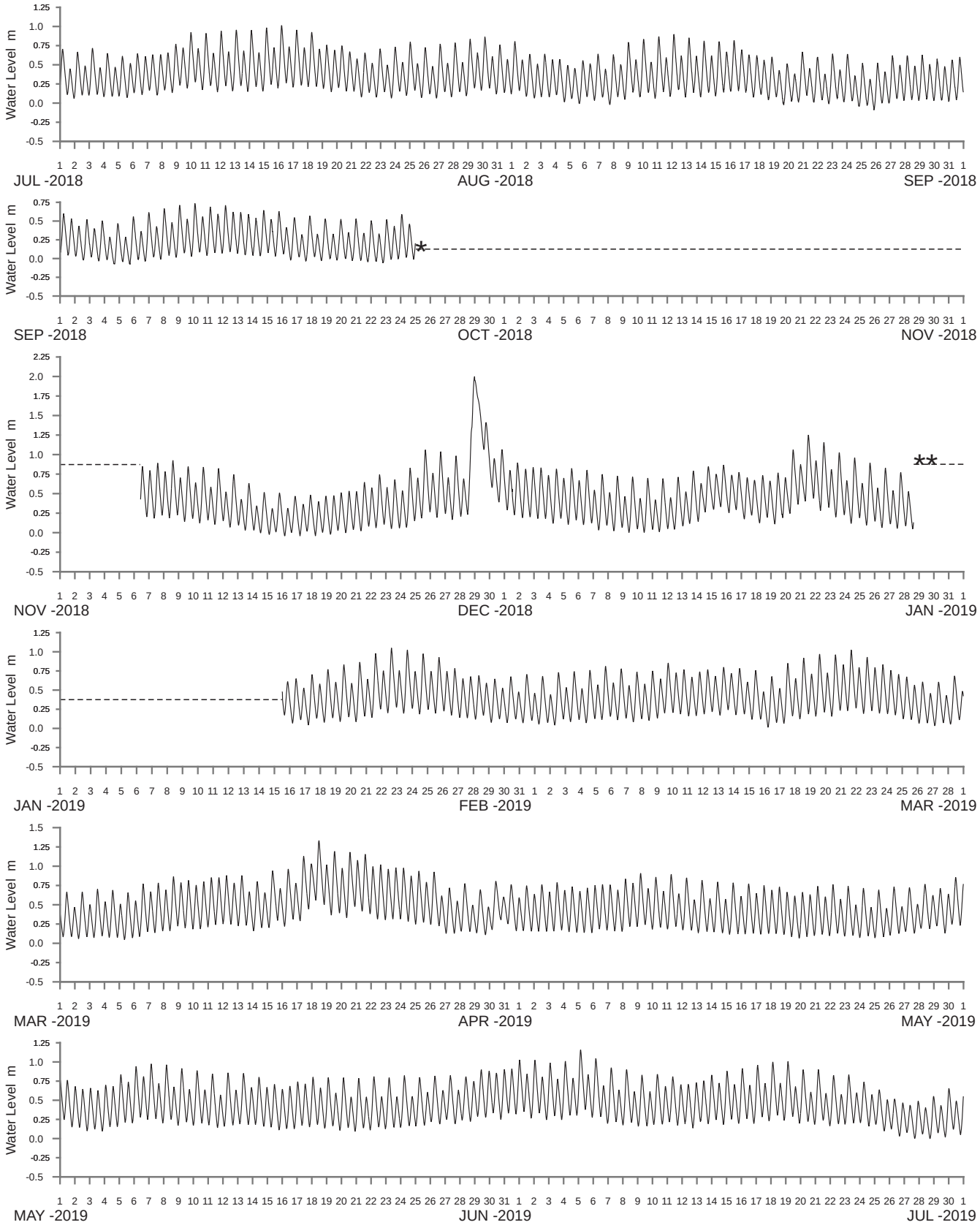
HAWKESBURY RIVER AT WINDSOR
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
176

DRAWING 2692-176.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to blocked gas line **Data loss due to battery failure

NSW GOVERNMENT

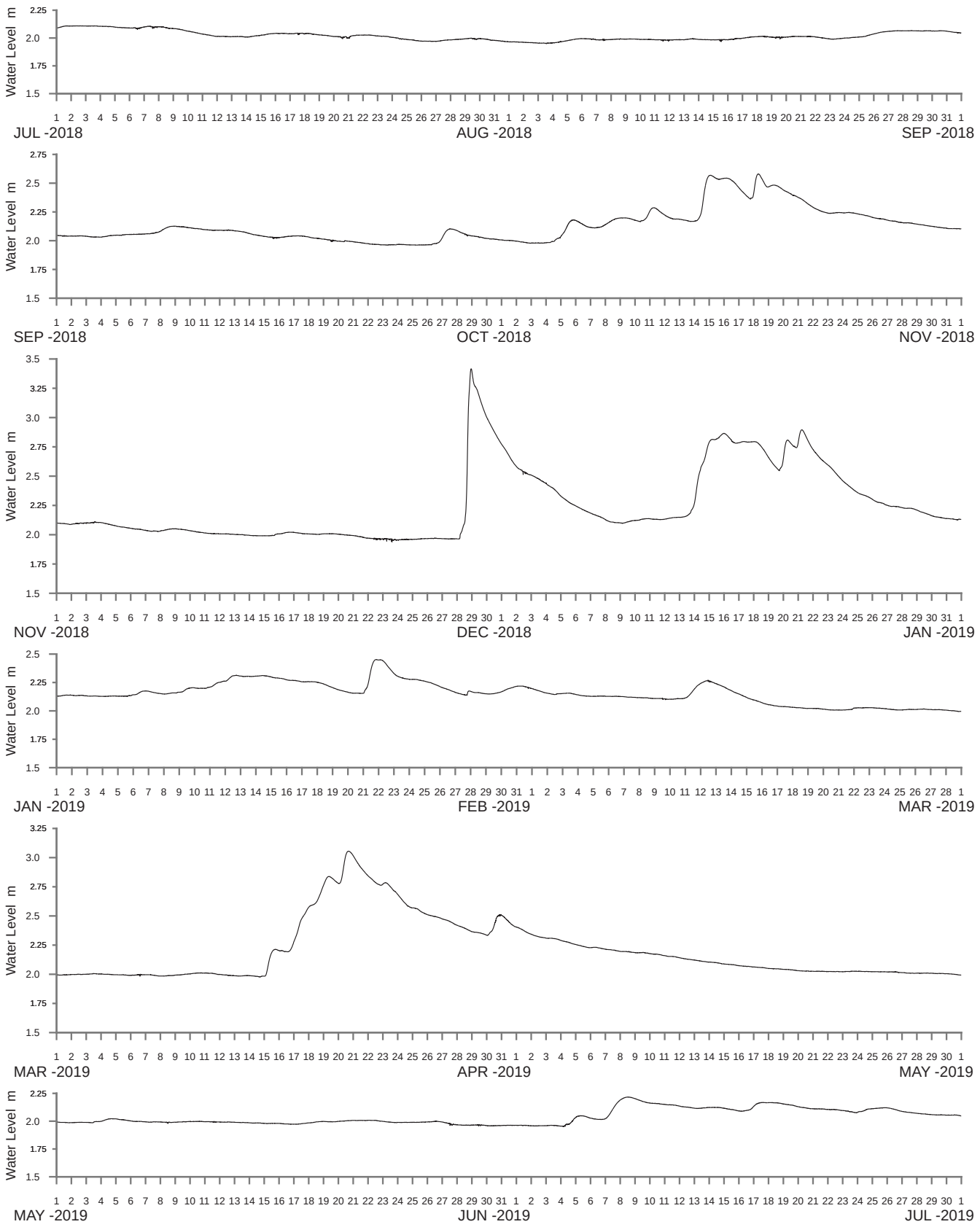
HAWKESBURY RIVER AT FREEMANS REACH
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 177

DRAWING 2692-177.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

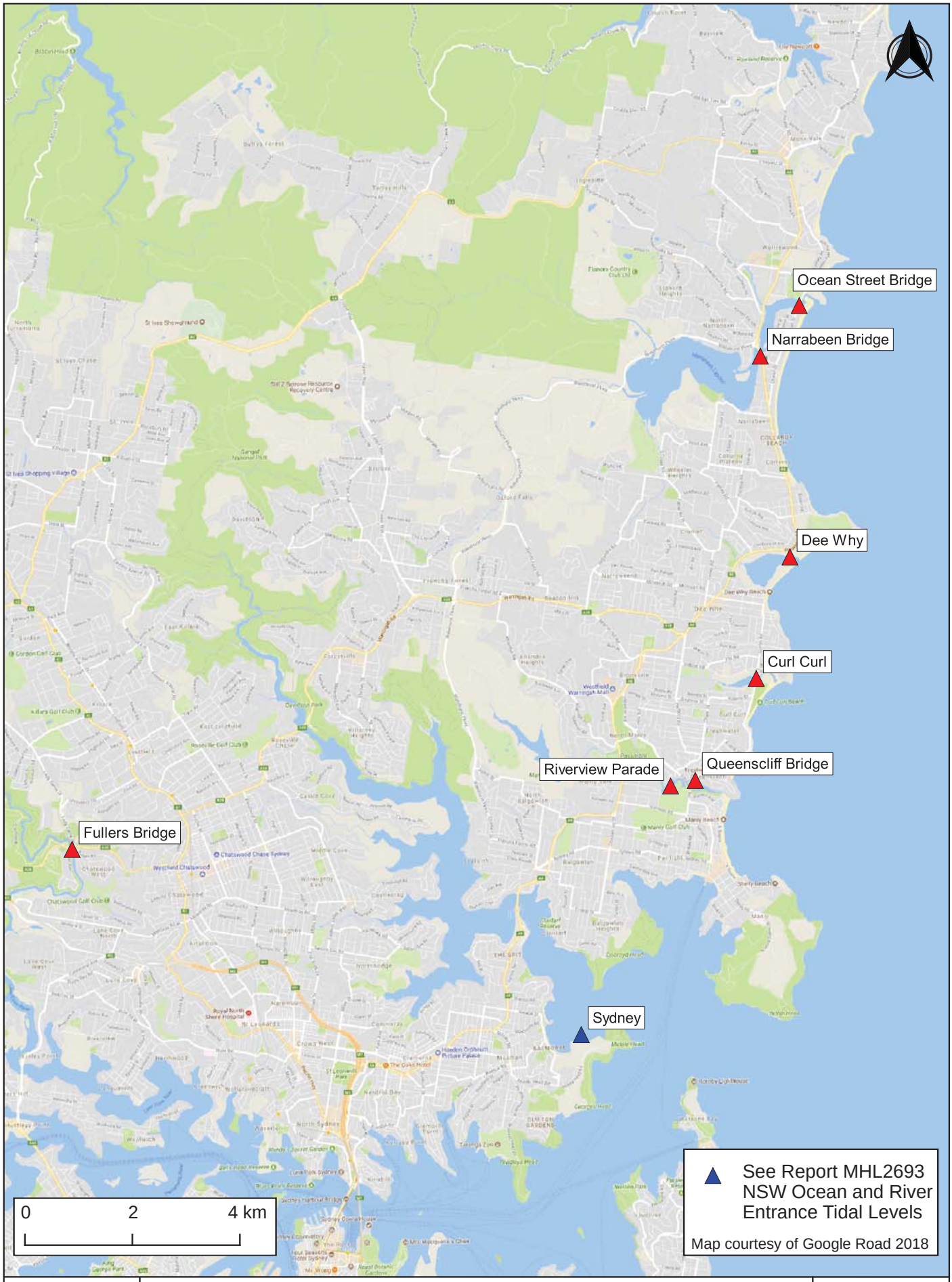
NEPEAN RIVER AT CASTLEREAGH
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
178

DRAWING 2692-178.cdr



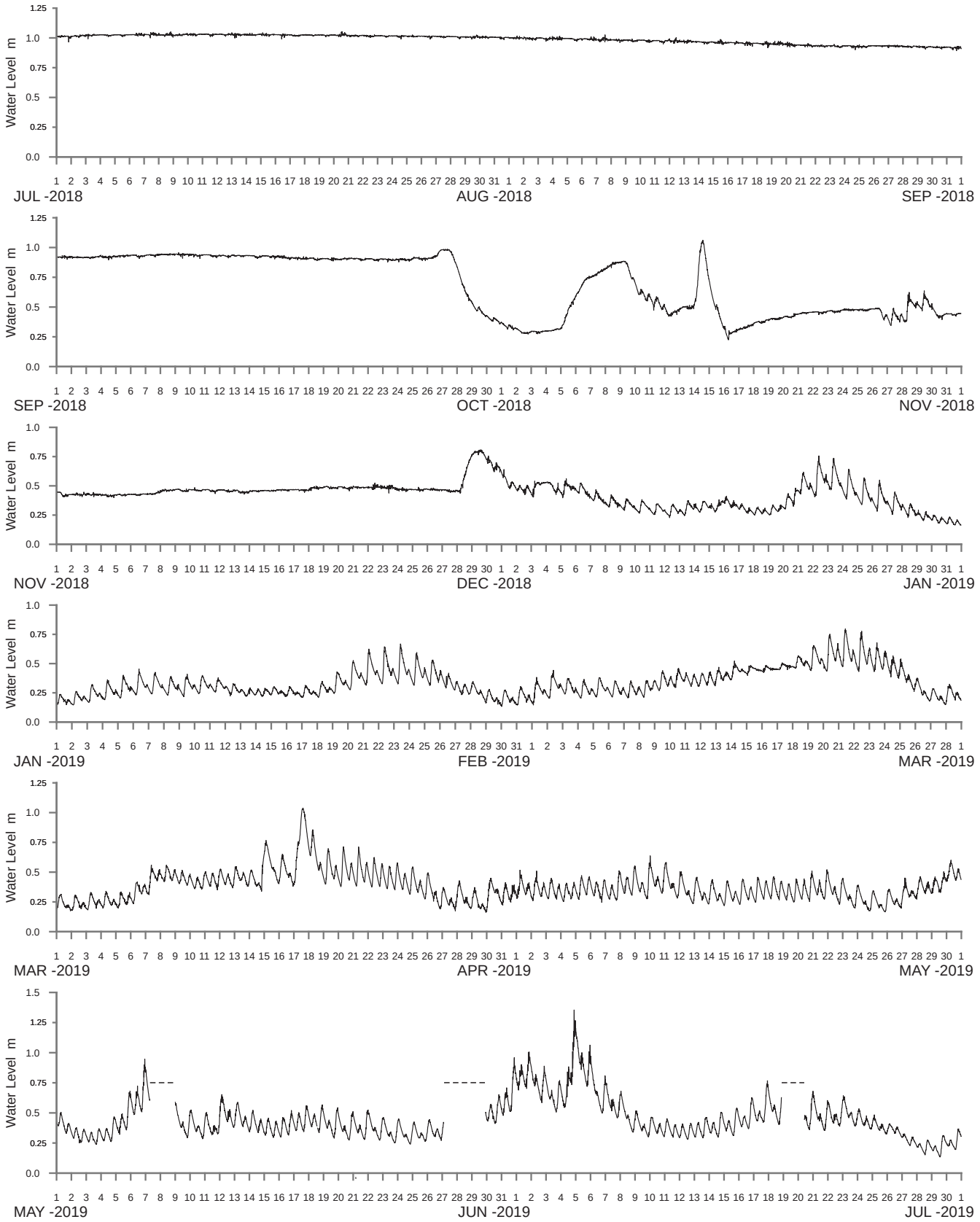
NSW GOVERNMENT

STATION LOCATIONS
NORTH SYDNEY REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
179

DRAWING 2692-179.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

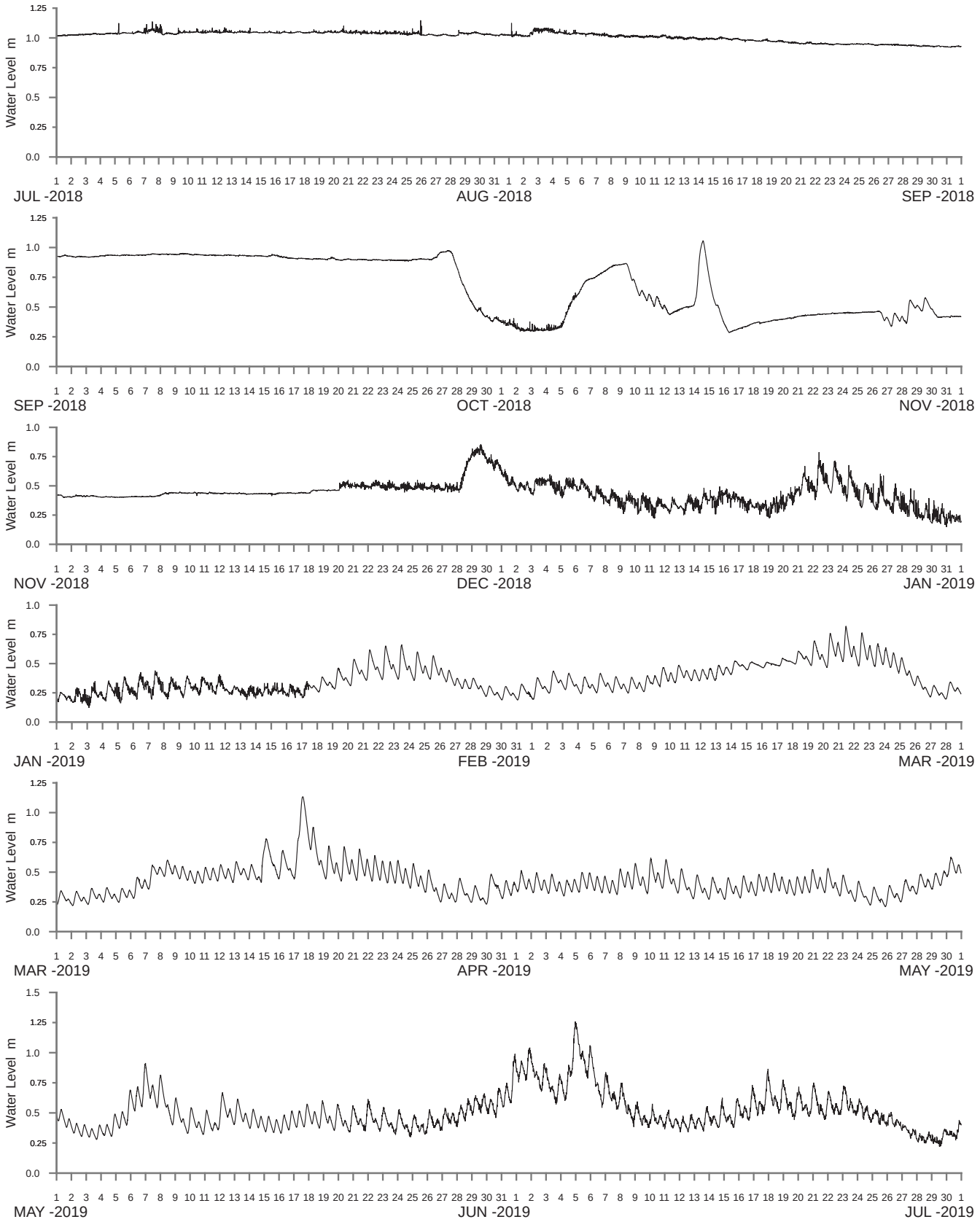
NARRABEEN LAGOON AT OCEAN STREET BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
180

DRAWING 2692-180.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

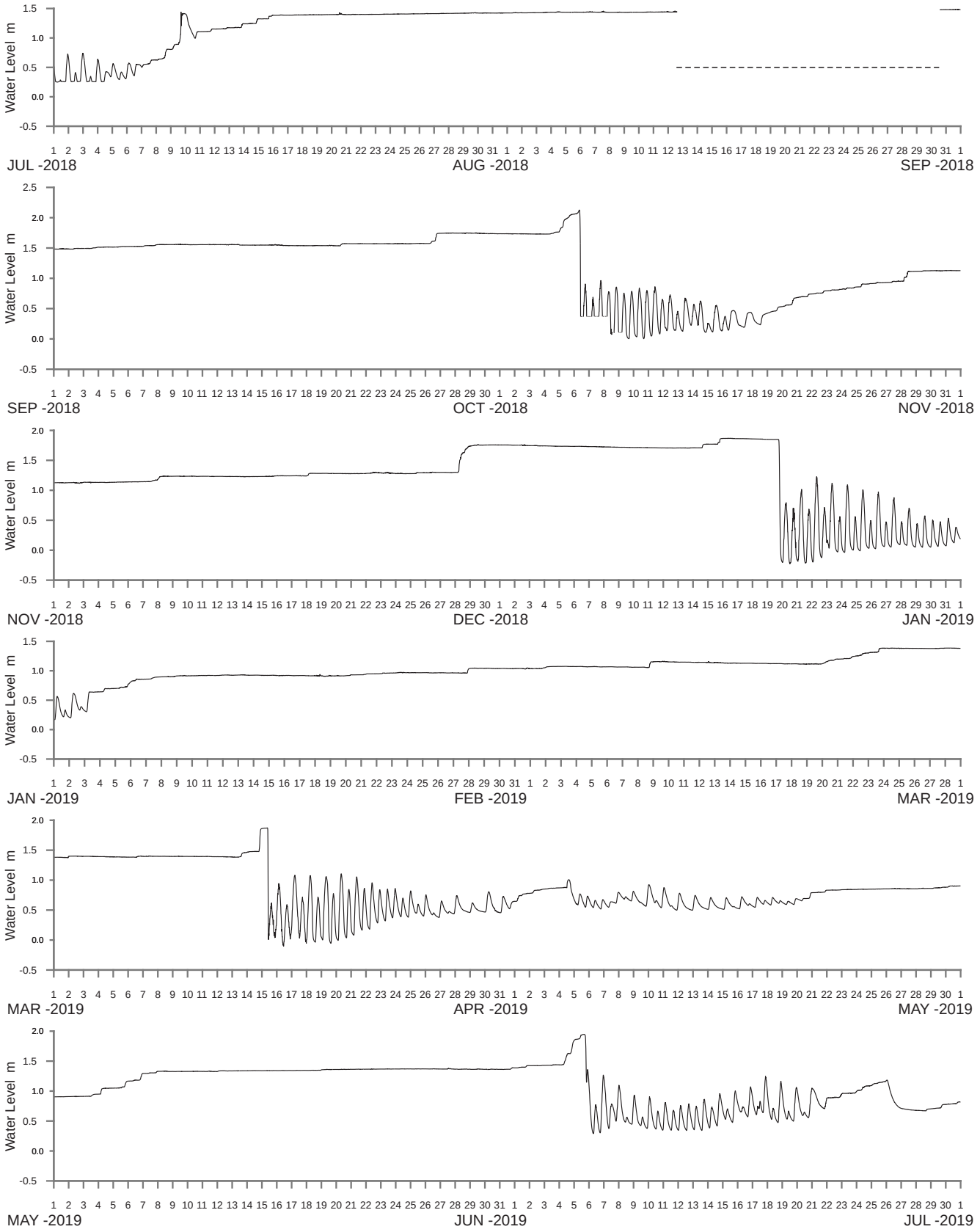
NARRABEEN LAGOON AT NARRABEEN BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
181

DRAWING 2692-181.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

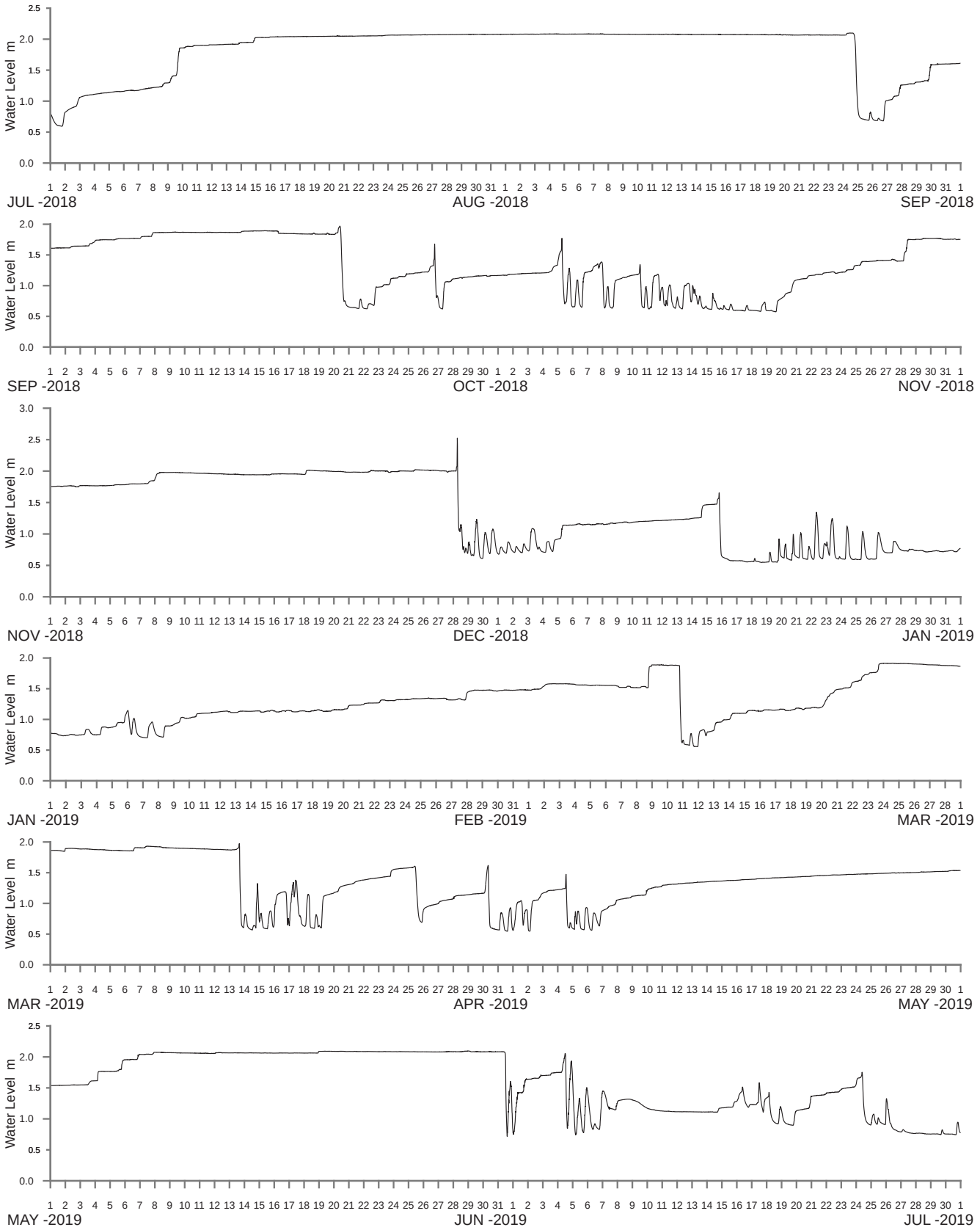
DEE WHY LAGOON AT DEE WHY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
182

DRAWING 2692-182.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

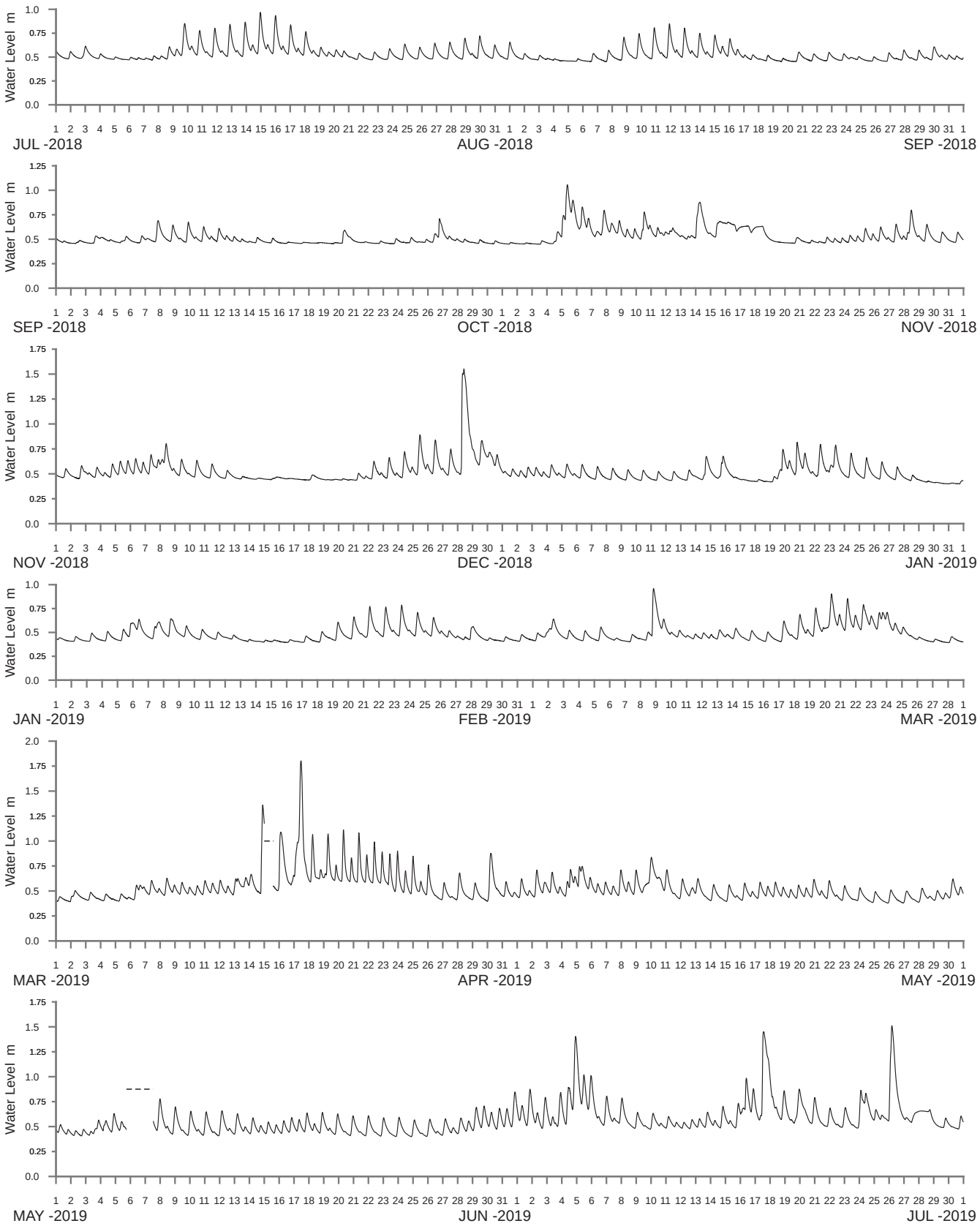
CURL CURL LAGOON AT CURL CURL
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
183

DRAWING 2692-183.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

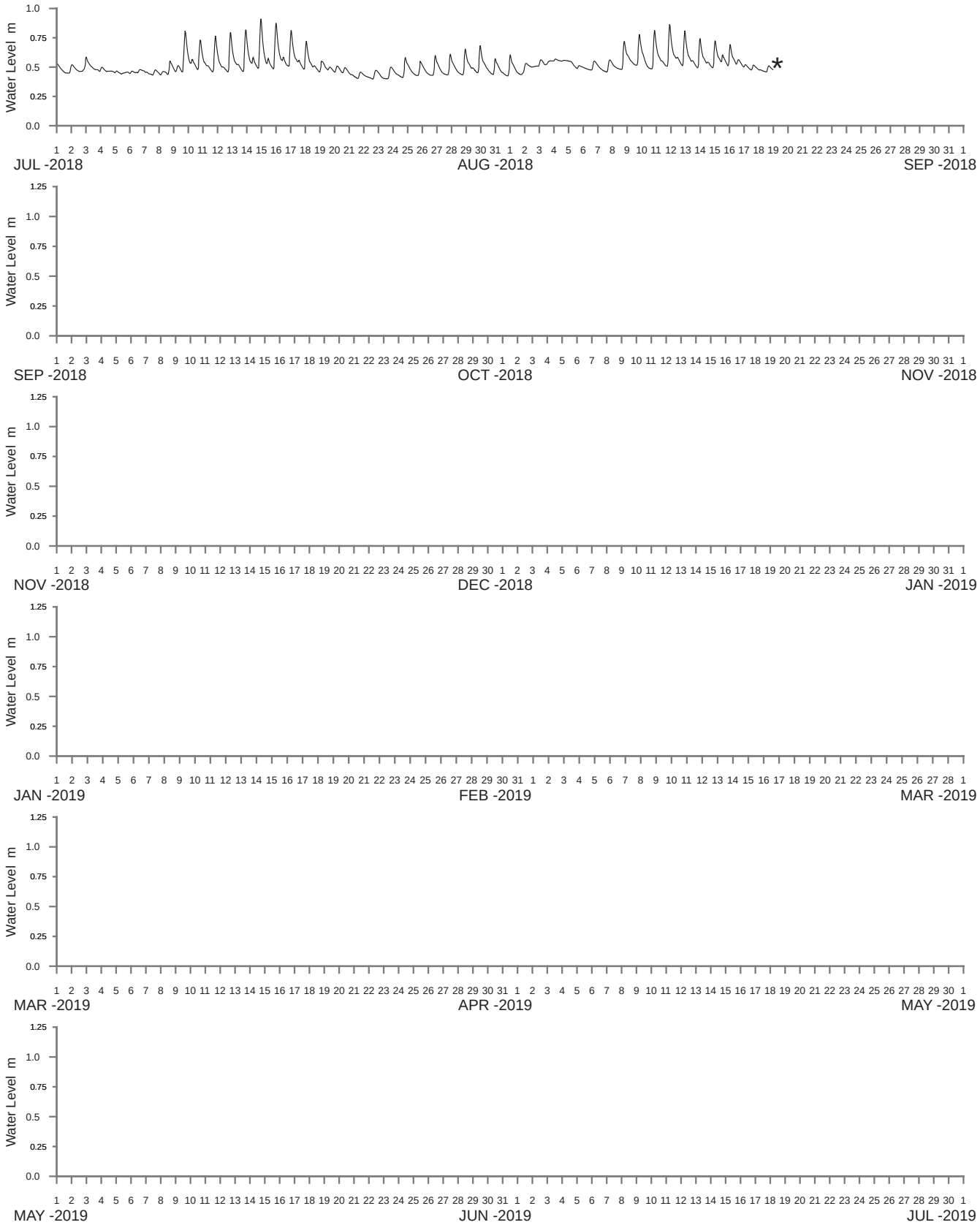
MANLY LAGOON AT RIVERVIEW PARADE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 184

DRAWING 2692-184.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Station temporarily decommissioned due to bank collapse

NSW GOVERNMENT

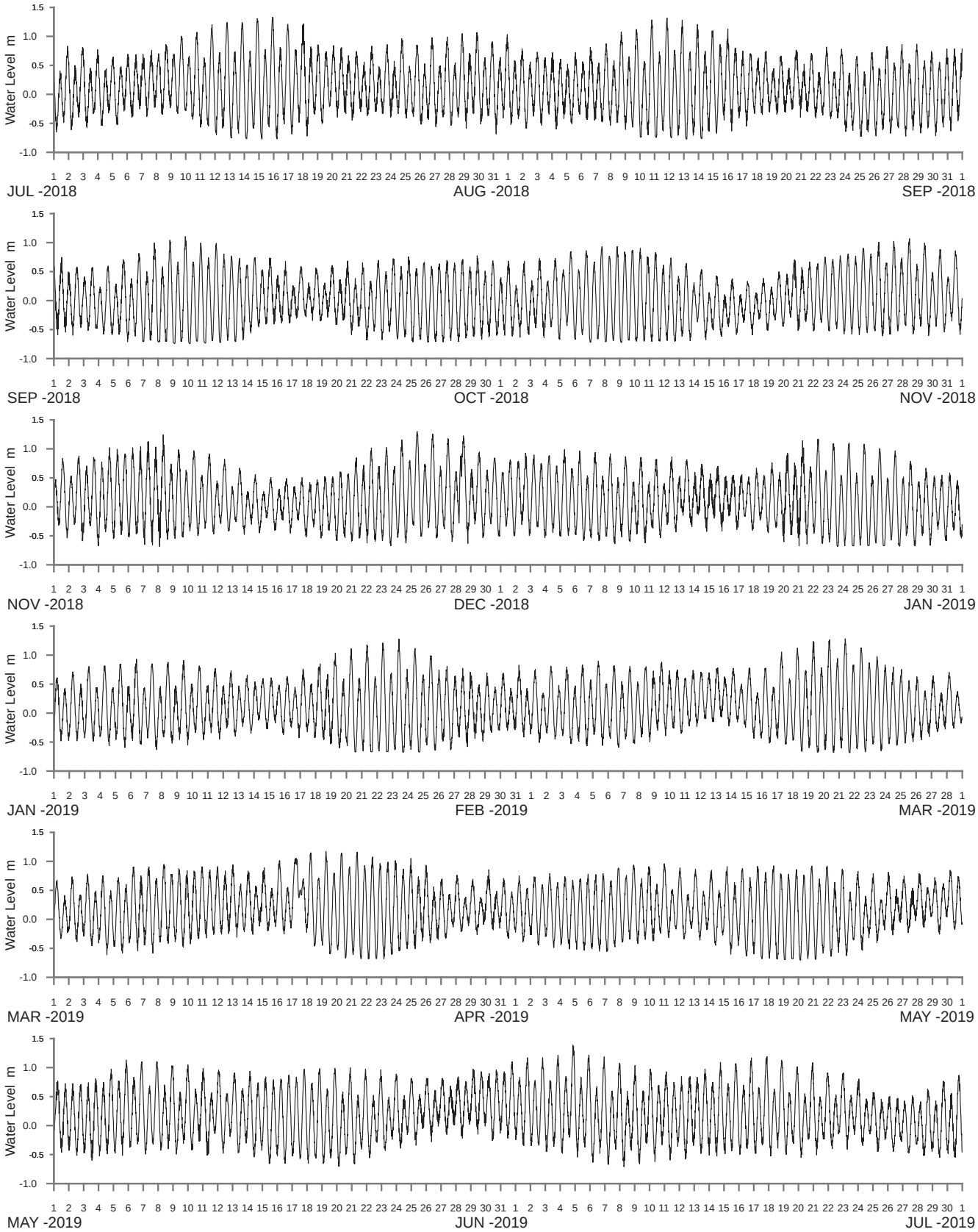
MANLY LAGOON AT QUEENSCLIFF BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 185

DRAWING 2692-185.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

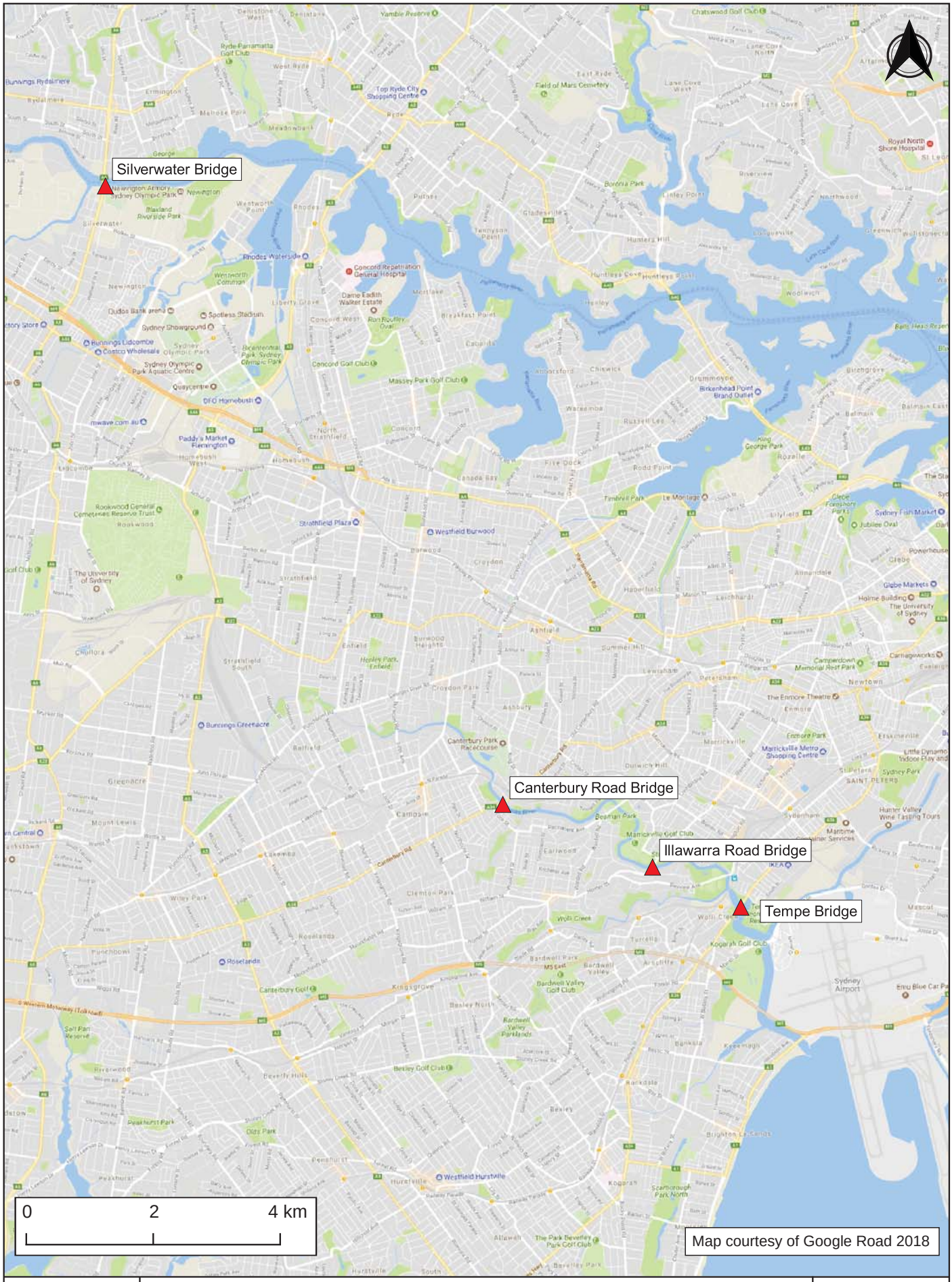
LANE COVE RIVER AT FULLERS BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
186

DRAWING 2692-186.cdr



NSW GOVERNMENT

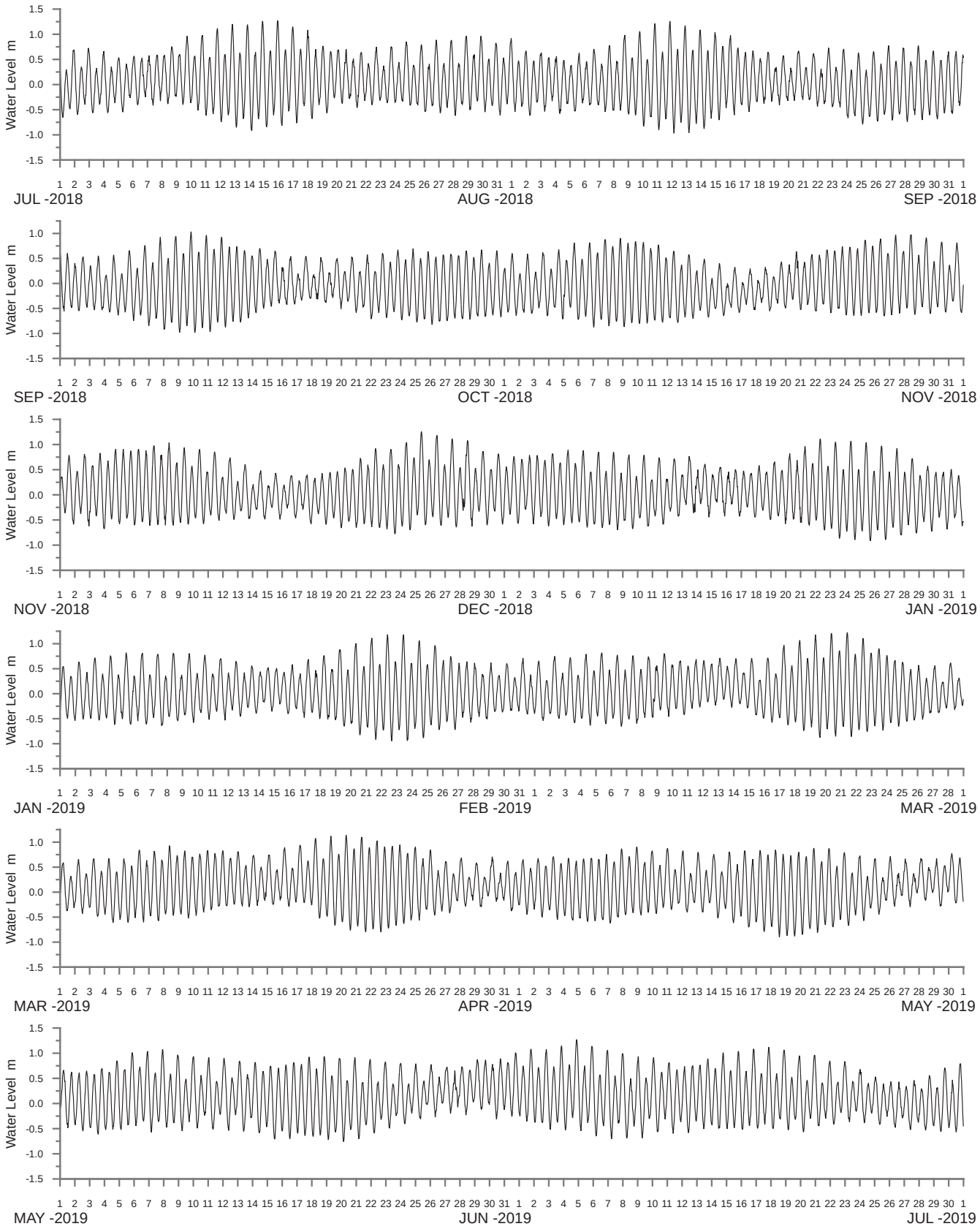
STATION LOCATIONS
PARRAMATTA RIVER AND COOKS RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 187

DRAWING 2692-187.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

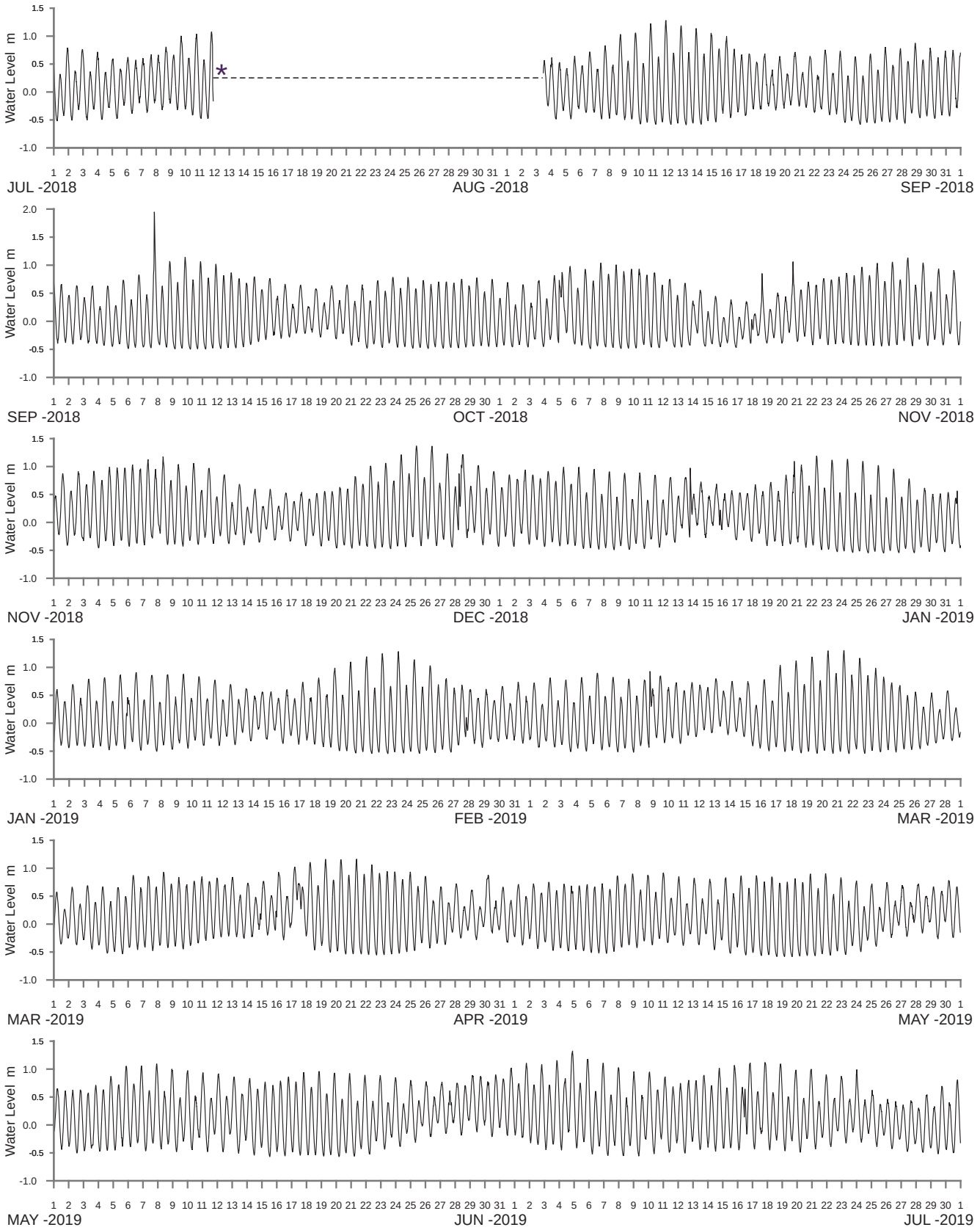
PARRAMATTA RIVER AT SILVERWATER BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
188

DRAWING 2692-188.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to gas line cut by bridge maintenance contractor

NSW GOVERNMENT

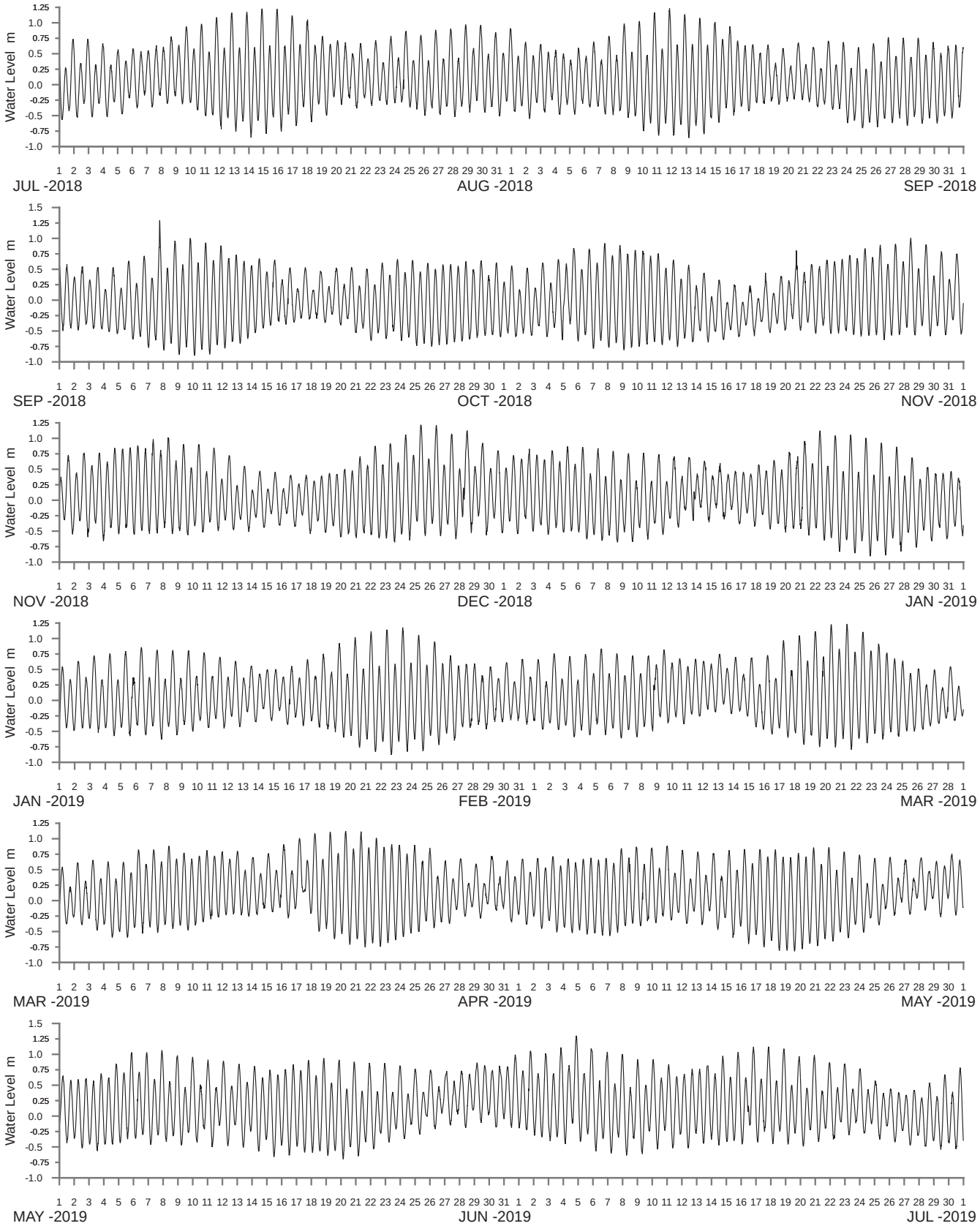
COOKS RIVER AT CANTERBURY ROAD
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 189

DRAWING 2692-189.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

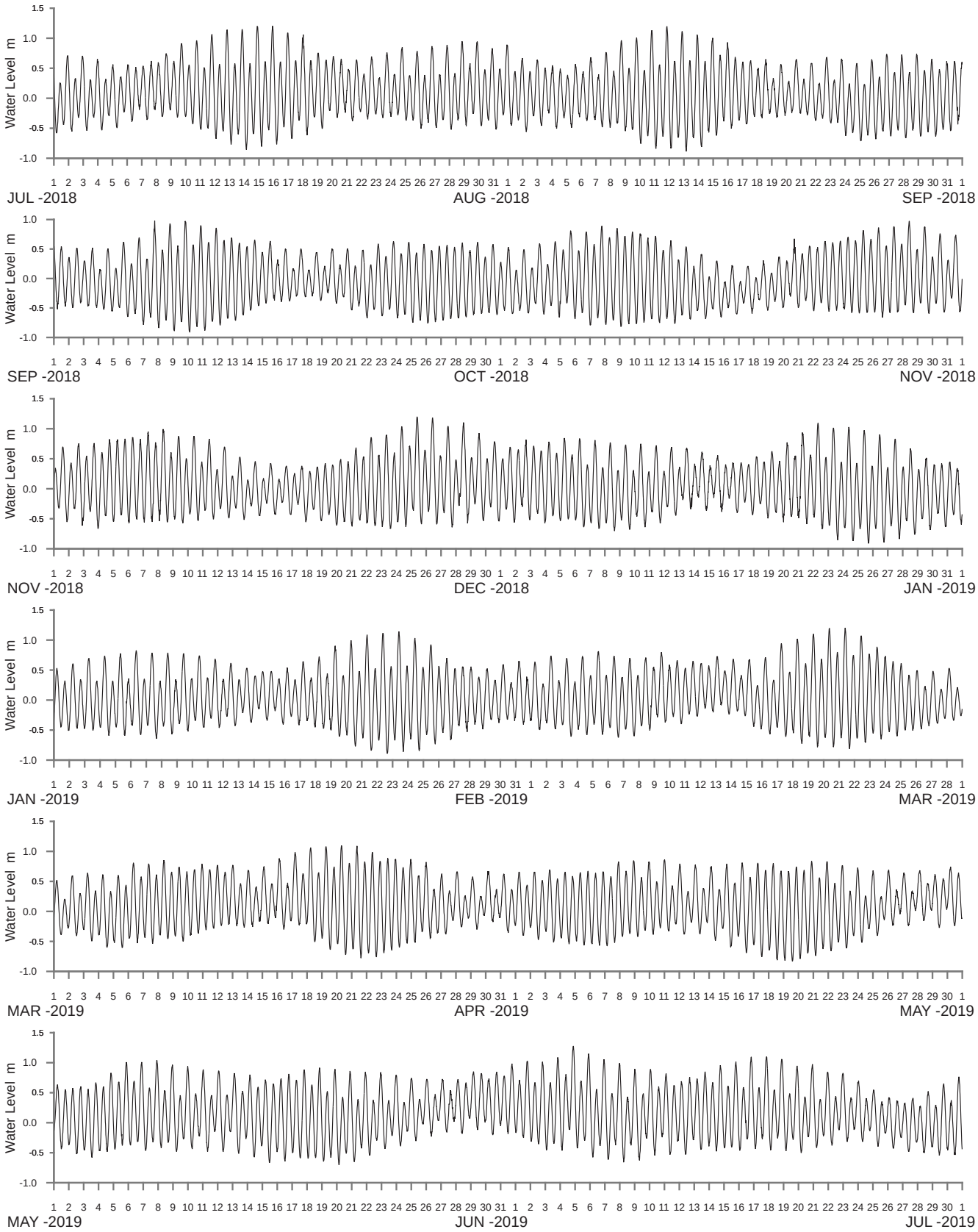
COOKS RIVER AT ILLAWARRA ROAD BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
190

DRAWING 2692-190.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

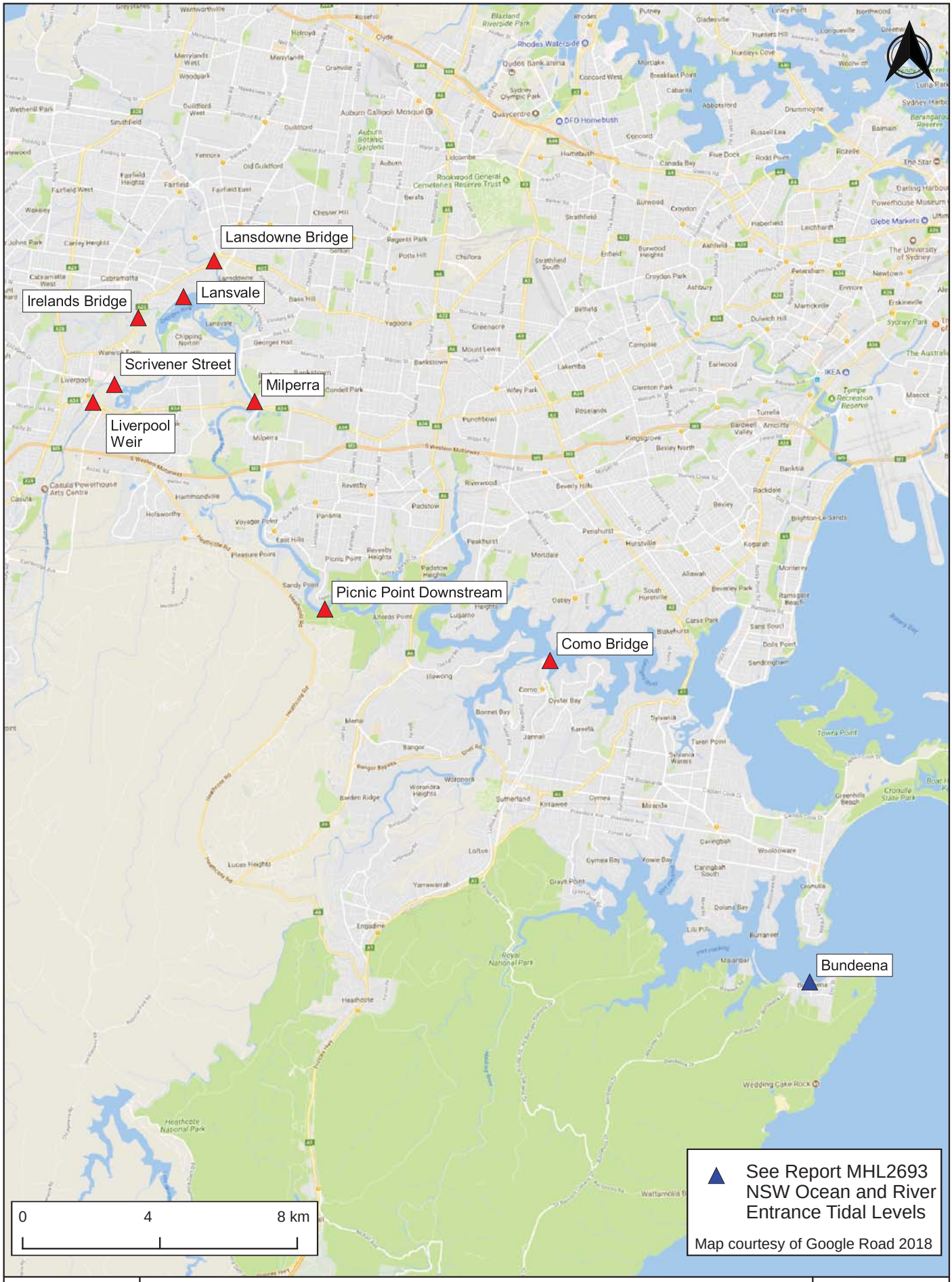
COOKS RIVER AT TEMPE BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
191

DRAWING 2692-191.cdr



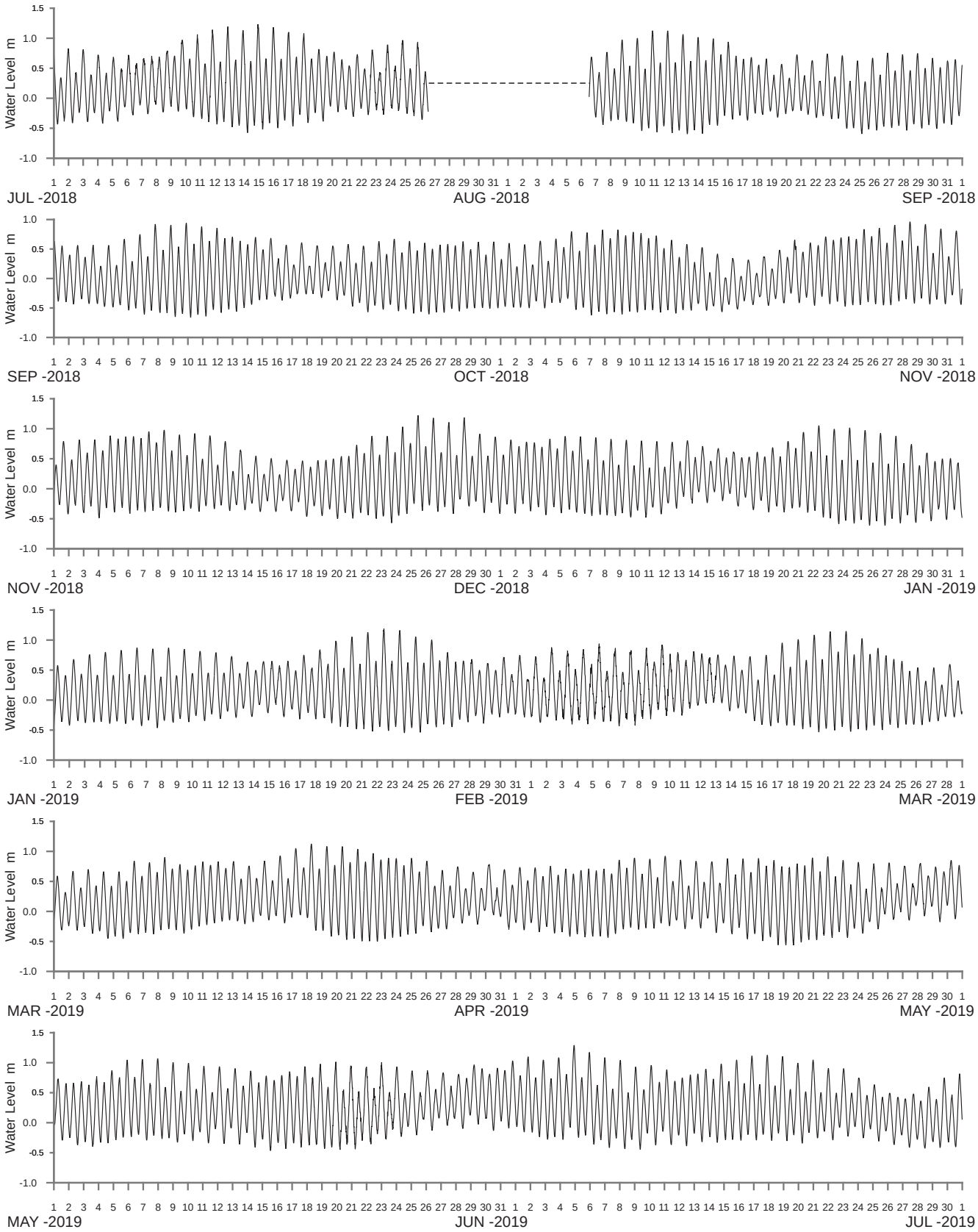
NSW GOVERNMENT

STATION LOCATIONS
GEORGES RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
192

DRAWING 2692-192.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

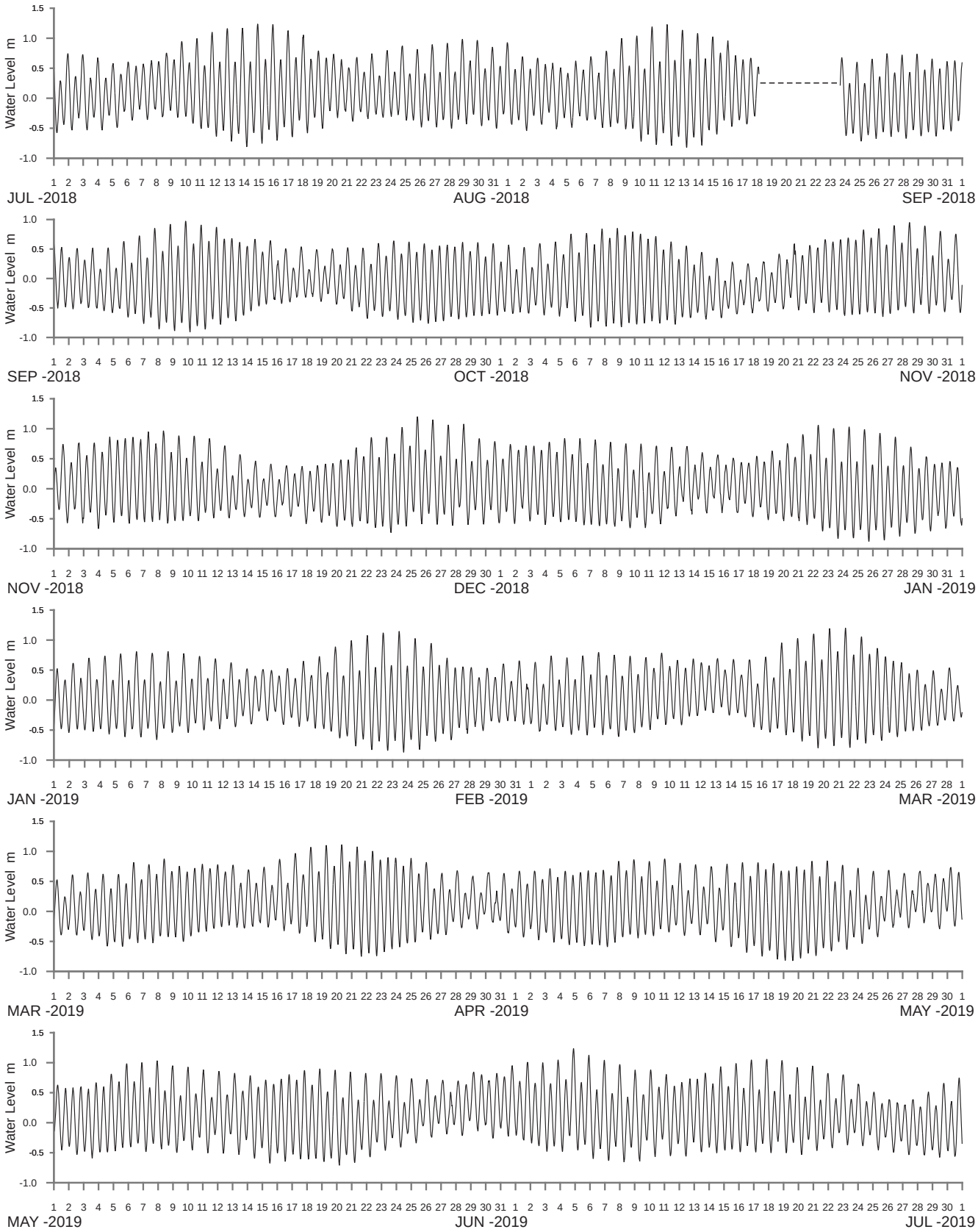
GEORGES RIVER AT PICNIC POINT DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
193

DRAWING 2692-193.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

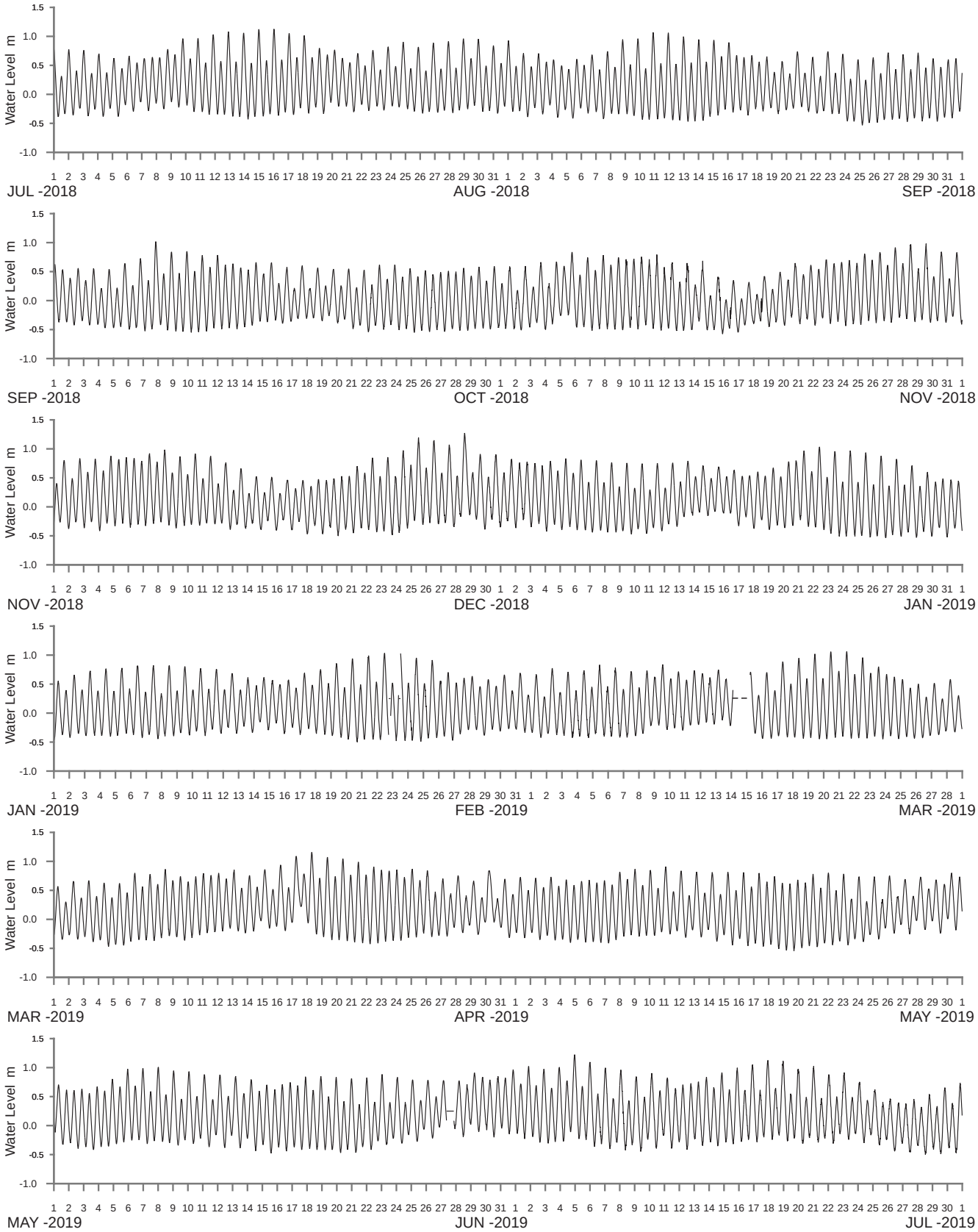
GEORGES RIVER AT COMO BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
194

DRAWING 2692-194.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

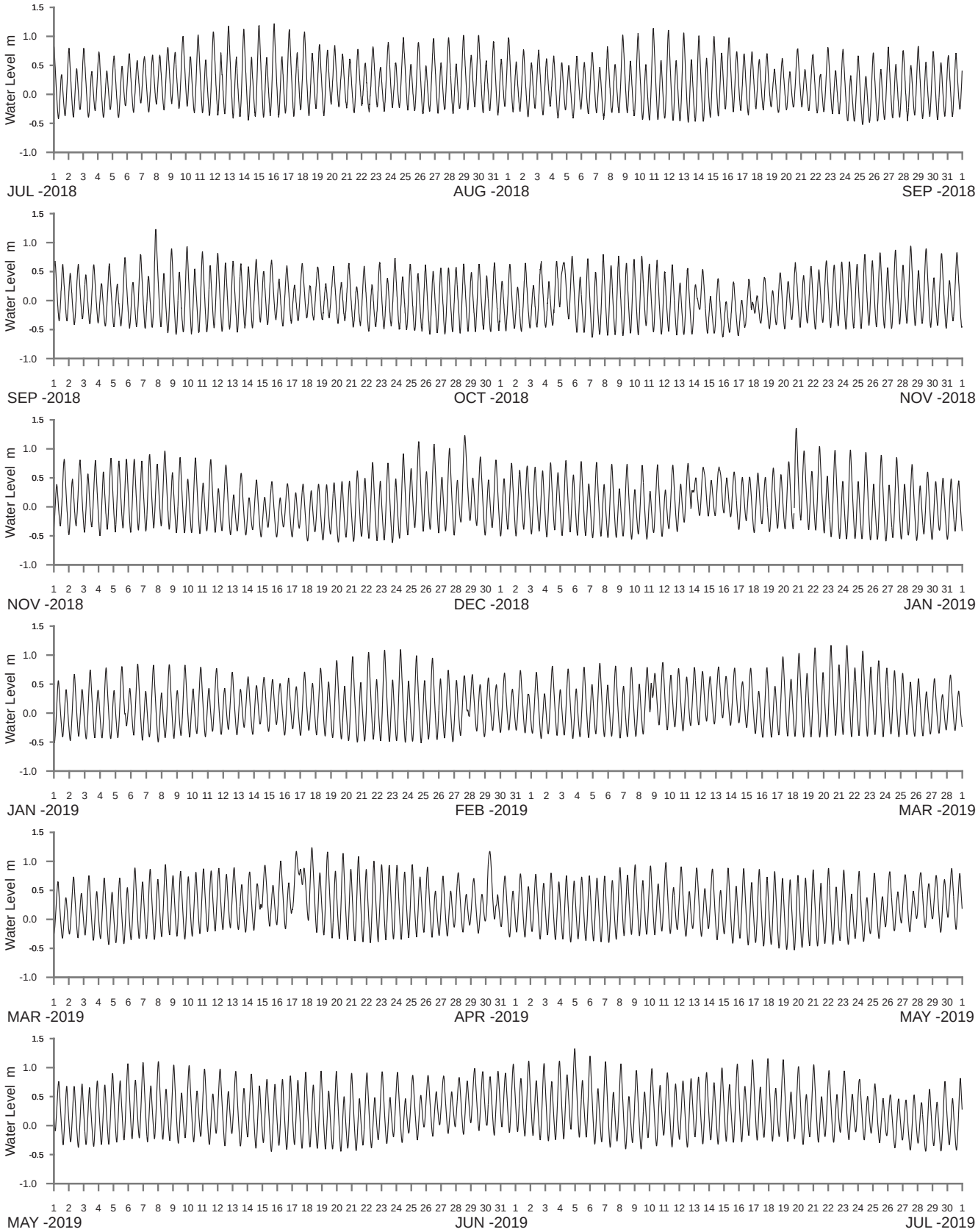
GEORGES RIVER AT MILPERRA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
195

DRAWING 2692-195.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

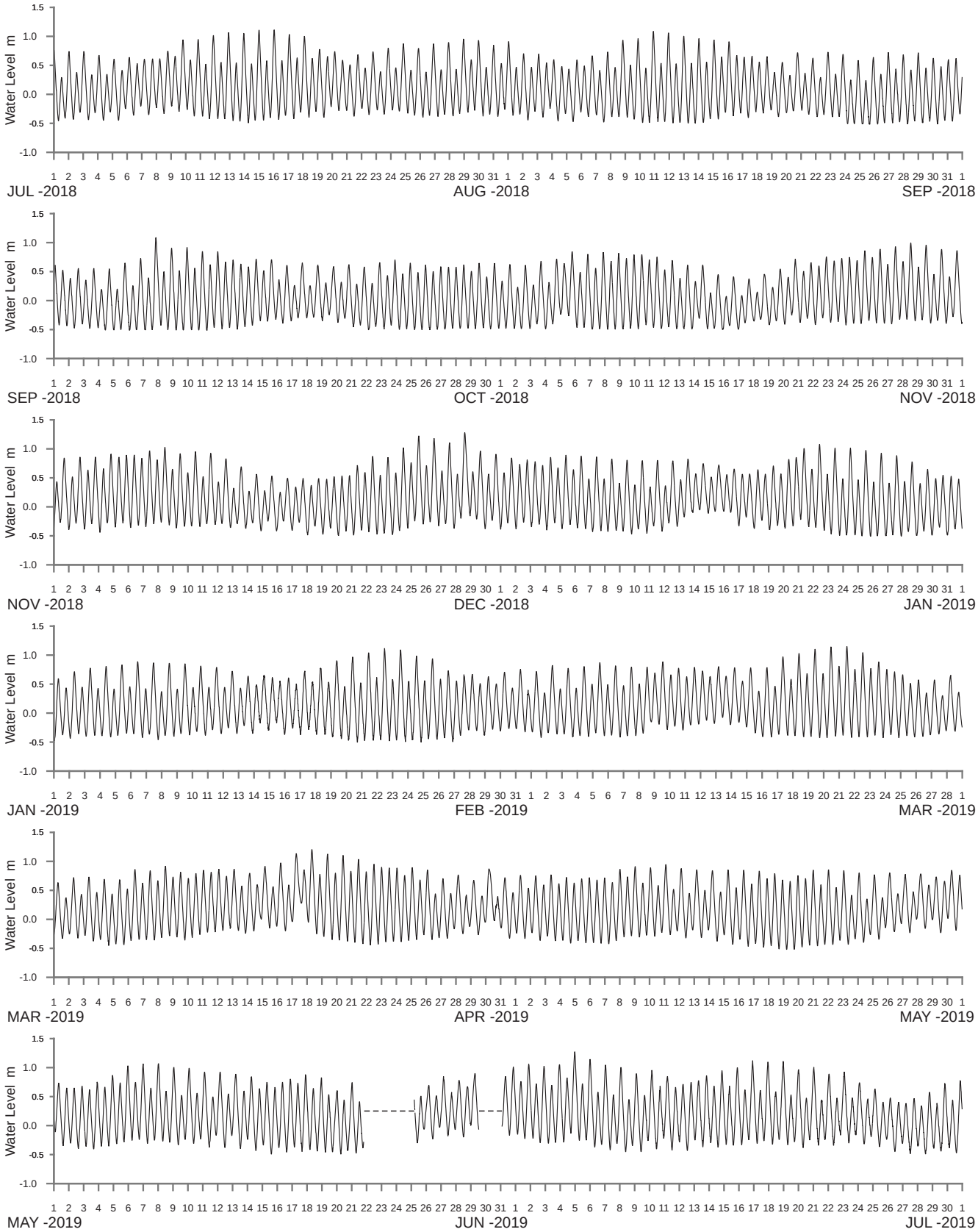
PROSPECT CREEK AT LANSDOWNE BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
196

DRAWING 2692-196.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

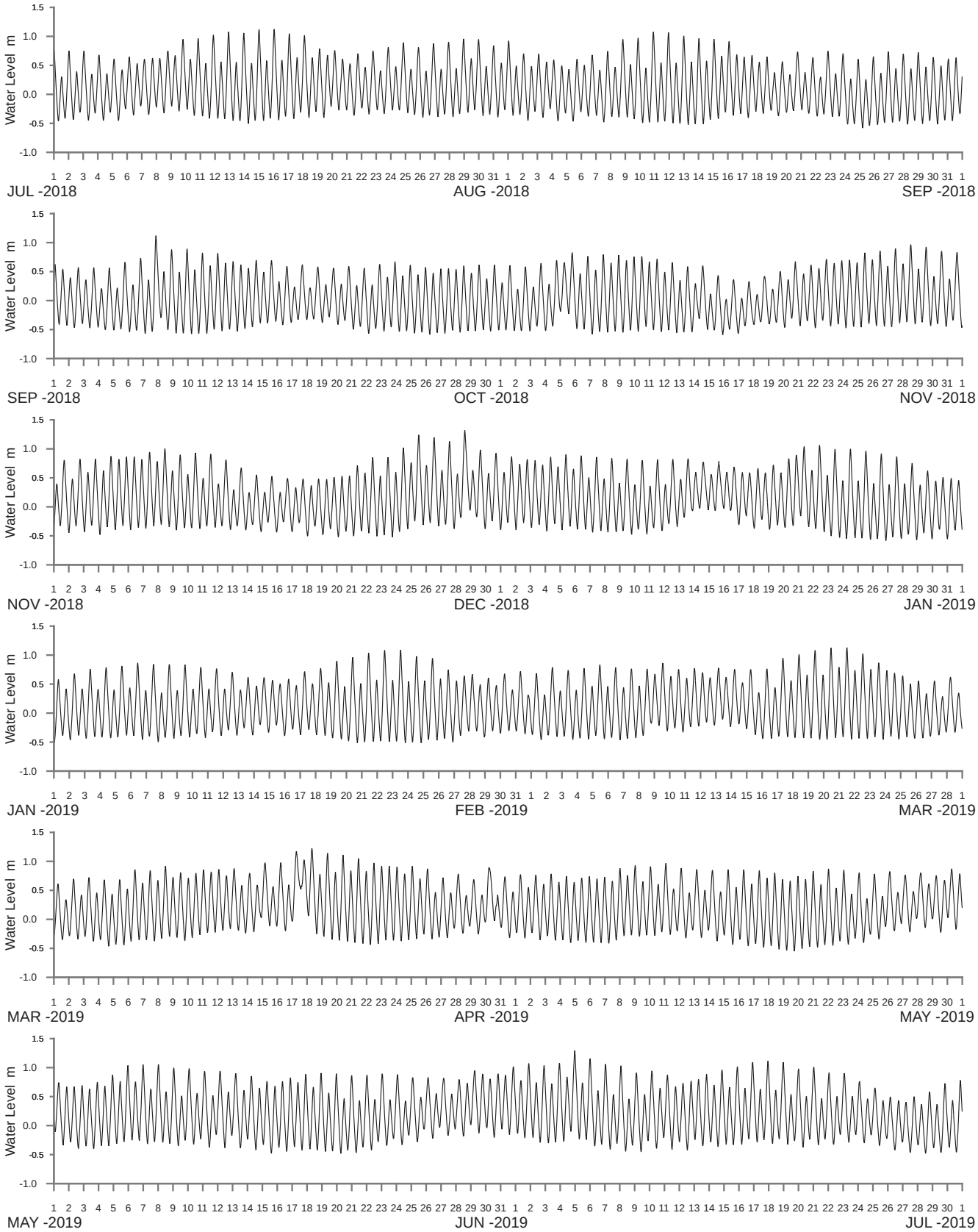
GEORGES RIVER AT LANSVALE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
197

DRAWING 2692-197.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

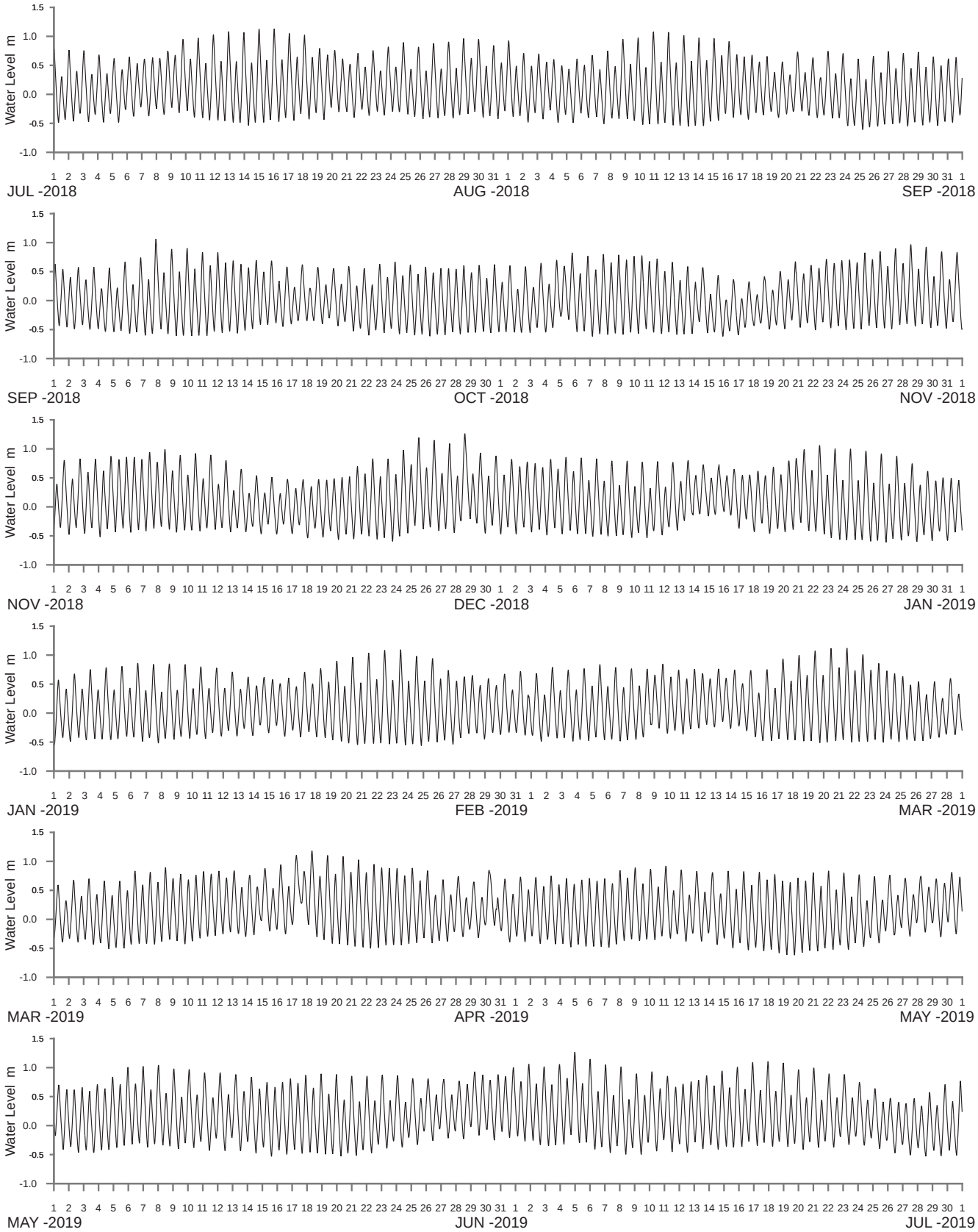
CABRAMATTA CREEK AT IRELANDS BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
198

DRAWING 2692-198.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

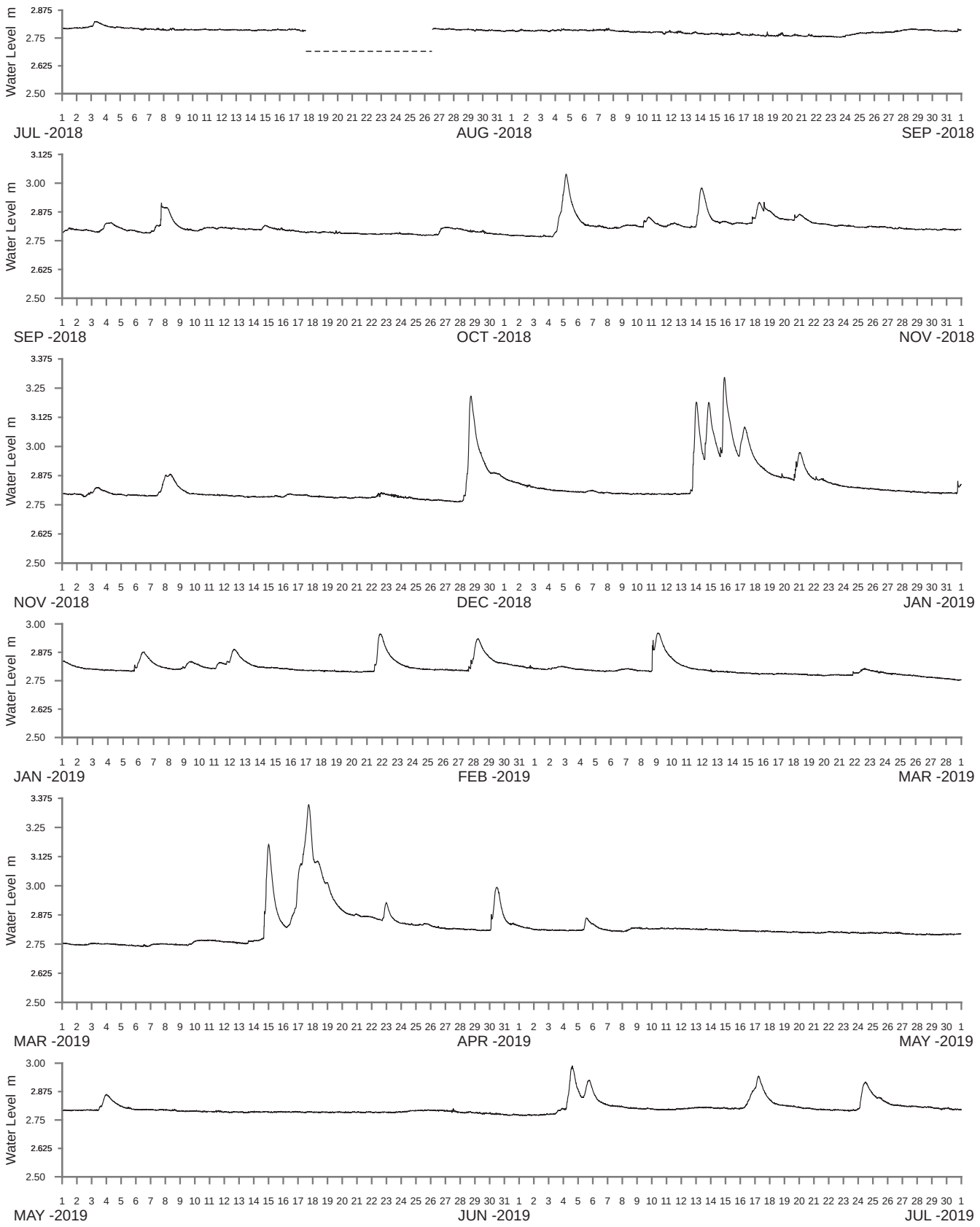
GEORGES RIVER AT SCRIVENER STREET
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
199

DRAWING 2692-199.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

Weir crest height is approximately 2.762m AHD

NSW GOVERNMENT

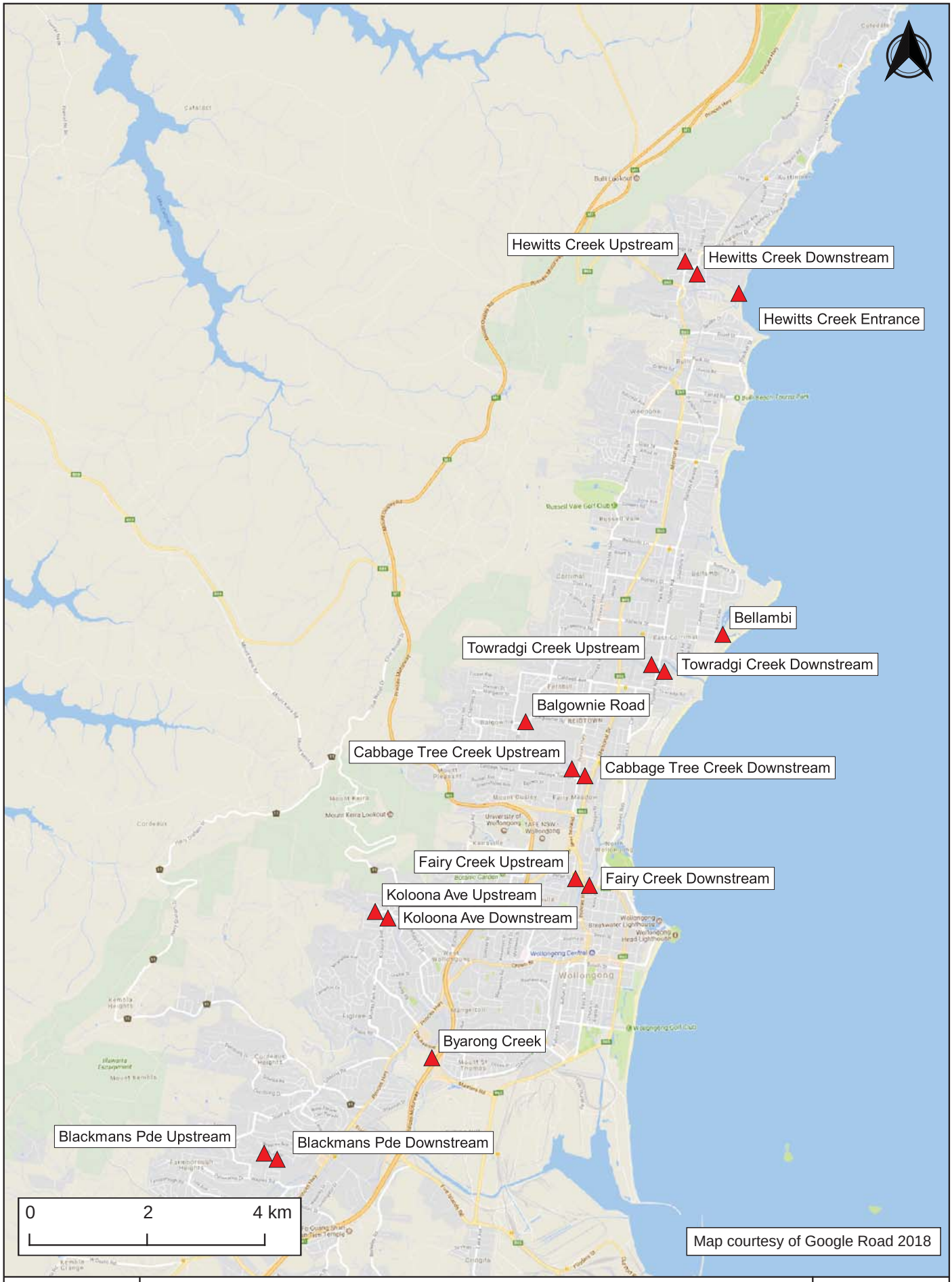
GEORGES RIVER AT LIVERPOOL WEIR
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 200

DRAWING 2692-200.cdr



NSW GOVERNMENT

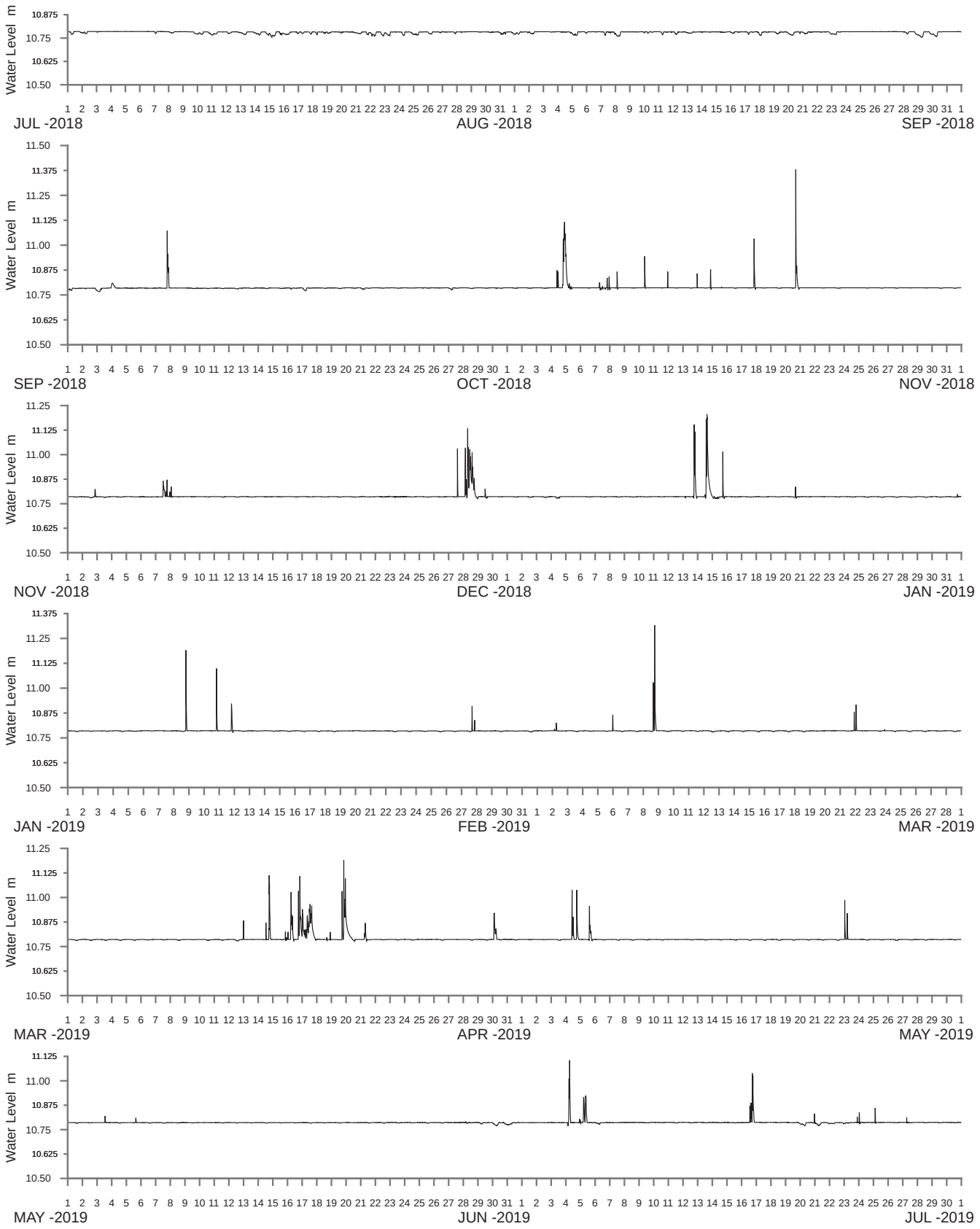
STATION LOCATIONS
WOLLONGONG REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 201

DRAWING 2692-201.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

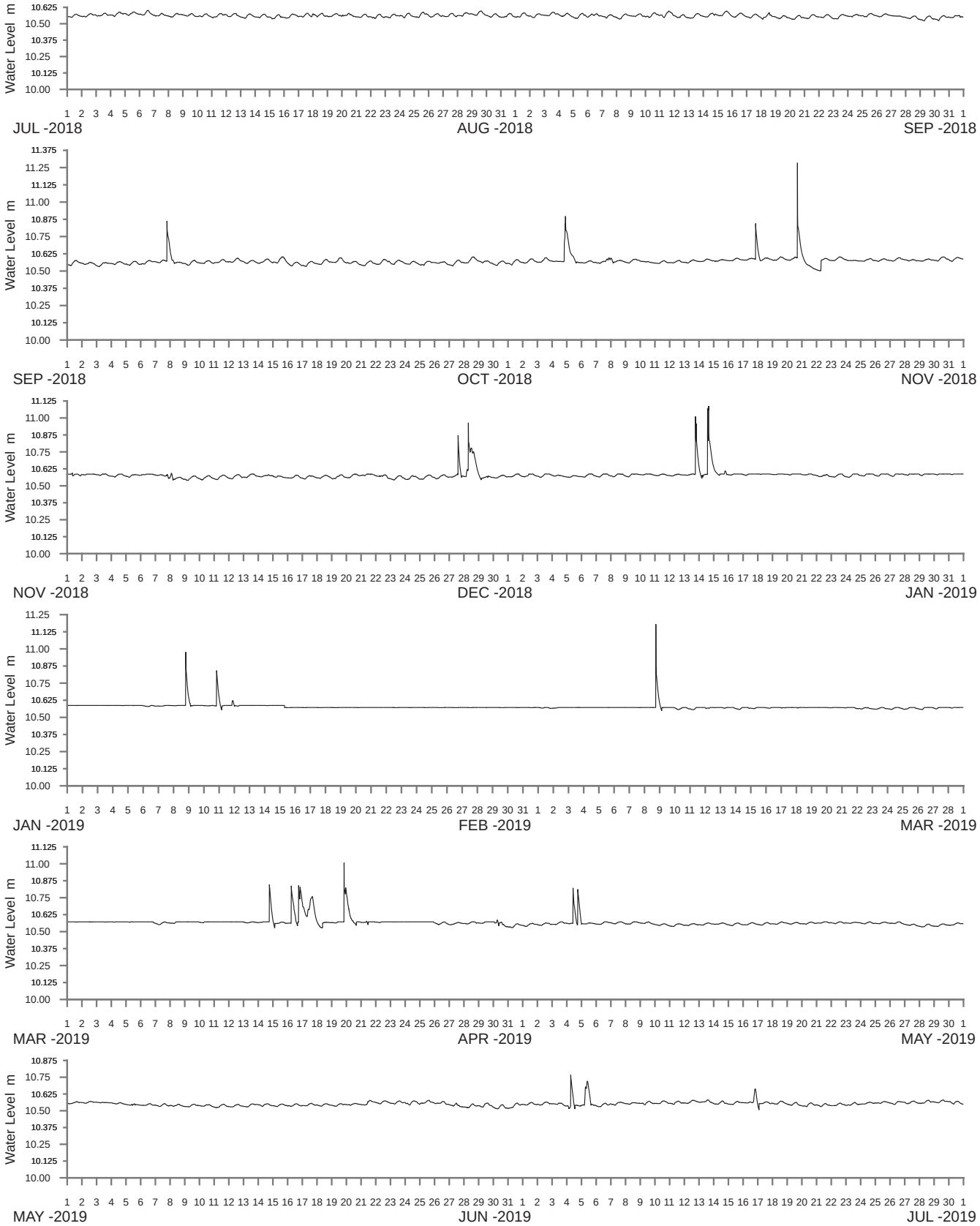
HEWITTS CREEK AT HEWITTS CREEK UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
202

DRAWING 2692-202.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

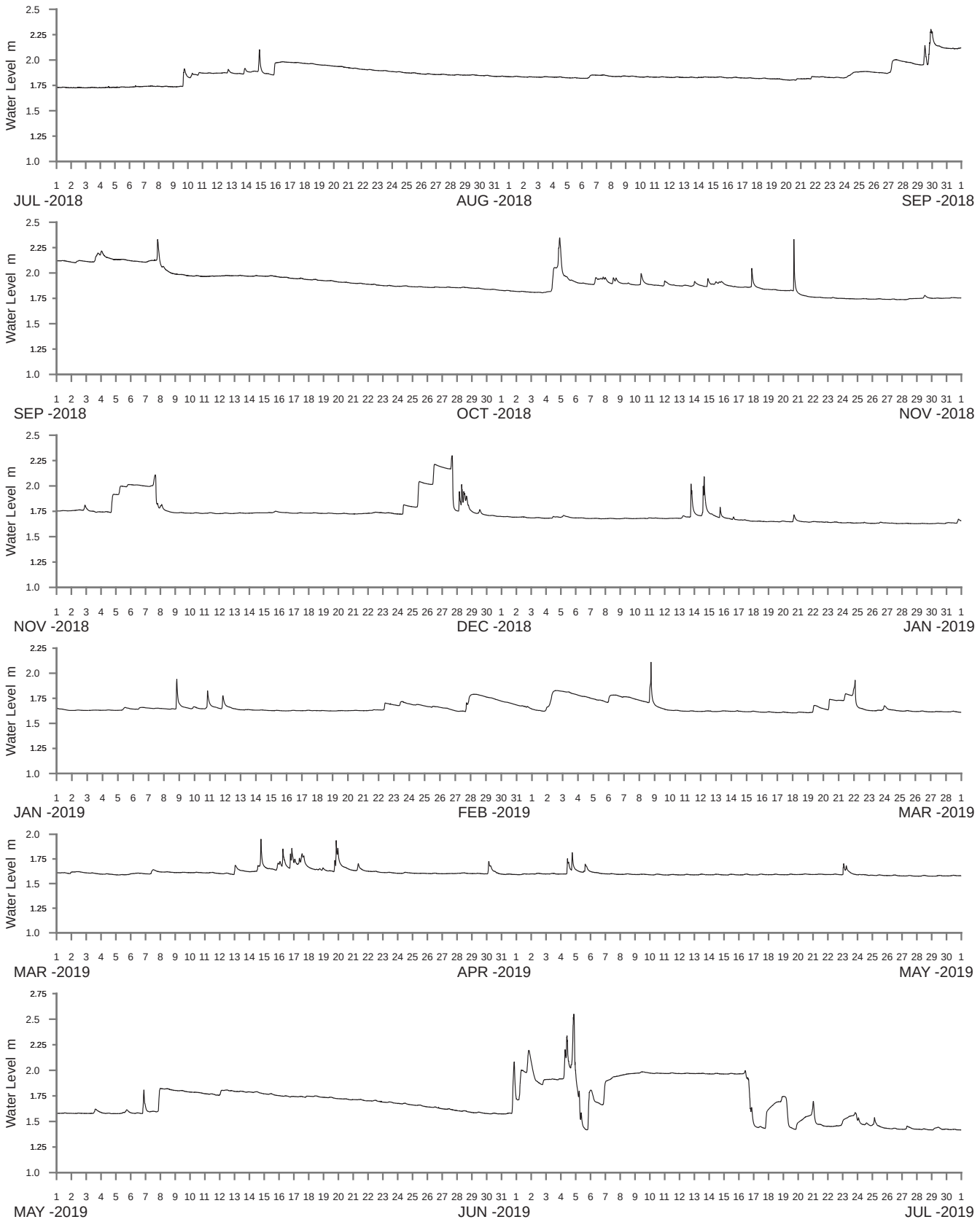
HEWITTS CREEK AT HEWITTS CREEK DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 203

DRAWING 2692-203.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

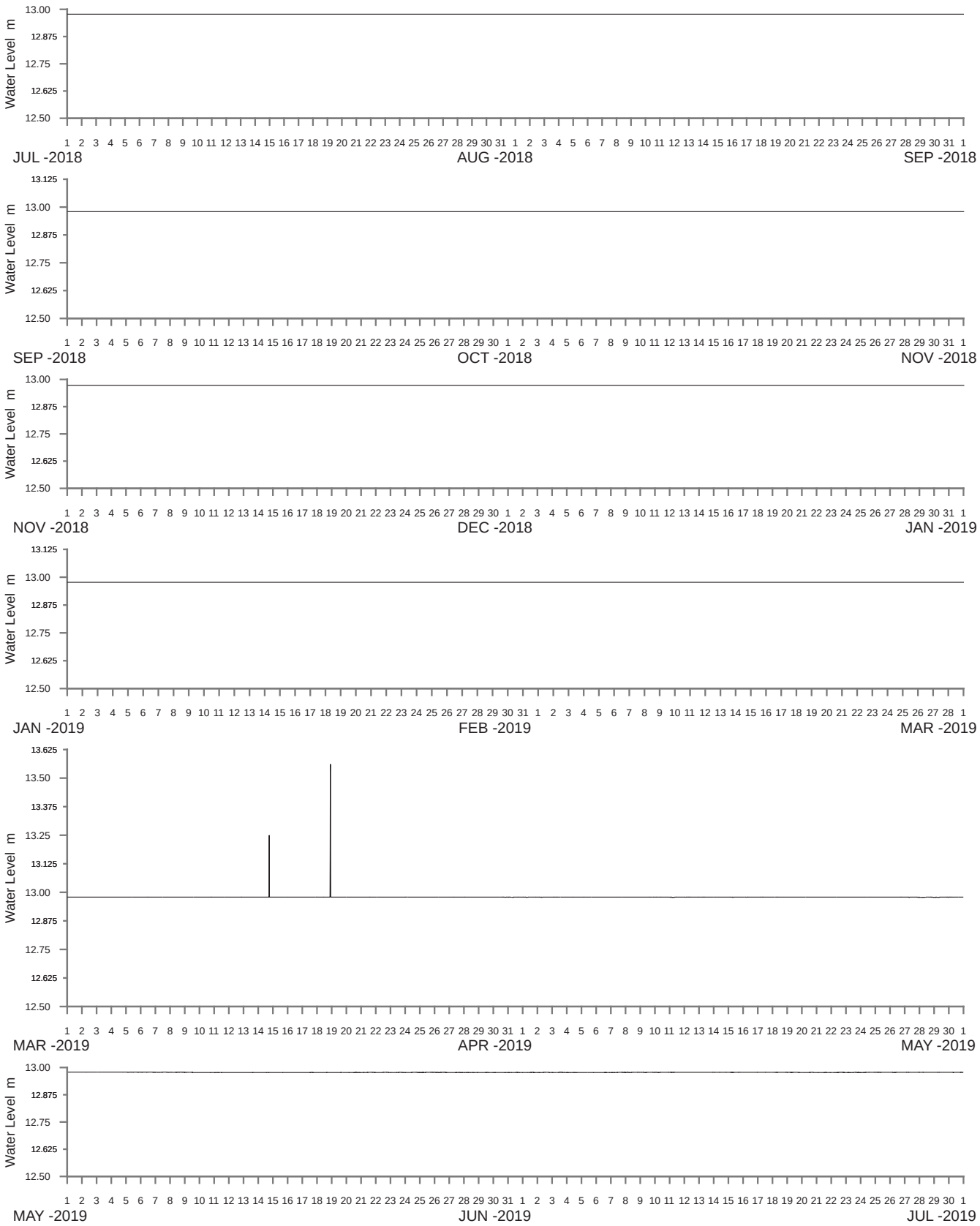
HEWITTS CREEK AT HEWITTS CREEK ENTRANCE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
204

DRAWING 2692-204.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

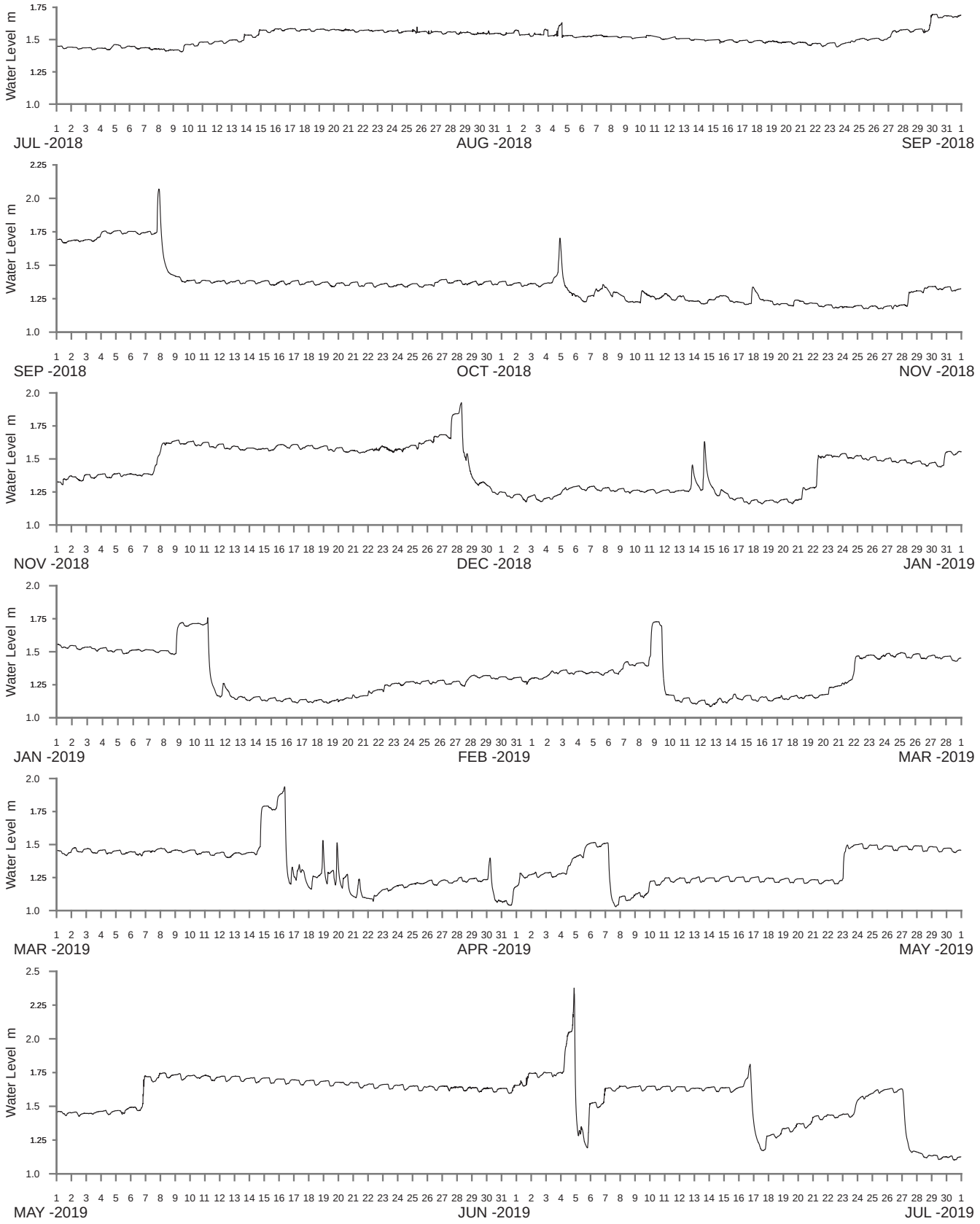
CABBAGE TREE CREEK AT BALGOWNIE ROAD
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
205

DRAWING 2692-205.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

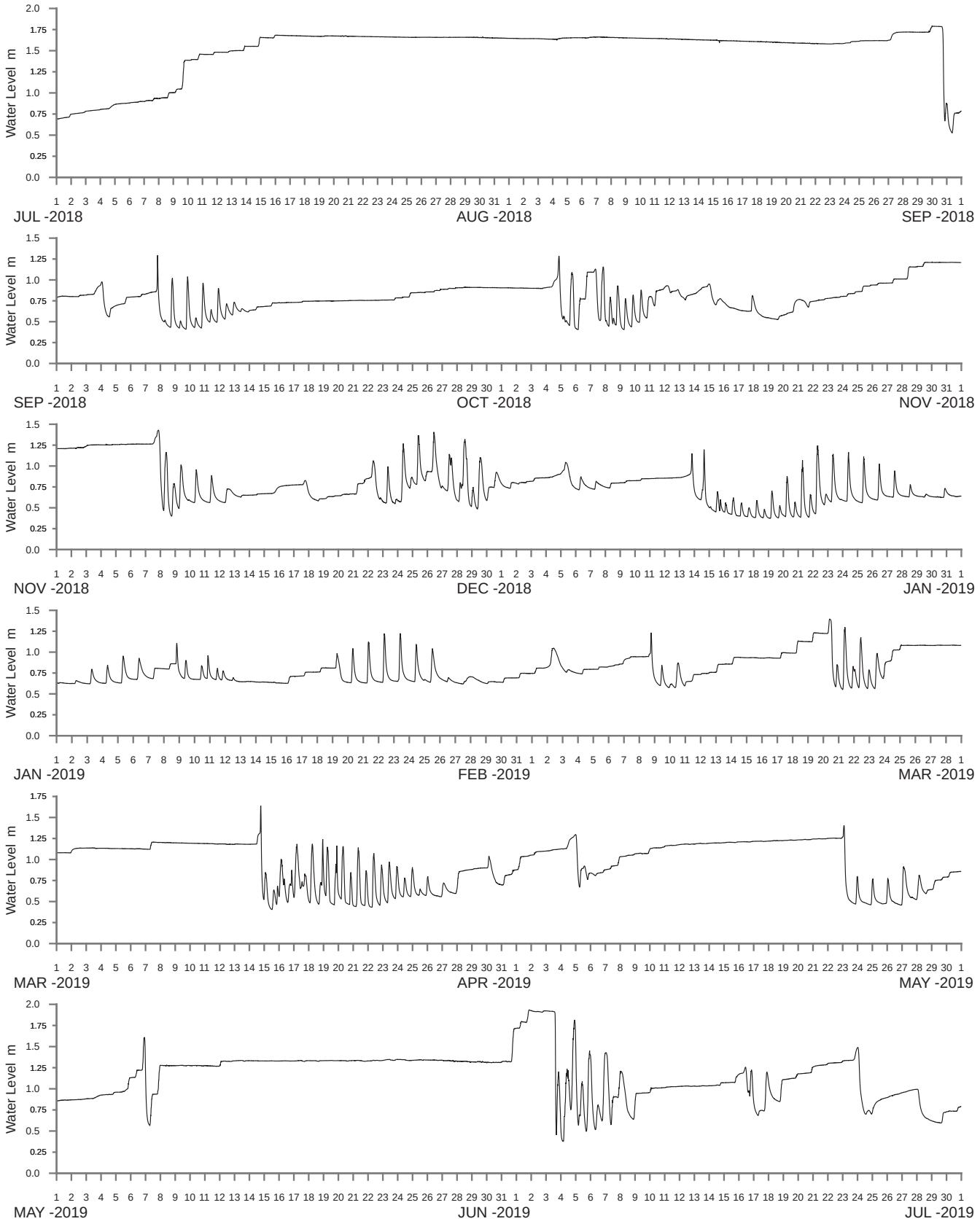
BELLAMBI LAKE AT BELLAMBI
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
206

DRAWING 2692-206.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

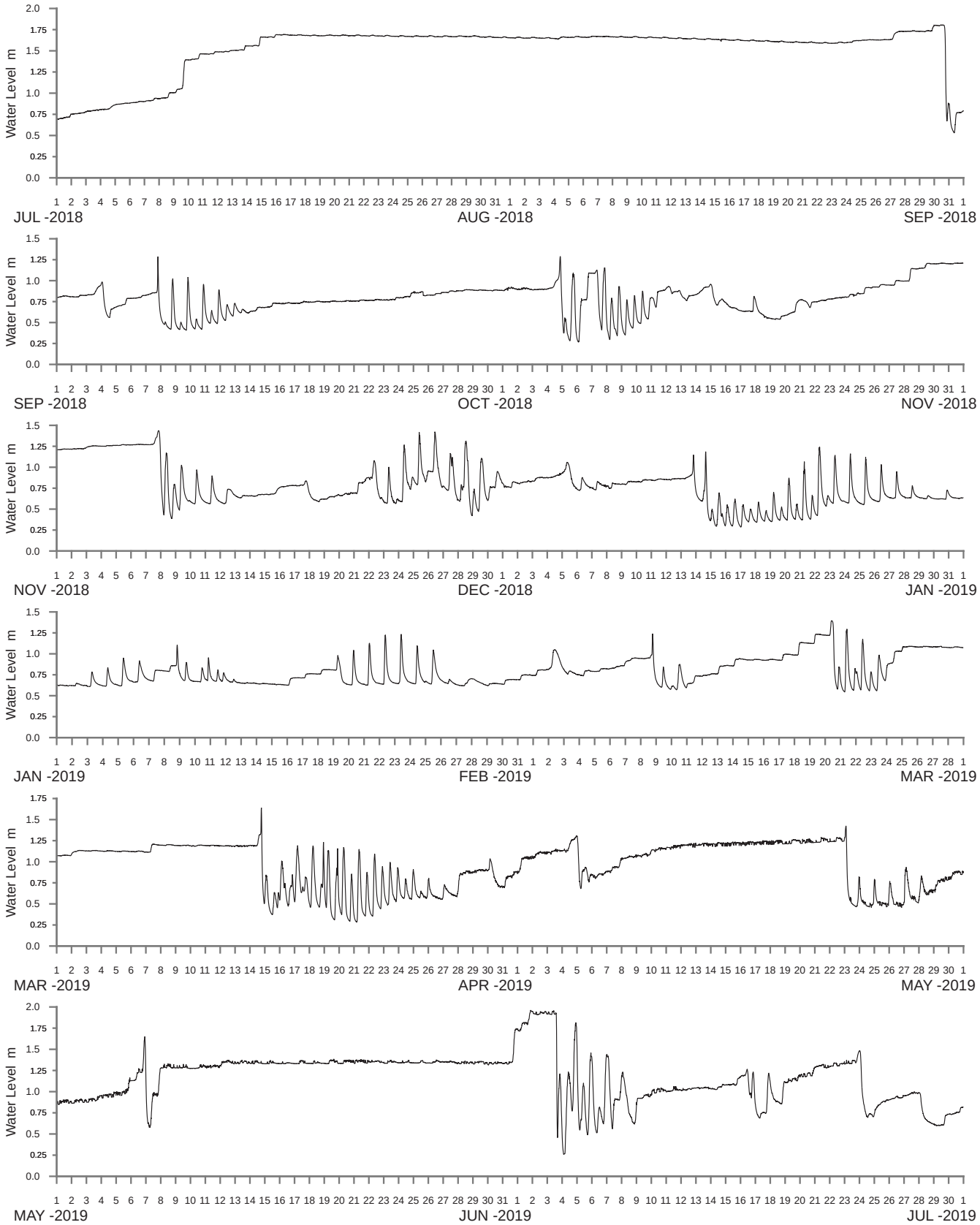
TOWRADGI CREEK AT TOWRADGI CREEK UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
207

DRAWING 2692-207.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

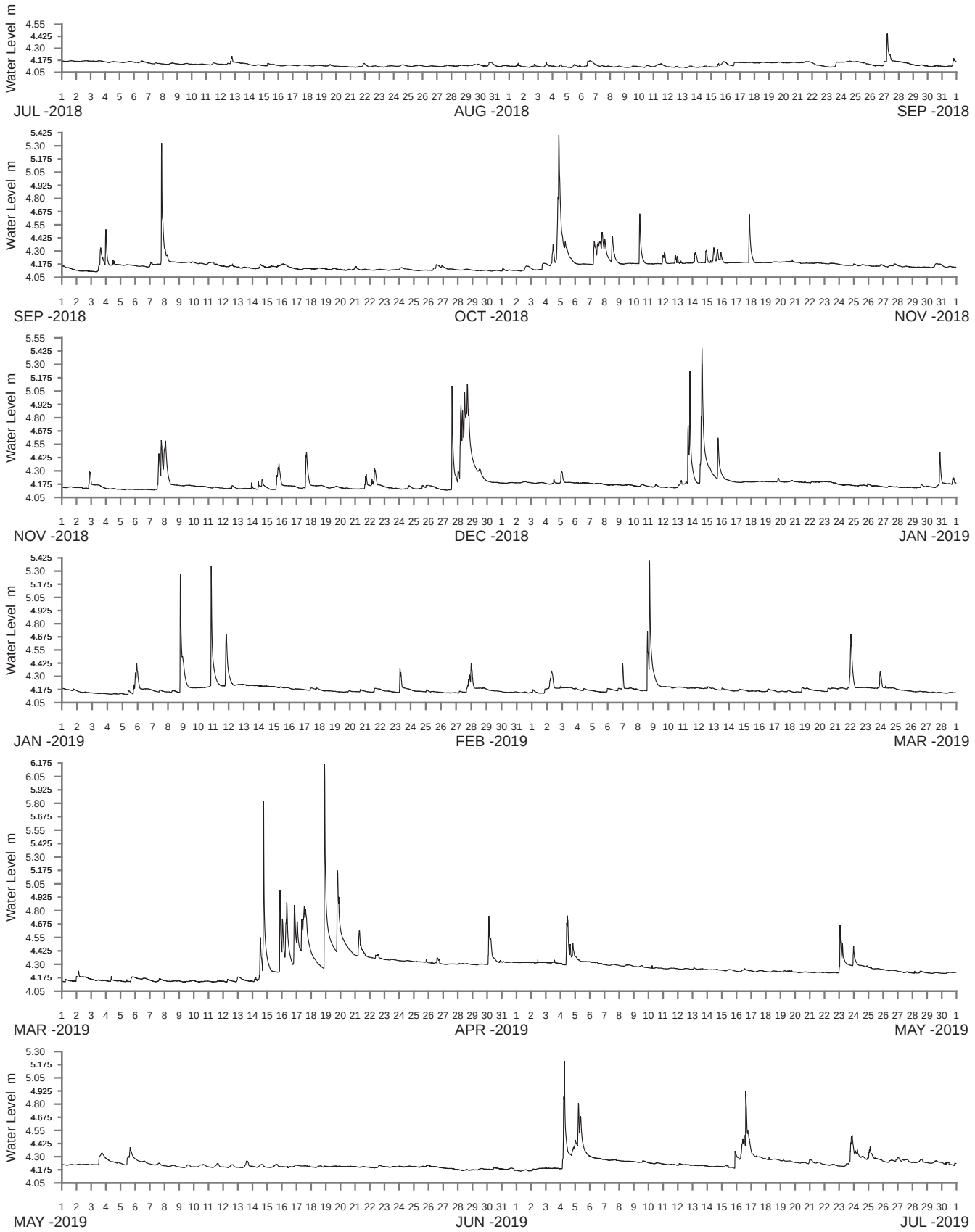
TOWRADGI CREEK AT TOWRADGI CREEK DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
208

DRAWING 2692-208.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

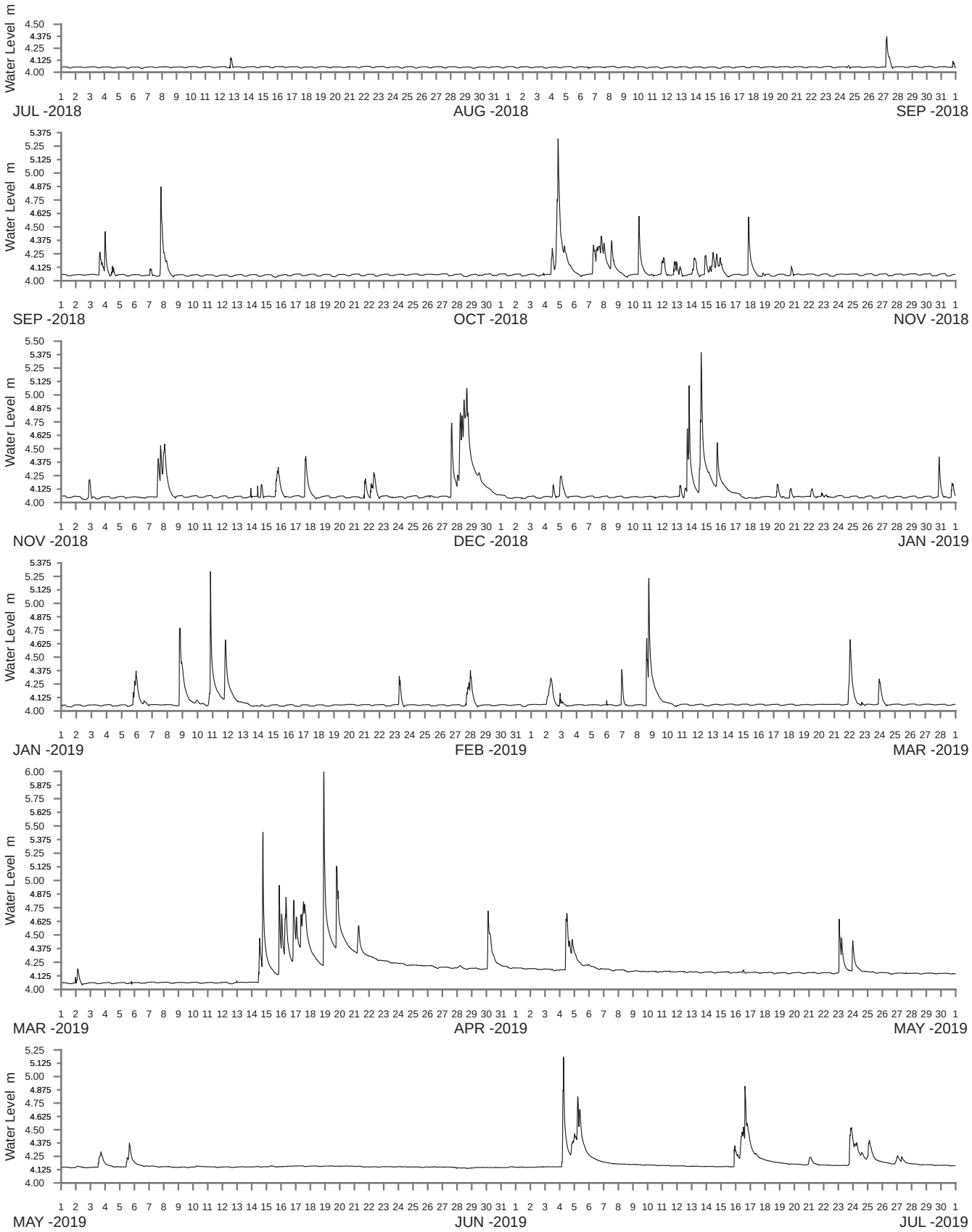
CABBAGE TREE CREEK AT CABBAGE TREE CREEK UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 209

DRAWING 2692-209.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

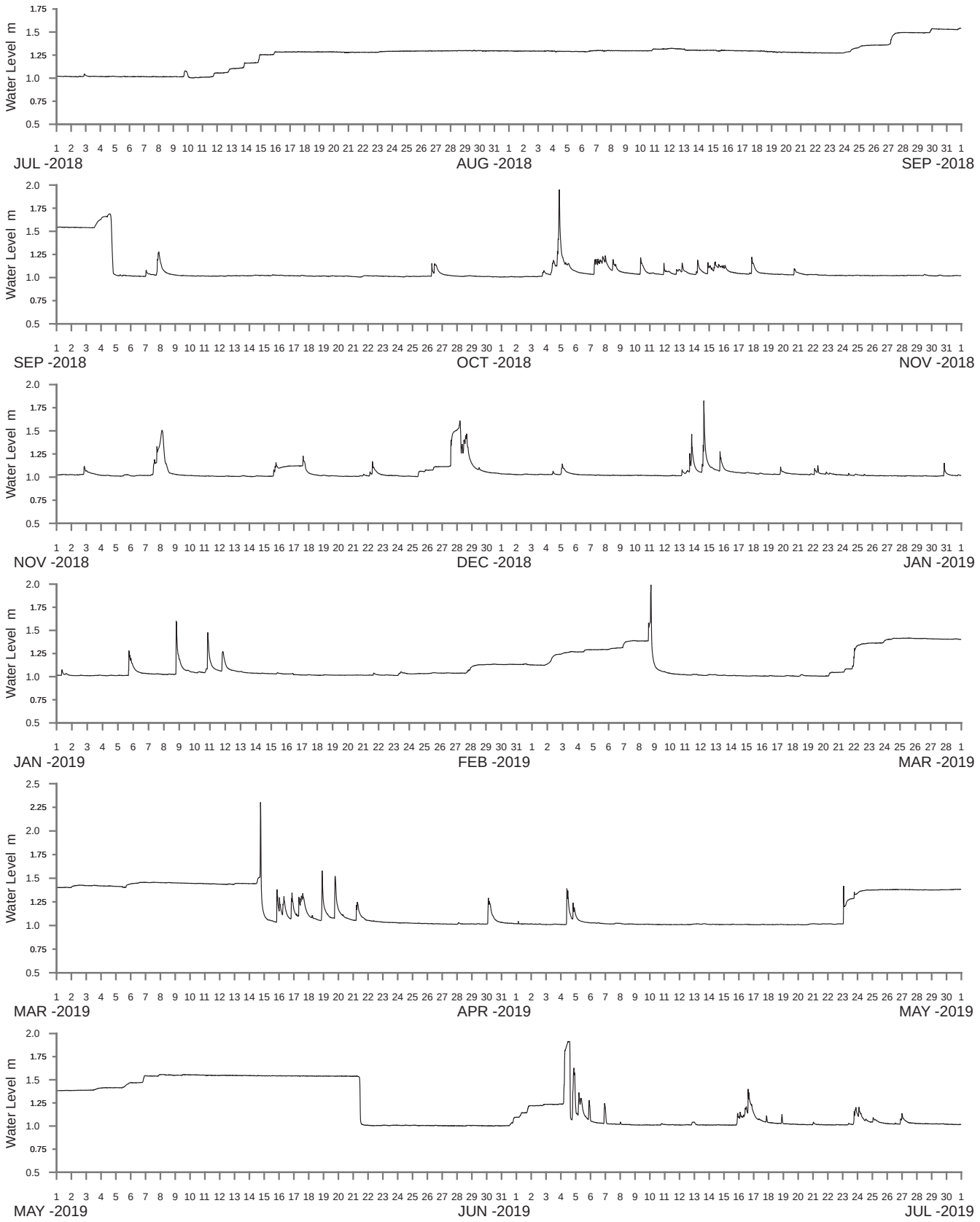
CABBAGE TREE CREEK AT CABBAGE TREE CREEK DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
210

DRAWING 2692-210.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

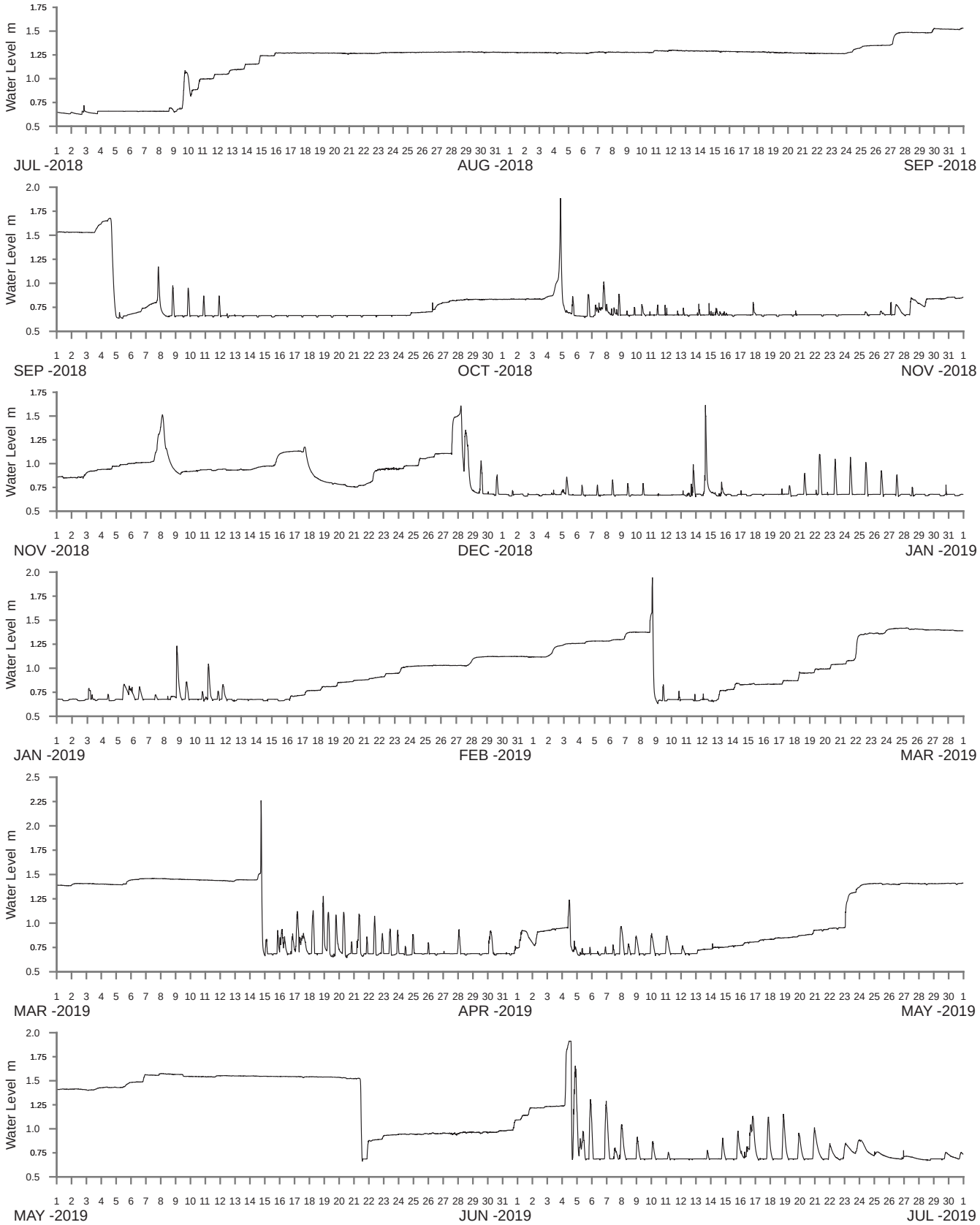
FAIRY CREEK AT FAIRY CREEK UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
211

DRAWING 2692-211.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

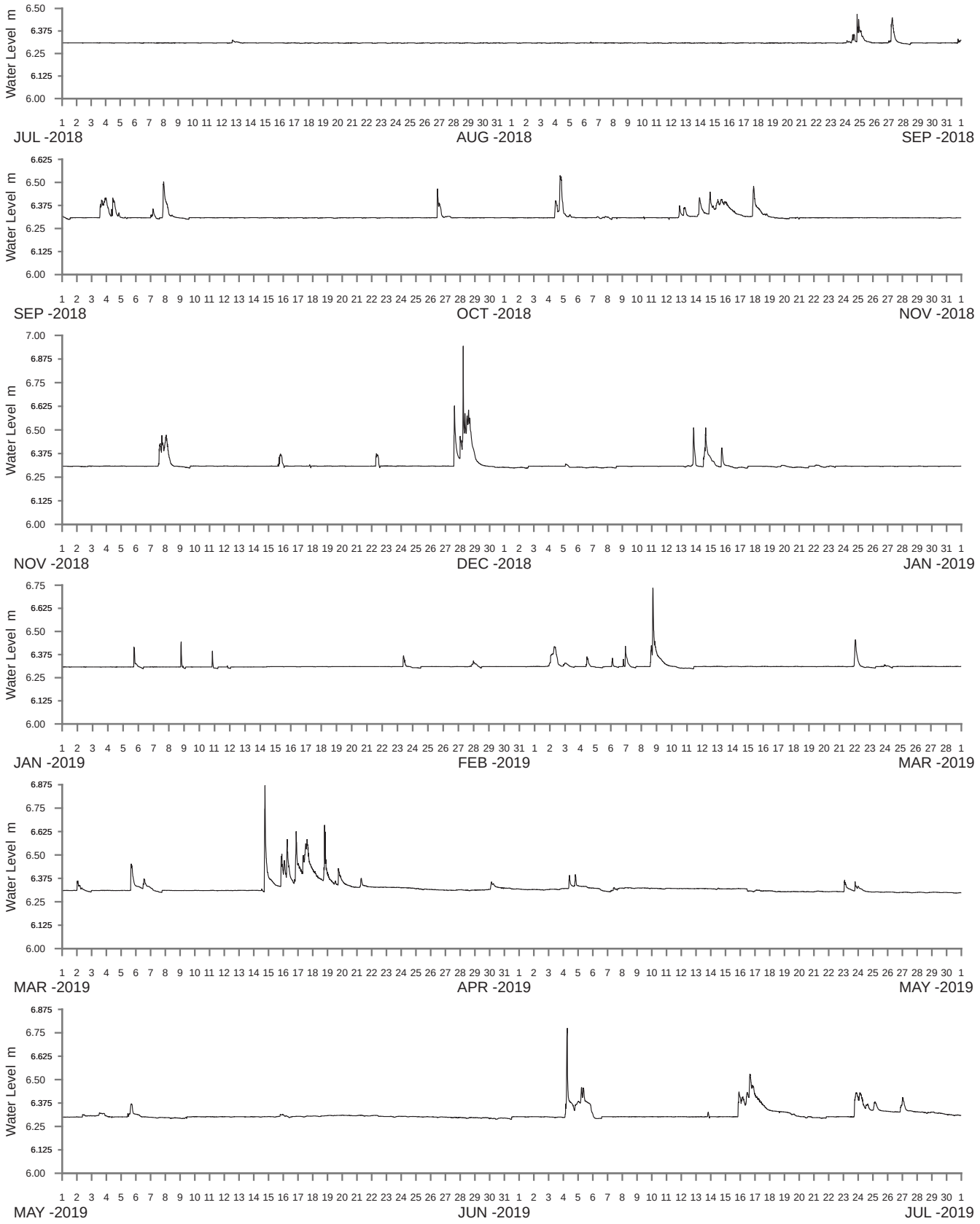
FAIRY CREEK AT FAIRY CREEK DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
212

DRAWING 2692-212.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

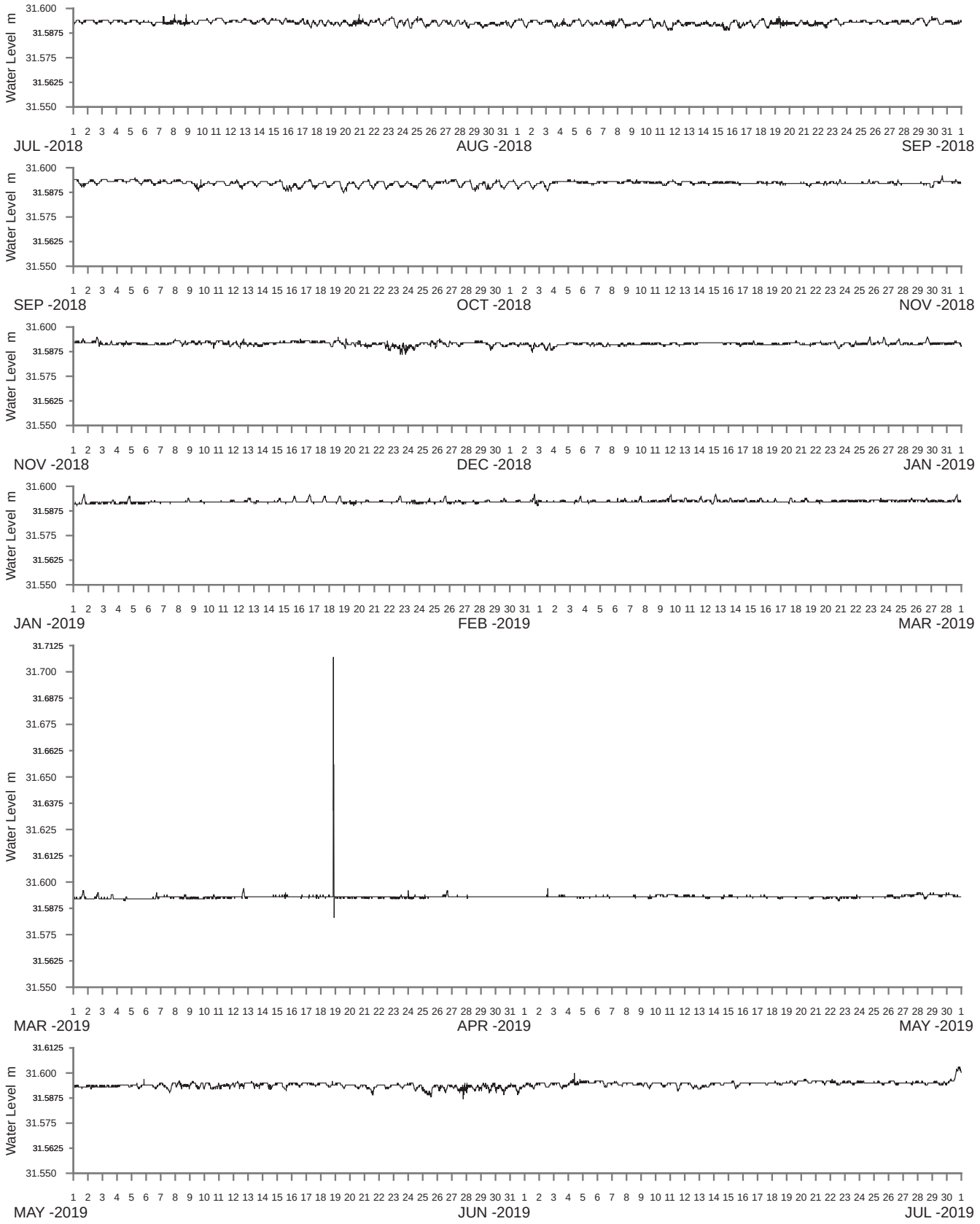
BYARONG CREEK AT BYARONG CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
213

DRAWING 2692-213.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

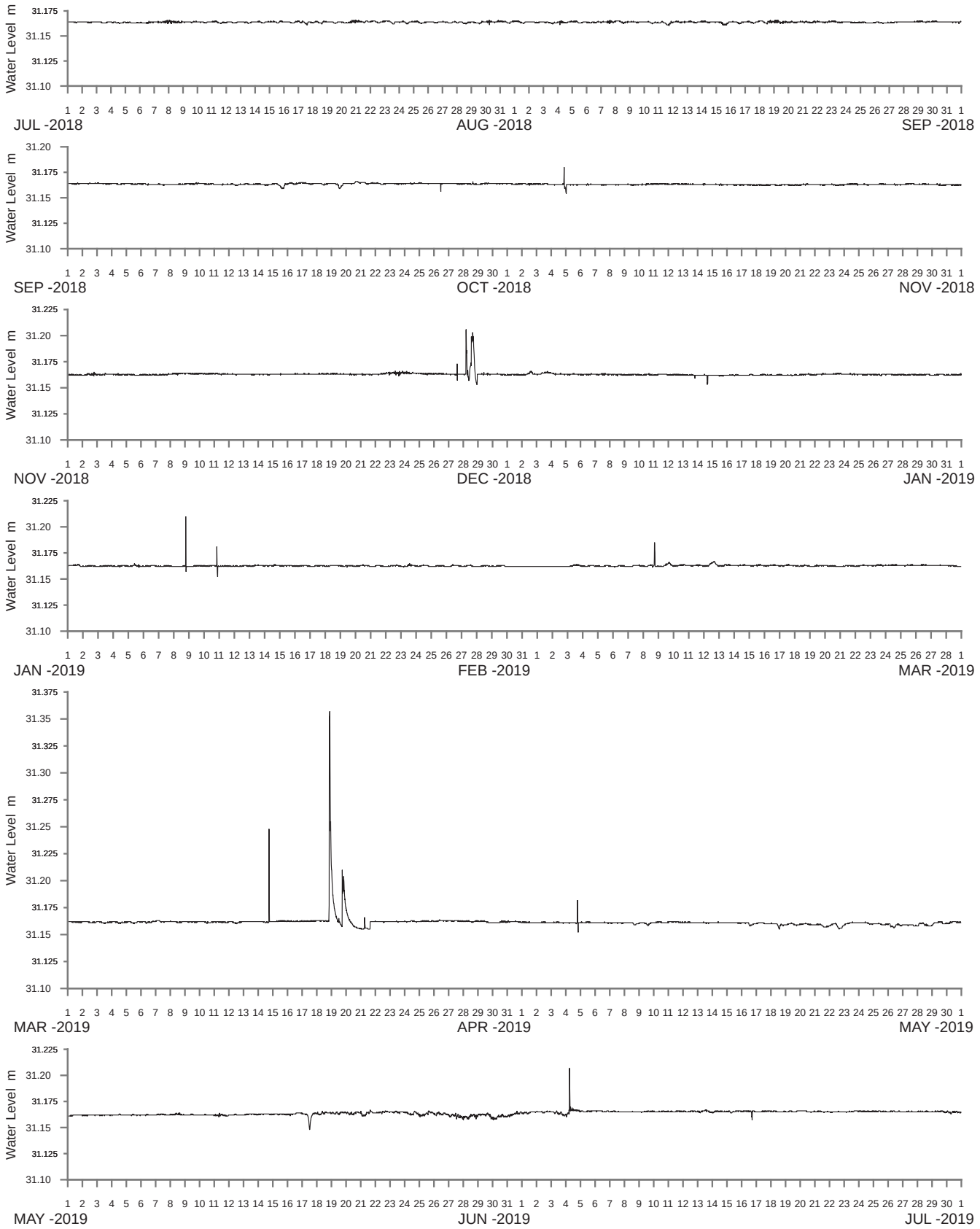
BYARONG CREEK AT KOLOONA AVENUE UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 214

DRAWING 2692-214.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

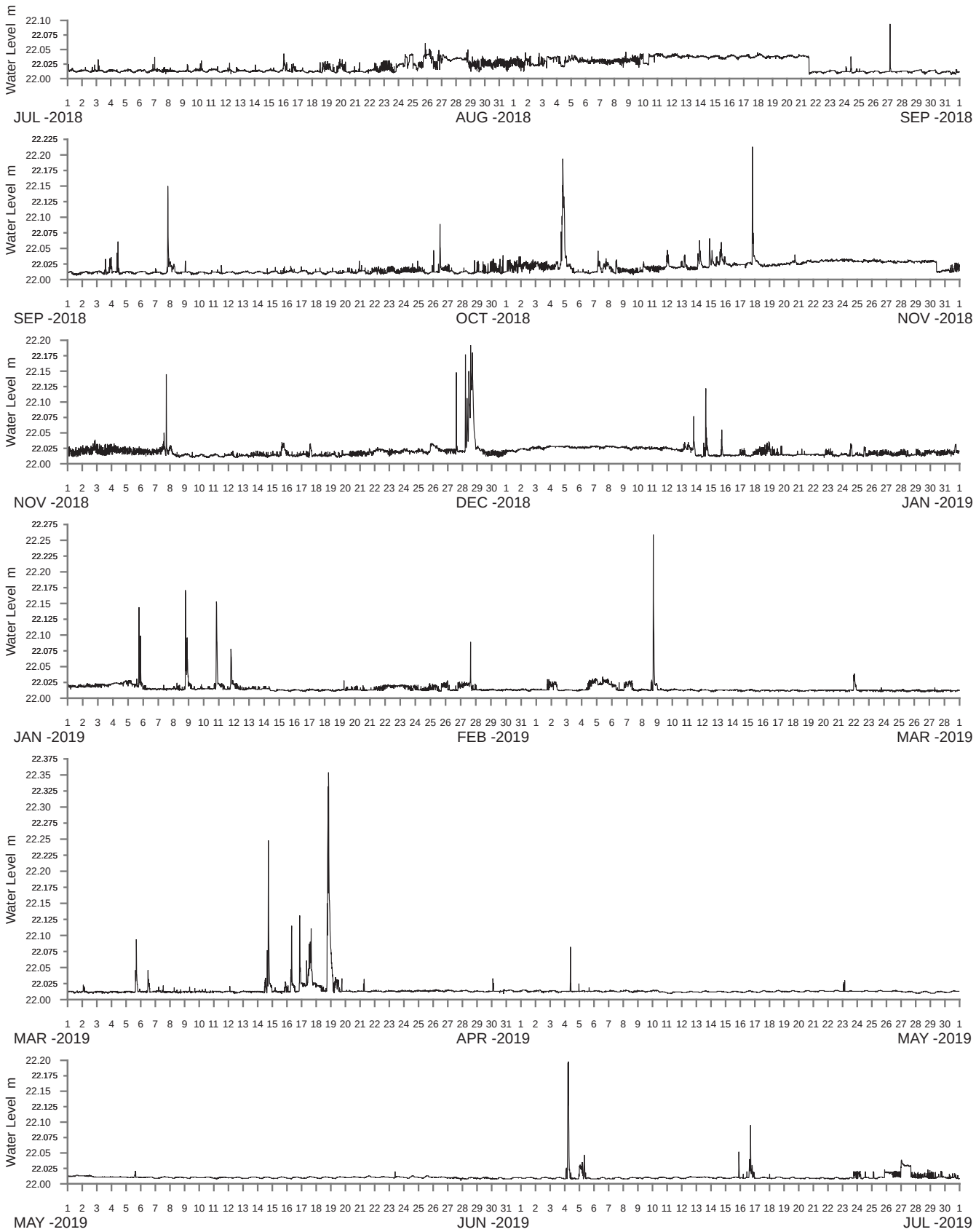
BYARONG CREEK AT KOLOONA AVENUE DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 215

DRAWING 2692-215.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

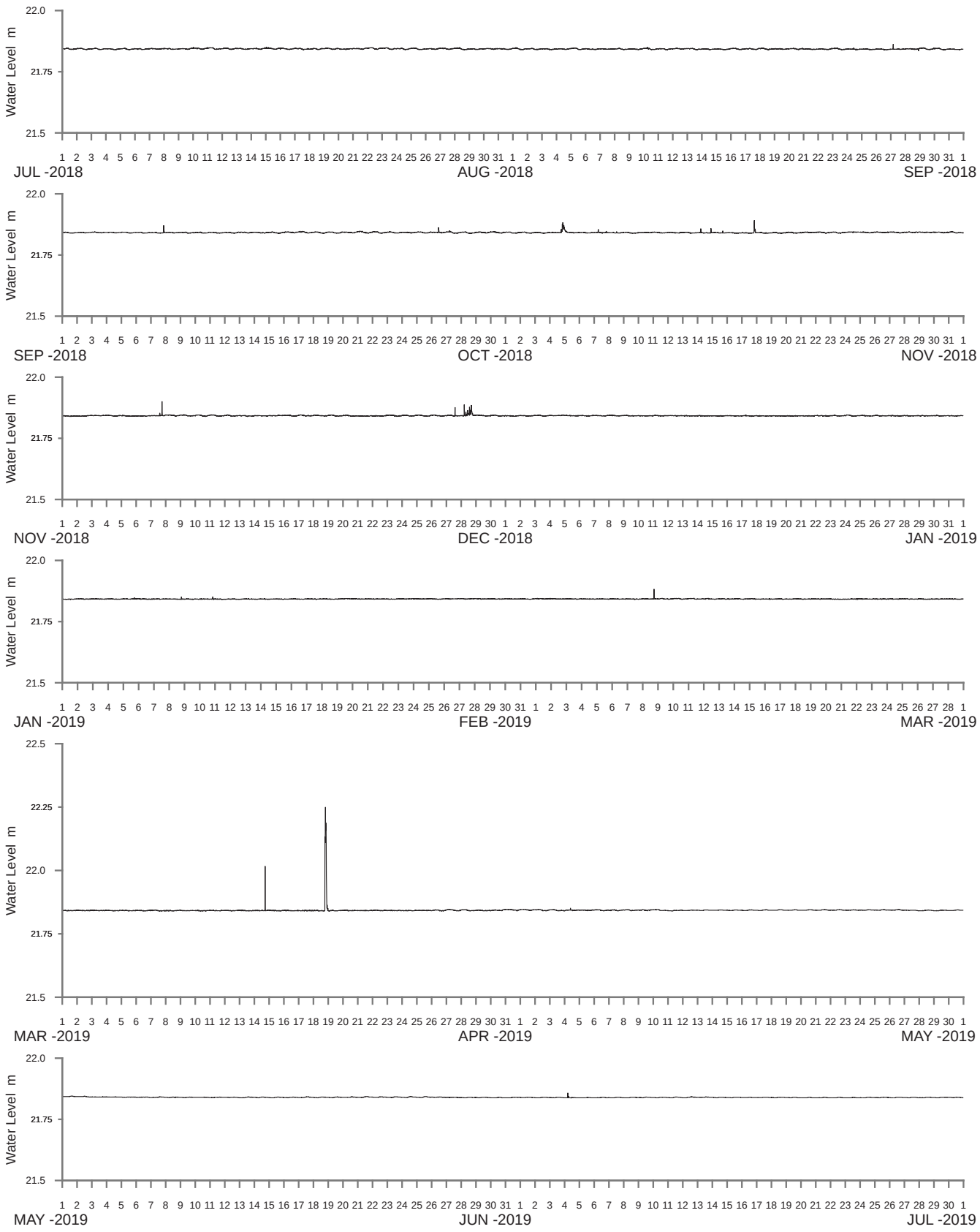
AMERICAN CREEK AT BLACKMANS PARADE UPSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
216

DRAWING 2692-216.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

AMERICAN CREEK AT BLACKMANS PARADE DOWNSTREAM
2018–2019

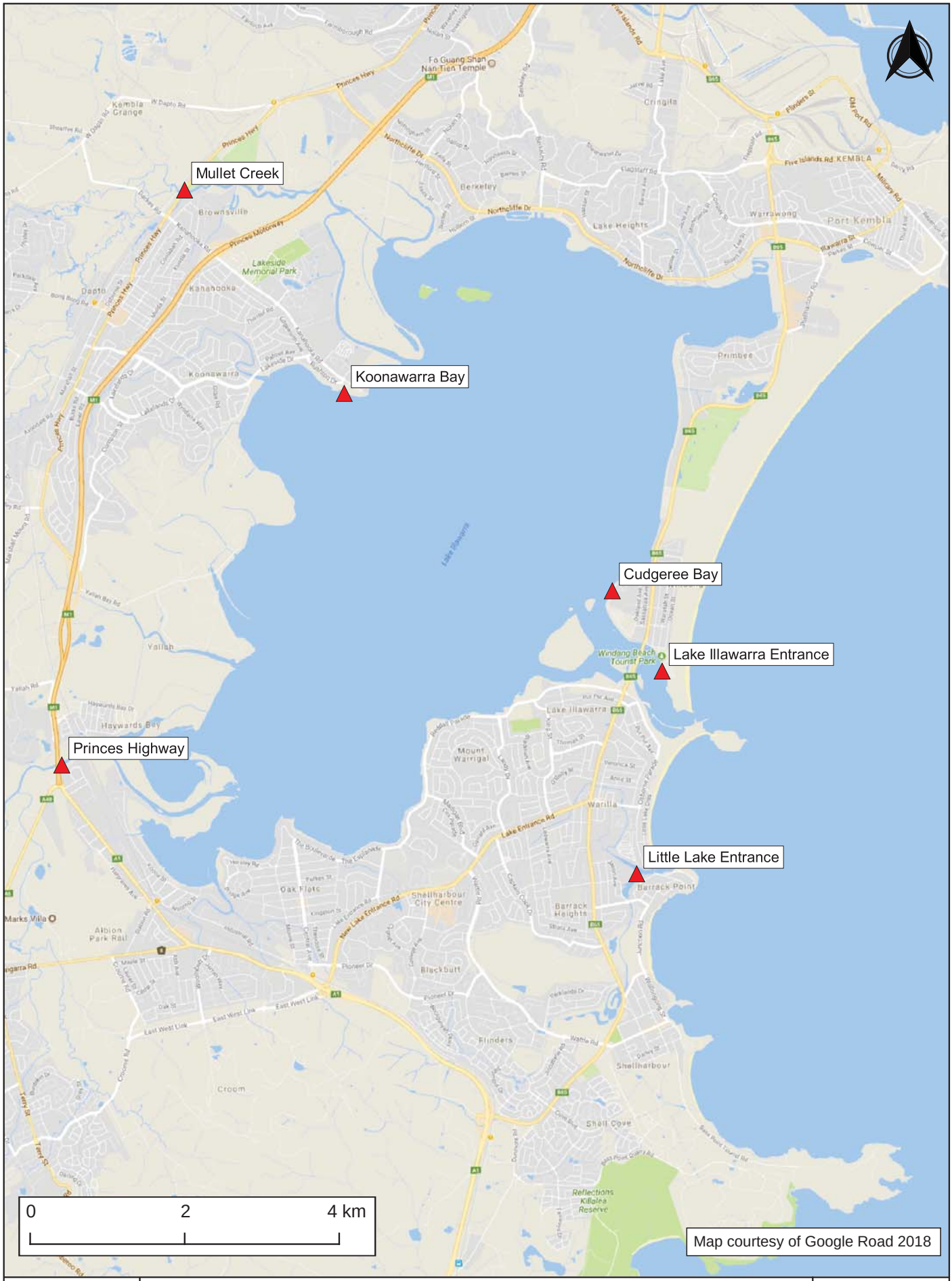
Manly Hydraulics Laboratory

Report MHL2692

Figure

217

DRAWING 2692-217.cdr



NSW GOVERNMENT

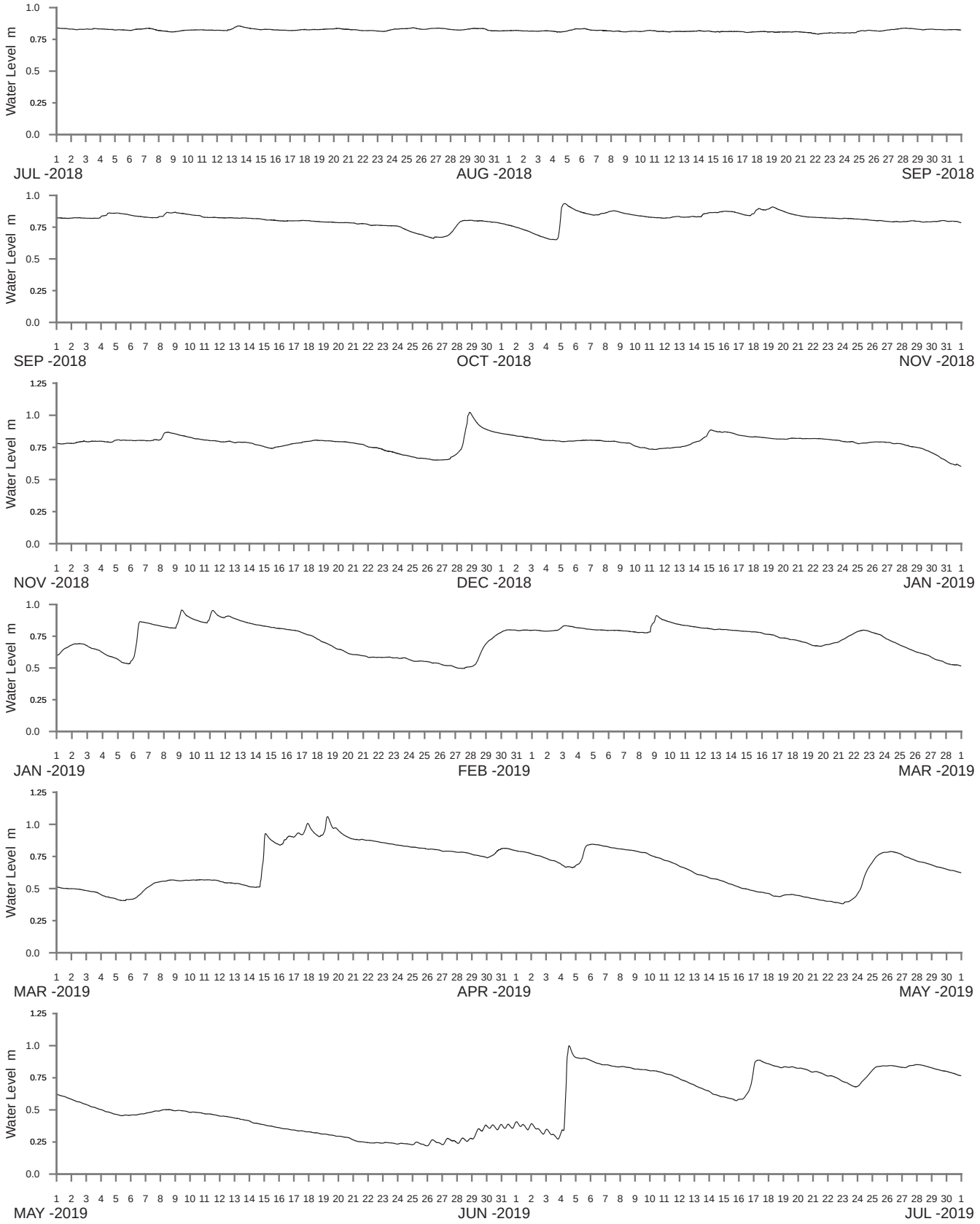
STATION LOCATIONS
LAKE ILLAWARRA REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure 218

DRAWING 2692-218.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

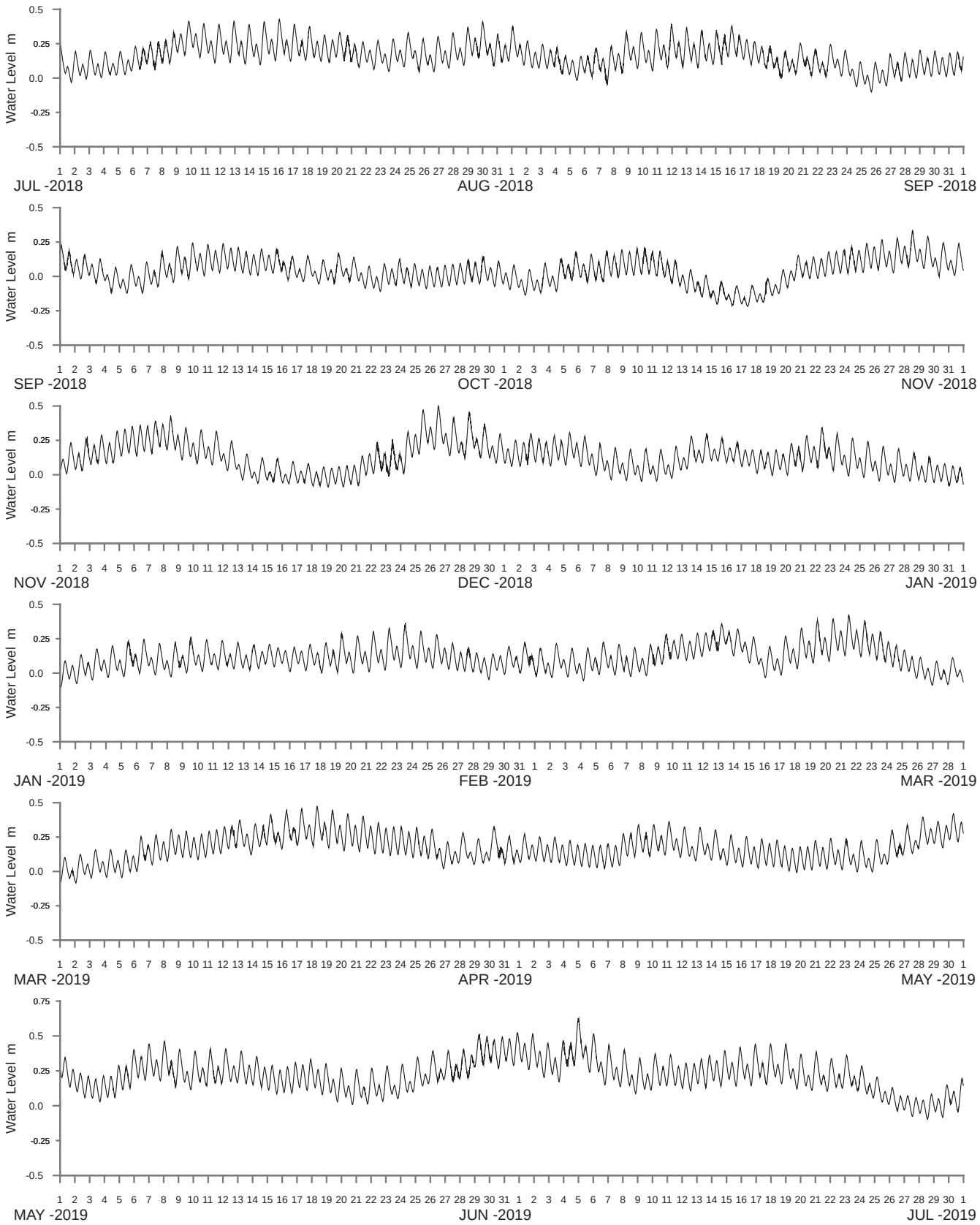
MULLET CREEK AT MULLET CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
219

DRAWING 2692-219.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

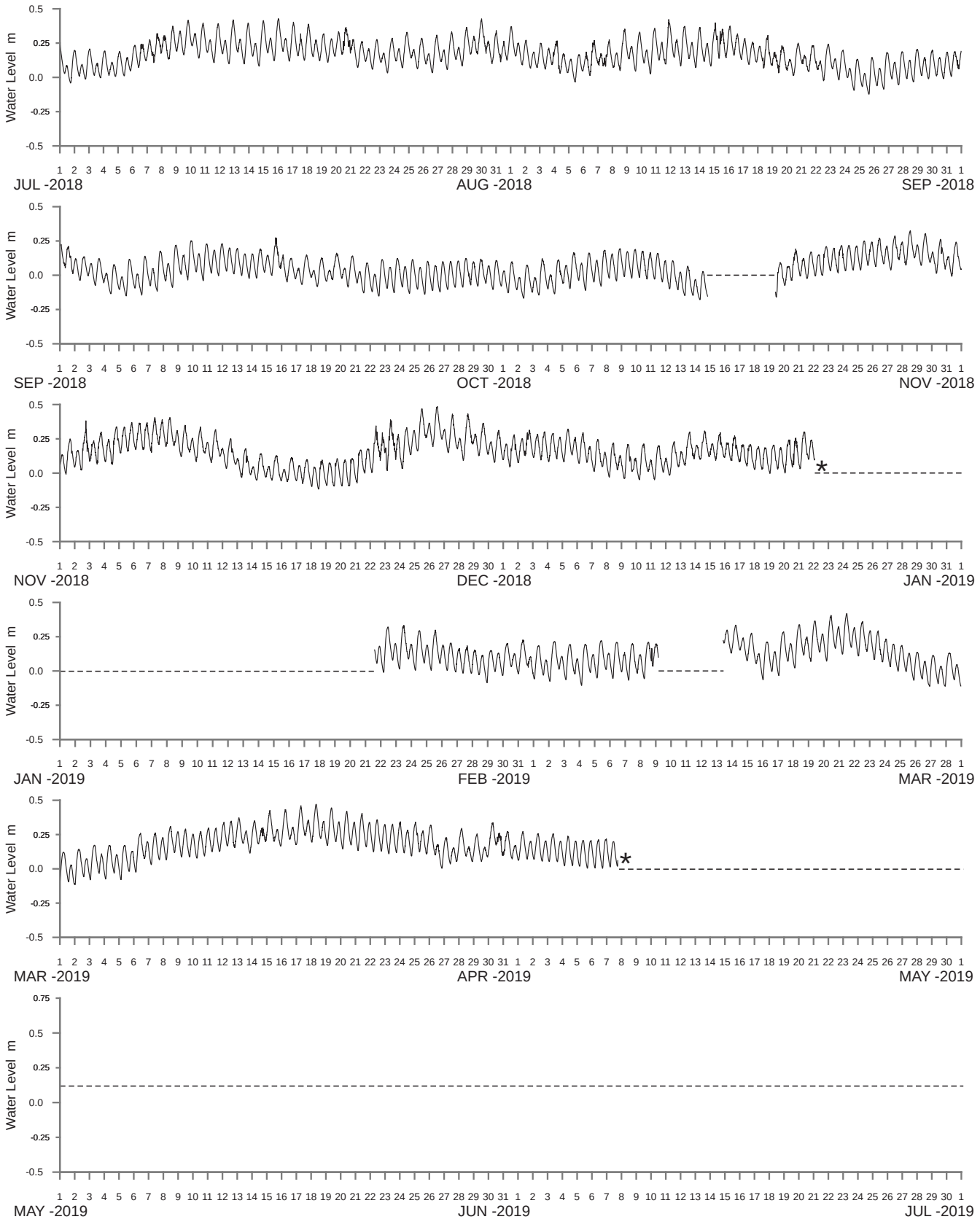
LAKE ILLAWARRA AT KOONAWARRA BAY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
220

DRAWING 2692-220.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to the formation of a sand bar at the site. The tidal regime may not be representative of the wider bay.

NSW GOVERNMENT

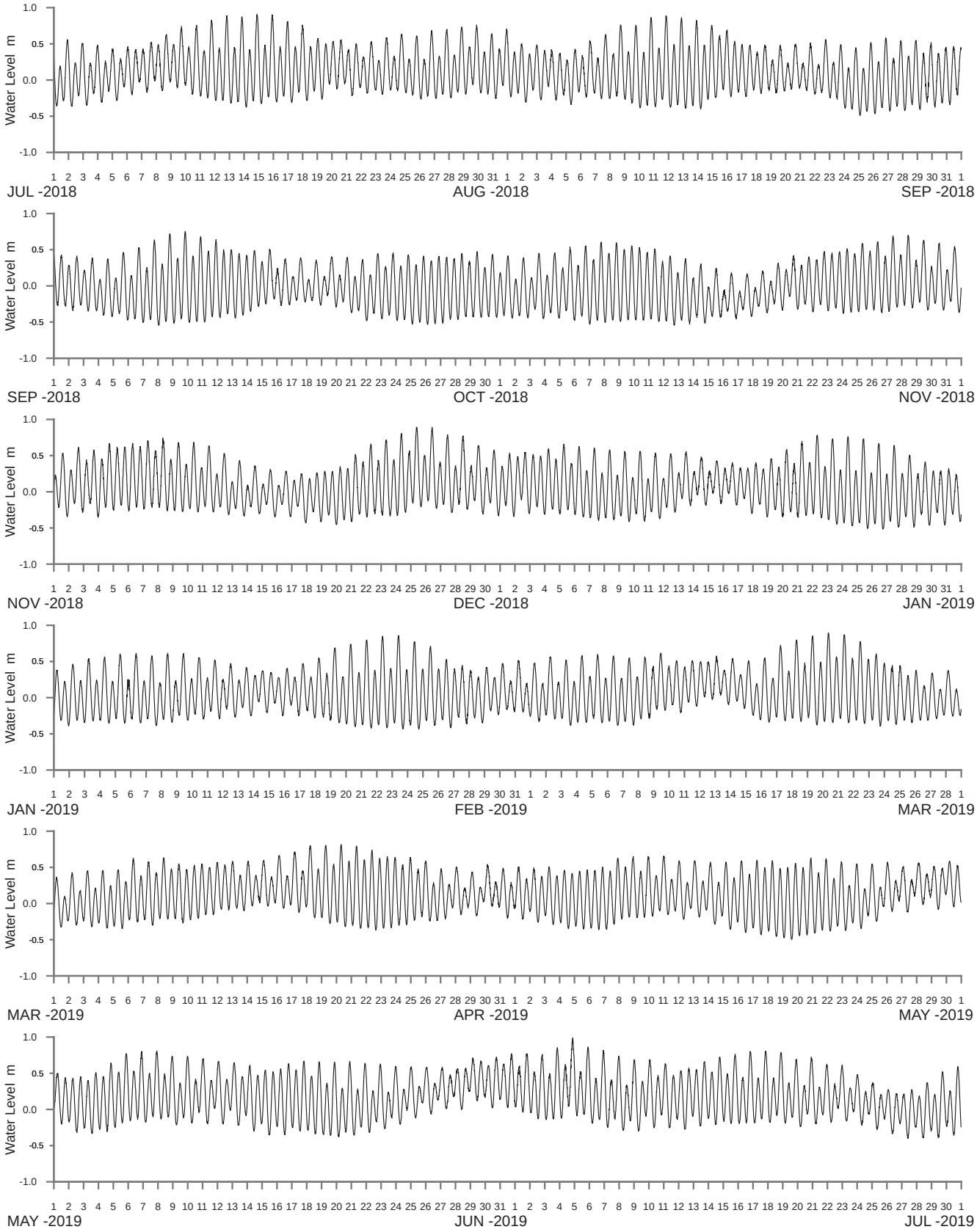
LAKE ILLAWARRA AT CUDGEREE BAY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 221

DRAWING 2692-221.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

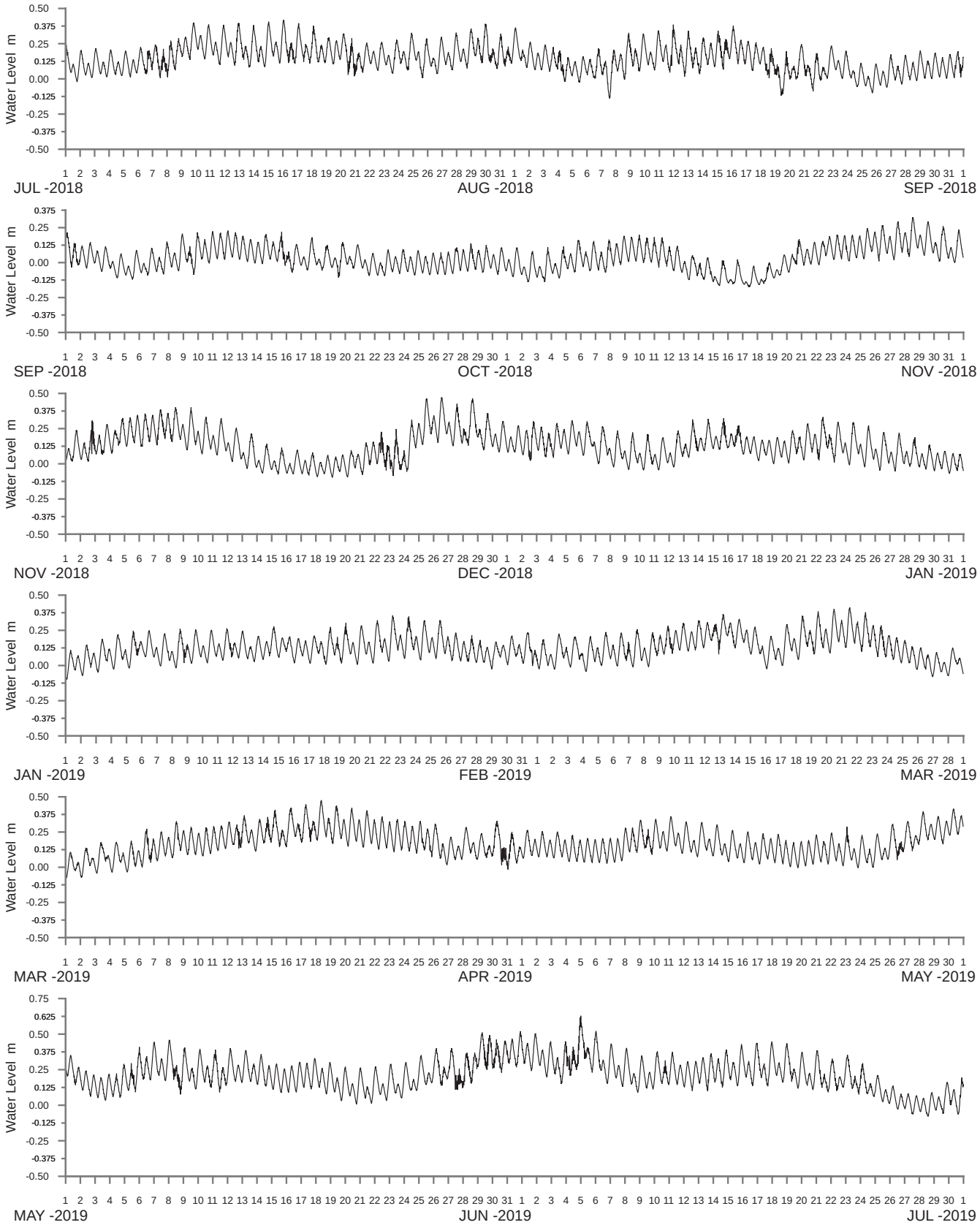
LAKE ILLAWARRA AT LAKE ILLAWARRA ENTRANCE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
222

DRAWING 2692-222.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

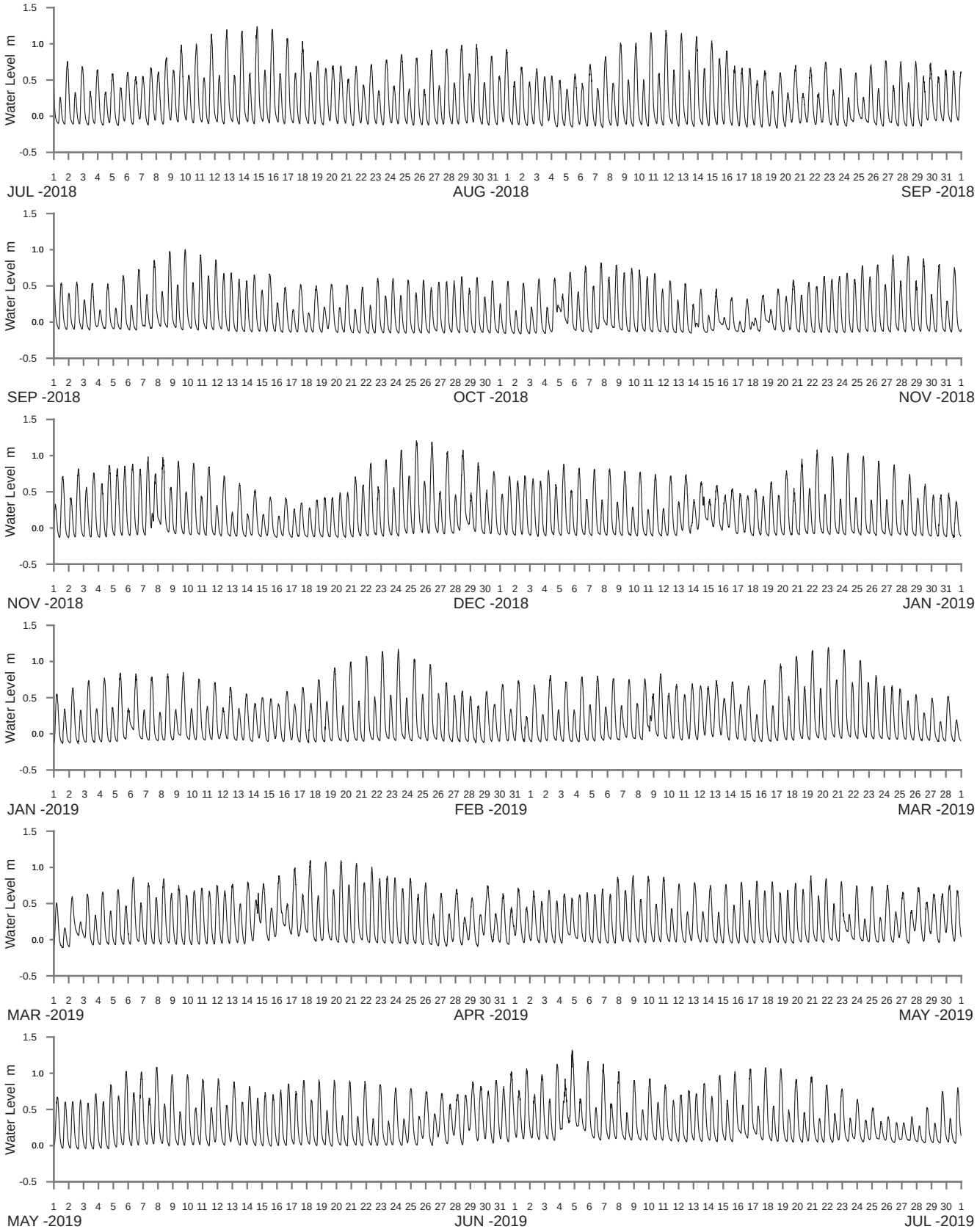
MACQUARIE RIVULET AT PRINCES HIGHWAY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
223

DRAWING 2692-223.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

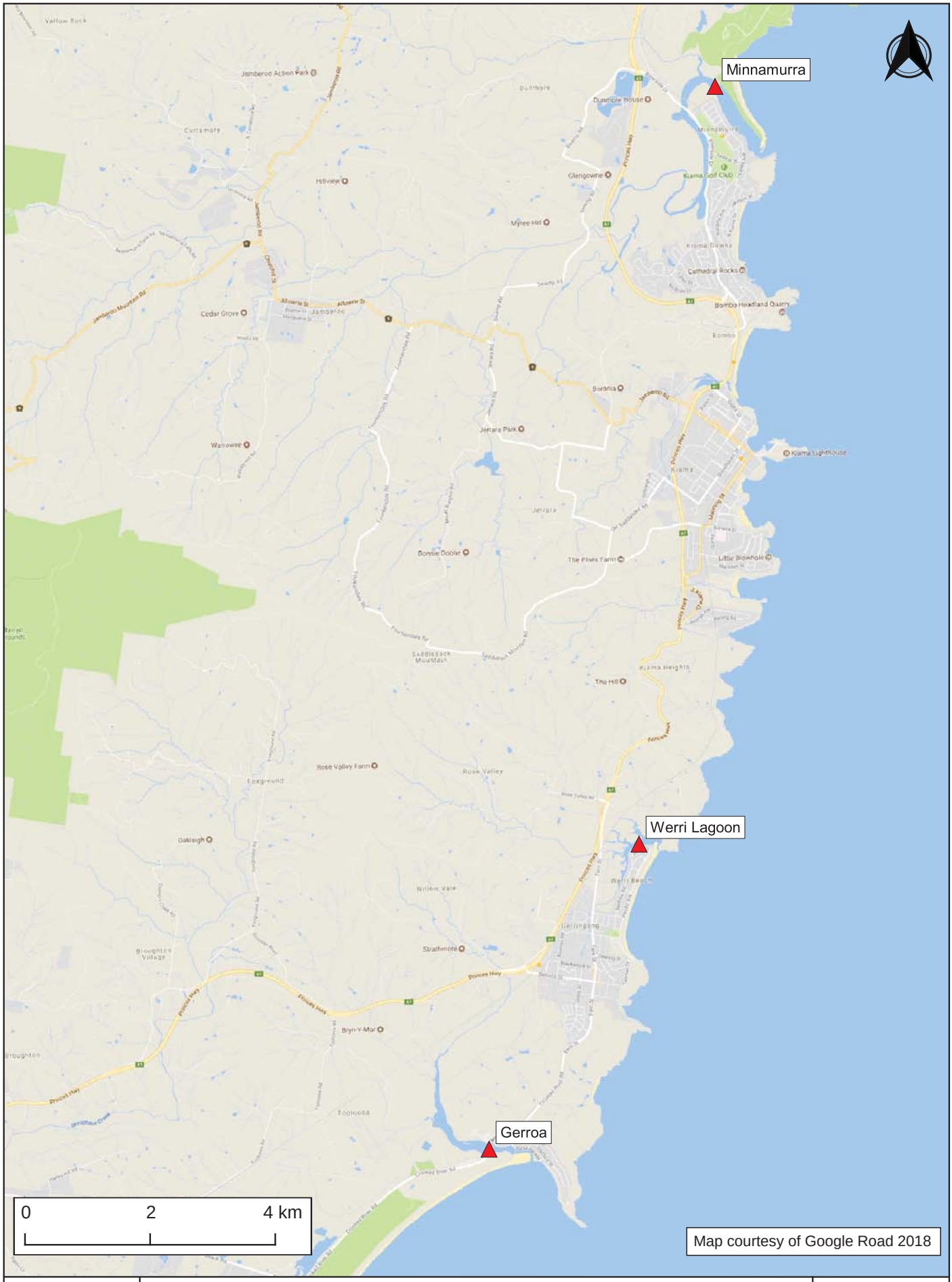
LITTLE LAKE AT LITTLE LAKE ENTRANCE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
224

DRAWING 2692-224.cdr



NSW GOVERNMENT

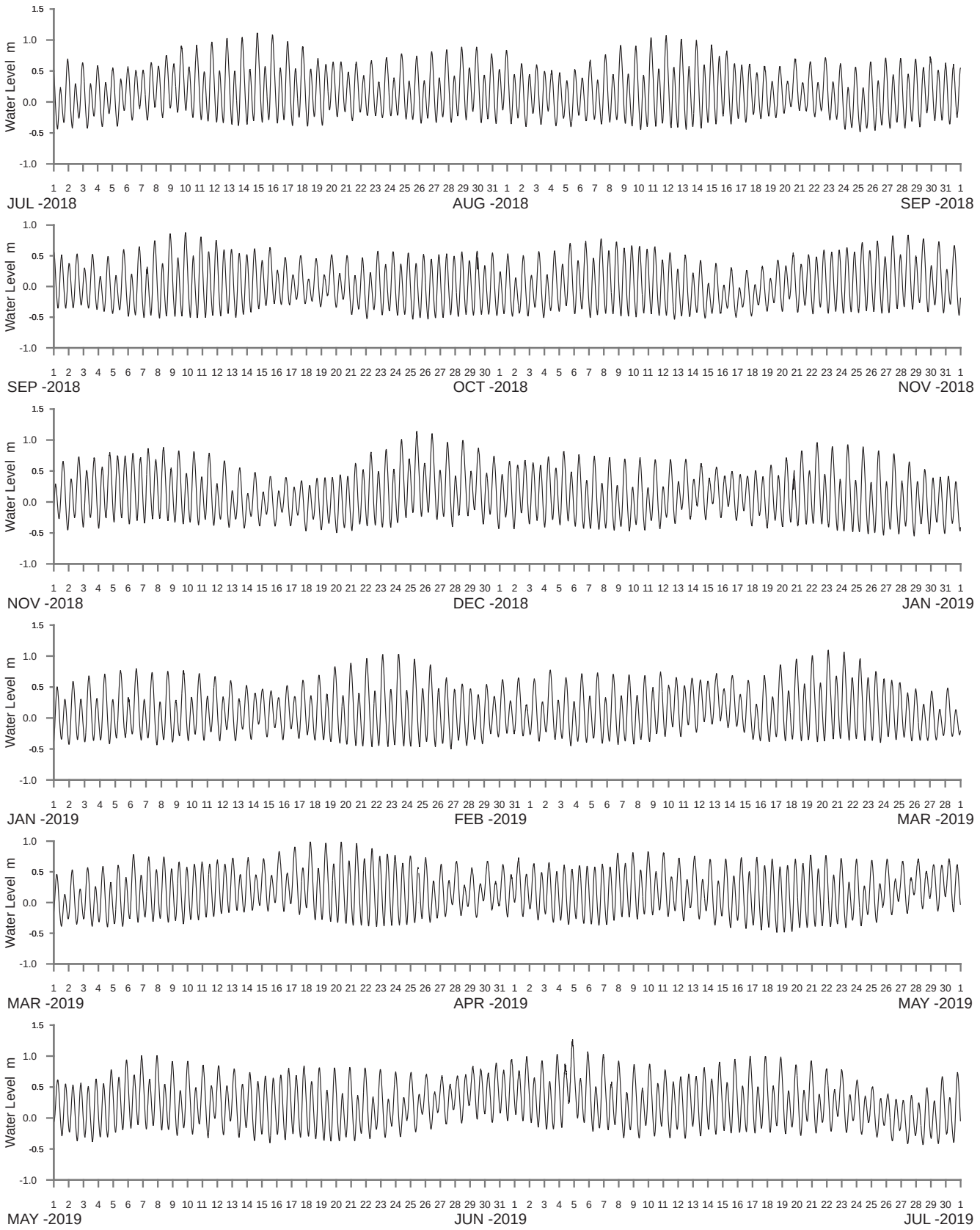
STATION LOCATIONS
KIAMA REGION

Manly Hydraulics Laboratory

Report MHL2692

Figure
225

DRAWING 2692-225.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

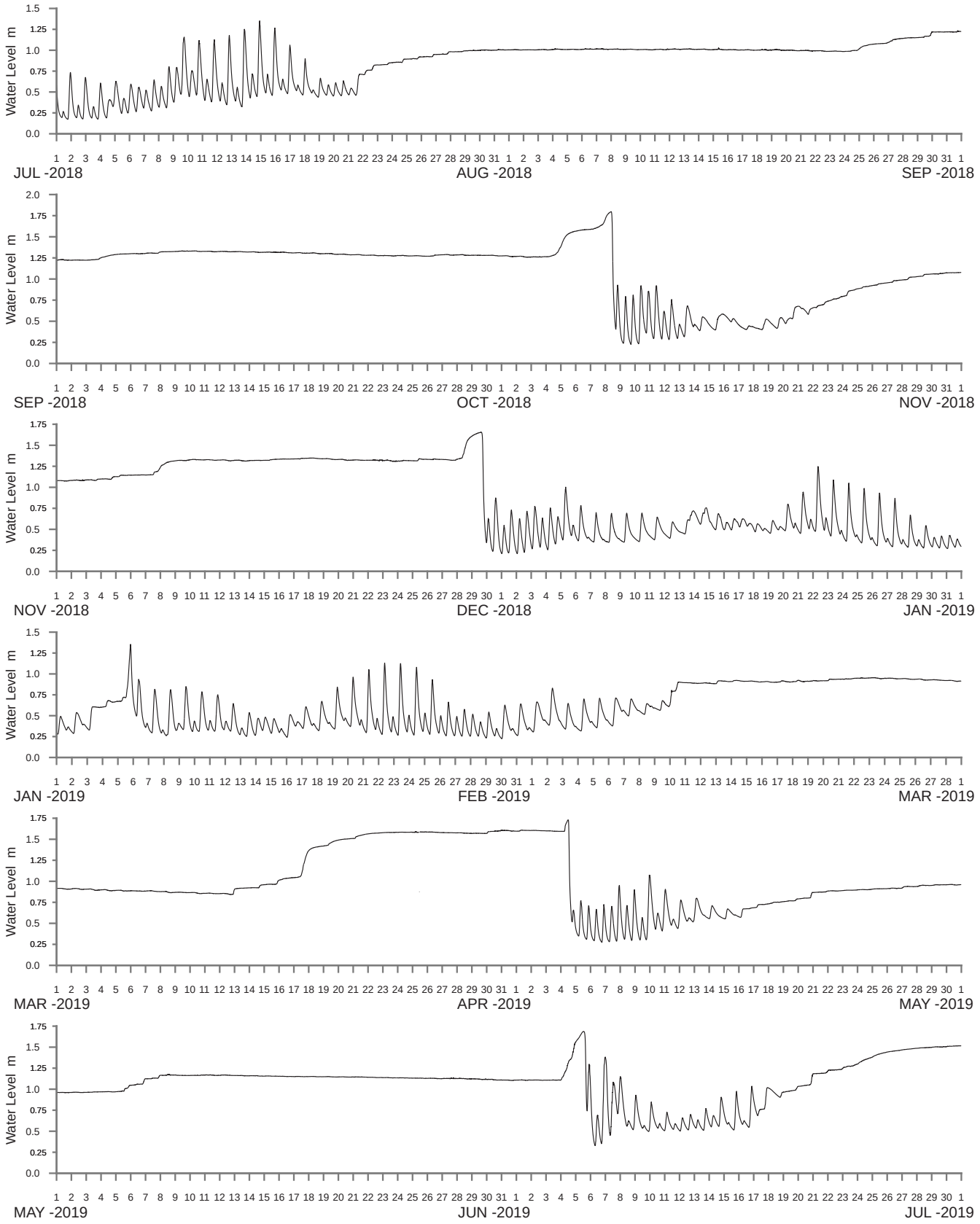
MINNAMURRA RIVER AT MINNAMURRA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
226

DRAWING 2692-226.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

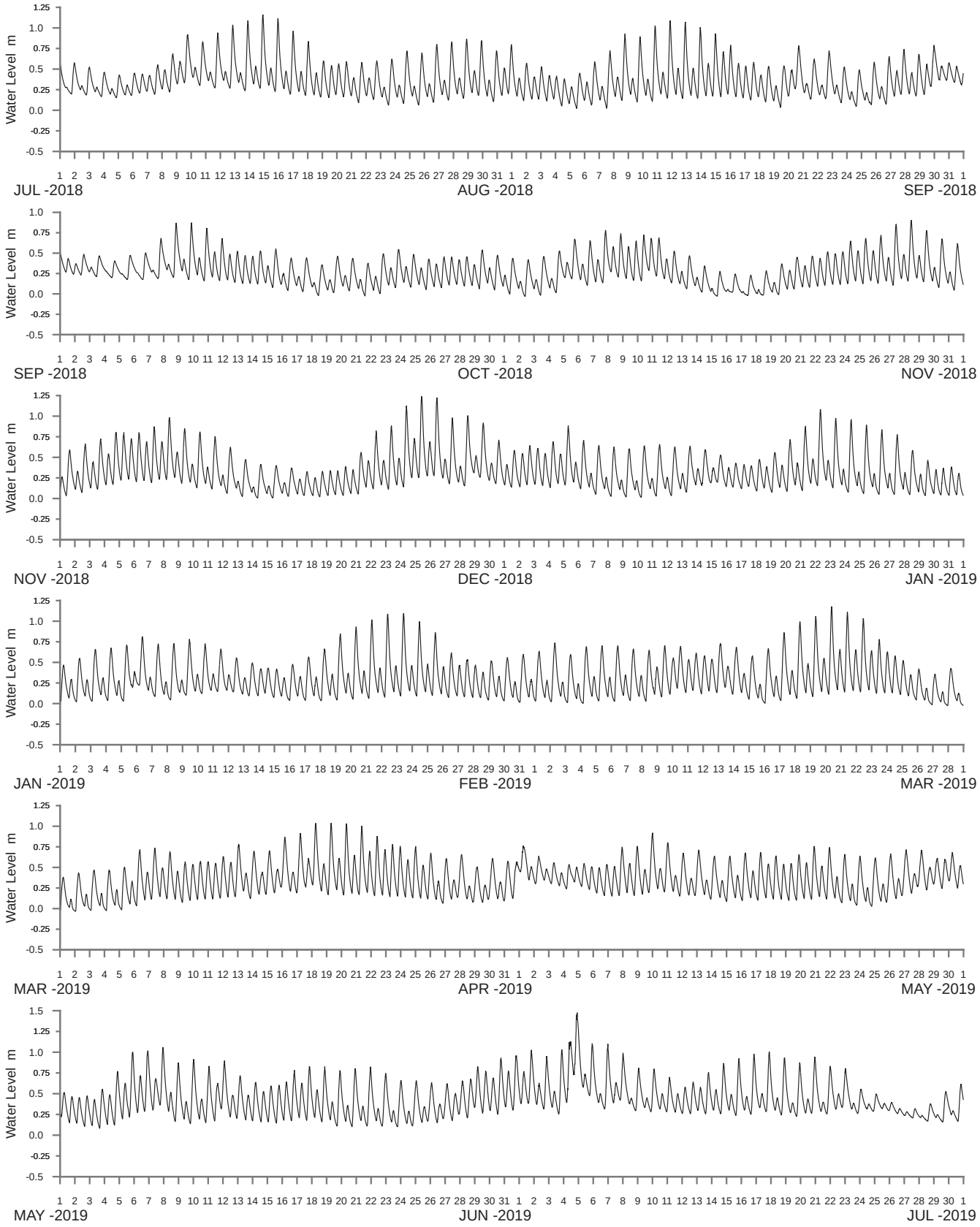
WERRI LAGOON AT WERRI LAGOON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
227

DRAWING 2692-227.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

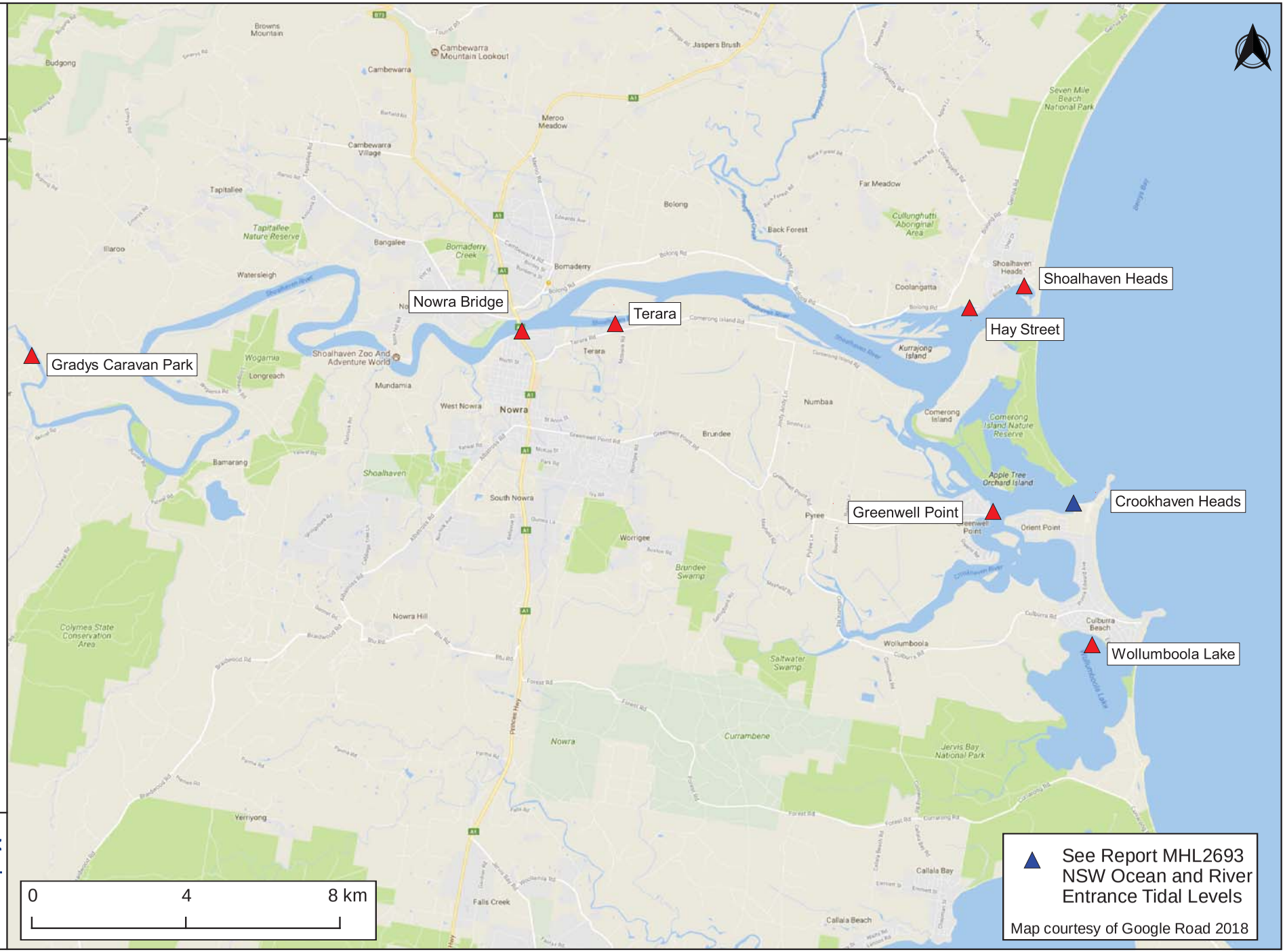
CROOKED RIVER AT GERROA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
228

DRAWING 2692-228.cdr



STATION LOCATIONS
SHOALHAVEN RIVER REGION

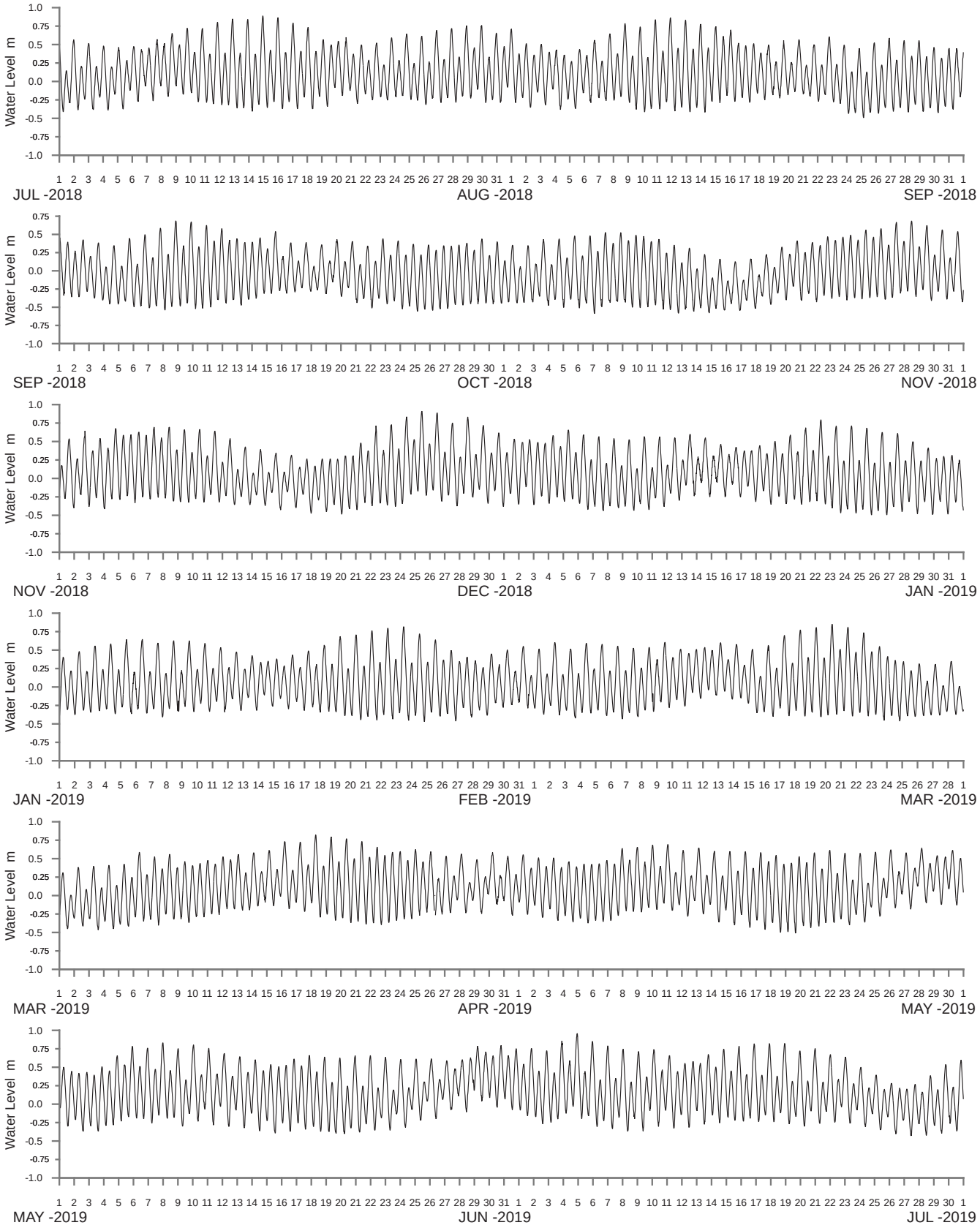
NSW GOVERNMENT

Manly Hydraulics Laboratory

Report MHL2692

Figure 229

DRAWING 2692-229.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

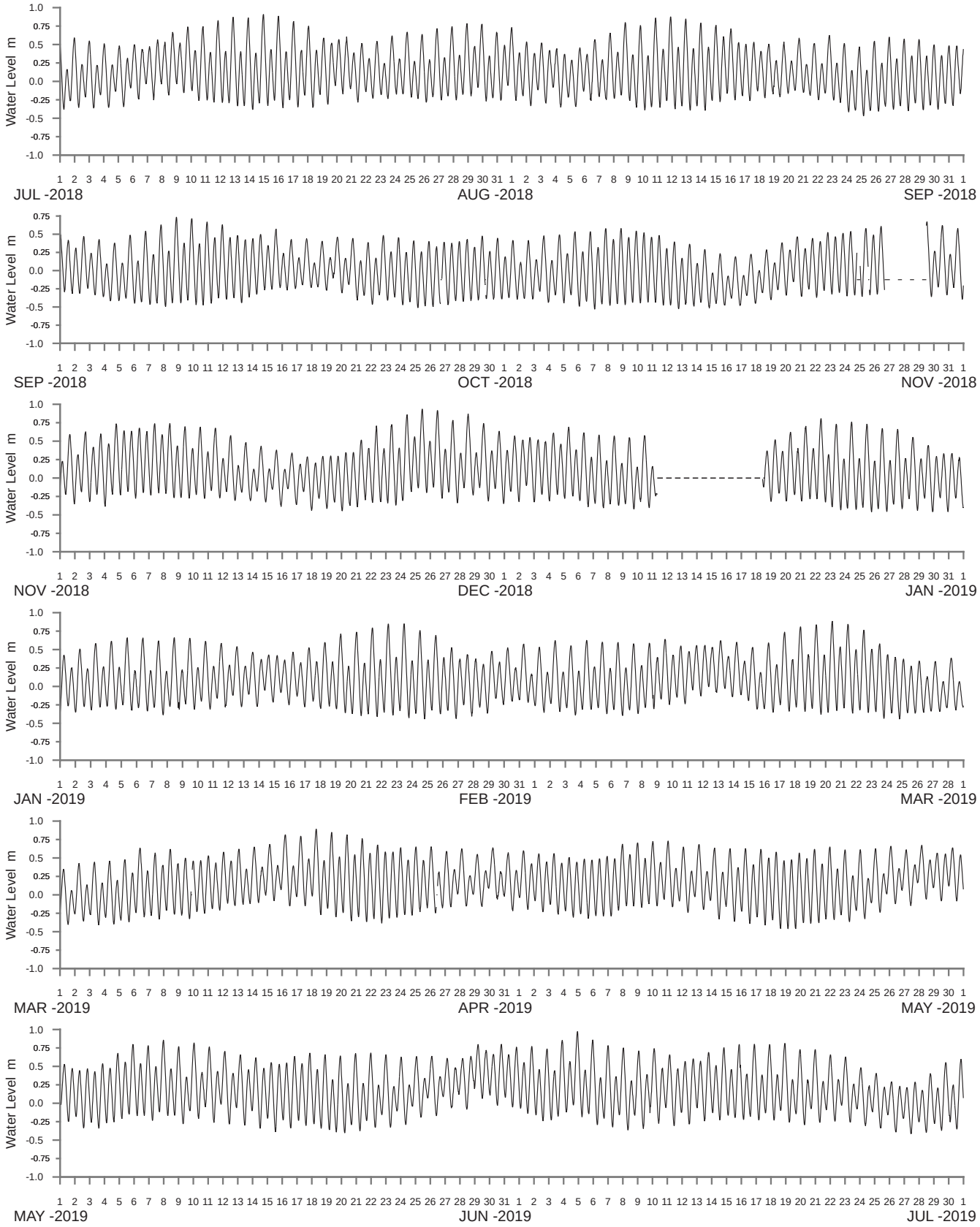
SHOALHAVEN RIVER AT SHOALHAVEN HEADS
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
230

DRAWING 2692-230.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

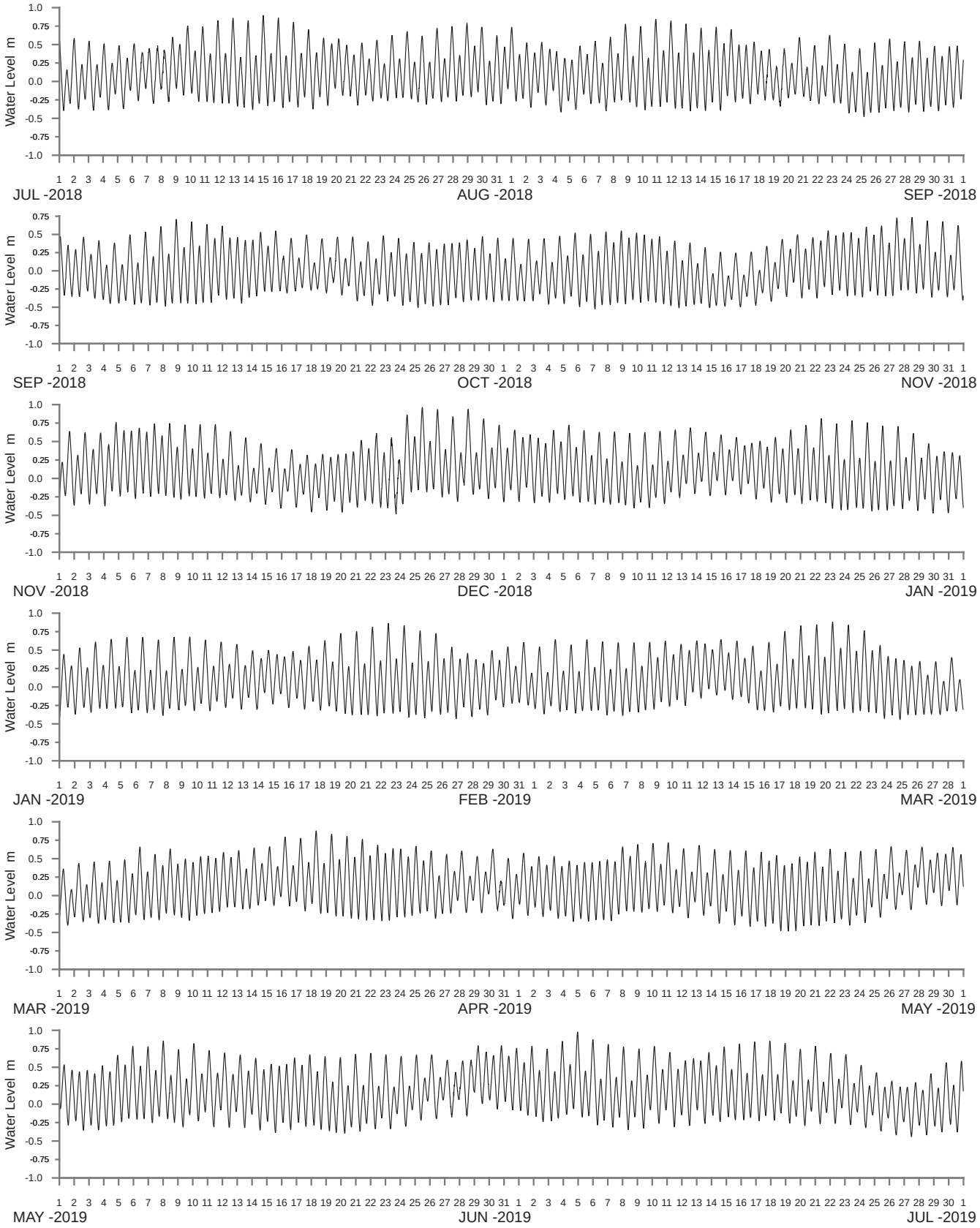
SHOALHAVEN RIVER AT HAY STREET
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
231

DRAWING 2692-231.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

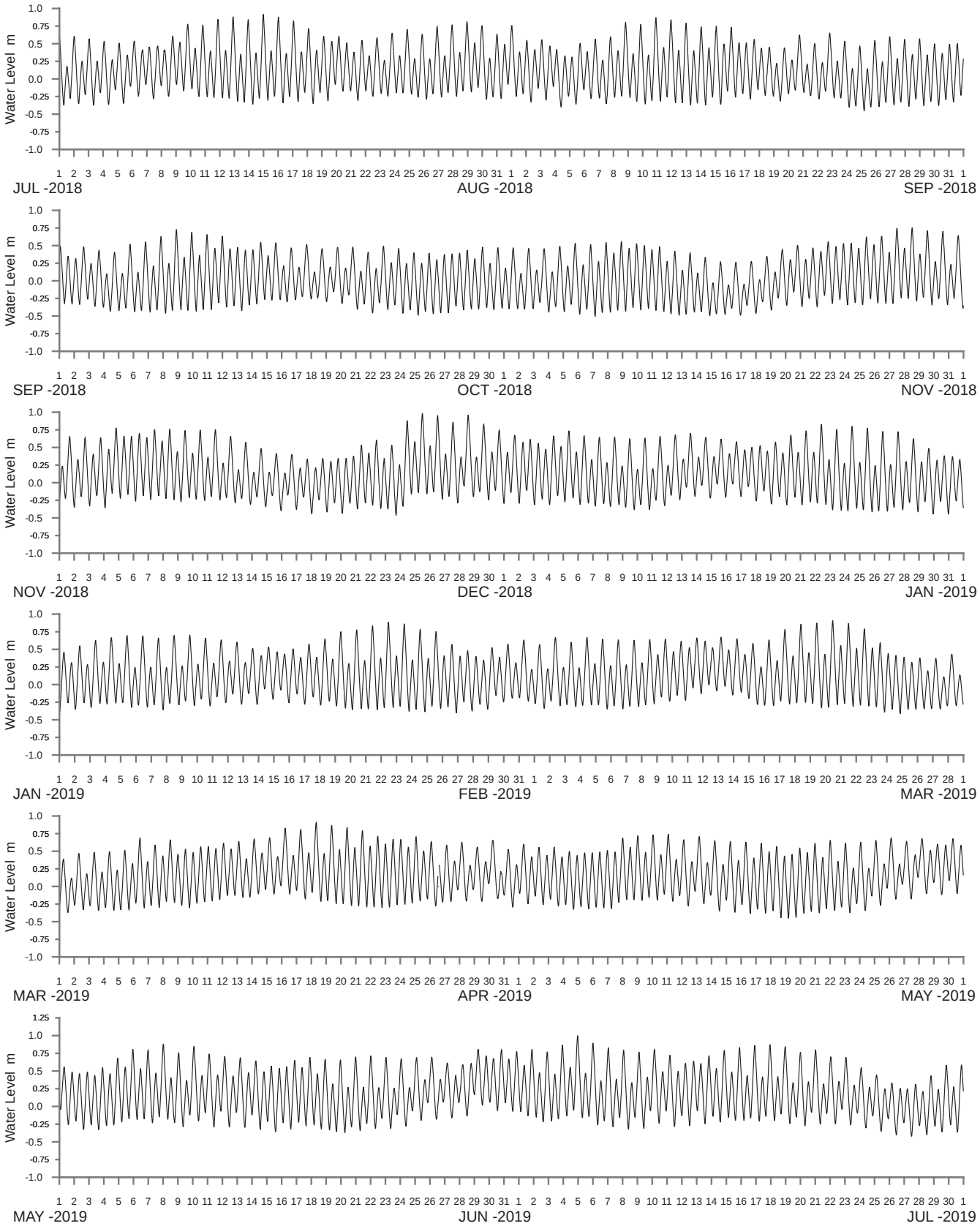
SHOALHAVEN RIVER AT TERARA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
232

DRAWING 2692-232.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

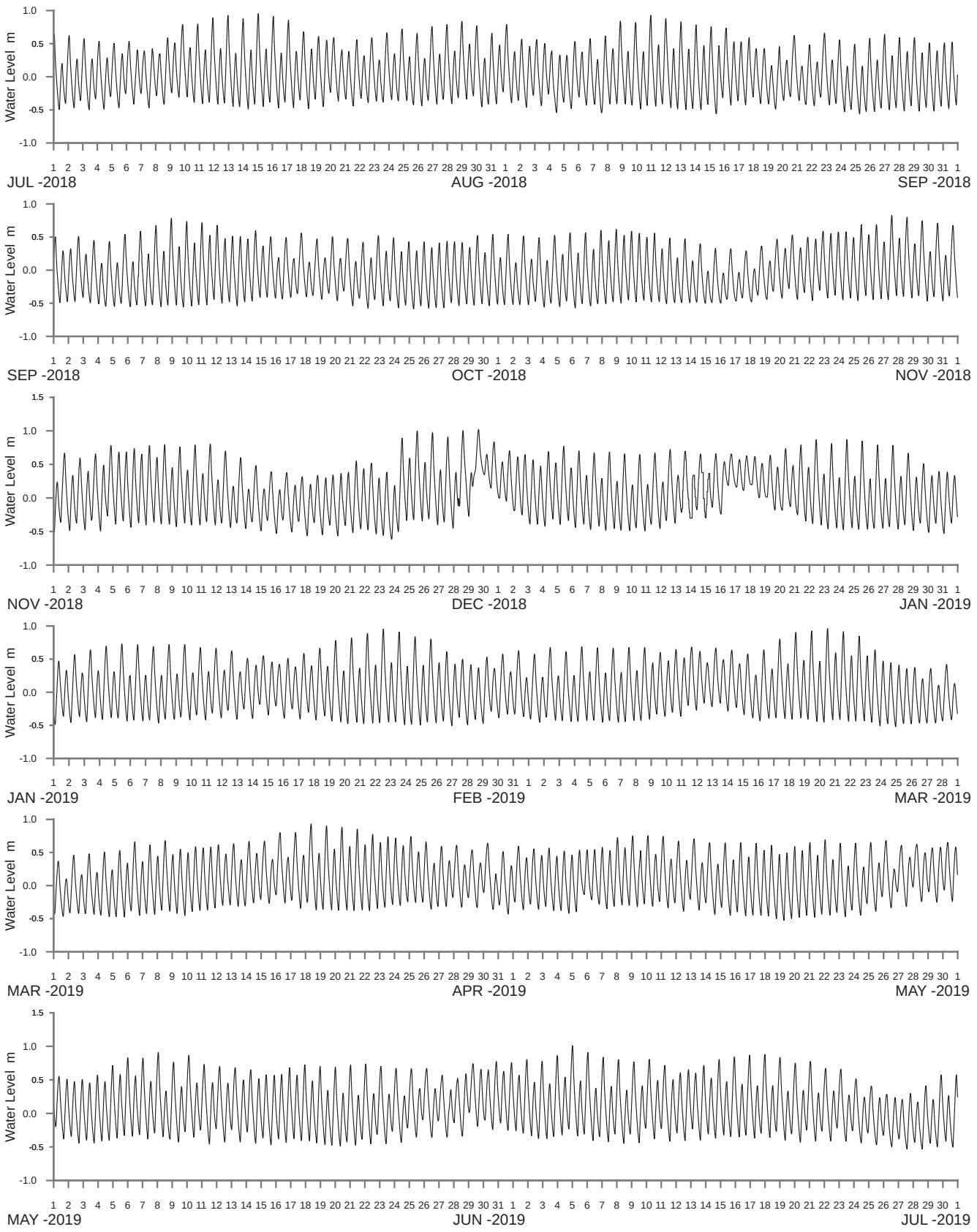
SHOALHAVEN RIVER AT NOWRA BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
233

DRAWING 2692-233.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

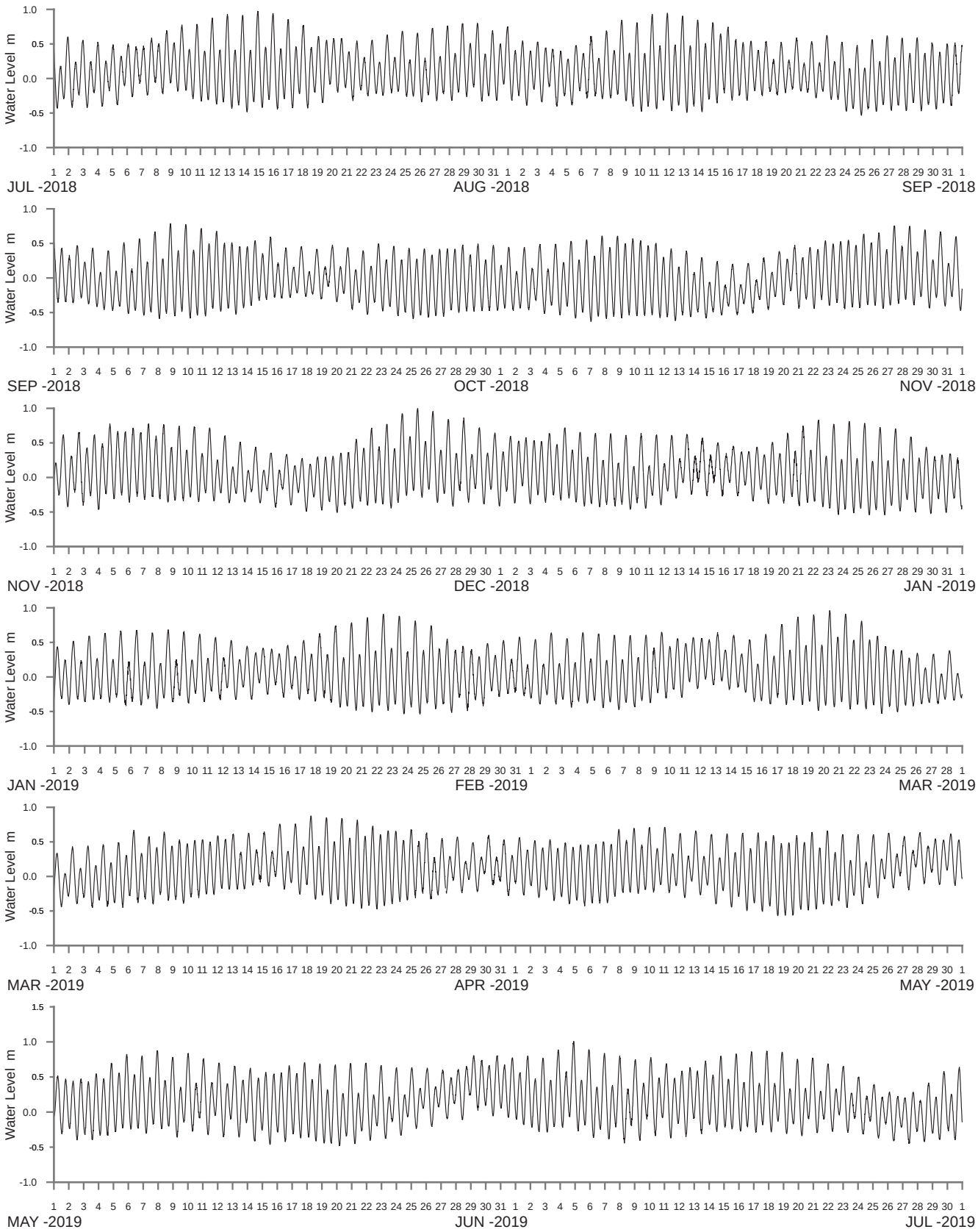
SHOALHAVEN RIVER AT GRADYS CARAVAN PARK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
234

DRAWING 2692-234.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

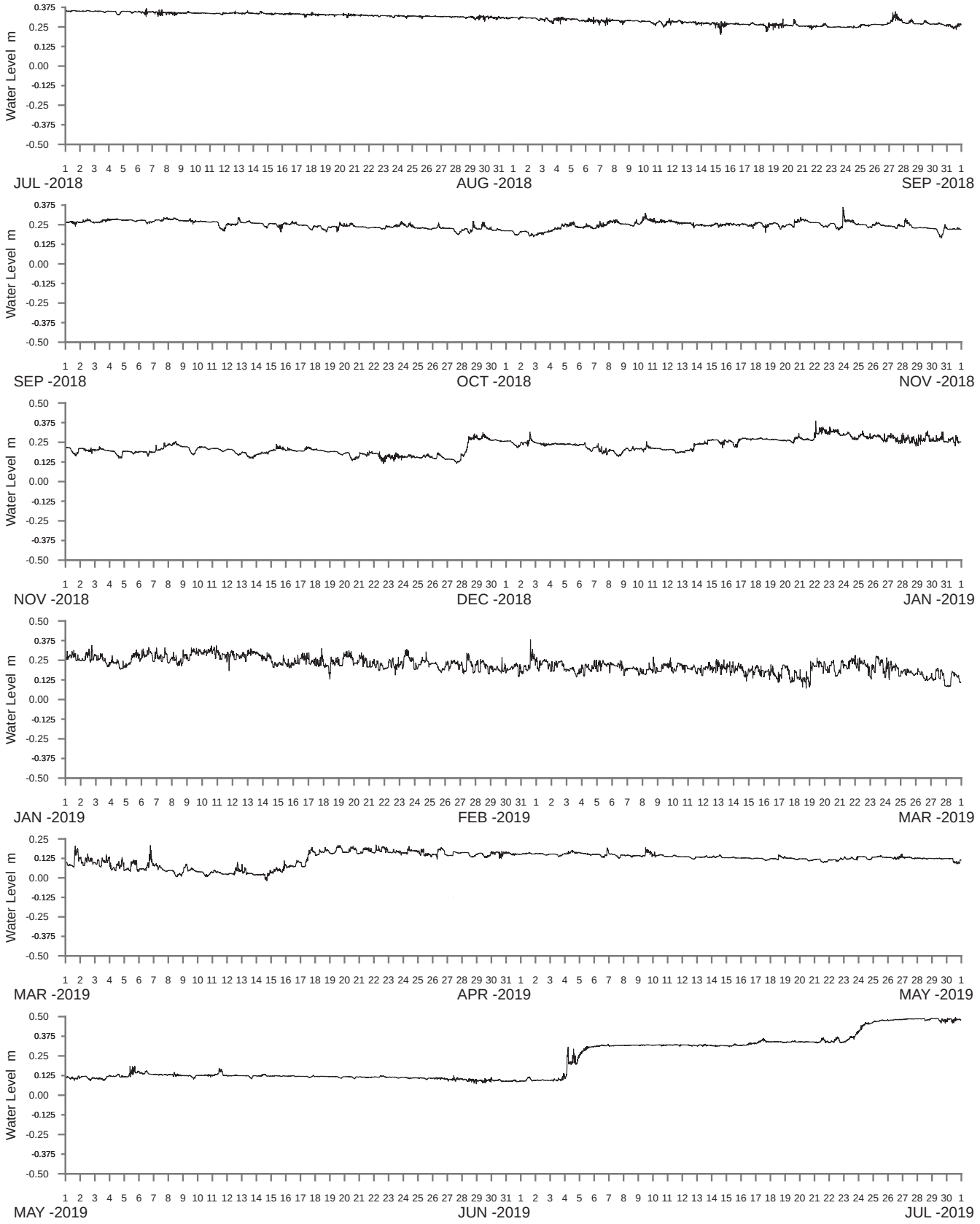
CROOKHAVEN RIVER AT GREENWELL POINT
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
235

DRAWING 2692-235.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

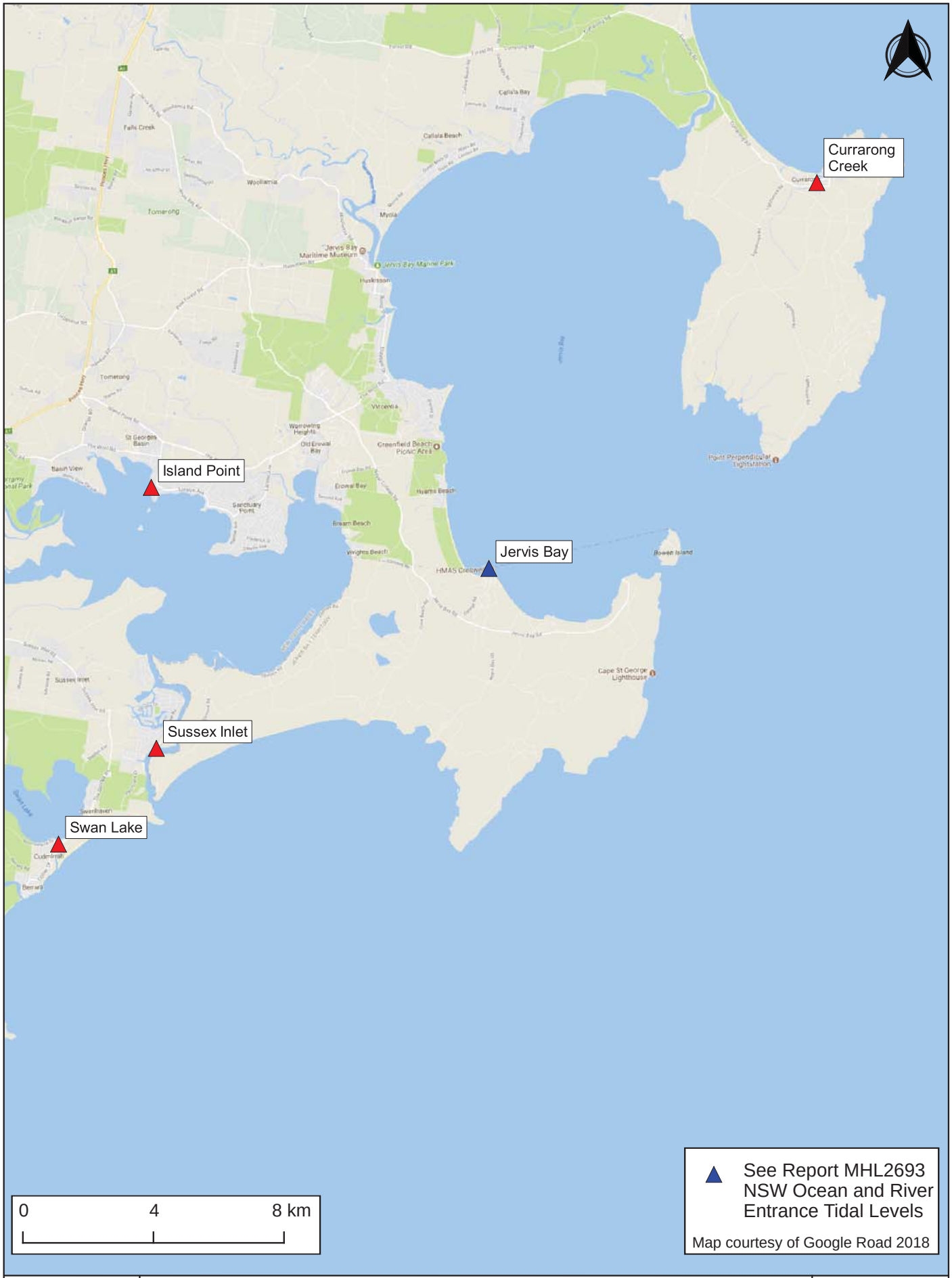
WOLLUMBOOLA LAKE AT WOLLUMBOOLA
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 236

DRAWING 2692-236.cdr



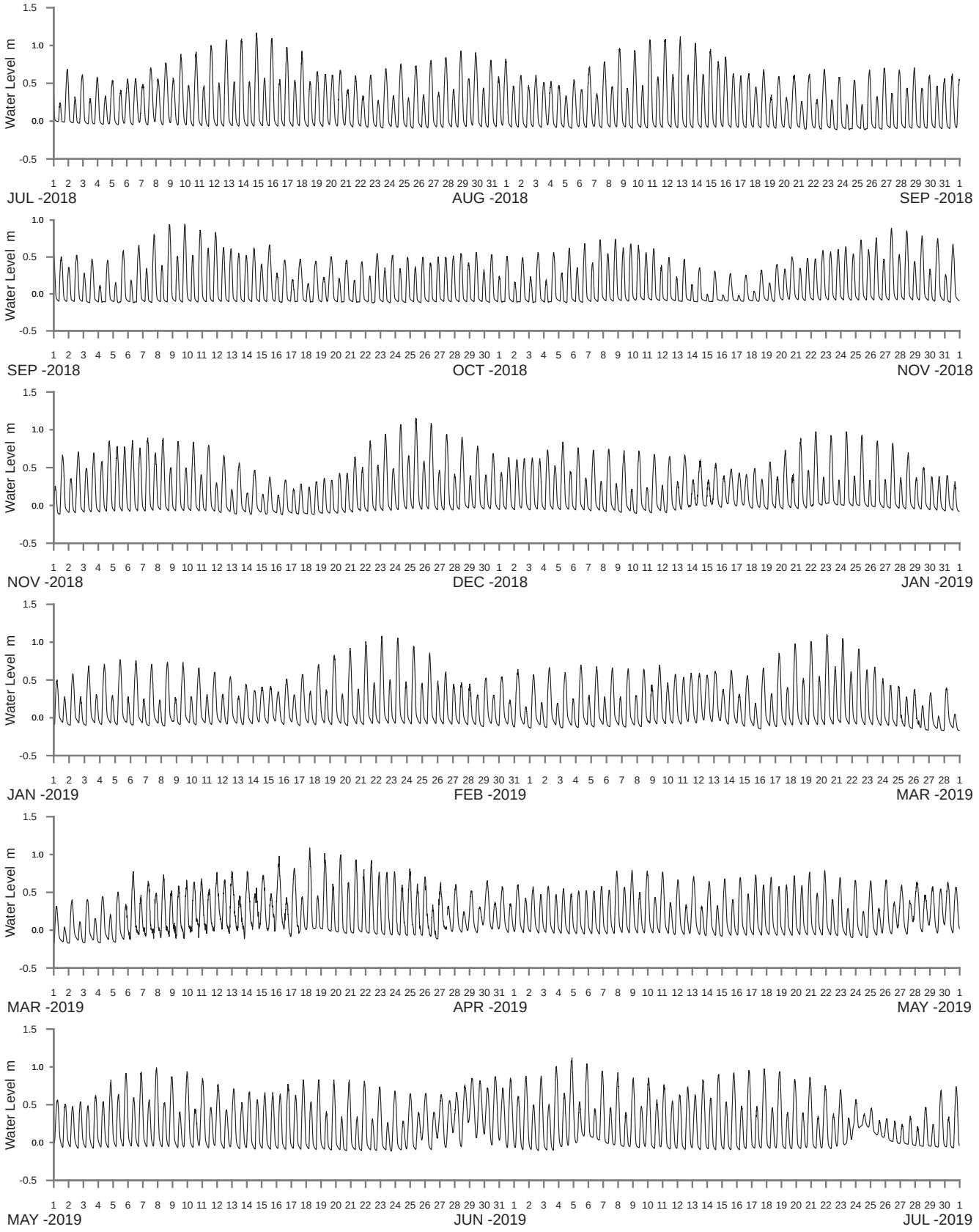
NSW GOVERNMENT

STATION LOCATIONS
JERVIS BAY REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
237

DRAWING 2692-237.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

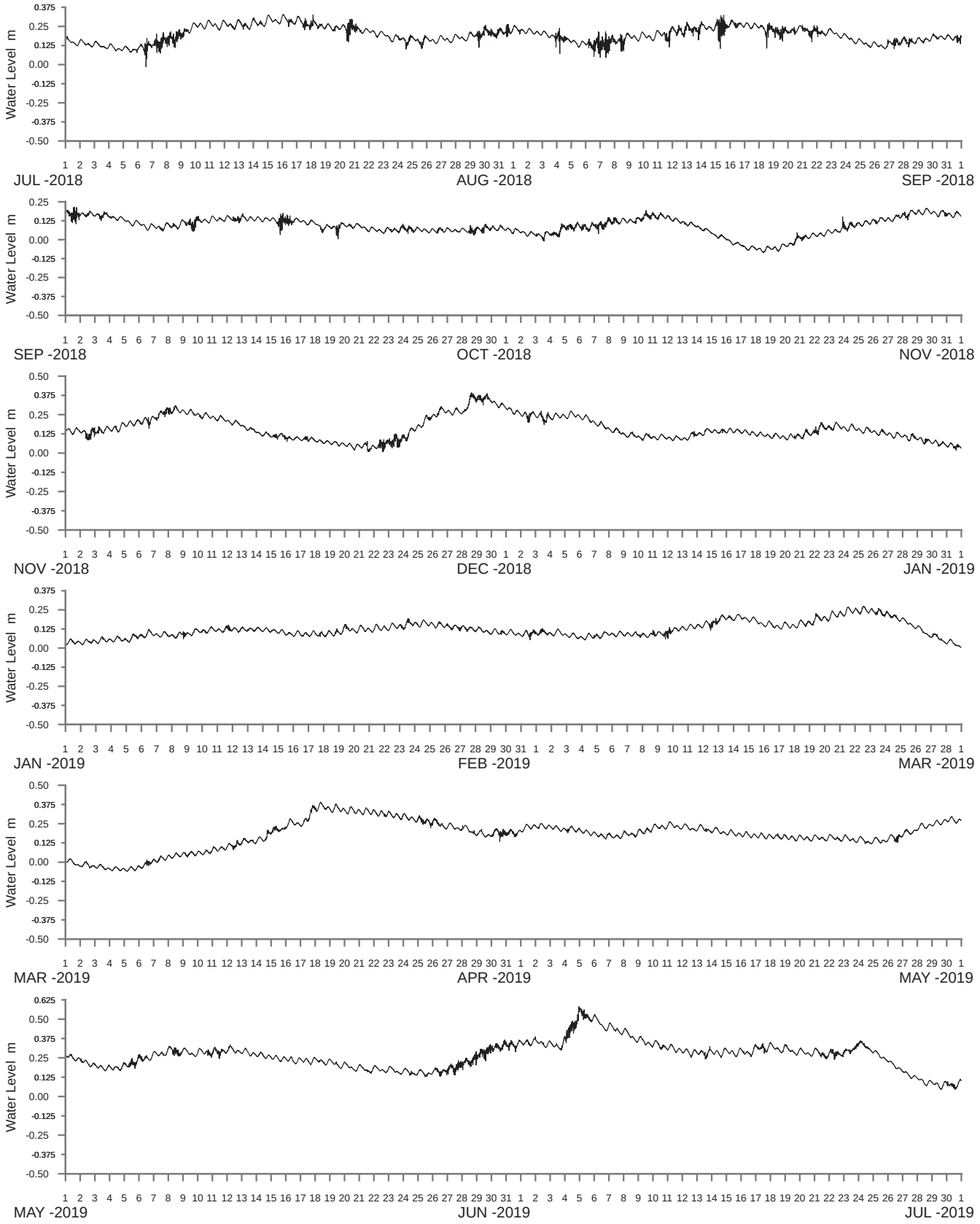
NSW GOVERNMENT

CURRARONG CREEK AT CURRARONG CREEK
2018–2019

Manly Hydraulics Laboratory

Report MHL2692
Figure
238

DRAWING 2692-238.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

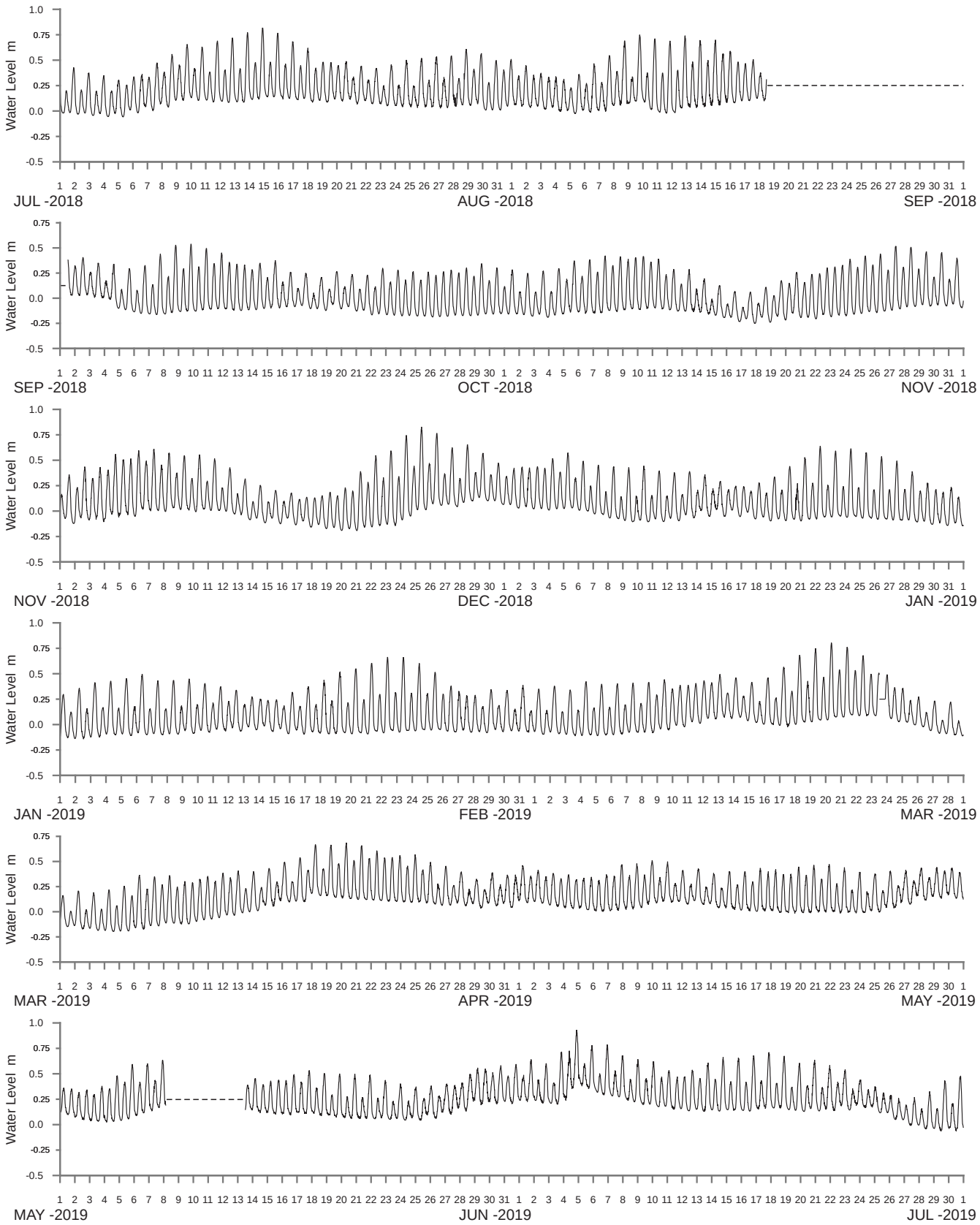
ST GEORGES BASIN AT ISLAND POINT
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
239

DRAWING 2692-239.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

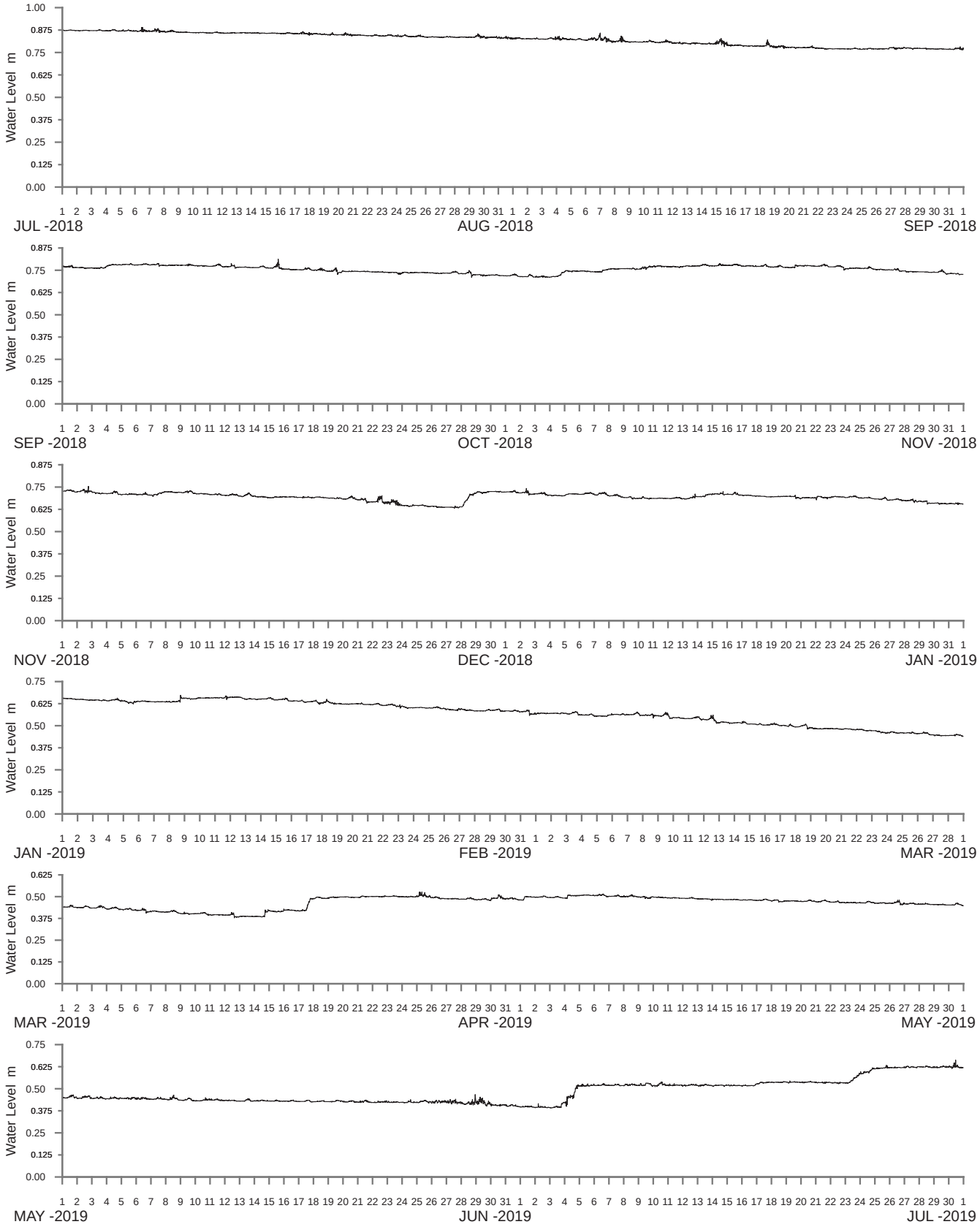
SUSSEX INLET AT SUSSEX INLET
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
240

DRAWING 2692-240.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

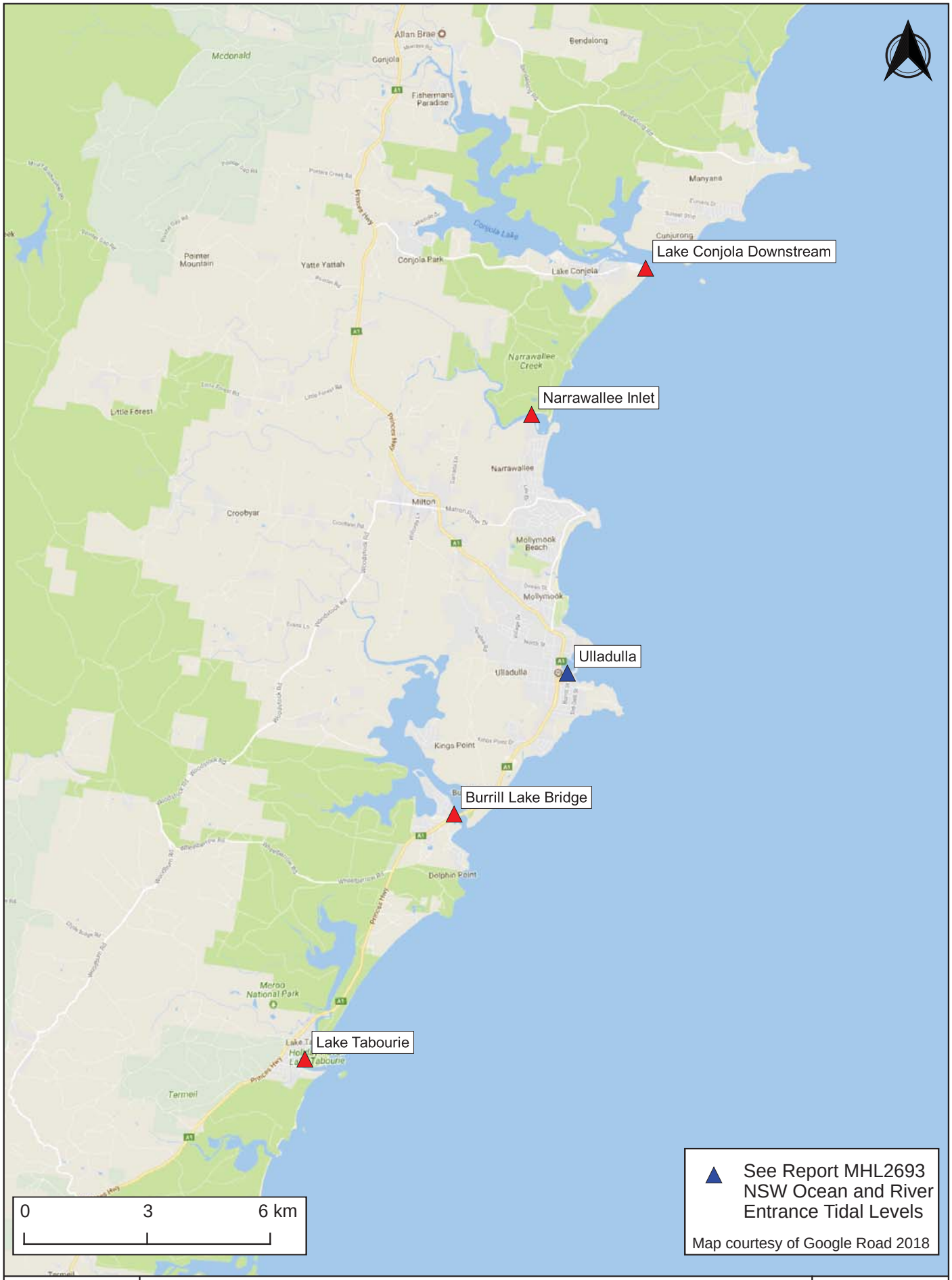
SWAN LAKE AT SWAN LAKE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
241

DRAWING 2692-241.cdr



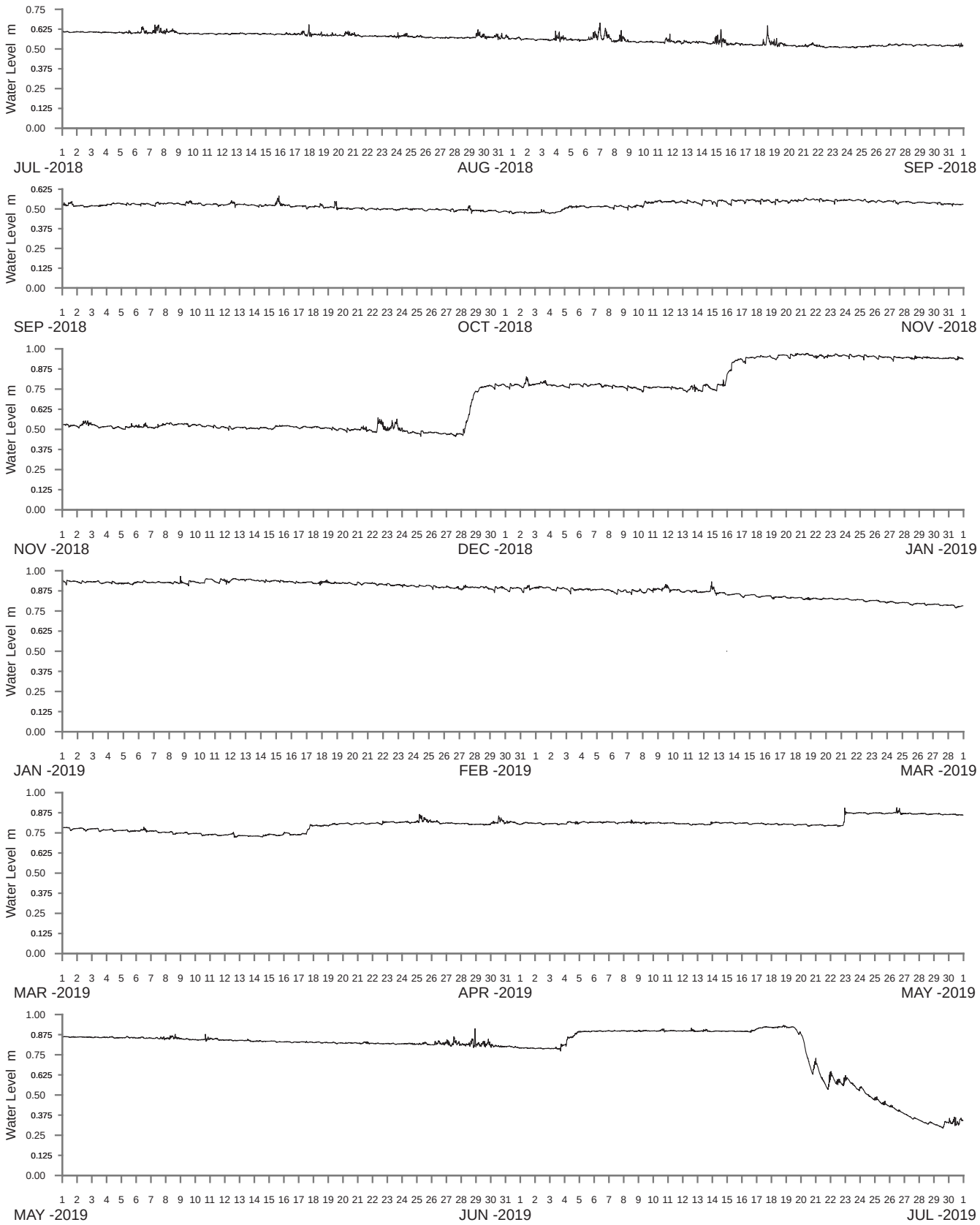
NSW GOVERNMENT

STATION LOCATIONS
ULLADULLA REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
242

DRAWING 2692-242.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

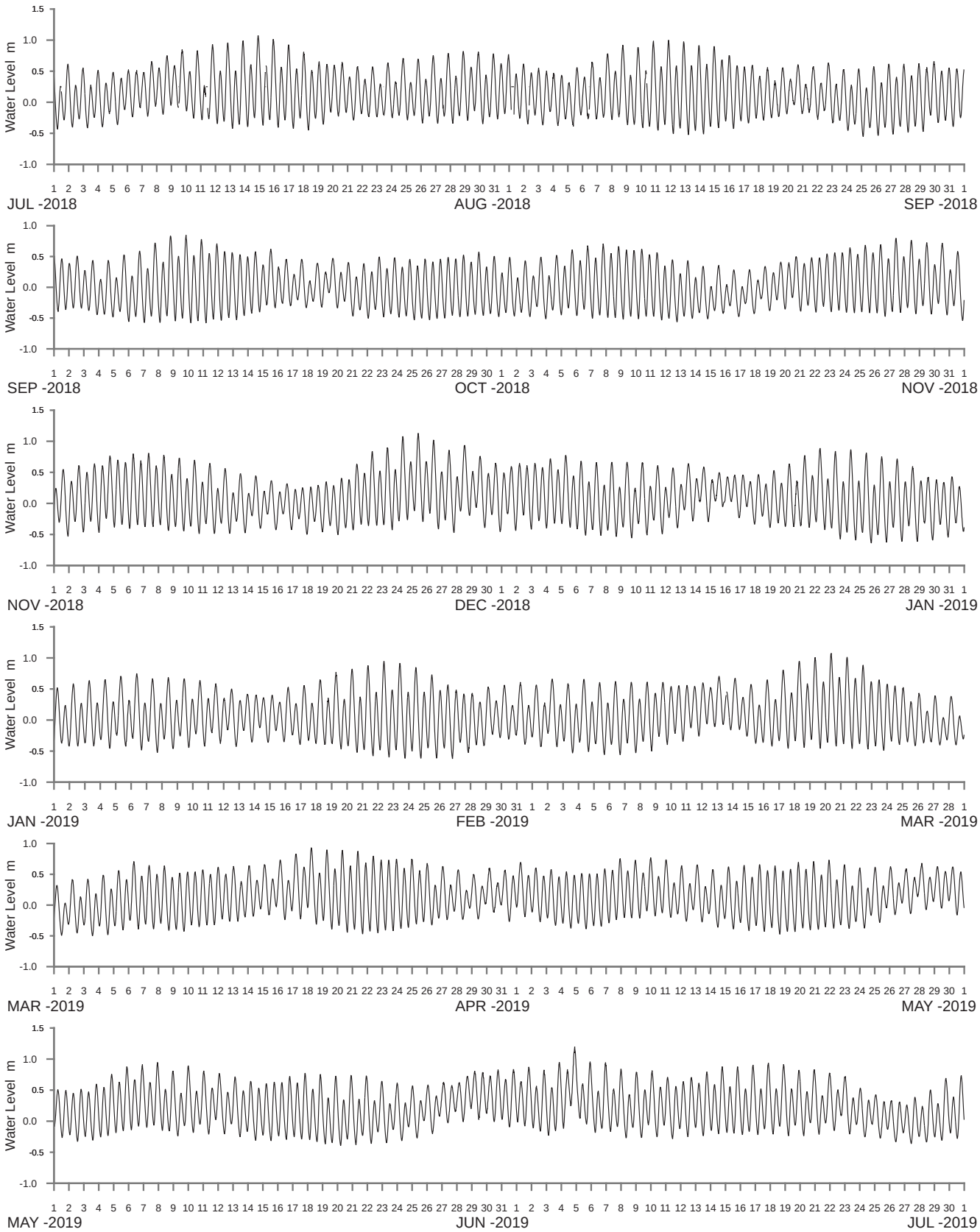
LAKE CONJOLA AT LAKE CONJOLA DOWNSTREAM
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 243

DRAWING 2692-243.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

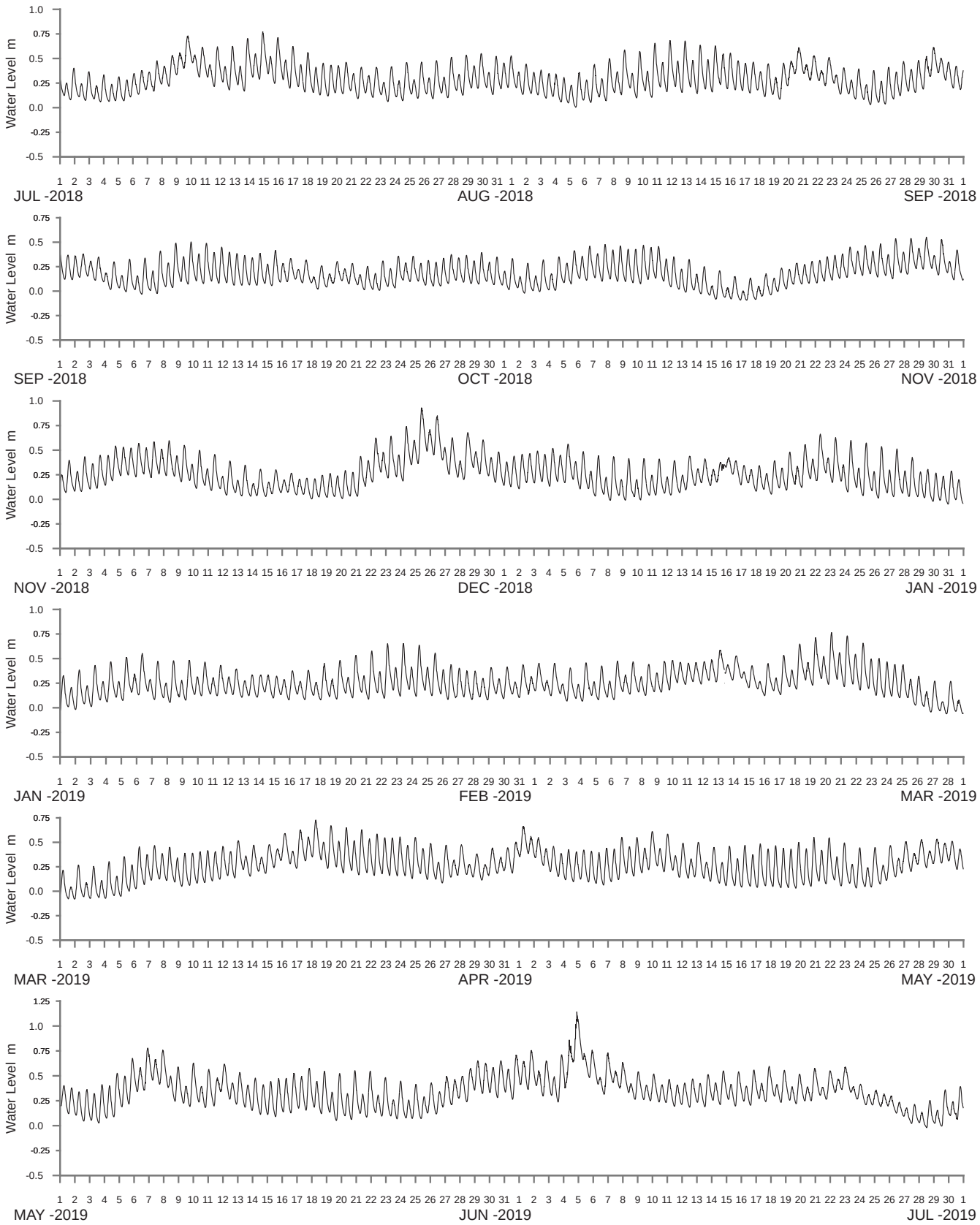
NARRAWALLEE INLET AT NARRAWALLEE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
244

DRAWING 2692-244.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

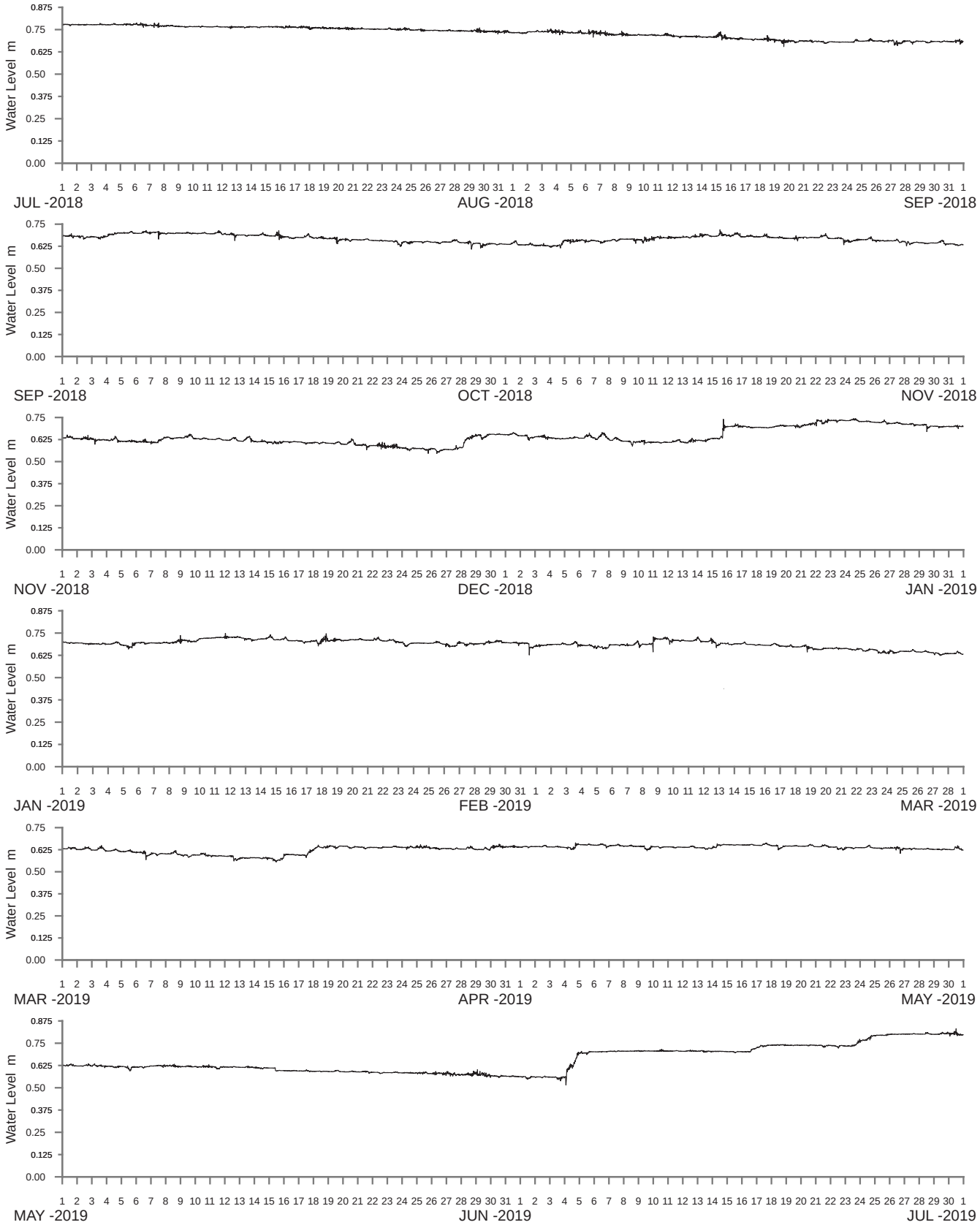
NSW GOVERNMENT

BURRILL LAKE AT BURRILL LAKE BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692
Figure
245

DRAWING 2692-245.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

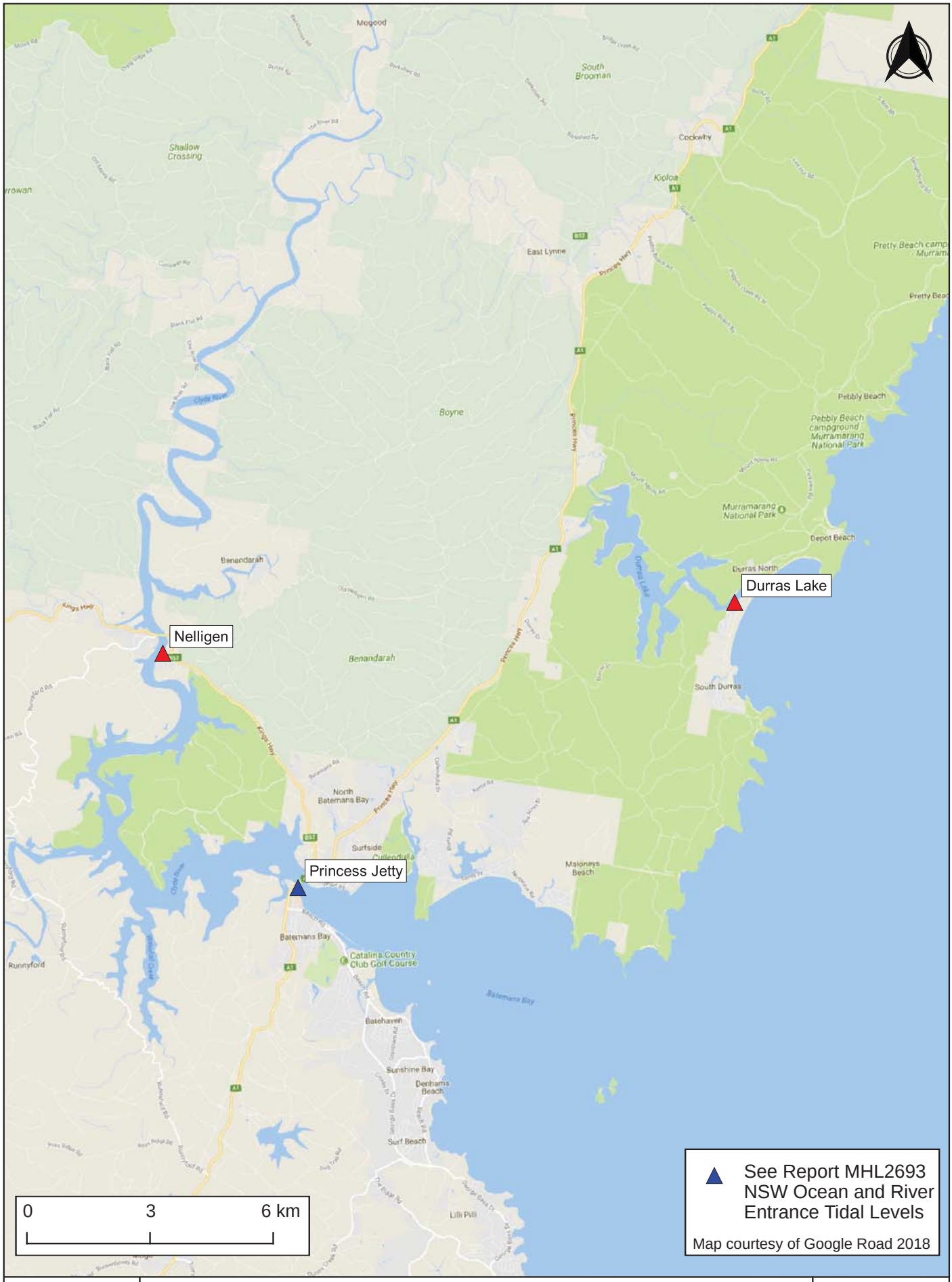
TABOURIE LAKE AT LAKE TABOURIE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
246

DRAWING 2692-246.cdr



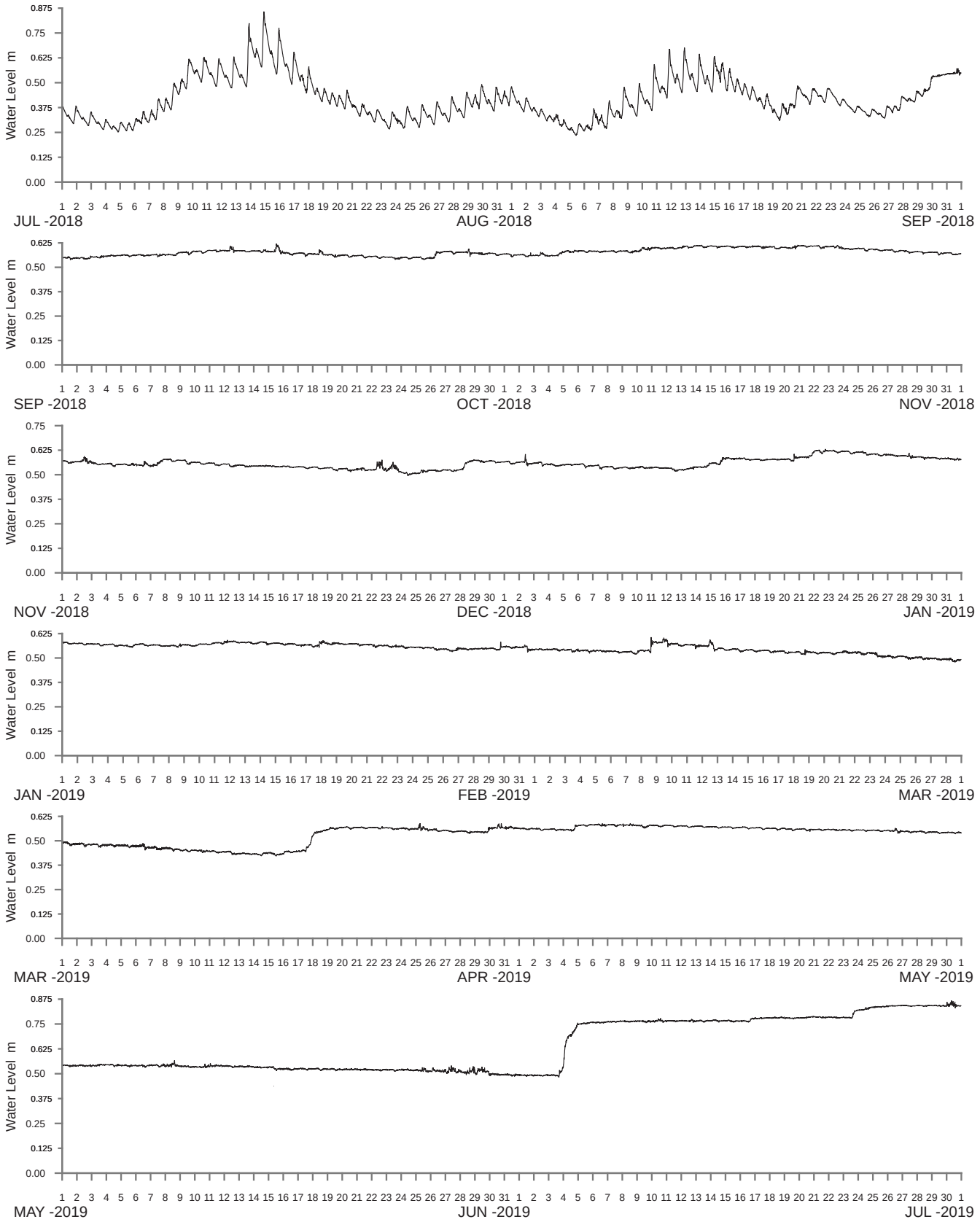
NSW GOVERNMENT

STATION LOCATIONS
BATEMANS BAY REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
247

DRAWING 2692-247.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

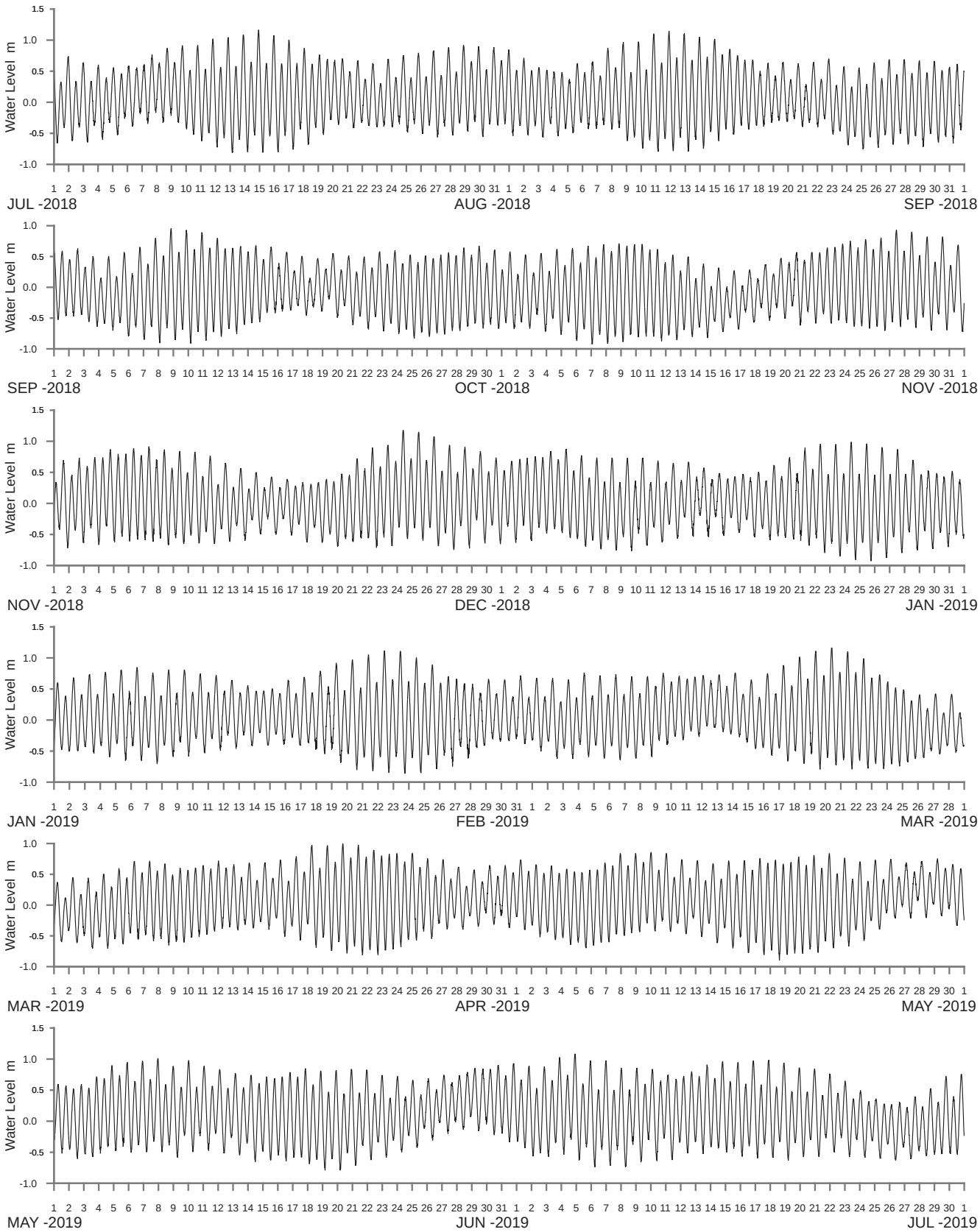
DURRAS LAKE AT DURRAS LAKE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
248

DRAWING 2692-248.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

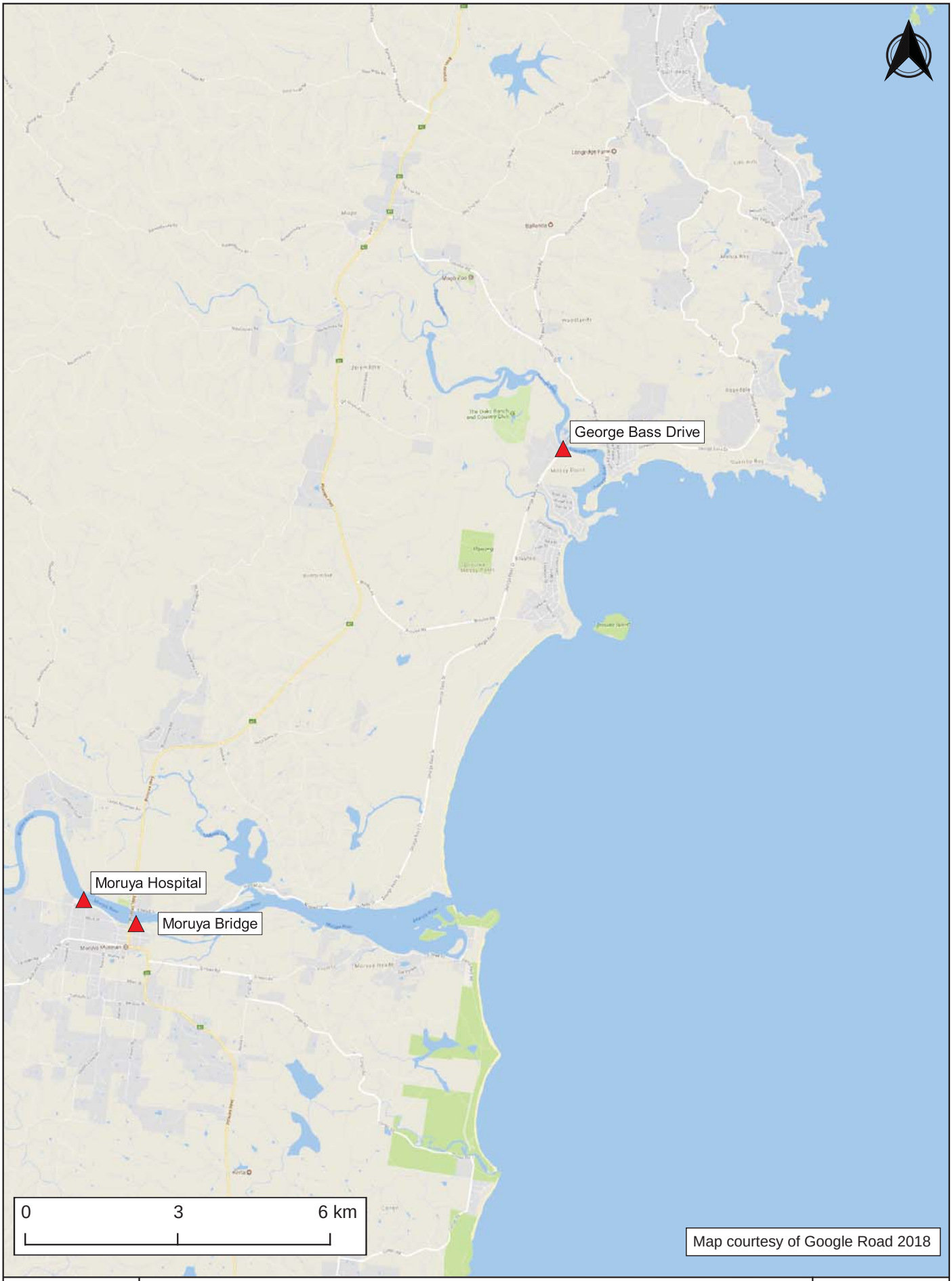
CLYDE RIVER AT NELLIGEN
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
249

DRAWING 2692-249.cdr



NSW GOVERNMENT

STATION LOCATIONS
MORUYA RIVER REGION

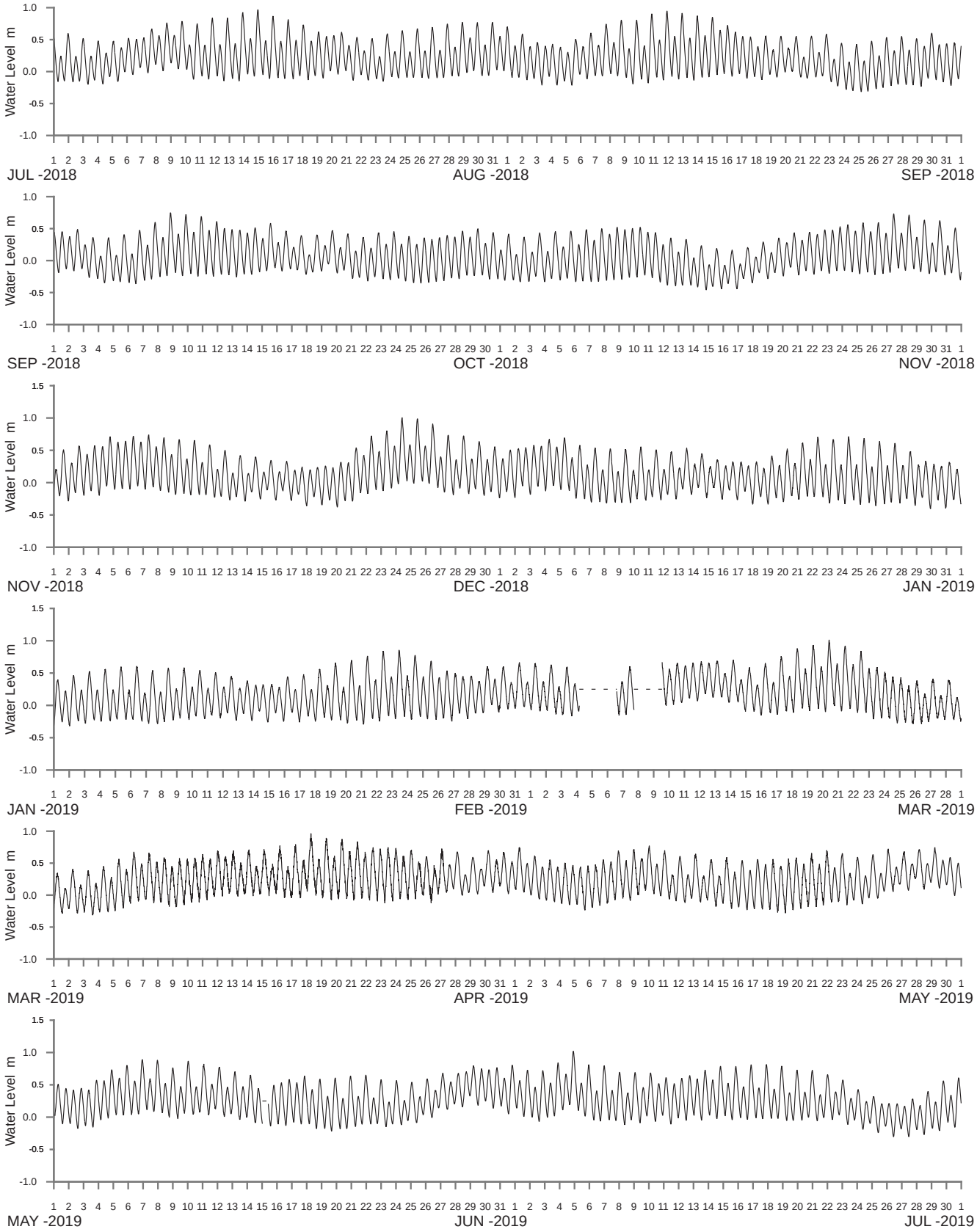
Manly Hydraulics Laboratory

Report MHL2692

Figure

250

DRAWING 2692-250.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

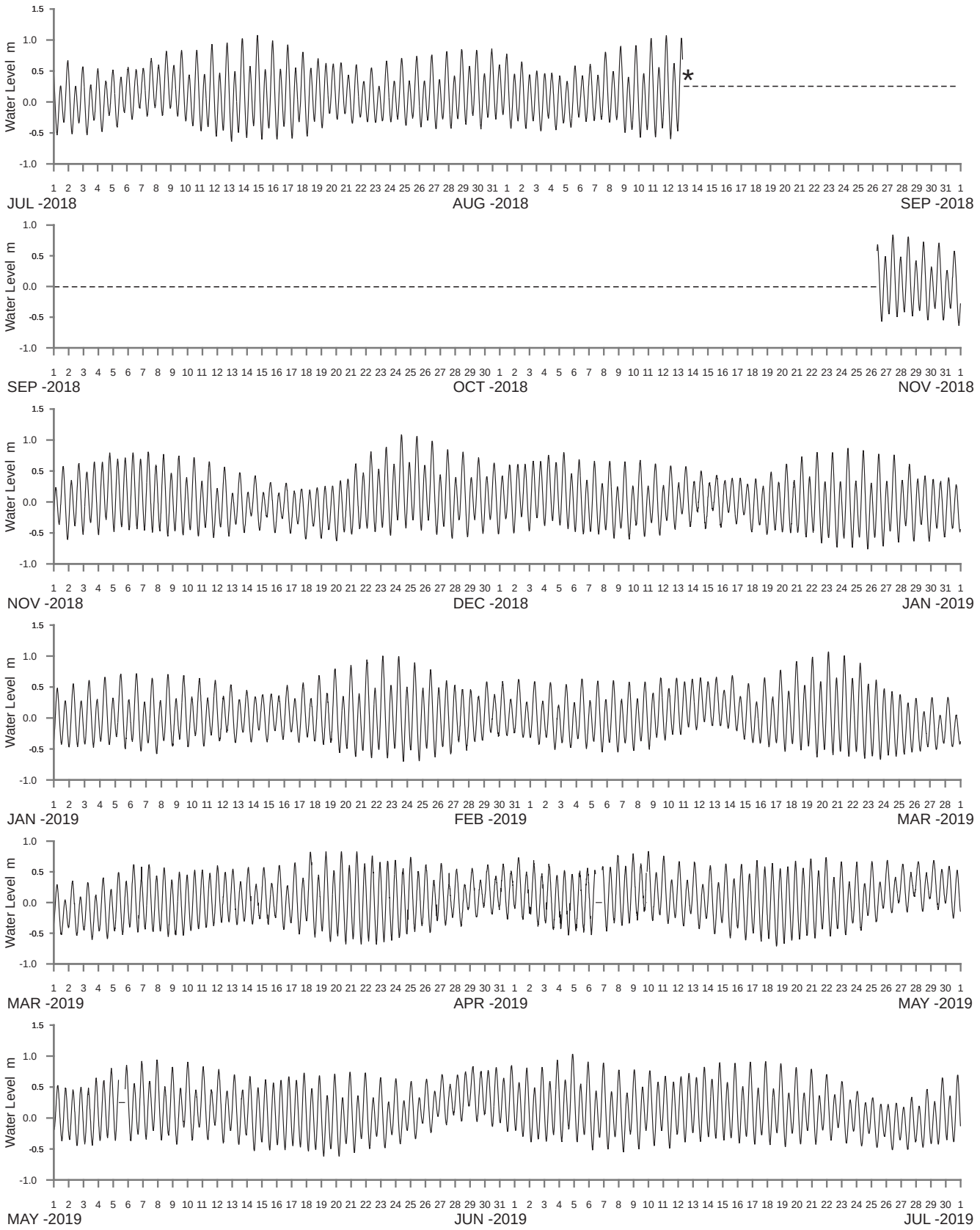
TOMAGA RIVER AT GEORGE BASS DRIVE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
251

DRAWING 2692-251.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Significant periods of data with uncertainty >±50mm due to siltation

NSW GOVERNMENT

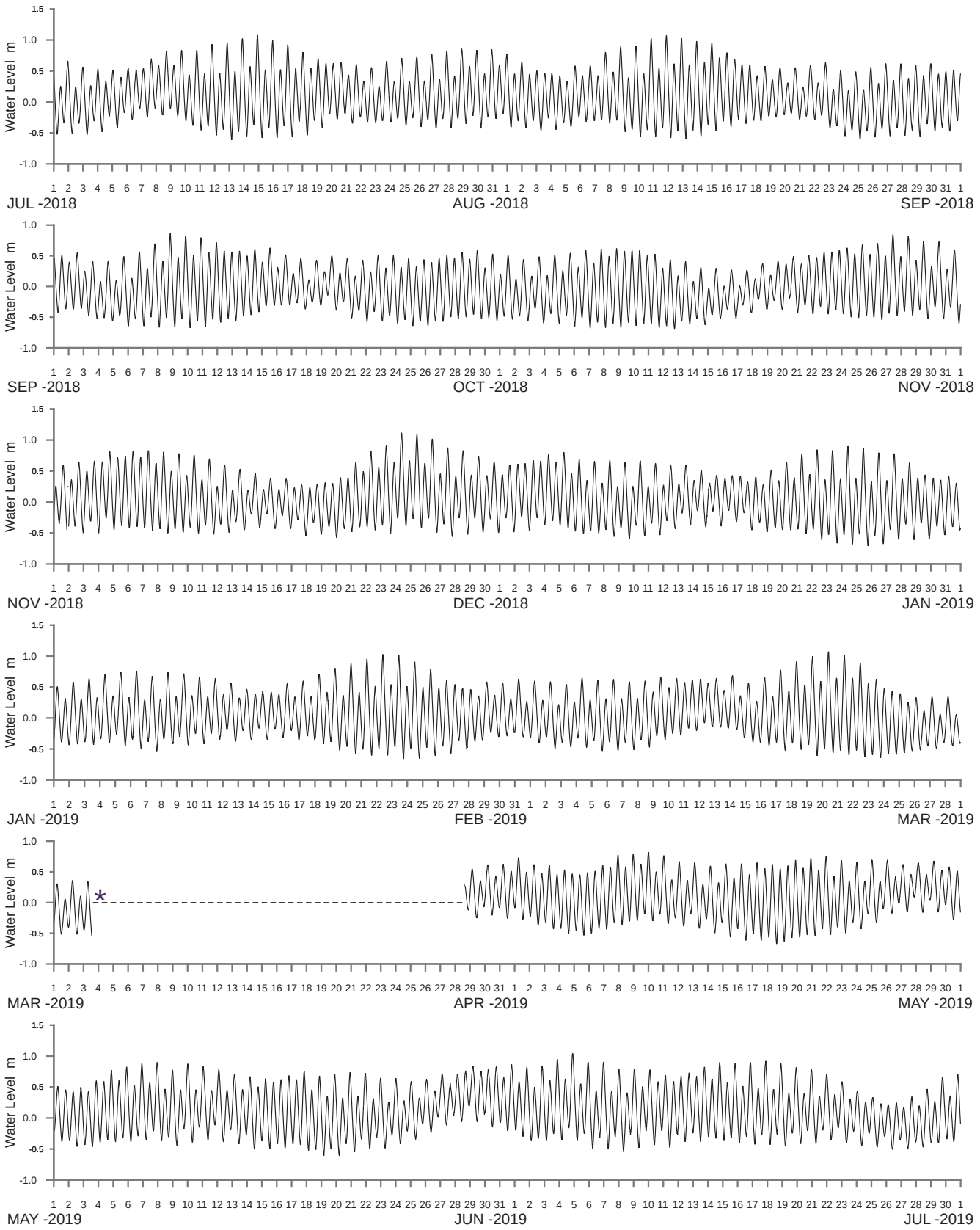
MORUYA RIVER AT MORUYA BRIDGE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 252

DRAWING 2692-252.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to logger failure

NSW GOVERNMENT

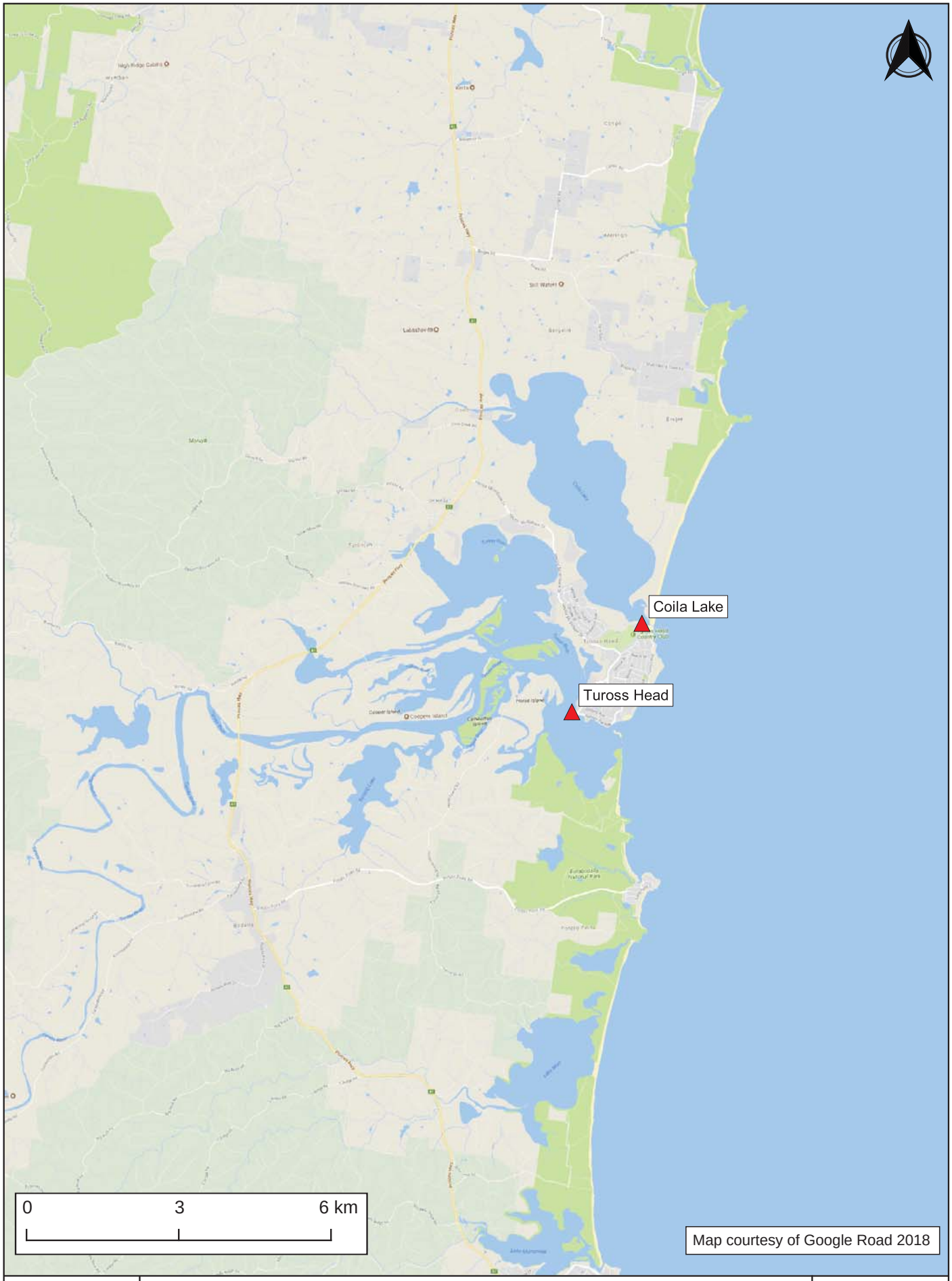
MORUYA RIVER AT MORUYA HOSPITAL
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 253

DRAWING 2692-253.cdr



NSW GOVERNMENT

STATION LOCATIONS
COILA AND TUROSS LAKES

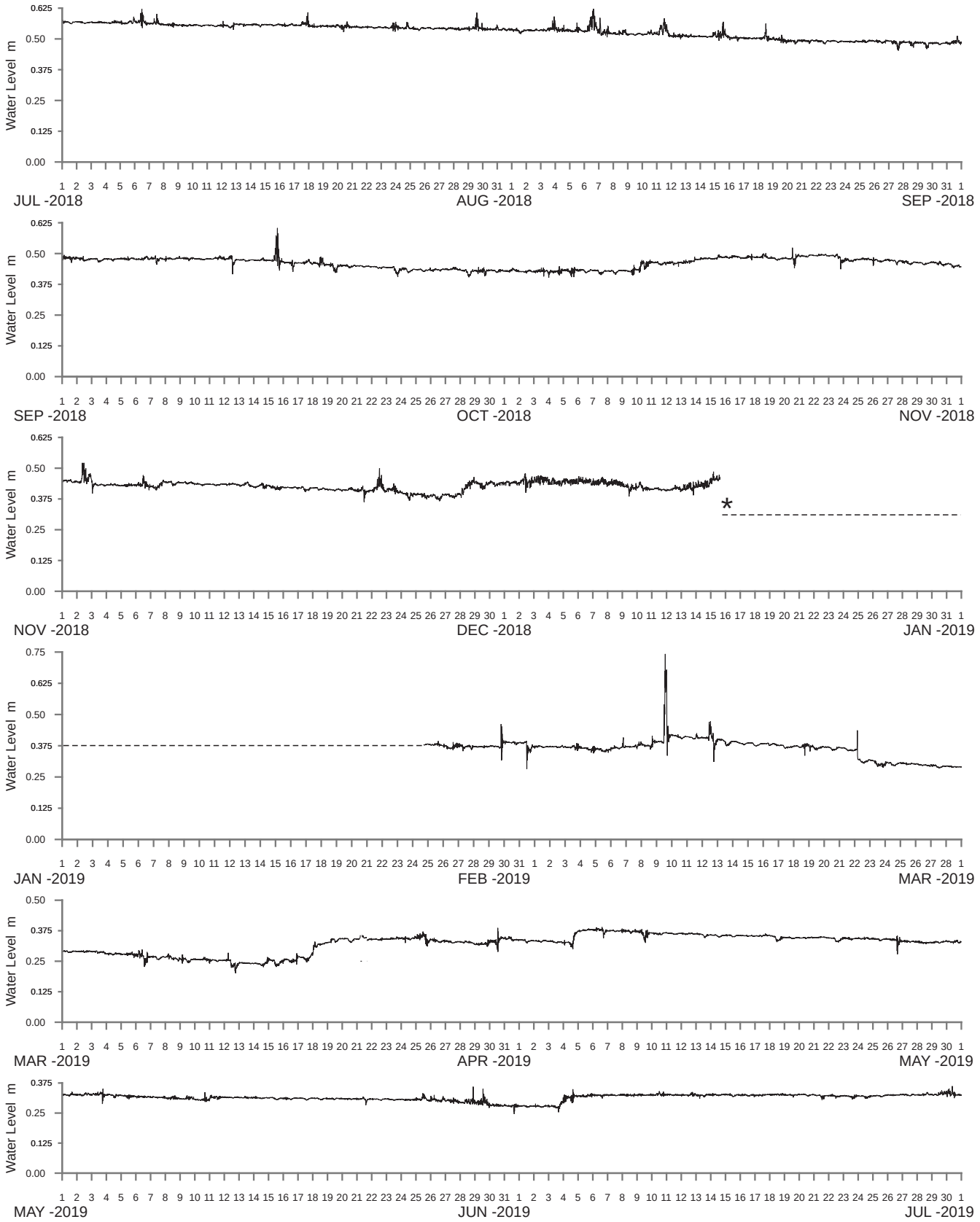
Manly Hydraulics Laboratory

Report MHL2692

Figure

254

DRAWING 2692-254.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to unsecured gas line, mooring bricks were stolen

NSW GOVERNMENT

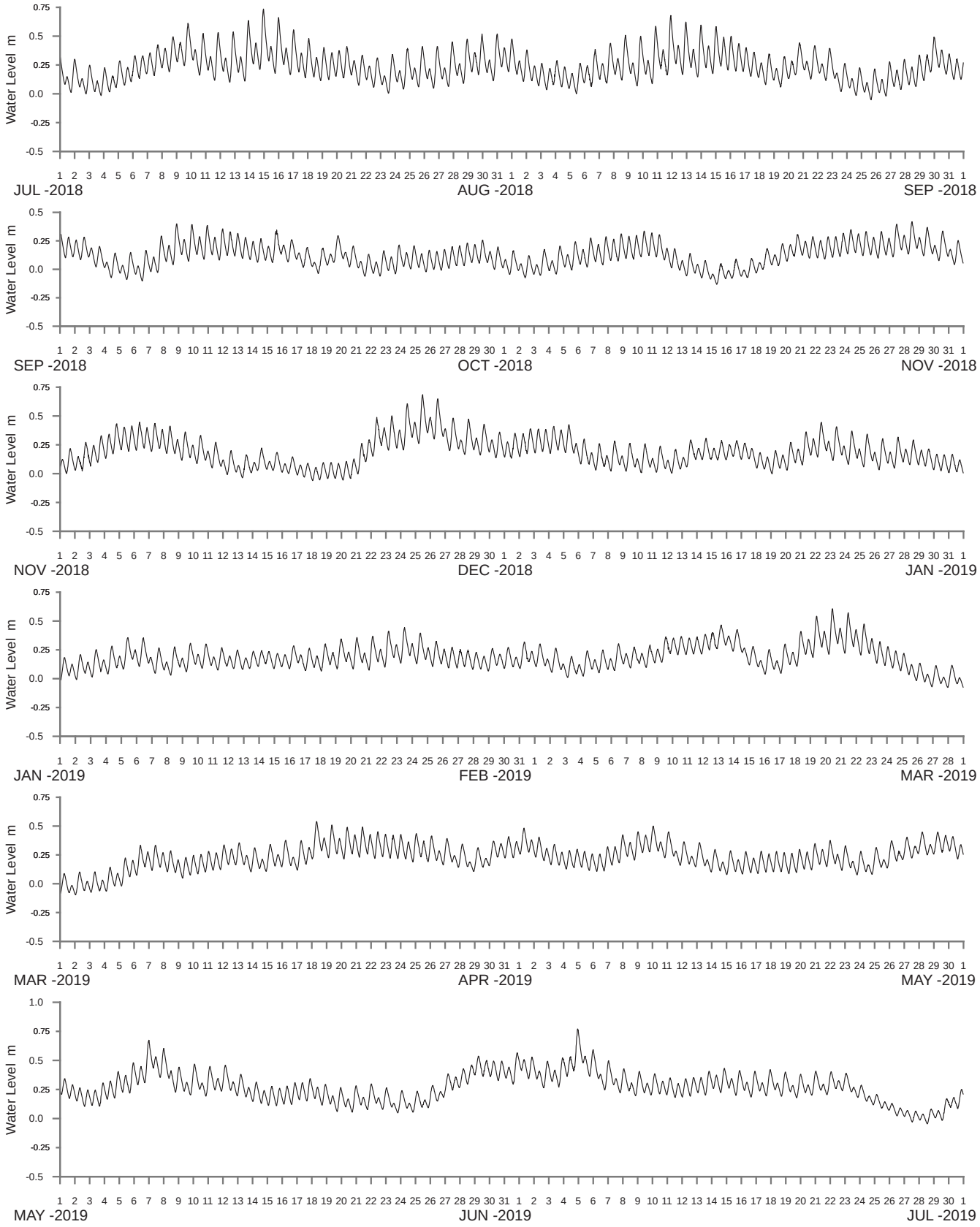
COILA LAKE AT COILA LAKE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
255

DRAWING 2692-255.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

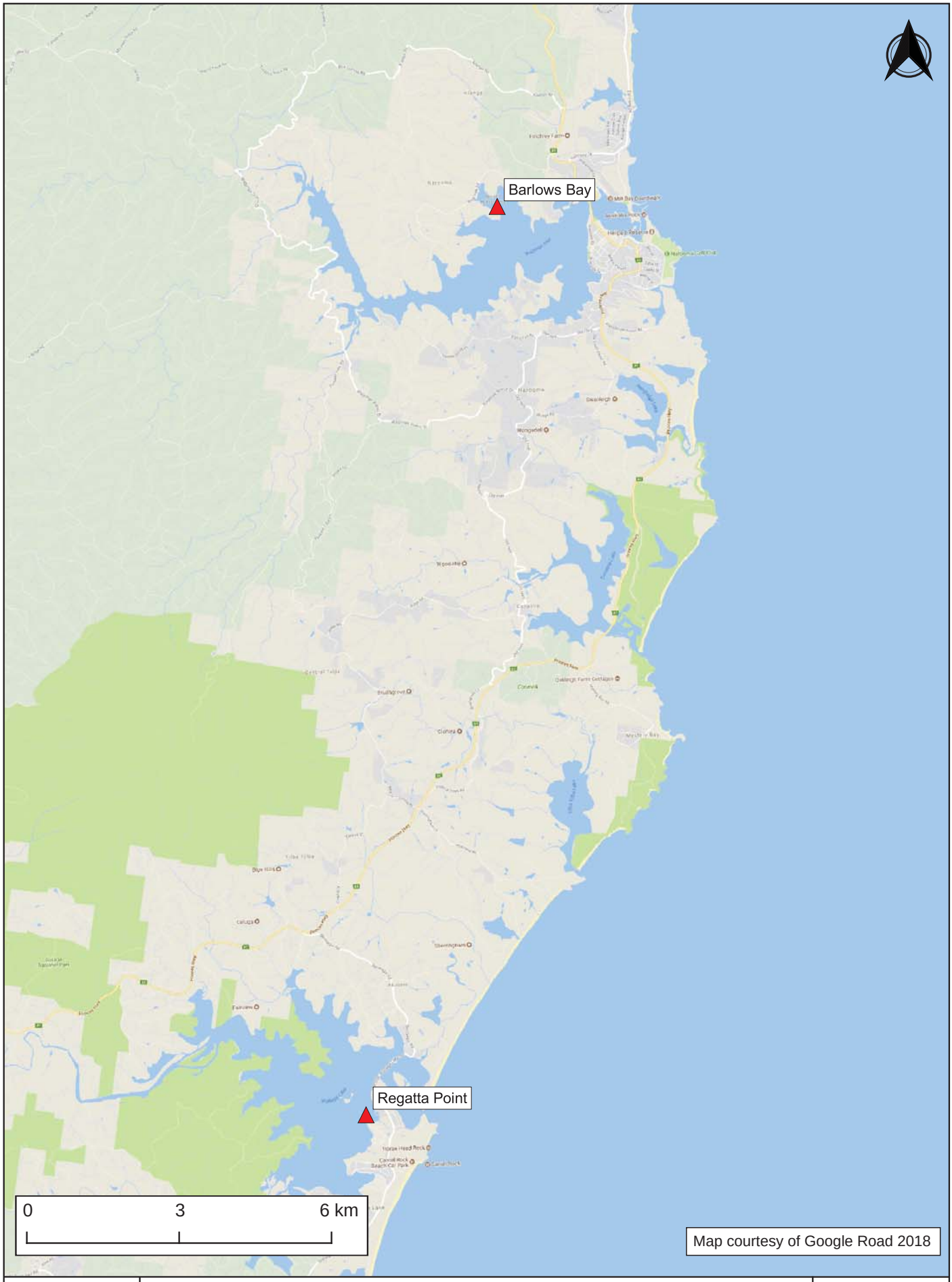
TUROSS RIVER AT TUROSS HEAD
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
256

DRAWING 2692-256.cdr



NSW GOVERNMENT

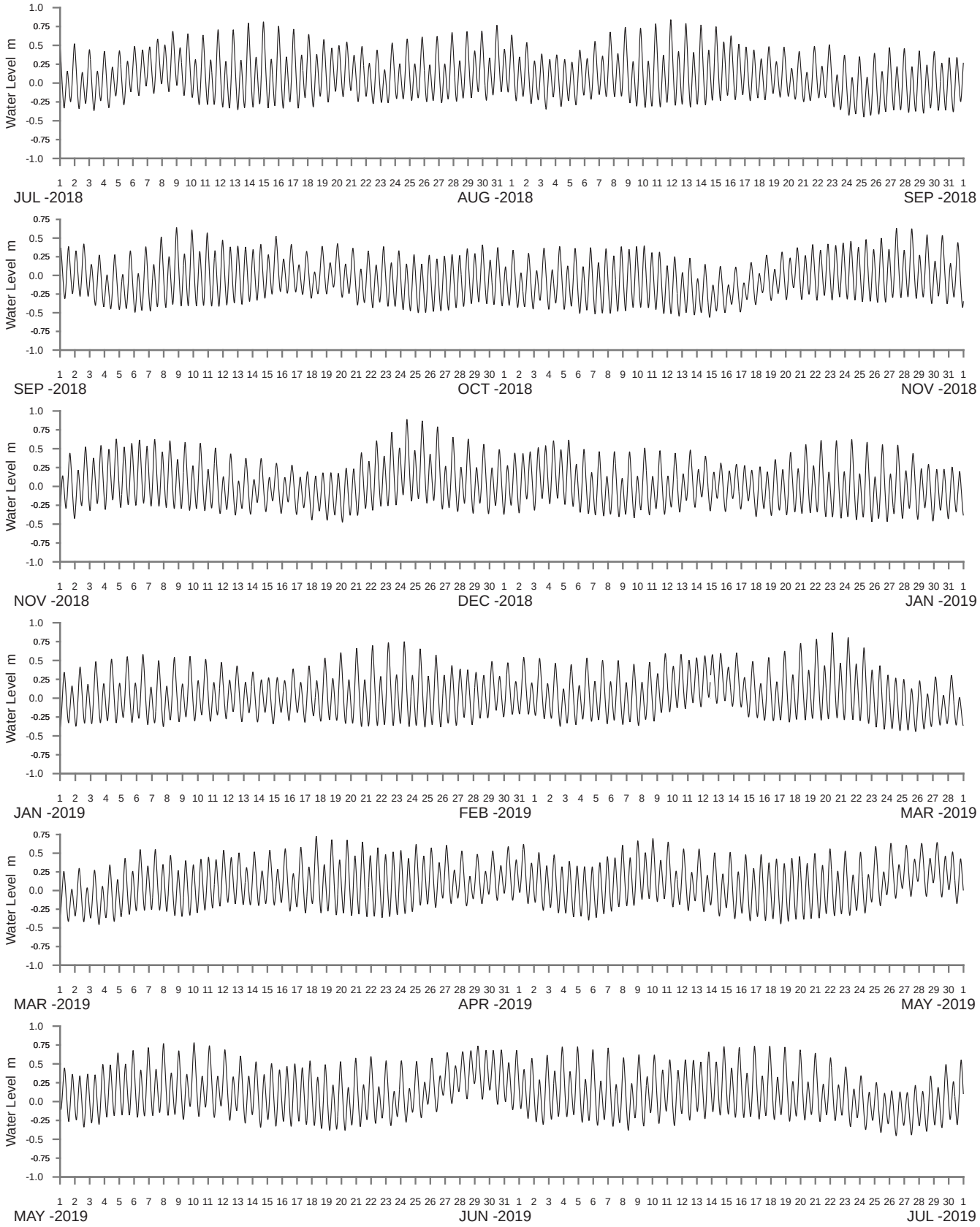
STATION LOCATIONS
WAGONGA INLET AND WALLAGA LAKE

Manly Hydraulics Laboratory

Report MHL2692

Figure
257

DRAWING 2692-257.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

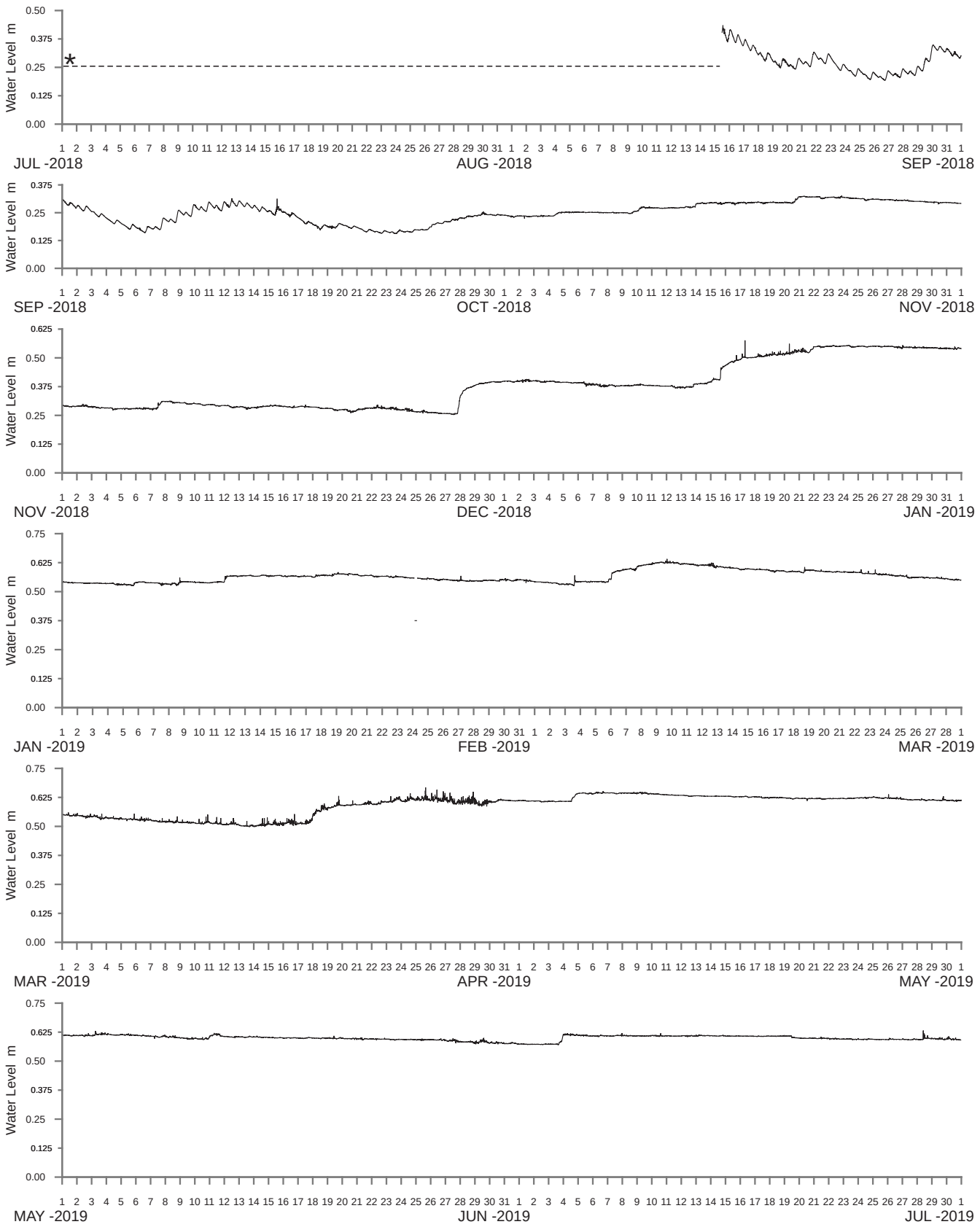
NSW GOVERNMENT

WAGONGA INLET AT BARLOWS BAY
2018–2019

Manly Hydraulics Laboratory

Report MHL2692
Figure
258

DRAWING 2692-258.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Data loss due to logger failure

NSW GOVERNMENT

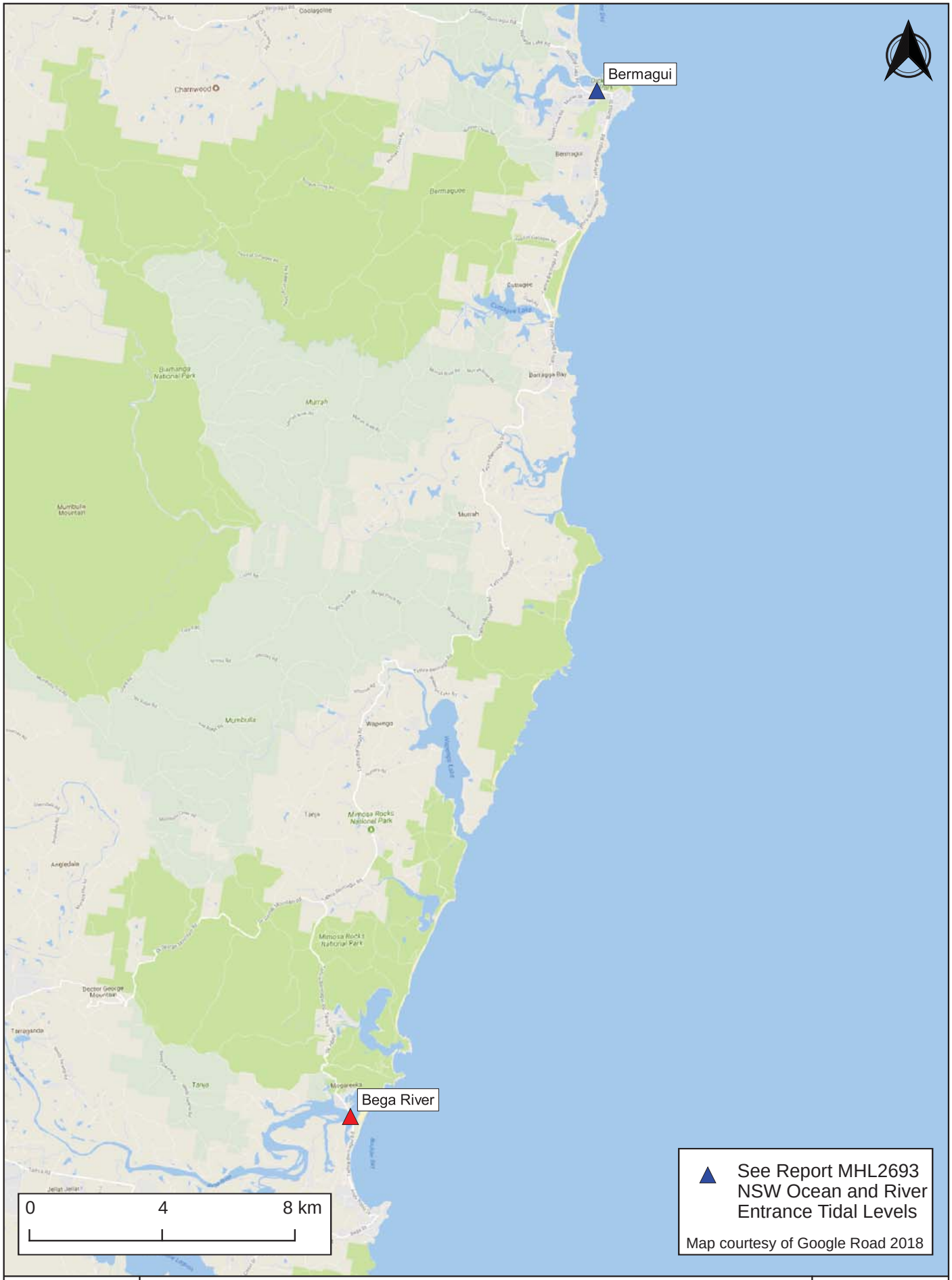
WALLAGA LAKE AT REGATTA POINT
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
259

DRAWING 2692-259.cdr



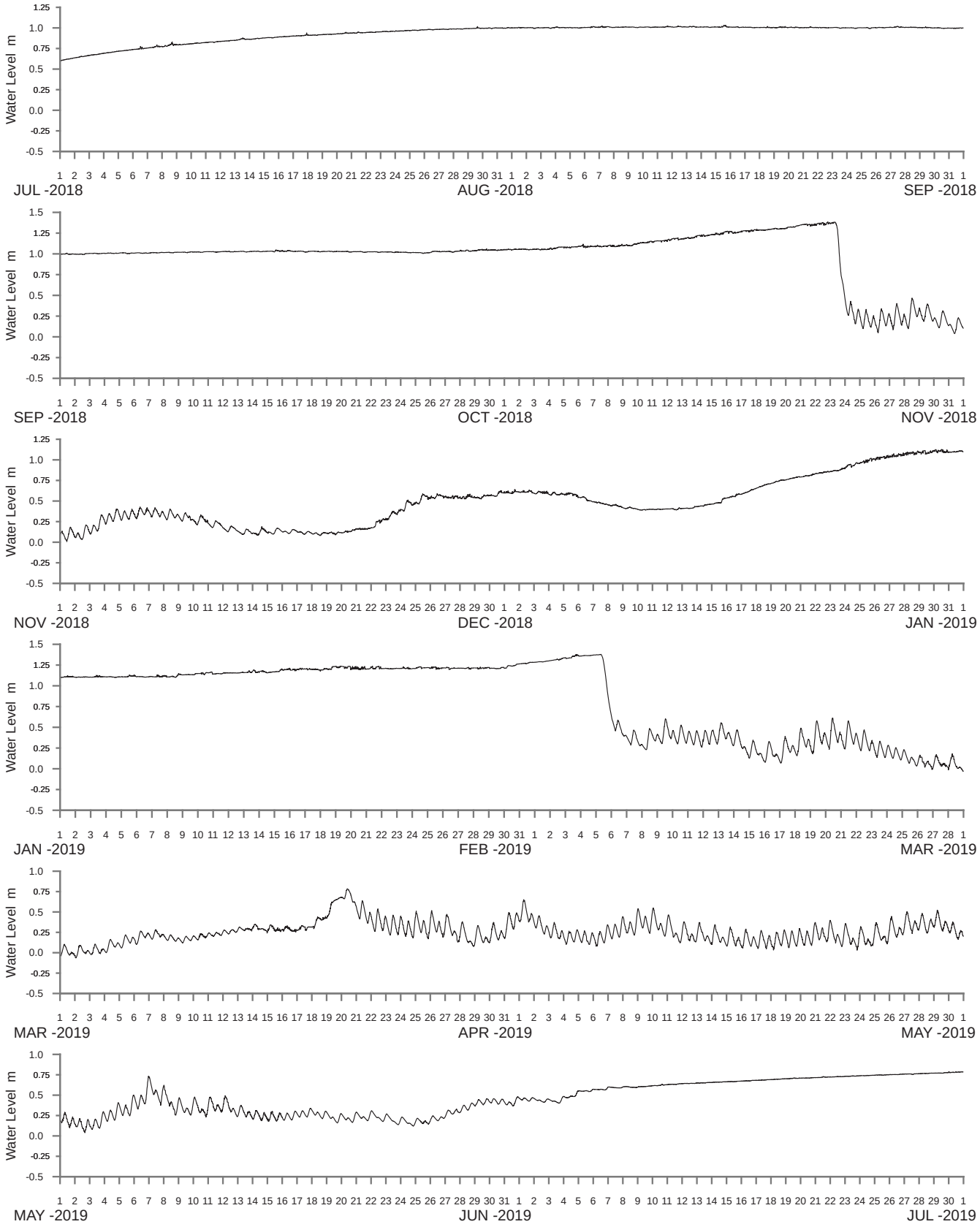
NSW GOVERNMENT

STATION LOCATIONS
BERMAGUI AND BEGA RIVER REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
260

DRAWING 2692-260.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

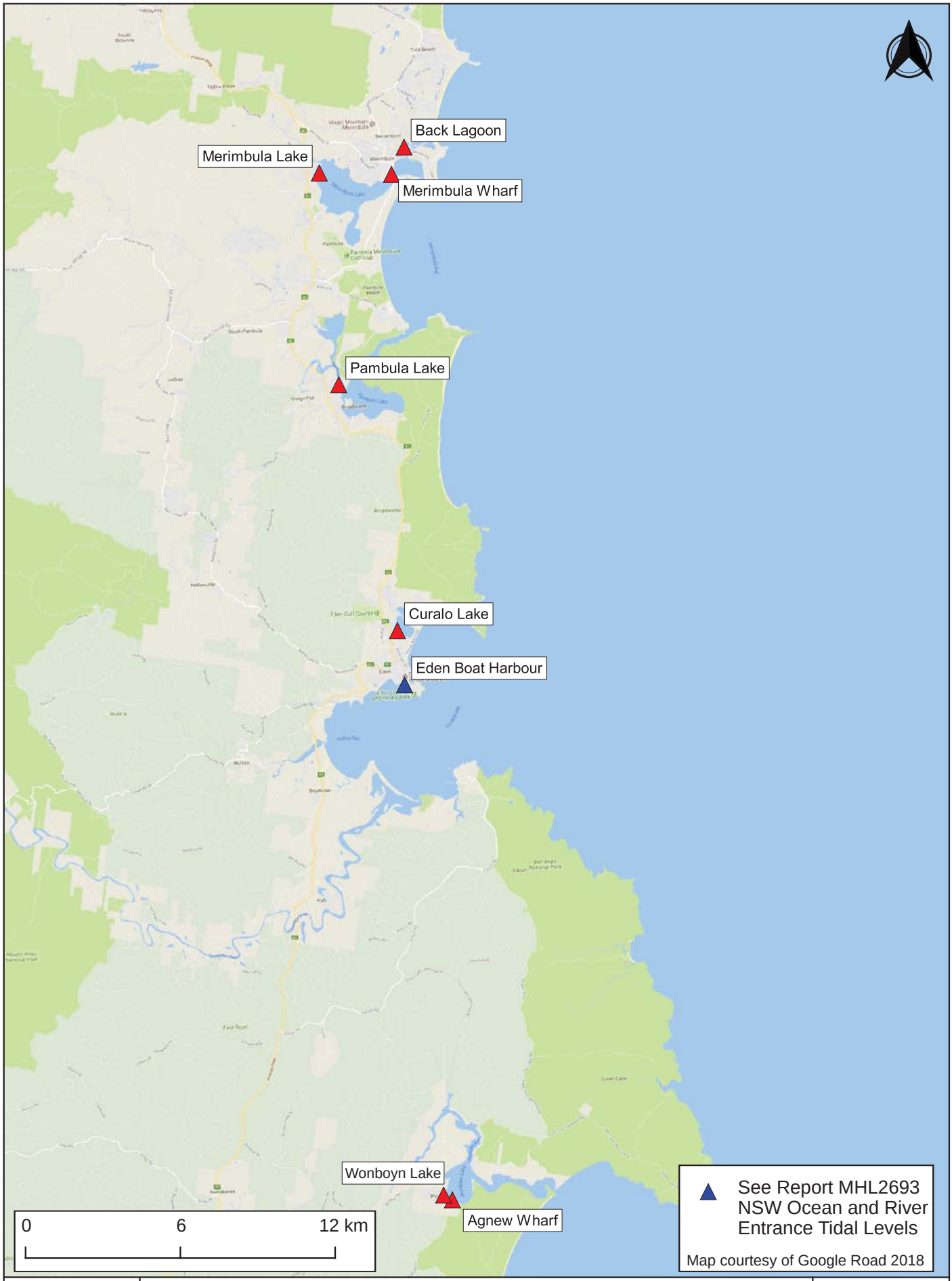
BEGA RIVER AT BEGA RIVER
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
261

DRAWING 2692-261.cdr



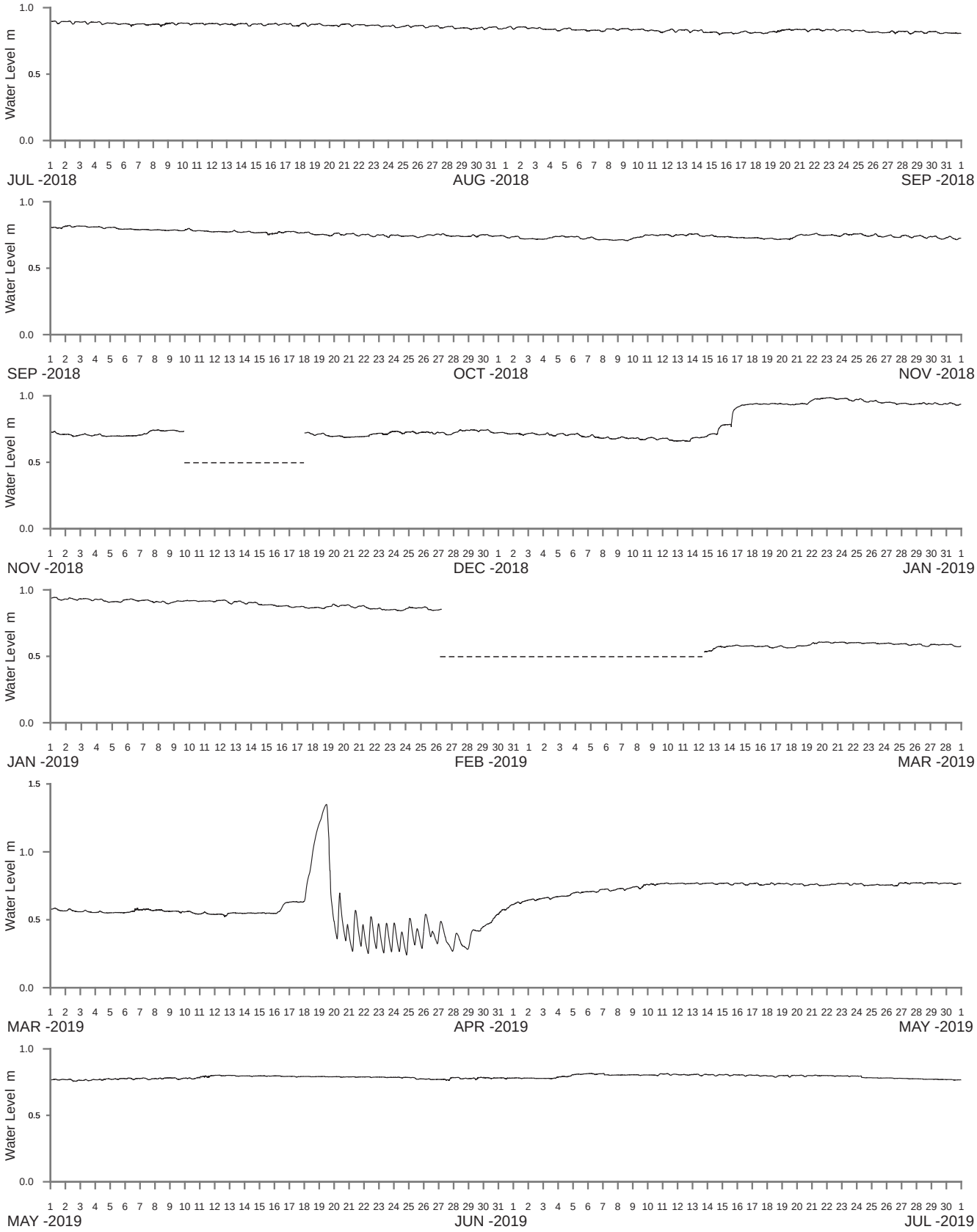
NSW GOVERNMENT

STATION LOCATIONS
EDEN REGION

Manly Hydraulics Laboratory

Report MHL2692
Figure
262

DRAWING 2692-262.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

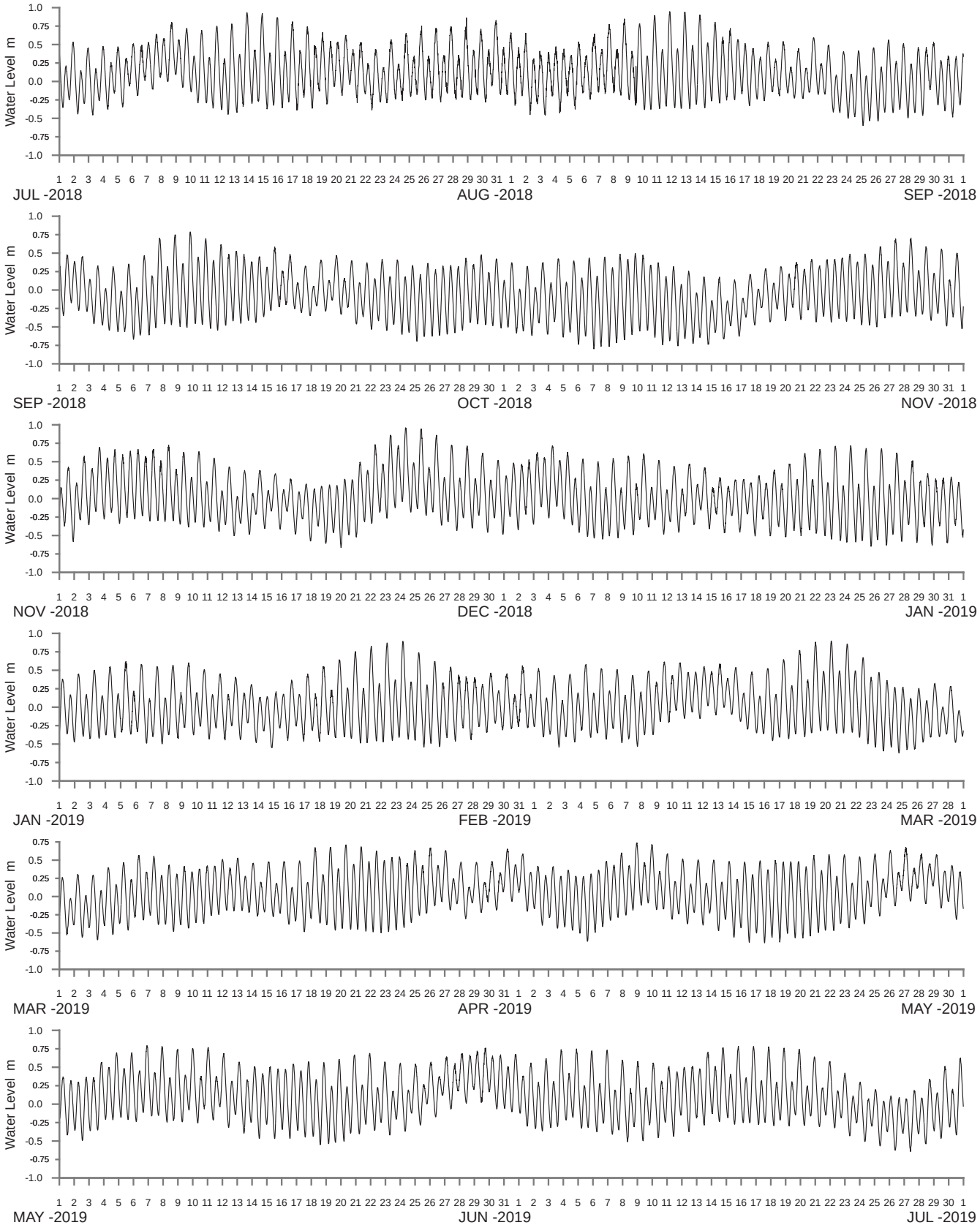
BACK LAGOON AT BACK LAGOON
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
263

DRAWING 2692-263.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

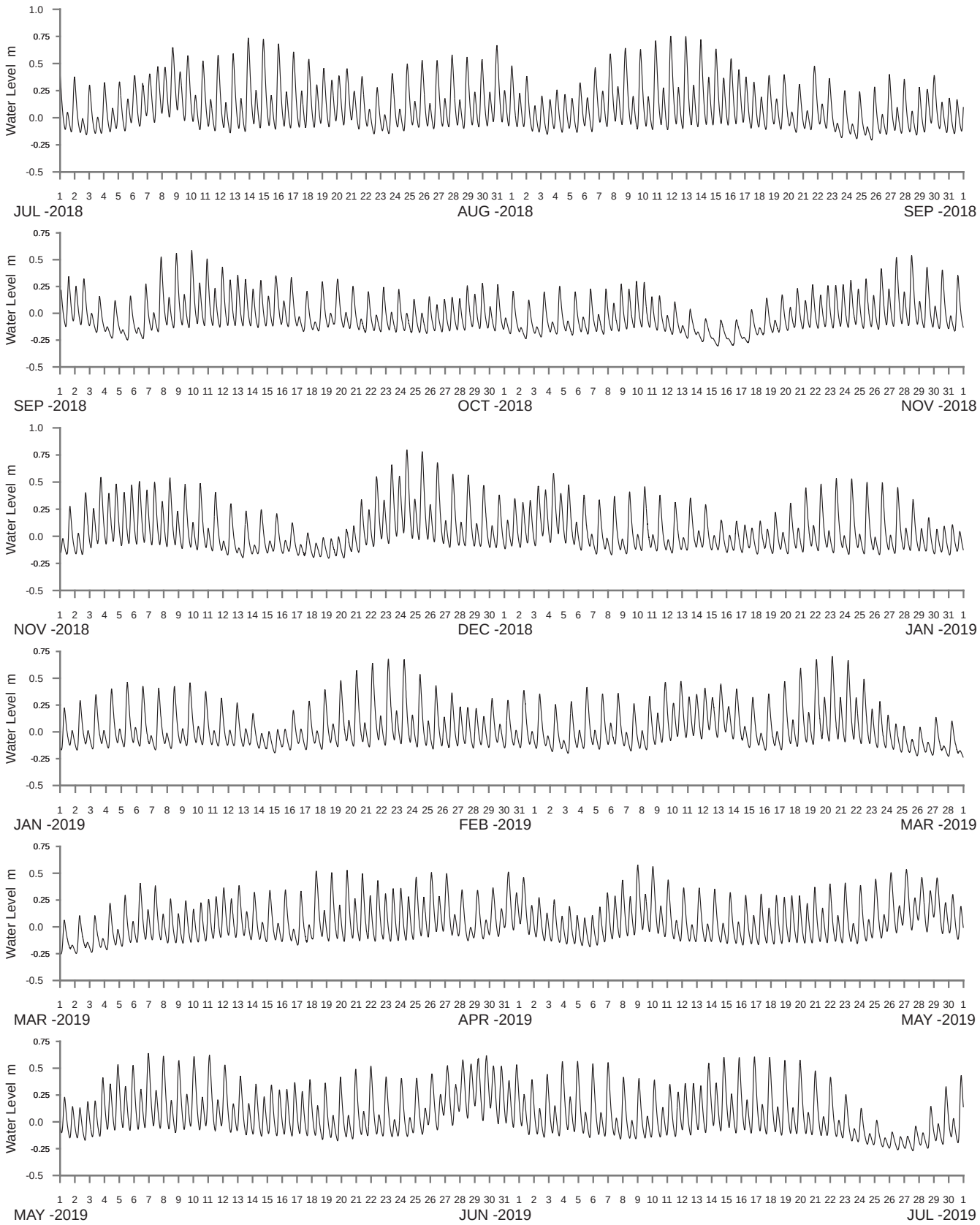
MERIMBULA LAKE AT MERIMBULA WHARF
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
264

DRAWING 2692-264.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

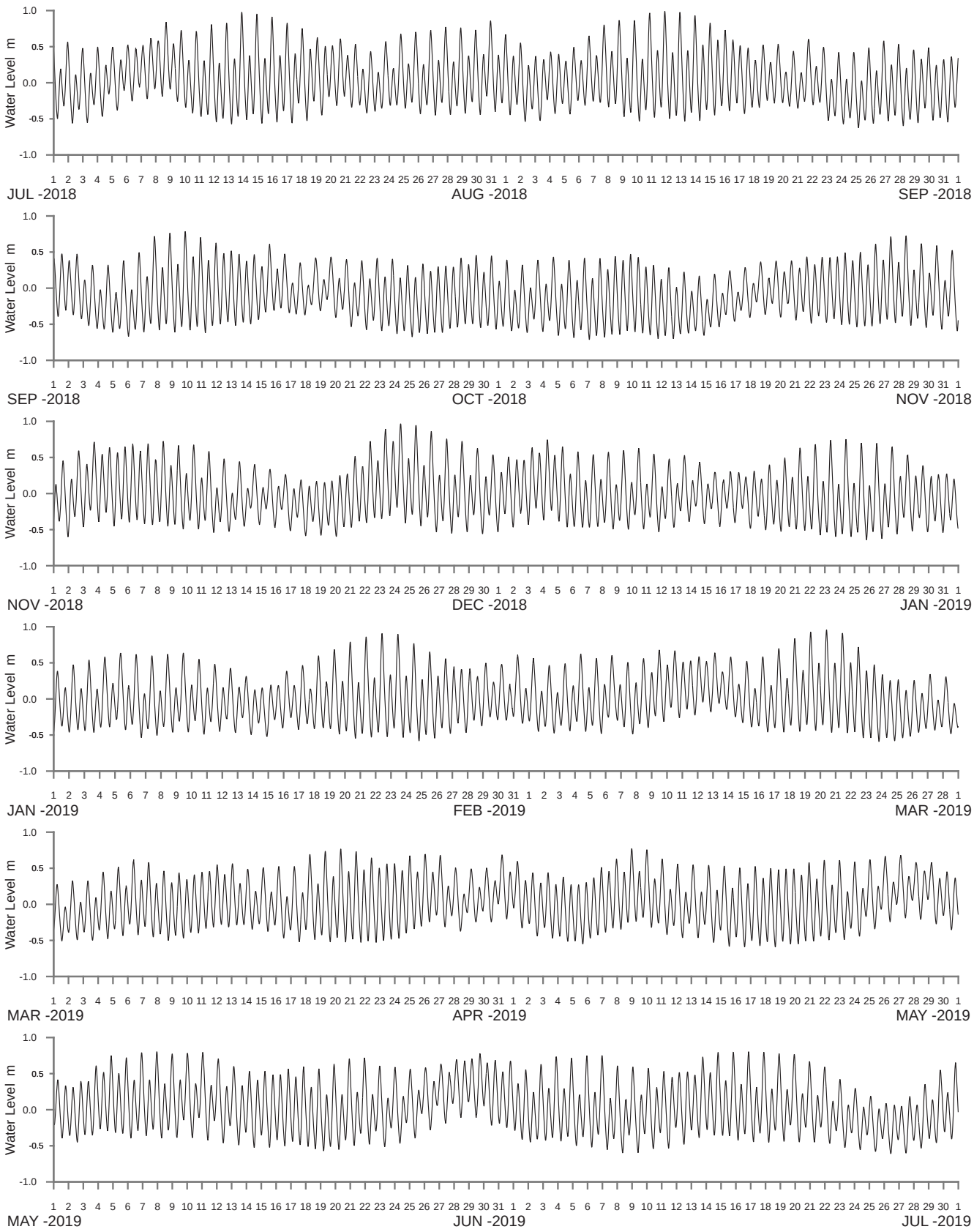
MERIMBULA LAKE AT MERIMBULA LAKE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
265

DRAWING 2692-265.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

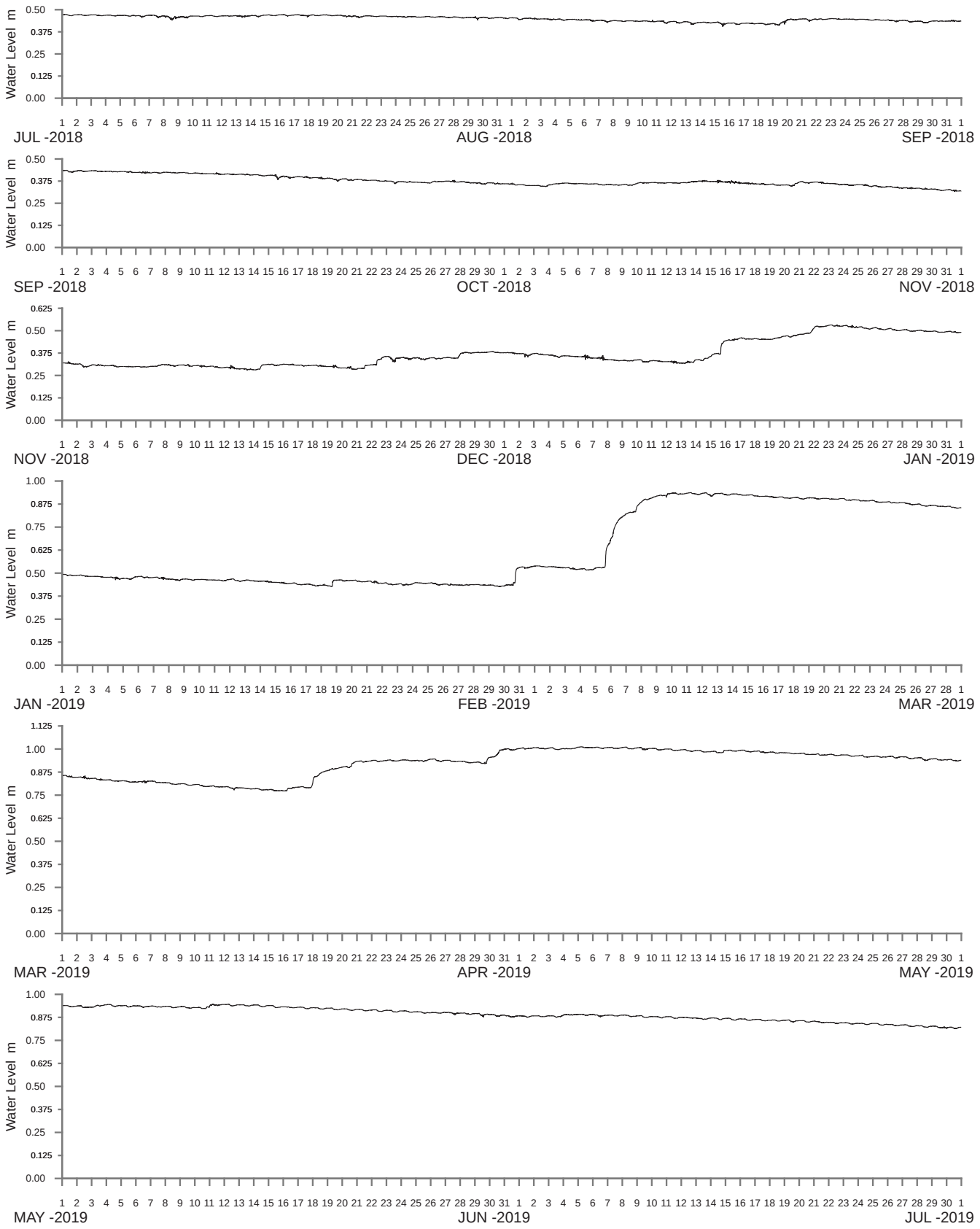
PAMBULA LAKE AT PAMBULA LAKE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure
266

DRAWING 2692-266.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

NSW GOVERNMENT

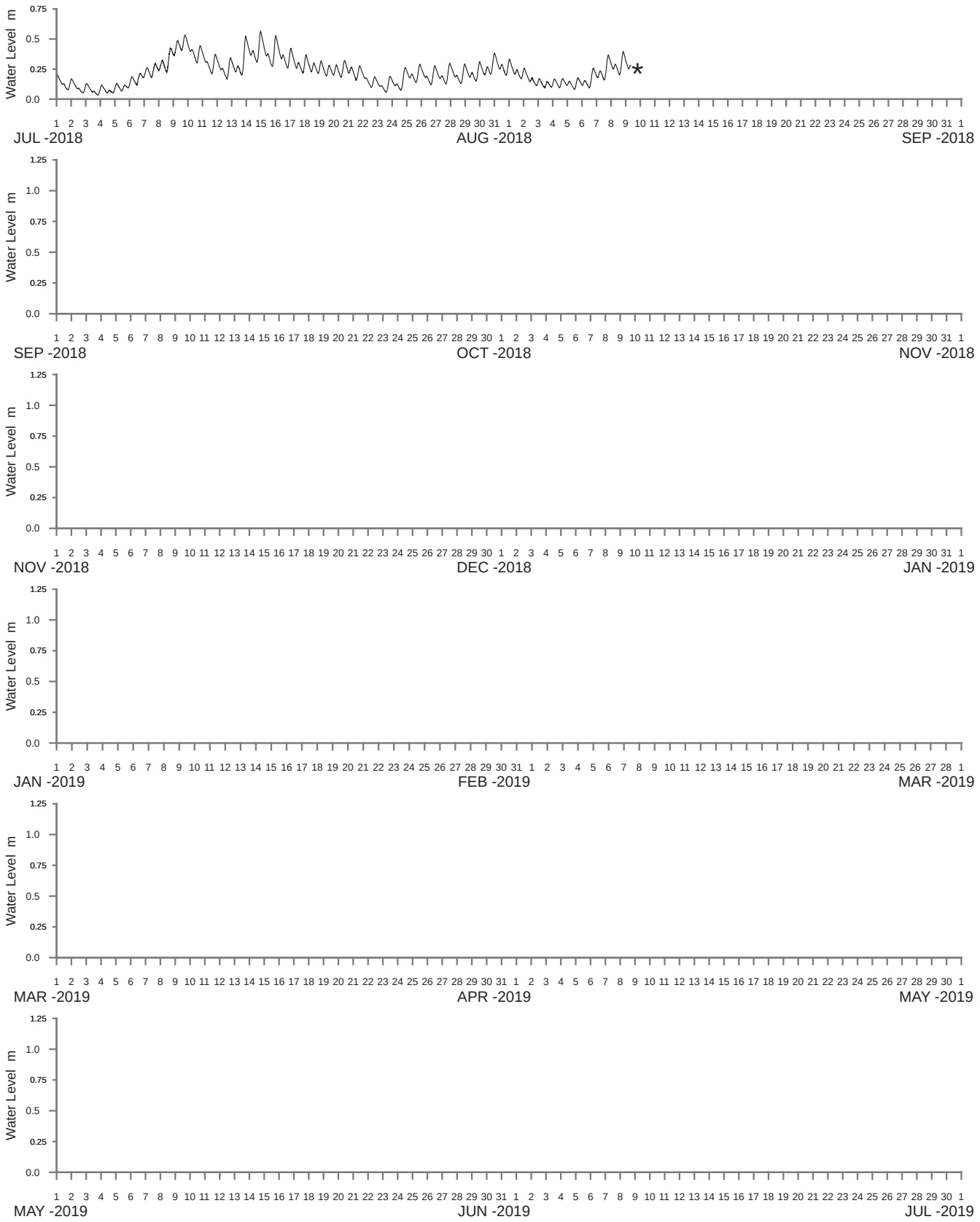
LAKE CURALO AT LAKE CURALO
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 267

DRAWING 2692-267.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Station decommissioned on 09/08/2018 at land owner's request

NSW GOVERNMENT

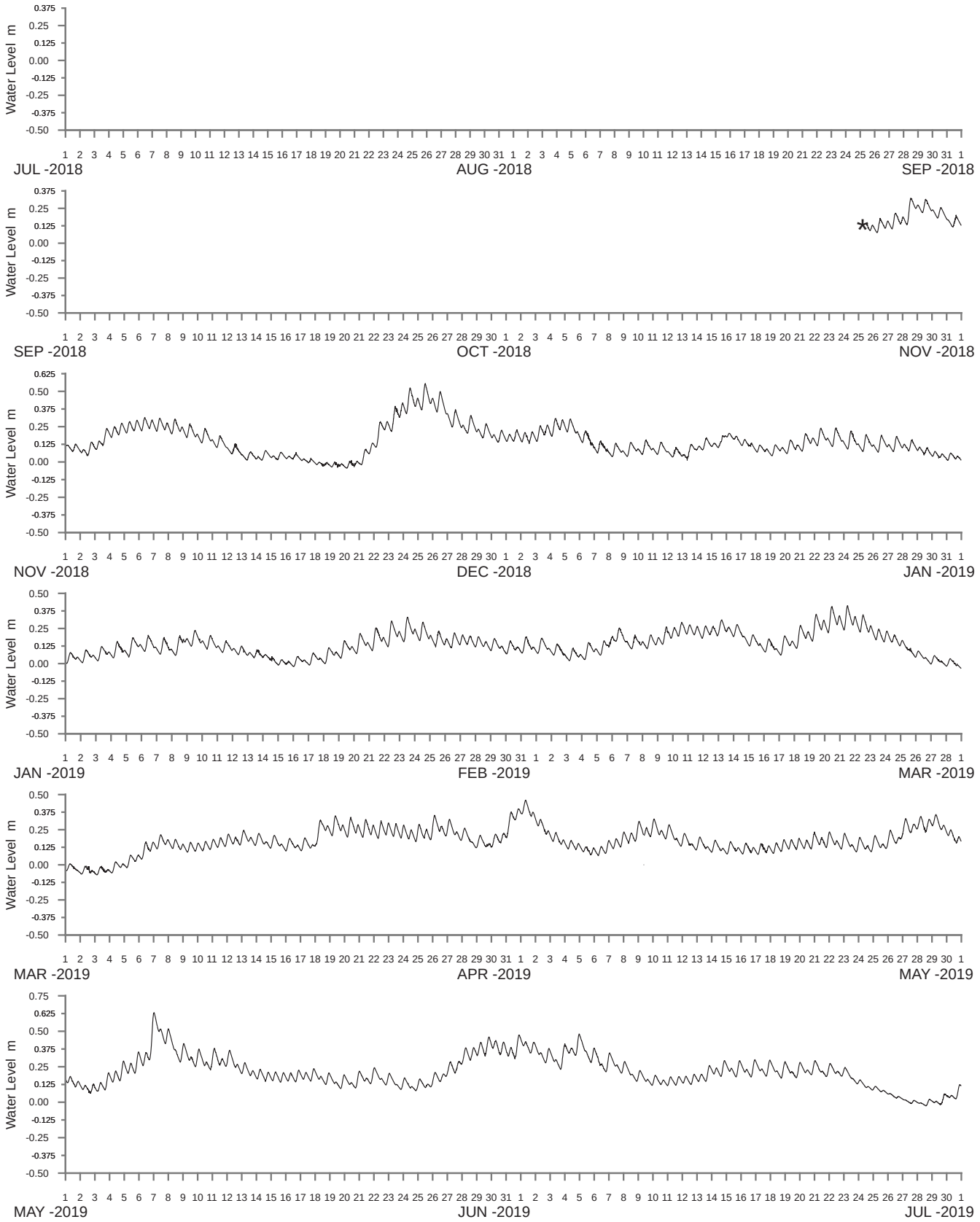
WONBOYN RIVER AT AGNEW WHARF
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 268

DRAWING 2692-268.cdr



WATER LEVEL REFERENCED TO AUSTRALIAN HEIGHT DATUM

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

*Station installed on 25/10/2018

NSW GOVERNMENT

WONBOYN LAKE AT WONBOYN LAKE
2018–2019

Manly Hydraulics Laboratory

Report MHL2692

Figure 269

DRAWING 2692-269.cdr

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	Cudgen Creek	Kingscliff	May 1985–ongoing	202418
Brunswick	Cudgen Creek	Kingscliff Upstream	May 2014–Jan 2017	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
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
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
Clarence	Clarence River	Oyster Channel	Nov 2002–ongoing	204451
Clarence	Clarence River	Maclean	Jan 1990–ongoing	204410

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Coastal region	River/creek	Location	Period of data	AWRC*
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	Empire Vale Creek	Empire Vale Creek	May 1998–Oct 1999	203489
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
Macleay	Saltwater Lagoon	Saltwater Lagoon	Jul 2004–ongoing	206460

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Coastal region	River/creek	Location	Period of data	AWRC*
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
Macleay	Ryanda Creek	Guyra	Dec 1987–Oct 1991	206455
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

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Coastal region	River/creek	Location	Period of data	AWRC*
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	560056
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	Brunswick River	Pacific Highway Bridge	Mar 1997–Mar 1999	212422
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–ongoing	210459
Hunter	Hunter River	Shortland Wetland Centre	Mar 1999–Jul 2000	210483
Hunter	Hunter River	Oakhampton Railway Br	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

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Coastal region	River/creek	Location	Period of data	AWRC*
Macquarie-Tuggerah Lakes	Dora Creek	Cooranbong	Jul 1990–ongoing	211470
Macquarie-Tuggerah Lakes	Stockton Creek	Morisset	Dec 1984–ongoing	211480
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
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
Hawkesbury	Hawkesbury River	Freemans Reach	Apr 1980–ongoing	212410
Hawkesbury	Nepean River	Castlereagh	Nov 1981–ongoing	212404

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Coastal region	River/creek	Location	Period of data	AWRC*
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	Penrith	Penrith Lakes	May 1992–Jun 1996	PENL01
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

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Coastal region	River/creek	Location	Period of data	AWRC*
Wollongong Coastal	Cabbage Tree Creek	Cabbage Tree Creek Downstream	Aug 1995–ongoing	214406
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–ongoing	214416
Wollongong Coastal	Lake Illawarra	Lake Illawarra Entrance	Jul 1991–ongoing	214417
Wollongong Coastal	Macquarie Rivulet	Princes Highway	Dec 1984–ongoing	214402
Wollongong Coastal	Minnamurra River	Minnamurra	Mar 2002–ongoing	214442
Wollongong Coastal	Lake Illawarra	Burroo Point	Dec 1987–May 1990	214414
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
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

Coastal region	River/creek	Location	Period of data	AWRC*
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 Commission.

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	13-Jun-1964	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	N/A	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	N/A	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	N/A	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 Commission.

For stations with Yes, full records are available in digitised form. For stations with No, early records are not available in digitised form.

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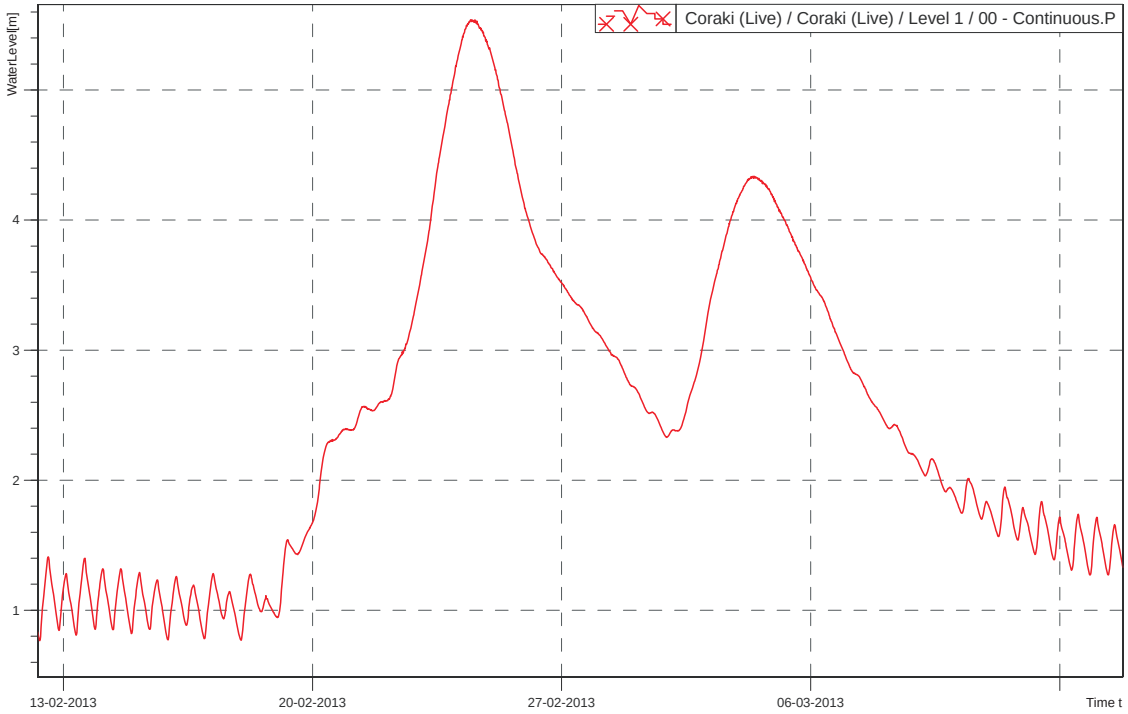
Appendix B Sample outputs



STANDARD WATER LEVEL PLOT

Manly Hydraulics Laboratory

Report MHL2692

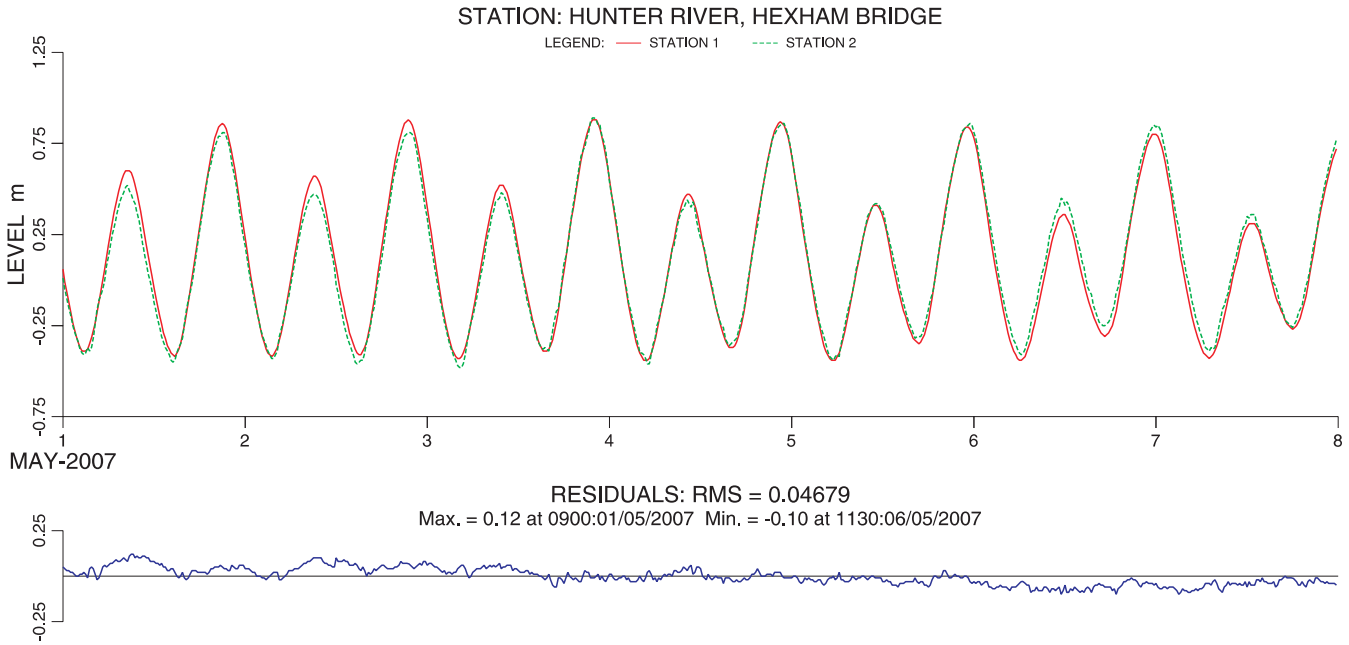
Figure

B1

DRAWING 2692-B1.cdr

Station Name	Bogangar (Live)
Station Number	202416
MGA Easting (m zone 56)	554672.28
MGA Northing (m zone 56)	6866410.41
Datum	Brunswick River Flood Mitigation Datum (BFMD)

Date	Time	Value [m]	State of value
13/03/2013	0:00:00	1.279	55 (Fair)
13/03/2013	0:15:00	1.278	55 (Fair)
13/03/2013	0:30:00	1.276	55 (Fair)
13/03/2013	0:45:00	1.277	55 (Fair)
13/03/2013	1:00:00	1.279	55 (Fair)
13/03/2013	1:15:00	1.277	55 (Fair)
13/03/2013	1:30:00	1.277	55 (Fair)
13/03/2013	1:45:00	1.275	55 (Fair)
13/03/2013	2:00:00	1.274	55 (Fair)
13/03/2013	2:15:00	1.274	55 (Fair)
13/03/2013	2:30:00	1.274	55 (Fair)
13/03/2013	2:45:00	1.274	55 (Fair)
13/03/2013	3:00:00	1.273	55 (Fair)
13/03/2013	3:15:00	1.273	55 (Fair)
13/03/2013	3:30:00	1.271	55 (Fair)
13/03/2013	3:45:00	1.271	55 (Fair)
13/03/2013	4:00:00	1.271	55 (Fair)
13/03/2013	4:15:00	1.269	55 (Fair)
13/03/2013	4:30:00	1.269	55 (Fair)
13/03/2013	4:45:00	1.268	55 (Fair)
13/03/2013	5:00:00	1.267	55 (Fair)
13/03/2013	5:15:00	1.267	55 (Fair)
13/03/2013	5:30:00	1.266	55 (Fair)
13/03/2013	5:45:00	1.264	55 (Fair)
13/03/2013	6:00:00	1.265	55 (Fair)
13/03/2013	6:15:00	1.263	55 (Fair)
13/03/2013	6:30:00	1.262	55 (Fair)
13/03/2013	6:45:00	1.261	55 (Fair)
13/03/2013	7:00:00	1.26	55 (Fair)
13/03/2013	7:15:00	1.259	55 (Fair)
13/03/2013	7:30:00	1.259	55 (Fair)
13/03/2013	7:45:00	1.258	55 (Fair)
13/03/2013	8:00:00	1.257	55 (Fair)
13/03/2013	8:15:00	1.256	55 (Fair)
13/03/2013	8:30:00	1.254	55 (Fair)
13/03/2013	8:45:00	1.254	55 (Fair)
13/03/2013	9:00:00	1.253	55 (Fair)



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SAMPLE PREDICTED vs. ACTUAL WATER LEVEL

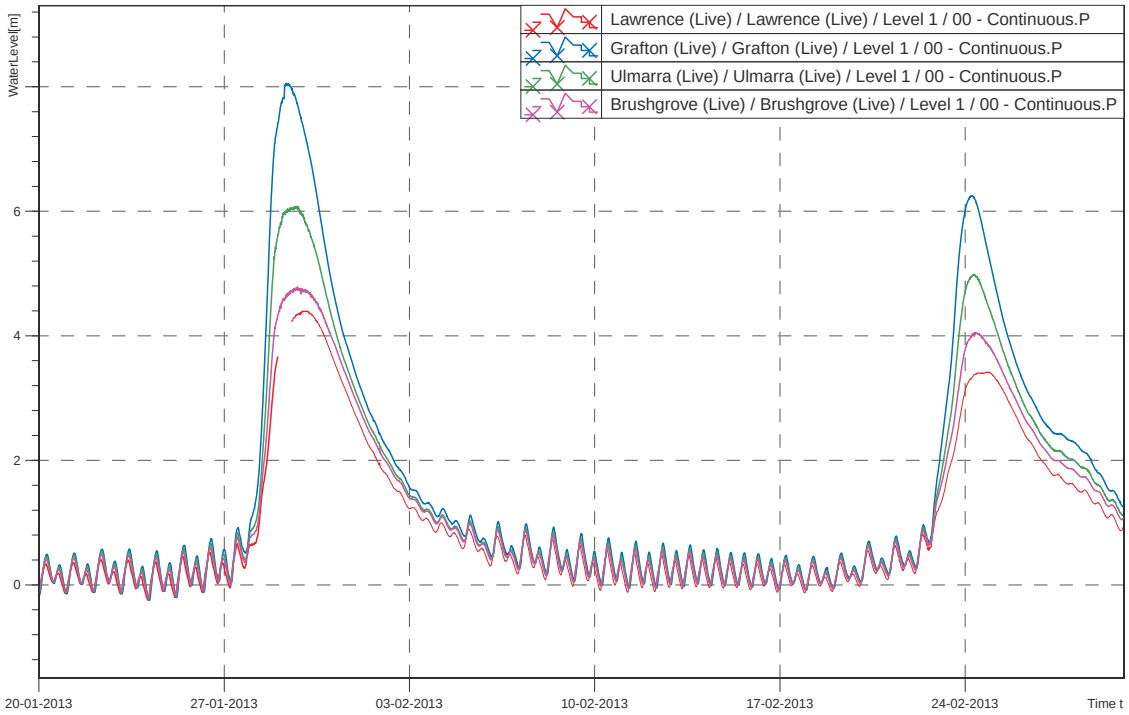
Manly Hydraulics Laboratory

Report MHL2692

Figure

B3

DRAWING 2692-B3.cdr



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TYPICAL FLOOD HYDROGRAPH

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Figure

B4

DRAWING 2692-B4.cdr

STATION NAME : Bellingen Bridge (Live)
RECORDER TYPE : MHL Station
A.W.R.C. No. : 205442
DATA START : 01.01.1997
DATA FINISH : 01.07.2013
DATA TOTAL : 16 years 6 months 1 days
DATABASE TIME INTERVAL (second) : 0
THRESHOLD LEVEL (m) : 4.000
DATUM : Australian Height Datum
DATE OF ISSUE : 14:14 17.07.2013
ANALYSIS PERFORMED BY : darvils3

COMMENTS : Bellingen Bridge (Live) Level 1 00 - Continuous.P event ranking for period 01.01.1997 to 01.07.2013

RANK	PEAK (m)	DATE TIME	START	DURATION (hr)	MAX RISE (m/hr)
1	8.810	31.03.2009 18:15	31.03.2009	59.5	1.200
2	8.770	09.03.2001 19:45	08.03.2001	98.3	0.680
3	8.470	22.05.2009 15:30	21.05.2009	85.3	0.520
4	8.270	17.02.2009 10:00	16.02.2009	33.0	1.240
5	7.910	01.02.2001 21:30	31.01.2001	80.0	0.480
6	7.890	20.10.2004 13:30	20.10.2004	15.8	5.200
7	7.740	14.06.2011 15:45	14.06.2011	40.8	0.600
8	7.590	03.03.2006 12:30	02.03.2006	42.8	0.800
9	7.270	06.11.2009 23:00	06.11.2009	15.0	1.320
10	6.390	15.07.1999 05:30	14.07.1999	35.3	0.400
11	6.330	05.09.2008 19:45	05.09.2008	13.3	0.760
12	6.070	11.01.2011 06:45	10.01.2011	41.0	0.400
13	6.000	27.10.2009 01:45	26.10.2009	19.3	0.880
14	5.720	05.02.2008 01:30	04.02.2008	11.3	1.160
15	5.520	21.08.2007 03:15	20.08.2007	11.3	0.600
16	5.330	05.01.2008 19:45	04.01.2008	38.0	0.600
17	4.800	04.10.2010 20:00	04.10.2010	14.3	0.480
18	4.410	06.11.2009 11:45	06.11.2009	2.5	0.480
19	4.390	20.10.2004 23:00	20.10.2004	1.5	0.320
20	4.300	03.03.1999 01:45	03.03.1999	3.3	0.280
21	4.290	29.01.2001 04:00	29.01.2001	2.8	0.400
22	4.259	03.03.2013 10:15	03.03.2013	17.3	0.276
23	4.250	06.03.1997 21:15	06.03.1997	11.5	0.120
24	4.210	16.06.2011 08:15	16.06.2011	12.0	0.160
25	4.160	06.03.2004 12:30	06.03.2004	1.8	0.320

ANALYSIS OF TIDAL OBSERVATIONS

STATION NAME: SYDNEY TIDE GAUGE
RECORDER TYPE: DATATAKER
DATUM: ZERO CAMP COVE
ANALYSIS OF HOURLY TIDAL HEIGHTS FROM 0000:01/07/2006 TO 2300:02/07/2007
NO. OF OBSERVATIONS = 8808 NO. OF POINTS ANALYSED = 8808
MID POINT 1100:31/12/2006 SEPARATION = 1.00
TIME ZONE : EST LATITUDE -33 DEG 51 MIN LONGITUDE 151 DEG 14 MIN

LIST OF HARMONIC CONSTITUENTS (none inferred)

NO	NAME	FREQUENCY (cyc/hr)	PERIOD (day,hr)	MEAN AMPLITUDE (metres)	G-PHASE (deg)	LOCAL AMPLITUDE (metres)	LOCAL PHASE (deg)
1	Z0			0.9442544		0.9442544	
2	SA	0.0001141	365d,06h	0.0687380	134.44	0.0687380	137.76
3	SSA	0.0002282	182d,15h	0.0253974	94.37	0.0253974	254.89
4	MSM	0.0013098	31d,19h	0.0127537	218.02	0.0127537	352.77
5	MM	0.0015122	27d,13h	0.0045407	231.96	0.0045407	183.42
6	MSF	0.0028219	14d,18h	0.0063242	203.81	0.0063242	290.01
7	MF	0.0030501	13d,16h	0.0197710	0.04	0.0197710	246.77
8	ALP1	0.0343966	29.07h	0.0010548	340.23	0.0012517	63.36
9	2Q1	0.0357063	28.01h	0.0042532	12.51	0.0049768	230.94
10	SIG1	0.0359087	27.85h	0.0034849	358.80	0.0040822	32.95
11	Q1	0.0372185	26.87h	0.0235868	62.04	0.0276398	231.35
12	RHO1	0.0374209	26.72h	0.0039826	47.55	0.0045466	33.57
13	O1	0.0387307	25.82h	0.0964938	79.47	0.1132471	199.69
14	TAU1	0.0389588	25.67h	0.0048251	39.02	0.0038170	140.68
15	BET1	0.0400404	24.97h	0.0009819	119.70	0.0012014	194.88
16	NO1	0.0402686	24.83h	0.0064338	97.09	0.0101144	331.97
17	CHI1	0.0404710	24.71h	0.0013989	109.61	0.0016622	158.00
18	PI1	0.0414385	24.13h	0.0024470	110.75	0.0024282	312.08
19	P1	0.0415526	24.07h	0.0438246	113.24	0.0433163	317.91
20	S1	0.0416667	24.00h	0.0085778	350.80	0.0057799	159.80
21	K1	0.0417807	23.93h	0.1482257	119.04	0.1648004	302.91
22	PSI1	0.0418948	23.87h	0.0009772	38.01	0.0009954	226.40
23	PHI1	0.0420089	23.80h	0.0013041	170.86	0.0012738	157.71
24	THE1	0.0430905	23.21h	0.0011649	133.17	0.0013896	91.59
25	J1	0.0432929	23.10h	0.0098439	143.92	0.0110957	277.22
26	SO1	0.0446027	22.42h	0.0011343	179.38	0.0013342	89.17
27	OO1	0.0448308	22.31h	0.0055142	179.16	0.0106868	247.15
28	UPS1	0.0463430	21.58h	0.0013787	191.35	0.0025018	209.65
29	OQ2	0.0759749	13.16h	0.0019358	185.88	0.0018419	283.90
30	EPS2	0.0761773	13.13h	0.0064635	190.10	0.0061639	99.91
31	2N2	0.0774871	12.91h	0.0188741	193.07	0.0178317	240.20
32	MU2	0.0776895	12.87h	0.0202965	207.12	0.0194891	65.35
33	N2	0.0789993	12.66h	0.1102693	219.37	0.1059412	211.22
34	NU2	0.0792016	12.63h	0.0222446	227.84	0.0214290	36.16
35	H1	0.0803973	12.44h	0.0032975	75.82	0.0032149	198.67
36	M2	0.0805114	12.42h	0.4972989	236.40	0.4796013	179.67
37	H2	0.0806255	12.40h	0.0018385	116.32	0.0017993	63.20
38	MKS2	0.0807396	12.39h	0.0027644	357.01	0.0035091	97.68
39	LDA2	0.0818212	12.22h	0.0062575	239.25	0.0059819	137.31
40	L2	0.0820236	12.19h	0.0255340	205.15	0.0160559	291.53
41	T2	0.0832193	12.02h	0.0075370	284.31	0.0075370	310.99
42	S2	0.0833333	12.00h	0.1230184	259.96	0.1232939	289.97
43	R2	0.0834474	11.98h	0.0009521	234.34	0.0011622	82.81
44	K2	0.0835615	11.97h	0.0372762	250.14	0.0489554	77.56
45	MSN2	0.0848455	11.79h	0.0016331	140.10	0.0015165	121.53
46	ETA2	0.0850736	11.75h	0.0021299	262.67	0.0030466	33.34
47	MO3	0.1192421	8.39h	0.0002076	257.42	0.0002349	320.91
48	M3	0.1207671	8.28h	0.0022126	329.64	0.0020900	64.72
49	SO3	0.1220640	8.19h	0.0002182	312.04	0.0002566	102.27
50	MK3	0.1222921	8.18h	0.0004813	256.17	0.0005161	23.31
51	SK3	0.1251141	7.99h	0.0014364	115.62	0.0016006	329.50
52	MN4	0.1595106	6.27h	0.0014571	86.07	0.0013501	21.20
53	M4	0.1610228	6.21h	0.0036473	100.36	0.0033923	346.90
54	SN4	0.1623326	6.16h	0.0001853	59.21	0.0001784	81.08
55	MS4	0.1638447	6.10h	0.0013697	162.81	0.0013239	136.09
56	MK4	0.1640729	6.09h	0.0003293	221.19	0.0004171	351.87
57	S4	0.1666667	6.00h	0.0005941	317.28	0.0005968	17.31
58	SK4	0.1668948	5.99h	0.0002646	110.72	0.0003482	328.16
59	2MK5	0.2028036	4.93h	0.0001315	223.15	0.0001360	293.56
60	2SK5	0.2084474	4.80h	0.0000989	182.53	0.0001105	66.43
61	2MN6	0.2400220	4.17h	0.0005808	12.83	0.0005190	251.22
62	M6	0.2415342	4.14h	0.0017160	49.46	0.0015393	239.26
63	2MS6	0.2443561	4.09h	0.0023009	120.07	0.0021448	36.61
64	2MK6	0.2445843	4.09h	0.0004861	120.42	0.0005937	194.37
65	2SM6	0.2471781	4.05h	0.0002108	133.96	0.0002043	137.26
66	MSK6	0.2474062	4.04h	0.0002752	145.25	0.0003493	305.95
67	3MK7	0.2833149	3.53h	0.0001989	344.69	0.0001984	358.36
68	M8	0.3220456	3.11h	0.0001635	15.87	0.0001415	148.93
69	M10	0.4025570	2.48h	0.0003138	209.37	0.0002618	285.70

RMS (RESIDUAL ERROR) = 0.07972

NSW GOVERNMENT

SAMPLE TIDAL PLANE ANALYSIS
HARMONIC CONSTITUENTS

Manly Hydraulics Laboratory

Report MHL2692
Figure
B6

DRAWING 2692-B6.cdr

ANALYSIS OF TIDAL OBSERVATIONS

TIME OF ANALYSIS	:	1745:03/10/2007
ANALYSIS PERFORMED BY	:	LB using INTERACTIVE program MTIDE1X V1.0A
STATION LOCATION	:	SYDNEY, N.S.W., AUSTRALIA
STATION NAME	:	MIDDLE HEAD, COBBLERS BAY
STATION LATITUDE	:	033 DEG 51 MIN SOUTH
STATION LONGITUDE	:	151 DEG 14 MIN EAST
DATUM	:	ZERO CAMP COVE
ANALYSIS PERIOD START TIME	:	0000:01/07/2006
ANALYSIS PERIOD FINISH TIME	:	2300:30/06/2007
MID POINT TIME	:	1100:30/12/2006
PERIOD OF ANALYSIS	:	365 DAYS 00 HRS
LOCAL TIME ZONE NAME	:	EASTERN STANDARD TIME
LOCAL TIME FACTOR	:	GMT +10.00 HRS
TIME MERIDIAN	:	-10.08 HRS

TIDAL PLANES IN METRES ABOVE ZERO OF LOCAL GAUGE VALUES

High High Water (Solstices Springs)	H.H.W.(S.S.)	:	1.907
Mean High Water Springs	M.H.W.S.	:	1.564
Mean High Water	M.H.W.	:	1.441
Mean High Water Neaps	M.H.W.N.	:	1.318
Mean Sea Level	M.S.L.	:	0.943
Mean Low Water Neaps	M.L.W.N.	:	0.569
Mean Low Water	M.L.W.	:	0.446
Mean Low water Springs	M.L.W.S.	:	0.323
Indian Spring Low Water	I.S.L.W.	:	0.078

TIDAL RANGES IN METRES

Mean Spring Range	(M.H.W.S. - M.L.W.S.)	:	1.241
Mean Neap Range	(M.H.W.N. - M.L.W.N.)	:	0.749
Mean Range	(M.H.W. - M.L.W.)	:	0.995
Range	(H.H.W.(S.S.) - I.S.L.W.)	:	1.829

NSW GOVERNMENT

TYPICAL TIDAL PLANE ANALYSIS

Manly Hydraulics Laboratory

Report MHL2692

Figure

B7

DRAWING 2692-B7.cdr

Port Jackson at Sydney
Frequency Distribution Analysis

Water Level (m)	Normalised Frequency	Cumulative Frequency	Number of Observations in Class Interval	Cumulative Observations	Percent Exceedance
2.3	0.00002	0.00002	17	17	0.0022
2.2	0.00015	0.00017	117	134	0.0172
2.1	0.00077	0.00094	601	735	0.0945
2.0	0.00240	0.00335	1870	2605	0.3348
1.9	0.00649	0.00983	5048	7653	0.9835
1.8	0.01276	0.02259	9928	17581	2.2593
1.7	0.02298	0.04557	17880	35461	4.5569
1.6	0.03606	0.08163	28058	63519	8.1625
1.5	0.04940	0.13103	38442	101961	13.1025
1.4	0.06235	0.19338	48519	150480	19.3375
1.3	0.07150	0.26487	55638	206118	26.4873
1.2	0.07666	0.34153	59655	265773	34.1533
1.1	0.07640	0.41793	59453	325226	41.7933
1.0	0.07364	0.49157	57305	382531	49.1573
0.9	0.07172	0.56329	55811	438342	56.3293
0.8	0.07595	0.63924	59101	497443	63.9241
0.7	0.08219	0.72143	63959	561402	72.1432
0.6	0.08521	0.80664	66308	627710	80.6642
0.5	0.07805	0.88469	60735	688445	88.4689
0.4	0.05891	0.94360	45845	734290	94.3603
0.3	0.03415	0.97775	26572	760862	97.7749
0.2	0.01566	0.99341	12190	773052	99.3414
0.1	0.00506	0.99847	3934	776986	99.8469
0.0	0.00126	0.99973	984	777970	99.9734
-0.1	0.00022	0.99996	172	778142	99.9955
-0.2	0.00004	1.00000	34	778176	99.9999
-0.3	0.00000	1.00000	1	778177	100.0000
TOTAL	1.00000		778177		

NSW GOVERNMENT

SAMPLE FREQUENCY DISTRIBUTION ANALYSIS

Manly Hydraulics Laboratory

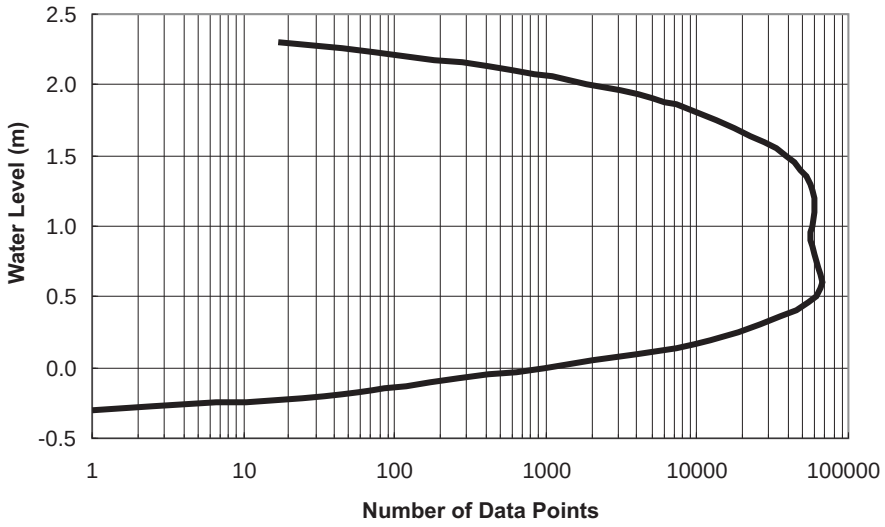
Report MHL2692

Figure

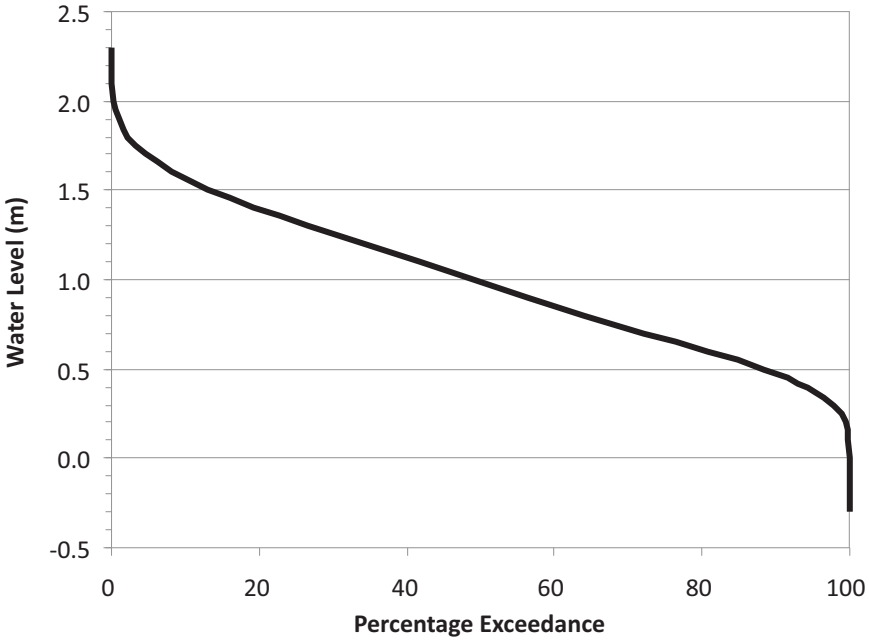
B8

DRAWING 2692-B8.cdr

Station Information	
River/Estuary System	Port Jackson
AWRC No.	213470
Station name	Sydney
Datum	Zero Camp Cove*
MGA Zone	56
Easting	338842
Northing	6255836



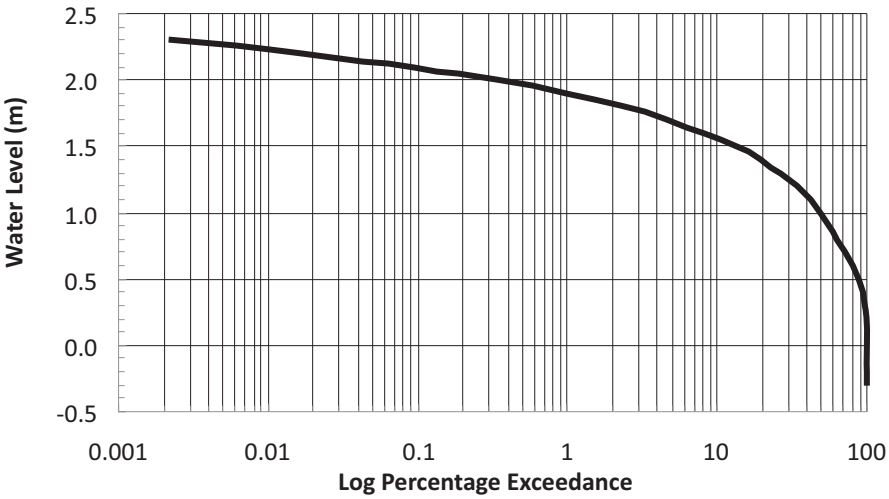
Summary Statistics	
Time Interval (mins)	15
Record start date	24/09/1987
Highest water level recorded (m)	2.32
Date recorded	27/04/1990
Lowest water level recorded (m)	-0.28
Date recorded	28/02/2010
Tidal plane annual average record	1990-2010
MHW (m)	1.45
MSL (m)	0.95
MLW (m)	0.44



Notes:

Refer to Appendix B for frequency distribution analysis table.

*The information supplied has been collected for use by the Office of Environment & Heritage, and the water levels only approximately relate to Australian Height Datum (AHD) or other specified datum. Other users should independently verify the suitability of this data for their particular use.



NSW GOVERNMENT

TYPICAL FREQUENCY DISTRIBUTION ANALYSIS

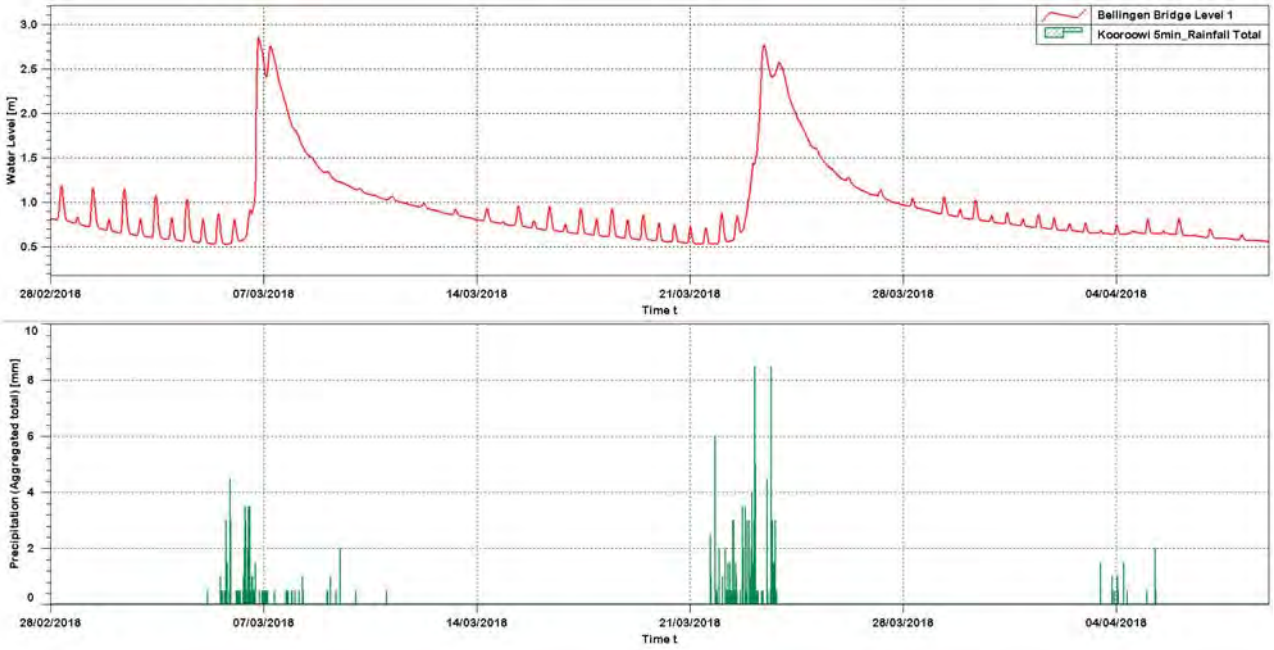
Manly Hydraulics Laboratory

Report MHL2692

Figure

B9

DRAWING 2692-B9.cdr



SAMPLE RAINFALL-WATER LEVEL CORRELATION

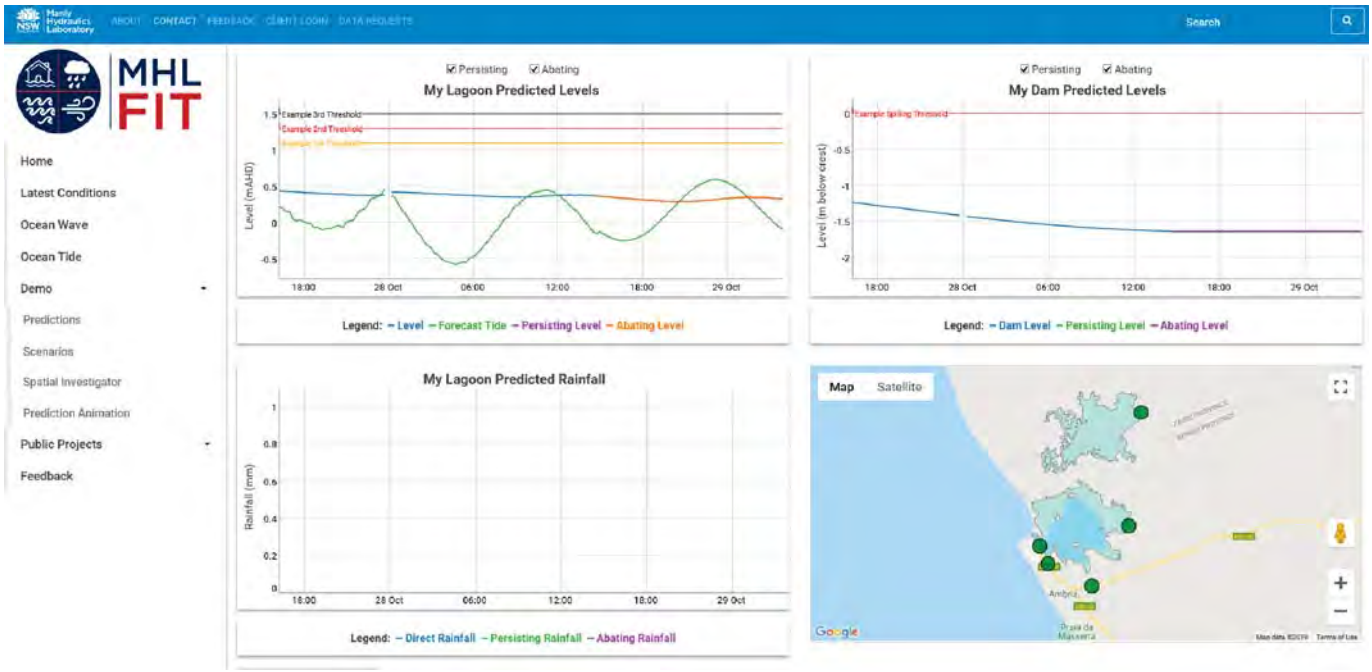
Manly Hydraulics Laboratory

Report MHL2692

Figure

B10

DRAWING 2692-B10.cdr



NSW GOVERNMENT

MHLFIT FLOOD INTELLIGENCE TOOL

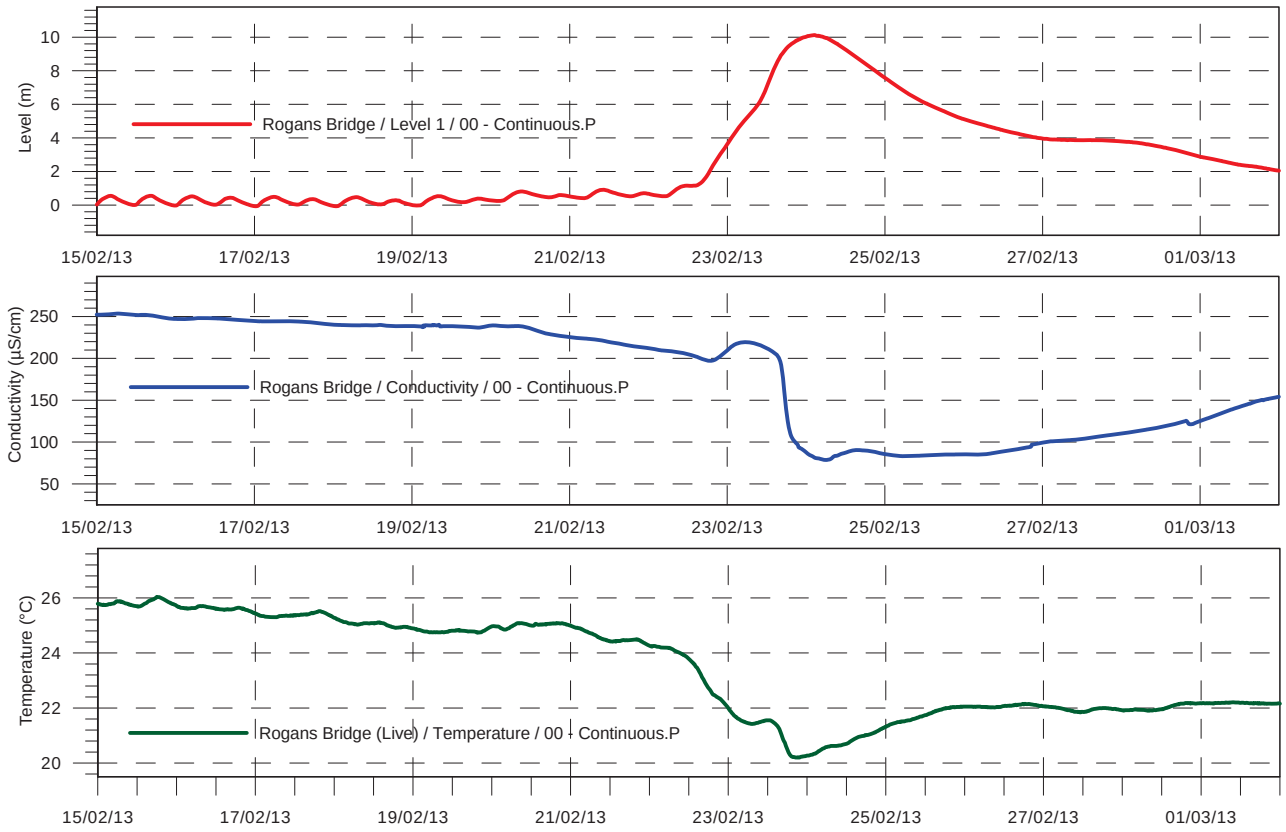
Manly Hydraulics Laboratory

Report MHL2692

Figure

B11

DRAWING 2692-B11.cdr



NSW GOVERNMENT

SAMPLE WATER QUALITY PLOTS

Manly Hydraulics Laboratory

Report MHL2692

Figure

B12

DRAWING 2692-B12.cdr

Appendix C Glossary of terms

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

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.
Coastal Boundary	The Mean High Water Line (MHWL) or Mean Higher High Water Line (MHHWL) when tidal lines are used as the coastal boundary. Also, lines used as boundaries inland of and measured from (or points thereon) the MHWL or MHHWL.
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.

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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.
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 analog 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.
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 23.5°, 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), Mean Low Water Neaps (MLWN)	The height of MHWN is the average, throughout a year, as defined above, of two successive high waters during those periods of 24 hours (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.

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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.
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.

Appendix D 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).

MHL Annual Ocean Tide Levels 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).

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).

MHL Annual Wave Climate and Coastal Air Pressure 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).

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.

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.

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.

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

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.*

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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