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4 October, 2019

EPA South Australia
GPO Box 2607,
Adelaide, SA, 5001

Outer Harbor Channel Widening Project - Monthly Report for September 2019

Flinders Ports has been undertaking dredging of the Outer Harbor Channel and Swing Basin. The work has been undertaken in accordance with the conditions of EPA licence 50556.

Flinders Ports engaged dredge contractor Boskalis to undertake this work.

Dredging commenced on 7/6/19 utilising the trailing suction hopper dredge 'Gateway'. Backhoe dredge 'Magnor' commenced dredging on 3/7/19.

Dredging work was completed on 18/9/19.

This monthly report consists of 3 components:

- Boskalis Monthly Environmental Report – September 2019
- BMT Monthly Water Quality Monitoring & Validation Report – September 2019
- Flinders Ports Monthly Stakeholder Engagement Update – September 2019

This will be the final monthly report for this project as dredging works have now been completed.

Monthly Environmental Report – September 2019

DOCUMENT NUMBER: 036-10315-01-015

PROJECT NAME: Port Adelaide Outer Harbor Channel Widening
PROJECT NUMBER: 036-10315

CLIENT NAME: Flinders Ports Pty Ltd
CLIENT REFERENCE: FP-10/18

DOCUMENT CONTROL

General document data	
Document Title:	Monthly Environmental Report – September 2019
Document Number:	036-10315-01-015
Project Name:	Port Adelaide Outer Harbor Channel Widening Project
Project Number:	036-10315
Client Name:	Flinders Ports Pty. Ltd.
Client Reference:	FP-10/18
Client Revision Number:	N/A
Boskalis Entity:	Boskalis Australia Pty. Ltd.

Revision status		
Revision Number:	Rev. 01	
Revision Date:	01-Oct-2019	
Approval Status:	Issued for Use	
Prepared By:	Irena Doets	Role: Environmental Manager
Reviewed By:	Michel Oosterwegel	Role: Environmental Engineer
Interdisciplinary Check:	Gary Beer	Role: SHE-Q Manager
Approved By:	Pieter Jan Stuiver	Role: Project Manager

Change log		
Revision	**Section**	**Change**
Rev A1	All	Issued for internal review
Rev B1	All	Issued for Client review
Rev 01	All	Issued for Use

Boskalis
Dredging & Marine Experts

TABLE OF CONTENTS

1. INTRODUCTION

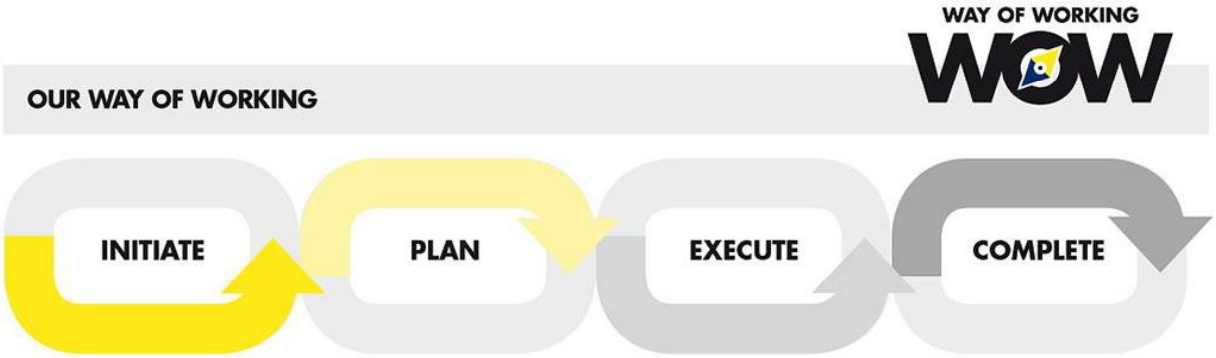
This Monthly Environmental Report presents the results of the third month of dredging and includes reporting period from the 1st of September until the 18th of September until dredge completion. The report presents action taken by the Contractor in line with the Licence conditions [1] and the Dredge Management Plan (DMP) [11]. It covers the following items:

- Any updates to the DMP (Chapter 3);
- Overview of dredge activities in this period including dredge and disposal volumes (Chapter 3).
- Actions taken to correct turbidity exceedances (Chapter 4);
- Summary of additional monitoring undertaken by the Contractor (Chapter 4);
- Marine mammal observations (Chapter 5);
- Summary of Weekly Site Inspections (Chapter 6);
- Register of non-conformances and actions taken (Chapter 7).

For results on Water Quality monitoring data and Zone Validation monitoring in this period, reference is made to Water Quality and Validation Report from September 2019 [10].

1.1. Boskalis Way of Working

This document forms part of the Boskalis Way of Working, the integrated quality management system applicable to all operations in Boskalis. The Boskalis Way of Working is structured around four Phases as pictured below. This Monthly Environmental Report is prepared in the EXECUTE Phase.



More detailed information about the Boskalis Way of Working can be found in the Group Manual and the User Guide. A dedicated website with all supporting materials is available at wow.boskalis.com

Where the Corporate Way of Working system does not meet the requirements of Australia Work Health and Safety legislation or Environmental legislation, additional or alternative procedures (BKA – Country Tools) have been prepared by Boskalis Australia as described in the Way of Working Booklet – Australia.

Management commitment is shown to SHE-Q through the various policy statements.
Reference is made to:

- GT-001 Way of Working Policy Statement
- BKA-016 Way of Working Booklet - Australia.
- BKA-001 Boskalis Fitness for Duty Policy
- BKA-002 Boskalis Rehabilitation Policy
- BKA-003 Boskalis Business Conduct and Workplace Behaviour Policy
- BKA-004 Boskalis Privacy Policy

1.2. Plan ownership, change management, approval and distribution

The Project Manager is the document owner and is responsible for the contents of the Monthly Environmental Report. He will ensure that the content is up to date and that only authorized and updated versions are in circulation.

Revision to the Report can be initiated by the following processes:

- Changes in legislation
- Changes in work methods
- Major scope and schedule changes
- Results from risk assessments
- Results from audits (external & internal)
- Results from management reviews
- Results from Client inspections/reviews
- Changes in the Boskalis Way of Working

Any resultant changes will be issued, and agreed upon, by all parties concerned.

2. PROJECT OUTLINE

The Port of Adelaide is the primary port in South Australia, located at Outer Harbor (approximately 14km north-west of the Adelaide CBD) in South Australia (Figure 2.1). The port is operated by Flinders Ports and handles a diverse array of inbound and outbound cargoes, contributing significantly to the State's economic activity. A significant amount of this trade is containerized, and Outer Harbor is the location of the Flinders Adelaide Container Terminal and the Port Adelaide Passenger Terminal which contribute significantly to South Australia's import and export of goods and visitors.

Flinders Ports Pty Ltd (FP) has identified the need to widen the existing shipping channel and swing basin at Outer Harbor in Port Adelaide. This is being driven by the emergence of Post Panamax class vessels which are wider than the 36m design vessel width of the existing channel and swing basin. Outer Harbor can only currently accommodate vessels up to a maximum width of 42.2m width with operational restrictions. The Port Adelaide Outer Harbor Channel Widening Project will enable the port to accommodate vessels with a maximum width of 49m without operational restrictions.

To meet this growth, the existing channel will be widened by 40m to a total width of 170m. The swing basin will be widened from 505m to 560m. The widening footprint of the channel and turning basin are illustrated by the red line in Figure 2.1.

The dredged material will be transported to a designated Dredge Material Placement Area (DMPA), located approximately 30km offshore in the Gulf of St Vincent (yellow box in Figure 2.1). This area is approximately 7km by 5km in size and located in deep water (>30m), thereby avoiding major shipping routes.

Figure 2.1: Overview Project area with outer shipping channel and turning basin

2.1. Project Identification

Project	
Details	**Description**
Project Name	Port Adelaide Outer Harbor Channel Widening Project
Project Scope	Widen and deepen the turning basin and approach channel to the port
Project Location	Outer Harbor, South Australia
Project Number	036-10315
Client Project Number	FP 10/18

Client	
Details	**Description**
Name Client	Flinders Ports Pty Ltd
Address Client	Level 1, 296 St Vincent Street, Port Adelaide South Australia, 5015
Other Client details	Carl Kavina Principal's Representative Lee Kolokas Principal's Representative's Delegate

Engineer / Consultant	
Details	**Description**
Name	ARUP via Flinders Ports
Address	N/A
Other details	Jasvinder Opkar (Principal's Site Representative)

Operating Company	
Details	**Description**
Name	Boskalis Australia Pty Ltd
Address	Level 1 - Suite 3 9 Havelock Street, West Perth, WA 6005 Australia
Other details	General Manager – Peter Boere

3. GENERAL

3.1. Updates to the DMP

After approval of the DMP [11] two Addenda have been made, covering the following elements:

- Addendum 1 to both the EMP and DMP [8] describing a methodology and framework for providing public access to the approved DMP and EMP and reports generated under the licence according to condition 2.7.3.
- Addendum 2 to the DMP [12] detailing revised contact details for:
  - HOLD trigger exceedance notifications;
  - Request for re-commencement after HOLD trigger exceedance;
  - Dolphin incidents;
  - Environmental incident reporting; and
  - Fuel spills.

No further revisions have been made this month.

3.2. Dredging Activities

Dredging in this reporting period took place from the 1st of September until the 18th of September. Dredging was undertaken in all areas of the dredge channel (Figure 3.1) by the Trailing Suction Hopper Dredge (TSHD) *Gateway* and the Backhoe Dredger (BHD) *Magnor*. The TSHD *Gateway* finalised dredging works on 18th of September 07:00 AM and the Backhoe Dredge finalised on Sunday evening 15th of September. In total the Gateway completed 46 trips in this period, the Union Topaz completed 30 trips and the Union Onyx 28 trips to the Dredge Material Placement Area (DMPA). The TSHD *Gateway* demobilized on 20th of September at 8:00 AM to Singapore, the barges departed on Monday 23rd of September 8:30 AM and the BHD *Magnor* on 10:30 AM to Melbourne.

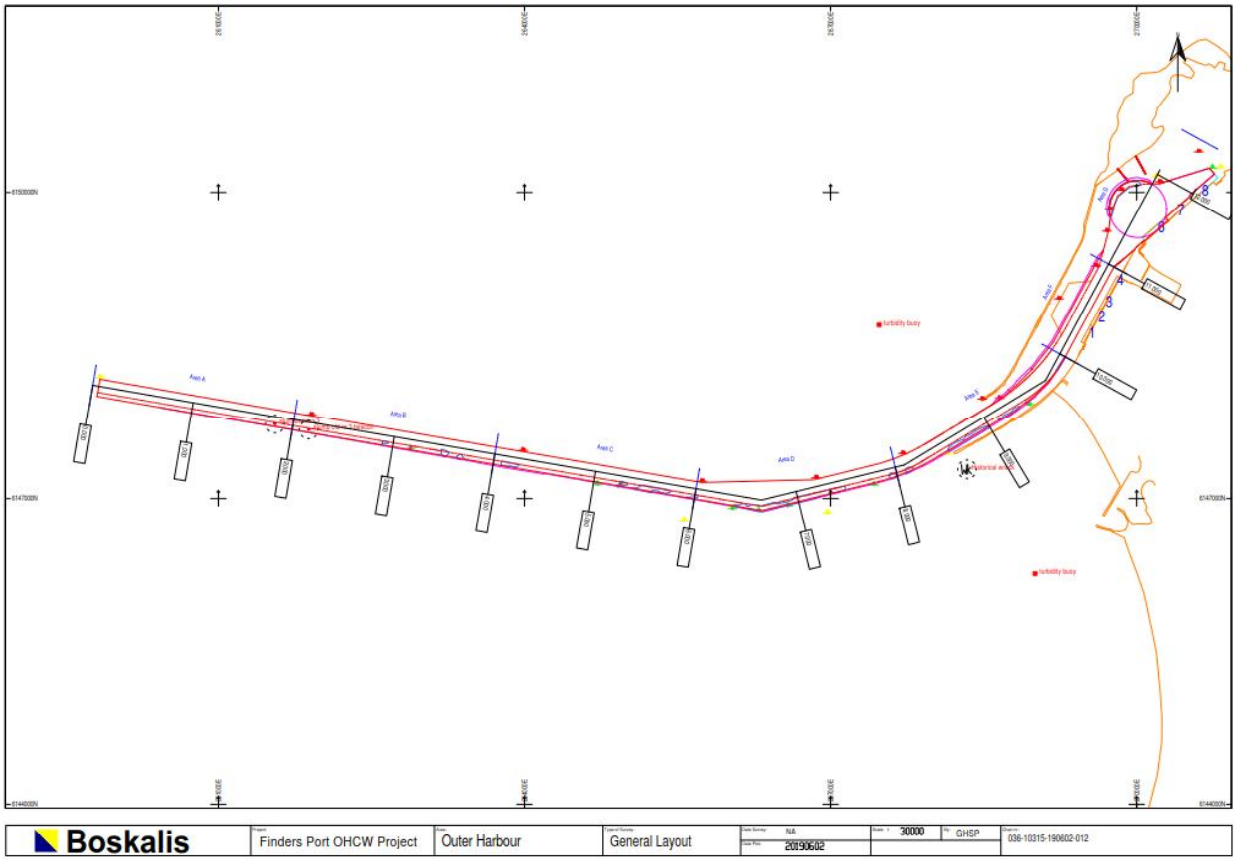


Figure 3.1: Overview dredge area including chainages and area numbering

A total volume of 1,487,208 m^3 has been dredged and deposited at the Dredge Material Placement Area (DMPA). Volume dredged in September is 100,212 m^3. Figure 3.2 gives an overview of the areas dredged based on survey on the 18th of September compared to the pre-dredge survey, where red/pink indicates large dredge volumes and blue small volumes. Figure 3.3 provides an overview of the difference to design, showing all material to design has been removed.

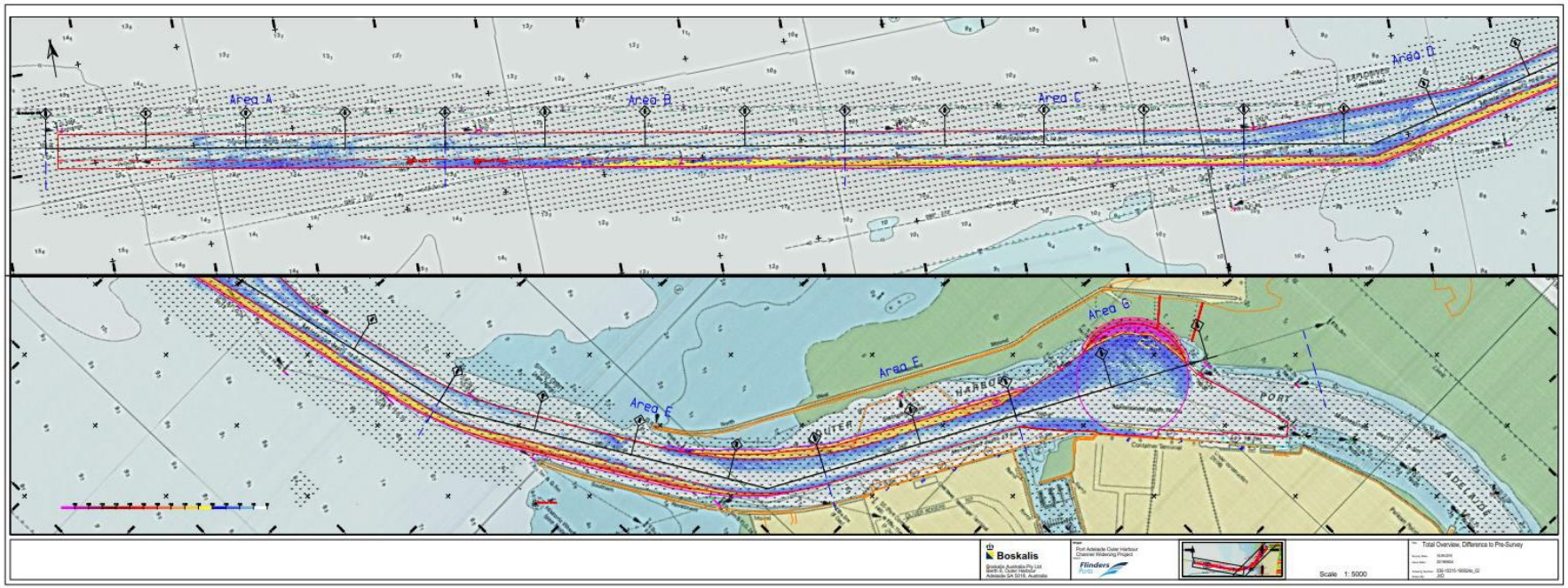


Figure 3.2: Difference in pre-survey compared to survey on the 18th of September

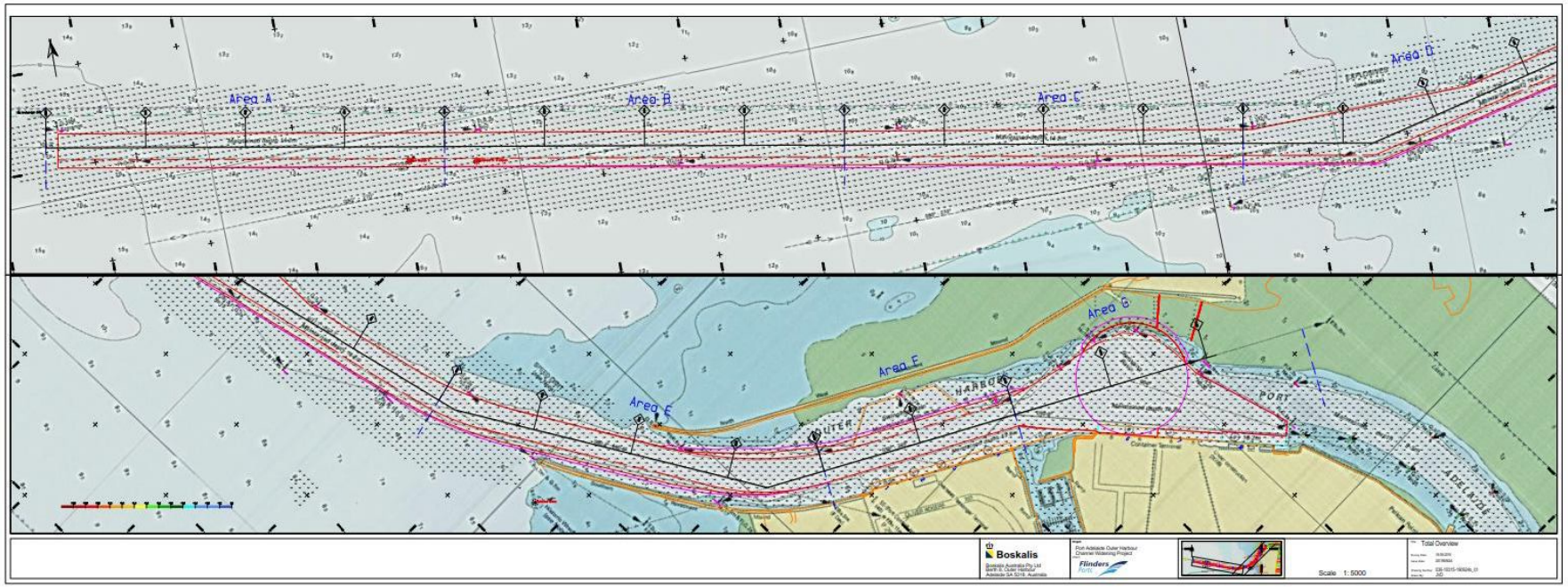


Figure 3.3: Difference compared to design on the 18th of September

4. TURBIDITY

4.1. Turbidity Exceedances

Table 4.1 provides an overview of turbidity exceedances occurred during this reporting period and actions taken. For an overview of dredge areas, see Figure 3.1. For the turbidity data reference is made to [10].

Table 4.1: Turbidity exceedances in month of August 2019 and actions taken

Turbidity station	Level of Exceedance	Start date and time exceedance	Stop date and time exceedance	Actions taken
D1	ALARM 15-day rolling median	23-08-2019 16:40:00	11-09-2019 07:40:00	▪ See section 4.2
D2	ALARM 15-day rolling median	11-08-2019 01:40:00	Still exceeded	▪ See section 4.2
D1	ALARM 6-day rolling median	06-09-2019 22:40:00	14-09-2019 08:40:00	▪ See section 4.2
D2	ALARM 6-day rolling median	08-09-2019 03:40:00	12-09-2019 16:40:00	▪ See section 4.2
B1	ALARM 6-day rolling median	09-09-2019 02:40:00	12-09-2019 06:40:00	▪ N/A
D1	HOLD 15-day rolling median	11-09-2019 07:40:00	13-09-2019 20:40:00	▪ See section 4.2
D1	ALARM 15-day rolling median	13-09-2019 20:40:00	14-09-2019 00:40:00	▪ See section 4.3
D1	HOLD 15-day rolling median	14-09-2019 00:40:00	23-09-2019 15:40:00	▪ See section 4.3
D1	ALARM 6-day rolling median	18-09-2019 05:40:00	19-09-2019 12:40:00	▪ See section 4.3
D1	ALARM 15-day rolling median	23-09-2019 15:40:00	Still exceeded	▪ N/A, dredging completed

4.2. HOLD exceedance D1 - 11th of September

While in ALARM levels, dredging between 23rd of August and 9th of September occurred as much as possible in line with EPA Determination from the 23rd of August for HOLD exceedances (see also Monthly Environmental Report of August 2019 [16]):

- Magnor (BHD): all areas
- Gateway (TSHD) dredge in areas A, B, C and D with overflow on outgoing tide
- Gateway (TSHD) to dredge in areas E, F and G with overflow on incoming tide

As wind increased from SW direction on Thursday night the 5th of September until Sunday night 9th of September, RAW turbidity values increased significantly. This contributed to the 15-day rolling median HOLD exceedance at station D1 on the 11th of September 07:40:00 AM.

TSHD Gateway bunkering was planned during the HOLD exceedance and occurred from 10th September 14:00 AM until 11th of September 15:30 PM.

Furthermore, as an ongoing turbidity management measure, the BHD Magnor has taken over a significant part of the Gateway scope in area E.

Within 3 hours of the HOLD exceedance, the EPA provided written approval for the undertaking of dredging from 09:30 11 September to 09:30 16 of September 2019, for periods when D1 and/or D2 exceeds HOLD criteria in accordance with condition 1.3 of the dredge licence [1] as follows:

1. When the 15-day median turbidity and/or 6-day median turbidity measured at monitoring station D1 and/or D2 is within 30% of the turbidity measured at background monitoring station B1:

- Magnor (BHD) to dredge in all areas
- Gateway (TSHD) to dredge in all areas with no overflow
- Gateway (TSHD) to dredge in areas A, B, C and D with overflow on an outgoing tide ONLY
- Gateway (TSHD) to dredge in areas E, F and G with overflow on an incoming tide ONLY

2. When the 15-day median turbidity and/or 6-day median turbidity measured at monitoring station D1 and/or D2 is NOT within 30% of the turbidity measured at background monitoring station B1:

- Magnor (BHD) to dredge in all areas
- Gateway (TSHD) to dredge in all areas with no overflow

Accordingly, as levels at station D1 were not within 30% of the turbidity measured at background station B1, dredging with the TSHD Gateway was performed with no overflow during the period of HOLD exceedance between 11th of September 09:30 AM until 13th of September 20:40 PM (Table 4.1).

4.3. HOLD exceedance D1 - 14th of September

On 14th of September 00:40 AM, the HOLD level at station D1 was again exceeded and dredging was again performed in line with EPA determination as stated in section 4.2.

Within 3 hours of the expiry of this EPA determination, the EPA provided written approval for the undertaking of dredging from 10:30 AM 16 September 2019 until 10:30 AM 18 September 2019, for periods when D1 and/or D2 exceeds HOLD criteria in accordance with condition 1.3 of EPA Licence 50556 as following:

- Magnor (BHD) to dredge in all areas
- Gateway (TSHD) to dredge in Area E with overflow

As such, dredging was performed from 16th to 18th of September with the TSHD Gateway with overflow in Area E. Dredging works were completed on 18th of September prior to expiry of this EPA determination.

4.4. Additional Handheld Monitoring

During this reporting period, no additional hand-held measurement campaign was undertaken.

5. MARINE MAMMAL OBSERVATIONS

In this reporting period a total number of 103 marine mammals was observed. All of the reported marine mammals were dolphins.

Following count was made by various vessels:

- Gateway: 23
- Magnor: 12
- Topaz: 29
- Onyx: 9
- Molly Grace: 30

As the Magnor is a stationary piece of dredge equipment and it does not change its location often, less dolphins are spotted on the Magnor. The Gateway, Topaz and Onyx which are sailing to and from the DMPA on a daily basis have reported most of the marine mammal sightings.

No incidents with marine mammals occurred.

For full details of the marine mammal sightings, reference is made to Attachment 9.2.

6. WEEKLY SITE INSPECTIONS

In this period four weekly site inspections were undertaken. For full details of the weekly site inspections reference is made to Attachment 9.3.

No corrective action was identified.

7. NON-CONFORMANCES

In this period no environmental audit was undertaken by Client's Environmental Representative or the EPA.

8. REFERENCES, ABBREVIATIONS, DEFINITIONS

8.1. References

Controlled Legislation		
No.	**Document No.**	**Document Title**
[1]		Licence No. 50556 Flinders Ports Pty Limited issued 12 March 2019
[2]		Development Approval Outer Harbor Channel and Swing Basin Widening

Client Documents		
No.	**Document No.**	**Document Title**
[3]	R.B22346.010.02	Adelaide Outer Harbor Channel Widening Project: Environmental Monitoring Program
[4]	R.B22346.008.03	Adelaide Outer Harbor Channel Widening Project: Seagrass Monitoring Program
[5]		Outer Harbor Channel Widening Project Community Engagement Plan
[6]	R.B22346.009.00	Adelaide Outer Harbor Channel Widening Project: POMS Management Plan
[7]	253257-00	Closure Plan
[8]	ADD-01	Outer Harbor Channel Widening Project Addendum 1: DMP/EMP
[9]	R.B22346.012.01	Adelaide Outer Harbor Channel Widening Project: Baseline Seagrass Survey
[10]		Water Quality Monitoring and Validation Report September 2019 (BMT)

Contractor Documents		
No.	**Document No.**	**Document Title**
[11]	036-10315-02-003	Dredge Management Plan
[12]	50556_036-10315-02-013	Addendum to DMP 036-10315-02-003 No. 2
[13]	036-10315-02-001	Work, Health and Safety Management Plan
[14]	036-10315-14-004	TSS-NTU Method Statement
[15]	036-10315-01-003	TSS-NTU Report
[16]	036-10315-01-012	Monthly Environmental Report - September 2019

Other Documents		
No.	**Document No.**	**Document Title**

8.2. Abbreviations

Abbreviation	Full meaning
ADS	Adelaide Dolphin Sanctuary
DMP	Dredge Management Plan
DMPA	Dredge Material Placement Area
EMP	Environmental Monitoring Program
EPA	Environment Protection Agency
FP	Flinders Ports Pty Ltd (Client)
MMO	Marine Mammal Observation
NTU	Nephelometric Turbidity Units
Rev	Revision
TSHD	Trailing Suction Hopper Dredge
TSS	Total Suspended Solids

8.3. Definitions

Definition	Full meaning
Client	Flinders Ports Pty Ltd
Client's Engineering Consultant	Arup
Client's Environmental Representative	BMT
Contractor	Boskalis Australia Pty. Ltd.
Project	Port Adelaide Outer Harbor Channel Widening
Project number	036-10315
Subcontractor	Companies contracted by Contractor to perform a specific portion of the work.

9. ATTACHMENTS

9.1. Specifications hand-held turbidity sensor

ProDSS Sensor Specifications

Sensor/Parameter	Range	Resolution	Accuracy
Temperature	-5 to 70 °C (temperature compensation range for DO mg/L measurement: -5 to 50 °C)	0.1 °C or 0.1 °F (user selectable)	±0.2 °C
pH	0 to 14 pH units	0.01 pH units	±0.2 pH units
ORP	-1999 to 1999 mV	0.1 mV	±20 mV
Dissolved Oxygen	0 to 500%, 0 to 50 mg/L	0.01 mg/L and 0.1%, or 0.1 mg/L and 1% (user selectable)	0 to 200%: ±1% of reading or 1% saturation, whichever is greater 200 to 500%: ±8% of reading 0 to 20 mg/L: ±0.1 mg/L or 1% of reading, whichever is greater 20 to 50 mg/L: ±8% of reading
Barometer	375 to 825 mmHg	0.1 mmHg	±1.5 mmHg from 0 to 50 °C
Conductivity	0 to 200 mS/cm	0.001, 0.01 or 0.1 µS/cm (range dependent)	0 - 100 mS/cm: ±0.5% of reading or .001 mS/cm, whichever is greater 100 - 200 mS/cm: ±1.0% of reading
Specific Conductance*	0 to 200 mS/cm	0.001, 0.01, 0.1 mS/cm	0 - 100 mS/cm: ±0.5% of reading or .001 mS/cm, whichever is greater 100 - 200 mS/cm: ±1.0% of reading. User selectable reference temperature (15 to 25 °C; default 25 °C) and compensation coefficient (0 to 4%/°C; default 1.91%)
Salinity*	0 to 70 ppt	0.01 ppt	±1.0% of reading or ±0.1 ppt, whichever is greater
Total Dissolved Solids (TDS)*	0 to 100 g/L	0.001, 0.01, 0.1 g/L	Calculated from specific conductance and a user-selectable TDS multiplier (0.30 to 1.00; default 0.65)
Resistivity*	0 to 2 Mohms	0.001, 0.01, 0.1 ohms	±0.1% Full Scale
Seawater Density*	0.0 to 50.0 sigma, sigma T	0.1 sigma or sigma T	-
Turbidity	0 to 4000 FNU	0.1 FNU	0 to 999 FNU: 0.3 FNU or ±2% of reading, whichever is greater 1000 to 4000 FNU: ±5% of reading
TAL-Chlorophyll	0 to 100 RFU or 0 to 400 µg/L chl	0.01 RFU or 0.01 µg/L	Linearity: $r^2 \geq 0.999$ for Rhodamine WT across full range
TAL-Phycocyanin	0 to 100 RFU or 0 to 400 µg/L PC		
TAL-Phycoerythrin	0 to 100 RFU or 0 to 400 µg/L PE		
Ammonium**	0 to 200 mg/L NH_4-N	0.01 mg/L	±10% of reading or 2 mg/L, whichever is greater
Ammonia*	0 to 200 mg/L NH_3-N	0.01 mg/L	-
Chloride**	0 to 18000 mg/L Cl	0.01 mg/L	±15% of reading or 5 mg/L, whichever is greater
Nitrate**	0 to 200 mg/L NO_3-N	0.01 mg/L	±10% of reading or 2 mg/L, whichever is greater
Depth	0 to 328 feet (0 to 100 m)	0.001 m or 0.01 ft	±0.004 m for 1, 4, and 10 m cables ±0.04 m for cables 20 m and longer

*Derived/calculated parameter
**ISEs for freshwater only; 20-meter maximum depth

9.2. Marine Mammal Observation Logsheets

9.2.1. Gateway

Date - Time	Position/dredge section of vessel at time of sight	Direction of animal(s) compared to vessel [N-E-S-W]	Distance of animal(s) from vessel (m)	Direction of travel of animals [N-E-S-W]	No. and type of animal (whale, dolphin, turtle)	Observer (name, position)	Action taken (e.g. evasive moment, speed reduction)
01/09/2019	Outer Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
02/09/2019	Outer Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
03/09/2019	Outer Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
04/09/2019 0849	Beacon 11	West	100	N	3 Dolphins	M. Pointon	Continue to dredge
05/09/2019 0850	Swing Basin #5	W	80m	Doing circles	2 Dolphins	M. Pointon	Continue to dredge
06/09/2019	Outer Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
07/09/2019	Outer Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
08/09/2019	Outer Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
09/09/2019 10:00 AM	34° 49.5'S 138° 11.3'E	W	5 - 10	Bow Riding	3 dolphins	R. de Lange	Continue to dump
10/09/2019 09:35 AM	Spoil ground	N	50	Circling vessel	3 dolphins	M. Pointon	Continue Dumping
11/09/2019	Outer Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
12/09/2019 13:05 PM	Spoil Ground	NW	20	Bow Wave Riding	2 Dolphins	W. Russell	Continued / slow down
13/09/2019 07:30 AM	Spoil Ground	Right round ship	20 - 100	Circling	10 Dolphins	R. de Lange	Did not use bow thruster to dump
14/09/2019	Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
15/09/2019	Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
16/09/2019	Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
17/09/2019	Channel	Nil sighting	N/A	N/A	0	M. Pointon	None
18/09/2019	Channel	Nil sighting	N/A	N/A	0	M. Pointon	None

9.2.2. Magnor

Date - Time	Position/dredge section of vessel at time of sight	Direction of animal(s) compared to vessel [N-E-S-W]	Distance of animal(s) from vessel (m)	Direction of travel of animals [N-E-S-W]	No. and type of animal (whale, dolphin, turtle)	Observer (name, position)	Action taken (e.g. evasive moment, speed reduction)
01-09-19	Area G	No Sighting				chris v D.	
02-09-19	Area G	No Sighting				chris v D.	
03-09-19	Area G	No Sighting				chris	
04-09-19	Area B	Dolphins	100 mts	East - S.East	Alot	chris	Vessel held till they past
05-09-19	Area G	No Sightings				chris	
06-09-19	Area G	No Sighting					
07-09-19	Area D+E	No Sightings					
08-09-19	Area D	No Sighting					
09-09-19	Area D	No Sighting					
10-09-19	AREA E-SOUTH	SIGHTINGS	100 MTS.	EAST	DOLPHIN	CHRIS VAN DALLEN	monitor.

Boskalis

MARINE MAMMAL OBSERVATION LOG SHEET
ADELAIDE OUTER HARBOR CHANNEL WIDENING PROJECT

Flinders Ports

Date - Time	Position/dredge section of vessel at time of sight	Direction of animal(s) compared to vessel [N-E-S-W]	Distance of animal(s) from vessel (m)	Direction of travel of animals [N-E-S-W]	No. and type of animal (whale, dolphin, turtle)	Observer (name, position)	Action taken (e.g. evasive moment, speed reduction)
11-09-2019	Area E	No sighting				M Hamilton	
12-09-2019	Area E	No sighting				M Hamilton	
13-09-2019	AREA E SOUTH	No Sightings					
14-09-2019	Area E	No sightings				M Hamilton	
15-09-2019	Area E	1 Dolphin	± 100 m	N-E		chris	
16-09-2019	Berth 8	No Sightings					

9.2.3. Union Onyx

Date - Time	Position/dredge section of vessel at time of sight	Direction of animal(s) compared to vessel [N-E-S-W]	Distance of animal(s) from vessel (m)	Direction of travel of animals [N-E-S-W]	No. and type of animal (whale, dolphin, turtle)	Observer (name, position)	Action taken (e.g. evasive moment, speed reduction)
01-09-2019	No observations						
02-09-2019	No observations						
03-09-2019	Berth No.8	North	Very close	North	Two dolphins	Jan	N.A.
04-09-2019 06:40 lt	34 47,5N138 24 E	SW	20-50	SE	5 dolphins	Jan	Vessel was stopped
04-09-2019 13:40 lt	34 47.3 s 138 24.7 e	s	50	w	1 dolphin	Andy	Vessel stopped
05-09-2019	No observations						
06-09-2019	No observations						
07-09-2019	No observations						
08-09-2019	No observations						
09-09-2019	No observations						
10-09-2019	No observations						
11-09-2019	No observations						
12-09-2019	No observations						
13-09-2019	No observations						
14-09-2019	34 50.5 s 138 08.7 e	W	100	W	1 dolphin	Brett	Reduced speed
15-09-2019	No observations						
16-09-2019	No observations						

9.2.4. Union Topaz

Date - Time	Position/dredge section of vessel at time of sight	Direction of animal(s) compared to vessel [N-E-S-W]	Distance of animal(s) from vessel (m)	Direction of travel of animals [N-E-S-W]	No. and type of animal (whale, dolphin, turtle)	Observer (name, position)	Action taken (e.g. evasive moment, speed reduction)
01/09/2019		No sightings				Captain Sergey Khoperskov	
02/09/2019		No sightings				Captain Sergey Khoperskov	
03/09/2019	34°478.36' S 138° 27.68' E	N	80	S	8 dolphins	Captain Sergey Khoperskov	Slow down and watching
04/09/2019		No sightings				Captain Sergey Khoperskov	
05/09/2019		No sightings				Captain Sergey Khoperskov	
06/09/2019		No sightings				Captain Sergey Khoperskov	
07/09/2019		No sightings				Captain Sergey Khoperskov	
08/09/2019		No sightings				Captain Sergey Khoperskov	
09/09/2019	34°49.9' S 138° 10.2' E	E	250	S	10 dolphins	Captain Sergey Khoperskov	Change course
10/09/2019		No sightings				Captain Sergey Khoperskov	
11/09/2019	34°50.3' S 138° 09.4' E	S	150	E	2 dolphins	Captain Arvydas Padriezas	Watching
12/09/2019	34°50.04' S 138° 09.56' E	N	150	W	6 dolphins	Captain Sergey Khoperskov	Watching
13/09/2019	34°48.50' S 138° 24.52' E	N	250	E	3 dolphins	Captain Arvydas Padriezas	Watching
14/09/2019		No sightings				Captain Sergey Khoperskov	
15/09/2019		No sightings				Captain Sergey Khoperskov	

16/09/2019		No sightings				Captain Sergey Khoperskov	

9.2.5.Molly Grace

Date - Time	Position/dredge section of vessel at time of sight	Direction of animal(s) compared to vessel [N-E-S-W]	Distance of animal(s) from vessel (m)	Direction of travel of animals [N-E-S-W]	No. and type of animal (whale, dolphin, turtle)	Observer (name, position)	Action taken (e.g. evasive moment, speed reduction)
2/9/19					Nil seen		
3/9/19	Area C	East	50m	west	6 dolphins	Lee McKeown	Stop works
3/9/19	Area c	south	20m	east	4 dolphins	Lee McKeown	Vessel drifting observe
4/9/19	Area F	North	50m	West	8 dolphins	Lee McKeown	Stop works, observe
5/9/19					Nil seen		
6/9/19					Nil seen		
7/9/19					Nil seen		
8/9/19					Nil seen		
9/9/19					Nil seen		
10/9/19	Area C	West	20m	East	4 dolphins	Lee McKeown	Vessel drifting, observe
11/9/19					Nil seen		
12/9/19					Nil seen		
13/9/19	Area E 0925	NE	50M	NE	4	Lee McKeown	Observe, vessel clear channel for shipping
13/9/19	Area E 0950	NE	80 M	NE	4	Lee McKeown	Vessel turned
14/9/19					Nil seen		
15/9/19					Nil seen		
16/9/19					Nil seen		
17/9/19					Nil seen		
18/9/19					Nil seen		

9.3. Weekly Site Inspections

Boskalis

LOCATION: Adelaide Site office
DATE: 07 / 09 / 2019 Time: 14:20

ENVIRONMENTAL INSPECTION

☑ = Complies ☒ = Does Not Comply N/A = Not Assessed

No.	ITEM	COMPLIANCE ACHIEVED ✓	✘	N/A	COMMENTS
1	Actions taken in case of ALARM or HOLD turbidity criteria exceedance	✓			NO HOLD, ALARM exceeded, relocating dredge as much as possible.
2	MMO observation carried out on dredge vessels	✓			
3	MMO sightings recorded on logsheets daily	✓			however, nearing end of works
4	Actions taken in case of marine mammals observed in caution zones (300m for whale, 150m for dolphin, pause/delay BHD in case of dolphin sighting within 50m)	✓			
5	Adherence to exclusion zones of 10km around commercial oyster growing areas	✓			
6	Record and resolve any complaints received			✓	
7	Dredging conducted in footprint of dredge area and disposal within boundaries of the DMPA in a uniform matter	✓			
8	Solid and hydrocarbon wastes disposed onshore at approved facilities	✓			
9	Spill kits in place in direct vicinity of areas where liquid wastes are stored	✓			
10	Segregation of solid waste for recycling	✓			
11	Waste bins are labelled to designate their waste stream	✓			
12	Refuelling occurs in designated areas and spill prevention measures are in place			✘	No bunkering this week
13	No spill incidents	✓			
14	Maintenance or changes to management measures required?			✓	

Required Action by Who and by When:

Inspection Team:

Name:	Signature:	Name:	Signature:
Jena Davis		Gary Bell	
Name:	Signature:	Name:	Signature:

Boskalis

LOCATION: Site office
DATE: 15/09/2019 Time: 12:00

ENVIRONMENTAL INSPECTION

☑ = Complies ☒ = Does Not Comply N/A = Not Assessed

No.	ITEM	COMPLIANCE ACHIEVED ✓	✗	N/A	COMMENTS
1	Actions taken in case of ALARM or HOLD turbidity criteria exceedance	✓			Gateway no overflow
2	MMO observation carried out on dredge vessels	✓			
3	MMO sightings recorded on logsheets daily	✓			
4	Actions taken in case of marine mammals observed in caution zones (300m for whale, 150m for dolphin, pause/delay BHD in case of dolphin sighting within 50m)	✓			
5	Adherence to exclusion zones of 10km around commercial oyster growing areas	✓			
6	Record and resolve any complaints received			✓	
7	Dredging conducted in footprint of dredge area and disposal within boundaries of the DMPA in a uniform matter	✓			
8	Solid and hydrocarbon wastes disposed onshore at approved facilities	✓			
9	Spill kits in place in direct vicinity of areas where liquid wastes are stored	✓			
10	Segregation of solid waste for recycling	✓			
11	Waste bins are labelled to designate their waste stream	✓			
12	Refuelling occurs in designated areas and spill prevention measures are in place			✓	No Bunkering
13	No spill incidents			✓	
14	Maintenance or changes to management measures required?			✓	

Required Action by Who and by When:

Inspection Team:

Name:	Signature:	Name:	Signature:
Name:	Signature:	Name:	Signature:

Boskalis

LOCATION: Adelaide site office
DATE: 21 / 09 / 2019 Time: 11:00

ENVIRONMENTAL INSPECTION

☑ = Complies ☒ = Does Not Comply N/A = Not Assessed

No.	ITEM	COMPLIANCE ACHIEVED ✓	✖	N/A	COMMENTS
1	Actions taken in case of ALARM or HOLD turbidity criteria exceedance	V			Following EPA determinations while in HOLD.
2	MMO observation carried out on dredge vessels	V			until end of dredging.
3	MMO sightings recorded on logsheets daily	V			
4	Actions taken in case of marine mammals observed in caution zones (300m for whale, 150m for dolphin, pause/delay BHD in case of dolphin sighting within 50m)	V			
5	Adherence to exclusion zones of 10km around commercial oyster growing areas	V			
6	Record and resolve any complaints received			V	
7	Dredging conducted in footprint of dredge area and disposal within boundaries of the DMPA in a uniform matter	V			
8	Solid and hydrocarbon wastes disposed onshore at approved facilities	✓			
9	Spill kits in place in direct vicinity of areas where liquid wastes are stored	✓			
10	Segregation of solid waste for recycling	✓			
11	Waste bins are labelled to designate their waste stream	✓			
12	Refuelling occurs in designated areas and spill prevention measures are in place	✓			Bunkers for Topaz + Onyx
13	No spill incidents		-	✓	
14	Maintenance or changes to management measures required?			V	

Required Action by Who and by When:

Inspection Team:

Name:	Signature:	Name:	Signature:
Trea Deeb		G Bell	
Name:	Signature:	Name:	Signature:

Boskalis

LOCATION: Adelaide site office.
DATE: 24 / 09 / 2019 Time:

ENVIRONMENTAL INSPECTION

☑ = Complies ☒ = Does Not Comply N/A = Not Assessed

No.	ITEM	COMPLIANCE ACHIEVED ✓	✗	N/A	COMMENTS
1	Actions taken in case of ALARM or HOLD turbidity criteria exceedance			X	dredge completed 18-09
2	MMO observation carried out on dredge vessels			X	"
3	MMO sightings recorded on logsheets daily			X	
4	Actions taken in case of marine mammals observed in caution zones (300m for whale, 150m for dolphin, pause/delay BHD in case of dolphin sighting within 50m)			X	
5	Adherence to exclusion zones of 10km around commercial oyster growing areas	X			
6	Record and resolve any complaints received			X	
7	Dredging conducted in footprint of dredge area and disposal within boundaries of the DMPA in a uniform matter	X			
8	Solid and hydrocarbon wastes disposed onshore at approved facilities	✓			site clean-up, only one bin remaining for site-offices
9	Spill kits in place in direct vicinity of areas where liquid wastes are stored	✓			
10	Segregation of solid waste for recycling	✓			
11	Waste bins are labelled to designate their waste stream	✓			
12	Refuelling occurs in designated areas and spill prevention measures are in place			✓	All vessels gone from Berth 8
13	No spill incidents			✓	
14	Maintenance or changes to management measures required?			✓	

Required Action by Who and by When:

Inspection Team:

Name:	Signature:	Name:	Signature:
Name:	Signature:	Name:	Signature:

Adelaide Outer Harbor Channel Widening Project: September Water Quality Monitoring and Validation Report

Reference: R.B22346.017.00.WQMPV Report_sep
Date: October 2019
Confidential

Document Control Sheet

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Document:	R.B22346.017.00.WQMPV Report_sep
Title:	Adelaide Outer Harbor Channel Widening Project: September Water Quality Monitoring and Validation Report
Project Manager:	Lisa McKinnon, BMT
Author:	Jarrod Etherington, BMT
Client:	Flinders Ports
Client Contact:	Lee Kolokas
Client Reference:	

Synopsis: This document reports on compliance with this project's Water Quality Monitoring Plan and the Zone Validation Plan for the month of September (1st September to Completion - 18th September).

REVISION/CHECKING HISTORY

Revision Number	Date	Checked by		Issued by	
0	03/10/2019	BFT		JME	

DISTRIBUTION

Destination	Revision										
	0	1	2	3	4	5	6	7	8	9	10
Flinders Ports	PDF										
BMT File	PDF										
BMT Library	PDF										

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1 Introduction

Flinders Ports Pty Ltd (Flinders Ports) is currently conducting dredging to widen the Adelaide Outer Harbor Channel (Outer Harbour Channel Widening Project – OHCW). A detailed Development Application (DA) Report was submitted in July 2017 in accordance with the *Development Act 1993*, as a Section 49 application given this project is defined as *public infrastructure*. Sponsorship for this application was received from the Minister for Transport and Infrastructure prior to lodgement in May 2017. Flinders Ports DA 010/V048/17 received approval on 28th May 2018.

Subsequently, a dredge licence was issued by the Environmental Protection Authority (EPA) in 2019, and an Environmental Monitoring Program (EMP) prepared which outlined water quality monitoring to be undertaken for the duration of the dredge campaign.

Condition 3.4.2 (f) requires a water quality monitoring report to be provided to the EPA on the 7th of each month, that includes Schedule 1 parameters, and all calculations, assessments and calibration required under this condition. Condition 3.5.2 (a) also requires that a monthly zone validation report is provided.

This document reports on compliance with the Water Quality Monitoring Plan and the Zone Validation Plan for the month of September (1st September to Completion - 18th September), the fourth month of reporting. A total of 1,487,208m^3 of in-situ material has now been dredged since commencement, with 100,212m^3 of material removed during September. Both the Trailer Suction Hopper Dredge (TSHD) Gateway and the Backhoe Dredge (BHD) Magnor were active during September. The TSHD Gateway finalised dredging works on 18th of September 07:00 AM and the Backhoe Dredge finalised on Sunday evening 15th of September.

1.1 Project Location

Figure 1-1 below provides an overview of the area to be dredged within the Port and the approved Dredge Material Placement Area (DMPA).

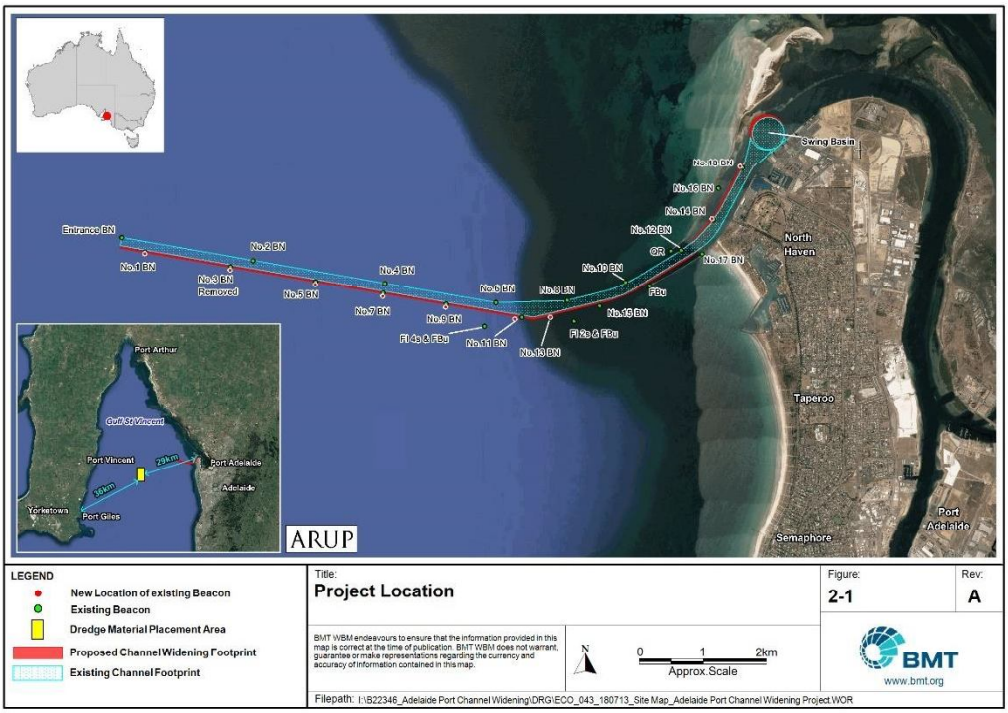

Figure 1-1 OHCW Project Location

2 Purpose, Scope and Objectives

The purpose of this report is to demonstrate compliance with the water quality criteria set for the project and validate plume impact predictions made in water quality modelling.

The objectives of this report are:

- To report on water quality parameters outlined in Schedule 1 of the dredge licence;
- To report any exceedance of either ALARM or HOLD turbidity triggers;
- To outline any actions taken to reduce turbidity in response to trigger exceedances; and
- To provide data validating modelling predictions.

3 Background

This section provides a summary of how the zones of impact and water quality triggers used for the project were derived, to enable comparison and validation of the modelling performed.

3.1 Water Quality Risk Assessment

3.1.1 Methodology

A water quality risk assessment methodology was applied to the project, using the outputs from the predictive dredge plume numerical model. The zones adopted for the water quality risk assessment, include the following:

- Zone of High Impact = water quality impacts resulting in predicted mortality of ecological receptors with recovery time greater than 24 months.
- Zone of Low to Moderate Impact = water quality impacts resulting in predicted sub-lethal impacts to ecological receptors and/or mortality with recovery between 6 months (lower end of range) to 24 months (upper end of range).
- Zone of Influence = extent of detectable[1] plume, but no predicted ecological impacts.

The adopted turbidity thresholds for this project are provided in Table 3-1.

Table 3-1 Impact thresholds for above ambient turbidity

Impact Zone	Turbidity (NTU) thresholds above background[2]			
	20%ile	**50%ile**	**80%ile**	**95%ile**
Zone of High Impact	3	5	15	-
Zone of Low to Moderate Impact	1	2	5	-
Zone of Influence	-	0.5	2	5

The turbidity impact map for the selected case winter scenario is shown in **Error! Reference source not found.**; the impact map includes the seagrass extent as surveyed in May 2019.

[1] 'Detectable' plume in terms of detectable above background conditions by instrumentation deployed in the water column
[2] Background is defined as turbidity measures in real-time during dredging at the background buoy (B1). Background measurements will be collected and report to provide an indication of whether turbidity is a result of dredging, or reflective of naturally occurring weather events.

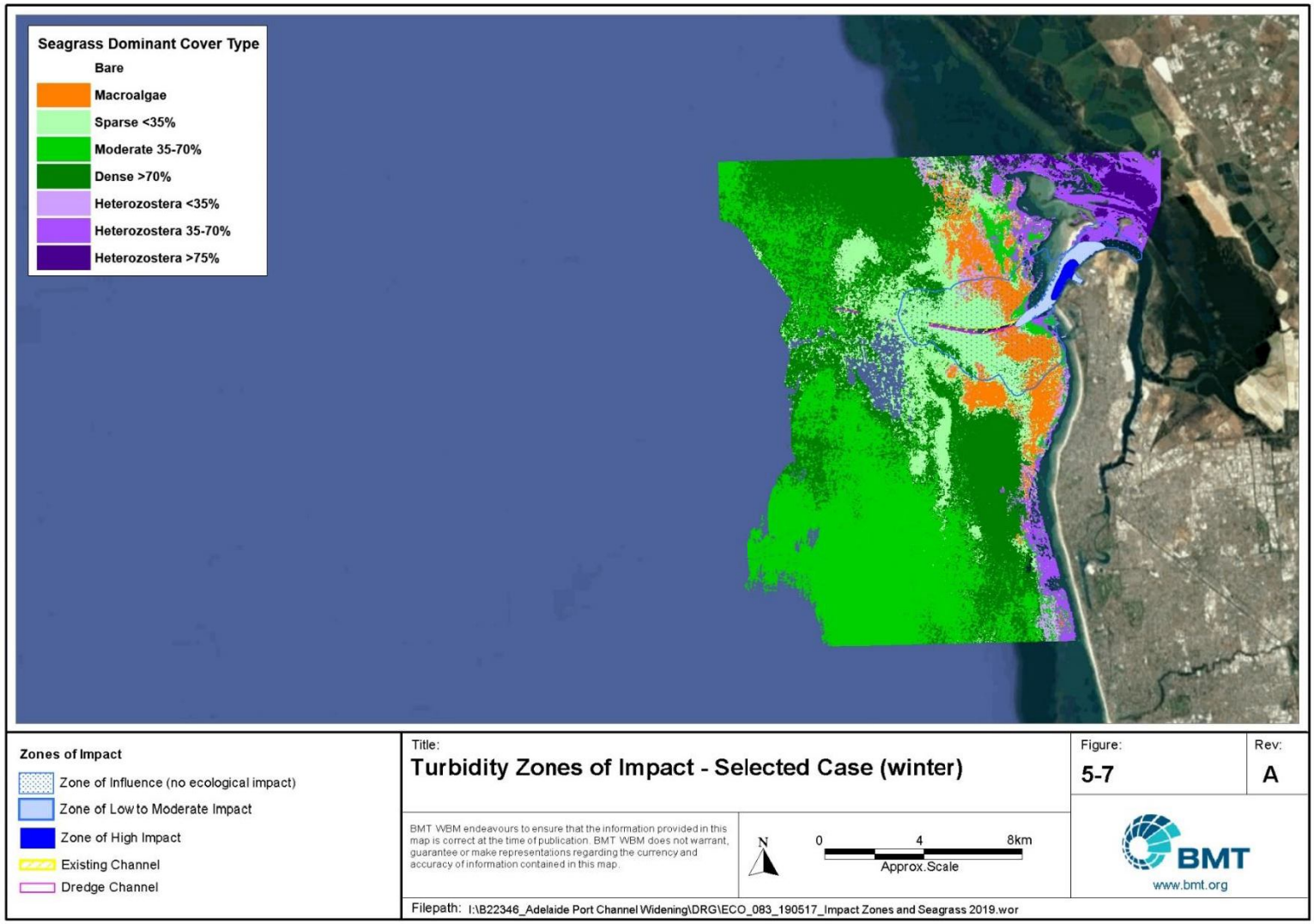

Figure 3-1 Turbidity Zones of Impact

3.2 Water Quality Limits

3.2.1 Data Collection

Water quality monitoring is being undertaken at three (3) sites to collect water quality data as follows:

- Two 'dredge plume monitoring' sites – one site located to the north of the channel (D1) and one site to the south of the channel (D2). These sites are located near to seagrass meadows and within the predicted zone of influence as indicated by dredge plume modelling.
- One 'background' site - located approximately 5.5 km from the channel dredging area and representing background conditions.

The monitoring sites are shown in Figure 3-2. All three sites are located in a water depth of approximately -8 m LAT.

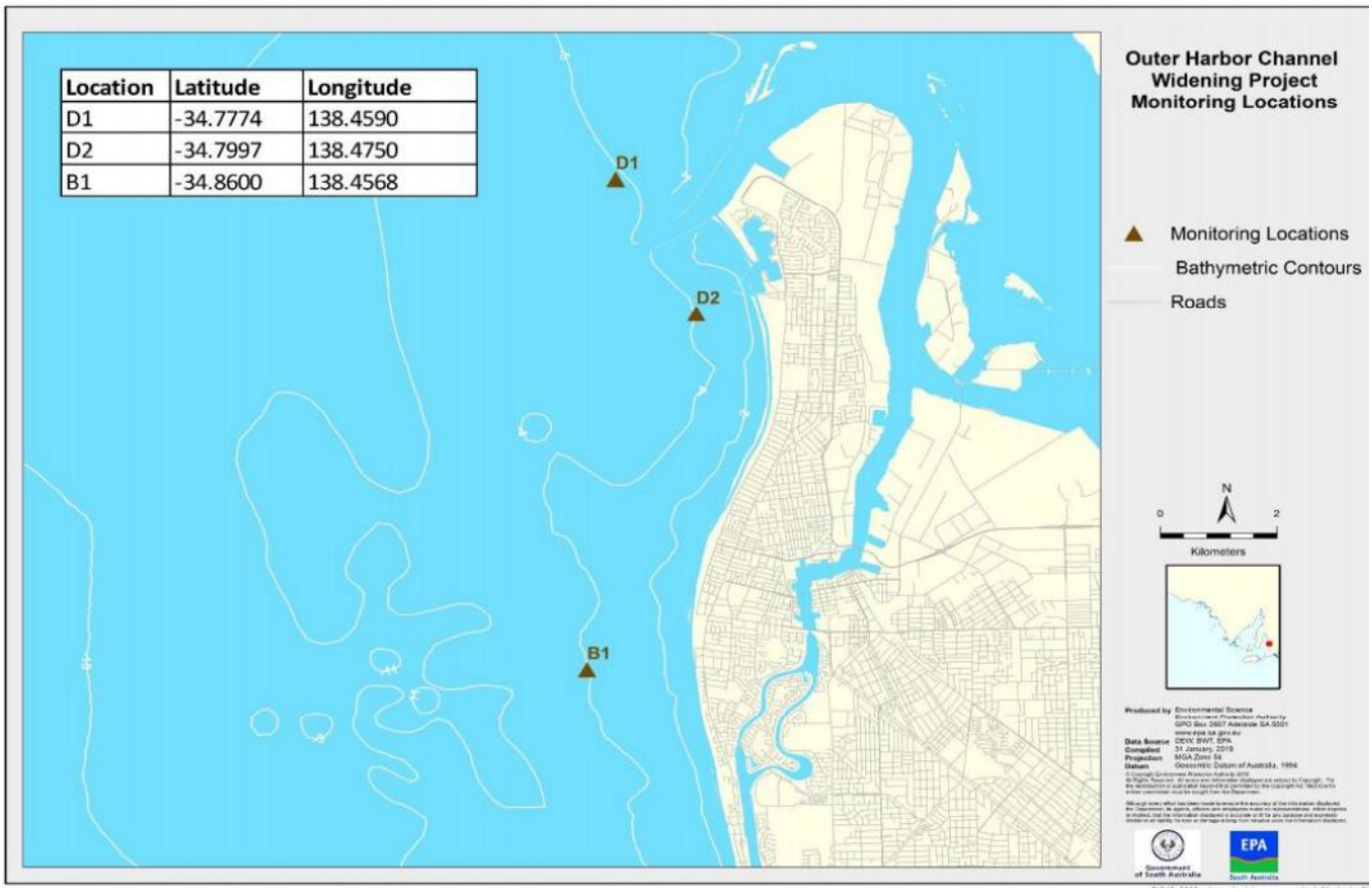

Figure 3-2 Water quality monitoring locations

The following parameters are being continuously measured (i.e. data logged every 10 minutes) during baseline and dredging phases:

- Turbidity - as measured by optical scatter via a nephelometer giving readings in Nephelometric Turbidity Units (NTU). Turbidity provides a proxy for suspended sediments within the water column.

- Photosynthetically Active Radiation (PAR) – benthic PAR measured on the seafloor to represent that part of the light spectrum that is available to benthic photosynthetic organisms (e.g. seagrass) to utilise.
- Dissolved oxygen, pH, salinity and temperature – water quality instruments at each site are fitted with sensors to measure these additional parameters.

To supplement the continuously logged data, and to give independent measures of turbidity, water samples were collected at the three monitoring sites during a servicing trip on the 25th and 26th July, 16th August and the 3rd September for the following parameters:

- Total suspended solids;
- Turbidity; and
- Chlorophyll-a.

Water samples were sent to a NATA accredited laboratory to be analysed; the results are provided in Table 3-2, Table 3-3 and Table 3-4.

Data for the month of July (collected on 26th July during 2nd reporting period, 16th August during 3rd reporting period and on the 3rd of September for the 4th reporting period) are provided in Table 3-2, Table 3-3 and Table 3-4. It should be noted that these are one off samples, and should not be used to establish any correlation between TSS and NTU. From the data, it appears there has been a laboratory error with the August samples, with TSS being unreasonably higher than the NTU values. For September, TSS values returned to expected concentrations.

Table 3-2 July Water Quality Samples (samples taken 26th July)

Parameter	Units	B1	D1	D2
Total Suspended Solids	Mg/L	<1	4	5
Turbidity	NTU	0.8	0.5	0.9
Chlorophyll a	Mg/m^2	0.6	0.6	0.5

Table 3-3 August Water Quality Samples (samples taken 16th August)

Parameter	Units	B1	D1	D2
Total Suspended Solids	Mg/L	9	10	16
Turbidity	NTU	1.9	0.8	0.5
Chlorophyll a	Mg/m^2	1	1	1

Table 3-4 September Water Quality Samples (samples taken 3rd September)

Parameter	Units	B1	D1	D2
Total Suspended Solids	Mg/L	2	4	8
Turbidity	NTU	0.6	0.5	1
Chlorophyll a	Mg/m^2	0.8	1	0.8

3.2.2 Turbidity Limits

Table 3-5 documents the turbidity limits that were set in Schedule 2 of the dredge licence; these were derived from the impact thresholds (Refer to Table 3-1) plus an additional allowance for average background turbidity of 0.8 NTU (determined from water quality monitoring in place for 11 months prior to dredging commencement).

Table 3-5 Turbidity Limits for the project set by the Dredge Licence

Level	Criteria
ALARM	2.8 NTU on a 15 day rolling median; or 5.8 NTU on a 6 day rolling median
HOLD	5.8 NTU on a 15 day rolling median; or 15.8 NTU based on a 6 day rolling median

4 Water Quality Results

4.1 Turbidity

An extreme wind event between the 6th and 10th of September saw very high turbidity experienced over that period. This event, plus a smaller continual high wind event between the 12th and 23rd September saw two exceedances of the 15-day median HOLD criteria at D1 (between 11th-13th and 14th-23rd).

Figure 4-1 provides raw turbidity readings (NTU) at each of the three monitoring locations (B1, D1 and D2). During the first storm period, turbidity reached a peak of 25 NTU at B1 and 40 and 42 NTU at D1 and D2 respectively. The high was sustained for several days, with increases associated with smaller wind events described above.

Prior to the HOLD exceedance on the 11th September, dredging occurred in line with EPA Determination from the 23rd of August for HOLD exceedances. Pre-emptive mitigation measures were taken to reduce turbidity including substitution of dredging scope between the TSHD Gateway and BHD Magnor. TSHD Gateway bunkering was planned to be undertaken within the HOLD exceedance. Similarly, in response to the HOLD exceedance on the 14th September, dredging was again performed in line with EPA determination. Upon reaching the HOLD criteria, dredging ceased within 3 hours, as per the dredge licence conditions. On both HOLD occasions the EPA provided written approval to conduct dredging during these periods under specific dredge conditions. Please refer to Boskalis September Monthly Report for further information.

In the lead up to both HOLD events, the raw turbidity at all locations was low, however exceedances occurred at the compliance monitoring sites due to earlier periods of high turbidity during wind events. Background turbidity at B1 (and more broadly along the length of the coastline, based on satellite imagery) was also high during these events. This is depicted in the 6-day rolling median in Figure 4-3.

The 15-day rolling median turbidity (chronic condition) for September is shown in Figure 4-2, with the range of medians provided in Table 4-1. Figure 4-3 shows the 6-day rolling median turbidity (acute condition) for the month of September.

Water Quality Results

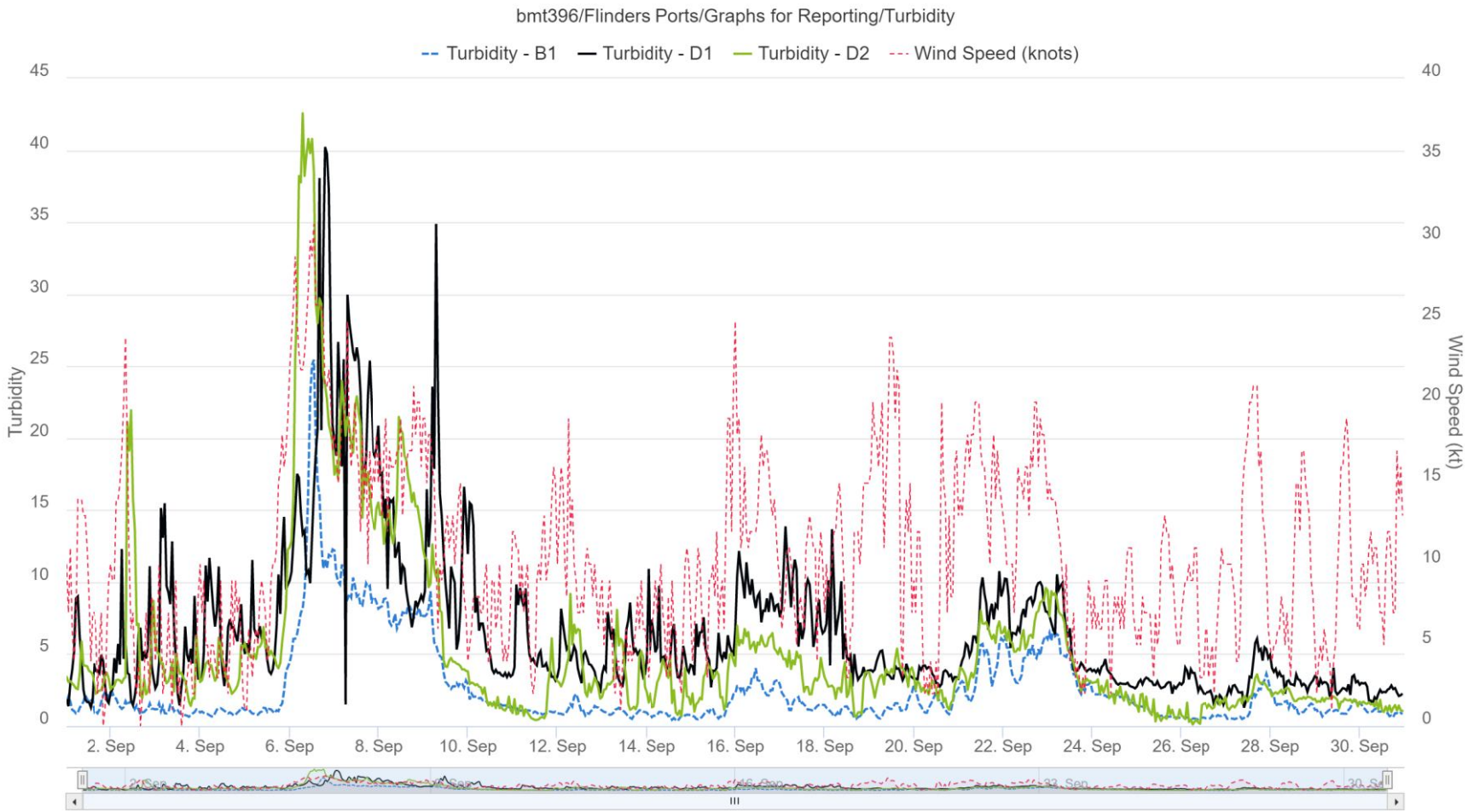

Figure 4-1 Raw turbidity data (NTU) for B1, D1 & D2 (1st to 31st September)

Table 4-1 Rolling Medians – 1st to 18th September 2019

Location	Lowest Value	Highest Value
15 Day Rolling Median		
B1	1.26	2.49
D1	4.19	7.07
D2	3.34	4.52
6 Day Rolling Median		
B1	0.98	6.83
D1	3.47	11.85
D2	2.41	12.4

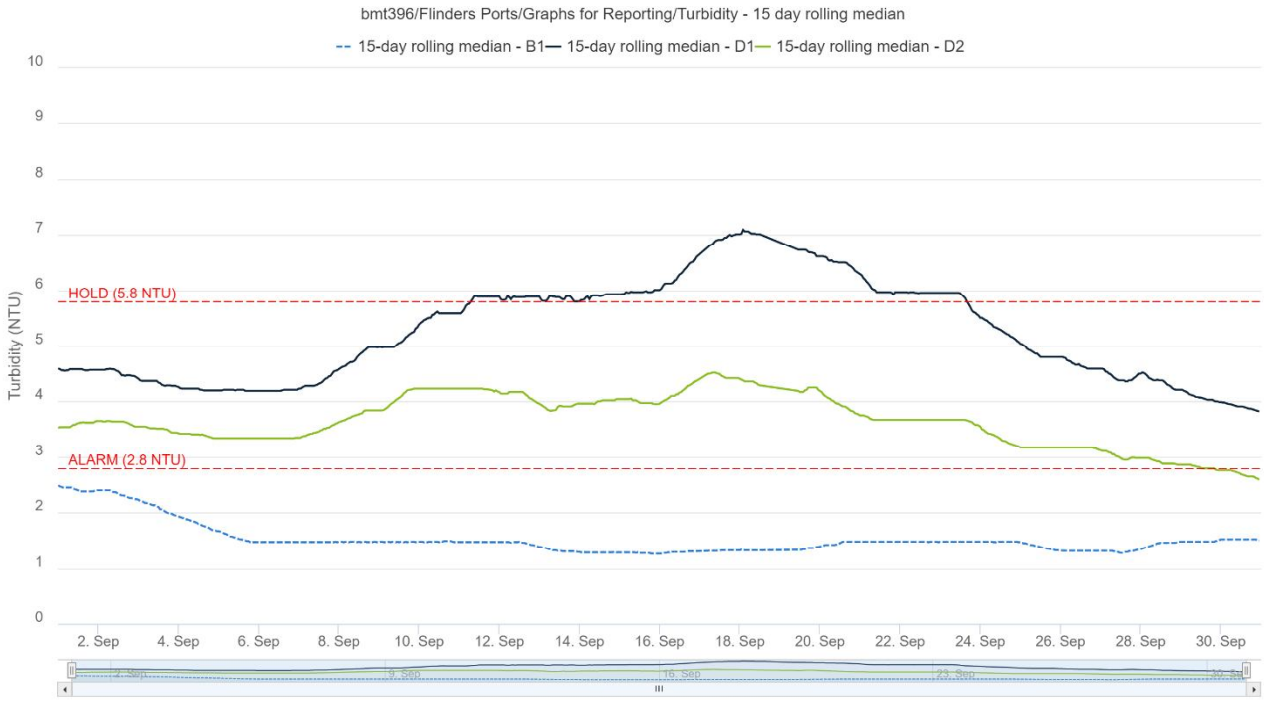

Figure 4-2 15 day rolling median QA' ed turbidity data (NTU) for B1, D1 and D2 – September 2019

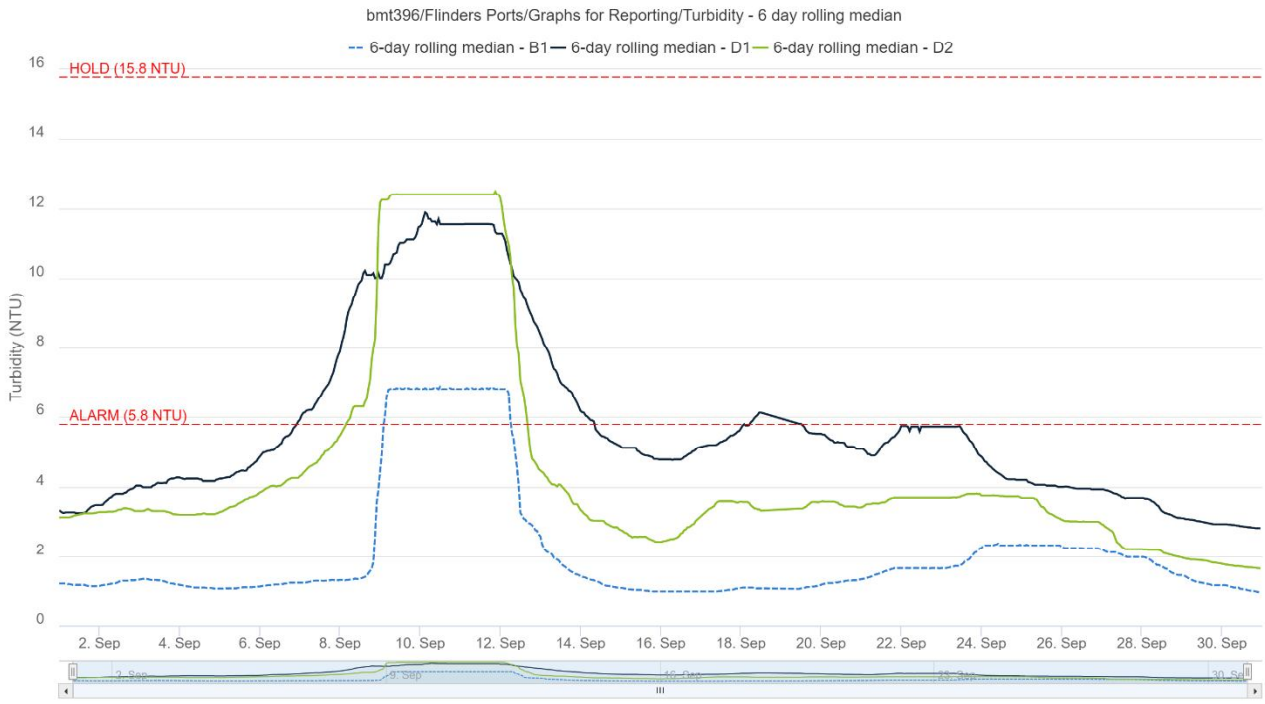

Figure 4-3 6 day rolling median QA'ed turbidity data (NTU) for B1, D1 and D2 – September 2019

4.2 Dissolved Oxygen

Dissolved Oxygen was steady throughout the month of September, ranging between 95 and 110% saturation for site D1 and D2 as shown in Figure 4-4, which is within the default trigger value range for marine waters (ANZECC, 2000). Site B1 had marginally higher Dissolved Oxygen concentrations (up to 115%) from the 12th to the 18 September. Note that there were some signal failures in the data set below.

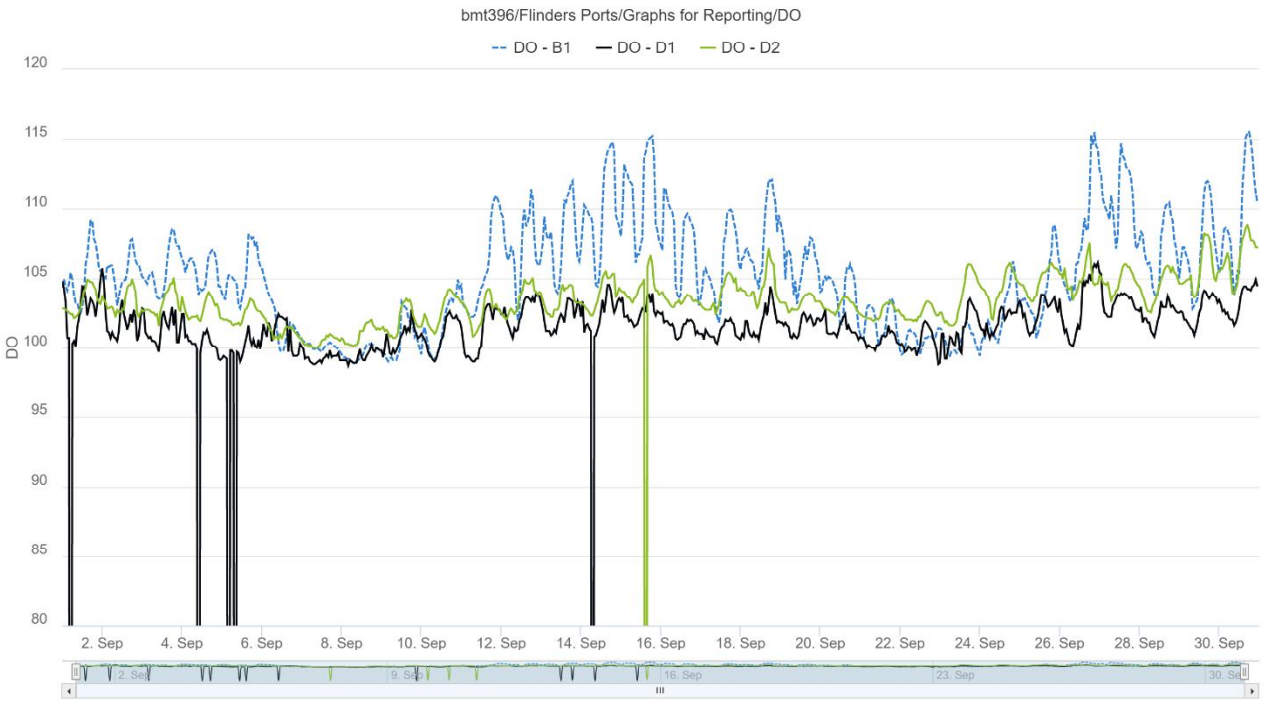

Figure 4-4 Dissolved Oxygen (% saturation) at B1, D1 and D2 – September 2019

4.3 pH

pH ranged between 8.1 and 8.3 for sites B1 and D1 as shown in Figure 4-5 which is well within the default trigger value range for marine waters (ANZECC, 2000). pH at site D2 ranged between 8 and 8.3 up until the 18th of September. Note that there were some signal failures in the data set below.

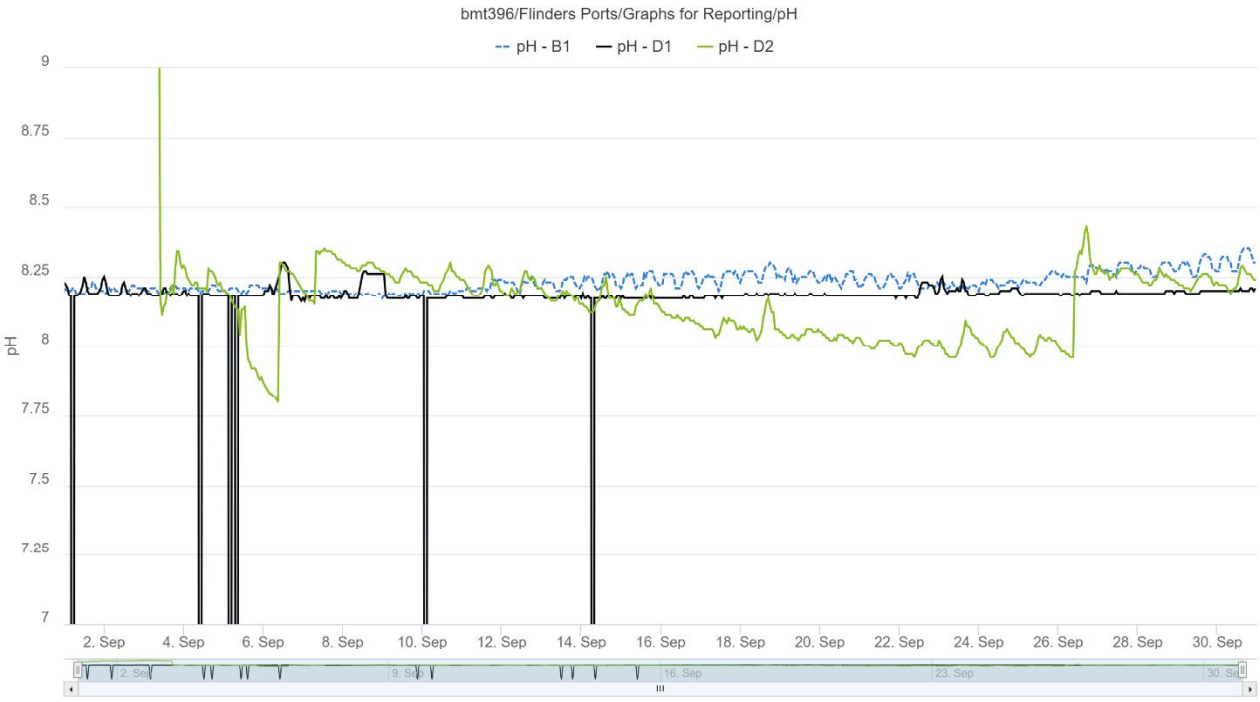

Figure 4-5 pH at B1, D1 and D2 – September 2019

4.4 Electrical Conductivity

Electrical Conductivity (EC) ranged between ~55,400 and ~56,400µS/cm, as shown in Figure 4-6.

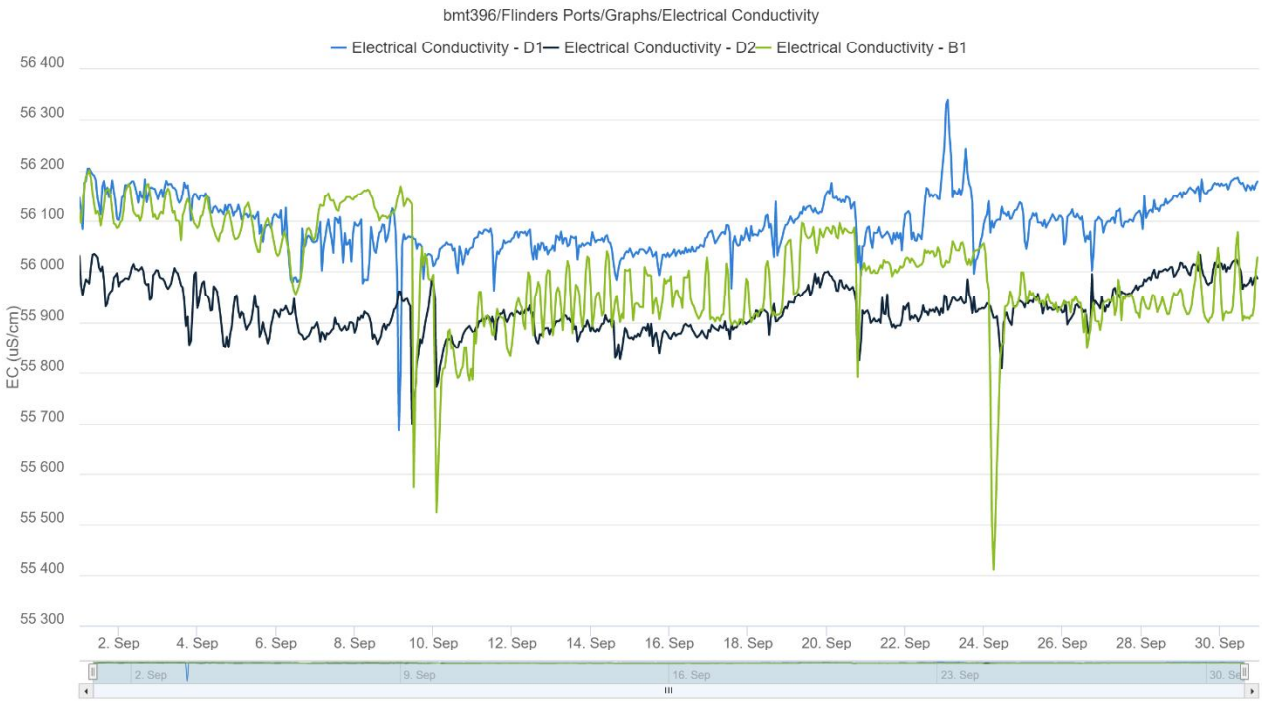

Figure 4-6 Electrical Conductivity (µs/cm) for B1, D1 and D2 – September 2019

4.5 Water Temperature

Water temperature remained between 13 and 16 degrees as shown in Figure 4-7.

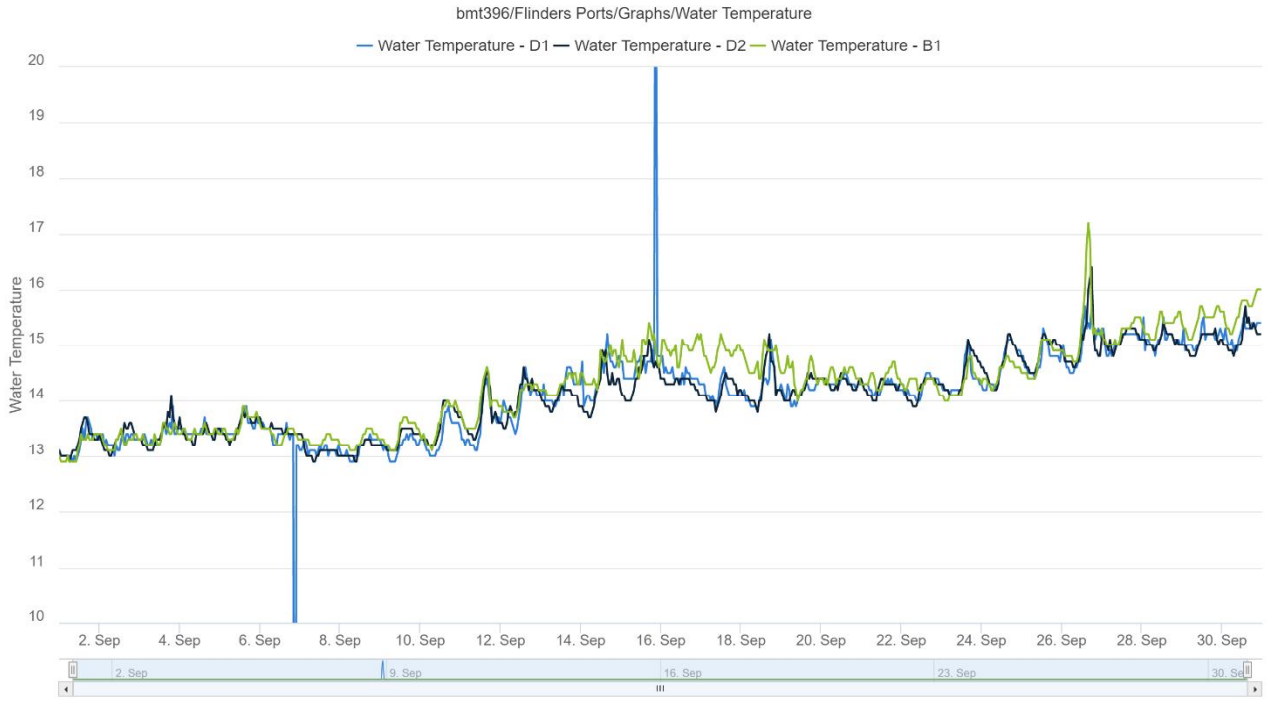

Figure 4-7 Temperature (ºC) for B1, D1 and D2 – September 2019

4.6 PAR

As one of the primary drivers of seagrass condition and resilience to disturbance, understanding the light available, and any loss of light for a prolonged period of time is important. Photosynthetically Available Radiation (PAR) is a way of measuring light available to seagrass. PAR is naturally lower in winter months when daylight hours are reduced. For seagrass loss to occur, light must be limited for a significant period, although the exact duration after which seagrass loss occurs is not well studied in South Australia. South Australian seagrasses would be naturally adapted to low light levels during the winter months.

Although a PAR target has not been set, BMT have been recording PAR data at the three monitoring stations. These have been processed as % of surface irradiance to enable a comparison of light availability. This data will be utilised when examining post-dredging seagrass survey results.

Data is displayed form the 1st to the 3rd of September. The remainder of the PAR data will be published upon retrieval of the PAR instrumentation.

Figure 4-8 % surface light irradiance at B1, D1 and D2 – September 2019

5 Plume Zone Validation

A dredge plume model validation review was undertaken using the satellite imagery collected as part of the dredge plume monitoring program. The review has considered satellite images collected during September utilising those images that contained the clearest imagery. The satellite imagery does show significant plumes along the length of the coastline within the satellite image during the high wind events (6th -10th and 12th-23rd), however turbidity reduced rapidly within 1-2 days (Figure 5-1; Figure 5-2).

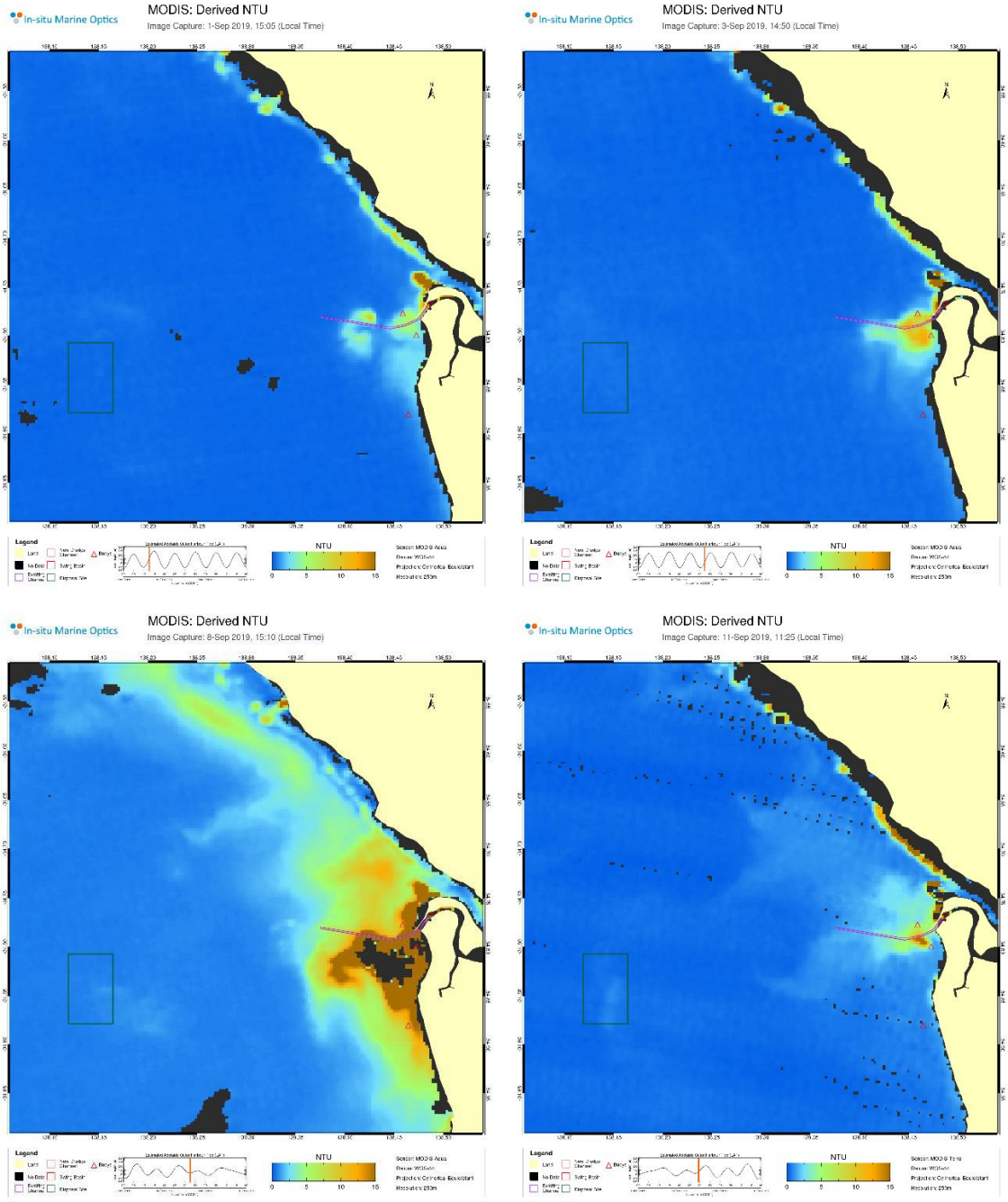

Figure 5-1 Satellite images during September (1st, 3rd, 8th, 11th)

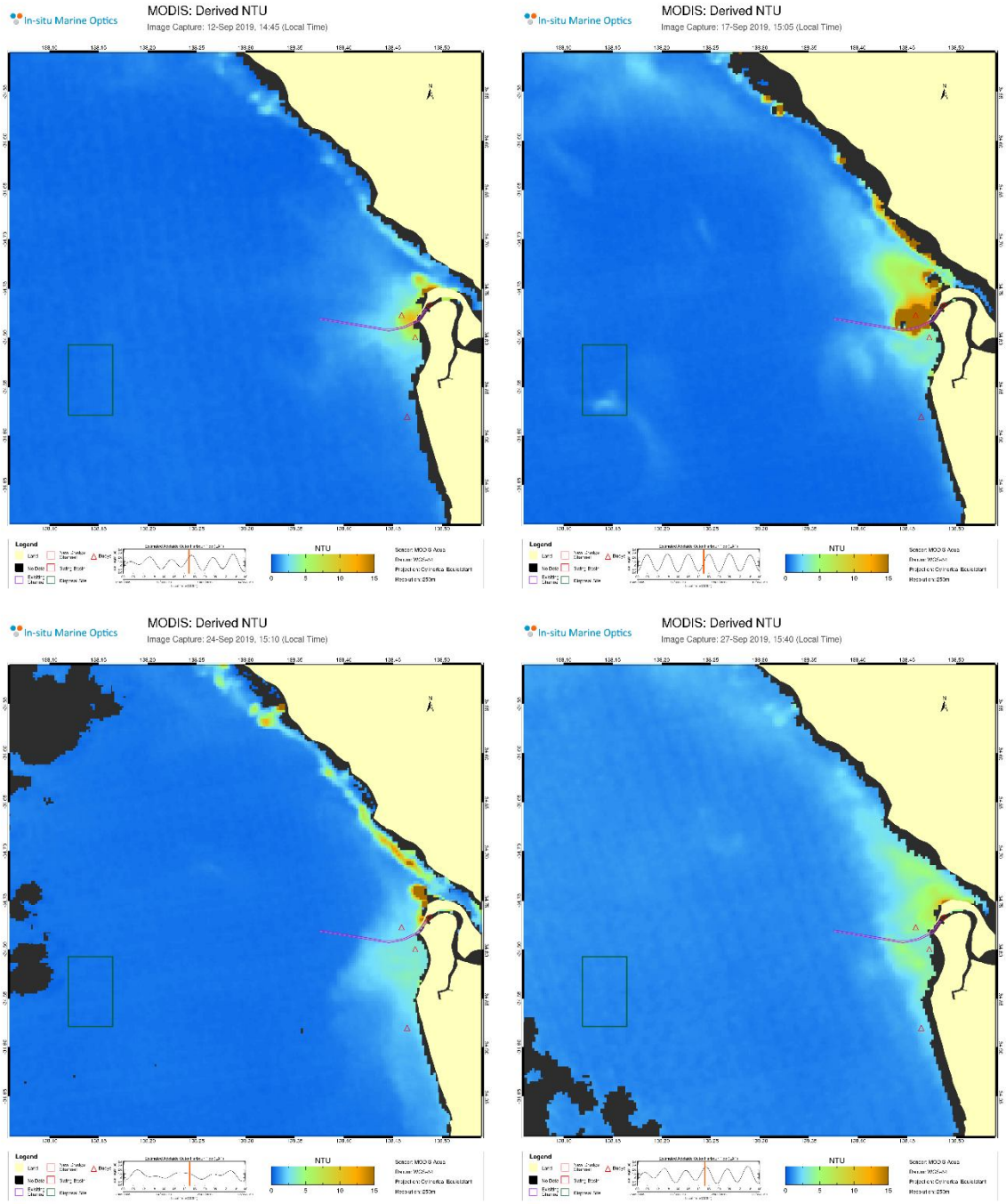

Figure 5-2 Satellite images during September (12th, 17th, 24th, 27th)

6 Conclusion and Summary

September saw one large wind event between the 6th to 10th, and a period of smaller winds, which did result in some higher turbidity plumes, causing the 15-day median HOLD criteria to be exceeded on two occasions. A combination of improved weather conditions and mitigation measures, including substitution of dredging scope between the TSHD Gateway and BHD Magnor saw turbidity reduce significantly towards the end of the dredge campaign on the 18th of September. Reduction of turbidity concentrations continued to the end of the month.

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Monthly Stakeholder Engagement Update - EPA reporting September 2019

Web page visits
684
(5,092 accumulative total)

Number of enquiries via website
0
(2 accumulative total)

Number of enquiries via hotline
10
(153 accumulative total)

Number of enquiries via email
3
(50 accumulative total)

Stakeholder meetings/briefings
0
(35 accumulative total)

Stakeholder database growth
1
(198 accumulative total)

EDM - Dredging completion (25 September 2019)

Number of people who received it
170

Open rate
43.5%

Milestone	Activities completed
Dredging completion	Noticeboard posters with dredging completion data distributed to various community groups and locations
	Communications announcing the completion of dredging and outcomes largely completed, including an EDM update, hard copy newsletter and social media posts
	Boat ramp signage removed
	Upcoming activities
Dredging completion	Complete dredging completion communications, including video content and key stakeholder phone calls, briefings and presentations
	Concluding engagement activities, including email account and hotline closure, web page consolidation

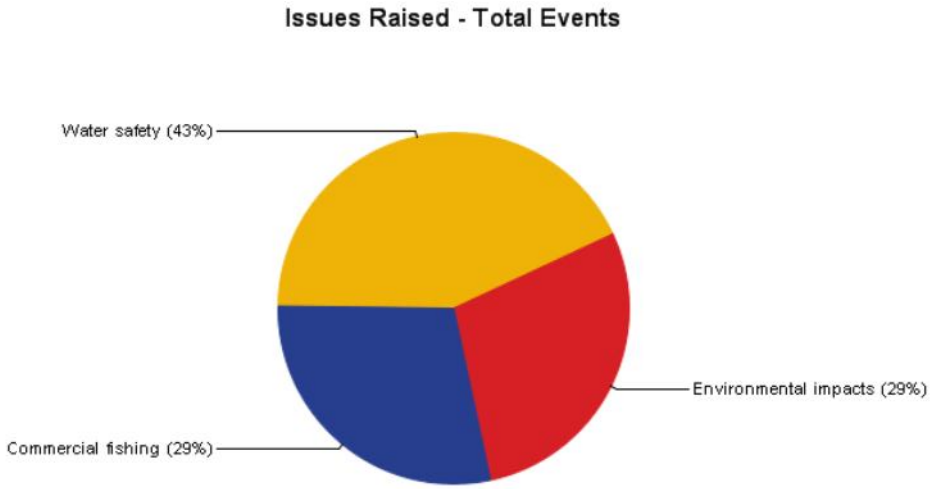
Complaints and engagement register summary

Outer Harbor Channel Widening Project

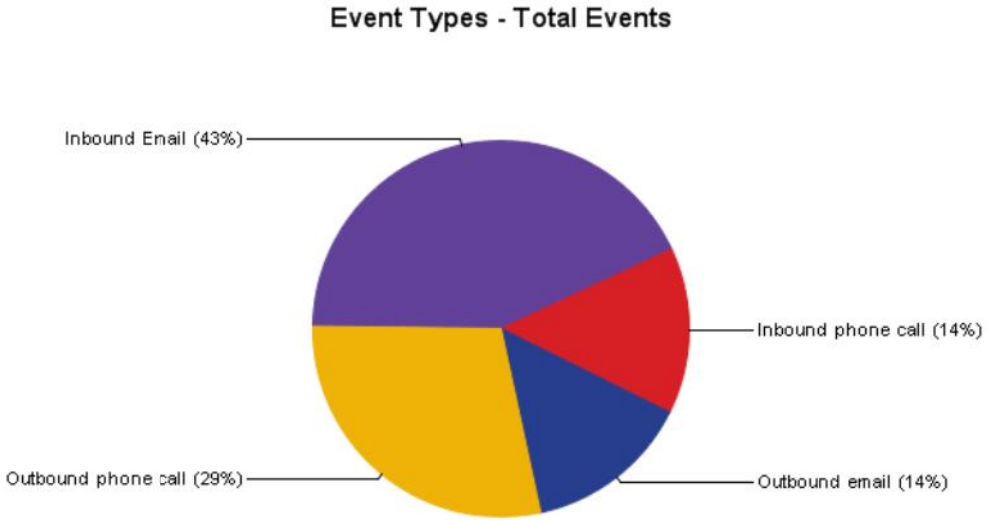
Engagement actions summary: September 2019

*When the word 'Events' is used in the graphs this is referring to 'engagement actions'

Issues	No. of Interactions	Stakeholders	
		Individual	Total
Water safety	3	1	3
Commercial fishing	2	1	2
Environmental impacts	2	1	2
[No Issues]	2	2	2
Total Event search	**7**	**2**	**7**



Action Types	No. of Interactions	Stakeholders	
		Individual	Total
Inbound Email	3	2	3
Outbound phone call	2	1	2
Inbound phone call	1	1	1
Outbound email	1	1	1
Total Event search	**7**	**2**	**7**



Complaints and engagement register summary

Outer Harbor Channel Widening Project

Stakeholder Groups	No. of Interactions	Stakeholders	
		Individual	Total
Individual / Resident	4	1	4
Environmental Group	3	1	3
Total Event search	**7**	**2**	**7**