Analysis Form

EPS Project Number: 201600346
Sample number(s): 201601928 (SW7)
Date and time of sampling: 09/08/2016
Sample type: Liquid

☐ Sediment ☒ Freshwater ☐ Brackish ☐ Seawater

Date of sample examination: 12/08/2016

Preservation status of the sample: Chilled and Lugol's iodine preserved

Analysis required

☒ Algal Identification

☐ Macro – or micro-invertebrate identification

Algal identification:

Method: Lund cell: a whole cell scan of un-concentrated subsample (about 0.5 mL in volume) under a compound microscope at a magnification of ×100-400.

Dominant algae: Green algae belonging to the group called "desmids", including the genera *Netrium (*most likely*), Cosmarium, Closterium* and others. Desmids are said to be ecologically highly sensitive, and often found in standing freshwaters where the electrical conductivity and nutrient concentrations are low (Coesel 2001, Ngearnpat and Peerapornpisal 2007).

References used:

Coesel, P.F., 2001. A method for quantifying conservation value in lentic freshwater habitats using desmids as indicator organisms. *Biodiversity & Conservation*, *10*(2), pp.177-187.

Ngearnpat, N. and Peerapornpisal, Y., 2007. Application of desmid diversity in assessing the water quality of 12 freshwater resources in Thailand. *Journal of applied phycology*, *19*(6), pp.667-674.

Additional Analysis required: ☐

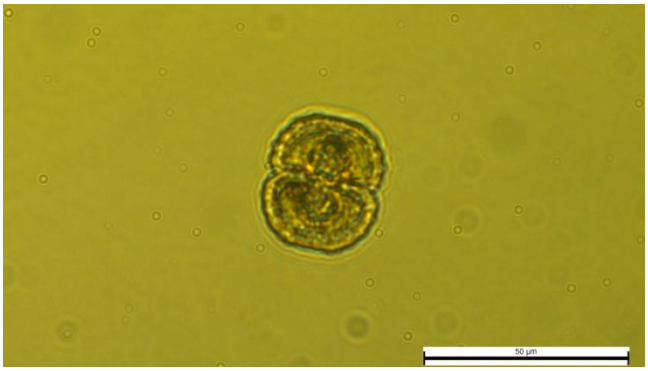
Macro- and micro-invertebrates:

Analysis not required.

Analyst: Yoshi Kobayashi

Insert photos:

Most-likely ***Netrium*** **in the sample 201601928**



Cosmarium **in the sample 201601928**

Closterium **in the sample 20161928**

Analysis Form

EPS Project Number: 201600346
Sample number(s): 201601930 (SW9)
Date and time of sampling: 09/08/2016
Sample type: Liquid

☐ Sediment ☒ Freshwater ☐ Brackish ☐ Seawater

Date of sample examination: 12/08/2016

Preservation status of the sample: Chilled and Lugol's iodine preserved

Analysis required

☒ Algal Identification

☐ Macro – or micro-invertebrate identification

Algal identification:

Method: Lund cell: a whole cell scan of un-concentrated subsample (about 0.5 mL in volume) under a compound microscope at a magnification of ×100-400.

Dominant algae: Green algae belonging to the group called "desmids", including the genera *Netrium* (most likely), *Cosmarium, Closterium* and others. Desmids are said to be ecologically highly sensitive, and often found in standing freshwaters where the electrical conductivity and nutrient concentrations are low (Coesel 2001, Ngearnpat and Peerapornpisal 2007).

References used:

Coesel, P.F., 2001. A method for quantifying conservation value in lentic freshwater habitats using desmids as indicator organisms. *Biodiversity & Conservation*, *10*(2), pp.177-187.

Ngearnpat, N. and Peerapornpisal, Y., 2007. Application of desmid diversity in assessing the water quality of 12 freshwater resources in Thailand. *Journal of applied phycology*, *19*(6), pp.667-674.

Additional Analysis required: ☐

Macro- and micro-invertebrates:

Analysis not required.

Analyst: Yoshi Kobayashi

Insert photos: no photo inserted

Analytical Report 158202

Sydney WATER
Laboratory Services

Delivery Address: Sydney Water Corporation
51 Hermitage Rd
West Ryde NSW 2114

Analysis contact: **Tel** : (02) 9800 6827
Fax : (02) 9800 6741

Issue Date: 13/08/2016

Issued By : Sydney Water Laboratory Services

Attention: Vilma Silva
Customer: Office of Environment & Heritage
Customer ID: ZOEH

Address: PO BOX 29
LIDCOMBE NSW 2141
Telephone: 9995 5031
Email: Vilma.Silva@environment.nsw.gov.au

CONTENTS

Sydney Water Approved Signatory

Jouliet Ashak, Microbiology Analyst

Tamara Taylor, Microbiology Analyst

Where a result is required to meet a compliance limit or specification the associated uncertainty must be considered. Uncertainty estimates are available for all accredited test results.

NATA
WORLD RECOGNISED ACCREDITATION

Accreditation No.: 610 Biological testing

Accredited for compliance with ISO/IEC 17025

Sydney WATER Laboratory Services

SAMPLE SUMMARY

Client Sample ID	Sample Number	Sampling Procedure	Date Sampled	Date Received	Date Authorised	Description
201601928	L16054651	1	09/08/2016	10/08/2016	12/08/2016	
201601930	L16054652	1	09/08/2016	10/08/2016	12/08/2016	

Sampling procedures

1 Samples analysed as received.
2 Samples collected as per FSG procedures SAWI 076 / 079 / 070, Excluding Oil & Grease which is collected as per clients instructions.
3 Samples collected as per FSG procedures SAWI 076 / 079 / 070.

Sydney WATER Laboratory Services

ANALYTICAL RESULTS

Client Sample ID		201601928	201601930						
Sampled Date		09/08/2016 10:00:00 AM	09/08/2016 10:00:00 AM						
Sample Number		L16054651	L16054652						
MICRO									
MI01MUG : Faecal Coliform and/or E. coli Date of Performance									
Faecal Coliform	CFU/100mL	~8	~13						
MI03ENT : Enterococci Date of Performance									
Enterococci	CFU/100mL	58	~58						
Date of Performance	D/M/Y H:M	10/08/16 10:03	10/08/16 10:03						

(~): Counts of target colonies are outside the optimal precision range.

COMMENTS

Sample ID	Comment Level	Method	Test	Comment
L16054651	**Method**	**MI03ENT**	-	Sample analysed outside recommended holding time of 24Hrs
L16054652	**Method**	**MI03ENT**	-	Sample analysed outside recommended holding time of 24Hrs

Analysis	Analysis Requirements
MI01MUG	Faecal Coliforms and/or E.Coli: all results are presumptive unless indicated otherwise.

Sydney WATER Laboratory Services

LABORATORY QC RESULTS

N/A - Not Applicable
PQL - Practical Quantitation Limit
LOQ - Limit of Quantification
RPD - Relative Percent Difference
SPIKE/Positive Control - Addition of a known amount and concentration
Duplicate Precision = Accepted - Result 2 within 95% confidence limits of result 1
Duplicate Precision = Outlier - Result 2 outside 95% confidence limits of result 1
Duplicate Precision = Not calculated - Result is outside test range

LOQ	Blank	Positive Control *Acceptance Criteria*	Negative Control *Acceptance Criteria*	Duplicate1	Duplicate2	Precision *Acceptance Criteria*
MI01MUG [Membrane Filtration]Faecal Coliform						
<1 CFU/100mL	**<1**	**Accepted**	**Accepted**			
MI03ENT [Membrane Filtration]Enterococci						
<1 CFU/100mL	**<1**	**Accepted**	**Accepted**			

Office of Environment & Heritage

Environmental Forensics

Replacement Report of Analysis

Report 201600346 v2

01 September 2016

Sample source: **Nelson Bay Road open drain - Foam water**

Report to: **Sam Waskett**

Environment Protection Authority
117 Bull Street
Newcastle West NSW 2302

Date received: **9-Aug-2016**

This report supersedes Report 201600346 dated 31/08/2016.

Office of Environment and Heritage

Environmental Forensics

Replacement Report of Analysis

Report number: **201600346**

Report date: 1-Sep-2016

Date received: 09-Aug-2016 13:55

Sample source: **Nelson Bay Road open drain - Foam water**

Sample details

Lab number	Client reference	Sample type	Date sampled	Sample description
201601922	SW1- FOAM	LIQUID	08-Aug-2016 14:15	
201601923	SW2 - WATER 1	LIQUID	08-Aug-2016 14:40	
201601924	SW3 - WATER 2	LIQUID	08-Aug-2016 14:45	
201601925	SW4 - WATER 4	LIQUID	08-Aug-2016 14:50	
201601926	SW5 - WATER 3	LIQUID	08-Aug-2016 14:55	
201601927	SW6 - WATER	LIQUID	09-Aug-2016 9:50	
201601928	SW7	LIQUID	09-Aug-2016 10:00	
201601929	SW8 - WATER	LIQUID	09-Aug-2016 10:05	
201601930	SW9 - WATER	LIQUID	09-Aug-2016 10:00	
201601931	SW10 - WATER	LIQUID	09-Aug-2016 10:05	

Report comments: THIS IS A REISSUED REPORT AND CONTAINS AN AUTHORISED SIGNATURE. THIS REPORT REPLACES THE ONE DATED 31 AUGUST 2016.

Samples numbered 201601928 and 201601930 were sent to Sydney Water Analytical and Field Services Laboratory (NATA Accreditation no: 610) for the analysis of Faecal Coliform and Enterococci. Please see attached report no: 158202 dated 13 August 2016.

Samples 201601928 and 201601930 were sent to the Water, Wetlands and Coastal Science for algal identification. Please see the attached reports dated 12 August 2016.

PFOS is quantified using linear standards, linear and branched PFOS isomers in samples are totalled for reporting. All reported PFAS concentrations have been corrected for surrogate recovery.

Reported PFAS concentrations for sample 201601922 are estimates only due to the foamy and heterogeneous nature of the sample. PFBS and PFHpA were also detected, but below the quantitation limit.

Organics by LC-MS

Laboratory number	201601922	201601923	201601924	201601925
Client sample ID	SW1- FOAM	SW2 - WATER 1	SW3 - WATER 2	SW4 - WATER 4
Sample type	LIQUID	LIQUID	LIQUID	LIQUID
Date started	17/08/2016	18/08/2016	18/08/2016	18/08/2016
Method used	PFAS	PFAS	PFAS	PFAS
C2H4-perfluorodecane sulfonate (8:2 FTS)	<0.4 µg/L	<0.08 µg/L	<0.08 µg/L	<0.08 µg/L
C2H4-perfluorooctane sulfonate (6:2 FTS)	<0.3 µg/L	<0.06 µg/L	<0.06 µg/L	<0.06 µg/L
M2-6:2 FTS (surrogate)	**119 % Recovery**	**297 % Recovery**	**310 % Recovery**	**313 % Recovery**
M2-8:2 FTS (surrogate)	**36 % Recovery**	**67 % Recovery**	**70 % Recovery**	**63 % Recovery**
MPFHxA (surrogate)	**93 % Recovery**	**59 % Recovery**	**68 % Recovery**	**66 % Recovery**
MPFHxS (surrogate)	**101 % Recovery**	**87 % Recovery**	**93 % Recovery**	**88 % Recovery**
MPFNA (surrogate)	**52 % Recovery**	**51 % Recovery**	**58 % Recovery**	**58 % Recovery**
MPFOA (surrogate)	**83 % Recovery**	**64 % Recovery**	**73 % Recovery**	**69 % Recovery**
MPFOS (surrogate)	**42 % Recovery**	**37 % Recovery**	**61 % Recovery**	**68 % Recovery**
Perfluorobutanesulfonate (PFBS)	<0.1 µg/L	**0.03 µg/L**	**0.04 µg/L**	**0.03 µg/L**
Perfluoroheptanoic acid (PFHpA)	<0.2 µg/L	<0.02 µg/L	<0.02 µg/L	<0.02 µg/L
Perfluorohexanesulfonate (PFHxS)	**3.1 µg/L**	**0.33 µg/L**	**0.34 µg/L**	**0.29 µg/L**
Perfluorohexanoic acid (PFHxA)	**0.6 µg/L**	**0.044 µg/L**	**0.061 µg/L**	**0.055 µg/L**
Perfluorononanoic acid (PFNA)	**0.4 µg/L**	<0.04 µg/L	<0.04 µg/L	<0.04 µg/L
Perfluorooctanesulfonate (PFOS)	**480 µg/L**	**1.2 µg/L**	**0.45 µg/L**	**0.46 µg/L**
Perfluorooctanoic acid (PFOA)	**1.2 µg/L**	**0.02 µg/L**	<0.02 µg/L	<0.02 µg/L

Laboratory number	201601926	201601931
Client sample ID	SW5 - WATER 3	SW10 - WATER
Sample type	LIQUID	LIQUID
Date started	18/08/2016	18/08/2016
Method used	PFAS	PFAS
C2H4-perfluorodecane sulfonate (8:2 FTS)	<0.08 µg/L	<0.08 µg/L
C2H4-perfluorooctane sulfonate (6:2 FTS)	<0.06 µg/L	<0.06 µg/L
M2-6:2 FTS (surrogate)	**294 % Recovery**	**308 % Recovery**
M2-8:2 FTS (surrogate)	**96 % Recovery**	**102 % Recovery**
MPFHxA (surrogate)	**81 % Recovery**	**81 % Recovery**
MPFHxS (surrogate)	**95 % Recovery**	**99 % Recovery**
MPFNA (surrogate)	**85 % Recovery**	**68 % Recovery**
MPFOA (surrogate)	**90 % Recovery**	**84 % Recovery**
MPFOS (surrogate)	**67 % Recovery**	**29 % Recovery**
Perfluorobutanesulfonate (PFBS)	<0.02 µg/L	**0.03 µg/L**
Perfluoroheptanoic acid (PFHpA)	<0.02 µg/L	<0.02 µg/L
Perfluorohexanesulfonate (PFHxS)	**0.07 µg/L**	**0.4 µg/L**
Perfluorohexanoic acid (PFHxA)	**0.015 µg/L**	**0.064 µg/L**
Perfluorononanoic acid (PFNA)	<0.04 µg/L	<0.04 µg/L
Perfluorooctanesulfonate (PFOS)	**0.11 µg/L**	**1.5 µg/L**
Perfluorooctanoic acid (PFOA)	<0.02 µg/L	**0.03 µg/L**

Result Note:	Method	Date started
	OLCSCAN	10-Aug-2016
201601922	LC/MS Scan	*LC/MS scan tentatively identified perfluorooctane sulfonate (PFOS) in the sample. No other polar organic compounds were identified.*
	OLCSCAN	10-Aug-2016
201601927	LC/MS Scan	*No polar organic compounds were identified by LC/MS scan.*
	OLCSCAN	10-Aug-2016
201601929	LC/MS Scan	*No polar organic compounds were identified by LC/MS scan.*

201601923	*PFHpA was detected below the quantitation limit.*
201601924	*PFHpA and PFOA were also detected, but below the quantitation limit.*
201601925	*PFHpA and PFOA were also detected, but below the quantitation limit.*
201601926	*PFBS was also detected, but below the quantitation limit.*
201601931	*PFHpA was also detected, but below the quantitation limit.*

Forensics

Result Note:	Method	Date started
	ISPOTGD	9-Aug-2016
201601922	Surfactants Spot Test (Anionic)	*Positive (Estimated concetration 0.3 mg/L)*
	ISPOTGD	9-Aug-2016
201601922	Surfactants Spot Test (Cationic)	*Negative (Detection limit 0.3 mg/L)*
	ISPOTGD	9-Aug-2016
201601927	Surfactants Spot Test (Anionic)	*Negative (Detection limit 0.3 mg/L)*
	ISPOTGD	9-Aug-2016
201601927	Surfactants Spot Test (Cationic)	*Negative (Detection limit 0.3 mg/L)*
	ISPOTGD	9-Aug-2016
201601929	Surfactants Spot Test (Anionic)	*Negative (Detection limit 0.3 mg/L)*
	ISPOTGD	9-Aug-2016
201601929	Surfactants Spot Test (Cationic)	*Negative (Detection limit 0.3 mg/L)*

Miscellaneous

Laboratory number	201601928	201601930
Client reference	SW7	SW9 - WATER
Sample type	LIQUID	LIQUID
Method	External Methods	External Methods
Algal Identification	**RC**	**RC**
E. coli	-	-
Enterococci	**RC**	**RC**
F. coliforms	**RC**	**RC**

Released by:

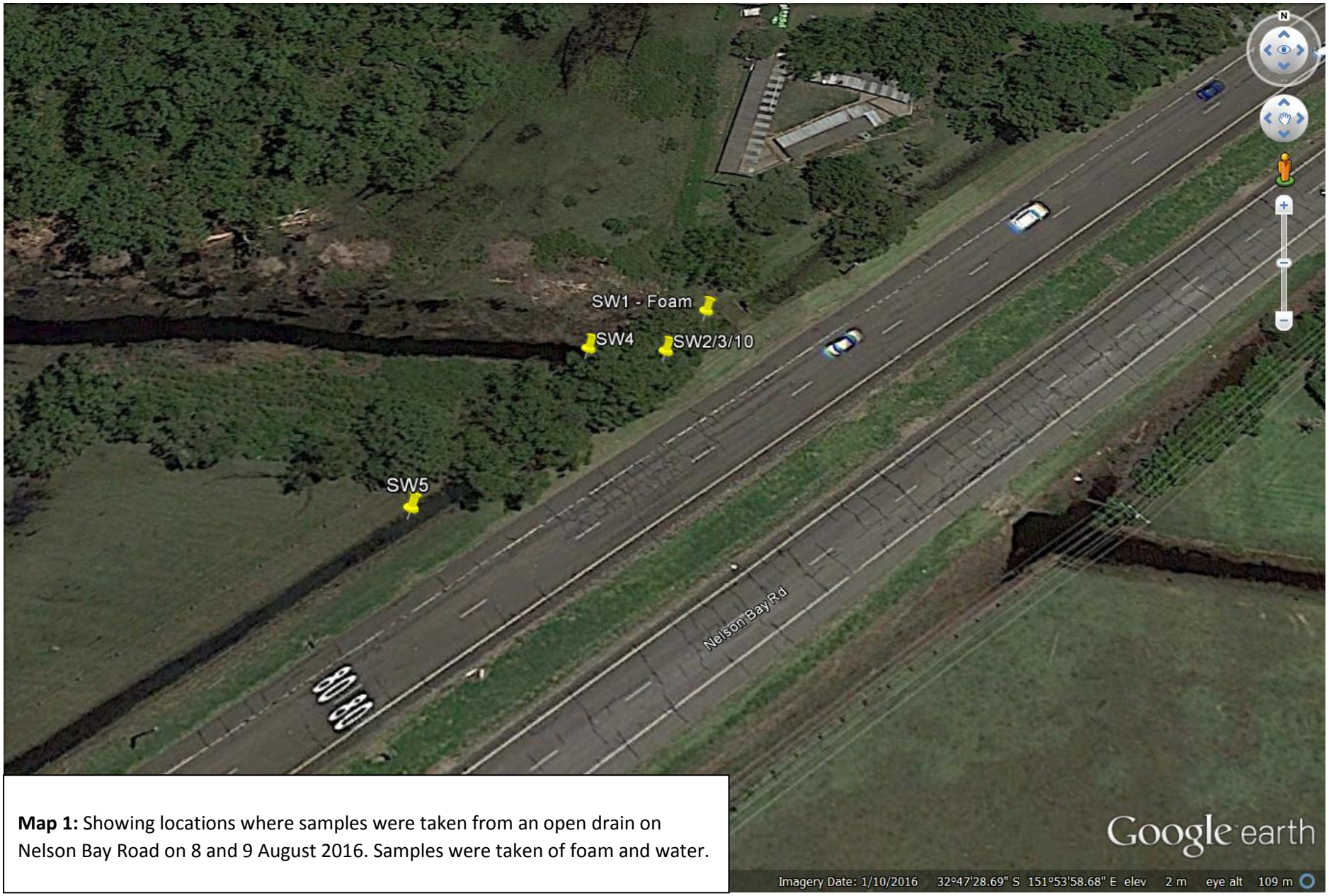
Stephen Fuller - Senior Scientist

Vilma Silva - Scientist

Date: 1/09/2016

This document has been digitally signed by the name that appears on this report. Digital signing has been carried out using private key encryption code.

Samples analysed as received from the client. Non-legal samples will be discarded one month from report date.
Solid samples are reported on a dry weight basis unless specified otherwise.
Biota samples are reported on an as received basis unless specified otherwise.



Map 1: Showing locations where samples were taken from an open drain on Nelson Bay Road on 8 and 9 August 2016. Samples were taken of foam and water.

Map 2: Distance aerial photograph of the sampling locations for the drain on Nelson Bay Road.