PUBLIC VERSION

ATTACHMENT #5 – NON-POTABLE WATER – PROCESS FLOW DIAGRAM

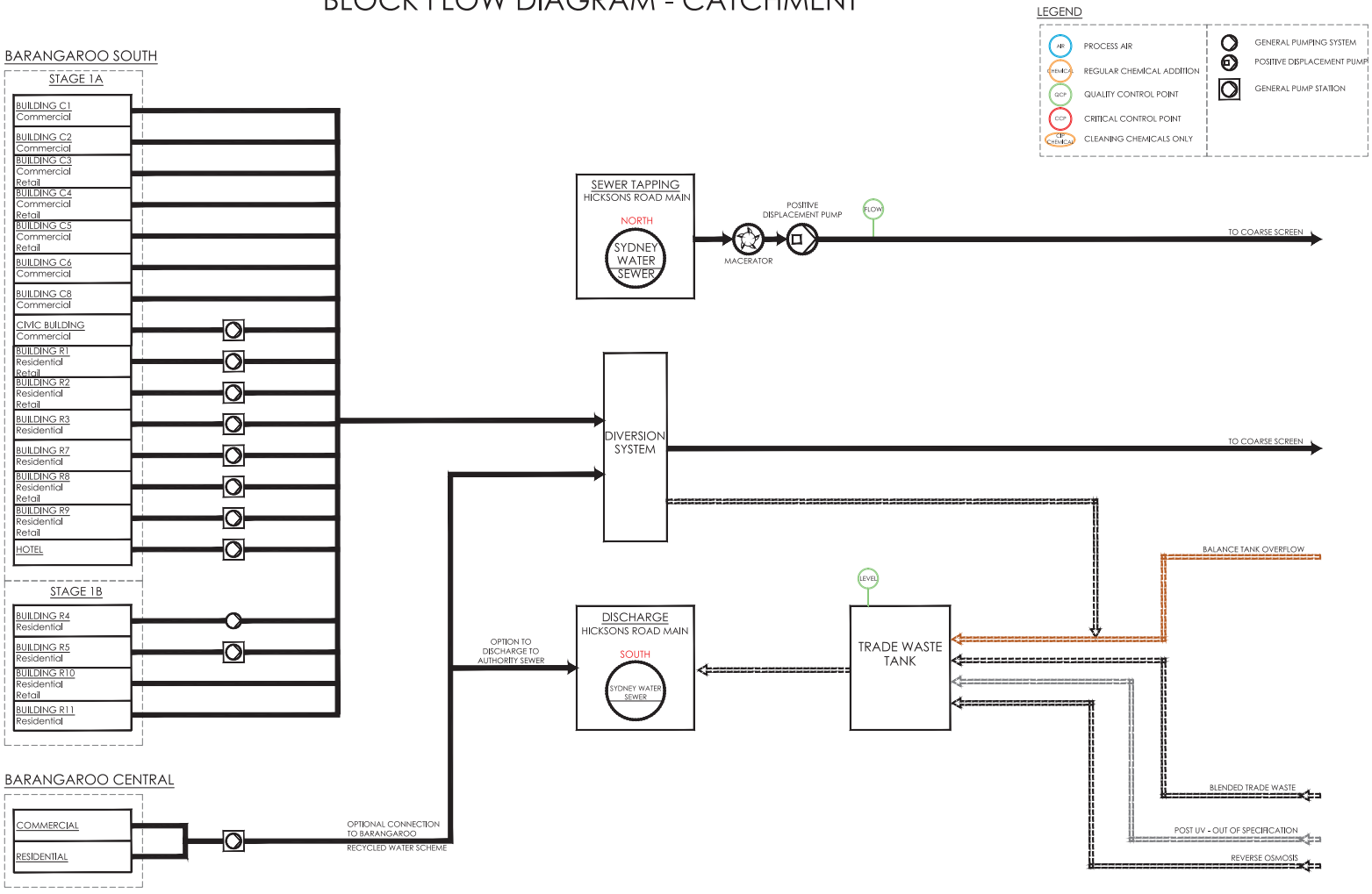
Includes

- Drawing BBO_HSK_W_0015 – Non-potable Water – Catchment – Process Flow Diagram
- Drawing BBO_HSK_W_0016 – Non-potable Water – Treatment Plant – Process Flow Diagram
- Drawing BBO_HSK_W_0017 – Non-potable Water – Distribution – Process Flow Diagram

Response to question

- 4.2.1

BARANGAROO RWP
BLOCK FLOW DIAGRAM - CATCHMENT



PRELIMINARY

FOR INFORMATION

Key Plan

Rev.	Date	Revision Description	Date
B		Preliminary Issue	11/09/2012
A		For Information	26/10/2012

Lead Architects: RSHP Australia Pty Ltd
Ben Harboe | Principal Architect
NSW ARB 6484
Sydney NSW 2000

Collaborating Architects: Land Lease
Graham W Jones | Principal Architect
FRAIA NSW ARB 4005
ABN 97 008 088 162

Consultant

Principal: Land Lease

Developer	Land Lease
Project Management & Construction	Land Lease
Design	Land Lease

30 The Bond 30 Hickson Road
Millers Point NSW 2000
www.landlease.com

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Project: BARANGAROO SOUTH

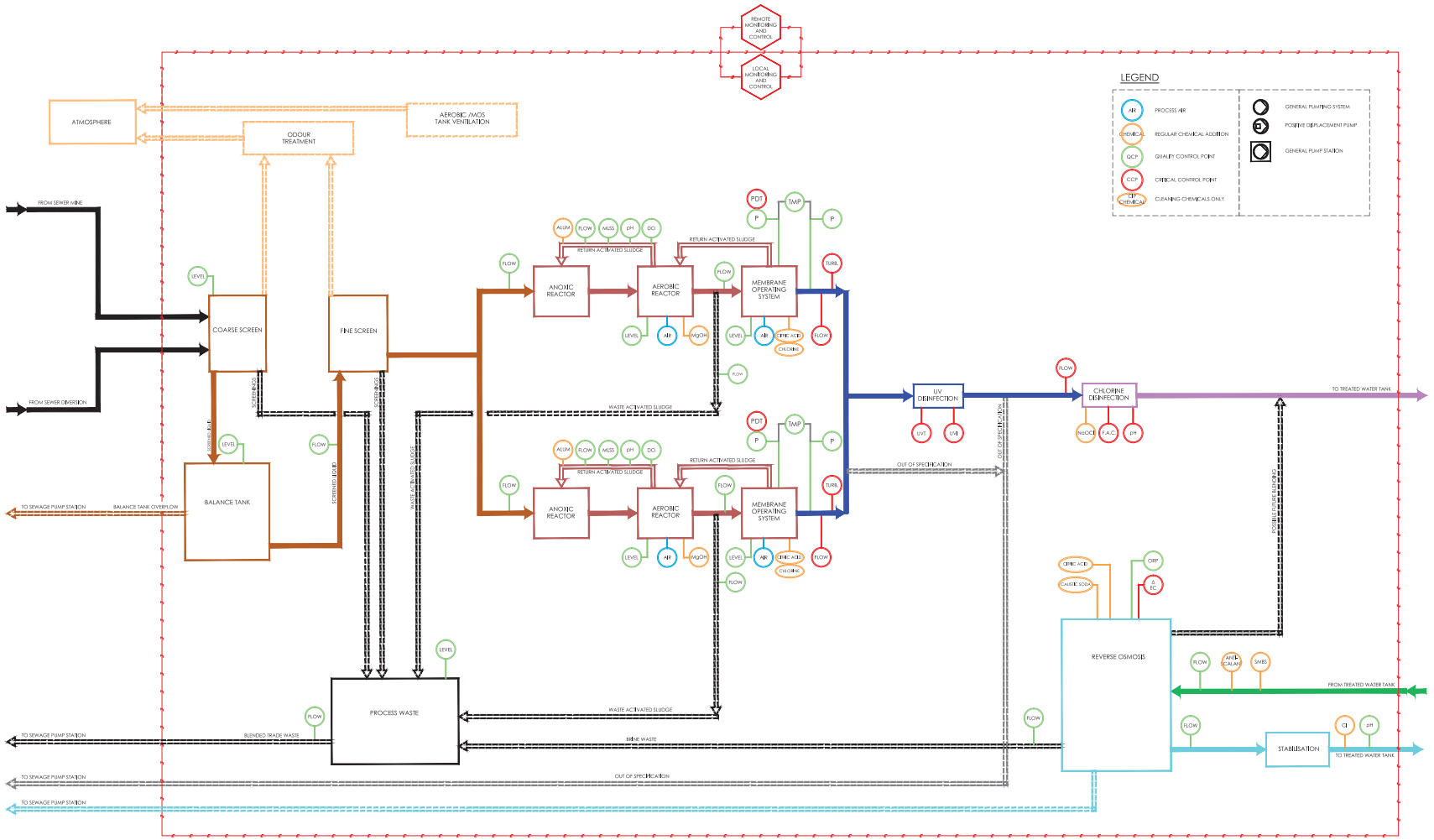
Title: RECYCLED WATER PLANT BLOCK FLOW DIAGRAM CATCHMENT

Drawn By	Date	Purpose	Approved By	Date
BDZ	25/10/2012		GSM	25/10/2012

Project No.	Site No., Drawing No.	Revision
5017	BB0_HSK_W_0015	B

B1

BARANGAROO RWP
BLOCK FLOW DIAGRAM - TREATMENT



PRELIMINARY

FOR INFORMATION

Rev.	Date	Revision Description	Date	Rev.	Date	Revision Description	Date
A		For Information	26/10/2012				

Lead Architects: RSHP Australia Pty Ltd, Ivan Harbour | Principal Architect, NSW ARB 6484, Sydney NSW 2000

Collaborating Architects: Land Lease; Graham W Jones | Principal Architect, Fitzpa NSW ARB 4005; ABN 97 008 088 162

Consultant:

Principal: Land Lease

Developer	Land Lease
Project Management & Construction	Land Lease
Design	Land Lease

30 The Bond 30 Hickson Road, Millers Point NSW 2000, www.landlease.com

Project: BARANGAROO SOUTH

Title: RECYCLED WATER PLANT BLOCK FLOW DIAGRAM PLANT

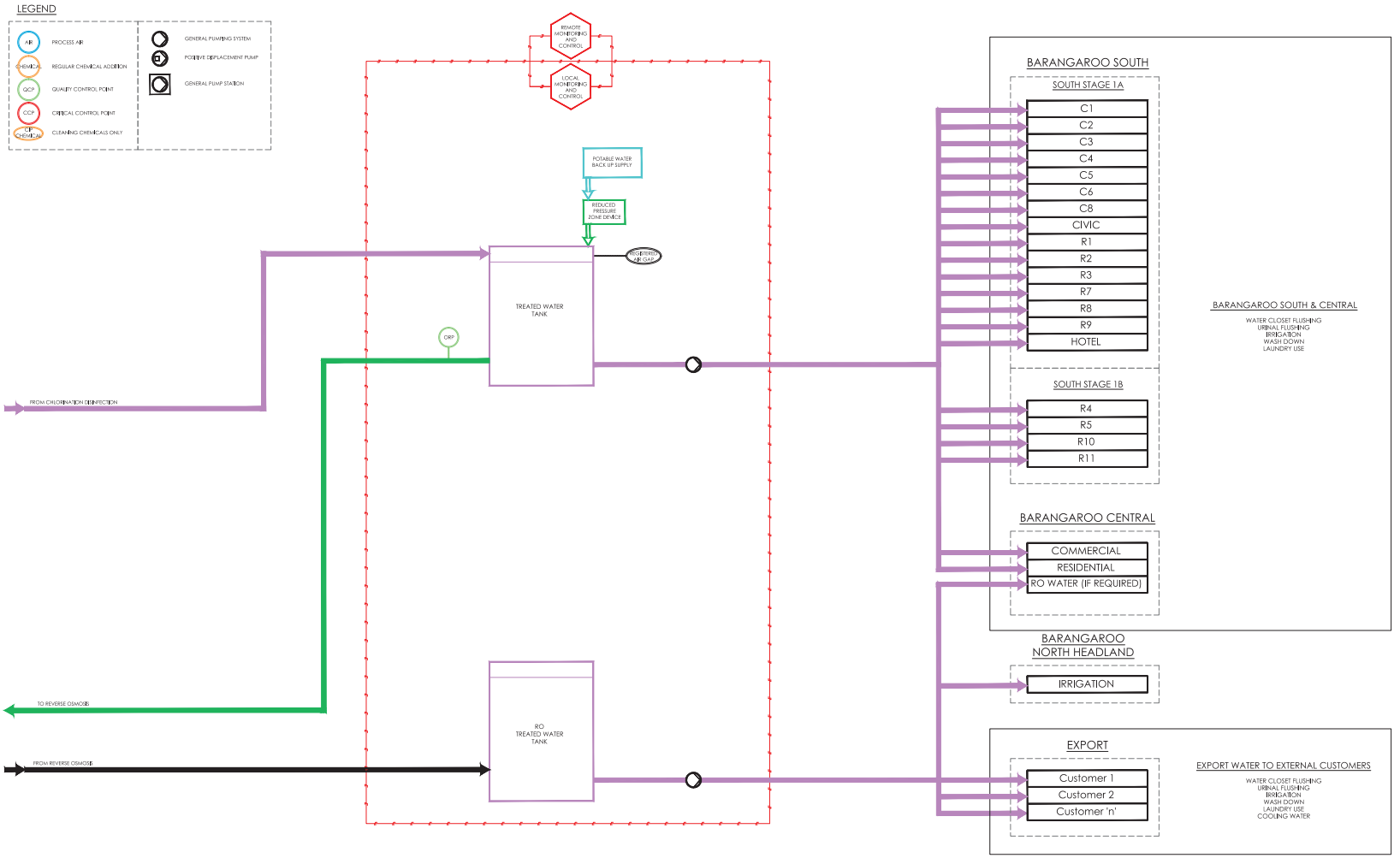
Drawn By	Date	Purpose	Approved By	Date
BSE	25/10/2012		GSM	25/10/2012

Scale:

Project No.	Site No.	Drawing No.	Revision
5017		BB0_HSK_W_0010	A

B1

BARANGAROO RWP
BLOCK FLOW DIAGRAM - DISTRIBUTION



PRELIMINARY

FOR INFORMATION

Key Plan

Rev.	Item	Revision Description	Date
B		Preliminary Issue	11/09/2012
A		For Information	26/10/2012

Lead Architects: RSHP Australia Pty Ltd
Ben Harbour | Principal Architect
NSW ARB 8484
Sydney NSW 2000

Collaborating Architects: Land Lease
Graham W Jones | Principal Architect
FRAIA NSW ARB 4005
ABN 97 008 088 162

Consultant

Principal: Land Lease

Developer	Land Lease
Project Management & Construction	Land Lease
Design	Land Lease

30 The Bond 30 Hickson Road
Millers Point NSW 2000
www.landlease.com

Project: BARANGAROO SOUTH

Title: RECYCLED WATER PLANT
BLOCK FLOW DIAGRAM
DISTRIBUTION

Drawn By	Date	Purpose	Approved By	Date
BDZ	25/10/2012		GSM	25/10/2012

Project No.	Site No., Drawing No.	Revision
5017	BB0_HSK_W_0017	B

B1

PUBLIC VERSION

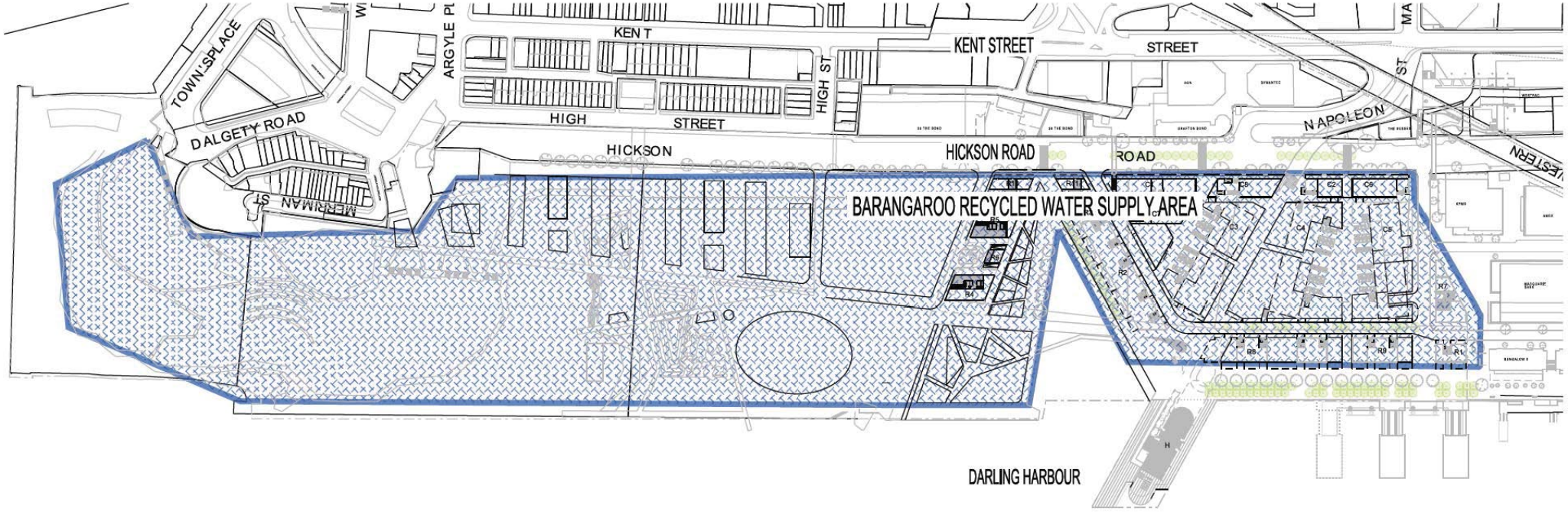
ATTACHMENT #6 – NON-POTABLE WATER – NETWORK DIAGRAMS

Includes

- Drawing BBO_HSK_W_002 – Non-potable Water – Network Diagram – Recycled Water Supply Area – Site
- Drawing BBO_HSK_W_005 – Non-potable Water – Network Diagram – Recycled Water Block Reticulation
- Drawing BBO_HSK_W_006 – Non-potable Water – Network Diagram – Recycled Water Block Flow Diagram
- Drawing BBO_HSK_W_007 – Non-potable Water – Network Diagram – Recycled Water Supply Area – Export
- Drawing BBO_HSK_W_008 – Site plan – Information on streets DP and lot numbers

Response to question

- 4.2.3



PRELIMINARY

FOR INFORMATION ONLY

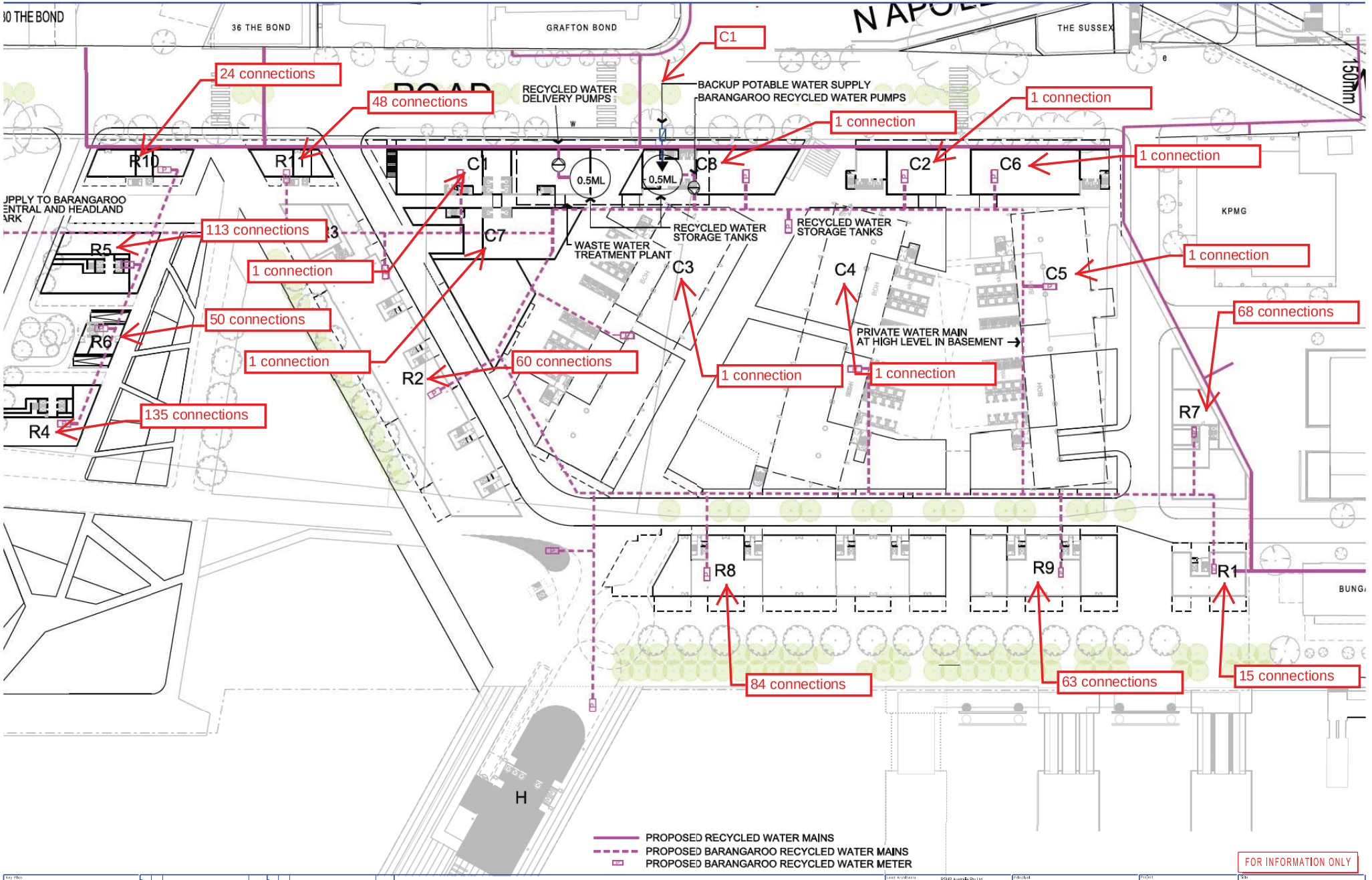
HYDRAULIC SERVICES
RECYCLED WATER SUPPLY AREA

SCALE : NOT APPLICABLE (NA)

Project No. 161010 | Bld No. BB0 | Drawing No. HSKW0002 | Revision 01

Lend Architects: RSHP Australia Pty Ltd
Collaborating Architects: Lend Lease
Consultant:
Principal: Lend Lease
Developer: Lend Lease
Project Management & Construction: Lend Lease
Design: Lend Lease
Project: BARANGAROO SOUTH
MP

B1



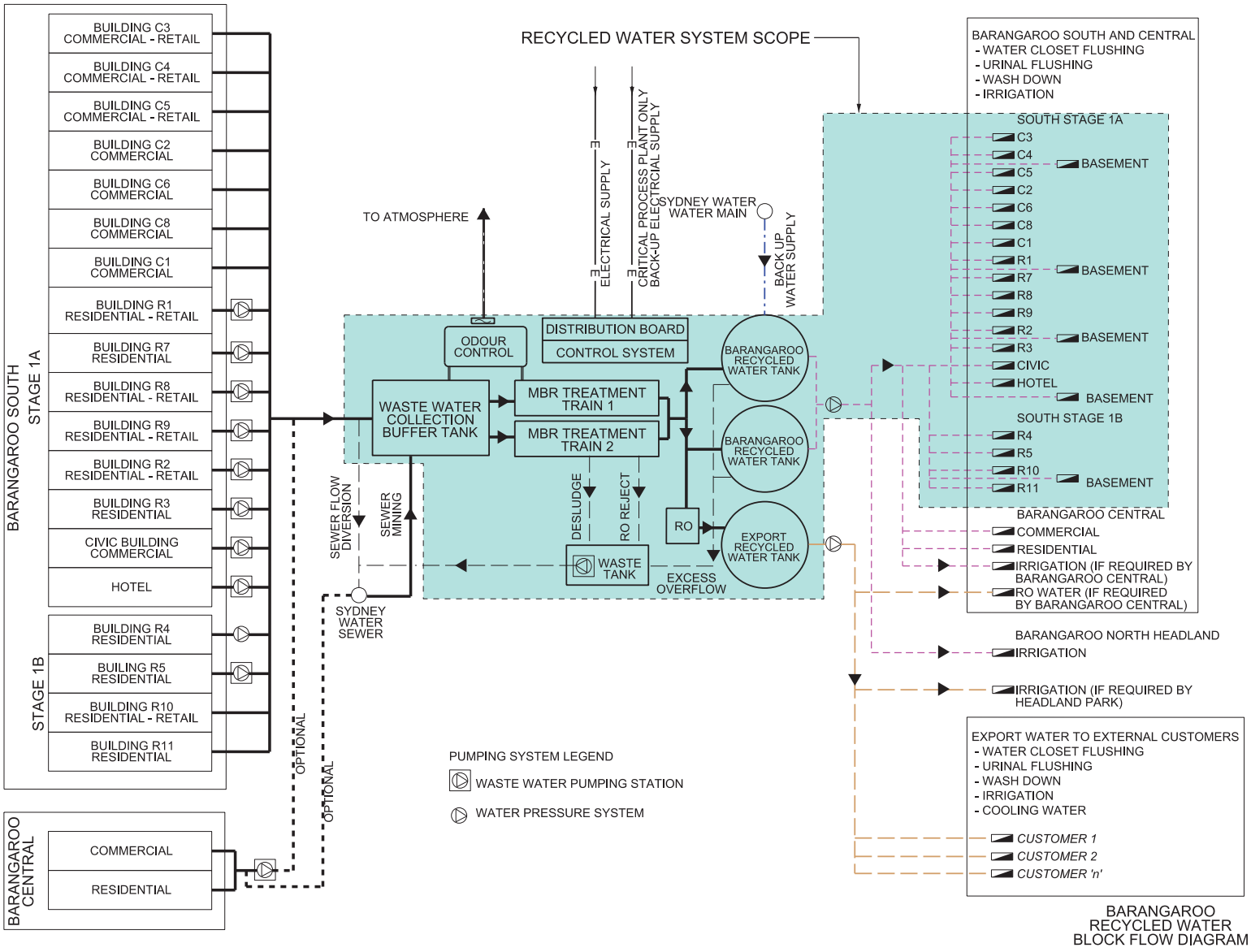
FOR INFORMATION ONLY

HYDRAULIC SERVICES
BARANGAROO CONCEPT
RECYCLED WATER MAINS

Lend Lease
BARANGAROO SOUTH
MP

Project No. 161010 | Site No., Drawing No. BB0 HSKW0005 | Revision 01

B1



BARANGAROO RECYCLED WATER BLOCK FLOW DIAGRAM

FOR INFORMATION ONLY

Lead Architects	RSHP Australia Pty Ltd	Principal	Lend Lee
Collaborating Architects	Lend Lee	Developer	Lend Lee
	Graham W Jones | Principal Architect	Project Management & Construction	Lend Lee
	ABN 97 000 098 162	Design	Lend Lee
Consultant	Lend Lee		
	ABN 97 000 098 162		

Project: BARANGAROO SOUTH

MP

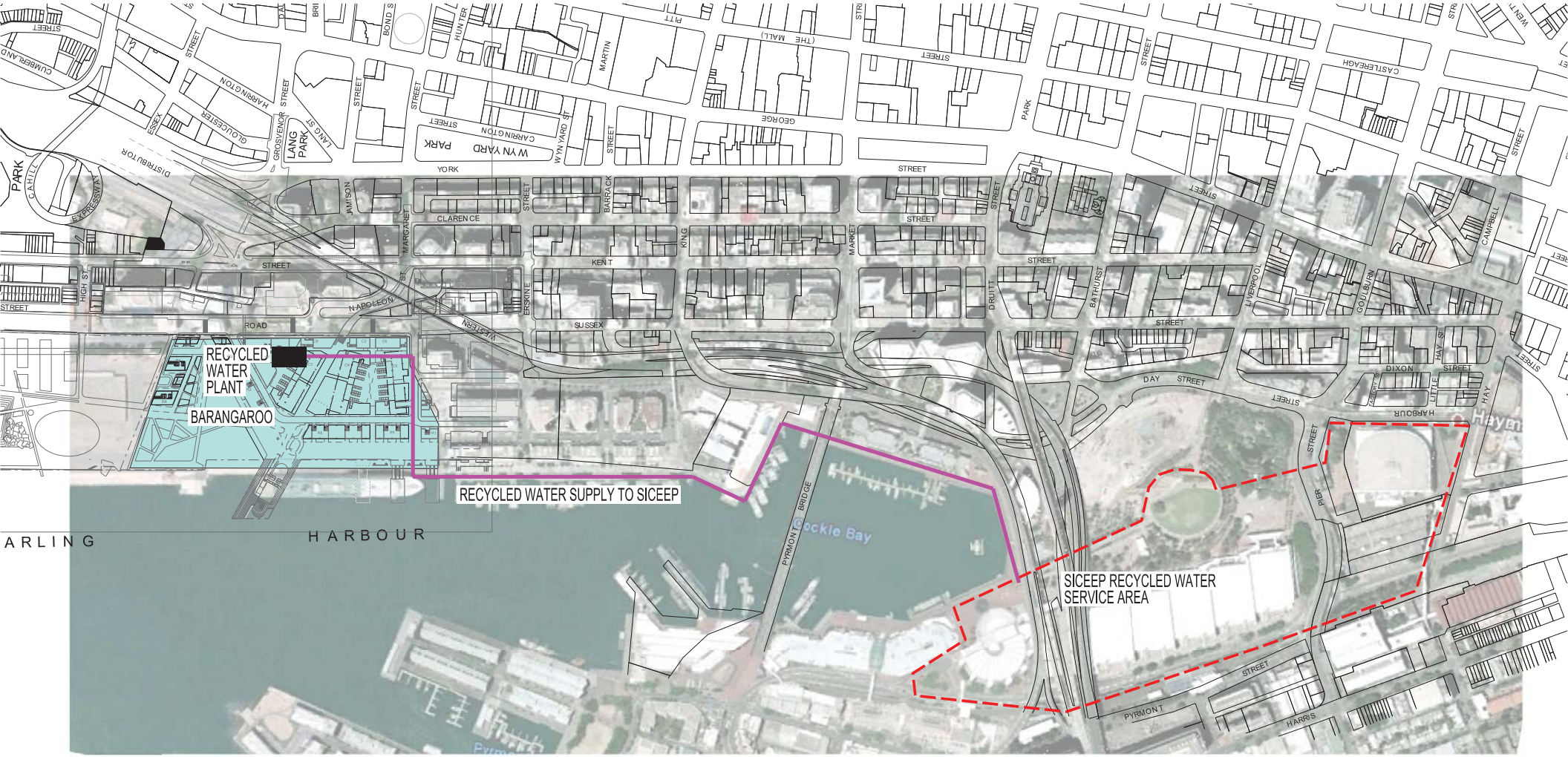
Title: HYDRAULIC SERVICES RECYCLED WATER BLOCK FLOW DIAGRAM

Drawn By	Date	Purpose	Approved By	Date

Project No.	Site No.	Drawing No.	Revision
161010	BB0	HSKW0006	01

Rev.	Date	Revision Description
01	-	ISSUED FOR INFORMATION

B1 If this drawing is printed or plotted at a size other than B1- DO NOT SCALE DIMENSIONS FROM DRAWING. Always take figured dimensions in preference to scaling.



PROPOSED RECYCLED WATER SUPPLY
SICEEP

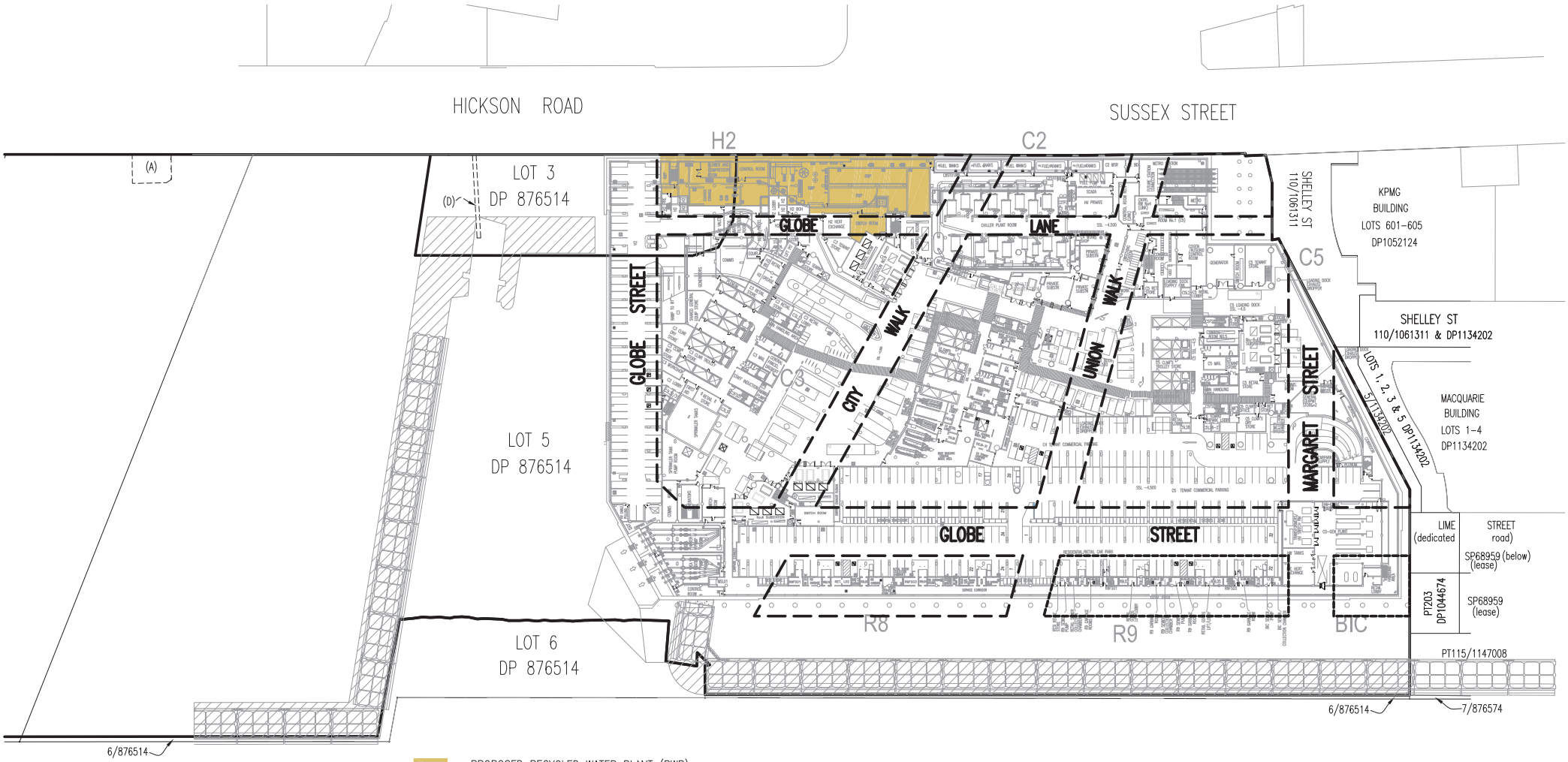
Drawing : BBO_HSK_W_0007

PLAN OF PROPOSED RECYCLED WATER PLAN LOCATION

BASEMENT 2 LEVEL

LGA SYDNEY

M.G.A. NORTH



PROPOSED RECYCLED WATER PLANT (RWP) LOT AT BASEMENT 2 LEVEL
RWP CURENTLY IS LOCATED WITHIN LOT 3 AND 5 IN DP 876514

DENOTES PODIUM LEVEL FOOTPRINT

DARLING HARBOUR
VOL. 5018 FOL. 1

DESIGN SHOWN BY THIS PLAN IS INDICATIVE ONLY AND SUBJECT TO FINAL APPROVALS AND MAY VARY.

(A) EASEMENT FOR SEWER PUMPING STATION VAR. WIDTH (DP1080540)
(D) EASEMENT FOR DRAINAGE 1.22 WIDE (J 23252 & DP106510)

REFERENCE FILE BB1 AD 0000008 REV 09

C:\GeoStrata Projects\1400 GeoStrata Projects\1400 Barangaroo\Stratum-Plans\1400 staging BDY B2-RWP.dwg

DRAWING BBO_HSK_W_008

SCALE 1:1250 AT A3
DATED 6-3-2013

PUBLIC VERSION

ATTACHMENT #9 – NON-POTABLE WATER – SYDNEY WATER TRADE WASTE POLICY DOCUMENTS

Includes

- Sydney Water – Consent to discharge industrial trade wastewater
- Sydney Water – Industrial customers trade waste management plan

Response to question

- 4.2.15

Sydney WATER

Consent to discharge industrial trade wastewater

Staple your consent here

General conditions

Recitals:

A. Under its Operating Licence, Sydney Water provides sewerage services and treats and disposes of trade wastewater. The objectives of Sydney Water include operating as an efficient business, maximising the net worth of the State's investment and exhibiting a sense of social responsibility by having regard to the interests of the community. Sydney Water has special objectives of reducing risks to human health and preventing degradation of the environment.

B. Sydney Water is granted by the Department of Environment and Climate Change licences subject to conditions to discharge pollutants.
A change to a licence condition may require that variations be made to a consent granted by Sydney Water.

C. In the conduct of its business operations, Sydney Water must comply with its obligations, duties and responsibilities under the Act and its Operating Licence and the Protection of the Environment Administration Act 1991, the Protection of the Environment Operations Act 1997 and the Protection of the Environment Operations (General) Regulation 1998.

D. The customer requests that Sydney Water grant consent to the customer for purposes of discharge of trade wastewater from the premises to the sewer.

Sydney Water grants to the customer consent to discharge trade wastewater, subject to the terms and conditions specified in this consent. The customer accepts the consent and agrees to be bound by the terms and conditions of this consent:

1. Definitions and interpretation

1.1 In this consent, unless the contrary intention appears;

Acceptance standards means Sydney Water's published concentration limits for certain substances in trade wastewater.

Act means the Sydney Water Act 1994.

Consent means this consent together with its attached schedules and appendices. Any definitions or standards referred to in this consent but not contained in it are deemed to form a part of this consent with necessary changes being made to accommodate their inclusion.

Authorised officer means:

- with respect to Sydney Water, the person from time to time holding the position pertained in schedule 9 or such other person or position as may be nominated by Sydney Water from time to time;
- with respect to the customer, the person identified, and includes the details specified, in schedule 9 or as may be notified to Sydney Water by the customer from time to time.

Breach means any contravention of or non-compliance with a term, condition or provision of this consent or the Act.

Chargeable trade waste mass means the mass of a pollutant subject to quality or critical substance charges.

Composite sample means a sample of trade wastewater obtained by combining equal volumes at either equal time or flow intervals.

Critical means the status of a substance determined in accordance with Sydney Water's Trade Waste Policy, 2007.

Critical mass charge means the charge applied to some critical and over capacity substances as calculated in accordance with the provisions set out in schedule 3.

Critical substance means a substance determined to be critical and notified from time to time by Sydney Water.

Customer means the party or parties (except Sydney Water) who executes or execute this consent.

Customer Service Representative means an officer of Sydney Water who is authorised to enter land or buildings for purposes of carrying out his or her duties in relation to Sydney Water's trade wastewater service.

Daily mass means the mass of a substance discharged during a 24-hour period.

Default notice means a notice issued in accordance with clause 8.1.

Department of Environment and Climate Change means the authority established in September 2007 incorporates the Environment Protection Authority, National Parks and Wildlife Service, Botanic Garden Trust and Resource NSW.

Domestic concentration means the concentration of a pollutant deemed by Sydney Water to be equivalent to that found in domestic wastewater.

Domestic wastewater means water which has in it human faecal matter, urine or refuse of any type produced in, and which is permitted to be discharged to a Sydney Water sewer from, any premises used exclusively for residential purposes.

Equivalent domestic mass means the mass of a substance that would be expected in the trade wastewater if it were at domestic concentration.

Flow weighted charge means the portion of a substance's charge for a billing period that is attributed to any sample collected in accordance with schedule 2 or, if such sample is required but is not collected, then fixed by Sydney Water in accordance with schedule 2.

Flow weighting factor means a factor used to determine charges as described in schedule 3.

Long term average daily mass means, for each pollutant, the figure listed in schedule 1 and used to determine critical mass charges as described in schedule 3.

Lower explosive limit means the minimum concentration of flammable and/or explosive substances that would result in a fire or explosion.

Mass discharged means the mass of a pollutant discharged on a sample day and is measured by multiplying the composite sample concentration by the trade wastewater discharge for that sample day.

Maximum daily mass means the greatest mass of a substance permitted for discharge within a 24-hour period.

Over capacity means the status of a substance as determined in accordance with Sydney Water's Trade Waste Policy, 2007.

Over capacity substance means a substance determined to be over capacity and notified from time to time by Sydney Water.

Premises means the land, plant and buildings described and specified in paragraph 1 of schedule 7, on or in which the customer carries on industrial or other commercial activities specified in paragraph 2 of schedule 7.

Quality charge means a pollutant charge applied to trade waste discharges based on the mass of each pollutant discharged to sewer.

Regulator means any statutory authority, which may grant permission, authority or licence to Sydney Water to operate the sewer or treat or dispose of sewage treatment by-products.

Residual products means biosolids, re-use water or such other product intended for re-use as may be developed by Sydney Water from time to time.

Risk index means a ranking applied to the consent by Sydney Water to describe the relative risk of accepting the trade wastewater. Determination of the risk index will be based on the methodology determined from time to time by Sydney Water, or as may be necessary in the opinion of Sydney Water to take into account particular circumstances. The risk index is used to determine, among other things, the amount of self-monitoring required, the number of inspections to be performed by Sydney Water, the annual consent fee and the term of the consent.

Sewer means the sewerage service of Sydney Water, including the sewage treatment plant, discharge to which is facilitated by a discharge point situated on the premises and specified in paragraph 3 of schedule 7.

Significant breach means any breach of a nature outlined at clause 15.2. Such breaches may result in immediate suspension or termination of the consent.

Standard mass charging rate means the charge per kilogram for substances as defined in schedule 3.

Sydney Water means Sydney Water Corporation.

Trade Waste Policy means Sydney Water's policy detailing the conditions under which Sydney Water will agree to accept trade wastewater to sewer.

Trade wastewater means any liquid and any substance in it that is produced in an industrial or commercial activity at the premises and discharged into the sewer, but does not include domestic wastewater.

Trade waste residue means any substance separated and retained, from trade wastewater being discharged into the sewer.

1.2 In this consent, unless the contrary intention appears:

(a) A reference to an Act or any delegated legislation or instrument made under an Act includes any other Act delegated legislation or instrument as may amend or replace any of them.

(b) A reference to a word or expression

(i) in the singular form includes a reference to the word or expression in the plural form; and

(ii) in the plural form includes a reference to the word or expression in the singular form.

(c) A reference to a party or a natural person includes a reference to a corporation.

(d) A word or expression that indicates one or more particular genders is taken to indicate every other gender.

(e) Headings to clauses and paragraphs are included in this consent to assist understanding of its terms and conditions but are not intended to affect the meaning or application of any term or condition.

(f) A reference to a clause, schedule or appendix is a reference to a clause of or schedule or appendix to this consent and any such schedule or appendix is a part of this consent.

1.3 Remedies available to the parties under this consent;

(a) are cumulative; and

(b) do not prejudice or affect any other remedy available to the parties.

1.4 No rule of construction applies to the disadvantage of a party because that party was responsible for the preparation of this consent or any part of it.

2. Application of certain statutes and laws

2.1 This consent is made under and is subject to the provisions of the Act.

2.2 This consent is governed by and will be performed according to the law applicable in the State of New South Wales.

2.3 Subject to the terms and conditions of this consent the customer;

(a) has lawful authority to dispose of trade wastewater for purposes of;

(i) Section 115 of the Protection of the Environment Operations Act 1997; and

(ii) Section 49 of the Act; and

(b) is exempt from the provisions of Section 120 of the Protection of the Environment Operations Act 1997 by virtue of the consent granted in clause 4.1 and, clause 55 of the Protection of the Environment Operations (General) Regulation 1998.

3. Commencement and term of consent

3.1 This consent commences on the date specified in paragraph 4 of schedule 7.

3.2 This consent will, unless terminated or renewed in accordance with this consent, continue for the period specified in paragraph 5 of schedule 7.

4. Discharge of trade wastewater into sewer

4.1 The customer may discharge trade wastewater from the premises into the sewer in accordance with the provisions of schedule 1 and schedule 4.

4.2 The customer must not discharge trade wastewater from the premises into the sewer contrary to the provisions of schedule 1 and schedule 4.

4.3 The customer indemnifies Sydney Water against all damages, losses, costs or expenses suffered or incurred by Sydney Water, caused by any unauthorised discharge from the premises in respect of:

(a) injury (including death) or harm to any person; or

(b) damage to property vested in Sydney Water; or

(c) contamination of residual products; or

(d) material harm to any sewage treatment process

provided that the said damages, losses, costs or expenses suffered or incurred by Sydney Water are caused by any unauthorised discharge of trade wastewater or other matter into the sewer by the customer which is in breach of this consent or by any other person from the customer's premises, except to the extent to which the damages, losses, costs or expenses (as the case my be) were caused by either the negligent or wilful act or omission of Sydney Water or a breach of this consent by Sydney Water.

4.4 The customer must take all precautions reasonably practicable to ensure that no person, other than a person acting for or on behalf of or with the consent of the customer, discharges any matter from the premises into the sewer.

4.5 For purposes of this consent, every discharge of matter from the premises into the sewer will be taken to have been a discharge by a person acting for or on behalf of, or with the consent of, the customer.

5. Charges

5.1 The customer must pay Sydney Water charges with respect to trade wastewater discharged to the sewer, the administration of this consent and, when applicable, the processing of grease trap waste determined in accordance with, and within the time and in the manner specified in, schedule 3.

5.2 Sydney Water may vary the basis of charges or the charging rates in schedule 3;

(a) as and when determined by the Independent Pricing and Regulatory Tribunal of New South Wales (IPART); or

(b) by written consent with the customer.

6. Inspections

6.1 A Customer Service Representative may enter the premises at any time;

(a) for purposes of inspecting whether the activities of the customer are being conducted in accordance with this consent; or

(b) for the purposes described in Section 38 of the Act or exercising any right or function conferred on Sydney Water under this consent.

This clause does not limit Sydney Water's statutory powers of entry.

6.2 When exercising rights under clause 6.1;

(a) a Customer Service Representative must not cause any delay or inconvenience to the efficient conduct of business activities by the customer which could be reasonably avoided; and

(b) except for any relevant safety precautions, a Customer Service Representative must not be impeded or delayed by any person on the premises.

6.3 If, in the opinion of Sydney Water, it is necessary for a Customer Service Representative to exercise rights under clause 6.1, the customer will make payment in accordance with the provisions of schedule 3.

7. Inquiries

7.1 Sydney Water may convene and determine the terms of reference of a joint inquiry about the circumstances relating to an incident that may have caused a breach.

7.2 An inquiry under clause 7.1 is to be conducted informally and without legal representation for purposes of gathering information about an incident directly from any person who may be expected to know, from his or her own observations, about the circumstances relating to the incident.

7.3 An inquiry under clause 7.1 may be conducted irrespective of whether the incident, the subject of the inquiry, is also the subject of a default notice.

7.4 Before conducting an inquiry under clause 7.1, the customer and Sydney Water may agree about what action, if any (except any action pursuant to a statutory obligation), may be taken with respect to any information that may be gathered during the inquiry.

8. Default procedures

8.1 If, in the opinion of Sydney Water, the customer commits, causes or allows a breach to occur, Sydney Water may issue to the customer a default notice.

8.2 A default notice must;

(a) provide any relevant particular of the breach alleged by Sydney Water, including any particular known to Sydney Water that may assist the customer to ascertain the alleged breach; and

(b) specify that the customer must provide a response in writing to Sydney Water within seven days of receipt of the notice.

8.3 A default notice is not invalid merely because it does not provide a particular that may assist the customer to ascertain the alleged breach.

8.4 Any supply to the customer by Sydney Water of particulars under clause 8.7(a) is taken, for purposes of clause 8.5, to be a default notice under clause 8.1.

8.5 The customer must supply to Sydney Water a written response to a default notice within seven days of receipt of the default notice which must;

(a) request further particulars of the alleged breach; or

(b) describe or explain the circumstances causing;

(i) the event which appeared to Sydney Water to be a breach; or

(ii) the breach to occur; and

(c) describe any action taken with respect to the alleged breach; and

(d) provide a plan of action to be taken by the customer to avoid the occurrence of any incident similar to the alleged breach; or

(e) explain the reasons of the customer for disputing the alleged breach.

8.6 The customer may make one request only for particulars under clause 8.5(a) with respect to a default notice.

8.7 When the customer responds in writing to Sydney Water in accordance with clause 8.5, Sydney Water must within seven days of receipt of that response either;

(a) with respect to clause 8.5(a), provide in writing to the customer any further particulars that it may be able to provide in which case the customer shall be allowed a further seven days from receipt of those particulars to respond as required by clause 8.5(b).

(b) specify to what extent it accepts, rejects or disagrees with the response under 8.5(b) and provide details of any action it proposes to take (including any special requirements it may impose) to deal with the breach.

8.8 The issue by Sydney Water of a default notice is without prejudice to any right or power Sydney Water may have pursuant to this consent or conferred on it by statute or statutory rule.

9. Improvement program

9.1 The customer must, at its own expense, establish and carry out the improvement program specified in, and in accordance with the provisions of, schedule 4.

9.2 If, prior to any failure to comply, the customer notifies Sydney Water that it may not be able to comply with any obligation under clause 9.1, Sydney Water will consider any reasonable proposal of the customer to vary a term or condition of the improvement program.

10. Diligence program

10.1 Within six months of the making of this consent, the customer must give a notice to Sydney Water specifying a current diligence program.

10.2 For purposes of clause 10.1, a diligence program includes a plan, whereby the customer demonstrates that the management of the customer is exercising reasonable care in planning and taking appropriate action, to prevent or minimise the effects of any incident that may constitute a breach.

11. Suspension of termination of consent to discharge trade wastewater

11.1 Sydney Water may suspend the consent granted in clause 4.1 if;

(a) the customer does not comply with clause 8.5, 9.1, 12.1, 12.2 or notice of the suspension is given to the customer; or

(b) Sydney Water is for any reason specified in clause 11.2 unable to accept for treatment trade wastewater that may be discharged by the customer.

11.2 Sydney Water may, by a notice given to the customer, suspend the consent granted in clause 4.1 if, in the reasonable opinion of Sydney Water;

(a) an emergency prevents the sewer from accepting any or certain specified categories of trade wastewater that may be discharged by the customer; or

(b) an event has occurred, which could have an adverse effect on any employee or agent of or contractor to Sydney Water or the sewer, including any biological process

whether the emergency or event is caused by fire, storm, tempest, flood, malicious damage, act of war, civil disobedience, explosion, earthquake or an act or omission of an employee, or agent of, or contractor to Sydney Water, or an unlawful discharge of matter into the sewer, or some other cause.

11.3 The period of any notice of suspension given under clause 11.2 will be no shorter than any period, which in the opinion of Sydney Water the circumstances dictate.

11.4 The customer must comply with any notice under clause 11.1 or 11.2 subject only to any delay that may be required to safeguard the health or life of any person.

11.5 Any suspension under clause 11.1 or 11.2 must not be for a period longer than, in the opinion of Sydney Water, the circumstances dictate.

11.6 If the customer does not cease discharging trade wastewater in accordance with a notice given under clause 11.1 or 11.2 and Sydney Water is of the opinion that the customer is not taking appropriate measures to stop the discharge, a Customer Service Representative may, with such other persons as he or she may think necessary, enter the premises and take such measures as he or she may think necessary to stop the discharge.

11.7 A suspension under clause 11.1 or 11.2 or any action that may be taken in accordance with clause 11.6 does not give rise to any remedy to the customer against Sydney Water for, or in respect of, the suspension or action.

11.8 Any costs incurred by Sydney Water with regard to taking action under clause 11.6 is a debt payable to Sydney Water by the customer on demand made by Sydney Water.

11.9 Sydney Water may suspend the consent granted in clause 4.1 if; the discharge of trade wastewater by the customer in accordance with the consent granted under clause 4.1, by itself or in conjunction with the discharges of other persons is likely, in the opinion of Sydney Water, to cause Sydney Water to contravene any legislation, permission, authority or licence granted by a regulator, or any other regulatory authority.

11.10 Any suspension under clause 11.9 must be terminated as soon as Sydney Water is reasonably satisfied that the conditions giving rise to the suspension no longer exist.

11.11 If the customer and Sydney Water cannot agree in accordance with clause 11.10, they will initiate and attend discussions with the regulator to resolve any relevant matter.

11.12 If, after discussions under clause 11.11 the customer and Sydney Water fail to agree in accordance with clause 11.10, the consent granted in clause 4.1 may be terminated by Sydney Water.

11.13 Without limitation of the effect of any other clause in this consent, Sydney Water may terminate or suspend the customer's permission to discharge trade wastewater immediately by written notice to the customer, if in the opinion of Sydney Water the customer's discharge of trade wastewater is in breach of this consent and is likely to cause;

(a) Sydney Water's contravention of the condition of any licence issued to it by the Department of Environment and Climate Change; or

(b) the failure to meet a product specification of any of Sydney Water's residual products.

(c) Sydney Water to breach or fail to comply with any legislation.

11.14 A suspension under clause 11.9 or 11.13 in accordance with the terms of this consent or a termination under clause 11.12 or 11.13 in accordance with the terms of this consent does not give rise to any remedy to the customer against Sydney Water for or in respect of the suspension or termination.

11.15 Without limitation of the effect on any other clause in this consent, Sydney Water may terminate or suspend the customer's consent to discharge trade wastewater immediately by written notice served on the customer in accordance with Section 100 of the Act, on the occurrence of any one of the following events;

(a) The customer fails to pay to Sydney Water any amount due and payable under this consent within twenty-one days of the due date for payment and such payment is not made within fourteen days of a written request from Sydney Water to do so.

(b) The customer is in breach of the consent and is unable or unwilling to remedy the breach of consent as required by Sydney Water.

The customer acknowledges and agrees that if, following the termination of the consent, it continues to discharge trade wastewater into the sewer, a Customer Service Representative may enter the customer's premises and take all reasonable necessary steps to stop the customer's continued discharge of trade wastewater to the sewer. The right of entry conferred by this clause is in addition to, and not in substitution for, any power of entry conferred on Sydney Water by the Act.

12. Supply of information

12.1 Any information supplied by the customer to Sydney Water for purposes of making this consent or for any purpose of this consent must as far as reasonably possible be a true and complete disclosure by the customer for purposes of enabling Sydney Water to;

(a) determine whether to grant the consent in clause 4.1; and

(b) determine whether there has been any breach of this consent.

12.2 The customer must not, in or in connection with a document supplied to Sydney Water for purposes of making this consent or for any purpose of this consent, furnish information, which is false or misleading in a material particular with regard to the trade wastewater to be discharged to the sewer.

12.3 Sydney Water must not disclose any confidential information obtained in connection with the administration or execution of this consent, unless that disclosure is made;

(a) with the consent in writing of the customer

(b) with other lawful excuse.

13. Sampling

13.1 For purposes of this consent, schedule 2 specifies sampling and analysis criteria, flow rates and volume determinations of trade wastewater to be discharged or discharged under clause 4.1.

13.2 A Customer Service Representative may take as many samples of trade wastewater at any point in any

production process or storage facility, or at any other point on the premises, as he or she thinks fit.

13.3 The customer must comply with the provisions of schedule 2.

14. Apparatus, plant and equipment for recording or treating trade wastewater

14.1 The customer must, at its own cost, provide, operate and maintain in an effective and efficient working order, the apparatus, plant and equipment described in schedule 5 for purposes of regulating, treating, determining and measuring the quality, quantity and rate of discharge of trade wastewater under clause 4.1.

14.2 Sydney Water may require the customer to use its discretion to formulate and take such additional actions as may be appropriate to achieve the objects which, in the opinion of Sydney Water, are necessary for the customer to regulate, treat, determine or measure trade wastewater for purposes of discharge under clause 4.1.

14.3 The customer must, at its own costs, maintain records in such manner as may be required by Sydney Water, of all measurements, sampling and results obtained in the course of treatment and discharge of trade wastewater under clause 4.1.

14.4 The customer must submit to Sydney Water documents containing records of results specified in schedule 2.

14.5 The customer must maintain records of particulars and dates of cleaning and maintaining all apparatus, plant and equipment described in schedule 5 and particulars, dates and method of disposal of trade waste residue from such apparatus, plant and equipment.

14.6 The customer acknowledges that Sydney Water does not approve or warrant that any apparatus, plant or equipment used by the customer is sufficient for purposes of processing or treating trade wastewater for discharge under clause 4.1.

15. Variation and renewal of consent

15.1 Before varying, substituting or adding any process conducted or to be conducted on the premises that may cause the volume, rate or quality of wastewater discharged to change from that agreed under schedule 1 and schedule 4, the customer shall give Sydney Water not less than 14 days written notice of its intention. Any variation, substitution or addition shall only be conducted after receipt of written approval to same and subject to any conditions (including any requirement to vary the terms of this consent) that Sydney Water may impose.

15.2 Sydney Water may vary the terms of this consent where:

(a) Sydney Water alleges a single significant breach or three breaches, of the same nature, to have occurred in a six month period; or

(b) in the opinion of Sydney Water, a substantial or material part of any plan of action under clause 8.5(d) may not be completed for a period exceeding 90 days; or

(c) the customer gives Sydney Water notice under clause 15.1.

For the purposes of this clause and without limitation, the following circumstances shall be regarded as being a single significant breach:

(i) an activity or event that could adversely affect; the health and safety of any employee, agent or contractor to Sydney Water, the integrity of Sydney Water assets or the viability of any of Sydney Water's treatment processes or products; or

(ii) failure to achieve effluent improvement program milestone; or

(iii) failure to install pre-treatment; or

(iv) by-pass pre-treatment and/or installation of equipment that facilitates by-pass of pre-treatment; or

(v) flow-meter turned off or bypassed.

15.3 A renewal of this consent may be initiated by the customer:

(a) not less than two months before the date of expiration of this consent, and

(b) not more than six months before the date of expiration of this consent.

15.4 If this consent remains current immediately prior to the expiration of the term detailed in 3.2, or any subsequent terms renewed in accordance with this clause, and:

(a) the customer has not given notice in accordance with clause 20.1 of this consent and;

(b) Sydney Water has not given to the customer at least 30 days notice prior to the expiration of this consent, of its intention to permit the consent to expire in accordance with clause 3.2

Then this consent shall be deemed to be renewed immediately following its expiration, for a further period of six months.

15.5 Any amended schedules that Sydney Water prepares in response to a variation or renewal will be taken to be incorporated into this consent;

(a) on execution by the customer; or

(b) after 14 days of receipt by the customer of the notice of the variation or renewal.

15.6 The notification of alterations to the critical status of any pollutants does not constitute a variation.

16. Disposal of trade waste residue

The customer must not dispose of any trade waste residue, except in accordance with the requirements of the Department of Environment and Climate Change.

17. Disposal of grease trap wastes

The customer must not dispose of grease trap

wastes other than in accordance with Sydney Water's 'Wastesafe' Management System.

18. This consent comprises all applicable terms and conditions

18.1 The provisions of this consent comprise all of the applicable terms and conditions between the parties.

18.2 It is declared by the parties that no further or other promises or provisions are, or will be claimed to be implied, or to arise between the parties by way of collateral or other agreement by reason of any promise, representation, warranty or undertaking given or made by any party (or its agent) to another, on or prior to the execution of this deed, and the existence of any such implication or collateral or other agreement, is hereby negated by the parties.

18.3 Clauses 18.1 and 18.2 do not prejudice the ability of the parties to vary or amend this consent in accordance with the provisions of this consent or by a further consent in writing.

19. No transfer or assignment

The customer cannot transfer or assign the consent granted in clause 4.1 nor any other right or obligation the customer has or may have under this consent, without the prior consent in writing of Sydney Water.

20. Termination of consent by customer

20.1 Termination of this consent may be effected by the customer upon the giving of at least 30 days notice in writing to Sydney Water. The notice must state the date on which this consent terminates.

20.2 The customer is bound by the provisions of this consent with regard to any discharge of trade wastewater into the sewer from the premises, including the payment of charges under clause 5.1, from the commencement of this consent until its termination.

Sydney Water Corporation
ABN 49 776 225 038
PO Box 974, Parramatta NSW 2124
Phone: 13 20 92

20.3 Notwithstanding provisions contained elsewhere in this consent the parties may terminate this consent in writing by mutual agreement provided the parties enter into a further trade waste consent immediately following termination of this consent.

21. Notices and communications

21.1 A notice or communication under this consent must be in writing.

21.2 For purposes of clause 21.1, a notice or communication may;

(a) be left at the address of the addressee; or

(b) be sent by prepaid ordinary post to the address of the addressee; or

(c) sent by facsimile transmission to the facsimile number of the addressee

(d) sent by email to the email address of the addressee

as specified in schedule 8 or such other address as may be notified by the addressee to the other party.

21.3 Unless a later time is specified in it, a notice or communication takes effect from the time it is received.

21.4 Unless the contrary is shown, for purposes of clause 21.3, if a notice or communication is;

(a) a letter sent by pre-paid post, it will be taken to have been received on the third day after posting; or

(b) a facsimile, it will be taken to have been received on receipt by the sender, of the written or oral advice of the addressee that the whole of the facsimile transmission has been received by the addressee in a form that is legible.

22. Miscellaneous

Each party must act in good faith in the implementation of this consent and, without limiting the scope of this obligation, must also seek to resolve any difference or dispute between them as to the consent in good faith.

23. Entire consent

This consent constitutes the entire agreement between the parties in relation to its subject matter. No understanding, arrangement or provision not expressly set out in this consent will bind the parties. Accordingly all correspondence, negotiations and other communications between the parties in relation to the subject matter of this consent that precede this consent are superseded by and merged in it.

Note: This consent has no effect until it is executed for and on behalf of Sydney Water Corporation.

Contact us

To know more
sydneywater.com.au
or call 13 20 92

Postal address

Sydney Water
PO Box 974
Parramatta NSW 2124

Sydney Water
ABN 49 776 225 038

SW212 02/10
CICS0161

Industrial customers

Trade waste management plan

The *Trade waste management plan* for industrial customers explains Sydney Water's *Trade Waste Policy* for industrial customers. You should read this document together with our *Trade Waste Policy*.

Customers can not discharge trade wastewater to any of Sydney Water's sewerage systems without written permission from Sydney Water.

Accepting trade wastewater to the sewer presents Sydney Water with operational, environmental and safety risks. Sydney Water has developed a risk assessment process that is applied to all industrial customers to determine the degree of risk in accepting trade wastewater to the sewer. We assess each request to discharge trade wastewater to the sewer, to determine whether the wastewater can be safely accepted, transported and treated by the respective sewerage system. If the wastewater is NOT acceptable for discharge to Sydney Water's sewerage system, we will notify the customer in writing.

Risk index

We will review each customer's application and assign a risk index to trade wastewater that is acceptable for discharge to Sydney Water's sewerage system. The risk index considers the:

- maximum volume of trade wastewater discharged by the customer
- capacity of the receiving transportation system and sewage treatment plant
- substances discharged
- customer's compliance history
- activity factor for the highest risk process being conducted on-site.

The risk index ranges from 1 to 7, where a risk index of 1 presents the highest risk and a risk index of 7 the lowest risk to Sydney Water. The process for determining the risk index is described in the fact sheet *Risk index and risk factor formula* at sydneywater.com.au.

The risk index determines the duration of the consent and frequency of ongoing monitoring by inspection, sampling and analysis. It also determines the annual agreement fees that apply to the customer. These fees are identified in the fact sheet *Trade wastewater fees and charges for industrial customers* at sydneywater.com.au.

Risk index	Agreement duration (years)	Routine inspections each year by Sydney Water	Sample frequency days	Composite samples each year	Minimum samples in first four months of conditional consent
1	1	52	1	365	120
2	1	52	2	182	60
3	1	26	4	90	30
4	2	13	8	45	15
5	2	5	22	16	8
6	4	4	60	6	8
7	4	2	90	4	8

Consent to discharge industrial trade wastewater

Conditional consent

When Sydney Water approves an industrial trade waste application, we grant the customer a conditional consent for up to twelve months from the date the consent commenced. The conditional consent details the sampling program the customer must complete and outlines their obligation to manage the trade wastewater discharge effectively.

The conditional consent period allows both the customer and Sydney Water to gather information required for a full consent. The sampling and inspection requirement for a new discharger will be determined according to the assessed risk. See the *Risk index table* for the minimum number of samples to be collected in the first four months.

Full consent to discharge industrial trade wastewater

Before the conditional consent term ends, Sydney Water and the customer will negotiate a full consent. A customer with a conditional consent is not guaranteed a full consent. Sydney Water will not issue a full consent if the customer's discharge poses an unacceptable risk to Sydney Water.

If Sydney Water requires a customer to undergo a site or effluent improvement program, we will only grant a full consent for the term of the effluent improvement program and for no longer than the maximum period in the risk index.

Managing discharges to the sewer

Generally, a customer's self-monitoring of trade wastewater discharged under an industrial consent, will be based on discrete and composite samples collected on specified production days.

Discrete samples are an instantaneous grab sample of trade wastewater. Composite samples are trade wastewater samples collected flow proportionally or time-based over 24 hours or a production day.

If the composite sample result exceeds the acceptance standard, a breach has occurred and Sydney Water will impose additional charges. The sample results will also contribute to the customer's performance history, which is used to calculate the risk index.

Sydney Water may collect composite or discrete samples for monitoring purposes on any day, or collect a duplicate sample held by the customer for this purpose, as specified in the industrial consent. This sample may also be used for breaching and charging purposes and will contribute towards the risk index calculation.

Consents for substances with safety implications may include a program for collecting and analysing discrete samples. Safety substances include, but are not limited to ammonia, benzene, bromine, cyanide, formaldehyde, petroleum hydrocarbons, volatile halocarbons and sulphide. For a full list of safety substances, refer to the *Acceptance standards and charging rates* fact sheet at sydneywater.com.au.

Breaches of consent or conditional consent

A breach of the consent or conditional consent is deemed to occur if Sydney Water finds the customer has broken any of the terms or conditions in the consent or conditional consent.

Breaches can be classified as 'significant' or 'notable'.

Significant breaches present a safety risk to Sydney Water workers or affect Sydney Water's ability to transport or treat wastewater.

When significant breaches occur, Sydney Water will issue a written breach notice to the customer. Sydney Water may issue a breach notice on-the-spot during an inspection, or as a default notice.

The customer must respond by identifying the cause(s) of the breach and the action(s) taken to prevent a recurrence. If the customer fails to adequately respond to a breach notice Sydney Water may suspend their consent to discharge trade wastewater.

Significant breaches may result in a variation to the trade waste consent.

Examples of significant breaches include, but are not limited to:

- exceeding an acceptance standard of a safety substance in either a composite or discrete sampling
- exceeding an acceptance standard for any substance, three or more times in less than six months, either in composite or discrete sampling
- failing to achieve an effluent improvement program milestone date
- failing to install a pre-treatment system
- wastewater bypassing pre-treatment system
- wastewater bypassing discharge meter
- installing equipment to bypass pre-treatment system
- installing equipment to bypass discharge meter
- exceeding maximum instantaneous flow rate
- exceeding maximum daily flow
- exceeding maximum daily mass
- exceeding maximum temperature
- having pH significantly outside acceptable range
- failing to comply with the agreed operating procedure for the radiation delay tank system
- exceeding five per cent lower explosive limit (LEL)
- discharging any substance not included in the consent
- having unsafe or no access to discharge meter, pre-treatment or sampling point
- having a faulty or inoperative discharge meter
- discharging excessive gross solids
- discharging excessive fibrous material
- the presence of discrete oil, fat or grease
- having insufficient or compromised bunding or storage, where there is an immediate risk to the sewer
- use of hexavalent chromium (Cr6+) in cooling towers without approval
- installing pre-treatment, vents, lids and associated equipment incorrectly

- failing to comply with rainwater controls
- failing to provide the minimum number of sample results
- failing to maintain or calibrate equipment used for monitoring
- failing to sample as specified in the sampling program.

Notable breaches are less serious than significant breaches and do not present an immediate risk to Sydney Water workers, *Operating Licence* or ability to transport, treat or reuse wastewater or biosolids.

Notable breaches do not usually result in written notification, but are recorded and discussed at regular meetings with the customer.

Sydney Water may record notable breaches for any of the following reasons:

- minor exceedance of temperature
- not calibrating the discharge meter at 12 month intervals or as directed by Sydney Water
- not having adequate bunding or storage
- exceeding a non safety acceptance standard once or by a small degree
- exceeding the maximum instantaneous flow rate
- inadequately operating or maintaining pre-treatment equipment
- not maintaining or calibrating rainwater controls

Three notable breaches in six months may initiate a variation to the trade waste consent.

* In systems or sub-systems declared as corrosion impacted, any pH or temperature breach will be considered a 'significant breach' by Sydney Water.

Safety substances

Discharging at a concentration that exceeds the acceptance standard for a safety substance, as measured by discrete or composite sampling, will constitute a significant breach.

If a customer becomes aware that his/ her trade waste discharge may exceed any safety acceptance standard, the customer must immediately notify Sydney Water.

Sydney Water may direct the customer to cease discharging to the sewer, until the issue is fixed.

Concentration breaches

Any substance discharged at a concentration that exceeds the acceptance standards, as measured by composite sampling, will attract mass charges at double the standard rate for that sample day. For minor breaches of concentration, a notable breach is recorded. The doubled charge serves as notice to the customer that the breach has occurred.

Concentration breaches and breaches of pH and temperature contribute to the risk index factors that Sydney Water uses to calculate the risk index. These risk index factors are the performance history factor (P) and the historical incident factor (H):

P is based on the number of breaches of acceptance standards

H is based on the severity of breaches of acceptance standards.

Sydney Water recalculates the risk index when a consent is renewed or varied. The quarterly fees are automatically adjusted for the next consent term of one, two or four years. Sydney Water may recalculate the risk index at any time. Customers can ask for the risk index to be recalculated once every six months, if they have a valid reason.

To know more, refer to the fact sheet *Risk index and risk factor formula* at sydneywater.com.au

Default on sampling

Industrial customers must collect samples for analysis under their trade waste consents. Sydney Water calculates mass-based quality charges from the results of composite samples and their measured or estimated flow.

Where customers fail to collect and analyse samples as set out in their consent, Sydney Water will use the highest composite concentrations recorded in the previous year in lieu of the missing samples. Failure to provide samples also attracts a significant breach notice.

If Sydney Water determines that the customer is in breach of the consent or conditional consent, the default notice procedure will apply. Complete details of default notice procedures are outlined in individual consent documents.

In all breach cases the customer must respond to the notification within seven days and ensure that appropriate actions have been taken to rectify the problem to ensure that the breach does not recur.

If the problem persists or is likely to re-occur, Sydney Water will require the customer to submit and complete a suitable effluent improvement program. (See section on effluent improvement program.)

Suspending consents

Sydney Water may suspend a customer's consent to discharge trade wastewater if the wastewater poses a potential threat to Sydney Water staff and contractors, sewage treatment systems, processes, or the environment. Sydney Water will decide how long the suspension will be, depending on the seriousness of the breach.

If a Sydney Water representative believes there is an immediate safety risk to staff or the operation of the sewerage system, he or she may direct the customer to stop discharge to sewer immediately, to ensure the risk is minimised. This initial verbal notification will be followed by written confirmation.

The customer must immediately comply and cease discharge to sewer. If the customer fails to comply, Sydney Water may physically disconnect the trade waste service for the property and/or restrict the water supply.

Terminating consent to discharge

If the problem isn't resolved within a reasonable time, Sydney Water will cancel the consent and discharge to the sewer must cease. Under the *Sydney Water Act 1994*, the customer may be liable for prosecution if he/she doesn't stop discharging to the sewer as directed. Penalties under other New South Wales legislation may also apply.

Prosecution

Under the *Sydney Water Act 1994*, a customer or any other person may be prosecuted for any breach of the Act or the terms and conditions in the consent, or any of the quality or quantity standards relating to the discharge of trade wastewater to a Sydney Water asset. Maximum penalties are outlined in the Act. Penalties under other New South Wales environmental legislation may also apply.

Determining discharge volume

The rates and volumes of trade wastewater discharged into Sydney Water's sewer, under a consent or conditional consent, are determined as follows:

All industrial consents require the customer to provide an approved flow measurement device, including Amphenol plugs, and instruments to display the instantaneous flow rate in litres per second and total volume in kilolitres on a continuous basis. The pulses generated by the flowmeter should trigger automatic collection of flow based composite samples.

Where water is imported to the site or comes from sources other than Sydney Water's water supply system, eg bore water, rainwater or groundwater, the customer must provide an approved flow measurement device, including Amphenol plugs and instruments to display the instantaneous flow rate in litres per second and the total volume in kilolitres on a continuous basis

In all cases the flowmeter must be installed after the final stage of the pre-treatment plant and before the point of connection of domestic waste streams.

Calibrating discharge flow meters

Flow meters must be calibrated in situ at least once a year, and the calibration certificate submitted to Sydney Water within seven days.

The calibration certificate must include the NATA accreditation number of the service provider as well as the make, model and serial number of the flow meter.

Service providers without ISO 17025 General requirements for the competence of testing and calibration laboratories (basis for NATA accreditation) or NATA accreditation must obtain this by 30 June 2011.

To know more about discharge flow meters, refer to the *Flow measurement guidelines* at sydneywater.com.au.

Determining discharge quality

The quality of trade wastewater discharged to the sewer under any consent, must be analysed by a NATA accredited laboratory in accordance with Sydney Water's published methods. The samples must be taken at the agreed discharge point, upstream of the boundary trap before entering the sewer.

Industrial customers must arrange collection and analysis of samples of their own trade wastewater as specified in their consent or conditional consent. Where a discharge meter is installed, Amphenol plugs are required for flow proportional composite sampling, using an automatic sampler. The risk index will determine sample frequency.

Sydney Water will also audit all aspects of the trade wastewater discharge under the terms of the consent, both by duplicate analysis and by independent automatic composite sampling.

Under this management plan, self monitoring of trade wastewater will generally be based on daily flow proportional composite samples, collected on all production days. Sydney Water may collect a daily composite sample for monitoring purposes on any day, or collect a duplicate sample held by the customer for this purpose, as specified in the industrial consent. Sydney Water uses these daily composite samples to determine trade waste quality charges, for breach purposes or to calculate the risk index.

Customers who discharge trade wastewater that presents a safety risk to Sydney Water are also required to collect and analyse discrete samples on production days. Sydney Water may collect duplicate discrete samples for monitoring purposes at any time, on any day.

Sampling location

The agreed sampling point for determining discharge quality should be at a safe, acceptable location. Within practical limitations, the sampling point must include all trade waste streams generated on-site and exclude domestic wastewater. Access to Amphenol-type plugs must be available no more than five metres from the sampling point. The sampling point and flowmeter must be after any diversion back to pre-treatment.

Online monitoring

Online monitoring is any type of continuous measurement of a substance in a customer's wastewater discharge. Where required by Sydney Water, the measured data must be downloadable to a secure website that Sydney Water can access. If the monitored substance reaches unsafe levels, an alarm must be generated to inform Sydney Water and the customer that the discharge does not comply and may present a risk to Sydney Water.

Customers may need to install and maintain online monitoring equipment when:

- they discharge trade wastewater containing substances that are a safety risk
- they have a poor compliance history
- non- compliance (of the volume or type of wastewater discharged) will present an immediate and significant risk to the environment, worker safety, or the transport, treatment and/or reuse of wastewater
- they cannot demonstrate compliance with regard to flammable substances and must install a lower explosive limit (LEL) meter.

Online monitoring may be required at other times and customers may elect to implement online monitoring of their trade wastewater as an alternative to the standard prescribed composite and discrete sampling programs.

In all cases, the customer must supply, maintain and calibrate the instruments. Exceeding the acceptance standard must generate alarms and automatically prevent further discharge of wastewater to Sydney Water's sewer. The customer may also need to provide remote access to the data through a third party website. In these cases the customer may qualify for a reduction in trade waste agreement fees, if the customer installs the remote telemetry unit, provides Sydney Water with access to the data and monitors the substances required by Sydney Water.

Sydney Water may also monitor a customer's site using online monitoring. The results may be used to issue a non-compliance notice or to request an improvement program.

To know more about online monitoring refer to the *Online monitoring* fact sheet at sydneywater.com.au

Critical and over capacity substances

The capacity of Sydney Water's systems to accept and treat specific substances from trade wastewater discharges may become limited due to increased development within the catchment, changed environmental regulations, health and safety requirements, reuse of the wastewater, or operational restrictions.

Sydney Water has developed a biosolids, effluent quality and sewer capacity model and runs this model yearly, to assess the impact of accepting trade wastewater at each sewerage system following the critical substance criteria in Table 1. Where a substance must be restricted, the substance will be declared as critical or over capacity.

Where a sewerage system or sub-system is determined to be affected, or likely to be affected, by significant corrosion from trade wastewater, it will be declared as over capacity due to corrosion.

Trade wastewater customers discharging to these systems may need to commit to and implement an effluent improvement program to minimise the corrosion risk of their trade wastewater. The basic discharge requirements for customers in these systems are:

- total biological oxygen demand (BOD) of 600 mg/L and soluble BOD of 100 mg/L or less
- temperature of 25 ^{o}C or less
- pH stable between 7 and 10 for at least 12 hours.

Depending on the severity of corrosion and how far the system is from the sewage treatment plant, Sydney Water may impose alternative requirements on customers, discharging to these systems.

Sydney Water may declare the critical and over capacity substances for affected sewerage systems or subsystems at any time. We will write to customers affected by the change in status. Any change in charging will apply a year after the sewer is declared 'corrosion impacted'. Sydney Water will also determine when a substance ceases to be critical or over capacity.

The *Determination of critical substances* fact sheet includes current declaration of corrosion for specific catchments and can be found at sydneywater.com.au

If pricing mechanisms for critical and overcapacity systems do not reduce or contain the total mass of a critical or over capacity substance within a sewerage system, Sydney Water may apply load capping or suspend the consent.

Table 1 – Critical substance criteria

Status of substance	Criteria used to determine status within a sewerage system	Charging rate multiplier	Mass subject to higher charging rate
Normal	Total invoiced mass or the sum of long-term average daily mass (LTADM) of the substance discharged by all industrial customers is less than or equal to 60% of the maximum allowable industrial loading (MAIL).	No multiplier	Not applicable
Critical	Total invoiced mass or the sum of LTADM of the substances discharged by all industrial customers exceeds 60% of MAIL but is less than or equal to MAIL.	2	Actual mass > 1.5 LTADM
Over capacity	Total invoiced mass or the sum of LTADM of the substances discharged by all industrial customers exceeds MAIL. OR Where a sewerage system, or sub-system, is determined to be corrosion-impacted, the system or sub-system will be regarded as over capacity with respect to BOD – five days (BOD_5).	3	Actual mass > 1.5 LTADM

Determining trade waste charges

Customers are charged for the mass of substances in their trade wastewater under the charging rates identified in the *Trade wastewater fees and charges for industrial customers* fact sheet at sydneywater.com.au

With the exception of substances with a 'domestic equivalent', the chargeable trade waste mass is equal to the mass discharged. For substances with a 'domestic equivalent', Sydney Water will deduct the mass of substances up to the 'equivalent domestic mass' to determine the chargeable trade waste mass.

Chargeable trade waste mass	=	Trade waste mass (actual or assessed)	-	Equivalent domestic mass
Equivalent domestic mass	=	Volume (actual or assessed)	x	Equivalent domestic concentration

Charges for substances discharged at concentrations exceeding standards

For substances that exceed the acceptance standards, quality charges, including any critical mass charges, are doubled for that sample day.

Effluent improvement programs

An Effluent Improvement Program (EIP) outlines the steps a customer must take to ensure its trade wastewater meets Sydney Water's published (or proposed) acceptance standards within an agreed timeframe.

An EIP is required when the trade wastewater does not meet the trade waste standards or mass limits in a trade waste consent. Sydney Water may require a customer to make improvements to the quality of the trade wastewater discharge or to activities that occur on site that may affect trade waste quality through an EIP.

An EIP is specifically required where:

Long term average daily mass (kg/day) > acceptance standard (mg/L)

Average daily discharge volume (ML/day)

or

Measured average daily discharged mass (kg/day) > acceptance standard (mg/L)

Measured average daily discharged volume (ML/day)

or

Measured average daily concentration (mg/L) > acceptance standard (mg/L)*

* Measured average daily concentration can be for either composite or discrete samples

or

Where a transport system is declared 'over capacity', specific pollutants may be targeted for reduction

Effluent improvement programs must, at a minimum, include:

- a series of steps, each taking no longer than three months, that detail how the customer will improve the quality/quantity of the trade wastewater discharge
- any incremental improvements expected in the quality/quantity of the trade waste discharge
- the outcomes expected for trade wastewater quality/quantity within the timeframes
- reporting milestones for each step
- a management plan outlining the nature (solid or liquid, containing chemical, food, or metal residues) and mass (tonnes a year) of waste substances expected to be produced from the EIP and the method(s) proposed to reuse, recycle, or dispose of these substances
- a description of pre-treatment technology including sizing
- data on diurnal patterns and wastewater characteristics for the influent to pre-treatment. This is required to assess the adequacy of the EIP.

Failure to provide a suitable EIP or complete an EIP or milestone by the due date will result in a significant breach. A consent will not be renewed if an EIP is outstanding or the EIP or a significant milestone has not been completed. A consent will only be issued for the duration of an EIP. In extreme cases, such as where intensive capital expenditure is required, a consent may be issued for the duration of the delivery of a milestone.

Where an EIP is required for a customer who discharges on average less than 5,000 litres a day, Sydney Water may not allow continued discharge to the sewer. In these cases, the customer must complete an EIP within 60 days. The consent will be suspended if the customer cannot demonstrate compliance with the acceptance standards within this period. This particularly applies to safety substances, but may apply to any substance where an EIP is required.

Site improvement programs

Some customers may be required to complete a site improvement program. The aim of a site improvement program is to ensure conditions on-site do not present a threat to Sydney Water's sewerage system or prevent a customer complying with his/her consent.

A site improvement program may refer to such things as bunding chemical storage areas, open area issues and monitoring requirements.

Optimising trade wastewater discharge to sewer

Customers must ensure they reuse process water efficiently before discharging to the sewer. Direct discharge is not permitted for 'single pass' process water from cooling, heating and similar high volume, low contamination processes.

Customers must not use water (this includes Sydney Water's supply, bore water, groundwater, stormwater, rainwater or water from any non-process source) to dilute a trade waste stream before discharge to the sewer. Trade waste streams must be measured and sampled before mixing with domestic wastewater streams.

Water efficiency initiatives

Sydney Water customers must use water efficiently within the terms and conditions of the trade waste consent.

Managing water efficiently and effectively provides many benefits, such as:

- reducing water use and charges
- reducing hydraulic loading on pre-treatment systems
- reducing operating/maintenance costs
- protecting the environment
- improving the business's corporate image
- reducing the customer's carbon footprint and related energy costs.

We recommend businesses install water efficient devices and have a Water Management Plan (WMP) or adopt their Water Savings Actions Plan (WSAP) where required by the NSW Department of Environment, Climate Change and Water. Refer to www.waterforlife.nsw.gov.au/waterefficiency/businesses/water_savings_actions_plans

Both a WMP and WSAP should include a detailed water balance model of business operations. This will determine the most efficient and effective methods to use water without affecting the quality of trade wastewater.

Sydney Water may be able to help you develop a WMP. Contact us to see if we can help you manage water use better.

Sewer mining systems

Sewer mining is the process of tapping directly into a sewer, either before or after a sewage treatment plant, to treat and reuse wastewater as recycled water.

Most sewer mining involves extracting the wastewater directly from a Sydney Water sewer. The customer must measure the quality and quantity of wastewater extracted from the sewer and the quality and quantity of any returned to the sewer. Sydney Water will only charge for the additional load of substances discharged back to the sewer. No gross solids or grit are to be returned to the sewer.

The discharge from sewer mining schemes must meet all acceptance standards outlined in the fact sheet *Acceptance standards and charging rates*. This condition applies even when there has been no overall increase in the load of a substance to the sewer.

The acceptance standard for suspended solids for sewer mining schemes is determined by the capacity of the receiving sewer directly downstream of the connection point. The scheme must also show there is no significant detrimental impact on the influent to the sewage treatment plant, at any time of the day. Customers must demonstrate that they can meet these conditions before Sydney Water will issue a consent.

To know more about catchments for sewer mining, refer to the *Sewer mining: How to establish a sewer mining operation* fact sheet at sydneywater.com.au

Decentralised wastewater treatment systems extract domestic wastewater from a private connection on-site before treating and reusing it as recycled water. Customers operating these systems must apply for an industrial consent.

Discharging contaminated surface and groundwater to the sewer

Surface water and groundwater entering the sewerage system can cause severe operational difficulties for Sydney Water and increase sewer overflows. Sydney Water prefers that surface water from open areas (unroofed areas) and ground water are not discharged to the sewer.

However, Sydney Water recognises there are some circumstances where, under strict controls, it is of benefit to the environment to accept this water to the sewer.

Where roofing an area is impractical and the contaminated run-off can't be directed to the site stormwater system, the first 10 mm of rainfall collected through a 'first flush' system may be accepted to the sewer, but this must comply with the conditions of an industrial trade waste consent.

Groundwater and/or surface water from excavation and construction is not accepted to the sewer and should be managed as part of site development. This should be treated and discharged to the site stormwater drainage system, according to the requirements of the NSW Department of Environment, Climate Change and Water or the local council.

Contaminated groundwater from garbage tips (leachate) will be accepted to the sewer in dry weather only, but this must comply with the conditions of the industrial trade waste consent.

Groundwater will only be accepted to the sewer where contamination is from man-made activities and only for a finite period while the site is undergoing remediation. Customers must install an approved rain gauge and controls.

To know more, refer to the *Discharge of contaminated surface and groundwater to the sewer* fact sheet at sydneywater.com.au

Bunding

Any substances used by customers that could adversely affect the sewerage system must be contained by bunds or other approved containment. This is to prevent any leaks, spills or overflows from draining by gravity, or any automated or mechanical means, directly to the sewer.

Bunded areas around chemical storage may contain blind sumps to collect spills, but must not incorporate level-controlled pumps, gravity drains or any valves (including locked valves).

All trade wastewater pre-treatment systems must be bunded or protected by other approved means to contain any leaks, spills or overflows. Bunded areas, including those containing pre-treatment systems, must be roofed to prevent rainwater collecting in the bunded area.

All bunds must be sized to contain at least 110% of the largest container in the bunded area.

Discharging vehicle transported liquid waste to the sewer

No person may discharge, or cause the discharge of, any waste, directly or indirectly, to any of Sydney Water's assets from any vacuum pump tanker or any other liquid transport vehicle, unless the:

- type of waste transported is covered by a current Sydney Water trade waste consent
- discharge takes place at a facility where the owners/operators hold a Sydney Water trade waste consent

- discharge takes place at a depot licensed by the NSW Department of Environment, Climate Change and Water
- vehicle complies with any requirement of the NSW Department of the Environment, Climate Change and Water.

'Waste' includes, but is not limited to, waste from septic tanks (sludge and liquid), seepage pits, excavations, cesspools, grease traps, chemical toilets or any other waste-holding device (including holding tanks on mobile cleaning vehicles), or any industrial or commercial waste.

Discharging septic effluent (including septic effluent containing trade wastewater)

Sydney Water accepts discharge from septic effluent depots to the sewer provided the depot is covered by a current Sydney Water trade waste consent. The discharge of untreated septic sludge to Sydney Water's sewers is not permitted. Septic effluent depots may receive septic sludge if adequate treatment is provided to comply with agreed acceptance criteria.

Discharging bilge waste from ships

Due to the possibility of flammable materials, bilge water may only be discharged through an industrial consent. Special safety requirements may be applied, depending on the assessed risk.

Ballast water is not acceptable for discharge to sewer.

Discharge from mobile plant and mobile waste processing

The discharge of trade wastewater from mobile plant and mobile waste processing systems may be accepted if the business has a current trade waste consent.

Single discharges to the sewer

Single discharges to the sewer are usually not permitted, however, in some instances Sydney Water will grant permission to discharge, after an industrial consent has been entered into.

Use of additives in pre-treatment systems

Adding solvents, enzymes, mutant or natural bacteria, odour control agents and pesticides to pre-treatment systems is not permitted, unless specifically authorised by Sydney Water.

Public disclosure

To maintain community confidence in the quality of treated wastewater from sewage treatment plants and the Trade Waste Program, the public may access portions of trade waste consents. Although a few commercially confidential details will be withheld, the company name and discharge address, risk index, plus Schedule 1 (trade wastewater which may be discharged), Schedule 2 (sampling, analysis, flow rates and volume determination) and Schedule 3 (payments) are subject to public disclosure. This information is available at sydneywater.com.au

Want to know more?

To find out more, visit sydneywater.com.au or phone 13 20 92.

Case Number: 134637V2

31 October 2013

LEND LEASE MILLERS POINT
c/- CARDNO FORBES RIGBY PTY LTD

LETTER of APPROVAL
For
CONNECTION TO A SYDNEY WATER SEWER FOR SEWER MINING

Applicant:	**LEND LEASE MILLERS POINT**
Your reference:	**210079-134637**
Property location:	**HICKSON RD, Sydney**
Your application date:	**5 September 2013**

Dear Applicant

Your application to connect to the sewer main at the above location is approved provided you do the following things:

1. Enter into the following agreements or contracts with Sydney Water:

   - **Sewer Mining Agreement** – a draft copy of this is available on our website http://www.sydneywater.com.au/SavingWater/RecyclingandReuse/RecyclingAndReuseInAction/SewerMining.cfm;
   - **Consent to Discharge Industrial Trade Wastewater**;
   - **Developer Works Deed** – this is to be executed before construction of the connection; and
   - **Land Lease Agreements** (if they are needed).

2. Engage your current or another authorised Water Servicing Coordinator (Coordinator) to manage the design and construction of the required works to Sydney Water's standards, procedures and technical requirements as well as the Water Services Association of Australia standards.

   Note: The Coordinator must be fully authorised by us for the whole time of the Deed. Before you engage another Coordinator you must write and tell Sydney Water.

   For a list of authorised Coordinators either visit www.sydneywater.com.au > Building and Developing > Developing Your Land or call 13 20 92.

   When you construct these works you will need to pay project management, survey, design and construction costs **directly to your Coordinator and other providers.**

The Coordinator generally will be the single point of contact between you and Sydney Water. They can answer most questions you might have about our process and charges.

There are other fees and charges that need to be paid at certain times after you connect. These are detailed in Section 7 of the Sewer Mining Agreement.

3. Before any work is started, have your Coordinator submit detailed designs to Sydney Water for review that show all proposed modifications to Sydney Water's sewerage system. The documents must also include:

- Work Methods Statement;
- Flow Management Plan;
- Safe Work Plan;
- Odour Management Plan – Note that there are currently no sewage odour issues at this location. Therefore, if Sydney Water receives sewage odour complaints during the period of connection, they will be considered as resulting from that connection and Lend Lease Millers Point will be responsible for any problems that result.
- Inspection and Test Plans; and
- Construction Commencement Notice.

Notes:

- The sewer mining connection must be designed so that it does not interfere with the normal operation of the sewerage system and does not cause sewage surcharges during dry or wet weather.
- **Before you connect, if there is no activity on this project for a period of twelve months, your application must be re-investigated and you must pay another application fee.** Sydney Water may have extra requirements and charges may change.

4. Ensure that no work on the existing sewer main or the proposed connection is started until Sydney Water advises your Coordinator.

If any work on our assets is carried out without that advice or final approval, Sydney Water will take action to have work on the site stopped. We will apply the provisions of Section 45 of the *Sydney Water Act 1994.*

5. Ensure that work on Sydney Water's sewerage system is carried out by Sydney Water accredited providers in accordance with the Sydney Water Asset Creation – Developer Process. Temporary accreditation (with conditions) can be arranged upon application to Sydney Water.

6. Once the design has been approved by Sydney Water and the sewer mining connection point constructed, ensure that operation of the connection is in accordance with the terms and conditions of the:

- Water Services Association of Australia (WSAA) standards and specifications;
- Sewer Mining Agreement;

- Consent to Discharge Industrial Trade Wastewater; and
- Land Lease Agreements (if they apply).

7. In regard to the preliminary plans lodged the following comments are provided:

   - The DTC drawing 2200 is not acceptable for this design.
   - The valve design in M.H. is not acceptable for maintenance and replacement.
   - Show detail of brackets to hold valve spindle.
   - Clearly show on plan the ownership details of off-take line. Sydney Water does not own off take line.

Please contact me if you have any enquiries.

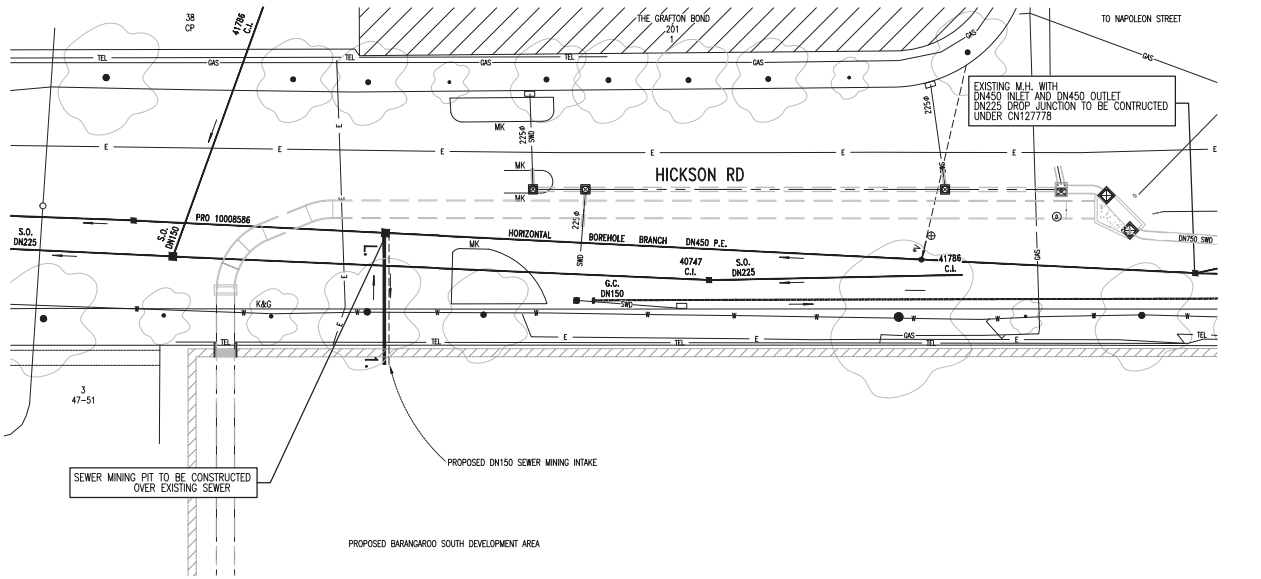
Yours faithfully,

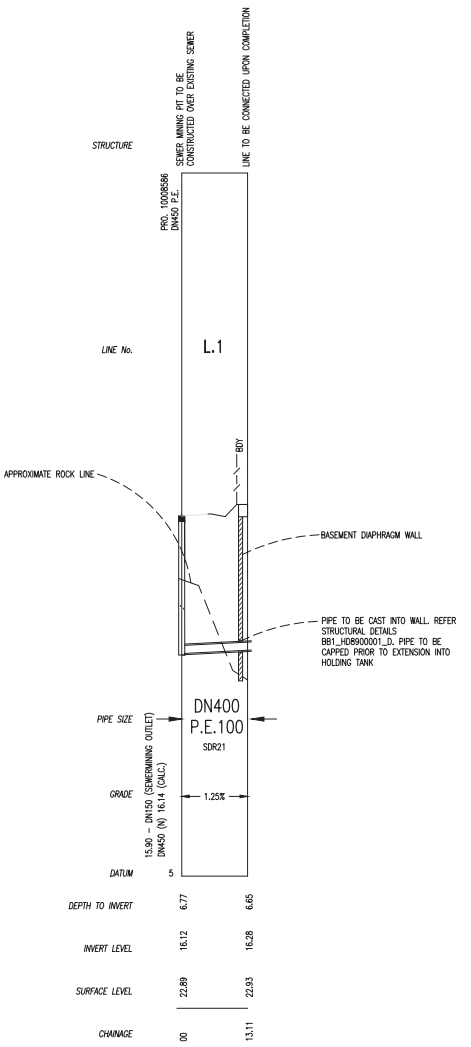
Gina Nichols
Urban Growth
Sydney Water
Ph: 8849 4452Fax: 8849 3063
Email: gina.nichols@sydneywater.com.au

A1

FILE LOCATION: YN210079 / CN134637WW | DESIGNED: AMW | DRAFTED: AMW | VERIFIED: LJD | REVIEWED: MTT | APPROVED: LJD | ISSUED: OCT 2013

DEVELOPER CONTRACT PLAN





NOTES :

1. SURVEY PREPARED BY:
   RYGATE & COMPANY PTY LTD, LEVEL 9, 89 YORK STREET, SYDNEY NSW 2000 (PH: 9263 6800)
   DESIGN & FINAL PLANS PREPARED BY:
   WSC: CARDNO FORBES RIGBY PTY LTD, 47 BURELLI STREET P.O BOX 1285 , WOLLONGONG NSW 2500 (PH: 4228 4133)
   FOR: LEND LEASE, 30 HICKSON ROAD, MILLERS POINT NSW 2000 (PH: 9236 6111)
2. THE PROPOSED WORKS DETAILED HEREON ARE TO BE CONSTRUCTED IN ACCORDANCE WITH THE SEWERAGE CODE OF AUSTRALIA, SYDNEY WATER EDITION (WSA 02–2002). THE CONTRACTOR MUST HAVE A COPY OF THIS DOCUMENT ON SITE AT ALL TIMES.
3. THE CONTRACTOR TO OBTAIN COUNCIL APPROVAL BEFORE EXCAVATING ADJACENT TO TREES AND TAKE ALL NECESSARY STEPS TO PROTECT TREES FROM DAMAGE.
4. THE CONSTRUCTOR TO SUBMIT A SAFE WORK PLAN TO THE WATER SERVICING COORDINATOR FOR REVIEW PRIOR TO COMMENCING THE WORKS.
5. THE CONSTRUCTOR TO SUBMIT AN ENVIRONMENTAL MANAGEMENT PLAN TO THE WATER SERVICING COORDINATOR FOR REVIEW PRIOR TO COMMENCING THE WORKS.
6. MEASURES REQUIRED TO PROTECT THE ENVIRONMENT ARE DETAILED IN REVIEW OF ENVIRONMENTAL FACTORS.
7. ALL LEVELS ELECTRONICALLY GENERATED. NO LEVEL BOOK AVAILABLE.
8. ACCESS CHAMBERS SHALL BE CONSTRUCTED IN ACCORDANCE WITH SYDNEY WATER DEEMED TO COMPLY DRAWING DTC–2200.
9. THE MINIMUM NUMBER OF COMPACTION TESTS REQUIRED TO SATISFY SECTION 22 OF THE SEWERAGE CODE OF AUSTRALIA SYDNEY WATER EDITION ARE:
   PIPE EMBEDMENT ZONE: 1
   TRENCH FILL ZONE: NON TRAFFICABLE 0 TRENCH FILL ZONE: TRAFFICABLE 24
   WITHIN 300mm OF MS/MH = 7
10. MHs TO BE CONSTRUCTED IN ACCORDANCE WITH DTC DRAWINGS 10. REFER DTC – 2000, 2200, 2201, 2203, 2220, 2221, 2222 & 2223

ENVIRONMENTAL NOTES :

E1. AREAS DOWNSLOPE OF CONSTRUCTION ACTIVITY ARE TO BE ADEQUATELY PROTECTED FROM SEDIMENT POLLUTION ETC. SILT TRAP DEVICES ARE TO BE INSTALLED PRIOR TO ANY CONSTRUCTION ACTIVITY, EFFECTIVELY MAINTAINED AND TO BE REMOVED ONLY AFTER THE AREA HAS BEEN SATISFACTORILY REVEGETATED.

E2. ALL STORMWATER GRATES, OPEN CHANNELS, SWALES, TABLE DRAINS, GULLIES ETC. DOWNSLOPE OF CONSTRUCTION ACTIVITY TO BE ADEQUATELY PROTECTED BY STRAWBALES WRAPPED IN GEOTEXTILE FABRIC OR GEOTEXTILE FENCE.

E3. THE EXTENT OF CLEARING OF VEGETATION IS TO BE KEPT TO AN ABSOLUTE MINIMUM NECESSARY TO EFFECT THE WORKS.

CONTRACTOR TO NOTE :

C1. ALL SERVICES SHOWN ARE INDICATIVE ONLY. THE CONTRACTOR MUST CONFIRM THE LOCATION OF ALL SERVICES PRIOR TO EXCAVATION.

C3. CONTRACTOR TO MAKE ALL APPLICATIONS, PROVIDE TRAFFIC CONTROL AND PAY COUNCILS ROAD OPENING FEES.

No.	AMENDMENT DESCRIPTION	BY	DATE
2	AMEND SEWER MINING PIT	A.M.W	15/10/13
1	ORIGINAL ISSUE	D.A.C.	09/09/13

PLAN TO BE READ IN CONJUNCTION WITH CURRENT SYDNEY WATER STANDARDS
SYDNEY WATER CORPORATION

PRIOR TO COMMENCEMENT OF EXCAVATION FOR PROPOSED AND EXISTING SERVICES CONTACT :-

DIAL BEFORE YOU DIG		Ph. 1100
ELECTRICITY	AUSGRID	Ph. 0249510899
GAS	JEMENA	Ph. 1300880906
TELE/COMMUNICATIONS	TELSTRA	Ph. 1800500777
	SYDNEY WATER	Ph. 132092

GIVING AT LEAST 48 HOURS NOTICE.

UTILITIES

TYPE		DATE	REF.	TYPE	DATE	REF.
TEL	TEL	NOV'11	SURVEY			
E	E	NOV'11	SURVEY			
G	G	NOV'11	SURVEY			
WATER	WATER	NOV'11	SURVEY			

WORK AS CONSTRUCTED CERTIFICATION

DEVELOPER .....
WATER SERVICE CO-ORDINATOR .....
CONSTRUCTOR .....
COMPLETED ..... W.A.C. PREPARED .....

DESIGNER .....

I CERTIFY THAT THE WORKS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE WORK AS CONSTRUCTED DRAWINGS.

PIPE SCHEDULE

SIZE DN	TYPE	CLASS	LENGTH	PIPE JOINING METHOD / NOTES
150	PE100	SDR17	1.0	
400	PE100	SDR17	14.0	

DESIGN HEAD ..... m

NO BOUNDARY TRAPS REQUIRED.

ALL LEVELS REFER TO A PLANE 20m BELOW AUSTRALIAN HEIGHT DATUM

SCALES
PLAN 1:250, SECTION HOR 1:250, VERT 1:125
CROSS SECTIONS ..... NATURAL
LENGTHS, DEPTHS & LEVELS ARE IN METRES.

NO AMENDMENTS ARE TO BE MADE TO THIS PLAN WITHOUT REFERENCE TO SYDNEY WATER. THIS PLAN IS NOT NECESSARILY UP TO DATE OR CORRECT AND SYDNEY WATER ACCEPTS NO RESPONSIBILITY.

U.B. DIRECTORY MAP 236 B7 (44th Edition)

SHEET 1 OF 4 File No. N/A

SYDNEY WATER CORPORATION

Case No. 134637WW

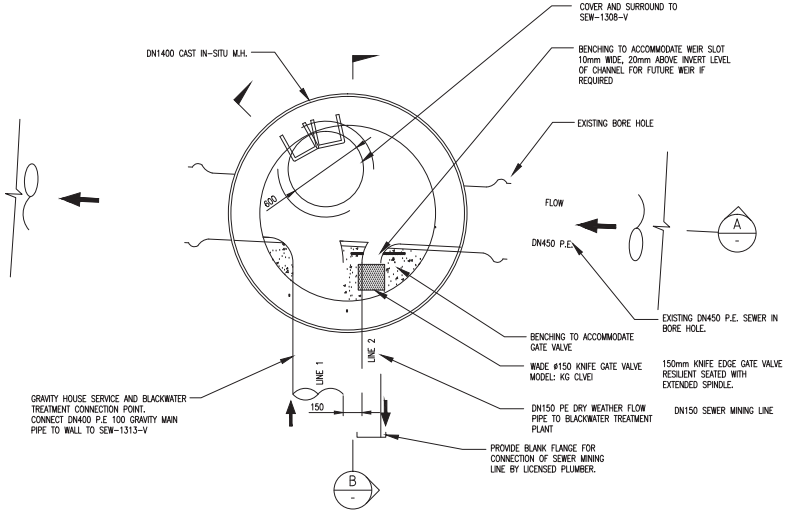
SYDNEY SEWERAGE
DRAINS TO
B.O.O.S.

PLAN DRAWN DATE: 15/10/13 VERSION: 2 SHEET 1 OF 4 SHEETS

A1F

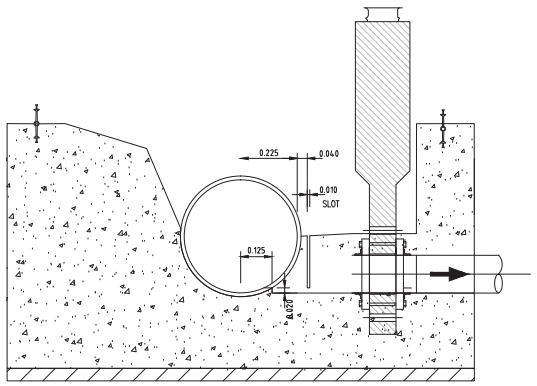
FILE LOCATION: YN210079 / CN134637WW | DESIGNED: AMW | DRAFTED: AMW | VERIFIED: LJD | REVIEWED: MTT | APPROVED: LJD | ISSUED: OCT 2013

DEVELOPER CONTRACT PLAN



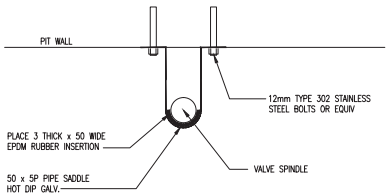
SEWER MINING OFFTAKE MAINTENANCE STRUCTURE PLAN

Scale 1:20

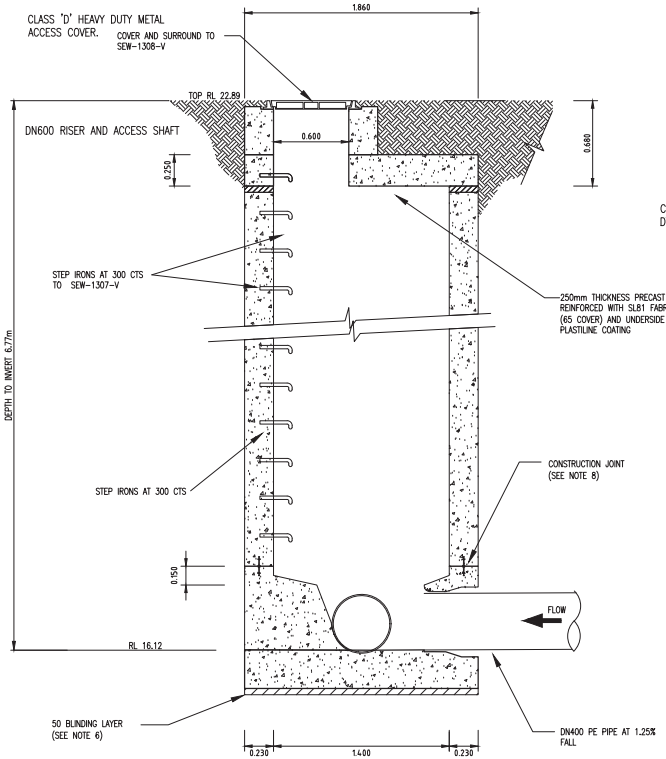


DETAIL AT SEWER OFFTAKE

Scale 1:10



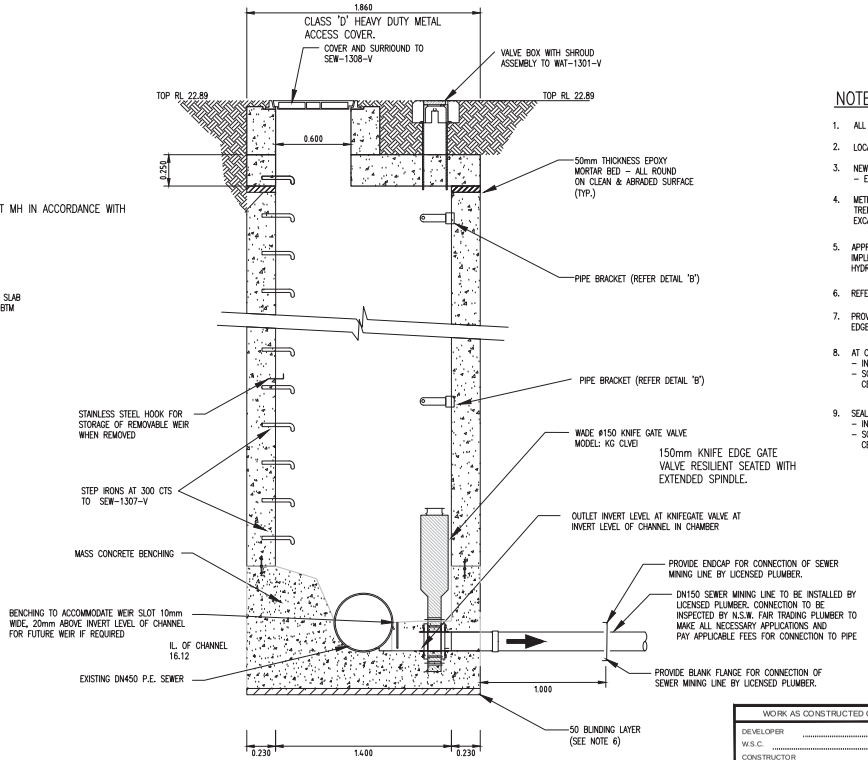
DETAIL B
SCALE 1:5



SECTIONAL ELEVATION A

Scale 1:20

CONSTRUCT MH IN ACCORDANCE WITH DTC 2200



SECTIONAL ELEVATION B

Scale 1:20

NOTES:–

1. ALL DIMENSIONS IN MILLIMETERS.
2. LOCATE EXISTING MH'S 8A/2 AND 8A/3 AS SHOWN IN DESIGN DRAWINGS.
3. NEW CONCRETE WORKS SHALL BE IN ACCORDANCE WITH AS3735 – EXPOSURE CLASSIFICATION D
4. METHOD OF BACKFILL AND COMPACTION OVER MH TO BE GENERALLY AS FOR TRENCHES. PLACE FILL EVENLY AROUND AND OVER MAINTENANCE HOLE EXCAVATION TO AVOID UNBALANCED LATERAL LOADING
5. APPROPRIATE FLOW MANAGEMENT AND ASSET ISOLATION PROCEDURES ARE TO BE IMPLEMENTED TO SWC HSP–070 FLOW AMNAGEMENT AND ISOLATION OF HYDRAULIC ASSETS
6. REFER TO WSA 02 PT 3 – FOR FOUNDATION DETAILS
7. PROVIDE ROUNDED NOSING ON INLET AND OUTLET PIPE. PROVIDE ROUNDED EDGES ON UNDERSIDE OF ACCESS HOLE TO SHAFT
8. AT CONSTRUCTION JOINTS:
   – INSERT WATERSTOP FIXED CENTRALLY IN THE WALL
   – SCABBLE AND BRUSH CLEAN JOINT, THEN PRIME WITH CEMENT SLURRY IMMEDIATELY BEFORE PLACING CONCRETE.
9. SEALING METHODS:
   – INSERT WATERSTOP FIXED CENTRALLY IN THE WALL
   – SCABBLE AND BRUSH CLEAN JOINT, THEN PRIME WITH CEMENT SLURRY IMMEDIATELY BEFORE PLACING CONCRETE.

No.	AMENDMENT DESCRIPTION	BY	DATE
2	AMEND SEWER MINING PIT	A.M.W	15/10/13
1	ORIGINAL ISSUE	D.A.C.	09/09/13

WORK AS CONSTRUCTED CERTIFICATION

DEVELOPER .....
W.S.C. .....
CONSTRUCTOR .....
COMPLETED .....
W.A.C. PREPARED .....
DESIGNER .....

I CERTIFY THAT THE WORKS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE WORK AS CONSTRUCTED DRAWINGS

SYDNEY WATER CORPORATION

Sydney WATER

Case No. 134637WW | SHT 2 OF 4 SHTS.

SYDNEY WATER CORPORATION

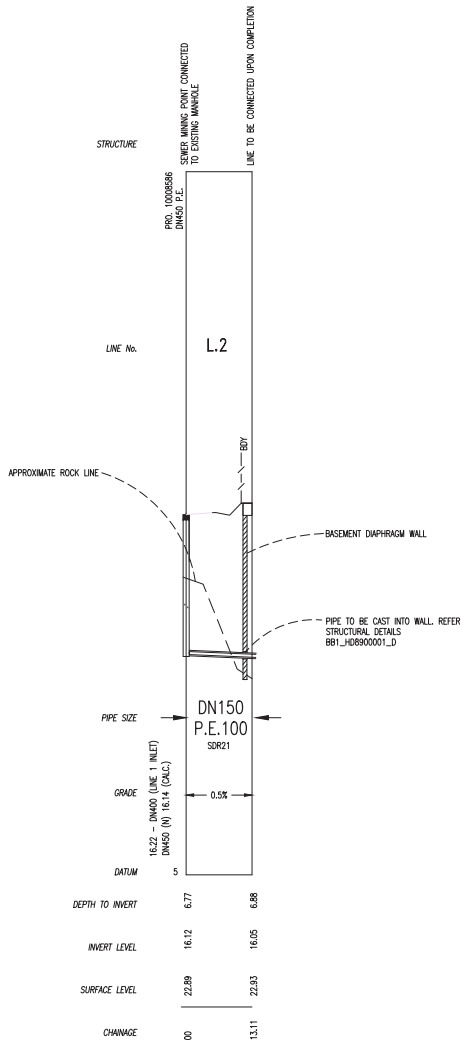
FOR DETAILS OF SERVICES SEE SHEET 1

PLAN DRAWN DATE: 15/10/13 VERSION: 2 SHEET 2 OF 4 SHEETS

A1F

FILE LOCATION: YN210079 / CN134637WW | DESIGNED: AMW | DRAFTED: AMW | VERIFIED: LJD | REVIEWED: MTT | APPROVED: LJD | ISSUED: OCT 2013

DEVELOPER CONTRACT PLAN



NOTE :

DN150 SEWER LINE (L.2) IS A PRIVATE SEWER AND SHOWN FOR INFORMATION PURPOSES ONLY

No.	AMENDMENT DESCRIPTION	BY	DATE
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DEVELOPER .....

W.S.C. .....

CONSTRUCTOR .....

COMPLETED .....

W.A.C. PREPARED .....

DESIGNER .....

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SYDNEY WATER CORPORATION

Case No. 134637WW | SHT 3 OF 4 SHTS

SYDNEY WATER CORPORATION

FOR DETAILS OF SERVICES SEE SHEET 1

PLAN DRAWN DATE: 15/10/13 VERSION: 2 SHEET 3 OF 4 SHEETS

A1F

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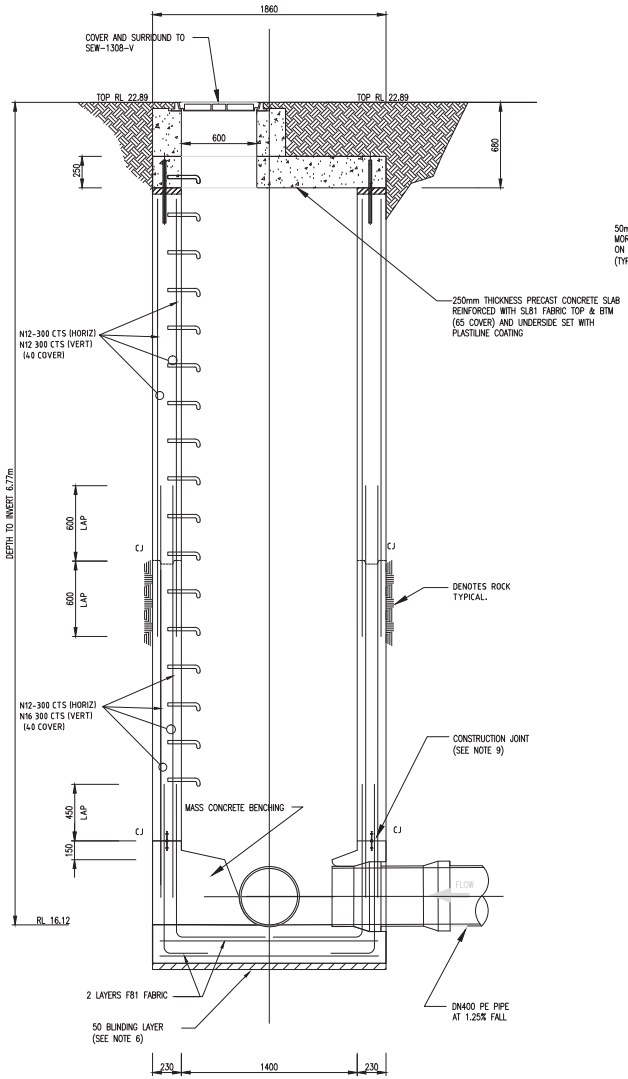
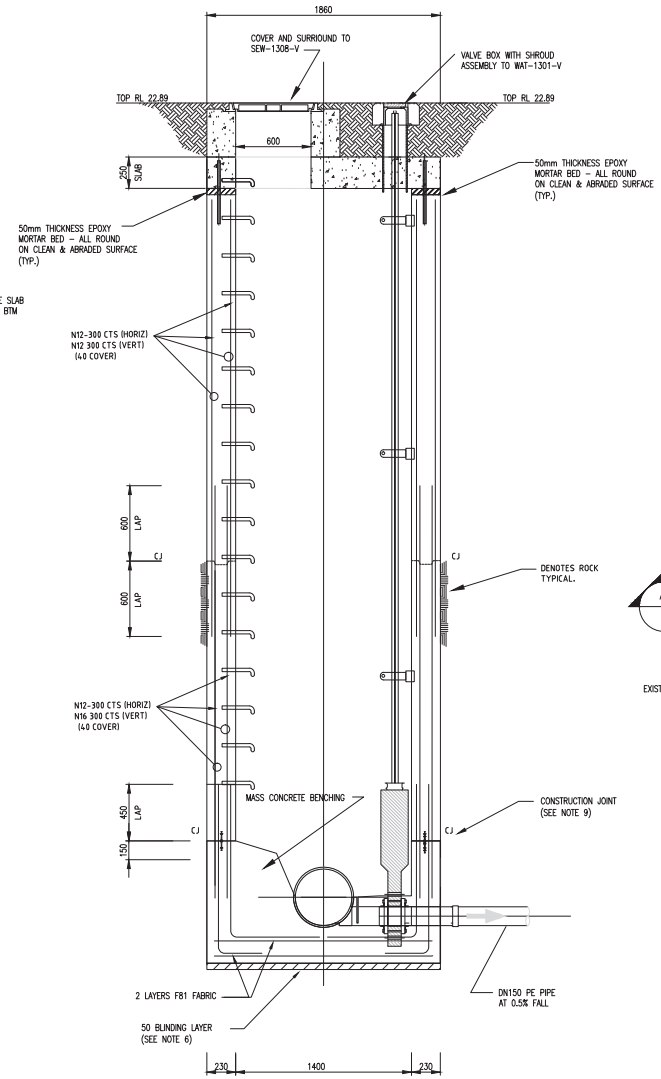
DEVELOPER CONTRACT PLAN



SECTIONAL ELEVATION A
Scale 1:20



SECTIONAL ELEVATION A
Scale 1:20

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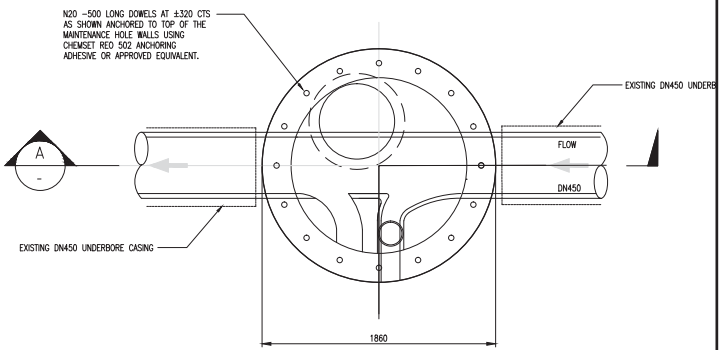
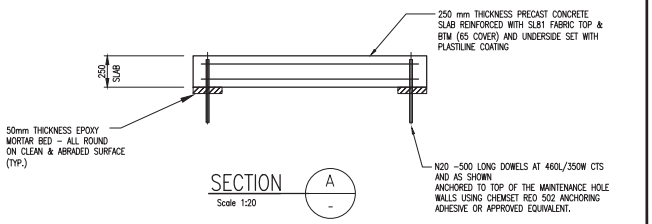
4. METHOD OF BACKFILL AND COMPACTION OVER MH TO BE GENERALLY AS FOR TRENCHES. PLACE FILL EVENLY AROUND AND OVER MAINTENANCE HOLE EXCAVATION TO AVOID UNBALANCED LATERAL LOADING
5. INSIDE SURFACE OF MH AND UNDERSIDE OF ROOF TO HAVE EPOXY COATING, PVC LINING OR PE LINING TO WATER AGENCY REQUIREMENTS
6. APPROPRIATE FLOW MANAGEMENT AND ASSET ISOLATION PROCEDURES ARE TO BE IMPLEMENTED TO SWC HSP-070 FLOW AMNAGEMENT AND ISOLATION OF HYDRAULIC ASSETS
7. REFER TO WSA 02 PT 3 – FOR FOUNDATION DETAILS
8. PROVIDE ROUNDED NOSING ON INLET AND OUTLET PIPE. PROVIDE ROUNDED EDGES ON UNDERSIDE OF ACCESS HOLE TO SHAFT
9. AT CONSTRUCTION JOINTS:
   – INSERT WATERSTOP FIXED CENTRALLY IN THE WALL
   – SCABBLE AND BRUSH CLEAN JOINT, THEN PRIME WITH CEMENT SLURRY IMMEDIATELY BEFORE PLACING CONCRETE.
10. CLEAR CONCRETE COVER TO REINFORCEMENT – 40mm



TOP VIEW OF SLAB
(SHOWING DOWEL LOCATION)
Scale 1:20



SECTION A
Scale 1:20

REINFORCEMENT DETAILS

No.	AMENDMENT DESCRIPTION	BY	DATE
2	AMEND SEWER MINING PIT	A.M.W	15/10/13
1	ORIGINAL ISSUE	D.A.C.	09/09/13

WORK AS CONSTRUCTED CERTIFICATION

DEVELOPER .....
W.S.C. .....
CONSTRUCTOR .....
COMPLETED .....
W.A.C. PREPARED .....
DESIGNER .....

I CERTIFY THAT THE WORKS HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE WORK AS CONSTRUCTED DRAWINGS

SYDNEY WATER CORPORATION

Sydney WATER

Case No. 134637WW | SHT 4 OF 4 SHTS.

SYDNEY WATER CORPORATION

FOR DETAILS OF SERVICES SEE SHEET 1

PLAN DRAWN DATE: 15/10/13 VERSION: 2 SHEET 4 OF 4 SHEETS

PUBLIC VERSION

ATTACHMENT #10 – SEWERAGE – PROCESS FLOW DIAGRAM

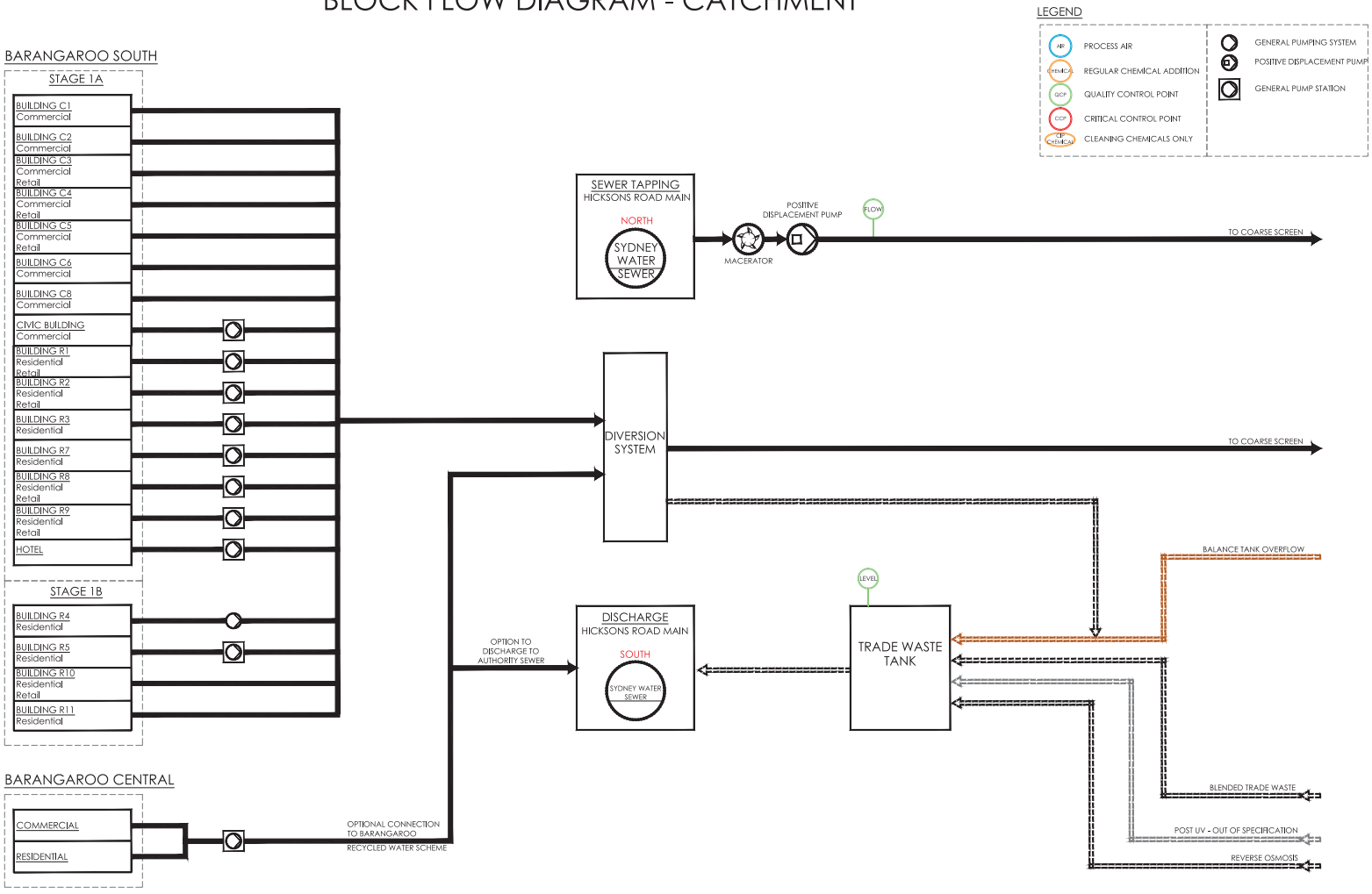
Includes

- Drawing BBO_HSK_W_0015 – Non-potable Water – Catchment – Process Flow Diagram

Response to question

- 4.3.3

BARANGAROO RWP
BLOCK FLOW DIAGRAM - CATCHMENT



PRELIMINARY

FOR INFORMATION

Key Plan

Rev.	Date	Revision Description	Date
B		Preliminary Issue	11/09/2012
A		For Information	26/10/2012

Lead Architects: RSHP Australia Pty Ltd
Ben Harboe | Principal Architect
NSW ARB 6484
Sydney NSW 2000

Collaborating Architects: Land Lease
Graham W Jones | Principal Architect
FRAIA NSW ARB 4005
ABN 97 008 088 162

Consultant

Principal: Land Lease

Developer	Land Lease
Project Management & Construction	Land Lease
Design	Land Lease

30 The Bond 30 Hickson Road
Millers Point NSW 2000
www.landlease.com

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Project: BARANGAROO SOUTH

Title: RECYCLED WATER PLANT BLOCK FLOW DIAGRAM CATCHMENT

Drawn By	Date	Purpose	Approved By	Date
BDZ	25/10/2012		GSM	25/10/2012

Project No.	Site No., Drawing No.	Revision
5017	BB0_HSK_W_0015	B

B1

PUBLIC VERSION

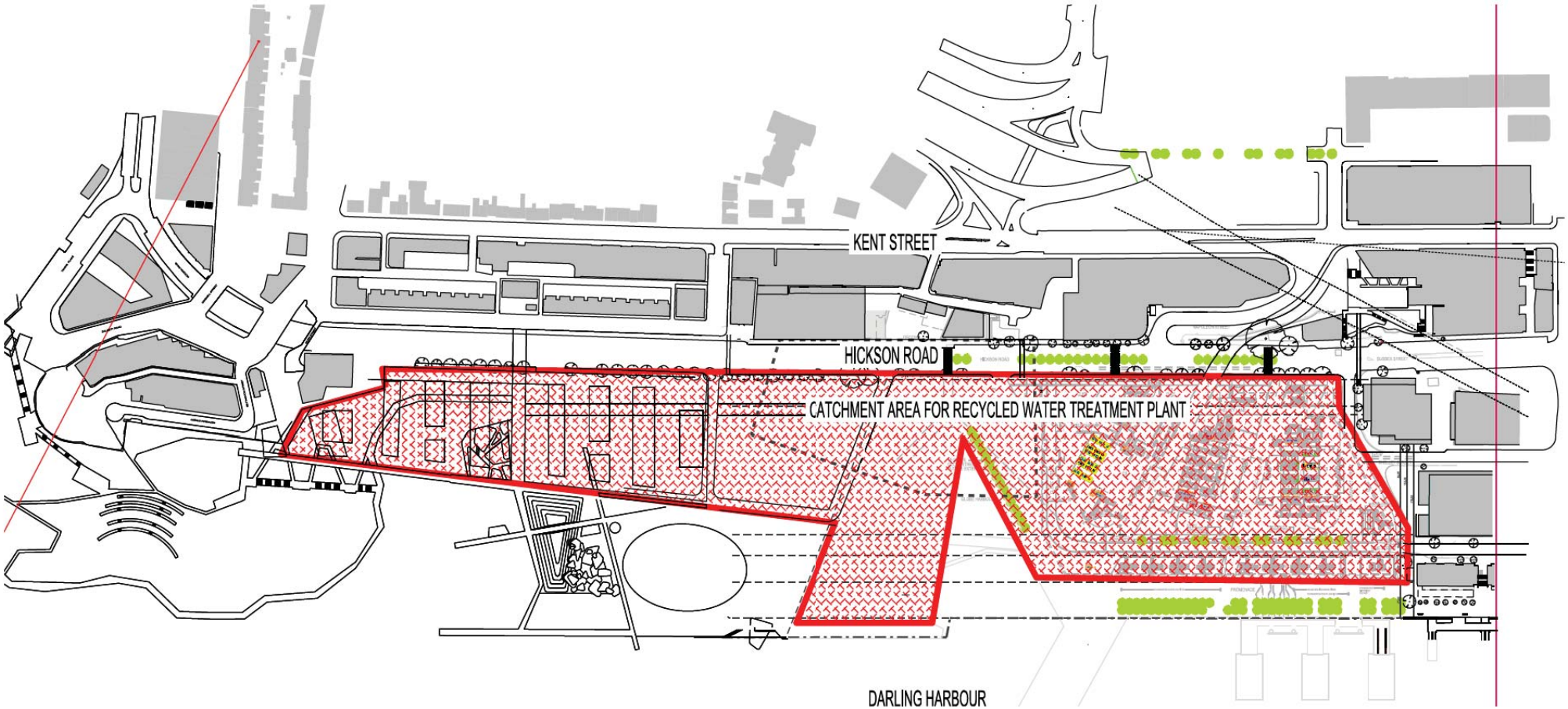
ATTACHMENT #11 – SEWERAGE – NETWORK DIAGRAM

Includes

- Drawing BBO_HSK_W_001 – Non-potable Water – Network Diagram – Sewerage Catchment Area – Site
- Drawing BBO_HSK_W_0003 – Sewerage – Network Diagram

Response to question

- 4.3.3



FOR INFORMATION ONLY

Key Plan

Rev.	Num	Revision Description	Date
01	-	ISSUED FOR INFORMATION	16/10/12

Lead Architects: RSHP Australia Pty Ltd
Ivan Harbour | Principal Architect
RAIA NSW ARB 8494
Sydney NSW 2000

Collaborating Architects: Lend Lease
Graham W Jones | Principal Architect
RAIA NSW ARB 4805
ABN 97 008 086 162

Consultant

Principal: Lend Lease

Developer	Lend Lease
Project Management & Construction	Lend Lease
Design	Lend Lease

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Project: BARANGAROO SOUTH

MP

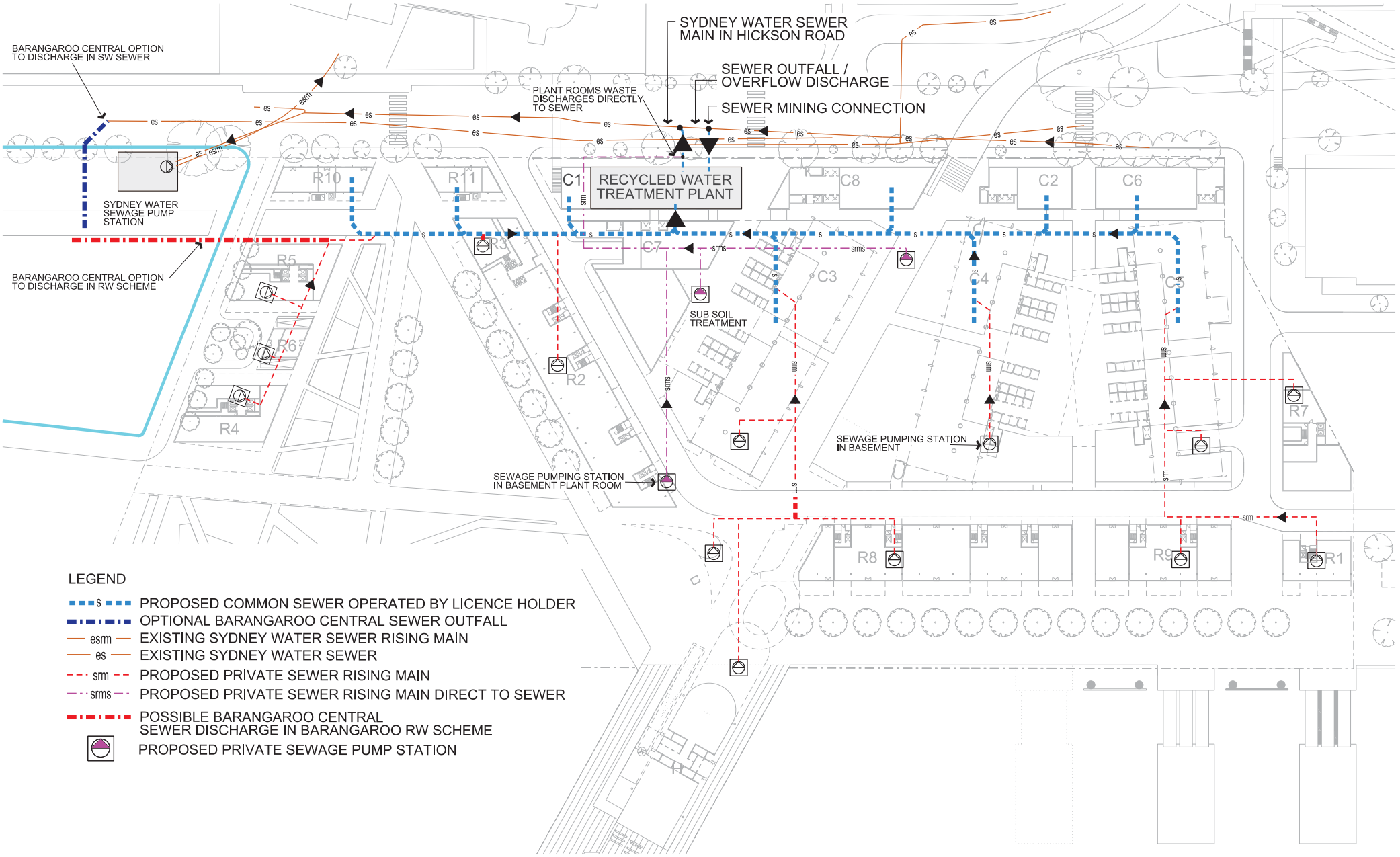
Title: HYDRAULIC SERVICES
CATCHMENT AREA FOR RECYCLED WATER TREATMENT PLANT

Drawn By	Date	Purpose	Approved By	Date
CR	16/10/12	FOR INFO		

SCALE : NOT APPLICABLE (NA) N/A

Project No.	Site No.	Drawing No.	Revision
161010	BB0	HSKW0001	01

B1



Key Plan

Rev.	Item	Revision Description	Date
01	-	ISSUED FOR INFORMATION	16/10/12

Lend Architects: RSHP Australia Pty Ltd, Ivan Harbour | Principal Architect, RAIA NSW ARB 8464, Sydney NSW 2000

Collaborating Architects: Lend Lease; Graham W Jones | Principal Architect, RAIA NSW ARB 4900; ABN 97 000 098 162

Consultant: Lend Lease; ABN 97 000 098 162

Principal: Lend Lease

Developer	Lend Lease
Project Management & Construction	Lend Lease
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30 The Bond 30 Hickson Road, Millers Point NSW 2000, www.lendlease.com

Project: BARANGAROO SOUTH

Title: HYDRAULIC SERVICES CONCEPT - SEWER MAINS

Drawn By	Date	Purpose	Approved By	Date
CR	16/10/12	FOR INFO		

SCALE 1:500 @ B1 | N/A

Project No.	Site No.	Drawing No.	Revision
161010	BB0	HSKW0003	02

B1 If this drawing is printed or plotted at a size other than B1- DO NOT SCALE DIMENSIONS FROM DRAWING. Always take figured dimensions in preference to scaling.

PUBLIC VERSION

ATTACHMENT #12 – SEWERAGE – WASTEWATER AND CATCHMENT CHARCTERISATION

Includes

- Site sewage – Characterisation by WJP
- Sewer mining – Characterisation by Permeate Partners

Response to question

- 4.3.7

CONSULTANT:

WJP Solutions Pty Ltd
WWRP Design & Construct
11/828 High St Kew East, 3102
03 98540900

PROJECT:

BARANGAROO SOUTH – WASTE WATER RECYCLING PLANT

BUILDER:

LEND LEASE PROJECT MANAGEMENT & CONSTRUCTION

DOCUMENT:

CATCHMENT ASSESSMENT REPORT

PROJECT REF	REF	ISSUE
5017	E-R-201	2

WJPS CLIENT:

LEND LEASE PROJECT MANAGEMENT & CONSTRUCTION

PROJECT CLIENT:

LEND LEASE. PTY LTD

END OF SECTION

DOCUMENT ISSUE REGISTER

Issue No.	Document Description	Issue Description	Date of Issue	By	Checked
1	Catchment Assessment Report	Draft for Comment	12/08/2012	GM, PG & CR	GM
2	Catchment Assessment Report	For WICA Application	20/11/2012	GM, PG & CR	GM

DISCLAIMER

QUALITY ASSURANCE

WJP Solutions is an ISO 9001 (Quality Management) and ISO 14001 (Environmental Management) certified company for the design and installation of Water Treatment Plants.

TABLE OF CONTENTS

1 PROJECT PROFILE

Parameter	Description
Site	Barangaroo South
Site Type	Commercial, Retail & Residential Development
Source Water	- Onsite Black & Grey Water - Future Black & Grey Water from Barangaroo Central - Sewage extracted from adjacent Sydney Water sewer main
Treatment Process	- Coarse Screening - Equalisation - Fine Screening - MBR– with N & P reduction - UV Disinfection - Chlorination - Reverse Osmosis - Stabilisation
End Use	- Flushing Sanitary Fixtures - Wash Down - Clothes Washing Machines - Irrigation - Potential Cooling Tower water Supply (Export Water only)
Termination Points in main process	**TP1 –** Incoming sewer extraction point from Sydney Waters Sewer – Flanged and valved in WWRP plant room **TP2 –** Diversion System is cut into the incoming Barangaroo South Precinct gravity sewer discharging to the Sewer Pump Station in WWRP plant room. terminating in sewer. **TP3 –** Aerobic treatment ventilation system terminating in plant room high level **TP4 –** Exhaust from Odour Treatment Unit servicing screening systems, balance tank, anoxic tank, trade waste tank and sewer pump station, terminating in plant room high level **TP5 –** Outgoing treated water rising main from chlorination contactor connecting to Barangaroo Recycled Water Tank

	TP6 – Outgoing treated water rising main from desalinated water Calcite Filters connecting to Export Recycled Water Tank **TP7** – Balance Tank Overflow pipe connection to Sewer Pump Station **TP8** – Non – Spec water connection to Sewer Pump Station **TP9 –** Power supply terminated in WWRP Central Control System **TP10 –** Comms cabling terminated in WWRP Central Control System
State Jurisdiction **Authority Approval Required**	New South Wales WICA Licence

2 SEWER CATCHMENT ASSESSMENT

The proposed water reuse scheme includes catchment, treatment and distribution phases that have been engineered to reduce risk and deliver water fit for purpose. The engineering process applied to the catchment is summarised below.

2.1 Catchment Description

The Barangaroo South catchment consists of various functional areas. Wastewater from these areas is discharged to the gravity sewer feeding into the plantroom or by pump wells located around the facility pumping into the gravity sewer. The wastewater is then pumped to the wastewater treatment plant facility.

Barangaroo South - Functional Areas
Residential
Commercial
Hotel
Hotel - Function
Retail

The Barangaroo Central catchment is expected to have the following functional areas

Projected Barangaroo Central - Functional Areas
Residential
Commercial

The development staging has dictated that the design be a dual train arrangement, allowing gradual staging of the biological system.

The first two stages of the project will feed the first bioreactor only, however sewer mining of the adjacent sewer in Hicksons Road will be utilised to provide a consistent supply of source water. For details on the Sewer Mining system please refer to **Section 6** of this report.

2.2 Barangaroo Wastewater Catchment Report

The methodology of assessment for the catchment report will follow a distinct path.

- Identify all wastes of concern to be present at the site
- Identify each wastes' disposal path
- Identify pre-treatment requirements prior to release the discharge points for the wastes of concern from the BWTP catchment

2.3 BWTP Catchment

A spreadsheet containing all spatial allocation of functional areas for the site was developed to make a preliminary assessment of the likely discharge of waste.

The spreadsheet generated was used to inform the design of likely mass and hydraulic loading and assess treatment implications.

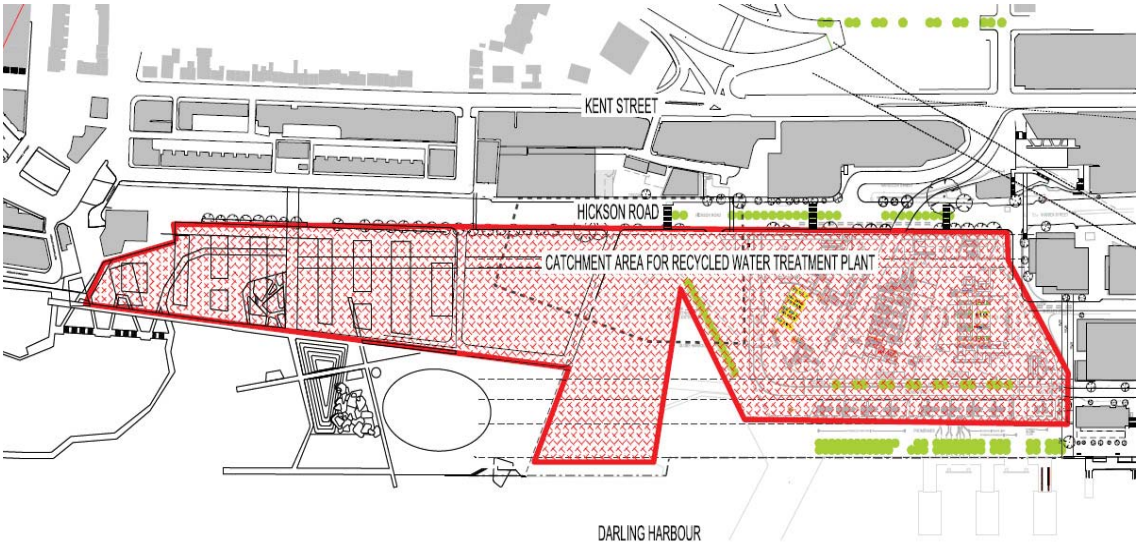

Figure 2-1 - Onsite Catchment Area

3 SITE BREAKDOWN

A breakup of the various buildings within the development and their projected times of occupancy and population are provided below.

Description	Total No. Apartments	Population June 2015	Population December 2015	Population December 2020
RESIDENTIAL				
Building R1	15	45	45	45
Building R2	60			178
Building R3	160			485
Building R4	135			441
Building R5	113			353
Building R6	0			
Building R7	68		220	220
Building R8	84	238	238	238
Building R9	63	168	168	168
Building R10	24			192
Building R11	48			
Sub Total	**770**	**451**	**671**	**2320**
Hotel (Serviced Apartments)	45			115
HOTEL (Rooms)	204			408

Description	Total Commercial Space (m^2)	Population June 2015	Population December 2015	Population December 2020
COMMERCIAL				
Building C1	7,940		1554	1554
Building C2	4,450	1015	1015	1015
Building C3	107,222		9592	9592
Building C4	100,000	8055	8055	8055
Building C5	82,608	8121	8121	8121
Building C6	4,270		384	384
Building C7	0			
Building C8	5,300		476	476
Building C10	0			
Hotel Function Area				
Sub Total	**323,700**	**17,190**	**29,306**	**29,306**

Description	Total Retail Space (m^2)	Population June 2015	Population December 2015	Population December 2020
RETAIL				
R1 Retail	892			
R2 Retail	2,478			
R8 Retail	2,478			
R9 Retail	3,443			
C4 Retail	4,000			
C5 Retail	6,000			
C3 Retail	5,000			
R10 Retail	3,330			
Sub Total	**27,621**	**0**	**1107 Staff 2214 Visitors / Day**	**1689 Staff 3378 Visitors / Day**

Barangaroo Central	
Barangaroo Central Commercial - Space	20,000 m^2
Barangaroo Central Residential	113 apartments

4 HYDRAULIC LOADING ASSESSMENT

Hydraulic loading assessments were conducted by Lend Lease Design to ascertain the various source volumes of sewage from the Barangaroo site. The results are indicated the following sections.

4.1 Sewerage reticulation

Waste water from all fixtures and waste points shall be collected from the buildings via a sewage collection system on site and discharged into the BWTP sewage collection/buffer tank.

Where possible the collection system shall be gravity pipework. Where not feasible the waste water shall be collected into a private sewer pump wells and pumped into the BWTP sewage collection tank.

Grease waste from retail/food outlets etc shall be pre treated in accordance with Sydney Water trade waste policy requirements, collected and discharged into the BWTP. Car Park Drainage and overflow from car wash bays shall be pretreated and discharged to the Blackwater Treatment Plant. No other trade waste from the site is to be discharged into the Barangaroo Blackwater treatment plant.

Sewer mining operation will be required to make up the difference between required sewage volumes to produce recycled water quantities for achieving Project objectives and the volume of waste water captured from Barangaroo. The sewer mining connection shall be from the Sydney Water sewer main in Hickson Road

4.2 Interconnections between proposed sewerage infrastructure and other infrastructure

The system is to have a sewer outfall connected to the Sydney Water sewer main in Hickson road. All the waste water from Barangaroo shall be collected into the buffer tank at the waste water treatment plant. When the buffertank is full or during maintenance the sewage shall be diverted to flow into the Sydney water sewer main.

4.3 Flow Modelling

Each section of catchment has its own characteristics. It is estimated that the catchment flow to sewer consists of the following hydraulic breakdown:

Functional Area	Percentage Breakdown
Commercial	~53%
Retail	~9%
Residential	~31%
Hotel	~7%

Table 4-1 - General Flow Weighting from Various Sources (C.Rust 2012)

4.4 Diurnal Flow of Each Source

Each Functional area has it's own daily flow patterns a typical flow pattern for each area is shown below. The raw data is provided in Attachment A

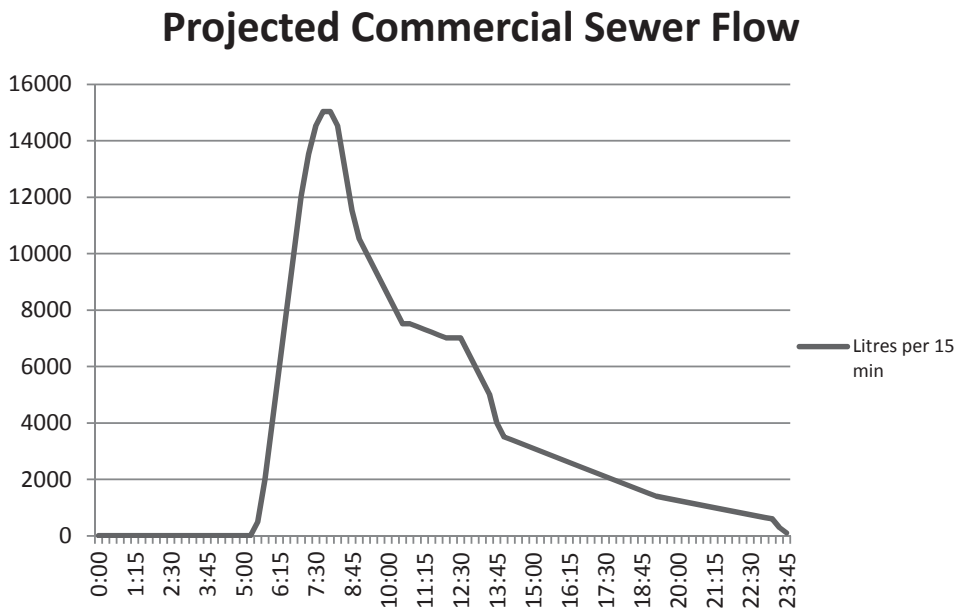

Figure 4-1 Projected Commercial Sewer Flows

Figure 4-2 Projected Residential Sewage Flows

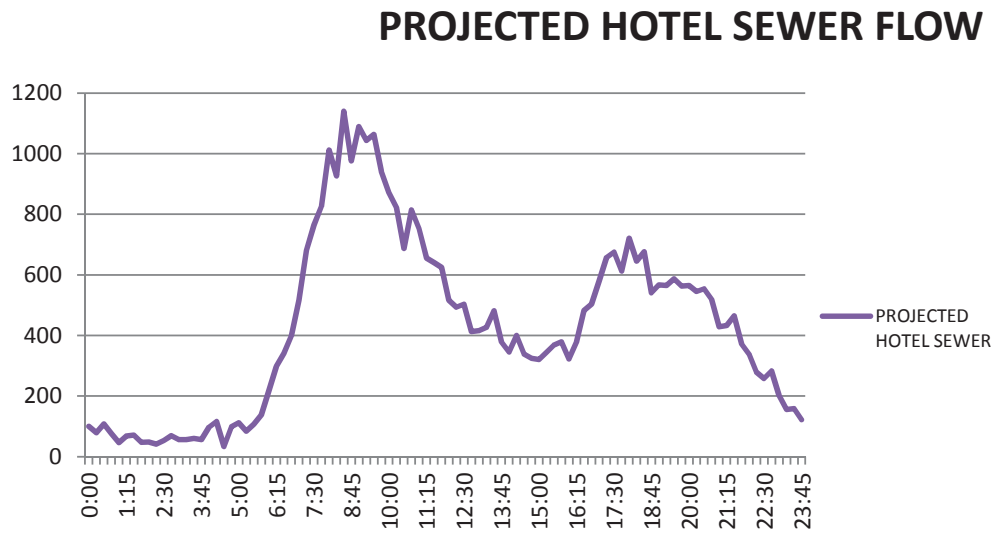

Figure 4-3 Projected Hotel Sewage Flows

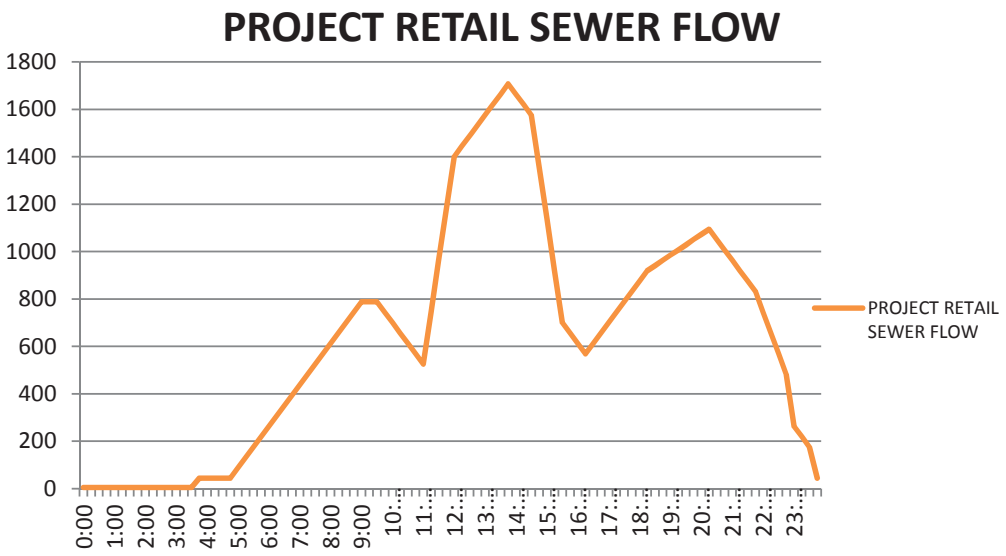

Figure 4-4 Projected Retail Sewage Flows

4.5 Diurnal Flow of Total Site

The following projected combined flow pattern for all of Barangaroo is detailed below:

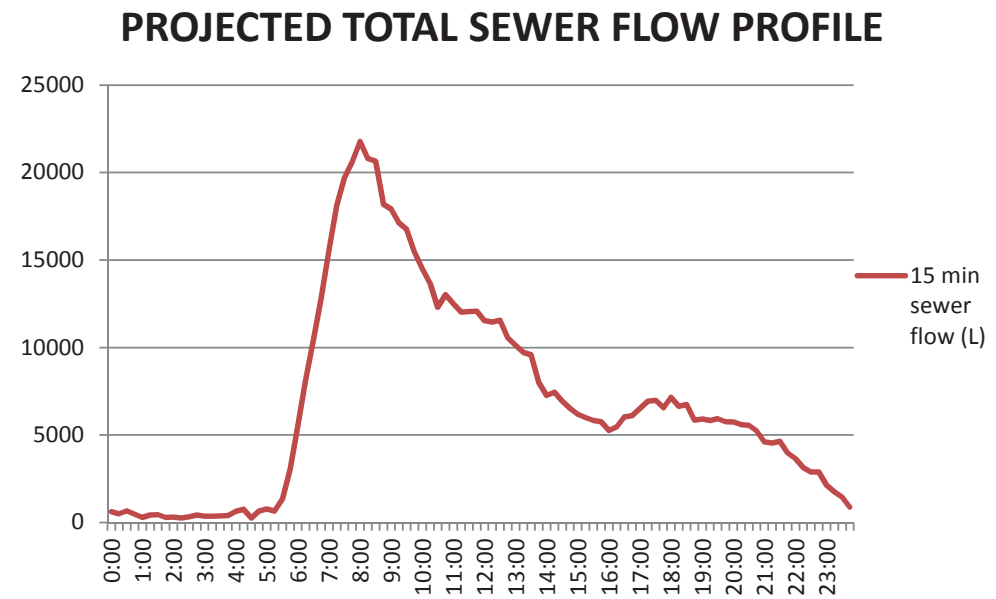

Figure 4-5 Projected Combined Sewage Flows

5 SEWER MINING

A Sewer mining operation will be required to make up the difference between required sewage volumes to produce recycled water quantities for achieving Project objectives and the volume of waste water captured from Barangaroo. The sewer mining connection shall be from the Sydney Water sewer main in Hickson Road. A copy of the full sewer mining report can be found in Attachment B

A sewer mining assessment was conducted by Peter Gordon of Permeate Partners to ascertain the volume and quality of the sewage available from the Hicksons Road sewer main. The results are indicated the following sections.

In periods where recycled water demand exceeds the sewage production from Barangaroo South/Central, the Barangaroo Recycled Water Plant will source additional sewage via sewer mining from a Sydney Water sewer in Hickson Rd.

Lend Lease engaged Manly Hydraulics to install monitoring equipment at the proposed extraction point between 5th May 2012 and 23rd August 2012. A copy of the installation report is provided in Appendix A.

Flow, conductivity and temperature were logged at 15 minute intervals during this period. To further characterise the sewage three sampling events were undertaken on the 3rd July 2012 (Tuesday), 15th July 2012 (Sunday) and 22nd August 2012 (Wednesday).

Lend Lease engaged Permeate Partners to review the sewer mining flow and quality data provided by Manly Hydraulics. The results of the review are summarised below and detailed herein.

5.1 Total Daily Flow:

The average, maximum and minimum daily flow was 1,629kL/day, 2,351kL/day and 1,321kL/day respectively. Higher (~10%) than average flows were evident on Fridays and lower (~10%) then averagel flows were evident on Sundays.

5.2 Total daily flow:

Average flows picked up form ~10L/s @ 0600 and peaked at ~25L/s @ 0830. Average flow then stayed relatively constant at 20 to 25L/s until 2200. Between 2200 and 0600 the next day the average flow dropped from ~22L/s to 10L/s. Whilst a diurnal flow pattern was observed it appeared to be buffered by the mix of residential, commercial and residential activities in the catchment. In that typically low flows from residential coincided with typically high flows from commercial / retail and vice versa.

5.3 Impact of rainfall on flow:

A number of rainfall events occurred during the monitoring period. Only one rainfall event (~70mm) had any material impact (ie ~30% increase) on the sewer flow. This indicates that the sewer catchment currently suffers from very little inflow during rainfall events.

5.4 Impact of high tide on daily flow:

Spikes in conductivity (ie from <1mS/cm to >18mS/cm) were evident in the continuous monitoring. On further investigation these spikes appear to coincide with high tides exceeding 1.5m. A preliminary mass balance based

on conductivity indicates that seawater flow into the sewer can be up to 120kL/day. It is important to note the current level of seawater ingress will be influenced by sewer integrity and overall sea level rise. One or a combination of these factors may render the current proposed sewer mining location unfeasible at some point in the future. The sewer mining system needs to be programmed to only extract when the tide level is less 1.5m (adjustable) and should be provided with continuous conductivity monitoring to detect unacceptable sewage.

5.5 Lab results:

The analysis of the samples collected on the 3rd July 2012, 15th July 2012 and 22nd August 2012 were found to be typical of sewage from a catchment with commercial, residential and retail activities. The percentage of volatile solids were unusually high, however, this was confirmed by ALS.

Aside from a conductivity spike in the sewage between 1800 and 2300 on the 3rd July 2012, conditions in the sewer were normal during the sampling events.

Lend Lease personnel currently working on contaminated groundwater at the Barangaroo site should review the detailed analysis of the sewage to check if any of the parameters indicate groundwater infiltration into the sewer. If present, the nature and magnitude of this contamination may render the current proposed sewer mining location unfeasible now or at some point in the future.

5.6 Temperature:

The average, maximum and minimum temperature of the sewage during the monitoring period was 21.9 C, 26.95 C and 17.75 C respectively.

6 SOURCE WATER CHARACTERISATION

A source water characterisation was conducted by WJP Solutions to ascertain the mass loading of various nutrients feeding the proposed Water Recycling plant. The characterisation utilises information from previous sections in this report, however additional modelling of hydraulic loads as well as organic loads have been done in tandem during this process to maintain uniformity in the process. As a result, some figures may vary slightly with the findings in Section 4 of this report.

6.1 Existing Sites - Assessment

To understand the variations in the quality of wastewater discharging from various sites it was important to quantify the concentrations of various wastewater constituents. Sample results from operating commercial and retail plants are represented in the following table. Typical domestic wastewater figures are well known and understood. The Sewer Mining results are taken from Section 5 of this report.

SAMPLE DESCRIPTION	UNITS	TYPICAL COMMERCIAL WASTEWATER QUALITY	TYPICAL RETAIL WASTEWATER QUALITY	TYPICAL RESIDENTIAL WASTEWATER QUALITY	SEWER MINING WASTEWATER QUALITY
BOD_5	mg/l	800-900	500-800	250-300	150-320
Suspended Solids	mg/l	800-1000	500-950	250-300	200-390
Ph		7.5-8.5	6.8-7.5	7.5-8.5	7-8.2
Total Dissolved Solids	mg/l	750-1250	600-800	400-600	400-1550
COD	mg/l	2000-2500	1200-1700	500-600	500-1250
Ammonia Nitrogen as N	mg/l	140-160	50-85	50-70	NA
TKN as N	mg/l	200-270	70-120	60-80	50-70
Total Phosphorus as P	mg/l	30-40	7-20	8-12	6-10

Table 6-1 - Wastewater Constituents for Various Area Types

6.2 Dealing with Wastes of Concern

Within the catchment there are potential areas of concern that may generate wastes that must be managed including;

1. Chemical waste – (photographic, medical, cleaning, cooling tower)
2. Pharmaceutical waste (passed through the body or by preparation)
3. Infectious waste
4. Greasy Waste.

A full waste management strategy will encompass the entire site. As a preliminary indication, the following management strategies are to be adopted:

Waste	Management
Chemical Waste	Pre-treatment of acidic waste using interceptors Identification, Storage and Disposal of wastes not to be discharged to sewer Holding periods for waste (radioactive)

Pharmaceutical Waste	Address in treatment process design and distribution management
Infectious waste	Address in treatment process design and distribution management
Greasy Waste	Pre-treatment of food and greasy waste using interceptors. Ensure regular maintenance occurs through well documented management plan

Table 6-2 Types of Potential Wastes Generated from Barangaroo

6.3 Mass Loading Calculation Method

The area schedule was used to develop a hydraulic and mass loading model for Barangaroo. Population indicators such as Gross Floor Areas, Net Lettable areas and bedrooms were used to determine populations for various sections of the development.

Treatment plant mass and hydraulic loadings were applied to the various population sectors within Barangaroo to determine the overall mass of organics and nutrients feeding the plant and by using a volumetric function to determine feedwater variation and concentration.

The recycled water supply shortfall for the Barangaroo site was then to be supplemented by sewer mining for an additional primary water source.

This information from the above process would then feed into the treatment plant design to finalise the sizing of major equipment and in particular the bioreactor.

6.4 Mass Loading Calculations

Allowance in the design model was made using the following parameters:

	Residential	Commercial	Retail Visitors	Retail Staff	Hotel Function	Hotel Accom.
EP Weighting	1	0.3	0.13	0.25	0.5	0.7
Flow (l/p/d)	100	20	6.5	12.5	2	100
BOD_5 (g/p/d)	50.0	15.0	6.5	12.5	25.0	35.0
TKN (g/p/d)	12.9	3.9	1.7	3.2	6.5	9.0
TP (g/p/d)	3.1	0.9	0.4	0.8	1.6	2.2

Table 6-3 Loading Factors Applied the Model

Attachment C contains the detailed Mass Loading Calculations for Stage 1 (June 2015), Stage 1a (December 2015), Stage 2 (December 2018) and Stage 2a (December 2020). The results are summarised below. It should be noted the significant reduction in organic and nutrient load to the plant during non-working days. The reduced loading is calculated by factoring in 10% occupancy rate for the commercial office space during these periods.

	Population June 2015	Population December 2015	Population December 2018	Population December 2020
BOD_5 (kg/d) Non- Working Day	280	525	603	635
BOD_5 (kg/d) Weekend	48	129	213	244
TKN (kg/d) Working Day	72	135	156	164
TKN (kg/d) Weekend	12	33	55	63
TP (kg/d) Working Day	17	33	37	39
TP (kg/d) Weekend	3	8	13	15

Table 6-4 Total Mass Loading

6.5 The Effects of Staging

Construction staging of the site reveals several challenges for the treatment process. In the early stages of development the on-site sewage is mostly generated by commercial developments resulting in higher strength wastewater. This can have an impact on staging the treatment process. As two bioreactors are proposed for the site staging time can be critical.

A summary of the characterisation process can be seen in Table 6.5.

Given that sewer mining is available during this period, it may be pertinent to increase the sewer mining / on-site collection ratio for the early stages of the project. During the final stages of the project the increased residential sewage will reduce the specific mass loading to the plant by as much as 40 percent.

			30/06/2015		31/12/2015		30/06/2018		30/06/2020	
			Working	Non-Working	Working	Non-Working	Working	Non-Working	Working	Non-Working
Hydraulic loading	Onsite	kl/day	339	79	440	150	604	341	668	404
Hydraulic loading	Sewer Mining	kl/day	0	260	90	380	204	467	243	507
COMBINED		kl/day	339	339	530	530	808	808	911	911
Percentage Mining			**0%**	**77%**	**17%**	**72%**	**25%**	**58%**	**27%**	**56%**
BOD Mass loading	Onsite	kg/day	280	48	330	129	603	213	635	244
BOD Mass loading	Sewer Mining	kg/day	0	65	27.3	95	51	116.8	35	101
COMBINED		kg/day	280	113	357.3	224	654	329.8	670	345
Concentration		**mg/l**	**826**	**333**	**674**	**423**	**809**	**408**	**735**	**379**
TN Mass loading	Onsite	kg/day	72	12	85	33	156	55	164	63
TN Mass loading	Sewer Mining	kg/day	0	15.6	6.5	22.8	12.2	28	8.4	24.2
COMBINED		kg/day	72	27.6	91.5	55.8	168.2	83	172	87
Concentration		mg/l	**212**	**81**	**173**	**105**	**208**	**103**	**189**	**96**
TP Mass loading	Onsite	kg/day	17	3	20	8	37	13	39	15
TP Mass loading	Sewer Mining	kg/day	0	2.1	0.9	3	1.6	3.7	1.1	3.2
COMBINED		kg/day	17	5.1	20.9	11	38.6	16.7	40	18
Concentration		mg/l	**50**	**15**	**39**	**21**	**48**	**21**	**44**	**20**

Table 6-5 Summary of Sewage Characterisation

In many cases the wastewater strength is high with the exception of non-working days. This is largely due to the significant commercial component of the site.

6.6 Other Considerations

From the sewer mining report, it is clear that ingress of saltwater from Darling Harbour into the Hicksons Rd sewer will require consideration. It is feasible to extract water outside high tide periods, however, a conductivity sensor on the sewer mining feed and a method of returning salty water back to sewer will dictate when the Hickson Road sewer will or won't be mined.

ATTACHMENT A – RAW FLOW DATA

ATTACHMENT B – SEWER MINING REPORT

ATTACHMENT C – MASS LOADING PROJECTIONS

BARANGAROO RECYCLED WATER PLANT
REVIEW OF SEWER MINING FLOW AND QUALITY DATA

Submitted to : **Lend Lease**
Laze Kelepurovski

Submitted by : **Permeate Partners**
Peter Gordon

Date : 23rd November 2012

PROPRIETARY AND CONFIDENTIAL INFORMATION

The attached document contains proprietary and confidential information and is submitted under a confidential relationship for the purpose defined below.

Purpose : *Review of sewer mining flow and quality data for the proposed sewer mining source for the Barangaroo Recycled Water Plant.*

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DOCUMENT STATUS

Revision	Date	Comments	Author	Review
A – DRAFT	21/08/12	Issued as DRAFT.	PBG	KRD
B – DRAFT	23/10/12	Issued as FINAL DRAFT.	PBG	KRD
A	23/11/12	Issued as FINAL.	PBG	KRD

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. EXECUTIVE SUMMARY

In periods where recycled water demand exceeds the sewage production from Barangaroo South / Central, the Barangaroo Recycled Water Plant will source additional sewage via sewer mining from a Sydney Water sewer in Hickson Rd.

Lend Lease engaged Manly Hydraulics to install monitoring equipment at the proposed extraction point between 5th May 2012 and 23rd August 2012. A copy of the installation report is provided in Appendix A.

Flow, conductivity and temperature were logged at 15 minute intervals during this period. To further characterise the sewage three sampling events were undertaken on the 3rd July 2012 (Tuesday), 15th July 2012 (Sunday) and 22nd August 2012 (Wednesday).

Lend Lease engaged Permeate Partners to review the sewer mining flow and quality data provided by Manly Hydraulics. The results of the review are summarised below and detailed herein.

Total daily flow : The average, maximum and minimum daily flow was 1,629kL/day, 2,351kL/day and 1,321kL/day respectively. Higher (~10%) than average flows were evident on Fridays and lower (~10%) then average flows were evident on Sundays.

Total daily flow : Average flows picked up from ~10L/s @ 0600 and peaked at ~25L/s @ 0830. Average flow then stayed relatively constant at 20 to 25L/s until 2200. Between 2200 and 0600 the next day the average flow dropped from ~22L/s to 10L/s. Whilst a diurnal flow pattern was observed it appeared to be buffered by the mix of residential, commercial and residential activities in the catchment. In that typically low flows from residential coincided with typically high flows from commercial / retail and vice versa.

Impact of rainfall on flow : A number of rainfall events occurred during the monitoring period. Only one rainfall event (~70mm) had any material impact (ie ~30% increase) on the sewer flow. This indicates that the sewer catchment currently suffers from very little inflow during rainfall events.

Impact of high tide on daily flow : Spikes in conductivity (ie from <1mS/cm to >18mS/cm) were evident in the continuous monitoring. On further investigation these spikes appear to coincide with high tides exceeding 1.5m. A preliminary mass balance based on conductivity indicates that seawater flow into the sewer can be up to 120kL/day. **It is important to note the current level of seawater ingress will be influenced by sewer integrity and overall sea level rise. One or a combination of these factors may render the current proposed sewer mining location unfeasible at some point in the future. The sewer mining system needs to be programmed to only extract when the tide level is less 1.5m (adjustable) and should be provided with continuous conductivity monitoring to detect unacceptable sewage.**

Lab results : The analysis of the samples collected on the 3rd July 2012, 15th July 2012 and 22nd August 2012 were found to be typical of sewage from a catchment with commercial, residential and retail activities. The percentage of volatile solids were unusually high, however, this was confirmed by ALS.

Aside from a conductivity spike in the sewage between 1800 and 2300 on the 3rd July 2012, conditions in the sewer were normal during the sampling events.

Lab results (cont'd) : **Lend Lease personnel currently working on contaminated groundwater at the Barangaroo site should review the detailed analysis of the sewage to check if any of the parameters indicate groundwater infiltration into the sewer. If present, the nature and magnitude of this contamination may render the current proposed sewer mining location unfeasible now or at some point in the future.**

Temperature : The average, maximum and minimum temperature of the sewage during the monitoring period was 21.9°C, 26.95°C and 17.75°C respectively.

2. REVIEW OF FLOW DATA

2.1 Total daily flow

Figure (1) details the total daily flow for the monitoring period. The average, maximum and minimum daily flow was 1,629kL/day, 2,351kL/day and 1,321kL/day respectively.

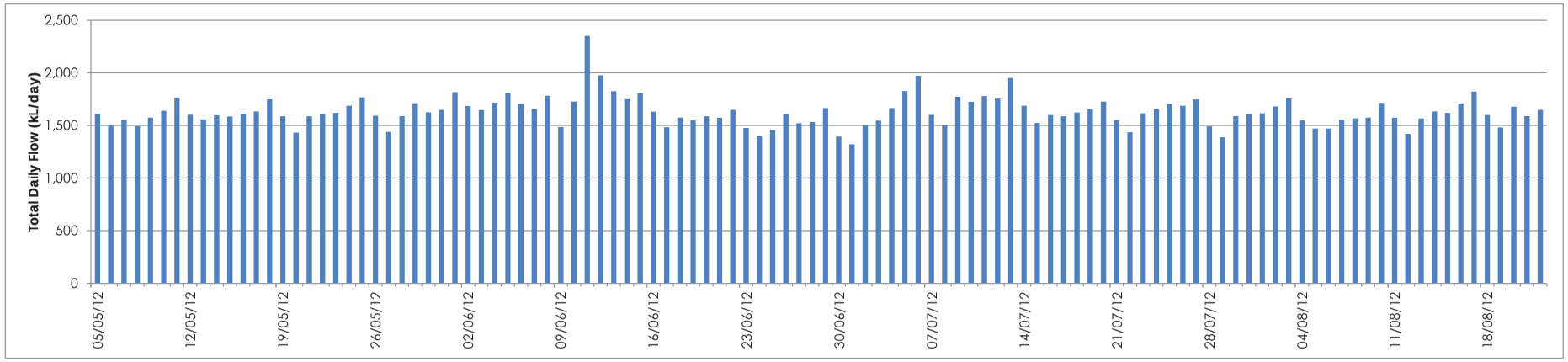


Figure (1) – Total daily flow

2.2 Instantaneous flow

Figure (2) details the average, minimum and maximum values recorded for instantaneous flow during each 15 minute period (over 24 hours) during the monitoring period.

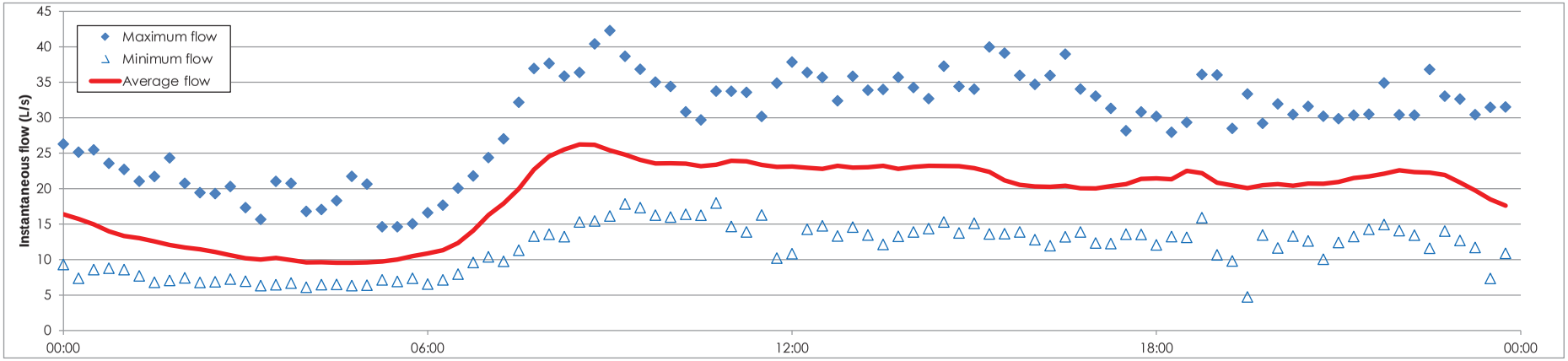


Figure (2) – Instantaneous flow

2.3 Impact of rainfall on daily flow

Figure (3) highlights that there is currently minimum inflow into the sewer catchment during rainfall events.

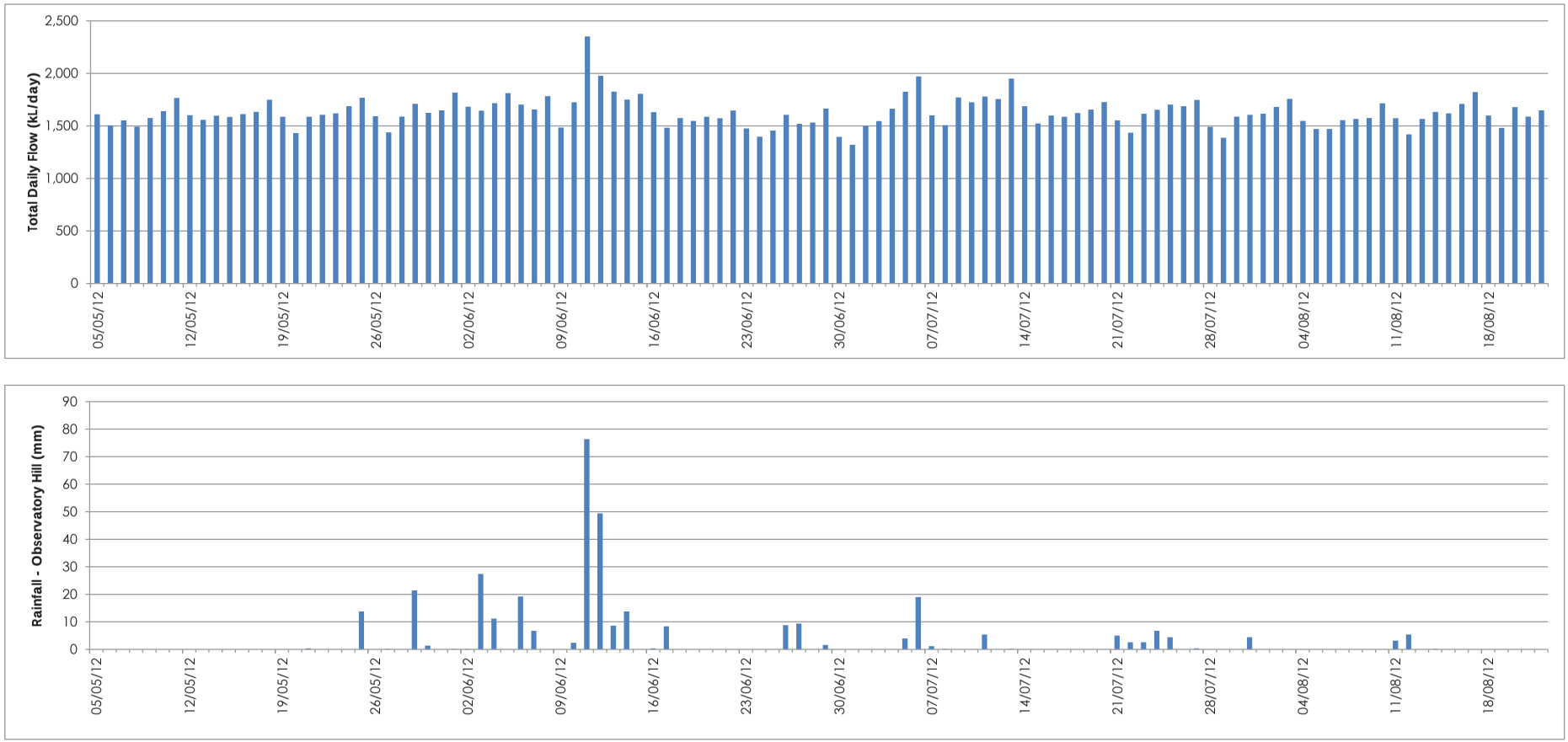


Figure (3) – Total daily flow and rainfall events

2.4 Impact of high tide on daily flow

Figure (4) details the conductivity during the flow monitoring period. The average, maximum and minimum conductivity was 1.47mS/cm, 18.34mS/cm and 0.27mS/cm respectively.

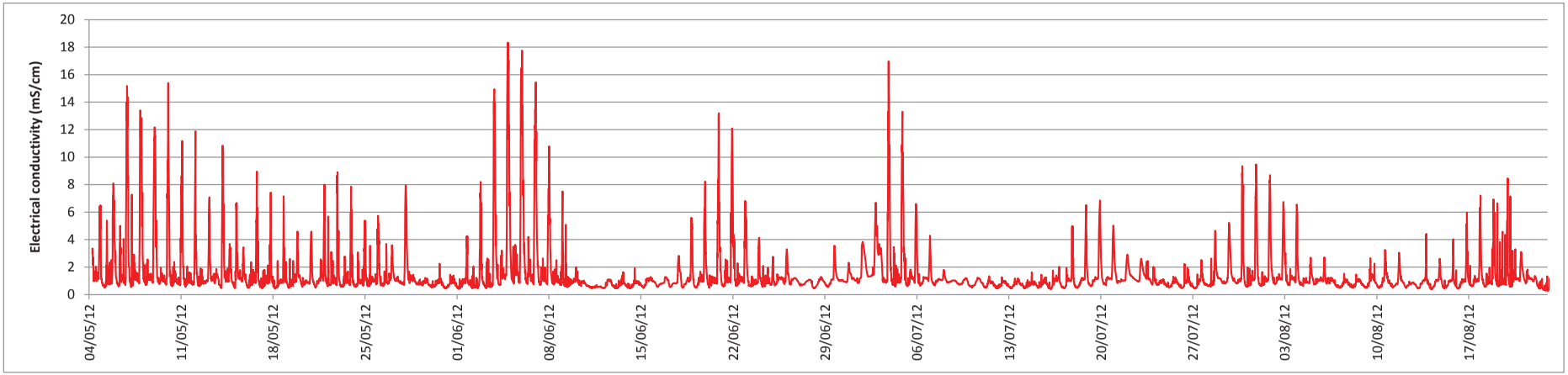


Figure (4) – Conductivity

Figure (5) was generated assuming a conductivity of 1mS/cm for sewage and 50mS/cm for seawater.

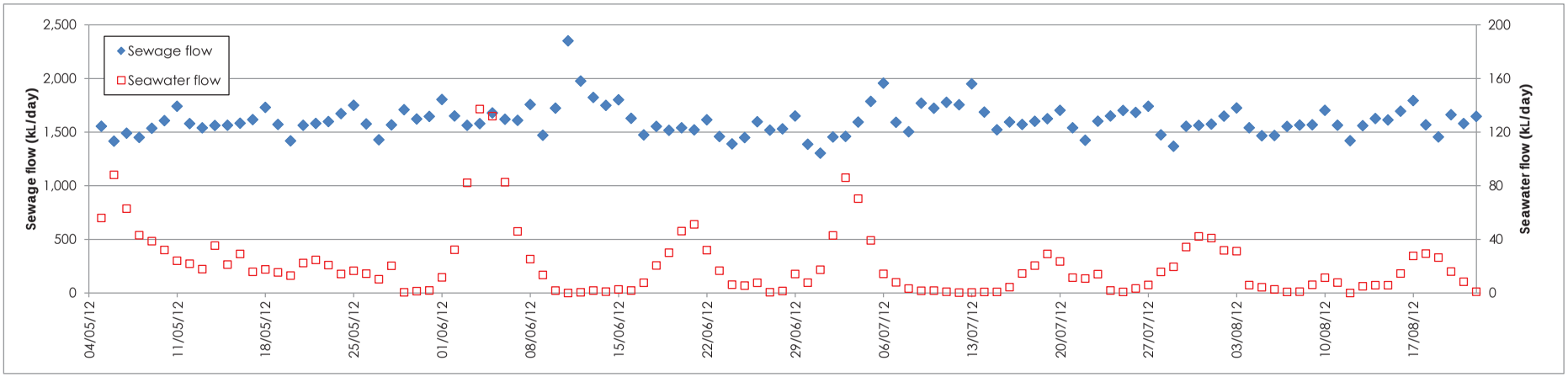


Figure (5) – Estimated seawater contribution to daily flow

Figure (6) was generated to understand the impact of high tide on seawater ingress into the sewer. It highlights that there are currently opportunities to harvest sewage only (ie no seawater) when the tide is less than ~1.5m. The tide information for Darling Harbour was sourced from http://tides.willyweather.com.au/nsw/sydney/darling-harbour.html. Whilst Figure (6) only covers the period 29th July 2012 to 2nd August 2012, a similar phenomenon was evident throughout the monitoring period.

Note : It is important to note the current level of seawater ingress will be influenced by sewer integrity and overall sea level rise. One or a combination of these factors may render the current proposed sewer mining location unfeasible at some point in the future. The sewer mining system needs to be programmed to only extract when the tide level is less 1.5m (adjustable) and should be provided with continuous conductivity monitoring to detect unacceptable sewage.

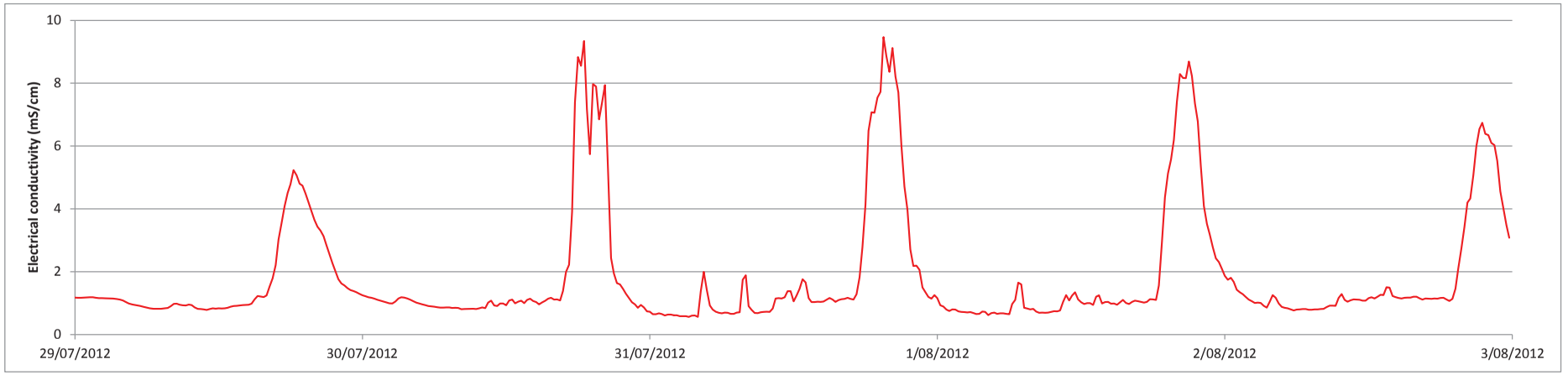


Figure (6) – Impact of high tide on seawater ingress

3. REVIEW OF QUALITY DATA

3.1 Lab results

Table (1) summarises the lab results for the quality data. Copies of lab reports are provided in Appendix B.

Table (1) – Lab results for quality data

Parameter	Units	Weekday sample – 3rd July 2012 (ES1216519)							Weekend sample – 15th July 2012 (ES1217431)							Weekday sample – 22nd August 2012 (ES1220484)						
		04:00 04/07	08:00 03/07	12:00 03/07	16:00 03/07	20:00 03/07	Combined	Flow weighted	04:00 15/07	08:00 15/07	12:00 15/07	16:00 15/07	20:00 15/07	Combined	Flow weighted	04:00 23/08	08:00 22/08	12:00 22/08	16:00 22/08	20:00 22/08	Combined	Flow weighted
Flow at time sample was taken	L/s	7.6	24.4	24.5	20.2	20.9			10.4	17.0	18.4	15.7	18.3			9.95	28.0	23.3	22.8	20.0		
pH	-	7.40	7.62	7.65	7.87	7.16	7.50	7.56	7.40	7.83	7.27	7.81	7.09	7.33	7.47	7.94	8.48	8.12	8.07	8.23	7.76	8.21
Total dissolved solids	mg/L	752	625	508	496	5800	1,530	1,530	678	364	356	446	475	396	445	328	338	360	417	972	397	481
Total suspended solids	mg/L	28	357	402	431	286	388	343	55	246	238	224	224	208	210	136	220	372	596	536	282	389
Volatile suspended solids	mg/L	NR	NR	NR	NR	NR	NR	NR	55	246	238	224	224	NR	210	136	220	372	596	536	282	389
Total hardness as $CaCO_3$	mg/L	192	147	113	80	991	282	309	NR	NR	NR	NR	NR	83	NR	80	69	71	78	156	83	89
Total alkalinity as $CaCO_3$	mg/L	94	200	303	330	198	239	244	91	253	238	224	224	155	216	192	241	219	229	252	232	230
Sulfate as SO_4	mg/L	48	42	51	34	364	107	112	NR	NR	NR	NR	NR	41	NR	29	30	30	31	48	30	33
Chloride	mg/L	398	310	232	147	3200	759	882	NR	NR	NR	NR	NR	125	NR	120	96	107	113	358	107	154
Calcium	mg/L	34	26	24	19	77	34	36	NR	NR	NR	NR	NR	20	NR	19	16	17	18	26	20	19
Magnesium	mg/L	26	20	13	8	194	48	53	NR	NR	NR	NR	NR	8	NR	8	7	7	8	22	8	10
Sodium	mg/L	224	177	142	93	1720	465	485	NR	NR	NR	NR	NR	72	NR	68	69	63	68	198	72	92
Potassium	mg/L	13	19	44	42	90	42	45	NR	NR	NR	NR	NR	16	NR	13	16	16	20	37	21	21
Nitrite as N	mg/L	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	NR	NR	NR	NR	NR	<0.01	NR	<0.01	<0.01	<0.01	<0.01	0.12	0.13	0.03
Nitrate as N	mg/L	0.27	0.09	0.03	0.02	0.03	0.04	0.06	0.20	0.04	<0.01	0.02	0.02	0.02	0.05	0.04	0.09	0.09	0.24	0.12	0.08	0.12
Total Kjedahl Nitrogen as N	mg/L	12.3	55.8	90.0	99.2	49.8	69.7	69	12.4	67.6	47.2	63.0	52.1	7.4	51	47.1	58.2	47.7	72.8	71.6	73.6	61
Total Nitrogen as N	mg/L	12.6	55.9	90.0	99.2	49.8	69.7	69	12.6	67.6	47.2	63.0	52.1	7.4	51	47.1	58.3	47.8	73	71.8	73.8	61
Total Phosphorus as P	mg/L	1.30	9.09	11.4	13.2	7.80	8.74	9.6	1.41	7.84	5.93	7.74	6.86	0.94	6.3	4.96	7.41	8.45	10.2	8.15	7.5	8.2
Total Anions	meq/L	14.1	13.6	13.7	11.4	102	28.4	32.1	NR	NR	NR	NR	NR	7.48	NR	7.83	8.15	8.02	8.41	16.1	8.28	9.7
Total Cations	meq/L	13.9	11.1	9.57	6.73	96.9	27.0	28.4	NR	NR	NR	NR	NR	5.20	NR	4.9	4.79	4.57	5.03	12.7	5.33	6.3
Ionic balance	%	0.69	10.1	17.6	26.0	2.47	2.66	12.9	NR	NR	NR	NR	NR	18	NR	23	26	27.4	25.2	12	21.7	23.2
Oil & Grease	mg/L	<5	234	15	57	37	48	82	9	21	25	38	74	32	35.9	10	25	37	35	34	37	30
Chemical oxygen demand	mg/L	82	461	1,040	955	676	902	725	192	527	560	906	659	527	596	375	358	2,160	2,250	784	941	1,259
Biological oxygen demand	mg/L	36	225	353	359	449	342	318	48	112	177	218	304	159	184	46	125	242	322	408	115	241
E-coli	cfu/100mL	$2.6x10^6$	$5.9x10^6$	$1.0x10^6$	$1.6x10^7$	$2.4x10^7$	$2.0x10^7$	$1.0x10^7$	NR	NR	NR	NR	NR	$4.6x10^7$		NR	NR	NR	NR	NR	$9.0x10^6$	
Clostridia perfringens	orgs/100mL	NS	NS	NS	NS	NS	$5.0x10^4$		NS	NS	NS	NS	NS	$2.0x10^4$		NS	NS	NS	NS	NS	$6x10^3$	
Somatic Coliphage	pfu/100mL	NS	NS	NS	NS	NS	$2.5x10^5$		NS	NS	NS	NS	NS	$1.1x10^5$		NS	NS	NS	NS	NS	$1.2x10^6$	
Monocyclic aromatic compounds	µg/L	NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL	
Oxygenated compounds	µg/L	NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL	
Sulfonated compounds	µg/L	NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL	
Fumigants	µg/L	NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL	
Halogenated aliphatic compounds	µg/L	NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL	
Halogenated aromatic compounds	µg/L	NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL	
Trihalomethanes	µg/L	NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL	
Napthalene	µg/L	NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL	
Total petroleum hydrocarbons – C6 to C9	µg/L	NS	NS	NS	NS	NS	120		NS	NS	NS	NS	NS	BDL		NS	NS	NS	NS	NS	BDL	
Total petroleum hydrocarbons – C10 to C36	µg/L	NS	NS	NS	NS	NS	22,600		NS	NS	NS	NS	NS	16,500		NS	NS	NS	NS	NS	11,600	

NOTES:
1) NS = Not analysed / NR = No result / BDL = Below detection limit
2) Composite sample collected as equal mix of individual samples.
3) Flow weighted sample calculated by proportioning instantaneous results based on instantaneous flow.

3.2 Conditions in sewer at time of sampling

Figure (7), Figure (8) and Figure (9) detail the conditions in the sewer at the time of sampling on the 3rd July, 15th July and 22nd August respectively. No rainfall was recorded on any of the sampling days.

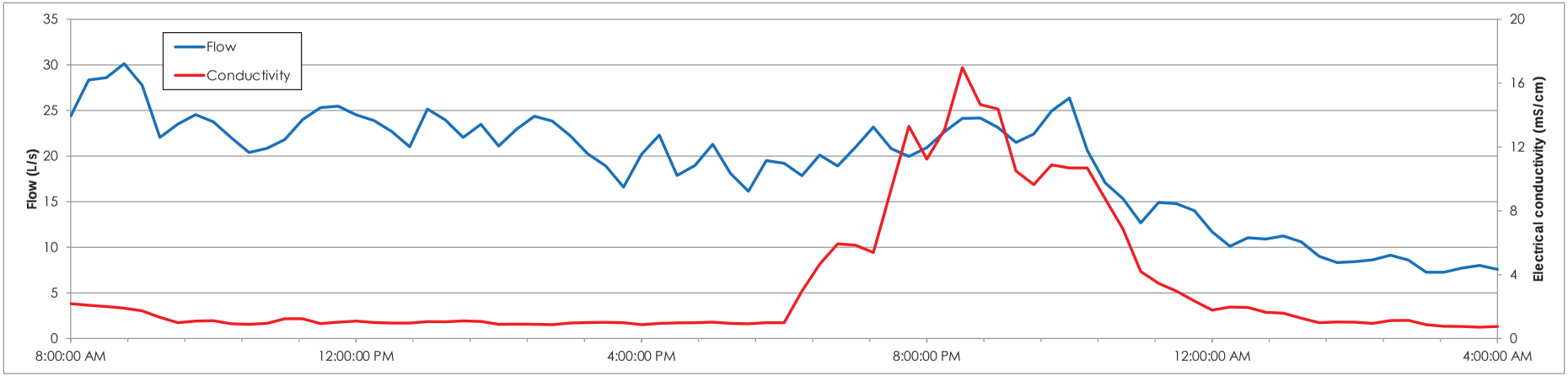


Figure (7) – Flow and conductivity of the liquid in the sewer during sampling event from 0800 3rd July 2012 to 0400 4th July 2012

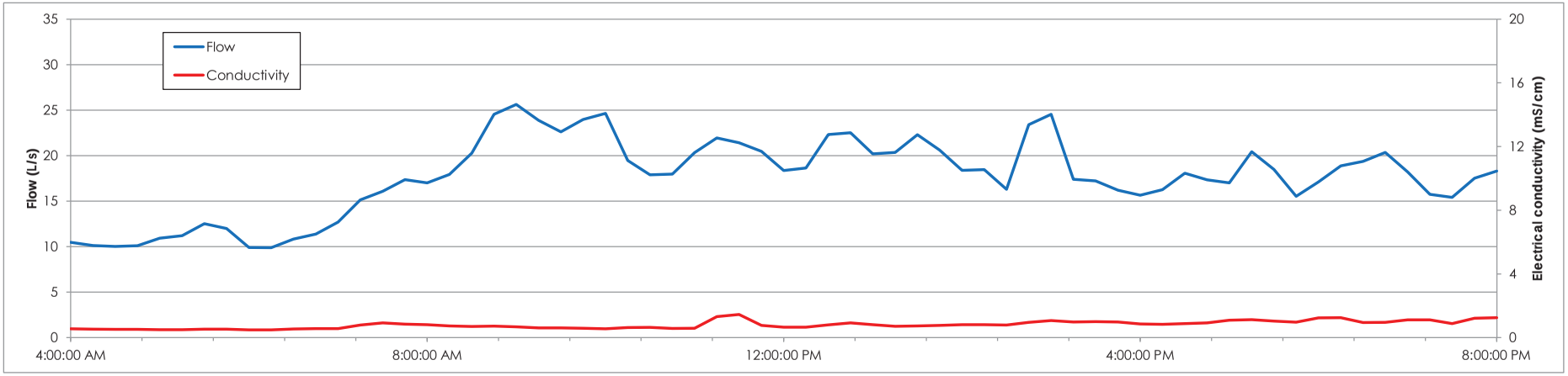


Figure (8) – Flow and conductivity of the liquid in the sewer during sampling event from 0400 15th July 2012 to 2000 15th July 2012

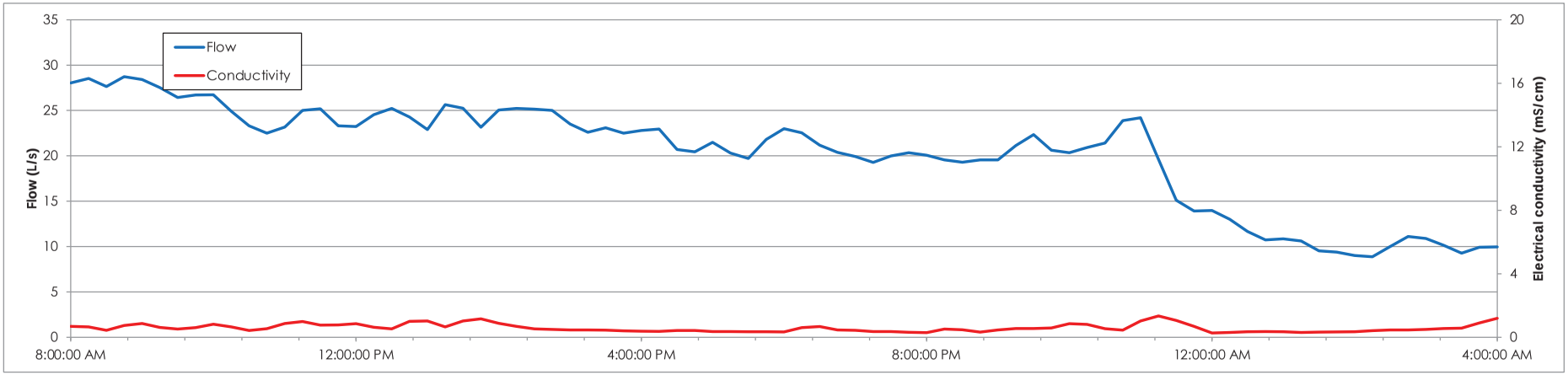


Figure (9) – Flow and conductivity of the liquid in the sewer during sampling event from 0800 22nd August 2012 to 0400 23rd August 2012

Lend Lease personnel currently working on contaminated groundwater at the Barangaroo site should review the detailed analysis of the sewage to check if any of the parameters indicate groundwater infiltration into the sewer. If present, the nature and magnitude of this contamination may render the current proposed sewer mining location unfeasible now or at some point in the future.

3.3 Temperature

Figure (10) details the temperature of the liquid in the sewer during the monitoring period. The average, maximum and minimum temperature was 21.9°C, 26.95°C and 17.75°C respectively.

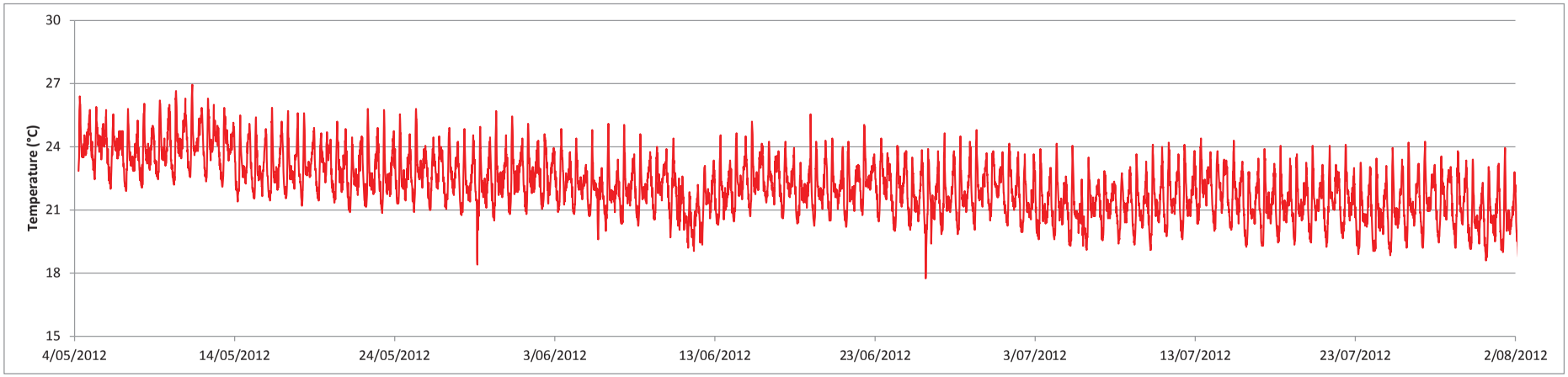


Figure (10) – Temperature

APPENDIX A – INSTALLATION REPORT FOR MONITORING EQUIPMENT

Public Works
Manly Hydraulics Laboratory

110B King Street
Manly Vale NSW 2093
T 02 9949 0200 **F** 02 9948 6185 **TTY** 1300 301 181
ABN 81 913 830 179 www.mhl.nsw.gov.au

23 October 2012

Lend Lease
30 The Bond,
30 Hickson Road,
Millers Point NSW 2000 Australia

Attention; **Laze Kelepurovski**

Sewer Flow, Conductivity and Sampling - BARANGAROO

As requested in the brief, please find attached the flow and conductivity data from the initial download presented as a plot and with a excel file.

For Edward Couriel
Principal Engineer
Manly Hydraulics Laboratory

Installation Sheets

Contract	Barrahgaroo Sewer Mining			Contract No.	na
HYDSYS No.	na	na		Data Phone No.	na
UBD Ref.		MGA Zone 56/1 Co-ord: East		Northing	
Address	Hickson Road				
Access	Manhole in centre of roadway, upstream of SPS 1129	Line		Access Chamber	
Inspection Date	4/5/12	Inspected By	Peter Davidson and Brett Glover		
Installation Date	4/512 05:00	Installed By	Peter Davidson and Brett Glover		

Traffic	Lid Type	Step Irons	Frame	System
☐ Heavy	☒ Gatic	☒ Intact	☐ Elevated	☒ Residential
☒ Moderate	☐	☐ Broken	☒ Normal	☐ Commercial
☐ Light	☐ Double	☐ Poor	☐ Misaligned	☐ Industrial
☐ None	☐ Hook	☐ None	☐ Other	☐ Other
	☐ Other			

Traffic Control: TCP required

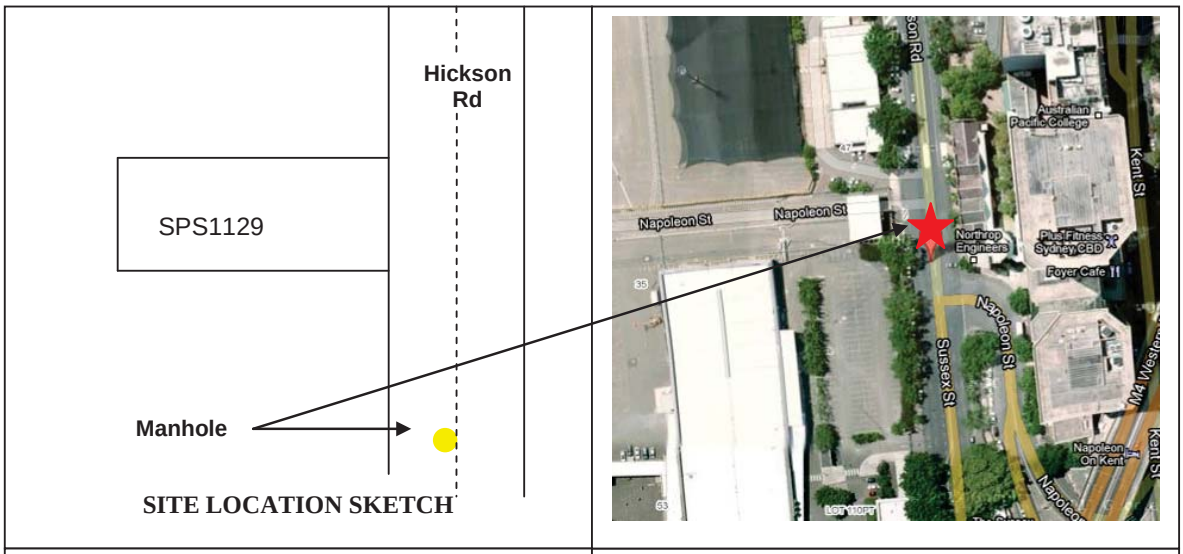
Site Specific: MHL standard

Atmospheric Conditions

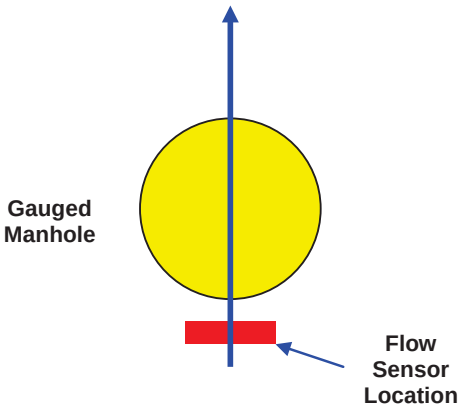
H_2S	0
CO	0
O_2	20.8
LEL	0

Pipe Dimensions	450 mm			Pipe	circular		
Pipe Type	clay	Silt Depth	0.000 m	Silt Type	na		
Manhole Depth to Invert	6 m	Overflow	Level Above	N/A	Surcharge	Level Above	nil
Hydraulic Characteristics	smooth uniform flow ;						
U/S Manhole Conditions	na	D/S Manhole Conditions	na				
Weir: Yes ☐ No ☒	Weir Structure Material		Weir Plate Asset No.	N/A			
Height of Cease to Flow Above	N/A	Height of Weir (Cease to Flow to	N/A				
Constriction: Yes ☐ No ☒	Height Above						
Logger	HVFLO	Date of Manufacture					
Logger ID	163						
Sensor ID	34987	Slope	0.34526	Range of Level Sensor	4 m		

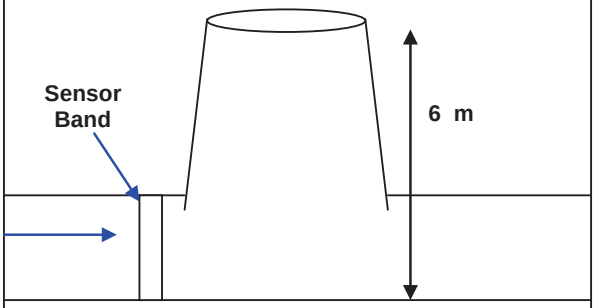
General Comments: At installation; velocity = 0.47 m/s depth = 0.090 m Conductivity = 0.6 mS/cm
Predicted high tide 1.64 m at 6.13 am



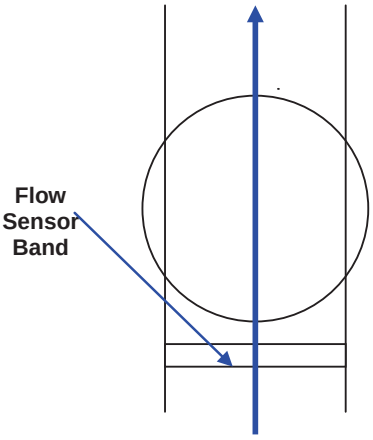
SITE LOCATION SKETCH



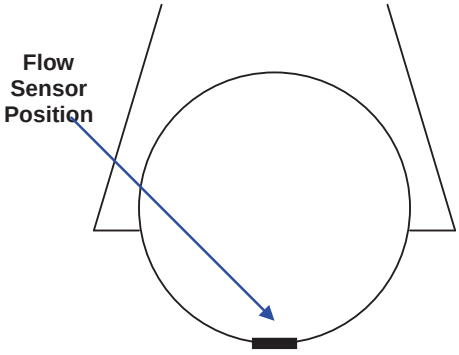
SEWER PLAN



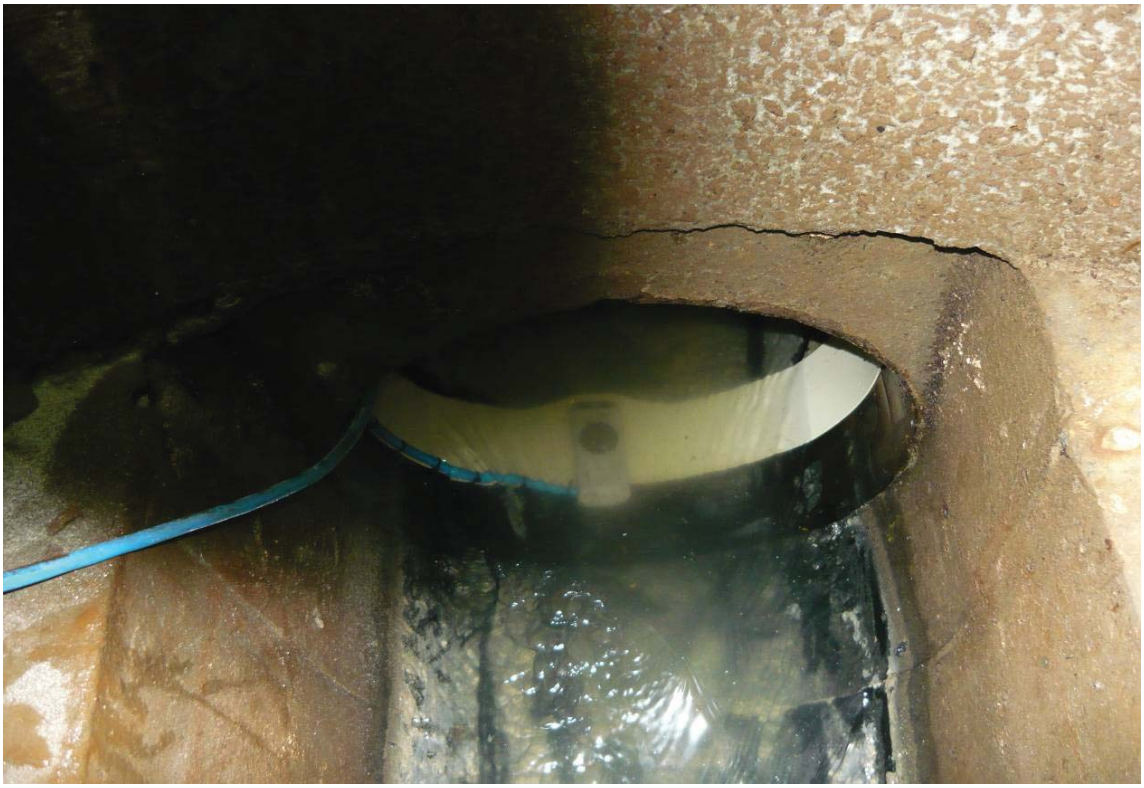
MONITORING POINT CROSS-SECTION

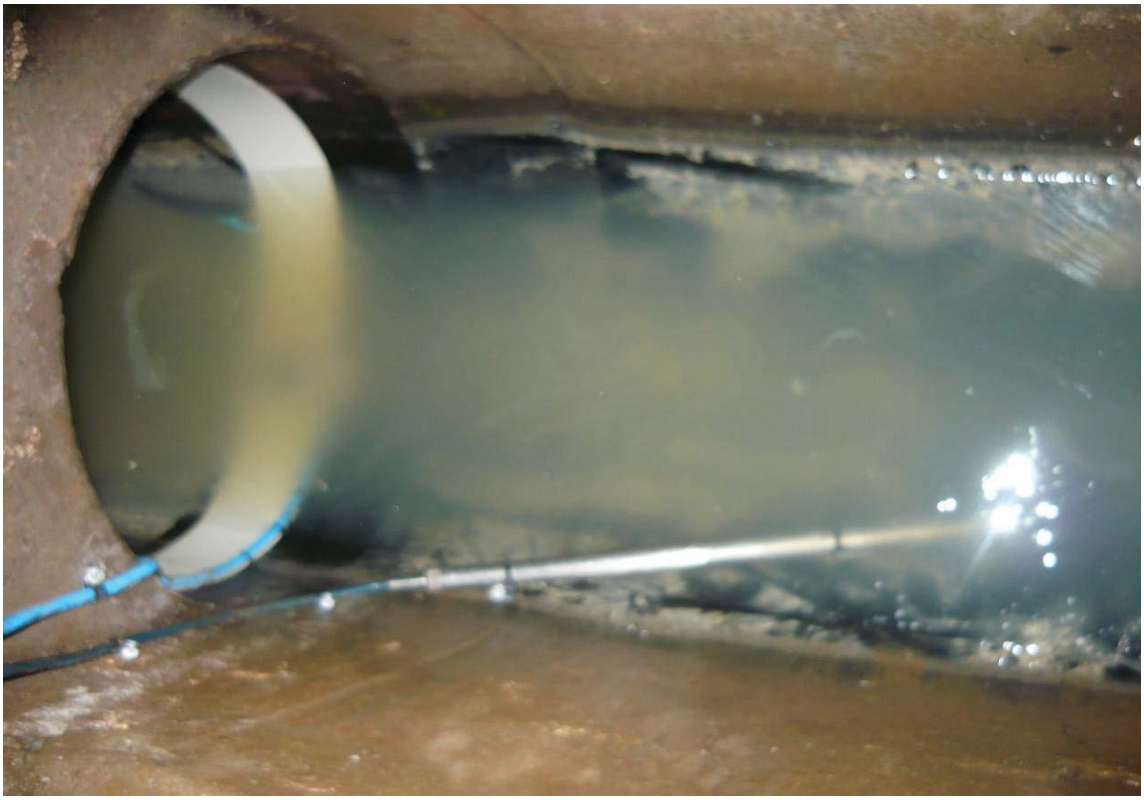


MONITORING POINT PLAN



MONITORING POINT CROSS-SECTION





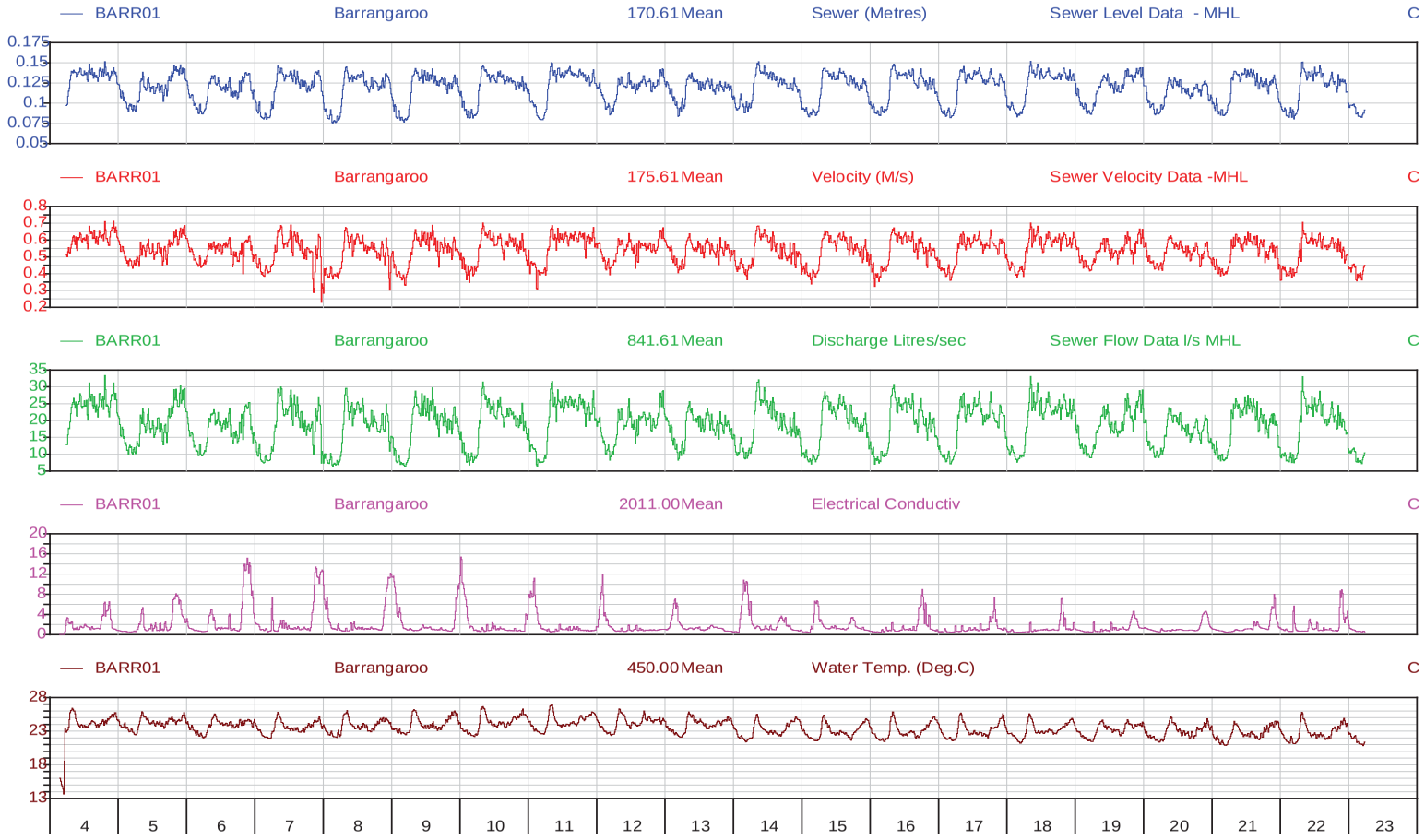
Installation looking upstream

Installation looking downstream

Manly Hydraulics Laboratory

HYPLOT V133 Output 23/05/2012

Period	20 Day	Plot Start	00:00_04/05/2012	2012
Interval	15 Minute	Plot End	00:00_24/05/2012	



APPENDIX B – LAB REPORTS

ALS Group

Environmental Division (Water Resources Group)

CERTIFICATE OF ANALYSIS

Batch No:	**12-30683**	*Page*	Page 1 of 2
Final Report	314738	*Laboratory*	Scoresby Laboratory
		Address	Caribbean Business Park, 22 Dalmore Drive, Scoresby, VIC 3179
Client:	**Australian Laboratory Services Pty Ltd**	*Phone*	03 8756 8000
		Fax	03 9763 1862
Contact:	**Jacob Waugh**	Contact:	Ximena Iglesias
Address:	277-284 Woodpark Road SMITHFIELD NSW 2164		Client Manager Ximena.Iglesias@alsglobal.com
Client Program Ref:	**ES1216519**	Date Sampled:	03-Jul-2012
ALS Program Ref:	**ALSNSW**	Date Samples Received:	05-Jul-2012
PO No:	**402948**	*Date Issued:*	**11-Jul-2012**

The sample(s) referred to in this report were analysed by the following method(s):
- NATA accreditation does not cover the performance of this service

Analysis	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*
Clostridia MF	MW506	Scoresby	**Somatic Coliphage DA**	MW535	Scoresby			

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Sample received outside of holding time for microbiological tests.

Signatories
These results have been electronically signed by the authorised signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11

Name	*Title*	*Name*	*Title*
Betty Le	**Analyst**	**Natacha Begue**	**Microbiologist**

Batch No: **12-30683**
Report Number: **314738**
Client: **Australian Laboratory Services Pty Ltd**
Client Program Ref: **ES1216519**

LOR = Limit of reporting. When a reported LOR is higher than the standard LOR, this may be due to high moisture content, insufficient sample or matrix interference.
CAS Number = Chemistry Abstract Services Number. The analytical procedures in this report (including in house methods) are developed from internationally recognised procedures such as those published by USEPA, APHA and NEPM.

				Sample No.	3097645
				Client Sample ID	ES1216519-6
				Sample Date	03/07/12
				Sample Type	WATER
Analysis	**Analyte**	**CAS #**	**LOR**		
Clostridia MF	Sulphite reducing Clostridia (Spores)		0	orgs/100mL	62000 HTEX
Clostridia MF	Clostridium perfringens		0	orgs/100mL	50000 HTEX
Analysis	**Analyte**	**CAS #**	**LOR**		
Somatic Coliphage	Somatic Coliphage Double Agar Layer			pfu/100mL	250000 HTEX

HTEX Holding time was not met. Therefore result may be indicative.

Samples tested as received. A blank space indicates no test performed. Soil results expressed in mg/kg dry weight unless specified otherwise. Microbiological testing was commenced within 24 hours of sampling unless otherwise stated. VIC-MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate. VIC-MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate. Calculated results are based on raw data.

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1216519**	Page	: 1 of 9
Client	: **DEPARTMENT OF FINANCE AND SERVICES**	Laboratory	: Environmental Division Sydney
Contact	: PETER DAVIDSON	Contact	: Client Services
Address	: LEVEL 13 McKELL BUILDING 2-24 RAWSON PLACE SYDNEY NSW, AUSTRALIA 2000	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: pdavidson@mhl.nsw.gov.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 02 99490200	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 99486185	Facsimile	: +61-2-8784 8500
Project	: BOVIS- BARRANGAROO	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 04-JUL-2012
Sampler	: MD	Issue Date	: 13-JUL-2012
Site	: ----		
		No. of samples received	: 6
Quote number	: SY/279/10	No. of samples analysed	: 6

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Evie.Sidarta	Inorganic Chemist	Sydney Inorganics
Hoa Nguyen	Inorganic Chemist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Sarah Axisa	Microbiologist	Sydney Microbiology
Sarah Millington	Senior Inorganic Chemist	Sydney Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **EN055 - PG: Ionic Balance out of acceptable limits for various samples due to analytes not quantified in this report.**
- **Microbiological Comment: Membrane filtration results are reported as approximate (~) due to the growth of bacteria on the filter membrane being counted <10cfu and/or >100cfu. It may be informative to record this fact.**
- **MW006 is ALS's internal code and is equivalent to AS4276.7.**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: 1	2	3	4	5
				Client sampling date / time: 03-JUL-2012 08:00	03-JUL-2012 12:00	03-JUL-2012 16:00	03-JUL-2012 20:00	04-JUL-2012 04:00
				ES1216519-001	ES1216519-002	ES1216519-003	ES1216519-004	ES1216519-005
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.62	7.65	7.87	7.16	7.40
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	625	508	496	5800	752
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	357	402	431	286	28
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	147	113	80	991	192
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	200	303	330	198	94
Total Alkalinity as CaCO3	----	1	mg/L	200	303	330	198	94
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	42	51	34	364	48
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	310	232	147	3200	398
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	26	24	19	77	34
Magnesium	7439-95-4	1	mg/L	20	13	8	194	26
Sodium	7440-23-5	1	mg/L	177	142	93	1720	224
Potassium	7440-09-7	1	mg/L	19	44	42	90	13
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	0.08
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.09	0.03	0.02	0.03	0.19
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.09	0.03	0.02	0.03	0.27
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	55.8	90.0	99.2	49.8	12.3
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	55.9	90.0	99.2	49.8	12.6
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	9.09	11.4	13.2	7.80	1.30
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	13.6	13.7	11.4	102	14.1

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: 1	2	3	4	5
				Client sampling date / time: 03-JUL-2012 08:00	03-JUL-2012 12:00	03-JUL-2012 16:00	03-JUL-2012 20:00	04-JUL-2012 04:00
				ES1216519-001	ES1216519-002	ES1216519-003	ES1216519-004	ES1216519-005
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	**11.1**	**9.57**	**6.73**	**96.9**	**13.9**
Ionic Balance	----	0.01	%	**10.1**	**17.6**	**26.0**	**2.47**	**0.69**
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	**234**	**15**	**57**	**37**	<5
EP026ST: Chemical Oxygen Demand (Sealed Tube)								
Chemical Oxygen Demand	----	5	mg/L	**461**	**1040**	**955**	**676**	**82**
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	**225**	**353**	**359**	**449**	**36**
MW006: Faecal Coliforms & E.coli by MF								
Escherichia coli	Ecoli	1	CFU/100mL	**5900000**	**~1000000**	**16000000**	**24000000**	**~2600000**

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: 6	----	----	----	----
				Client sampling date / time: 03-JUL-2012 15:00	----	----	----	----
				ES1216519-006	----	----	----	----
EA005P: pH by PC Titrator								
pH Value	----	0.01	pH Unit	7.50	----	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-210-010	10	mg/L	1530	----	----	----	----
EA025: Suspended Solids								
Suspended Solids (SS)	----	5	mg/L	388	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg/L	282	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	----	----	----	----
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	239	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg/L	239	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	107	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	16887-00-6	1	mg/L	759	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	34	----	----	----	----
Magnesium	7439-95-4	1	mg/L	48	----	----	----	----
Sodium	7440-23-5	1	mg/L	465	----	----	----	----
Potassium	7440-09-7	1	mg/L	42	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	0.01	mg/L	<0.01	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	0.04	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	0.04	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	69.7	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	69.7	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	8.74	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	0.01	meq/L	28.4	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: 6	----	----	----	----
				Client sampling date / time: 03-JUL-2012 15:00	----	----	----	----
				ES1216519-006	----	----	----	----
EN055: Ionic Balance - Continued								
Total Cations	----	0.01	meq/L	27.0	----	----	----	----
Ionic Balance	----	0.01	%	2.66	----	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	5	mg/L	48	----	----	----	----
EP026ST: Chemical Oxygen Demand (Sealed Tube)								
Chemical Oxygen Demand	----	5	mg/L	902	----	----	----	----
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg/L	342	----	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	71-43-2	1	µg/L	<1	----	----	----	----
Toluene	108-88-3	2	µg/L	<2	----	----	----	----
Ethylbenzene	100-41-4	2	µg/L	<2	----	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	2	µg/L	<2	----	----	----	----
Styrene	100-42-5	5	µg/L	<5	----	----	----	----
ortho-Xylene	95-47-6	2	µg/L	<2	----	----	----	----
Isopropylbenzene	98-82-8	5	µg/L	<5	----	----	----	----
n-Propylbenzene	103-65-1	5	µg/L	<5	----	----	----	----
1.3.5-Trimethylbenzene	108-67-8	5	µg/L	<5	----	----	----	----
sec-Butylbenzene	135-98-8	5	µg/L	<5	----	----	----	----
1.2.4-Trimethylbenzene	95-63-6	5	µg/L	<5	----	----	----	----
tert-Butylbenzene	98-06-6	5	µg/L	<5	----	----	----	----
p-Isopropyltoluene	99-87-6	5	µg/L	<5	----	----	----	----
n-Butylbenzene	104-51-8	5	µg/L	<5	----	----	----	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	108-05-4	50	µg/L	<50	----	----	----	----
2-Butanone (MEK)	78-93-3	50	µg/L	<50	----	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	50	µg/L	<50	----	----	----	----
2-Hexanone (MBK)	591-78-6	50	µg/L	<50	----	----	----	----
EP074C: Sulfonated Compounds								
Carbon disulfide	75-15-0	5	µg/L	<5	----	----	----	----
EP074D: Fumigants								
2.2-Dichloropropane	594-20-7	5	µg/L	<5	----	----	----	----
1.2-Dichloropropane	78-87-5	5	µg/L	<5	----	----	----	----
cis-1.3-Dichloropropylene	10061-01-5	5	µg/L	<5	----	----	----	----
trans-1.3-Dichloropropylene	10061-02-6	5	µg/L	<5	----	----	----	----
1.2-Dibromoethane (EDB)	106-93-4	5	µg/L	<5	----	----	----	----

Analytical Results

Sub-Matrix: **WATER**

Compound	CAS Number	LOR	Unit	Client sample ID: 6	----	----	----	----
				Client sampling date / time: 03-JUL-2012 15:00	----	----	----	----
				ES1216519-006	----	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	75-71-8	50	µg/L	<50	----	----	----	----
Chloromethane	74-87-3	50	µg/L	<50	----	----	----	----
Vinyl chloride	75-01-4	50	µg/L	<50	----	----	----	----
Bromomethane	74-83-9	50	µg/L	<50	----	----	----	----
Chloroethane	75-00-3	50	µg/L	<50	----	----	----	----
Trichlorofluoromethane	75-69-4	50	µg/L	<50	----	----	----	----
1.1-Dichloroethene	75-35-4	5	µg/L	<5	----	----	----	----
Iodomethane	74-88-4	5	µg/L	<5	----	----	----	----
trans-1.2-Dichloroethene	156-60-5	5	µg/L	<5	----	----	----	----
1.1-Dichloroethane	75-34-3	5	µg/L	<5	----	----	----	----
cis-1.2-Dichloroethene	156-59-2	5	µg/L	<5	----	----	----	----
1.1.1-Trichloroethane	71-55-6	5	µg/L	<5	----	----	----	----
1.1-Dichloropropylene	563-58-6	5	µg/L	<5	----	----	----	----
Carbon Tetrachloride	56-23-5	5	µg/L	<5	----	----	----	----
1.2-Dichloroethane	107-06-2	5	µg/L	<5	----	----	----	----
Trichloroethene	79-01-6	5	µg/L	<5	----	----	----	----
Dibromomethane	74-95-3	5	µg/L	<5	----	----	----	----
1.1.2-Trichloroethane	79-00-5	5	µg/L	<5	----	----	----	----
1.3-Dichloropropane	142-28-9	5	µg/L	<5	----	----	----	----
Tetrachloroethene	127-18-4	5	µg/L	<5	----	----	----	----
1.1.1.2-Tetrachloroethane	630-20-6	5	µg/L	<5	----	----	----	----
trans-1.4-Dichloro-2-butene	110-57-6	5	µg/L	<5	----	----	----	----
cis-1.4-Dichloro-2-butene	1476-11-5	5	µg/L	<5	----	----	----	----
1.1.2.2-Tetrachloroethane	79-34-5	5	µg/L	<5	----	----	----	----
1.2.3-Trichloropropane	96-18-4	5	µg/L	<5	----	----	----	----
Pentachloroethane	76-01-7	5	µg/L	<5	----	----	----	----
1.2-Dibromo-3-chloropropane	96-12-8	5	µg/L	<5	----	----	----	----
Hexachlorobutadiene	87-68-3	5	µg/L	<5	----	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	108-90-7	5	µg/L	<5	----	----	----	----
Bromobenzene	108-86-1	5	µg/L	<5	----	----	----	----
2-Chlorotoluene	95-49-8	5	µg/L	<5	----	----	----	----
4-Chlorotoluene	106-43-4	5	µg/L	<5	----	----	----	----
1.3-Dichlorobenzene	541-73-1	5	µg/L	<5	----	----	----	----
1.4-Dichlorobenzene	106-46-7	5	µg/L	<5	----	----	----	----
1.2-Dichlorobenzene	95-50-1	5	µg/L	<5	----	----	----	----

Analytical Results

Sub-Matrix: WATER				Client sample ID	6	----	----	----	----
				Client sampling date / time	03-JUL-2012 15:00	----	----	----	----
Compound	CAS Number	LOR	Unit		ES1216519-006	----	----	----	----
EP074F: Halogenated Aromatic Compounds - Continued									
1.2.4-Trichlorobenzene	120-82-1	5	µg/L		<5	----	----	----	----
1.2.3-Trichlorobenzene	87-61-6	5	µg/L		<5	----	----	----	----
EP074G: Trihalomethanes									
Chloroform	67-66-3	5	µg/L		<5	----	----	----	----
Bromodichloromethane	75-27-4	5	µg/L		<5	----	----	----	----
Dibromochloromethane	124-48-1	5	µg/L		<5	----	----	----	----
Bromoform	75-25-2	5	µg/L		<5	----	----	----	----
EP074H: Naphthalene									
Naphthalene	91-20-3	7	µg/L		<7	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	20	µg/L		120	----	----	----	----
C10 - C14 Fraction	----	50	µg/L		820	----	----	----	----
C15 - C28 Fraction	----	100	µg/L		18400	----	----	----	----
C29 - C36 Fraction	----	50	µg/L		3350	----	----	----	----
^ C10 - C36 Fraction (sum)	----	50	µg/L		22600	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft									
C6 - C10 Fraction	----	20	µg/L		130	----	----	----	----
>C10 - C16 Fraction	----	100	µg/L		1440	----	----	----	----
>C16 - C34 Fraction	----	100	µg/L		27000	----	----	----	----
>C34 - C40 Fraction	----	100	µg/L		2150	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	100	µg/L		30600	----	----	----	----
MW006: Faecal Coliforms & E.coli by MF									
Escherichia coli	Ecoli	1	CFU/100mL		20000000	----	----	----	----
EP074S: VOC Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		113	----	----	----	----
Toluene-D8	2037-26-5	0.1	%		129	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		112	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		118	----	----	----	----
Toluene-D8	2037-26-5	0.1	%		129	----	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		117	----	----	----	----

Surrogate Control Limits

Sub-Matrix: **WATER**

Compound	CAS Number	Recovery Limits (%) Low	High
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	17060-07-0	78.3	133.2
Toluene-D8	2037-26-5	79.1	128.9
4-Bromofluorobenzene	460-00-4	80.8	123.7
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	71	137
Toluene-D8	2037-26-5	79	131
4-Bromofluorobenzene	460-00-4	70	128

ALS Group

Environmental Division (Water Resources Group)

CERTIFICATE OF ANALYSIS

t c:o3 Nbs	a1J6181B	*Page*	Page 1 of 2
Final Report	314782	*Laboratory*	Mcokesby Dabokatoky
		Address	Cakibbean Business PakR, 22 Nalmoke Nkive, Mcokesby, VTC 3189
Client:	Al r:ic2tcy LcWbic:bie SviProvr d:e L:5	*Phone*	03 7854 7000
		Fax	03 9843 1742
Contact:	ucobWg cl h3	Contact:	Ximena Tglesias
Address:	288-27Wd oopr akRSoap M THFETLDN 6Md 214W		Client l anagek Ximena.Tglesias@alsglobal.com
Client Program Ref:	ESa1aB96a	Nate Mamr lep:	15-Jul-2012
ALS Program Ref:	ALSNSg	Nate Mamr les Seceivep:	17-Jul-2012
PO No:	901446	*Date Issued:*	1-Jul 2f10a1

Hhe samr le(s) kefekkep to in this ker okt weke analysep by the following methop(s):
- 6AHA acckepitation poes not covek the r ekfokmance of this sekvice

Analysis	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*	*Analysis*	*Method*	*Laboratory*
C2br:ir5rc MF	l d 504	Mcokesby	Sbmc:ro Cb2p3chv DA	l d 535	Mcokesby			

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Mamr les keceivep outsipe of holping time fok mickobiological tests.

Signatories

These results have been electronically signed by the authorised signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11

Name	*Title*	*Name*	*Title*
t v::e Lv	Ayc2er:	Nc:co3c t vhl v	MroibWb2bhrr:

Page:	dchv 1 bf 1
Batch No:	a1J6181B
Report Number:	6a87B1
Client:	Al r:ic2cy LcWbic:bie SviProvr d:e L:5
Client Program Ref:	ESa1aB96a

LOR = Limit of reporting. When a reported LOR is higher than the standard LOR, this may be due to high moisture content, insufficient sample or matrix interference.
CAS Number = Chemistry Abstract Services Number. The analytical procedures in this report (including in house methods) are developed from internationally recognised procedures such as those published by USEPA, APHA and NEPM.

				Sample No.	3111684
				Client Sample ID	12
				Sample Date	15/07/12
				Sample Type	WATER
Analysis	**Analyte**	**CAS #**	**LOR**		
Clostridia MF	Clostridium perfringens		0	orgs/100mL	20000 HTEX
Analysis	**Analyte**	**CAS #**	**LOR**		
Somatic Coliphage	Somatic Coliphage Double Agar Layer			pfu/100mL	110000 HTEX

FHLX F olping time was not met. Hhekefoke kesult may be inpicative.

Samples tested as received. A blank space indicates no test performed. Soil results expressed in mg/kg dry weight unless specified otherwise. Microbiological testing was commenced within 24 hours of sampling unless otherwise stated. VIC-MM524: Plate count results <10 per mL and >300 per mL are deemed as approximate. VIC-MM526: Plate count results <2,500 per mL and >250,000 per mL are deemed as approximate. Calculated results are based on raw data.

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1217431**	Page	: 1 of L
i lrevy	: **DEPARTMENT OF FINANCE AND SERVICES**	bar otayotC	: EvmtovDevyal dmmsrov SCcveC
i ovyaTy	: PEREA dVI Cl SN3	i ovyaTy	: i lrevy SetmTes
Vcctess	: bEI Eb 19 MTKEbb BUCOd C3 G 2-25 AV4 SN3 PbVi E SWd 3 EW3 S4 YVUSRAVbCV 2, , ,	Vcctess	: 266-2L0 4 ooc7at8 Aoac SDnpfrelc 3 S4 Vksytalra 21h5
E-Dart	: 7camrcsovu Dpl@s. @om@k	E-Dart	: sCcveCu alsglor al@oD
Rele7pove	: wh1 , 2 0050, 2, ,	Rele7pove	: wh1-2-L6L5 L+++
FaTsrDrte	: wh1 , 2 005Lh1L+	FaTsrDrte	: wh1-2-L6L5 L+, ,
PtojeTy	: BNI CS 2-BEAAV3 GVANN	Qi bemel	: 3 EPM 1000 STpeckle B(9) avc VbS Qi S9 teqkrteDevy
Ntcet vkDr et	: ----		
i -N-i vkDr et	: ----	daye SaD7les AeTemrec	: 1h-JUb-2, 12
SaD7let	: Pd	Cske daye	: 2+-JUb-2, 12
Snye	: ----		
		3 o@f saD7les teTemrec	: h
Qkoye vkDr et	: SW260/1,	3 o@f saD7les avalCsec	: h

Rpns te7oty sk7etseces avC 7temroks te7oty(s) . nyp ypns tefetevTe@Aesklys a77lC yo ype saD7le(s) as skr Dnyec@Vll 7ages of ypns te7oty pame r eev TpeT8ec avc a77tomec fot telease@

Rpns i etynTaye of VvalCsns Tovyarvs ype follo. nvg nvfotDayrov:

- Gevetal i oDDevys
- VvalCynTal Aesklys
- Skttogaye i ovytol brDnys

NATA
WORLD RECOGNISED ACCREDITATION

3VRV VTTtecnyec bar otayotCL2+

VTTtecnyec fot ToD7lravTe . nyp CSN/CEi 16, 2+@

Signatories

Rpns coTkDevy pas r eev eleTytovnTallC snyvec r C ype akypotnzec snyvayotres nvcnTayec r elo. @ EleTytovnT snyvnvg pas r eev Tattrec okynv ToD7lravTe . nyp 7toTecktes s7eTrfrec nv 21 i FA Paty11@

Signatories	*Position*	*Accreditation Category*
Vv8nyJospn	Qvotgavn i peDrsy	SCcveCQvotgavnTs
i elrve i ovTenTao	Sevrot S7eTytosTo7rsy	SCcveCQvotgavnTs
Ec. avcCFacjat	NtgavnTi ootcnvayot	SCcveCNtgavnTs
Emre@rcatya	Qvotgavn i peDrsy	SCcveCQvotgavnTs
Hoa 3 gkCev	Qvotgavn i peDrsy	SCcveCQvotgavnTs
Satap Mnlnvgyov	Sevrot QvotgavnTi peDrsy	SCcveCQvotgavnTs
RovCd e Sokza	Sevrot MnTtor nologrsy	SCcveCMnTtor nologC

General Comments

Rpe avalOynTal 7toTecktes ksec rC ype EvmtlovDevyal dmmsnov pane reev cemelo7ec ftoD esyarlnspec nvyetvayovvallC teTogvnzec 7toTecktes skTp as ypose 7krlnspec rC ype USEPVY VPHVY VS avc 3EPM@ⓘ pokse cemelo7ec 7toTecktes ate eD7loCec nv ype ar sevTe of coTkDevyec syavcatcs ot r CTlnevyteqkesy@

4 pete Dorsykte ceyetDnvayov pas reev 7etfotDecYtesklys ate te7otyec ov a ctC. ergpyr asns@

4 pete a te7otyec less ypav (x) tesklyns prgpet ypav ype bNAYypns DaCr e cke yo 7tnDatCsaD7le e<ytaTycrgesyaye cnkyov avc/ot nvskffnTnevysaD7le fot avalCsns@

4 pete ype bNA of a te7otyec tesklycnffets ftoD syavcatc bNAYypns DaCr e cke yo prgp Dorsykte TovyevyYnvskffnTnevysaD7le (teckTec . ergpyeD7loCec) ot Daytn< nvyetfetevTe@

4 pev saD7lnvg ynDe nvfotDayov ns voy7tomncec rCype TlnevyYsaD7lnvg cayes ate spo. v . nypokya ynDe ToD7ovevy@ⓘ ypese nvsyavTesYype ynDe ToD7ovevypas reev asskDec rCype lar otayotCfot 7toTessnvg 7kt7oses@

KeC: i VS 3kDret = i VS tegnsytCvkDret ftoD cayar ase Danvyarvec rCi peDnTal Vr sytaTys SetmnTes@Rpe i peDnTal Vr sytaTys SetmnTe ns a cmnsnov of ype VDetnTav i peDnTal SoTnevC@
bNA = bnDnyof te7otynvg
^ = Rpns tesklyns ToD7kyec ftoD nvcmnckal avalCye ceyeTynovs ayot ar one ype lenel of te7otynvg

- **EN055 - PG: Ionic Balance out of acceptable limits for sample ID '12' due to analytes not quantified in this report.**
- **MW006 is ALS's internal code and is equivalent to AS4276.7.**

Analytical Results

Skr -Maytrs: WATER			Client sample ID	7	8	9	10	11
			Client sampling date / time	1+-JUb-2, 12 , 5:, ,	1+-JUb-2, 12 , L:, ,	1+-JUb-2, 12 12:, ,	1+-JUb-2, 12 1h:, ,	1+-JUb-2, 12 2, :, ,
Compound	CAS Number	LOR	Unit	ES1217431-001	ES1217431-002	ES1217431-003	ES1217431-004	ES1217431-005
EA005P: pH by PC Titrator								
pH Value	----	, @1	7H Uvry	7.40	7.83	7.27	7.81	7.09
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GⓈ-21, -, 1,	1,	Dg/b	678	364	356	446	475
EA025: Suspended Solids								
Suspended Solids (SS)	----	+	Dg/b	55	246	238	224	224
EA036: Fixed/Volatile Suspended Solids								
Volatile Suspended Solids @ 550°C	----	1	Dg/b	55	246	238	224	224
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	dMN-21, -, , 1	1	Dg/b	x1	x1	x1	x1	x1
Carbonate Alkalinity as CaCO3	9L12-92-h	1	Dg/b	x1	x1	x1	x1	x1
Bicarbonate Alkalinity as CaCO3	61-+2-9	1	Dg/b	91	253	157	235	160
Total Alkalinity as CaCO3	----	1	Dg/b	91	253	157	235	160
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	, @1	Dg/b	0.20	0.04	x, @1	0.02	0.02
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	, @	Dg/b	12.4	67.6	47.2	63.0	52.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	, @	Dg/b	12.6	67.6	47.2	63.0	52.1
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	, @1	Dg/b	1.41	7.84	5.93	7.74	6.86
EP020: Oil and Grease (O&G)								
Oil & Grease	----	+	Dg/b	9	21	25	38	74
EP026ST: Chemical Oxygen Demand (Sealed Tube)								
Chemical Oxygen Demand	----	+	Dg/b	192	527	560	906	659
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	Dg/b	48	112	177	218	304

Analytical Results

Skr-Mayt~: WATER			Client sample ID	12	----	----	----	----
			Client sampling date / time	1+-JUb-2, 12 1+:, ,	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1217431-006**	**----**	**----**	**----**	**----**
EA005P: pH by PC Titrator								
pH Value	----	, @1	7H Uvry	**7.33**	----	----	----	----
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GS-21, -, 1,	1,	Dg/b	**396**	----	----	----	----
EA025: Suspended Solids								
Suspended Solids (SS)	----	+	Dg/b	**208**	----	----	----	----
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	Dg/b	**83**	----	----	----	----
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	dMN-21, -, , 1	1	Dg/b	x1	----	----	----	----
Carbonate Alkalinity as CaCO3	9L12-92-h	1	Dg/b	x1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	61-+2-9	1	Dg/b	**155**	----	----	----	----
Total Alkalinity as CaCO3	----	1	Dg/b	**155**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	15L, L-60-L	1	Dg/b	**41**	----	----	----	----
ED045G: Chloride Discrete analyser								
Chloride	1hLL6-, , -h	1	Dg/b	**125**	----	----	----	----
ED093F: Dissolved Major Cations								
Calcium	655, -6, -2	1	Dg/b	**20**	----	----	----	----
Magnesium	6590-0+-5	1	Dg/b	**8**	----	----	----	----
Sodium	655, -29-+	1	Dg/b	**72**	----	----	----	----
Potassium	655, -, 0-6	1	Dg/b	**16**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	, @1	Dg/b	x, @1	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	15606-++-L	, @1	Dg/b	**0.02**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	, @1	Dg/b	**0.02**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	, @	Dg/b	**7.4**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
Total Nitrogen as N	----	, @	Dg/b	**7.4**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	, @1	Dg/b	**0.94**	----	----	----	----
EN055: Ionic Balance								
Total Anions	----	, @1	Deq/b	**7.48**	----	----	----	----

Analytical Results

Skr -Mayt~: WATER			Client sample ID	12	----	----	----	----
			Client sampling date / time	1+-JUb-2, 12 1+:, ,	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1217431-006**	**----**	**----**	**----**	**----**
EN055: Ionic Balance - Continued								
Total Cations	----	, @1	Deq/b	**5.20**	----	----	----	----
Ionic Balance	----	, @1	%	**18.0**	----	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	+	Dg/b	**32**	----	----	----	----
EP026ST: Chemical Oxygen Demand (Sealed Tube)								
Chemical Oxygen Demand	----	+	Dg/b	**527**	----	----	----	----
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	Dg/b	**159**	----	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	61-59-2	1	µg/b	x1	----	----	----	----
Toluene	1, L-LL-9	2	µg/b	x2	----	----	----	----
Ethylbenzene	1, , -51-5	2	µg/b	x2	----	----	----	----
meta- & para-Xylene	1, L-9L-9 1, h-52-9	2	µg/b	x2	----	----	----	----
Styrene	1, , -52-+	+	µg/b	x+	----	----	----	----
ortho-Xylene	0+-56-h	2	µg/b	x2	----	----	----	----
Isopropylbenzene	0L-L2-L	+	µg/b	x+	----	----	----	----
n-Propylbenzene	1, 9-h+-1	+	µg/b	x+	----	----	----	----
1.3.5-Trimethylbenzene	1, L-h6-L	+	µg/b	x+	----	----	----	----
sec-Butylbenzene	19+-0L-L	+	µg/b	x+	----	----	----	----
1.2.4-Trimethylbenzene	0+-h9-h	+	µg/b	x+	----	----	----	----
tert-Butylbenzene	0L-, h-h	+	µg/b	x+	----	----	----	----
p-Isopropyltoluene	00-L6-h	+	µg/b	x+	----	----	----	----
n-Butylbenzene	1, 5-+1-L	+	µg/b	x+	----	----	----	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	1, L-, +-5	+,	µg/b	x+,	----	----	----	----
2-Butanone (MEK)	6L-09-9	+,	µg/b	x+,	----	----	----	----
4-Methyl-2-pentanone (MIBK)	1, L-1, -1	+,	µg/b	x+,	----	----	----	----
2-Hexanone (MBK)	+01-6L-h	+,	µg/b	x+,	----	----	----	----
EP074C: Sulfonated Compounds								
Carbon disulfide	6+-1+-,	+	µg/b	x+	----	----	----	----
EP074D: Fumigants								
2.2-Dichloropropane	+05-2, -6	+	µg/b	x+	----	----	----	----
1.2-Dichloropropane	6L-L6-+	+	µg/b	x+	----	----	----	----
cis-1.3-Dichloropropylene	1, , h1-, 1-+	+	µg/b	x+	----	----	----	----
trans-1.3-Dichloropropylene	1, , h1-, 2-h	+	µg/b	x+	----	----	----	----
1.2-Dibromoethane (EDB)	1, h-09-5	+	µg/b	x+	----	----	----	----

Analytical Results

Skr -Mayt~: WATER				Client sample ID	12	----	----	----	----
				Client sampling date / time	1+-JUb-2, 12 1+:, ,	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**ES1217431-006**	**----**	**----**	**----**	**----**
EP074E: Halogenated Aliphatic Compounds									
Dichlorodifluoromethane	6+-61-L	+,	µg/b		x+,	----	----	----	----
Chloromethane	65-L6-9	+,	µg/b		x+,	----	----	----	----
Vinyl chloride	6+-, 1-5	+,	µg/b		x+,	----	----	----	----
Bromomethane	65-L9-0	+,	µg/b		x+,	----	----	----	----
Chloroethane	6+-, , -9	+,	µg/b		x+,	----	----	----	----
Trichlorofluoromethane	6+-h0-5	+,	µg/b		x+,	----	----	----	----
1.1-Dichloroethene	6+-9+-5	+	µg/b		x+	----	----	----	----
Iodomethane	65-LL-5	+	µg/b		x+	----	----	----	----
trans-1.2-Dichloroethene	1+h-h, -+	+	µg/b		x+	----	----	----	----
1.1-Dichloroethane	6+-95-9	+	µg/b		x+	----	----	----	----
cis-1.2-Dichloroethene	1+h-+0-2	+	µg/b		x+	----	----	----	----
1.1.1-Trichloroethane	61-++-h	+	µg/b		x+	----	----	----	----
1.1-Dichloropropylene	+h9-+L-h	+	µg/b		x+	----	----	----	----
Carbon Tetrachloride	+h-29-+	+	µg/b		x+	----	----	----	----
1.2-Dichloroethane	1, 6-, h-2	+	µg/b		x+	----	----	----	----
Trichloroethene	60-, 1-h	+	µg/b		x+	----	----	----	----
Dibromomethane	65-0+-9	+	µg/b		x+	----	----	----	----
1.1.2-Trichloroethane	60-, , -+	+	µg/b		x+	----	----	----	----
1.3-Dichloropropane	152-2L-0	+	µg/b		x+	----	----	----	----
Tetrachloroethene	126-1L-5	+	µg/b		x+	----	----	----	----
1.1.1.2-Tetrachloroethane	h9, -2, -h	+	µg/b		x+	----	----	----	----
trans-1.4-Dichloro-2-butene	11, -+6-h	+	µg/b		x+	----	----	----	----
cis-1.4-Dichloro-2-butene	156h-11-+	+	µg/b		x+	----	----	----	----
1.1.2.2-Tetrachloroethane	60-95-+	+	µg/b		x+	----	----	----	----
1.2.3-Trichloropropane	0h-1L-5	+	µg/b		x+	----	----	----	----
Pentachloroethane	6h-, 1-6	+	µg/b		x+	----	----	----	----
1.2-Dibromo-3-chloropropane	0h-12-L	+	µg/b		x+	----	----	----	----
Hexachlorobutadiene	L6-hL-9	+	µg/b		x+	----	----	----	----
EP074F: Halogenated Aromatic Compounds									
Chlorobenzene	1, L-0, -6	+	µg/b		x+	----	----	----	----
Bromobenzene	1, L-Lh-1	+	µg/b		x+	----	----	----	----
2-Chlorotoluene	0+-50-L	+	µg/b		x+	----	----	----	----
4-Chlorotoluene	1, h-59-5	+	µg/b		x+	----	----	----	----
1.3-Dichlorobenzene	+51-69-1	+	µg/b		x+	----	----	----	----
1.4-Dichlorobenzene	1, h-5h-6	+	µg/b		x+	----	----	----	----
1.2-Dichlorobenzene	0+-+, -1	+	µg/b		x+	----	----	----	----

Analytical Results

Skr -Mayt~: WATER				Client sample ID	12	----	----	----	----
				Client sampling date / time	1+-JUb-2, 12 1+:, ,	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**ES1217431-006**	**----**	**----**	**----**	**----**
EP074F: Halogenated Aromatic Compounds - Continued									
1.2.4-Trichlorobenzene	12, -L2-1	+	µg/b		x+	----	----	----	----
1.2.3-Trichlorobenzene	L6-h1-h	+	µg/b		x+	----	----	----	----
EP074G: Trihalomethanes									
Chloroform	h6-hh-9	+	µg/b		x+	----	----	----	----
Bromodichloromethane	6+-26-5	+	µg/b		x+	----	----	----	----
Dibromochloromethane	125-5L-1	+	µg/b		x+	----	----	----	----
Bromoform	6+-2+-2	+	µg/b		x+	----	----	----	----
EP074H: Naphthalene									
Naphthalene	01-2, -9	6	µg/b		x6	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	2,	µg/b		x2,	----	----	----	----
C10 - C14 Fraction	----	+,	µg/b		**750**	----	----	----	----
C15 - C28 Fraction	----	1, ,	µg/b		**13100**	----	----	----	----
C29 - C36 Fraction	----	+,	µg/b		**2620**	----	----	----	----
^ **C10 - C36 Fraction (sum)**	----	+,	µg/b		**16500**	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft									
C6 - C10 Fraction	----	2,	µg/b		x2,	----	----	----	----
>C10 - C16 Fraction	----	1, ,	µg/b		**1140**	----	----	----	----
>C16 - C34 Fraction	----	1, ,	µg/b		**14400**	----	----	----	----
>C34 - C40 Fraction	----	1, ,	µg/b		**1890**	----	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	1, ,	µg/b		**17400**	----	----	----	----
MW006: Faecal Coliforms & E.coli by MF									
Escherichia coli	EToln	1	i FU/1, , Db		**46000000**	----	----	----	----
EP074S: VOC Surrogates									
1.2-Dichloroethane-D4	16, h, -, 6-,	, @	%		**113**	----	----	----	----
Toluene-D8	2, 96-2h-+	, @	%		**126**	----	----	----	----
4-Bromofluorobenzene	5h, -, , -5	, @	%		**111**	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	16, h, -, 6-,	, @	%		**124**	----	----	----	----
Toluene-D8	2, 96-2h-+	, @	%		**119**	----	----	----	----
4-Bromofluorobenzene	5h, -, , -5	, @	%		**113**	----	----	----	----

Surrogate Control Limits

Skr-Maytrs: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	16, h, -, 6-,	6L@	199@
Toluene-D8	2, 96-2h-+	60@	12L@
4-Bromofluorobenzene	5h, -, , -5	L, @	129@
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	16, h, -, 6-,	61	196
Toluene-D8	2, 96-2h-+	60	191
4-Bromofluorobenzene	5h, -, , -5	6,	12L

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1220484**	Page	: 1 of 16
Client	: **DEPARTMENT OF FINANCE AND SERVICES**	Laboratory	: Environmental Division Sydney
Contact	: PETER DAVIDSON	Contact	: Client Services
Address	: LEVEL 13 McKELL BUILDING 2-25 RA4 SON PLACE SWDNEWNS4 YAUSTRALIA 2666	Address	: 2, , -290 4 ood7ar8 Road Smitpfield NS4 Akstralia 21h5
E-mail	: 7davidsonu mpl@s. @ov@k	E-mail	: sydneyu alsglobal@om
Tele7pone	: wh1 62 00506266	Tele7pone	: wh1-2-9, 95 9+++
Facsimile	: wh1 62 0059h19+	Facsimile	: wh1-2-9, 95 9+66
Project	: BOVIS -BERRANGAROO	QC Level	: NEPM 1000 Scpedkle B(3) and ALS QCS3 reqkirement
Order nkmber	: ----		
C-O-C nkmber	: ----	Date Sam7les Received	: 23-AUG-2612
Sam7ler	: PD	Isske Date	: 36-AUG-2612
Site	: ----		
		No@f sam7les received	: h
Qkote nkmber	: SW2, 0J16	No@f sam7les analysed	: h

Tpis re7ort sk7ersedes any 7revioks re7ort(s) . itp tpis reference@Reskits a77ly to tpe sam7le(s) as skbmitted@All 7ages of tpis re7ort pave been cpec8ed and a77roved for release@

Tpis Certificate of Analysis contains tpe follo. ing information:

- General Comments
- Analytical Reskits
- Skrrogate Control Limits

NATA Accredited Laboratory 92+

Accredited for com7liance . itp ISOJEC 1, 62+@

Signatories

Tpis dockment pas been electronically signed by tpe aktpori/ed signatories indicated belo. @ Electronic signing pas been carried okt in com7liance . itp 7rocedkres s7ecified in 21 CFR Part 11@

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior S7ectrosco7ist	Sydney Inorganics
zacob 4 akgp	Laboratory Coordinator	4 RG Skbcontracting
Pabi Skbba	Senior Organic Cpemist	Sydney Organics
Sarap Millington	Senior Inorganic Cpemist	Sydney Inorganics
Tony De Sok/ a	Senior Microbiologist	Sydney Microbiology

General Comments

Tpe analytical 7rocedkres ksed by tpe Environmental Division pave been develo7ed from establisped internationally recogni/ ed 7rocedkres skcp as tpose 7kblisped by tpe USEPAY APHAY AS and NEPM@In pokse develo7ed 7rocedkres are em7loyed in tpe absence of dockmented standards or by client reqkest@

4 pere moistkre determination pas been 7erformedYreskIts are re7orted on a dry . eigpt basis@

4 pere a re7orted less tpan (x) reskIt is pigper tpan tpe LORYtpis may be dke to 7rimary sam7le e<tract.Jigestate dilktion and.Jor inskfficient sam7le for analysis@

4 pere tpe LOR of a re7orted reskIt differs from standard LORYtpis may be dke to pigp moistkre contentYinskfficient sam7le (redkced . eigpt em7loyed) or matri< interference@

4 pen sam7ling time information is not 7rovided by tpe clientYsam7ling dates are spo. n . itpokt a time com7onent@In tpese instancesYtpe time com7onent pas been asskmed by tpe laboratory for 7rocessing 7kr7oses@

Key : CAS Nkmber = CAS registry nkmber from database maintained by Cpemical Abstracts Services@Tpe Cpemical Abstracts Service is a division of tpe American Cpemical Society@
LOR = Limit of re7orting
^ = Tpis reskIt is com7kted from individkal analyte detections at or above tpe level of re7orting

- **EN055 - PG: Ionic Balance out of acceptable limits for various samples due to analytes not quantified in this report.**
- **Microbiological Comment: Membrane filtration (MF) results for MW006 are reported as approximate (~) when the growth of bacteria on the filter membrane is counted <10cfu and/or >100cfu.**

Analytical Results

Skb-Matri<: WATER			Client sample ID	13	14	15	16	17
			Client sampling date / time	23-AUG-2612 69:66	23-AUG-2612 12:66	23-AUG-2612 1h:66	23-AUG-2612 26:66	23-AUG-2612 65:66
Compound	CAS Number	LOR	Unit	ES1220484-001	ES1220484-002	ES1220484-003	ES1220484-004	ES1220484-005
EA005P: pH by PC Titrator								
pH Value	----	6@1	7H Unit	8.48	8.12	8.07	8.23	7.94
EA015: Total Dissolved Solids								
Total Dissolved Solids @180°C	GIS-216-616	16	mg⅃	338	360	417	972	328
EA025: Suspended Solids								
Suspended Solids (SS)	----	+	mg⅃	220	372	596	536	136
EA036: Fixed/Volatile Suspended Solids								
Volatile Suspended Solids @ 550°C	----	1	mg⅃	220	372	596	536	136
EA065: Total Hardness as CaCO3								
Total Hardness as CaCO3	----	1	mg⅃	69	71	78	156	80
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-216-661	1	mg⅃	x1	x1	x1	x1	x1
Carbonate Alkalinity as CaCO3	3912-32-h	1	mg⅃	25	x1	x1	x1	x1
Bicarbonate Alkalinity as CaCO3	, 1-+2-3	1	mg⅃	216	219	229	252	192
Total Alkalinity as CaCO3	----	1	mg⅃	241	219	229	252	192
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	15969-, 0-9	1	mg⅃	30	30	31	48	29
ED045G: Chloride Discrete analyser								
Chloride	1h99, -66-h	1	mg⅃	96	107	113	358	120
ED093F: Dissolved Major Cations								
Calcium	, 556-, 6-2	1	mg⅃	16	17	18	26	19
Magnesium	, 530-0+-5	1	mg⅃	7	7	8	22	8
Sodium	, 556-23-+	1	mg⅃	69	63	68	198	68
Potassium	, 556-60-,	1	mg⅃	16	16	20	37	13
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	----	6@1	mg⅃	x6@1	x6@1	x6@1	0.12	x6@1
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	15, 0, -++-9	6@1	mg⅃	0.09	0.09	0.24	0.12	0.04
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	6@1	mg⅃	0.09	0.09	0.24	0.24	0.04
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	6@	mg⅃	58.2	47.7	72.8	71.6	47.1
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	6@	mg⅃	58.3	47.8	73.0	71.8	47.1
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	6@1	mg⅃	7.41	8.45	10.2	8.15	4.96

Analytical Results

Skb-Matri<: WATER			Client sample ID	13	14	15	16	17
			Client sampling date / time	23-AUG-2612 69:66	23-AUG-2612 12:66	23-AUG-2612 1h:66	23-AUG-2612 26:66	23-AUG-2612 65:66
Compound	*CAS Number*	*LOR*	*Unit*	**ES1220484-001**	**ES1220484-002**	**ES1220484-003**	**ES1220484-004**	**ES1220484-005**
EN055: Ionic Balance								
Total Anions	----	6@1	meq⊥	**8.15**	**8.02**	**8.41**	**16.1**	**7.83**
Total Cations	----	6@1	meq⊥	**4.79**	**4.57**	**5.03**	**12.7**	**4.90**
Ionic Balance	----	6@1	%	**26.0**	**27.4**	**25.2**	**12.0**	**23.0**
EP020: Oil and Grease (O&G)								
Oil & Grease	----	+	mg⊥	**25**	**37**	**35**	**34**	**10**
EP026ST: Chemical Oxygen Demand (Sealed Tube)								
Chemical Oxygen Demand	----	+	mg⊥	**358**	**2160**	**2250**	**784**	**375**
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg⊥	**125**	**242**	**322**	**408**	**46**

Analytical Results

Skb-Matri<: WATER				Client sample ID	18 (COMPOSITE)	----	----	----	----
				Client sampling date / time	23-AUG-2612 66:66	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*		**ES1220484-006**	**----**	**----**	**----**	**----**
EA005P: pH by PC Titrator									
pH Value	----	6@1	7H Unit		**7.76**	----	----	----	----
EA015: Total Dissolved Solids									
Total Dissolved Solids @180°C	GIS-216-616	16	mg⅃		**397**	----	----	----	----
EA025: Suspended Solids									
Suspended Solids (SS)	----	+	mg⅃		**282**	----	----	----	----
EA036: Fixed/Volatile Suspended Solids									
Volatile Suspended Solids @ 550°C	----	1	mg⅃		**282**	----	----	----	----
EA065: Total Hardness as CaCO3									
Total Hardness as CaCO3	----	1	mg⅃		**83**	----	----	----	----
ED037P: Alkalinity by PC Titrator									
Hydroxide Alkalinity as CaCO3	DMO-216-661	1	mg⅃		x1	----	----	----	----
Carbonate Alkalinity as CaCO3	3912-32-h	1	mg⅃		x1	----	----	----	----
Bicarbonate Alkalinity as CaCO3	, 1-+2-3	1	mg⅃		**232**	----	----	----	----
Total Alkalinity as CaCO3	----	1	mg⅃		**232**	----	----	----	----
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA									
Sulfate as SO4 - Turbidimetric	15969-, 0-9	1	mg⅃		**30**	----	----	----	----
ED045G: Chloride Discrete analyser									
Chloride	1h99, -66-h	1	mg⅃		**107**	----	----	----	----
ED093F: Dissolved Major Cations									
Calcium	, 556-, 6-2	1	mg⅃		**20**	----	----	----	----
Magnesium	, 530-0+-5	1	mg⅃		**8**	----	----	----	----
Sodium	, 556-23-+	1	mg⅃		**72**	----	----	----	----
Potassium	, 556-60-,	1	mg⅃		**21**	----	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N	----	6@1	mg⅃		**0.13**	----	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N	15, 0, -++-9	6@1	mg⅃		**0.08**	----	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N	----	6@1	mg⅃		**0.21**	----	----	----	----
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser									
Total Kjeldahl Nitrogen as N	----	6@	mg⅃		**73.6**	----	----	----	----
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser									
^ Total Nitrogen as N	----	6@	mg⅃		**73.8**	----	----	----	----
EK067G: Total Phosphorus as P by Discrete Analyser									
Total Phosphorus as P	----	6@1	mg⅃		**7.50**	----	----	----	----

Analytical Results

Skb-Matri<: WATER			Client sample ID	18 (COMPOSITE)	----	----	----	----
			Client sampling date / time	23-AUG-2612 66:66	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1220484-006**	**----**	**----**	**----**	**----**
EN055: Ionic Balance								
Total Anions	----	6@1	meq⊥	**8.28**	----	----	----	----
Total Cations	----	6@1	meq⊥	**5.33**	----	----	----	----
Ionic Balance	----	6@1	%	**21.7**	----	----	----	----
EP020: Oil and Grease (O&G)								
Oil & Grease	----	+	mg⊥	**37**	----	----	----	----
EP026ST: Chemical Oxygen Demand (Sealed Tube)								
Chemical Oxygen Demand	----	+	mg⊥	**941**	----	----	----	----
EP030: Biochemical Oxygen Demand (BOD)								
Biochemical Oxygen Demand	----	2	mg⊥	**115**	----	----	----	----
EP074A: Monocyclic Aromatic Hydrocarbons								
Benzene	, 1-53-2	1	µg⊥	x1	----	----	----	----
Toluene	169-99-3	2	µg⊥	x2	----	----	----	----
Ethylbenzene	166-51-5	2	µg⊥	x2	----	----	----	----
meta- & para-Xylene	169-39-3 16h-52-3	2	µg⊥	x2	----	----	----	----
Styrene	166-52-+	+	µg⊥	x+	----	----	----	----
ortho-Xylene	0+-5, -h	2	µg⊥	x2	----	----	----	----
Isopropylbenzene	09-92-9	+	µg⊥	x+	----	----	----	----
n-Propylbenzene	163-h+-1	+	µg⊥	x+	----	----	----	----
1.3.5-Trimethylbenzene	169-h, -9	+	µg⊥	x+	----	----	----	----
sec-Butylbenzene	13+-09-9	+	µg⊥	x+	----	----	----	----
1.2.4-Trimethylbenzene	0+-h3-h	+	µg⊥	x+	----	----	----	----
tert-Butylbenzene	09-6h-h	+	µg⊥	x+	----	----	----	----
p-Isopropyltoluene	00-9, -h	+	µg⊥	x+	----	----	----	----
n-Butylbenzene	165-+1-9	+	µg⊥	x+	----	----	----	----
EP074B: Oxygenated Compounds								
Vinyl Acetate	169-6+-5	+6	µg⊥	x+6	----	----	----	----
2-Butanone (MEK)	, 9-03-3	+6	µg⊥	x+6	----	----	----	----
4-Methyl-2-pentanone (MIBK)	169-16-1	+6	µg⊥	x+6	----	----	----	----
2-Hexanone (MBK)	+01-, 9-h	+6	µg⊥	x+6	----	----	----	----
EP074C: Sulfonated Compounds								
Carbon disulfide	, +-1+-6	+	µg⊥	x+	----	----	----	----
EP074D: Fumigants								
2.2-Dichloropropane	+05-26-,	+	µg⊥	x+	----	----	----	----
1.2-Dichloropropane	, 9-9, -+	+	µg⊥	x+	----	----	----	----
cis-1.3-Dichloropropylene	166h1-61-+	+	µg⊥	x+	----	----	----	----
trans-1.3-Dichloropropylene	166h1-62-h	+	µg⊥	x+	----	----	----	----

Analytical Results

Skb-Matri<: WATER			Client sample ID	18 (COMPOSITE)	----	----	----	----
			Client sampling date / time	23-AUG-2612 66:66	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1220484-006**	**----**	**----**	**----**	**----**
EP074D: Fumigants - Continued								
1.2-Dibromoethane (EDB)	16h-03-5	+	µg⅃	x+	----	----	----	----
EP074E: Halogenated Aliphatic Compounds								
Dichlorodifluoromethane	, +-, 1-9	+6	µg⅃	x+6	----	----	----	----
Chloromethane	, 5-9, -3	+6	µg⅃	x+6	----	----	----	----
Vinyl chloride	, +-61-5	+6	µg⅃	x+6	----	----	----	----
Bromomethane	, 5-93-0	+6	µg⅃	x+6	----	----	----	----
Chloroethane	, +-66-3	+6	µg⅃	x+6	----	----	----	----
Trichlorofluoromethane	, +-h0-5	+6	µg⅃	x+6	----	----	----	----
1.1-Dichloroethene	, +-3+-5	+	µg⅃	x+	----	----	----	----
Iodomethane	, 5-99-5	+	µg⅃	x+	----	----	----	----
trans-1.2-Dichloroethene	1+h-h6-+	+	µg⅃	x+	----	----	----	----
1.1-Dichloroethane	, +-35-3	+	µg⅃	x+	----	----	----	----
cis-1.2-Dichloroethene	1+h-+0-2	+	µg⅃	x+	----	----	----	----
1.1.1-Trichloroethane	, 1-++-h	+	µg⅃	x+	----	----	----	----
1.1-Dichloropropylene	+h3-+9-h	+	µg⅃	x+	----	----	----	----
Carbon Tetrachloride	+h-23-+	+	µg⅃	x+	----	----	----	----
1.2-Dichloroethane	16, -6h-2	+	µg⅃	x+	----	----	----	----
Trichloroethene	, 0-61-h	+	µg⅃	x+	----	----	----	----
Dibromomethane	, 5-0+-3	+	µg⅃	x+	----	----	----	----
1.1.2-Trichloroethane	, 0-66-+	+	µg⅃	x+	----	----	----	----
1.3-Dichloropropane	152-29-0	+	µg⅃	x+	----	----	----	----
Tetrachloroethene	12, -19-5	+	µg⅃	x+	----	----	----	----
1.1.1.2-Tetrachloroethane	h36-26-h	+	µg⅃	x+	----	----	----	----
trans-1.4-Dichloro-2-butene	116-+, -h	+	µg⅃	x+	----	----	----	----
cis-1.4-Dichloro-2-butene	15, h-11-+	+	µg⅃	x+	----	----	----	----
1.1.2.2-Tetrachloroethane	, 0-35-+	+	µg⅃	x+	----	----	----	----
1.2.3-Trichloropropane	0h-19-5	+	µg⅃	x+	----	----	----	----
Pentachloroethane	, h-61-,	+	µg⅃	x+	----	----	----	----
1.2-Dibromo-3-chloropropane	0h-12-9	+	µg⅃	x+	----	----	----	----
Hexachlorobutadiene	9, -h9-3	+	µg⅃	x+	----	----	----	----
EP074F: Halogenated Aromatic Compounds								
Chlorobenzene	169-06-,	+	µg⅃	x+	----	----	----	----
Bromobenzene	169-9h-1	+	µg⅃	x+	----	----	----	----
2-Chlorotoluene	0+-50-9	+	µg⅃	x+	----	----	----	----
4-Chlorotoluene	16h-53-5	+	µg⅃	x+	----	----	----	----
1.3-Dichlorobenzene	+51-, 3-1	+	µg⅃	x+	----	----	----	----

Analytical Results

Skb-Matri<: WATER			Client sample ID	18 (COMPOSITE)	----	----	----	----
			Client sampling date / time	23-AUG-2612 66:66	----	----	----	----
Compound	CAS Number	LOR	Unit	ES1220484-006	----	----	----	----
EP074F: Halogenated Aromatic Compounds - Continued								
1.4-Dichlorobenzene	16h-5h-,	+	µgJ	x+	----	----	----	----
1.2-Dichlorobenzene	0+-+6-1	+	µgJ	x+	----	----	----	----
1.2.4-Trichlorobenzene	126-92-1	+	µgJ	x+	----	----	----	----
1.2.3-Trichlorobenzene	9, -h1-h	+	µgJ	x+	----	----	----	----
EP074G: Trihalomethanes								
Chloroform	h, -hh-3	+	µgJ	x+	----	----	----	----
Bromodichloromethane	, +-2, -5	+	µgJ	x+	----	----	----	----
Dibromochloromethane	125-59-1	+	µgJ	x+	----	----	----	----
Bromoform	, +-2+-2	+	µgJ	x+	----	----	----	----
EP074H: Naphthalene								
Naphthalene	01-26-3	,	µgJ	x,	----	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	26	µgJ	x26	----	----	----	----
C10 - C14 Fraction	----	+6	µgJ	430	----	----	----	----
C15 - C28 Fraction	----	166	µgJ	7400	----	----	----	----
C29 - C36 Fraction	----	+6	µgJ	3760	----	----	----	----
^ C10 - C36 Fraction (sum)	----	+6	µgJ	11600	----	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
C6 - C10 Fraction	----	26	µgJ	x26	----	----	----	----
>C10 - C16 Fraction	----	166	µgJ	660	----	----	----	----
>C16 - C34 Fraction	----	166	µgJ	10400	----	----	----	----
>C34 - C40 Fraction	----	166	µgJ	2020	----	----	----	----
^ >C10 - C40 Fraction (sum)	----	166	µgJ	13100	----	----	----	----
MW006: Faecal Coliforms & E.coli by MF								
Escherichia coli	Ecoli	1	CFUJ166mL	~9000000	----	----	----	----
MW506: Clositridium perfringens by Membrane Filtration								
Clostridium perfringens	----	1	orgsJ166mL	6000	----	----	----	----
MW535 / 536: Somatic Coliphage								
Somatic Coliphage (DA)	----	1	7fkJ166mL	1200000	----	----	----	----
EP074S: VOC Surrogates								
1.2-Dichloroethane-D4	1, 6h6-6, -6	6@	%	117	----	----	----	----
Toluene-D8	263, -2h-+	6@	%	123	----	----	----	----
4-Bromofluorobenzene	5h6-66-5	6@	%	116	----	----	----	----
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	1, 6h6-6, -6	6@	%	126	----	----	----	----

Analytical Results

Skb-Matri<: WATER			Client sample ID	18 (COMPOSITE)	----	----	----	----
			Client sampling date / time	23-AUG-2612 66:66	----	----	----	----
Compound	*CAS Number*	*LOR*	*Unit*	**ES1220484-006**	**----**	**----**	**----**	**----**
EP080S: TPH(V)/BTEX Surrogates - Continued								
Toluene-D8	263, -2h-+	6@	%	**122**	----	----	----	----
4-Bromofluorobenzene	5h6-66-5	6@	%	**126**	----	----	----	----

Surrogate Control Limits

Skb-Matri<: WATER		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP074S: VOC Surrogates			
1.2-Dichloroethane-D4	1, 6h6-6, -6	, 9@	133@
Toluene-D8	263, -2h-+	, 0@	129@
4-Bromofluorobenzene	5h6-66-5	96@	123@
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	1, 6h6-6, -6	, 1	13,
Toluene-D8	263, -2h-+	, 0	131
4-Bromofluorobenzene	5h6-66-5	, 6	129