

Lend Lease (Millers  
Point) Pty Limited

---

**Barangaroo South -  
Concept Plan  
Amendment  
(MP06\_0162 MOD 4)**

---

Infrastructure Concept  
Plan

ARUP

Lend Lease (Millers  
Point) Pty Limited

---

**Barangaroo South -  
Concept Plan  
Amendment  
(MP06\_0162 MOD 4)**

---

Infrastructure Concept  
Plan

July 2010

Arup  
Arup Pty Ltd ABN 18 000 966 165



**Arup**  
Level 10 201 Kent Street, Sydney NSW 2000  
Tel +61 2 9320 9320 Fax +61 2 9320 9321  
[www.arup.com](http://www.arup.com)

This report takes into account the  
particular instructions and requirements  
of our client.

It is not intended for and should not be  
relied upon by any third party and no  
responsibility is undertaken to any third  
party

Job number 220316

## Contents

	Page
1 Introduction	1
1.1 Background	1
1.2 Planning History	2
1.3 Purpose	3
2 Stormwater Services	4
2.1 Existing Stormwater Services	4
2.2 Proposed Stormwater service upgrades	4
3 Potable Water Supply	5
3.1 Existing Water Services	5
3.2 Proposed Water Service Upgrades	5
4 Sewer Services	6
4.1 Existing Sewer Services	6
4.2 Proposed Sewer Service Upgrades	6
5 Electrical Services	7
5.1 Existing Electrical Services	7
5.2 Proposed Electrical Services Upgrades	7
6 Telecommunications Services	8
6.1 Existing Telecommunications services	8
6.2 Proposed Telecommunications Services Upgrades	8
7 Natural Gas Services	9
7.1 Existing Gas services	9
7.2 Proposed Gas Services Upgrades	9
8 Chilled Water Services	10
8.1 Proposed Chilled Water Service	10
9 Conclusion	10

## Appendices

### Appendix A

Existing Site Infrastructure Drawings

### Appendix B

Proposed Site Infrastructure Drawings

### Appendix C

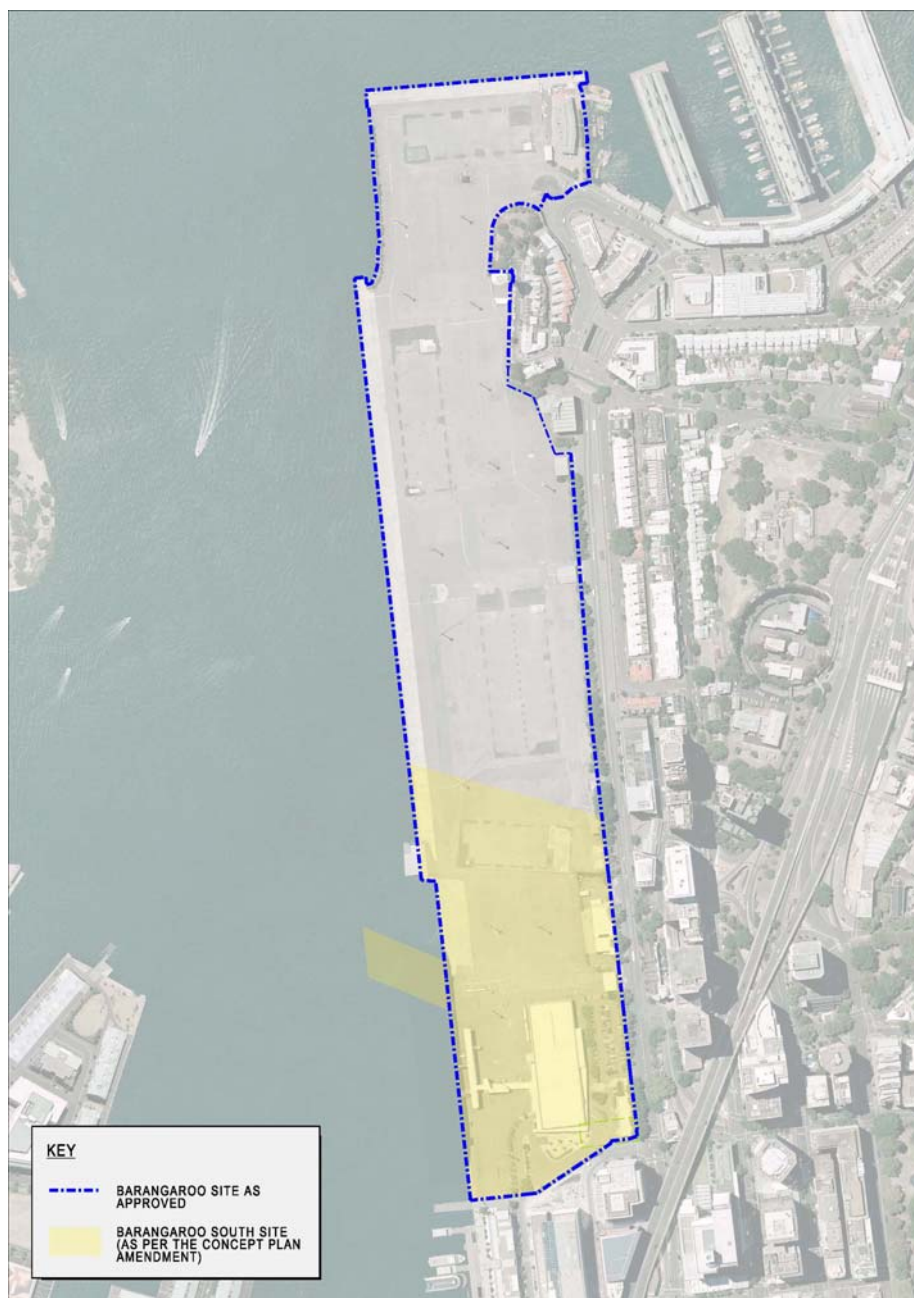
Worley Parsons Letter

# 1 Introduction

## 1.1 Background

On the 20 December 2009, Lend Lease (Millers Point) Pty Limited (Lend Lease) was appointed as the preferred proponent to develop Barangaroo South: comprising of Blocks 1 to 4 and associated public recreation areas.

The area of land that is subject to the Concept Plan Amendment is indicatively shown in Figure 1, and is herein referred to as “Barangaroo South” or the “Site”. It comprises an open apron which is largely reclaimed over water and is identified in the existing approved Concept Plan as Blocks 1 – 4 and the immediately adjacent public recreation area. Barangaroo South also extends beyond the western edge of the existing apron and includes a north-west oriented intrusion into the existing waters of Darling Harbour (see Figure 1).



**Figure 1: Indicative Site Boundary for Barangaroo South**

## 1.2 Planning History

---

On 9 February 2007 the Minister approved a Concept Plan for the site and on 12 October 2007 the land was rezoned to facilitate its redevelopment. The Approved Concept Plan allowed for:

- a mixed use development involving a maximum of 388,300m<sup>2</sup> of gross floor area (GFA) contained within 8 blocks on a total site area of 22 hectares;
- approximately 11 hectares of new public open space/public domain, with a range of formal and informal open spaces serving separate recreational functions and including a 1.4km public foreshore promenade;
- maximum building heights and maximum GFA for each development block within the mixed use zone; and
- public domain landscape concept, including parks, streets and pedestrian connections.

A condition of consent also required two enlarged water intrusions into the Barangaroo site, one at the northern end and one at the southern end and the creation of a natural northern headland.

Modification No. 1 was approved in September 2007 which corrected a number of minor typographical errors.

On 25 February 2009 the Minister approved Modification No. 2 to the Concept Plan. The Approved Concept Plan as modified allowed for a mixed use development involving a maximum of 508,300m<sup>2</sup> of gross floor area (GFA) contained within 8 blocks on a total site area of 22 hectares.

On 11 November 2009 the Minister approved Modification No. 3 to the Concept Plan to allow for a modified design for the Headland Park and Northern Cove. The Approved Concept Plan as modified allowed for a mixed use development involving a maximum of 489,500m<sup>2</sup> of gross floor area (GFA) contained within 7 blocks on a total site area of 22 hectares.

The proposed Concept Plan Amendment (MP 06\_0162 MOD 4) seeks the Minister's consent for:

- additional GFA within Barangaroo South, predominantly related to an increase in residential GFA;
- redistribution of the land use mix;
- an increase in height of a number of the proposed towers within Barangaroo South;
- the establishment of the new pier and landmark building extending into the Harbour; and
- reconfiguration and activation of the public waterfront area through the introduction of uses including retail and residential to the west of Globe Street.

### 1.3 Purpose

---

Arup has prepared this infrastructure assessment in support of the Concept Plan Amendment (MP06\_0162 MOD 4) and for the purpose of addressing Director General Requirements. This report fulfils the obligation to prepare a Utility Services Infrastructure Plan as required by the Statements of Commitments.

This Infrastructure Concept Plan provides a broad description of the impact on each utility infrastructure services in relation to the Concept Plan Amendment application. The primary requirement for utility infrastructure is to serve the future buildings and public domain which will be addressed under separate and future Planning Applications. Indicative impacts of the upgrades required to the infrastructure and proposed infrastructure plans are included within Appendix 2.

Details of the availability of the existing infrastructure services has been identified from Dial before you dig (DBYD) information and from information contained in previous reports prepared for the Sydney Harbour Foreshore Authority by other parties. The *Services Overview Report* prepared by Cardno Limited (Report number 600062-R002 Nov 2005) is the main source of this existing information. Drawings for each infrastructure service are provided in Appendix 1.

These infrastructure service proposals shall be developed in conjunction with the appropriate utility providers and other stakeholders ensuring that a comprehensive infrastructure plan is developed which can deliver on the aspirations of the proposed development.

Lend Lease has an integrated approach to sustainability that can deliver positive outcomes for the development of Barangaroo South and the surrounding precincts.

Barangaroo South is also targeting a zero waste outcome. This outcome will be achieved through a variety of on and off site initiatives under a common Precinct Waste Management Strategy.

Barangaroo South is targeting to be water positive in operation. It is proposed to achieve this via a number of initiatives. Non-potable water is proposed to be exported from Barangaroo South to other users in the CBD to offset the potable water that Barangaroo uses, subject to authority approval of these initiatives.

Barangaroo South is targeting to be carbon neutral in operation. Part of the strategy to achieve this outcome involves the utilisation of central plant including water treatment plant, centralised chillers and Harbour heat rejection plant.

## 2 Stormwater Services

### 2.1 Existing Stormwater Services

---

The existing stormwater network across Barangaroo South is characterised by a series of transverse piped stormwater systems draining to Hickson Road and other external catchments draining through Barangaroo South directly to the Harbour. The largest external catchment drains to the Harbour from Kent Street, down Napoleon Street and through the larger Barangaroo site as identified on the existing drawings. There is currently no treatment on this stormwater prior to discharge in the Harbour.

The external catchment drains from a ridge line at York Street, to the east of the site and from the ridgeline south of Erskine Street through to the Harbour.

The existing stormwater network will require realignment to suit the proposed development including the basement structure. It is proposed to extend this existing stormwater network to allow stormwater to flow to and be stored in the cultural parkland (part of Barangaroo Central also known as Barangaroo Stage 1) for use in irrigation of the future parkland. This concept will be developed in applications for the Parkland. The re-aligned pipe network is proposed to be intercepted and Gross Pollutant Traps (GPTs) installed (under a future Project Application) to reduce the discharge of suspended solids and refuse into the Harbour. This will improve the existing discharge quality for the external catchment.

All existing stormwater pipes on-site within the Barangaroo South footprint are proposed to be removed.

For further details of the site stormwater strategy please refer to the Stormwater Concept Plan – which forms part of the Bulk Excavation and Basement Car Parking Project Application (MP10\_0023) which has been submitted with the Department of Planning.

### 2.2 Proposed Stormwater service upgrades

---

Stormwater falling on the Barangaroo South footprint is proposed to be either reused via building based rainwater tanks or alternatively treated to required standards and discharged into the Harbour.

For further details of the site stormwater strategy please refer to the Stormwater Concept Plan – which forms part of the Bulk Excavation and Basement Car Parking Project Application (MP10\_0023) which has been submitted with the Department of Planning.

### 3 Potable Water Supply

#### 3.1 Existing Water Services

---

The existing water supplies to Barangaroo South are supplied from a 300mm diameter Sydney Water main in Hickson Road.

All existing site water infrastructure within Barangaroo South is proposed to be capped off at the site boundary and removed as part of the development.

Future water supply strategies are to be developed with Sydney Water.

#### 3.2 Proposed Water Service Upgrades

---

It is proposed to provide a water main extension from the existing 300mm Sydney Water supply in Hickson Road throughout the Barangaroo South site located typically beneath roadways, with easements created where necessary. Buildings would be provided with individual metered connections.

It is proposed that this infrastructure shall be owned by Sydney Water.

Final routing and locations are to be agreed with Sydney Water during detailed design and once modelling of the existing network is complete.

A separate non-potable water service shall be provided from a proposed black water treatment plant (located in the Barangaroo South development), to each building as part of the target to minimise potable water consumption. It is proposed that this infrastructure shall be privately owned. The plant will be sized to provide recycled water to the buildings located within Barangaroo Central and the Headland Park. A connection point to service these future sites will be identified at the northern boundary of Barangaroo South.

A preliminary proposed water infrastructure plan is included in Appendix 2, with final routing and locations to be agreed with Sydney Water during detailed design.



## 4 Sewer Services

### 4.1 Existing Sewer Services

---

There is an existing sewer network traversing Barangaroo South which drains to an existing Sydney Water sewage pumping station SP1129. This pumping station is located outside the Barangaroo South footprint.

This pumping station services both the current requirements of the Barangaroo site and the local residential and commercial catchments external to the site. These catchments include Kent Street on the eastern side of the site.

It is proposed to cap off existing sewer mains that service the Barangaroo South site and remove all existing sewer infrastructure contained within the Barangaroo South footprint.

### 4.2 Proposed Sewer Service Upgrades

---

A proposed black water treatment plant is to be located along the eastern side of the Barangaroo South site and generally south of the existing sewage pumping station (SP1129). Generally the sewage generated by the Barangaroo South development will be treated to required standards before being re-used on or off site. Buffer tank storage is to be provided as part of the water plant design.

Discussions are in progress with Sydney Water to confirm the capacity of the existing pumping station and the feasibility for the sewer main/pumping station to be sewer mined to provide additional capacity that can be treated and reused by the proposed water plant and subsequently exported.

The extent of any upgrades to the Sydney Water infrastructure can be determined once modelling of the existing network is complete. The target for the Barangaroo development is to be water positive and therefore external upgrades of the existing Sydney Water infrastructure are not expected to be significant at this stage. The upgrade of any existing sewer infrastructure will be the subject of further design development.

Preliminary proposed waste water infrastructure plan is included in Appendix 2, final routing and locations to be agreed with Sydney Water and developed during detailed design.

## 5 Electrical Services

### 5.1 Existing Electrical Services

---

There are a number of existing 5kV HV Energy Australia (EA) supplies to the Barangaroo development. There is an existing substation (DH No.7) currently within the footprint of Barangaroo South that served the recently decommissioned Passenger ship terminal and other existing buildings on site. The existing electrical infrastructure is not sufficient for the future development and will be removed or made redundant at the boundary of the site once decommissioned.

It is proposed to decommission the existing substation that supplied the recently decommissioned Passenger ship terminal and provide a temporary pad mounted substation outside the Barangaroo South envelope to supply the Barangaroo South temporary construction services until such time a further design solution is developed.

These strategies are to be developed with Energy Australia and the Barangaroo Delivery Authority.

### 5.2 Proposed Electrical Services Upgrades

---

In considering the Barangaroo South development, Energy Australia (EA) advised in October 2008 that supply will be from the new City North Zone Substation at the corner of Erskine Street and Sussex Street.

In recent meetings, EA propose that the supply to Barangaroo South from City North Zone substation be connected through 33kV feeder with similar redundancy provision to the 11kV Triplex network.

The feeders to the Barangaroo South development will be reticulated along Sussex Street and Hickson Road alignment in underground ducts from the City North Zone Substation. Substations will be established within buildings and basements on the Barangaroo South development to service the demand of the development. These substations will be supplied from the underground EA feeders noted above.

The parameters and details of supply are to be agreed with EA. The substations will support the demand of buildings and the site requirements.

Preliminary proposed HV electrical infrastructure plan is included in Appendix 2, final routing and locations to be agreed with the EA and developed during detailed design.

## 6 Telecommunications Services

### 6.1 Existing Telecommunications services

---

The Kent street telephone exchange is located relatively close to the site, and existing Telstra copper lines feed into the site at various locations along Hickson Road and Dalgety Road. There are mobile phone equipment shelters located near Hickson Road.

All existing telecommunications infrastructure within the basement footprint is proposed to be capped off at the boundary and removed.

### 6.2 Proposed Telecommunications Services Upgrades

---

Strategies to develop supplies to the wider Barangaroo site are to be developed with the telecommunications providers to develop appropriate concepts and technologies to meet the expected demands of the development in the future. Extensive upgrading of the surrounding telecommunications systems will be required.

Preliminary proposed telecommunication infrastructure plan is included in Appendix 2, final routing and locations to be agreed with the telecommunications providers and developed during detailed design.

## 7 Natural Gas Services

### 7.1 Existing Gas services

---

There is an existing 110mm low pressure (7kPa) nylon gas main along Hickson Road and a high pressure gas main located at the corner of Sussex and Napoleon Streets. There is no existing high pressure main connection serving the Barangaroo site but there are small low pressure connections.

The existing gas network from the low pressure main shall be decommissioned and capped off at the site footprint boundary and removed.

### 7.2 Proposed Gas Services Upgrades

---

Strategies to develop the gas supply and distribution network shall be developed with the gas supplier. The existing high pressure main may require extending to provide sufficient gas for the Barangaroo development. This new gas main shall be owned and maintained by the utility supplier and shall be reticulated under the roadways around the Barangaroo South development and easements created where necessary. Metered connections shall be made to each building to serve mechanical boiler plant and other gas uses.

A preliminary proposed gas infrastructure plan is included in Appendix 2, with final design, routing and locations to be agreed with the gas supplier during detailed design.

## 8 Chilled Water Services

### 8.1 Proposed Chilled Water Service

A centralised chiller plant and Harbour heat rejection plant from which chilled water shall be reticulated to individual buildings is proposed to be located within the Barangaroo South basement. This forms part of the strategy to meet the sustainability targets of the development.

A separate letter addressing the potential impacts on the Harbour of the Harbour heat rejection concept has been prepared by Worley Parsons for Lend Lease and it is attached in Appendix C to this report. The Worley Parsons letter concludes that the Harbour heat rejection concept can be applied to this site in accordance with current statutory guidelines. Further details regarding this system will be included with the relevant Project Application.

A preliminary proposed chilled water plan is included in Appendix 2, with final design, routing and locations to be developed further as part of design development.

It is proposed that this chilled water plant and reticulation network is privately owned and operated.

## 9 Conclusion

Arup has prepared this infrastructure assessment to inform and accompany the Barangaroo South – Concept Plan (MP06\_0162 MOD 4).

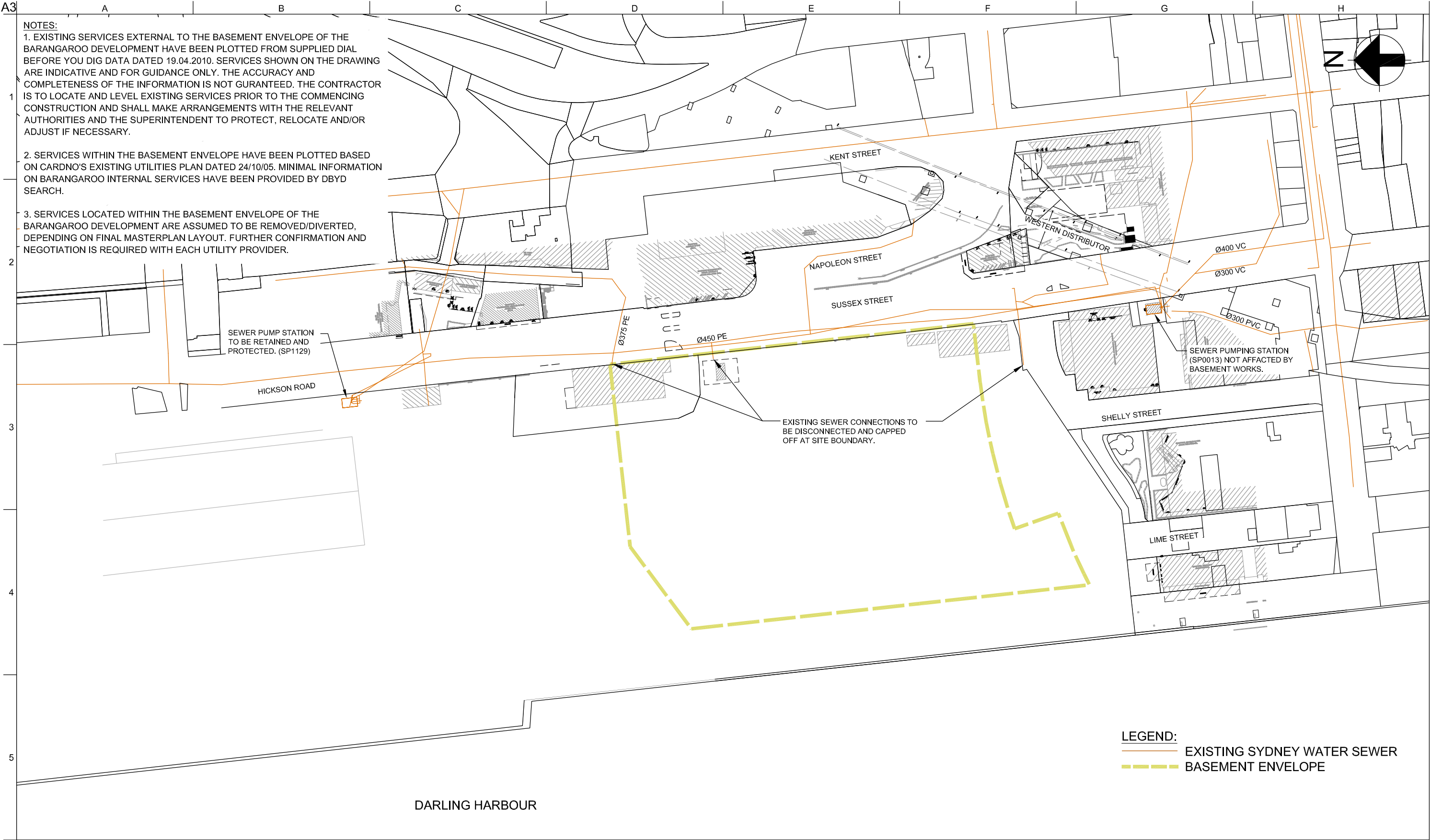
The assessment concludes that the development contemplated under the proposed Concept Plan Amendment will require extensive new on site infrastructure provision which shall be developed as part of design development in conjunction with relevant Utilities. A recycled water network is proposed to serve the site from a proposed black water treatment plant which has the capability to export recycled water from the site. Central cooling plant and Harbour Heat rejection plant is proposed as part of the overall sustainability strategy.

Arup conclude that the development scheme presented in the proposed Concept Plan Amendment (Modification 4) will not result in any significant additional impacts beyond those reasonably understood and expected to have been contemplated in the Approved Concept Plan (as modified), and can be designed and constructed utilising industry standard and proven design and construction techniques.

## Appendix A

---

### **Existing Site Infrastructure Drawings**



A	26/05/10	GM	MD	MD
Issue	Date	By	Chkd	Appd

Client  
**LEND LEASE (MILLERS POINT)  
PTY LIMITED**

Job Title  
**BARANGAROO  
BASEMENT APPLICATION**

Scale at A3  
1:2000

Discipline  
Civil

**ARUP**

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

Drawing Title  
**EXISTING SYDNEY WATER  
SEWER SERVICES**

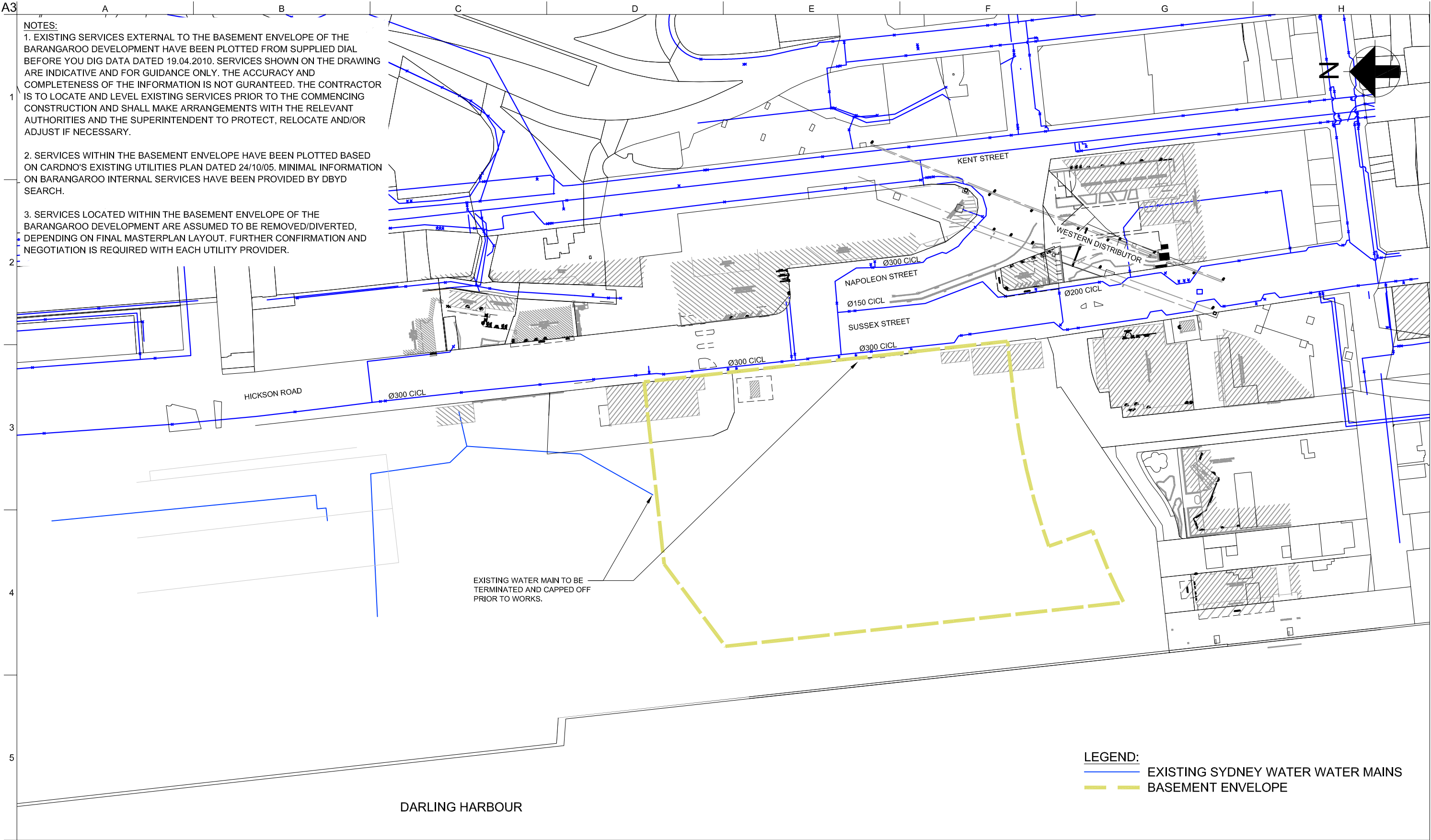
Drawing Status  
**SKETCH**

Job No  
**220316**

Drawing No  
**020**

Issue  
**A**





A	26/05/10	GM	MD	MD
Issue	Date	By	Chkd	Appd

Client  
LEND LEASE (MILLERS POINT)  
PTY LIMITED.

Job Title  
BARANGAROO  
BASEMENT APPLICATION

Scale at A3  
1:2000

Discipline  
Civil

ARUP

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

Drawing Title  
EXISTING SYDNEY WATER  
WATER MAINS SERVICES

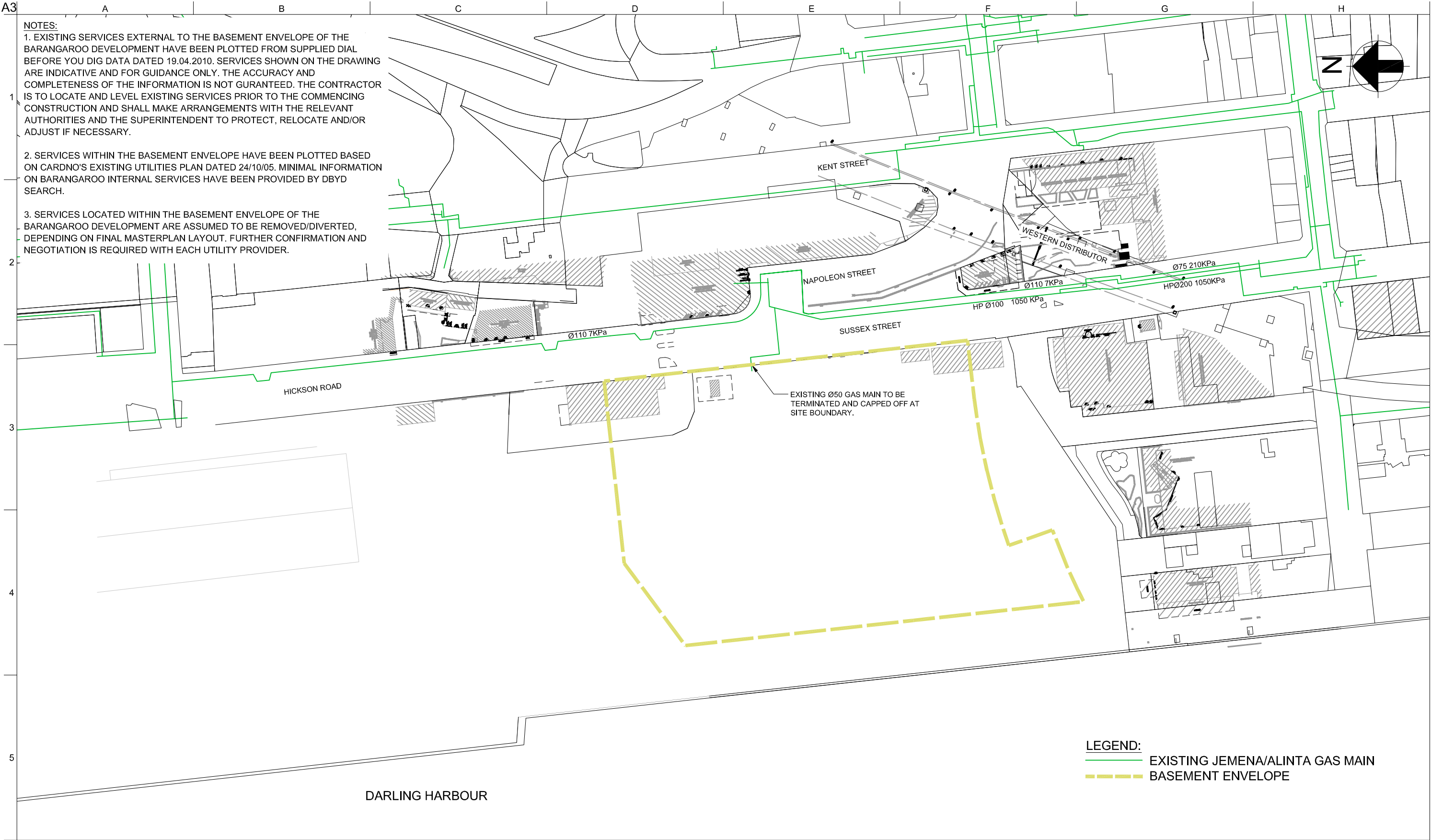
Drawing Status  
SKETCH

Job No  
220316

Drawing No  
021

Issue  
A





NOTES:

1. EXISTING SERVICES EXTERNAL TO THE BASEMENT ENVELOPE OF THE BARANGAROO DEVELOPMENT HAVE BEEN PLOTTED FROM SUPPLIED DIAL BEFORE YOU DIG DATA DATED 19.04.2010. SERVICES SHOWN ON THE DRAWING ARE INDICATIVE AND FOR GUIDANCE ONLY. THE ACCURACY AND COMPLETENESS OF THE INFORMATION IS NOT GURANTEED. THE CONTRACTOR IS TO LOCATE AND LEVEL EXISTING SERVICES PRIOR TO THE COMMENCING CONSTRUCTION AND SHALL MAKE ARRANGEMENTS WITH THE RELEVANT AUTHORITIES AND THE SUPERINTENDENT TO PROTECT, RELOCATE AND/OR ADJUST IF NECESSARY.

2. SERVICES WITHIN THE BASEMENT ENVELOPE HAVE BEEN PLOTTED BASED ON CARDNO'S EXISTING UTILITIES PLAN DATED 24/10/05. MINIMAL INFORMATION ON BARANGAROO INTERNAL SERVICES HAVE BEEN PROVIDED BY DBYD SEARCH.

3. SERVICES LOCATED WITHIN THE BASEMENT ENVELOPE OF THE BARANGAROO DEVELOPMENT ARE ASSUMED TO BE REMOVED/DIVERTED, DEPENDING ON FINAL MASTERPLAN LAYOUT. FURTHER CONFIRMATION AND NEGOTIATION IS REQUIRED WITH EACH UTILITY PROVIDER.

LEGEND:

EXISTING JEMENA/ALINTA GAS MAIN

BASEMENT ENVELOPE

A	26/05/10	GM	MD	MD
Issue	Date	By	Chkd	Appd

Client  
LEND LEASE (MILLERS POINT)  
PTY LIMITED

Job Title  
BARANGAROO  
BASEMENT APPLICATION

Scale at A3  
1:2000

Discipline  
Civil

ARUP

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

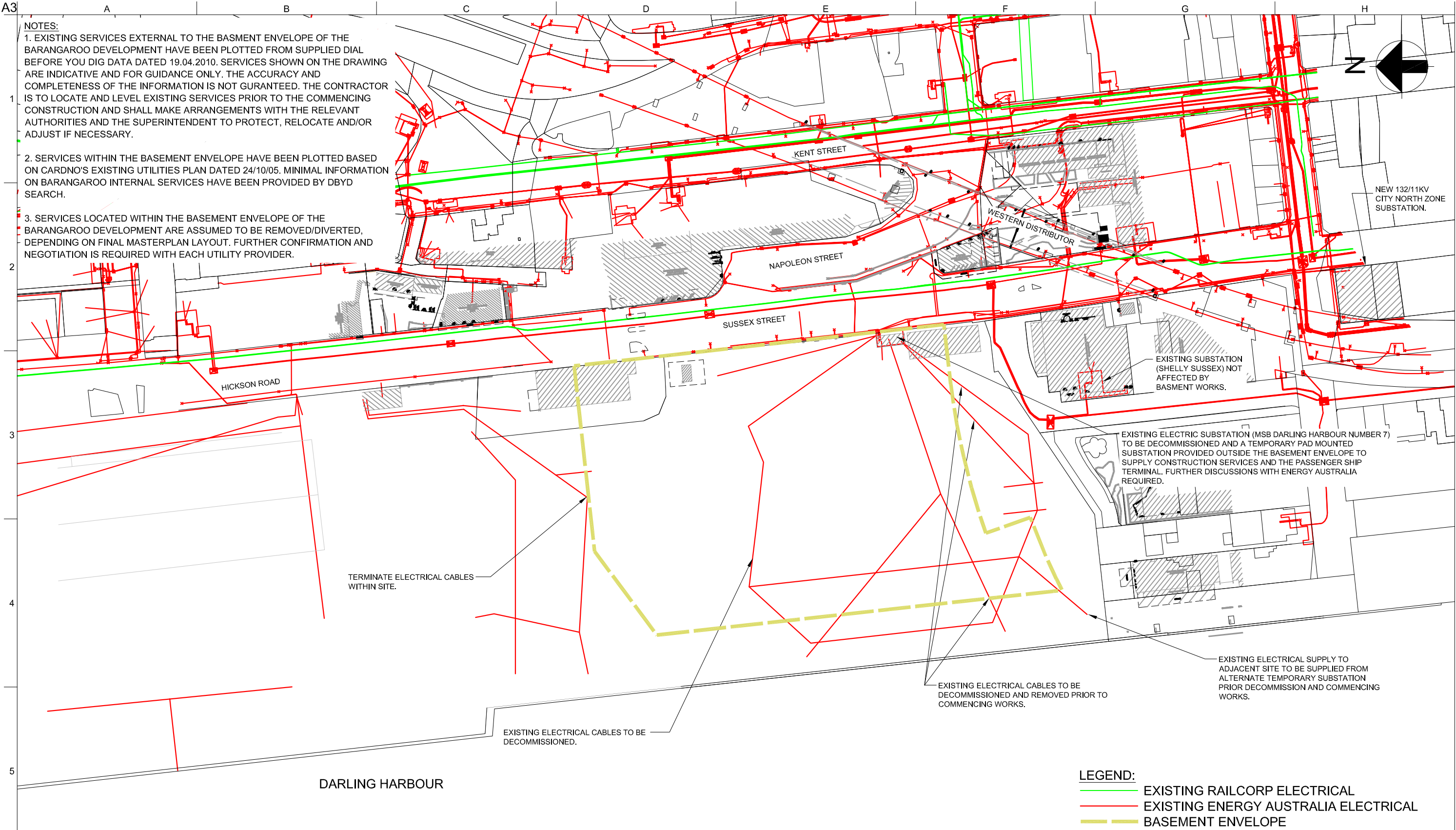
Drawing Title  
EXISTING JEMENA/ALINTA  
GAS MAIN SERVICES

Drawing Status  
SKETCH

Job No 220316	Drawing No 022	Issue A
------------------	-------------------	------------

A3

- NOTES:
1. EXISTING SERVICES EXTERNAL TO THE BASMENT ENVELOPE OF THE BARANGAROO DEVELOPMENT HAVE BEEN PLOTTED FROM SUPPLIED DIAL BEFORE YOU DIG DATA DATED 19.04.2010. SERVICES SHOWN ON THE DRAWING ARE INDICATIVE AND FOR GUIDANCE ONLY. THE ACCURACY AND COMPLETENESS OF THE INFORMATION IS NOT GURANTEED. THE CONTRACTOR IS TO LOCATE AND LEVEL EXISTING SERVICES PRIOR TO THE COMMENCING CONSTRUCTION AND SHALL MAKE ARRANGEMENTS WITH THE RELEVANT AUTHORITIES AND THE SUPERINTENDENT TO PROTECT, RELOCATE AND/OR ADJUST IF NECESSARY.
2. SERVICES WITHIN THE BASEMENT ENVELOPE HAVE BEEN PLOTTED BASED ON CARDNO'S EXISTING UTILITIES PLAN DATED 24/10/05. MINIMAL INFORMATION ON BARANGAROO INTERNAL SERVICES HAVE BEEN PROVIDED BY DBYD SEARCH.
3. SERVICES LOCATED WITHIN THE BASEMENT ENVELOPE OF THE BARANGAROO DEVELOPMENT ARE ASSUMED TO BE REMOVED/DIVERTED, DEPENDING ON FINAL MASTERPLAN LAYOUT. FURTHER CONFIRMATION AND NEGOTIATION IS REQUIRED WITH EACH UTILITY PROVIDER.



DARLING HARBOUR

- LEGEND:
- EXISTING RAILCORP ELECTRICAL
  - EXISTING ENERGY AUSTRALIA ELECTRICAL
  - BASEMENT ENVELOPE

A	26/05/10	GM	MD	MD
Issue	Date	By	Chkd	Appd

Client  
LEND LEASE (MILLERS POINT)  
PTY LIMITED

Job Title  
BARANGAROO  
BASEMENT APPLICATION

Scale at A3  
1:2000

Discipline  
Civil

ARUP

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

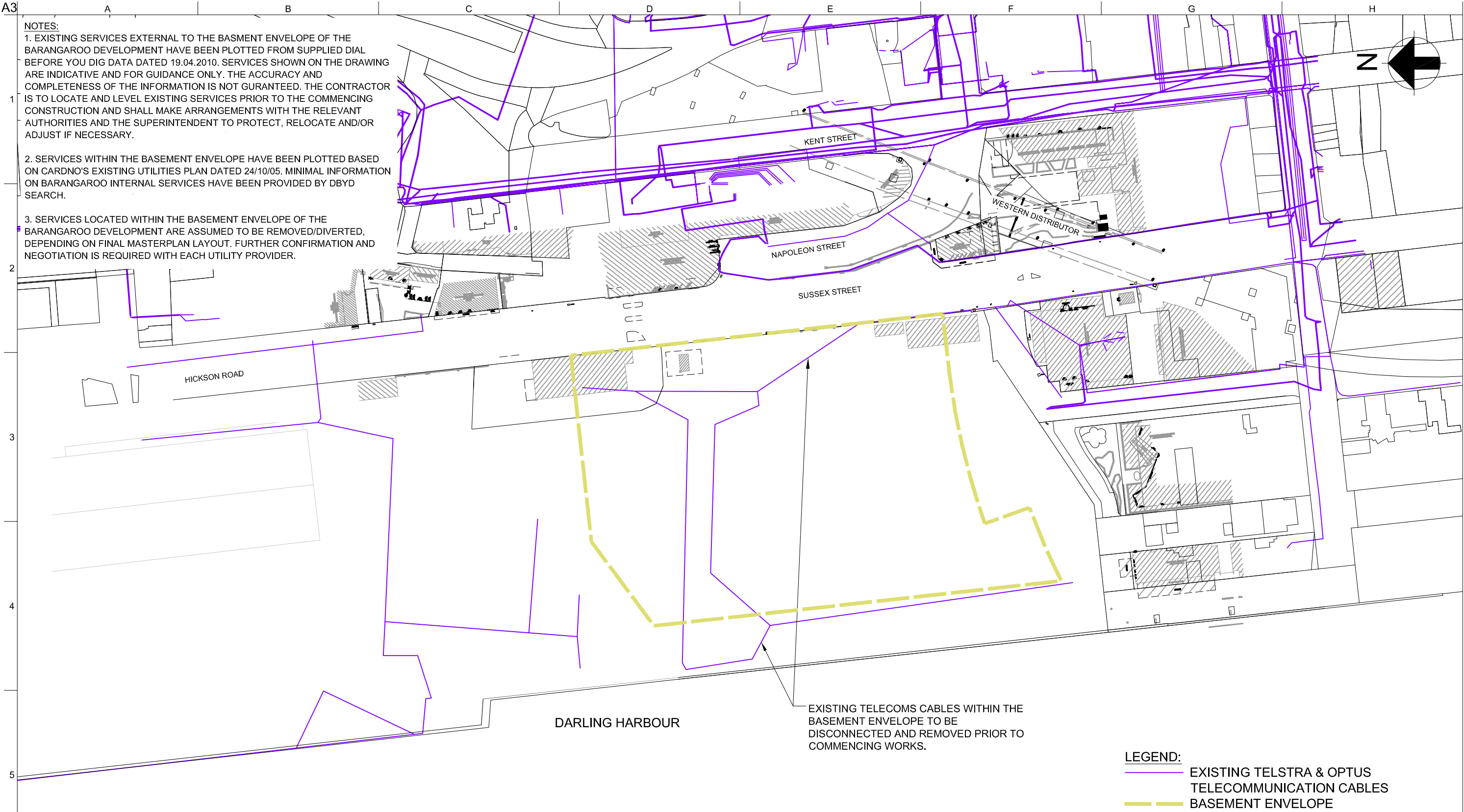
Drawing Title  
EXISTING ELECTRICAL  
SERVICES

Drawing Status  
SKETCH

Job No  
220316

Drawing No  
023

Issue  
A



- NOTES:
1. EXISTING SERVICES EXTERNAL TO THE BASMENT ENVELOPE OF THE BARANGAROO DEVELOPMENT HAVE BEEN PLOTTED FROM SUPPLIED DIAL BEFORE YOU DIG DATA DATED 19.04.2010. SERVICES SHOWN ON THE DRAWING ARE INDICATIVE AND FOR GUIDANCE ONLY. THE ACCURACY AND COMPLETENESS OF THE INFORMATION IS NOT GURANTEED. THE CONTRACTOR IS TO LOCATE AND LEVEL EXISTING SERVICES PRIOR TO THE COMMENCING CONSTRUCTION AND SHALL MAKE ARRANGEMENTS WITH THE RELEVANT AUTHORITIES AND THE SUPERINTENDENT TO PROTECT, RELOCATE AND/OR ADJUST IF NECESSARY.
  2. SERVICES WITHIN THE BASEMENT ENVELOPE HAVE BEEN PLOTTED BASED ON CARDNO'S EXISTING UTILITIES PLAN DATED 24/10/05. MINIMAL INFORMATION ON BARANGAROO INTERNAL SERVICES HAVE BEEN PROVIDED BY DBYD SEARCH.
  3. SERVICES LOCATED WITHIN THE BASEMENT ENVELOPE OF THE BARANGAROO DEVELOPMENT ARE ASSUMED TO BE REMOVED/DIVERTED, DEPENDING ON FINAL MASTERPLAN LAYOUT. FURTHER CONFIRMATION AND NEGOTIATION IS REQUIRED WITH EACH UTILITY PROVIDER.

EXISTING TELECOMS CABLES WITHIN THE BASEMENT ENVELOPE TO BE DISCONNECTED AND REMOVED PRIOR TO COMMENCING WORKS.

- LEGEND:
- EXISTING TELSTRA & OPTUS TELECOMMUNICATION CABLES
  - BASEMENT ENVELOPE

Client  
LEND LEASE (MILLERS POINT)  
PTY LIMITED.

Job Title  
BARANGAROO  
BASEMENT APPLICATION

ARUP

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

Drawing Title  
EXISTING TELECOMMUNICATIONS  
SERVICES

Drawing Status  
SKETCH

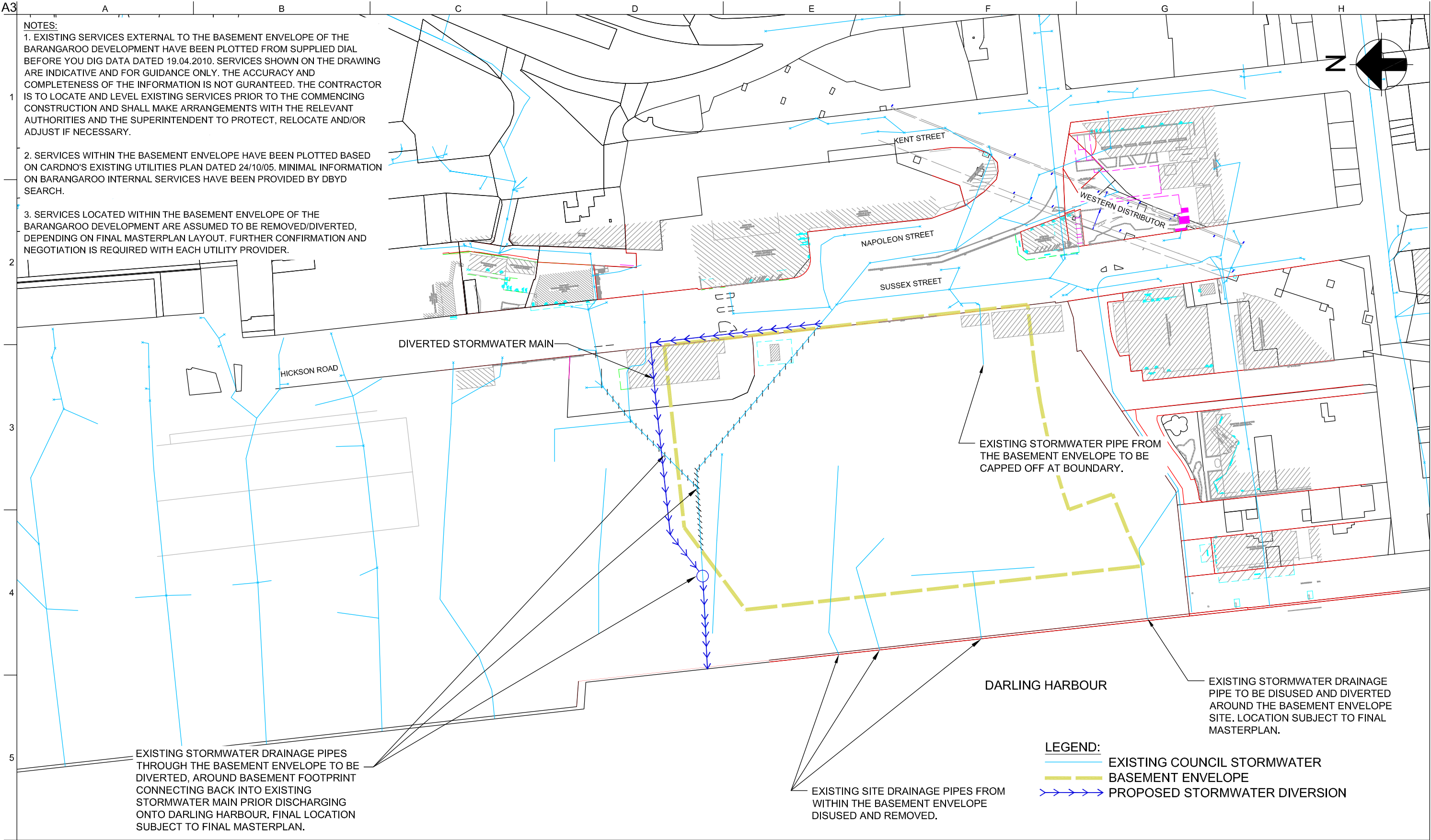
Job No  
220316

Drawing No  
024

Issue  
A

A	26/05/10	GM	MD	MD
Issue	Date	By	Chkd	Appd





A	26/05/10	GM	MD	MD
Issue	Date	By	Chkd	Appd

Client  
**LEND LEASE (MILLERS POINT)  
PTY LIMITED.**

Job Title  
**BARANGAROO  
BASEMENT APPLICATION**

Scale at A3  
1:2000

Discipline  
Civil

**ARUP**

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

Drawing Title  
**EXISTING STORMWATER  
SERVICES**

Drawing Status  
**SKETCH**

Job No  
**220316**

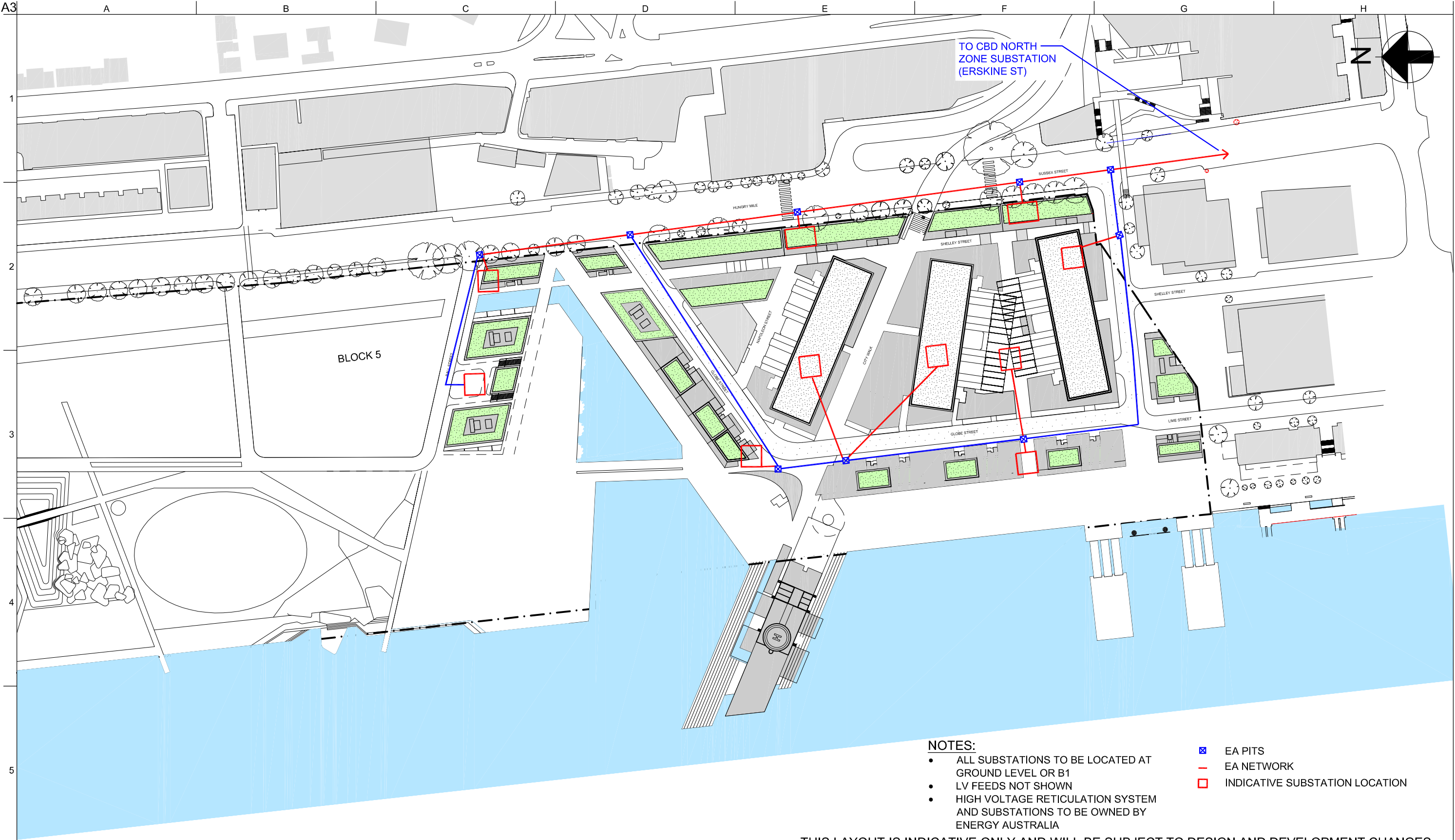
Drawing No  
**025**

Issue  
**A**

## Appendix B

---

### **Proposed Site Infrastructure Drawings**



- NOTES:**
- ALL SUBSTATIONS TO BE LOCATED AT GROUND LEVEL OR B1
  - LV FEEDS NOT SHOWN
  - HIGH VOLTAGE RETICULATION SYSTEM AND SUBSTATIONS TO BE OWNED BY ENERGY AUSTRALIA
- EA PITS  
EA NETWORK  
INDICATIVE SUBSTATION LOCATION

THIS LAYOUT IS INDICATIVE ONLY AND WILL BE SUBJECT TO DESIGN AND DEVELOPMENT CHANGES.

A	03/06/10	MMH	MD	MD
Issue	Date	By	Chkd	Appd

Client  
LEND LEASE (MILLERS POINT)  
PTY LIMITED

Job Title  
BARANGAROO STAGE 1

Scale at A3  
1:2000

Discipline  
Civil

ARUP

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

Drawing Title  
PROPOSED ELECTRICAL  
RETICULATION

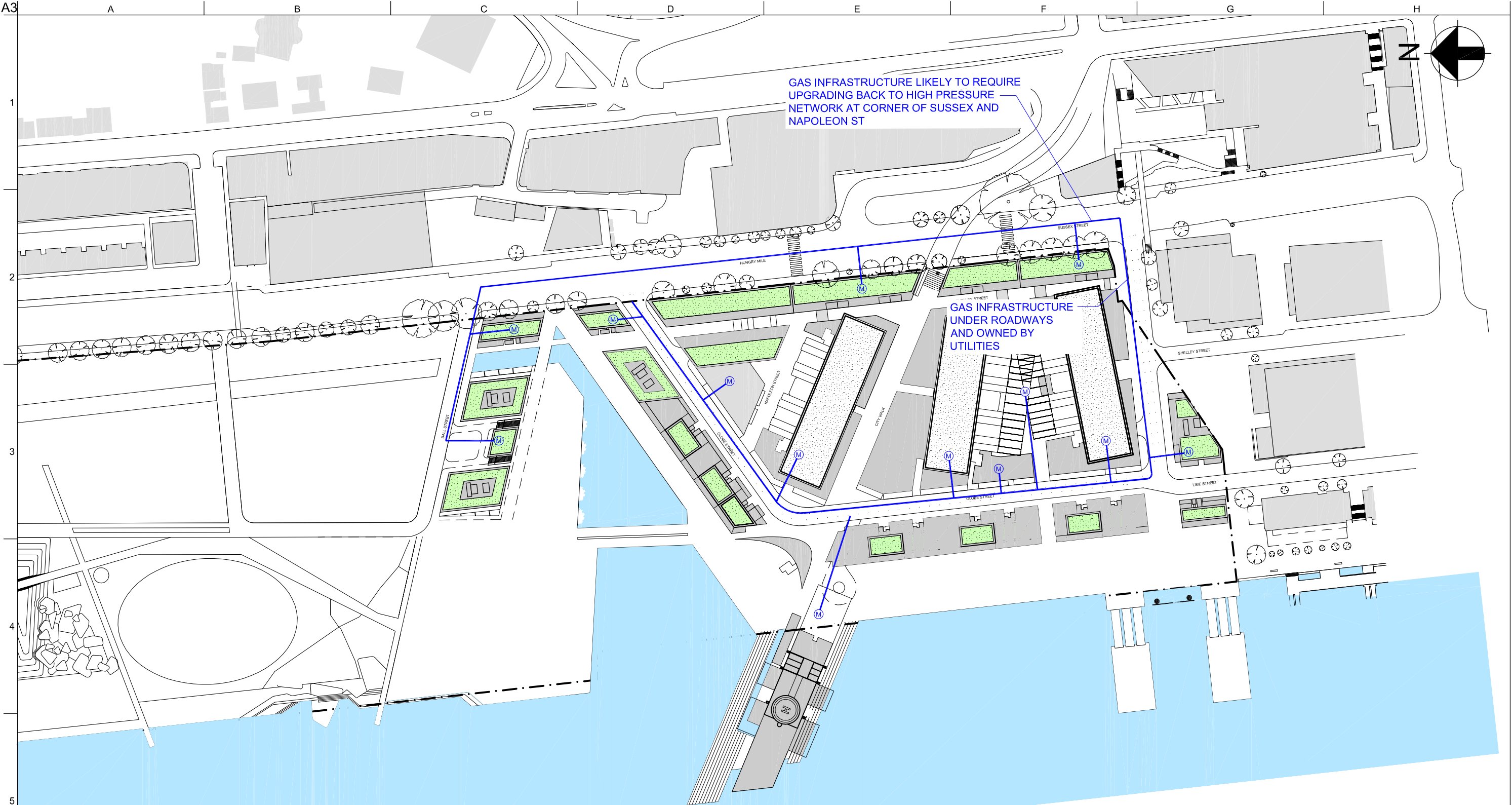
Drawing Status  
PRELIMINARY

Job No  
220316

Drawing No  
SK001

Issue  
A





**NOTES:**

- THE GAS SUPPLY INFRASTRUCTURE WILL BE OWNED BY THE APPROPRIATE UTILITY COMPANY

**(M)** = METERED GAS CONNECTION TO EACH INDIVIDUAL PLANT AND BOILER PLANT.

THIS LAYOUT IS INDICATIVE ONLY AND WILL BE SUBJECT TO DESIGN AND DEVELOPMENT CHANGES.

A	03/06/10	MMH	MD	MD
Issue	Date	By	Chkd	Appd

Client  
**LEND LEASE (MILLERS POINT)  
PTY LIMITED**

Job Title  
**BARANGAROO STAGE 1**

Scale at A3  
1:2000

Discipline  
Civil

**ARUP**

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

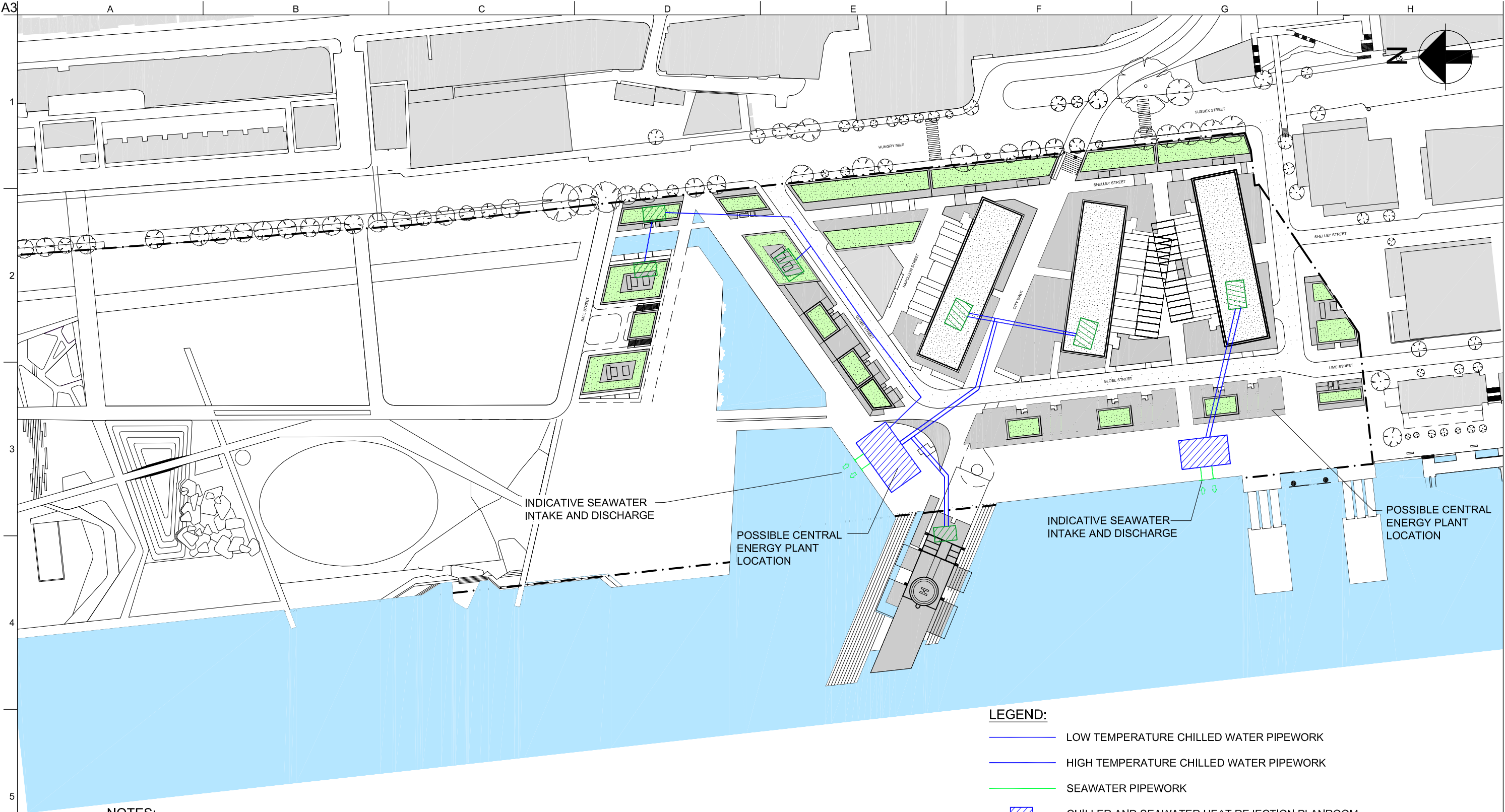
Drawing Title  
**PROPOSED GAS  
RETICULATION**

Drawing Status  
**PRELIMINARY**

Job No  
**220316**

Drawing No  
**SK002**

Issue  
**A**



**NOTES:**

- THE CENTRAL COOLING PLANTS AND CHILLED WATER RETICULATION SUPPLYING BUILDING WILL BE OWNED BY THE BARANGAROO INFRASTRUCTURE COMPANY. BUILDING PLANT AND EQUIPMENT WILL BE OWNED BY THE TENANT

- LEGEND:**
- LOW TEMPERATURE CHILLED WATER PIPEWORK
  - HIGH TEMPERATURE CHILLED WATER PIPEWORK
  - SEAWATER PIPEWORK
  - CHILLER AND SEAWATER HEAT REJECTION PLANROOM
  - HEAT EXCHANGER PLANROOM

THIS LAYOUT IS INDICATIVE ONLY AND WILL BE SUBJECT TO DESIGN DEVELOPMENT CHANGES

A	03/06/10	MMH	MD	MD
Issue	Date	By	Chkd	Appd

Client  
LEND LEASE (MILLERS POINT)  
PTY LIMITED

Job Title  
BARANGAROO STAGE 1

Scale at A3  
1:2000

Discipline  
Civil

ARUP

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

Drawing Title  
PROPOSED MECHANICAL  
COOLING RETICULATION

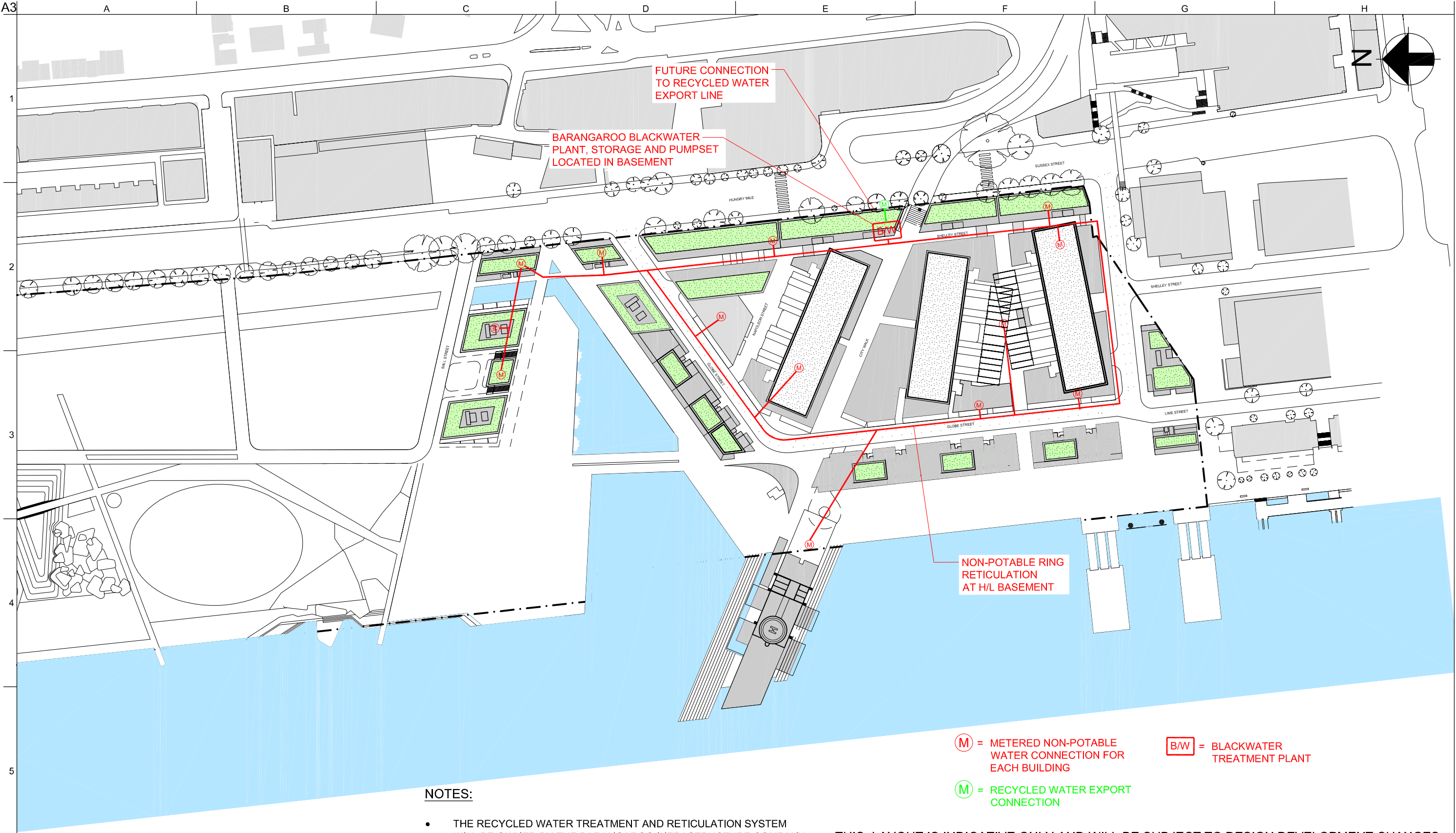
Drawing Status  
**PRELIMINARY**

Job No  
**220316**

Drawing No  
**SK003**

Issue  
**A**





**NOTES:**

- THE RECYCLED WATER TREATMENT AND RETICULATION SYSTEM WILL BE OWNED BY THE BARANGAROO INFRASTRUCTURE COMPANY.
- THIS LAYOUT IS INDICATIVE ONLY AND WILL BE SUBJECT TO DESIGN DEVELOPMENT CHANGES.

(M) = METERED NON-POTABLE WATER CONNECTION FOR EACH BUILDING  
(B/W) = BLACKWATER TREATMENT PLANT  
(M) = RECYCLED WATER EXPORT CONNECTION

A	03/06/10	MMH	MD	MD
Issue	Date	By	Chkd	Appd

Client  
LEND LEASE (MILLERS POINT)  
PTY LIMITED

Job Title  
BARANGAROO STAGE 1

Scale at A3  
1:2000

Discipline  
Civil

ARUP

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

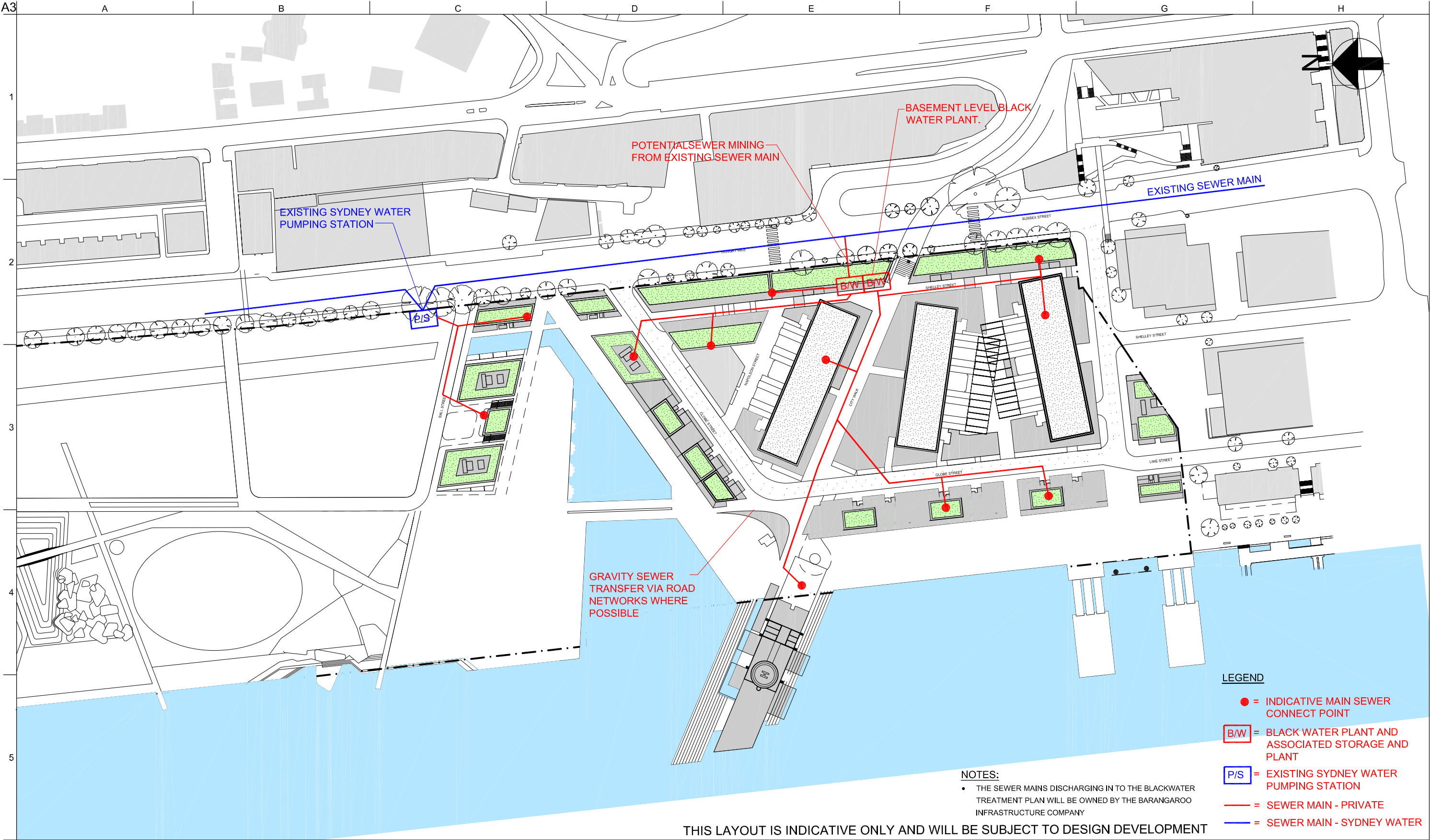
Drawing Title  
PROPOSED NON POTABLE  
WATER RETICULATION

Drawing Status  
**PRELIMINARY**

Job No  
**220316**

Drawing No  
**SK004**

Issue  
**A**



A	03/06/10	MMH	MD	MD
Issue	Date	By	Chkd	Appd

Client  
LEND LEASE (MILLERS POINT)  
PTY LIMITED

Job Title  
BARANGAROO STAGE 1

Scale at A3  
1:2000

Discipline  
Civil

ARUP

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

Drawing Title  
PROPOSED WASTE WATER  
RETICULATION

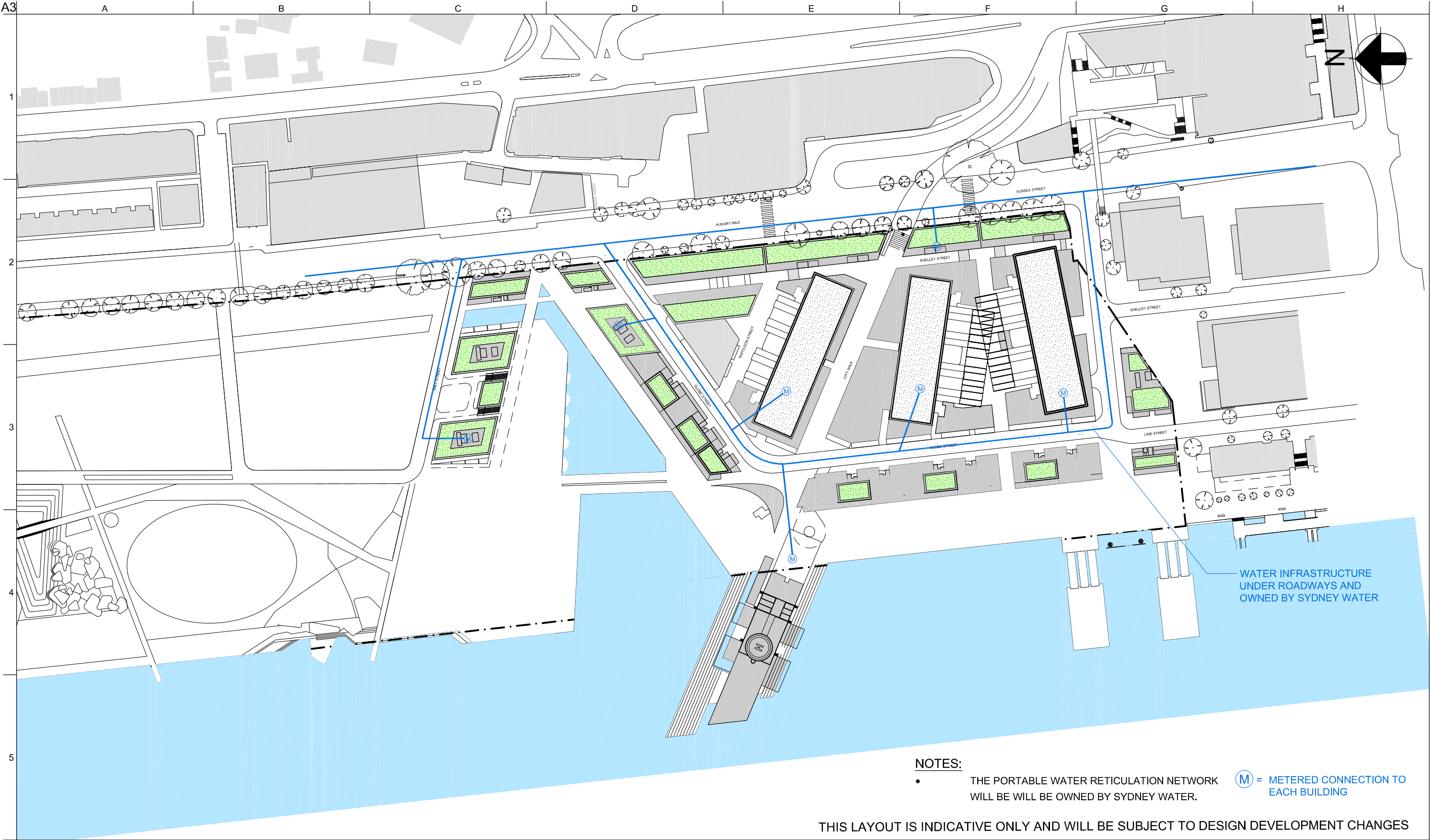
Drawing Status  
PRELIMINARY

Job No  
220316

Drawing No  
SK005

Issue  
A





**NOTES:**

- THE PORTABLE WATER RETICULATION NETWORK WILL BE OWNED BY SYDNEY WATER. **(M) = METERED CONNECTION TO EACH BUILDING**

THIS LAYOUT IS INDICATIVE ONLY AND WILL BE SUBJECT TO DESIGN DEVELOPMENT CHANGES

A	03/06/10	MMH	MD	MD
Issue	Date	By	Chkd	Appd

Client  
**LEND LEASE (MILLERS POINT)  
PTY LIMITED**

Job Title  
**BARANGAROO STAGE 1**

Scale at A3  
1:2000

Discipline  
Civil

**ARUP**

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

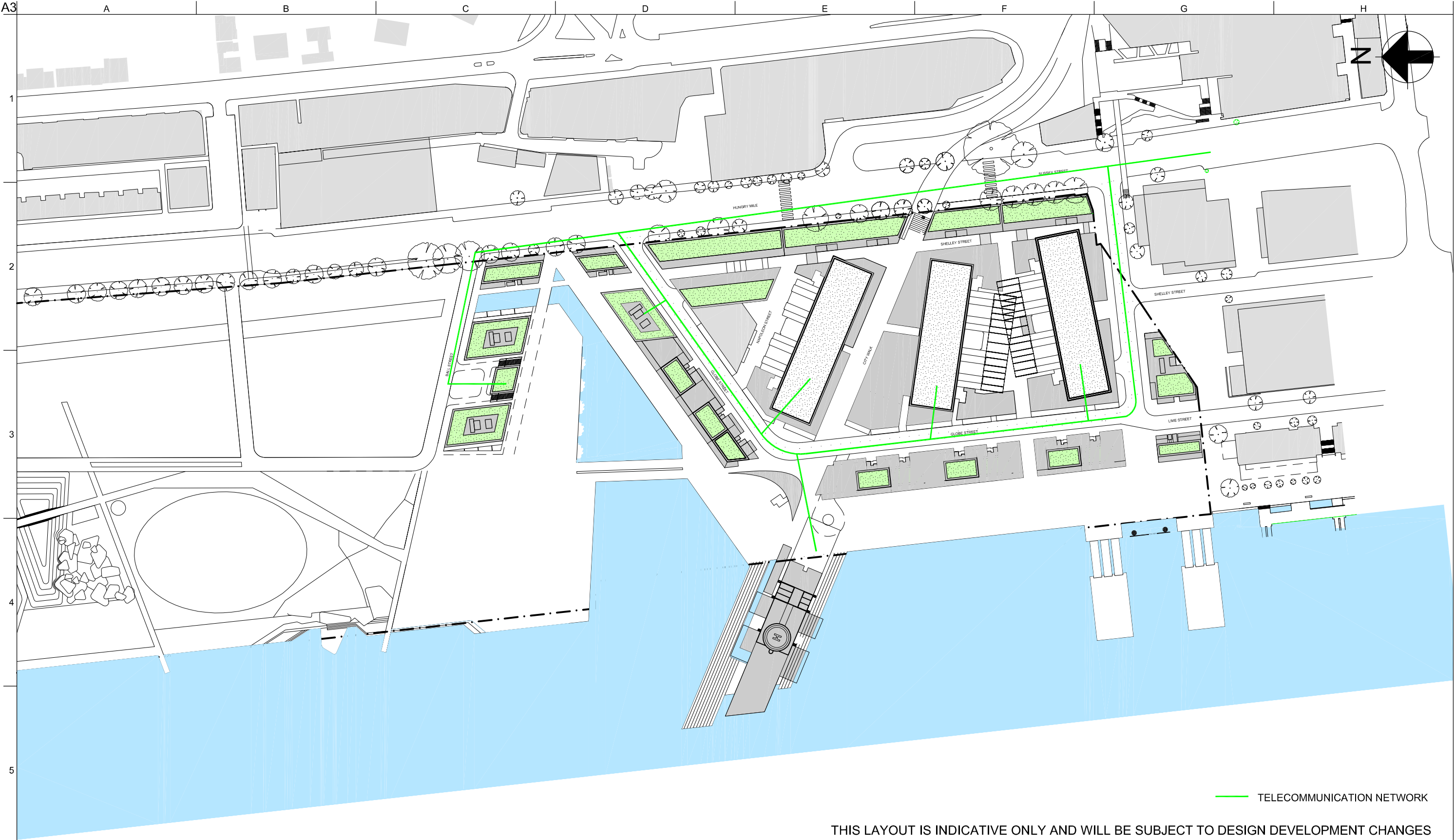
Drawing Title  
**PROPOSED POTABLE WATER  
RETICULATION**

Drawing Status  
**PRELIMINARY**

Job No  
**220316**

Drawing No  
**SK006**

Issue  
**A**



TELECOMMUNICATION NETWORK

THIS LAYOUT IS INDICATIVE ONLY AND WILL BE SUBJECT TO DESIGN DEVELOPMENT CHANGES

A	03/06/10	MMH	MD	MD
Issue	Date	By	Chkd	Appd

Client  
LEND LEASE (MILLERS POINT)  
PTY LIMITED

Job Title  
BARANGAROO STAGE 1

Scale at A3  
1:2000

Discipline  
Civil

ARUP

Arup, Level 10, 201 Kent St  
Sydney, NSW, 2000  
Tel +61(02)9320 9320 Fax +61(02)9320 9321  
www.arup.com.au

Drawing Title  
PROPOSED  
TELECOMMUNICATIONS  
RETICULATION

Drawing Status  
PRELIMINARY

Job No  
220316

Drawing No  
SK007

Issue  
A

## Appendix C

---

### **Worley Parsons Letter**



# WorleyParsons

resources & energy

## Infrastructure & Environment

Level 12, 141 Walker Street,  
North Sydney NSW 2060  
Australia  
Telephone: +61 2 8923-6866  
Facsimile: +61 2 8923-6877  
[www.worleyparsons.com](http://www.worleyparsons.com)  
WorleyParsons Services Pty Ltd  
ABN 61 001 279 812

23 July 2010

Ref: 301015-02234

File:

## PROPOSED HARBOUR WATER HEAT REJECTION SYSTEM

### Background

Lend Lease has proposed to construct a harbour water heat rejection system to absorb heat generated by the district cooling system for the Barangaroo development.

Lend Lease has committed to design and construct this heat rejection system so that the resulting discharge does not pollute the marine environment as detailed below.

The purpose of this report is to highlight environmental compliance of this system if constructed in a manner such that no pollutants (as detailed under NSW legislation) would be discharged into Sydney Harbour via the return water. Possible pollutant sources are:

- thermal waste, resulting in warmer seawater being returned to the harbour; and
- pesticides, used for minimising fouling of the system by marine organisms.

### Relevant Legislation

#### Protection of the Environment Operations Act 1997

Clause 120(1) of the *Protection of the Environment Operations Act 1997* (POEO Act) states that:

*"A person who pollutes any waters is guilty of an offence."*

Water pollution is defined in Schedule 5 of the *Protection of the Environment Operations Regulation 2009* and this definition includes:

- (j) *thermal waste (being any liquid which, after being used in or in connection with any activity, is more than 2 degrees Celsius hotter or colder than the water into which it is discharged<sup>1</sup>),*
- (p) *any pesticide (within the meaning of the Pesticides Act 1999)*

#### Pesticides Act 1999

The *Pesticides Act 1999* provides that pesticides must be used in accordance with the instructions on an approved label for the pesticide in accordance with a permit issued pursuant to Part 7 of the Schedule to the *Agricultural and Veterinary Chemical Codes Act 1994* (AVCC Act).

---

<sup>1</sup> Consistent with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ, 2000).



## Compliance with Relevant Legislation

1. If the proposed harbour water heat rejection system is designed, built, operated and maintained in such a way that ensures that discharge waters are no more than 2 degrees Celsius hotter or colder than the receiving waters, then the proposed system would not produce thermal waste as defined under the *POEO Act*; and
2. If the antifouling agent used in the proposed harbour water heat rejection system is an approved pesticide for this purpose under the *Pesticides Act 1999* and used in accordance with a permit issued pursuant to Part 7 of the *AVCC Act* then no pesticide pollutant would be released into Sydney Harbour.

Provided that the above two criteria are met and no other chemicals are introduced to the system's return water then the proposed harbour water heat rejection system would not be considered to pollute marine waters based on the legislation described herein.

Regards  
WorleyParsons

Peter Horton  
Manager Coastal (Sydney)

Nick Hannaford  
Environmental Scientist