Appendix X

Integrated water and infrastructure management plan

Ausgrid / Investa

33 Bligh St.
Sydney City East Zone Substation and Integrated Development

Integrated Water Management Plan

October 2011

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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 220776-00

Contents

1 Integrated water and infrastructure management plan

This report supports a Project Application for development of a substation and integrated commercial tower at 33 Bligh Street development. It addresses the relevant Director-General Requirements (DGR's) for the project and the report summarises the proposed stormwater and infrastructure strategy.

1.1 Site Location

33 Bligh Street is located in the Sydney Central Business District, bounded by O'Connell Street to the west, Bligh Street to the east, and adjacent buildings on the north and south.

1.2 Project Summary Description

This Project Application seeks approval for the:

- construction of a 36 storey building with a maximum RL of 177.48m AHD, comprising:
  - 28,000m^2 (approx.) GFA of commercial office floor space; and
  - 50m^2 (approx.) GFA retail floor space
- provision of approximately 40 car spaces, bicycle parking spaces and associated facilities.

2 Integrated Water Management plan Overview

2.1 Potable Water

The building is targeting reducing potable water consumption and targeting a high NABERS water rating which will be achieved through:

- Use of efficient water fittings;
- Collection of rainwater from the building roof, treated where necessary, and reticulated back through the building for non-potable water uses;
- Minimising the landscape irrigation requirements, by the selection of drought tolerant species.

The reduction in use of potable water will be subject to further design development.

2.2 Non-Potable Water

The sources of the non-potable water supply will be to utilise both the rainwater from the Building roof and paved area runoff (where feasible). This will be treated and distributed via a separate system to flush toilets within the commercial tower and for any irrigation needs.

Non-potable water use will be subject to further design development.

2.3 Rainwater and Stormwater

The proposed strategy is to maximise reuse of rainwater runoff from roofs on site. Rainwater is proposed to be utilised for approved non-potable uses such as toilet flushing and irrigation.

The design intent of the building stormwater system is summarised as below:

- Stormwater from the building main roof will be drained to a rainwater harvesting tank located at the plant level of the commercial tower via rainwater outlets and downpipes. Rainwater will be filtered via a first flush device prior to entering the tank. Rainwater surcharged from the tank will be discharged to the stormwater main or street kerbs and gutters at O'Connell Street and Bligh Street.

3 Stormwater Drainage

3.1 Design Criteria

The stormwater system on site is proposed to be designed to provide positive drainage for minor storm event flows (1 in 20 years).

3.2 Design Standards

The stormwater drainage network will be designed generally in accordance with the following standards and guidelines:

- Australian Rainfall and Runoff Volume 1 and 2, 1997;
- NSW Floodplain Development Manual 2005;
- City of Sydney Council Policies;
- AS3500 – Stormwater and Drainage Design codes;
- AS3725 – Loads on Buried Concrete Pipes; and
- Managing Urban Stormwater – Soils and Construction Volume 1, 4th edition.

3.3 Overland Flows and Flooding

The site is currently fully developed and therefore there will be no changes to the overland flood approach to the development.

3.4 On-site detention (OSD)

No on-site detention system is proposed to the development due to the following factors:

- The main reason for no on-site detention system is that water storage is an unacceptable risk to Ausgrid. 132/11kV City East Zone Substations and the associated electrical equipment and plant rooms are to be provided

within the development, and they are critical to the energy supply to the electricity transmission network within CBD. Omission of the OSD tank will reduce the chances of any potential water damage to the substations and associated electrical equipment.

- No increase or reduction in the site impervious area of the new development when compared to the existing condition (i.e. the site will remain 100% impervious), hence the stormwater runoff from the site in all storms will remain unaltered and hence will have no altered impact on council's stormwater system.
- The site is located at the downstream end of the catchment, it is anticipated that the water authority would prefer flows to be discharged directly and not held back to converge with runoff from upstream in the catchment.

4 Groundwater

The lowest point on the site is the City East Cable Tunnel (CECT) which has a separate specifically designed strategy for alleviating groundwater ingress.

Any groundwater ingress to the basement will be captured and conveyed to collection points, from where it shall be either discharged to the CECT treatment system or discharged to the stormwater system if found to meet the water quality targets.

Groundwater from the substation basement levels will be collected via grated drains and pumpout pits, from which it will be pumped to the stormwater main or street kerbs and gutters at O'Connell Street and Bligh Street.

A groundwater treatment plant may be needed to treat any contaminated groundwater prior to disposal to the external stormwater system. If the groundwater flow is sufficiently low, it may be discharged into the cable tunnel for treatment at the Campbell Street Zone Substation water treatment plant. If a groundwater treatment plant is required, it will need to be a modular compact unit that complies with Ausgrid's requirements. Currently the expected inflow of groundwater to the basement is low and therefore the preference is to combine with the larger cable tunnel groundwater treatment strategy proposed elsewhere. Therefore no groundwater treatment plant is proposed to be included within the substation.

Estimates of the quantity and quality of the groundwater that may ingress the basement, will be addressed during the detailed design phase for the basement but preliminary analysis has indicated these volumes will be low.

5 Erosion and Sediment Control

5.1 Construction Phase

The Erosion and Sedimentation Control measures proposed to be utilised during the construction phase would be detailed within the construction management plan.

5.2 Operational Phase

During the operational phase, erosion and sediment control will be achieved through a properly designed and maintained drainage system.

6 Infrastructure connections

This Infrastructure Plan provides a description of the impact on each utility infrastructure services in relation to the building.

Details of the availability of the existing infrastructure services has been identified from Dial Before You Dig (DBYD) information, discussions with Utilities, Cardno Utility Location report 25/09/10 and existing building drawings. Refer to appendix for a summary of the proposed connection points

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.

6.1 Stormwater Services

6.1.1 Existing Stormwater Services

There are existing stormwater mains along O'Connell Street and Bligh Street. These are of historical significance and new connection will be avoided where possible.

The existing stormwater connections from site appear to take the form of two connections to Bligh Street as identified from existing drawings. There also appears to be gutter discharge points from the existing building onto O'Connell Street.

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

6.1.2 Proposed Stormwater service upgrades

Stormwater strategies have been discussed elsewhere including rainwater re-use. The overflow from the rainwater tank is proposed to be a new connection on Bligh Street to the newly aligned stormwater main. Confirmation is required from Sydney Water that this approach is acceptable, alternatively a connection to O'Connell Street will be required.

6.2 Potable Water Supply

6.2.1 Existing Water Services

The existing water supplies to the site are from connections to Sydney Water mains in both O'Connell Street and Bligh Street.

All existing site water infrastructure within the basement footprint shall be capped off as they are unlikely to be of sufficient capacity for re-use.

Water mains are likely to need re-alignment to allow for cable riser excavations. These strategies are to be developed with Sydney Water.

6.2.2 Proposed Water Service Upgrades

It is proposed to provide new water connections to both O'Connell Street and Bligh Street water mains for Fire and Hydraulic services. It is not anticipated that any upgrades to the mains will be required.

Final routing and locations are to be agreed with Sydney Water.

6.3 Sewer Services

6.3.1 Existing Sewer Services

There appears to be existing sewer connections from the site to the main in O'Connell Street. There are very limited details about exact connection details.

It is proposed to cap off at the site boundary and remove all existing sewer infrastructure contained within the building footprint.

6.3.2 Proposed Sewer Service Upgrades

It is proposed to make a single sewer connection to the main at O'Connell Street and where possible this will reuse an existing connection. The connection point is proposed to be at the Sydney Water manhole. It is not anticipated that any upgrades to Sydney Water infrastructure will be required.

6.4 Electrical Services

6.4.1 Existing Electrical Services

There are a number of existing Ausgrid supplies to the site. The existing electrical infrastructure is not sufficient for the future development and will be removed or made redundant at the boundary of the basement envelope.

6.4.2 Proposed Electrical Services Upgrades

Due to the nature of the building there will be significant changes to the electrical infrastructure. The new supplies to the building itself will be taken from the substation directly rather than new incomers from the street.

This is to be developed further with Ausgrid.

6.5 Telecommunications Services

6.5.1 Existing Telecommunications Services

All existing telecommunications infrastructure within the building footprint is proposed to be capped off at the boundary and removed as it will be insufficient for the new building.

6.5.2 Proposed Telecommunications Services Upgrades

It is proposed to make new telecommunications connection to both O'Connell Street and Bligh Street. It is not anticipated that street infrastructure will need upgrading.

6.6 Natural Gas Services

6.6.1 Existing Gas Services

The existing gas network from the low pressure main shall be capped off at the basement footprint boundary and removed. There is very limited information about the existing gas supplies.

6.6.2 Proposed Gas Service Upgrades

A new gas connection is proposed to be made on O'Connell Street. This metered connections shall be made to the building to serve mechanical boiler plant and other gas uses.

7 Conclusion

This report has been prepared to describe the stormwater management strategy and other utilities for the new building at 33 Bligh street.

The strategy proposes to maximise stormwater reuse via a building rainwater tank and to follow the approach outlined within this document.

Appendix A – Proposed connection points

Level 3 Sewer connection. 225mm sewer connection required to street. Assume direct to existing manhole. Survey required to identify if there is an existing sewer connection from site or at manhole that is re-usable. Connection up to 6000mm below street RL. Existing sewer appears to be a 250mm diameter.

Level 4 Gas main. New connection needed to 7KPa gas main in street. Connection invert assumed 600 below street RL. Street main is 110mm

Level 4 Water main 80mm diameter. Connection invert assumed 600mm below street RL. Existing 100mm connection in basement that may be useful. Incoming service at 2000mm above existing basement slab. Street main is 250mm

Level 4 Fire Water main 150mm diameter. Connection invert assumed 600 below street RL. Street main is 250mm

Level 6 Comms. 4 x 100mm diameter. New street pit,. Connection invert assumed 450mm below street RL

If storm water discharge to Bligh not possible a storm water connection required. Likely to be a 300mm storm water main. Existing discharge points are unknown and likely to be to kerb. Sydney Water to advise on invert of main and preferred connection point. Further information required. Deep invert expected or discharge to kerb .

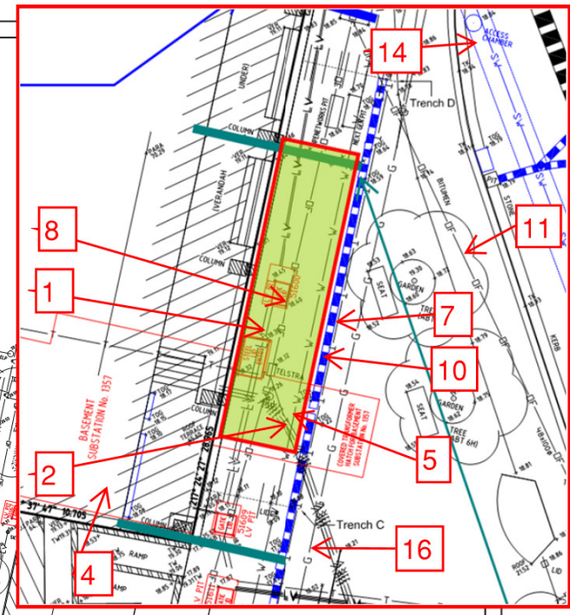
Level 4 Comms. 4 x 100mm diameter. New street pit. Connection invert assumed 450mm below street RL

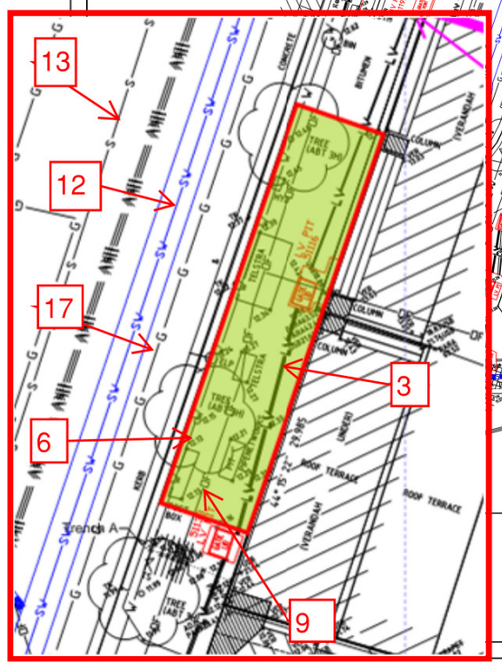
Level 6 Fire Water main 150mm diameter. Connection invert assumed 600mm below street RL. Street main is 250mm.

Existing 150mm Fire main connection to be capped off and removed as part of demolition.

Connection order to be developed and coordinated with proposed cable risers, Structure and all other services. HV connection will be taken directly from substation and not street connections.

Sydney water plan implies there are 2 x 100mm existing storm water connections from site. These are to be surveyed and detailed to determine if they are re-usable as part of the new building. However the storm water main will need re-aligning due to HV requirements. This is likely to be the preferred side to connect as realignment occurring hence lower cost impact. Note Council asset not Sydney Water.





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LEGEND

OF	DENOTES UNDERGROUND TELSTRA OPTICAL FIBRE CABLES
V	DENOTES UNDERGROUND WATER MAIN
S	DENOTES UNDERGROUND SEWER MAIN
	DENOTES UNDERGROUND STORMWATER MAIN
G	DENOTES UNDERGROUND GAS MAIN
RTA	DENOTES UNDERGROUND RTA SIGNALS
SRA	DENOTES UNDERGROUND STATE RAIL POWER LINE
E	DENOTES UNDERGROUND ENERGYAUSTRALIA CABLE
	DENOTES OVERHEAD ENERGYAUSTRALIA CABLE
	DENOTES STORMWATER CHANNEL
T	DENOTES UNDERGROUND TELECOMMUNICATION SERVICES
LV	DENOTES UNDERGROUND LOW VOLTAGE CABLE
11kV	DENOTES UNDERGROUND 8kV CABLE
P	DENOTES PILOT CABLE

LEGEND:

AC	ACCESS CHAMBER
BALC	BALCONY
CH 0.00	CROSS SECTION CHAINAGE
ELECT PIT	ELECTRICITY PIT
ELP	ELECTRIC LIGHT POLE
FP	FLAG POLE
HYD	HYDRANT
INV	INVERT
ELP	ELECTRIC LIGHT POLE
PARA	PARAPET
PM	PARKING METER
SIC	SEWER INSPECTION COVER
SV	STOP VALVE
TA	TOP OF AWNING
TBOX	TRAFFIC SIGNALS BOX
TOG	TOP OF GRATE
TK	TOP OF KERB
TL	TRAFFIC LIGHT
TS	TRAFFIC SIGN
TW	TOP OF WALL
USB	UNDERSIDE OF BUILDING
USD	UNDERSIDE OF VENTILATION DUCT
VER	VERANDAH

33 Bligh Building Utility connections
30/08/11 ARUP

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SCALE	1:150
SURVEYED	R.O.
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CHECKED	R.O.
APPROVED	J.P.T.
DATE	2.09.2009
PRJ/TRK No.	-
SURVEY JOB NUMBER	09-499

LGA: SYDNEY
LOCALITY: SYDNEY

PLAN OF
DETAIL SURVEY FOR LOT 1 D.P. 626651, BETWEEN BLIGH AND O'CONNEL STREETS, SYDNEY

DRAWING No S18470 | SHEET 1 OF 6 | AMD 4 | SIZE A0

Appendix B – Impacted utilities schedule

Project - 33 Bligh Street
Job No. - 222054
Impacted Utilities Schedule
Date - 24th Aug 2011

Item	Location	Cause	Asset Owner	Asset Description	Suggested Remediation
Direct Impact from building construction					
1	Bligh Street	Excavation for proposed basement and 11kV cable riser 2	Ausgrid	Cables from Pit 51609 to Pit 51577. 3 x 100mm dia AC conduits with roughly 0.4-0.8m cover, containing 2 runs of LV cables and 1 run of SL cables. Adjacent to these conduits are 3 abandoned direct buried cables roughly 0.5m cover and a single run of direct buried SL cable of unknown depth.	Relocate pit and cables outside of excavation footprint or redirected to other locations.
2	Bligh Street	Excavation for proposed basement and 11kV cable riser 2	Ausgrid	Cables from basement substation no. 1357 to pit 51637. 4 x 100mm dia AC conduits with roughly 1.2m cover, containing 3 runs of 11kV HV cables and pilot cables, and other pilot cables in separate run.	Depending on treatment of existing basement substation, these cables could made redundant if existing supply is to be reconnected to the new zone substation.
3	O'Connell Street	Excavation for proposed basement and 11kV cable riser 1	Ausgrid	Cables from pit 5113 to Pit 51089. 3 x 100mm dia AC conduits with roughly 0.5-0.8m cover, containing 2 runs of LV cables and 1 run of SL cable.	Pit 51133 maybe able to stay depending on basement footprint and construction methodology. Other cables will require diversion outside of basement footprint.
4	Within Project Site	New basement	Ausgrid	Existing basement substation No. 1357.	This substation will be replaced by new zone substation.
5	Bligh Street	Excavation for proposed basement and 11kV cable riser 2	Sydney Water	250mm CICL potable water supply main. Estimated 3m offset from PL and unknown depth.	Divert water main from adjacent hydrants outside of basement footprint.
6	O'Connell Street	Excavation for proposed basement and 11kV cable riser 1	Sydney Water	250mm CICL potable water supply main and associated hydrant. Estimated 3m offset from PL and unknown depth.	Divert water main and install new hydrant outside of basement footprint.
7	Bligh Street	Excavation for proposed basement and 11kV cable riser 2	City of Syd Council	Local stormwater drainage pits and pipes running alongside 250mm CICL water supply main. This drain does not connect directly into the heritage oviform stormwater brick drain but to the drain network in Hunter Street.	The stormwater pits and pipes will need to be relocated to suit new forecourt arrangement.
8	Bligh Street	Excavation for proposed basement and 11kV cable riser 1	Telstra	36 no. of 100mm dia PVC conduits in 6 x 6 arrangement with 9 conduits occupied by optic fibre cables. Separate run of 8 no. of 100mm dia asbestos conduits in 2 x 4 arrangement with 8 conduits occupied by optic fibre cables. Associated major joint pit located about 1.8m away from PL.	The adjoining cables running into the major joint pit will require diversion. The major joint pit could be impacted by the excavation and anchoring activities and subject to vibration induced cracking. The size of the pit underground has not been determined yet and is considered critical and need further investigation.
9	O'Connell Street	Excavation for proposed basement and 11kV cable riser 2	Telstra	5 no. of 100mm dia PVC conduits in 1 x 5 arrangement with 4 conduits occupied by optic fibre cables and assorted copper cables. Separate run of 2 no. of 100mm dia PVC conduits running alongside to the 5 conduits. Some distribution cables also presented possible within the same conduits or alignment. Associated joint pit located about 1.5m away from PL.	The conduits and the pit will be impacted by the cable riser and require diversion.
10	Bligh Street	Excavation for proposed basement and 11kV cable riser 1	Uecomm / Optus	Unknown number of optic fibre cables located on frontage of project site. Some cables are running within Ausgrid's spare conduits and some are running in independent conduits.	Diversion of these cables are subject to the Ausgrid cables diversion, and it is considered necessary for diversion under current design.
11	Bligh Street	Excavation for proposed basement and 11kV cable riser 1	Telstra	48 no. of 100mm dia PVC conduits in 12 x 4 arrangement with 13 conduits occupied by optic fibre cables and assorted copper cables. These conduits exit from the Telstra cable tunnel under intersection of Bligh Street and Hunter Street, and connected into the major joint pit located on the frontage of proposed building.	The impact on these conduits are highly dependent on the outcome of the major joint pit. If relocation is required for the major joint pit, then these conduits will need to be reconnected.
Indirect or no Impact from building construction					
12	O'Connell Street	Excavation vibration or wall anchoring	Sydney Water	Heritage oviform stormwater brick drain. Bennelong SWC No. 29. The drain is believed to be located under roadway.	Ensure alignment and depth of drain and establish protection methodology to control and monitor impact resulting from excavation and anchoring.
13	O'Connell Street	Excavation vibration or wall anchoring	Sydney Water	225mm VC sewer main and associated manhole. This sewer system is believed to be deep and located under roadway.	Likely will not impact, but need to ensure alignment.
14	Bligh Street	Excavation vibration or wall anchoring	Sydney Water	Heritage oviform stormwater brick drain. Bennelong SWC No. 29. The drain is believed to be traversing diagonally under 31 Bligh Street .	Ensure alignment and depth of drain and establish protection methodology to control and monitor impact resulting from excavation and anchoring. Works on Richard Johnson Square may impact however this will need to be confirmed by Sydney Water.
15	Bligh Street	Excavation vibration or wall anchoring	Sydney Water	711 x 1066 concrete sewer main running parallel to heritage stormwater brick drain.	Likely will not impact, but need to ensure alignment.
16	Bligh Street	Excavation vibration or wall anchoring	Jemena	7 kPa 110mm nylon gas main inserted into a 12 inch cast iron main and associated gas valve located about 5m away from the PL.	Likely will not impact, but need to ensure alignment. Works on Richard Johnson Square may impact however this will need to be confirmed by Jemena.
17	O'Connell Street	Excavation for proposed basement and 11kV cable riser 2	Jemena	7 kPa 110mm nylon gas main inserted into a 12 inch cast iron main and associated gas valve located about 4.9-5.5m away from the PL.	Likely will not impact, but need to ensure alignment.
18	Bligh Street	Excavation vibration or wall anchoring	Jemena	High pressure secondary 150mm gas main and associated gas valve located under eastern roadway.	Likely will not impact, but need to ensure alignment.
19	Bligh Street / Hunter Street intersection	Excavation vibration or wall anchoring	Telstra	A branch of Telstra cable tunnel located under intersection of Bligh Street and Hunter Street.	Likely will not impact, but need to ensure alignment.
20	Bligh Street	Pavement surface works	Optus	Optus assets in other Utility Owners ducts	Likely no impact though will need to confirm with Optus. Works on Richard Johnson Square may impact however this will need to be confirmed by Optus.
21	Bligh Street	Pavement surface works	Ausgrid	Cables from pit 51611. 4 x 100mm AC conduits. Roughly 0.6-0.8m cover.	Pit 51611 may not be affected, dependant upon the basement construction methodology. Works on Richard Johnson Square may impact however this will need to be confirmed by Ausgrid.
22	Bligh Street	Pavement surface works	Telstra	12 x 100mm Telstra Underground Optical Fibre cables.	Likely no impact though will need to confirm with Telstra. Works on Richard Johnson Square may impact however this will need to be confirmed by Telstra