AUSTRALAND/LANDCOM

Discovery Point Concept Plan

Engineering Services Strategy

MPI Consultants (NSW) Pty. Limited

June, 2010

IMPORTANT NOTICE

ISSUE RECORD

Revision	Description	Date	Authorised
A	Initial Draft	23 April, 2010	JGF
B	Final Draft	9 June, 2010	JGF
C	Final Draft Revised	18 June, 2010	JGF
D	Final Report	23 June, 2010	JGF
E	Final Report	2 August, 2010	JGF

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INTRODUCTION

OBJECTIVE

The objective of the Engineering Services Strategy is to establish the guiding principles in relation to Engineering Services within the Discovery Point Site (i.e. external to buildings) as well as within each building.

The Strategy aims to provide a high-level design solution that is broadly co-ordinated with the site's external design parameters and responds to the existing and future demands of the site, as well as the broad requirements of the various external utilities, including Water, Sewer, Gas, Communications and Electricity.

However, each of these specific utilities will requires detailed and exhaustive analysis during the Project Application design phases of each building. Moreover, it will also be necessary to engage with the external utility authorities and prescribed design authorities to a much greater detail than what is appropriate at concept plan level. Accordingly, the design principles provides in this Strategy are to be considered as a guide which must be developed in more detail as each building or precinct of buildings are designed.

ENGINEERING SERVICES

The Engineering Services to which this Strategy applies are:

1. Electrical and Telecommunications Services
2. Hydraulic and Gas Services
3. Fire Services
4. Mechanical Services

The Strategy pertaining to each of these Engineering Services are described in more detail in the subsequent sections.

STAGING

The Discovery Point development will be staged over several years. Accordingly that Engineering Services Strategy responds to the planned staging programme, so as to achieve continuity of services to already completed buildings whilst subsequent stages are developed.

Staging also gives rise to the need to provide temporary services and services diversions, as set-out in each of the sections that follow.

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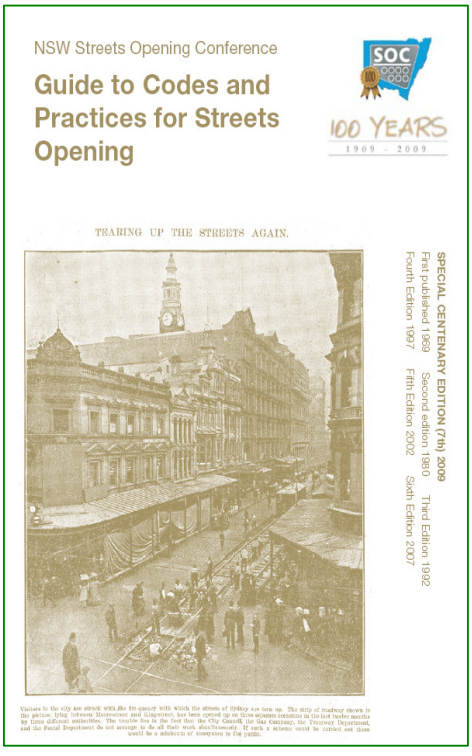
HANDOVER OF STREETS TO LOCAL COUNCIL

The existing Masterplan approval requires public access to be provided to the Wolli Creek Railway Station and open space areas. A bus and taxi zone is required to be provided adjoining Wolli Creek Railway Station. Ultimately given the public function of many roads within the development, the Developers envisage that the streets may be dedicated to the local Council and as such, they will become public streets. Roads providing access for busses must be constructed to certain design standards above those required for private access roads. Accordingly, the design and set-out of services will need to comply with the requirements of the various authorities and utilities in respect to:

1. Design
2. Inspection and Testing
3. Set-out and Access.

The guiding principles that must be satisfied to achieve such compliance are detailed in the *NSW Street Opening Conference 2009 - Guide to Codes and Practices for Streets Opening*.

Figure 1: SOC 2009



EXISTING IN-GROUND SERVICES

Existing in-ground services are generally reported in the current survey drawings.

Additionally, the *Dial Before You Dig* service reports the following interests on the site:

1. Roads & Traffic Authority
2. RailCorp - City Region
3. Transgrid
4. Airport Rail Link
5. AAPT / PowerTel
6. EnergyAustralia, Eastern
7. EnergyAustralia, Southern
8. Telstra, Newtown
9. Optus and/or Uecomm,
10. Jemena Gas South
11. Sydney Water 0288493800
12. Rockdale Council

ELECTRICAL & TELECOMMUNICATIONS SERVICES

EXISTING SERVICES

HIGH VOLTAGE

Supply to the existing building Site 4 (Vine) is from an Energy Australia 11kV distributor(Ring Main) which runs down Arncliffe St and across Brodie Spark Drive to Substation S10170 (Appendix 2).

The existing 400kVA pole mounted Substation PT10860 may need to be relocated at an early stage prior to construction of Stage 2. Early discussions with Energy Australia indicate that there may be a spare 400A distributor at substation S10170 but this has not been confirmed. The load on the pole mounted substation has somewhat reduced as some customers have been disconnected or transferred.

Figure 2: Pole Mounted Transformer

TELECOMMUNICATIONS

Some existing Telstra services are shown on the survey drawings and in *dial before you dig* plans. Some, such as the Melbourne to Sydney fibre, have been relocated but the status of others needs to be confirmed in the project applications. Discussions are in progress and a response is anticipated in late 2010.

The Telstra fibre link running along the river is in use and will likely to be relocated in the future, subject to negotiation and agreement with Telstra.

RAILWAYS

Services and easements for the Railways that are affecting the proposed development will be confirmed within subsequent future project applications.

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BUSES

There is a bus stop adjacent to the railway station and some minor services such as shelter lights may need to be relocated if the bus stop is to be relocated.

ESTIMATED DEMAND SUMMARY

The estimated maximum demand for each of the buildings and the overall site has been developed. This is based on the Energy Australia guidelines and discussions with their staff during the earlier Site 3 project design under the existing Masterplan. An allowance has been made for air conditioning to all residential units. The Maximum Demand calculations will need to be refined and submitted to Energy Australia for their review along with the application for Supply during the design phase and after the required fees to Energy Australia are paid. Table 1 summarises the anticipated Maximum Demand based on the NLA contained in the indicated design scheme.

Table 1: Estimated Electrical Demand (Energy Australia Basis) based on indicative design scheme

	NLA (m^2)			Parking Places		Energy Australia Requirements	
Site	Residential NLA	Commercial	Retail	Above Gnd Parking	Below Gnd Parking	KVA (calculated)	(Amps 11kV
1A	0	0	0	0	0	-	-
1B	845	0	1,283	288	2,711	249	14
1C	8,104	0	634	0	5,003	554	31
2	13,274	0	790	0	4,008	802	45
3	5,844	0	776	0	1,461	401	22
4	6,879	0	146	1,829	2,302	434	24
5	8,568	0	321	1,870	2,482	513	29
6	6,831	0	0	0	1,577	355	20
7	5,174	0	300	0	1,197	307	17
8	10,591	0	0	663	2,224	557	31
9	3,059	0	0	1,177	2,852	217	12
10	9,984	0	0	1,629	3,169	583	32
11	7,810	0	0	1,480	3,011	427	24
12	6,991	0	0	2,281	3,569	439	24
13	13,894	0	0	2,231	2,861	753	42
14	0	5,282	0	0	1,188	709	39
Total	**107,848**	**5,282**	**4,250**	**13,448**	**39,615**	**7,299**	**406**

SITE ELECTRICAL STRATEGY

HIGH VOLTAGE SUPPLY AND RETICULATION

Power supply to buildings other than Vine will need to be negotiated with the energy suppliers as the programming dictates.

Energy Australia previously advised during the earlier Site 3 negotiations that some additional demand can be supplied from an existing 11kV distributor however this was on the basis of first come first served and

may be somewhat reduced since the earlier discussions and Design document issue. They also indicated that clients will be required to fund additional capacity if it involves a new distributor or a contribution may be required if demand is in excess of 50% of the feeder rating. The costs of additional maximum demand must be further discussed with Energy Australia when proposals are firm.

The existing Energy Australia 11kV power supply is essentially via underground cables installed in 125mm diameter conduits and these will need to be extended and additional conduits provided to all proposed substations. Spare conduits and crossings will need to be provided as required by Energy Australia. Generally six diameter 125mm conduits are required in footpaths and eight at road crossings. However the above are subject to Energy Australia individual design requirements. The set outs are stated in Energy Australia's Network Standards and generally follow the Street opening Conference guidelines.

Existing site 4 conduits cast in slab under the footpath and intended for the Vine building substation 11kV will need to be inspected by Energy Australia and approved as they do not meet "standard" design guidelines.

Figure 3: Alcove Installed Kiosk Transformer (Not a Standard Design)

It is recommended that all design and works to be undertaken from now on with respect to 11kV and LV power is undertaken by suitably accredited Service Providers so as to ensure Energy Australia will not object to the work.

SUB-STATION STRATEGY

It is proposed that substations will comprise standard Energy Australia pad mounted Kiosk type substations located on ground in suitable locations with trafficable access as required by Energy Australia Standards.

All substations will be located above the 1:100 year flood level with suitable margin for surge and an allowance for global warming.

Leases will need to be provided in accordance with Energy Australia requirements.

Typically there will be one substation per building but where loads and location dictate shared substations can be provided.

LV SUPPLY AND RETICULATION

Low Voltage supply from the substation will be by using cables in heavy duty underground conduits, preferably in allocated easements along footpaths in public areas and direct routes from substation to the main switchboard where the substation is on private land. Inside buildings mains will be run on cable ladder at high level in car parks and where required to be suitably protected.

All consumers mains for buildings with Safety Services, such as Lifts, Sprinkler Pumps, etc will be fire rated to AS3000 and suitably protected where exposed to mechanical damage.

The reticulation of power within the buildings will be primarily using cable ladders at high level in car parks and in nominated risers to the units.

STREET LIGHTING

It is intended that the street lighting will be designed to the relevant standard level of illumination and to comply with the Energy Australia requirements.

Light poles will be provided with facilities for the hanging of banners with a suitable crossbar at the top and only a single point restraint at the bottom.

The street lights will be located at the furthest permitted location from the building property line for security, aesthetics and compliance reasons.

All cabling to street lights will be in underground conduits.

BRIDGE CROSSING

Two lots of six 125mm diameter conduits have been allocated for the crossing of 11kV and LV cables of the railway lines. Further six 100 diameter conduits have been provided for telecommunications cabling. The set outs may not be in accordance with Authority guidelines and approval will be required for their use.

TELEPHONE, NATIONAL BROAD BAND NETWORK & DATA STRATEGY

Telephone services to each building will primarily be copper cables with at least two 100mm diameter conduits provided.

A telecommunications cupboard or room will be required for the Building Distributor and any active equipment required for the implementation of the National Broadband Network. At this stage the exact requirements for facilities required to implement the above are not set out but it is expected that they will be similar or a simplified version of the Telstra Velocity offer. A separate room or cupboard may be required for these.

BUILDING ELECTRICAL STRATEGY

POWER SUPPLY AND MSB'S

Main Switchboards must be easily accessible from street level.

Main Switchrooms and cupboards with connected Safety Services should be fire rated as required by the BCA and Wiring Rules.

Switchboards to be located in dry areas free from flooding above the 1:100 year flood level plus allowance for surge and global warming.

If there are safety services connected to the main switchboard then the operation of any sprinklers should not subject the main switchboard to the possibility of an interruption to supply due to the switchboard being exposed to moisture.

Consumer's mains will need to be fire rated if safety services are connected to the switchboard and will be run in underground conduits and cable ladder. Consumer's mains will need to be suitably protected where exposed to the possibility of mechanical damage.

POWER RETICULATION

Power reticulation within buildings will be primarily using cable ladders.

Suitable risers must be provided for all cabling including cupboards for cables to units, house services, and equipment.

Power risers and cupboards must be separate from those allocated for communications.

MATV SERVICES

Provision will be made for Free To Air and Satellite/Cable TV to each Unit using an MATV system. Suitable MATV cupboard space must be allowed for the installation of all equipment.

Riser space will be provided for all cabling to units and any other equipment.

TEMPORARY SERVICES DURING CONSTRUCTION

There are existing site offices on the old Site No3 and presumably these will be retained until they are affected by construction works. Power supply from demolished substations or LV reticulation will need to be redirected as dictated by Energy Australia and should be the Builders responsibility.

ROOF SERVICES

It is envisaged that at least one satellite dish will be provided per building.

Lift shafts are expected to protrude above the roof line.

For tall buildings all roof mounted equipment such as air conditioning units, fans, ducts and other services as well as building structural components will need to be provided with some form of lightning protection and as such suitable facilities must be made for down conductors on the outside of the building to safely carry the lightning current safely to earth should be provided if this is deemed the most appropriate lightening protection strategy. For higher buildings the facade of the building may also need to be protected.

HYDRAULIC SERVICES

EXISTING SERVICES

POTABLE WATER

Potable water for the site is available from the existing in-ground 300mm DICL -authority water main in Brodie Spark Drive and 200mm uPVC main in Magdalene Terrace. (refer to Appendix 6 for details).

SEWER

The main sewer service for the site is available at the existing Sewer Manhole at the intersection of Brodie Sparks Drive and Magdalene Terrace. Additional sewer service exists to the east of the Verge (existing) and Vine (under construction) buildings.

STORM WATER

A new storm water service is suspended below the centre of Brodie Sparks Drive immediately west of the Vine Building.

NATURAL GAS

Natural gas for the site is available at the existing 210kPa 110mm PE authority gas main in Brodie Spark Drive (refer to Appendix 3 for details).

EXISTING ETHANE GAS PIPELINE

Figure 4: Ethane Pipeline Route

An existing Ethane main runs in-ground along Magdalene Terrace. This is a high pressure main supplying industry in the Port Botany area. Any work to be undertaken in the street is to be fully accessed by the operating authority prior to any works taking place.

RELOCATION OF EXISTING SERVICES

Based on the current Masterplan concept and staging programme, with the exception of water and sewer services impacted on by the construction of buildings 5 and 14, there does not appear to be any requirements for the relocation of existing Hydraulic Services.

PRESSURE & FLOW DATA

A Pressure and Flow Application was lodged by MPI on July 11, 2008 with Sydney Water.

The application was specific for two locations.

Table 2: Pressure and Flow Data

Data	Location 1	Location 2
Location	10m north from Magdalene	80m west from Arncliffe
Maximum Head	71 m	72 m
Minimum Head	35 m	36 m
Nominal Size of Water Main	300 mm	200 mm
Fire Hose Reel Installation	0.66 l/s @ 35 m head	0.66 l/s @ 36 m head
Fire installations based on peak demand	100 l/s @34 m head	100 l/s @33 m head

Full details are provided in Appendix 4 and 5.

SITE HYDRAULIC STRATEGY

STANDARDS

Hydraulic and Fire services designs will be in accordance with the relevant authorities as listed below:

1. Rockdale Council
2. Sydney Water
3. Jemena
4. AGL
5. NSW Fire Brigade

Engineered designs will be in accordance with the Building Code of Australia in particular the following sections:

1. Part 3.1.2 Drainage
2. Part 3.5.2 Gutters and Downpipes
3. Part 3.8.1 Health and Amenity
4. Part 3.12.5 Services
5. Part E.1.3 Fire Hydrants
6. Part E1.4 Fire Hose Reels
7. Part E.1.5 Sprinklers
8. Part E.1.6 Portable Fire Extinguishers

POTABLE WATER SUPPLY

Potable water for the site will be via a ring main system. Ring main pipework will pass within Spark Lane, Residential Street and Station Street. Pipework will be in-ground within nominated services zones.

The ring main will extend from the existing 300mm DICL main in Brodie Spark Drive and 200mm uPVC main in Magdalene Terrace.

Supply water pipework will cross the existing bridge deck within 225mm conduit.

Ring mains will reticulate along Station Street, Residential Street and Spark Lane in services zones below the footpath, in accordance with SOC 2009. Supply to Residential Street will pass through the existing bridge deck using existing 225 mm conduit.

Street Fire Hydrants will be provided along Station Street, Residential Street and Spark Lane. Fire Hydrant locations will be in accordance with the fire brigade, local council and local authority requirements. Flushing hydrants will be supplied at the end of any branch lines.

The site water service will be constructed from HDPE or Polypropylene pipework and fittings. The use of non-metallic pipework is proposed to prevent conduction of stray current.

Dual water supply branch lines will enter each building to provide both domestic and fire water demands. An in-ground stop valve accessible from the street will enable each building to be isolated individually. A main building water meter will be installed during construction.

SEWER

All sewer services from the new buildings will likely be connected to a new privately owned Sewer Mining Treatment Plant.

Sewer water will be mined from a new connection at the existing Sewer Man Hole in Brodie Sparks Drive, near the intersection of Magdalene Terrace. A new rising main will connect to the Sewer Mining Treatment Plant.

Overflow from the Sewer Mining Treatment Plant will flow back to the exiting sewer line on the southern side of the proposed location of the plant. Treated Class A water will be exported to council's parkland on the northern side of the Cooks River.

Sanitary drainage rising main pipework will be constructed from PE pipe and will reticulate down Station Street and Residential Street via in-ground branch pipelines in nominated services zones.

Discharge to Residential Street will pass through conduit cast in to the existing bridge deck.

NATURAL GAS

Natural gas for the site will be extended from the existing 210kPa 110mm PE authority gas main in Brodie Spark Drive. Gas will reticulate down Station Street and Residential Street via in-ground pipe in nominated services zones.

Supply to Residential Street will pass through conduit cast in to the existing bridge deck.

The site gas service will be constructed from PE pipework and fittings. All work will be in accordance with local council and authority requirements. The use of non-metallic pipework is proposed to prevent conduction of stray current.

A gas supply branch line will enter each building. A property service isolation valve accessible from the street will enable each building to be isolated individually.

FIRE HYDRANTS

Fire Hydrants will be supplied from the Street Water main. Flushing Hydrants will be provided at the end of each water main branch.

BUILDING HYDRAULIC STRATEGY

WATER STORAGE

Each building will be provided with a water storage tank for Hydrants and Sprinklers as appropriate (Refer Fire Section of Strategy).

RAINWATER HARVESTING

If necessary roof-top rainwater will be harvested and collected in storage tanks, located in the basement of each building, with each system optimised to the catchment capacity of the building it serves.

Each system will also comprise a treatment and filtration system ensuring compliance with the applicable codes and standards for rain water reuse.

SANITARY DRAINAGE

Each building will be provided with a sewer pit and pumping station, connected to a rising main that discharges into Sydney Water sewer Access Chamber. From this point flows will gravitate through the existing sewer service to the sewer mining draw-off point.

Sewer pump stations will be located at each buildings lowest basement level. Dual cutter pumps will operate on a duty / standby configuration. Sumps will be sized to provide emergency storage. Pump power supply will be from a back-up power source.

DOMESTIC HOT WATER

Domestic Hot Water will be provided as a central system for each building, in conjunction with a possible Combined Heat and Power System (Cogeneration System – See Mechanical Section)

RECYCLED WATER (BLACK WATER)

Treated Black Water from the centralised Sewer Mining Treatment Plant may be reticulated around the site for toilet flushing, washing machines, car washing and landscape irrigation.

FIRE SERVICES

WATER SUPPLY GRADE

Buildings that exceed 25m in height will require a Grade 2 Water Supply. Storage areas for the proposed supermarket may need a Grade 1 Water Supply. A grade 2 water supply can be provided by connection to a main that is fed from both ends (ring main). A Grade 1 water supply can be achieved by connecting to two water mains, i.e. the 200mm supply in Magdelene terrace and 300mm supply in Brodie Spark Drive.

STREET FIRE HYDRANTS

Street Fire Hydrant points will be provided to the requirements of NSW Fire Brigades, generally as shown on Drawing MP-H01.

FIRE SPRINKLER TANKS

Tanks may be located in roof or basement areas where preferable from a design stand-point.

The sprinkler tank will be sized in accordance with Australian standards. Sprinkler pumps will be provided adjacent to the tank.

Buildings will be accessed individually for the requirement of tank storage.

FIRE HYDRANT TANKS

Fire hydrant tanks are required to be installed in buildings over 25 meters. A 25,000 litre roof top or basement tank will achieve this requirement. A diesel hydrant pump will be provided adjacent to the tank.

Buildings below 25 meters in height do not require a roof top tank and pump.

HYDRAULIC AND FIRE SPATIALS

Fire hydrant tank footprint	4 x 4m
Fire hydrant pump room	3 x 2m
Sprinkler pump room	4 x 3m
Sprinkler tank footprint	6 x 6m (approx)
Centralised hot water plant	4 x 3m

FIRE CONTROL CENTRE

A fire control centre will be provided for all buildings over 25 meters.

TEMPORARY CONSTRUCTION FIRE PROTECTION

Temporary construction fire brigade access roads will be provided during construction. Access roads will allow fire brigade access to the existing Wolli Creek Interchange Station and other buildings within the site during all construction phases. Access roads will comply with local council requirements and fire brigade operational requirements.

MECHANICAL SERVICES

BUILDING MECHANICAL STRATEGY

HEATING AND COOLING

Provision will be made to provide air conditioning to each apartment.

COGENERATION

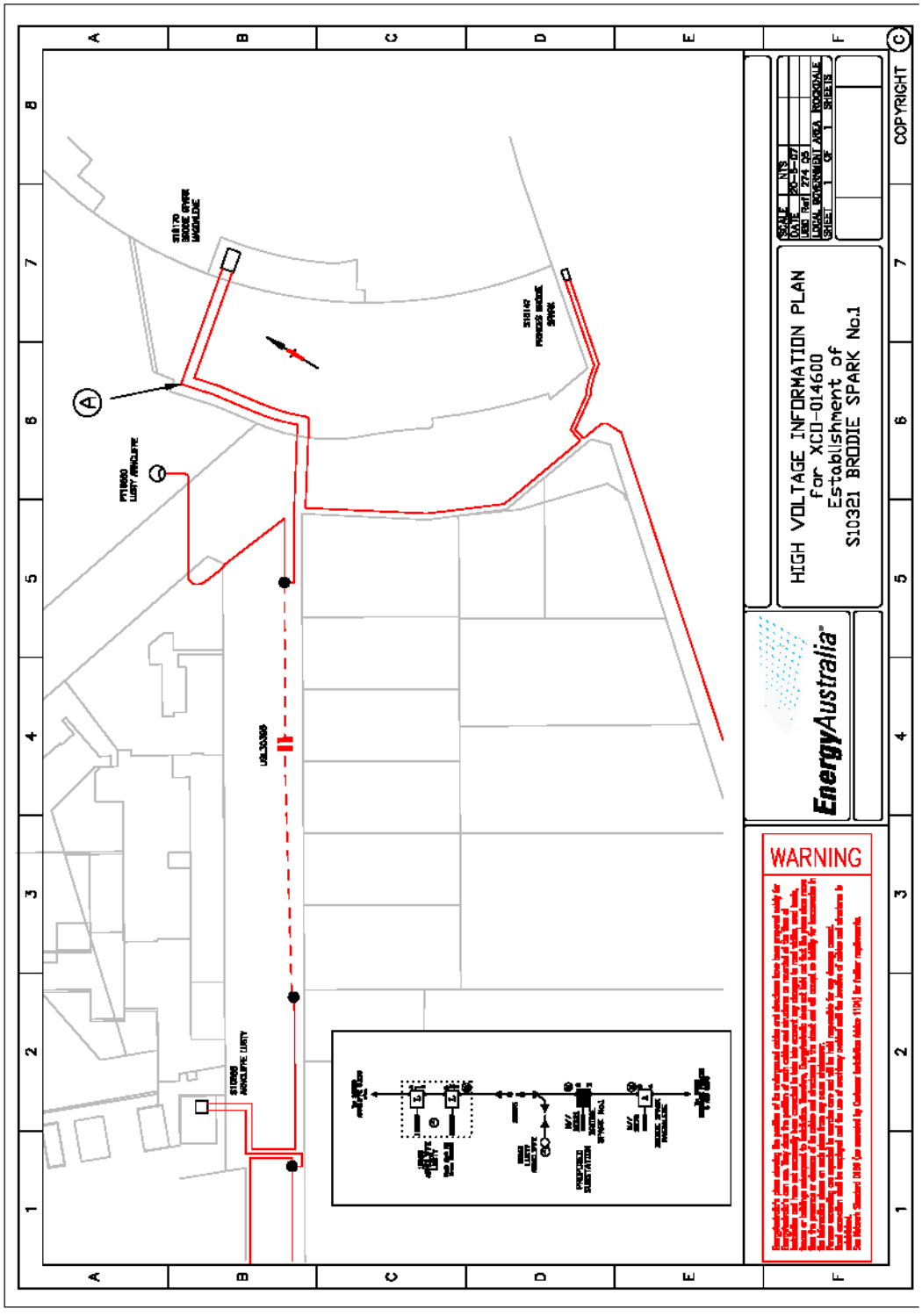
Each building will potentially incorporate a Cogeneration System that will utilise natural gas as a fuel. The cogeneration system will provide electric power for house services and heat for the Domestic Hot Water System & Pools.

This system was demonstrated as being a superior economic and environmental solution at the Cambridge Apartments.

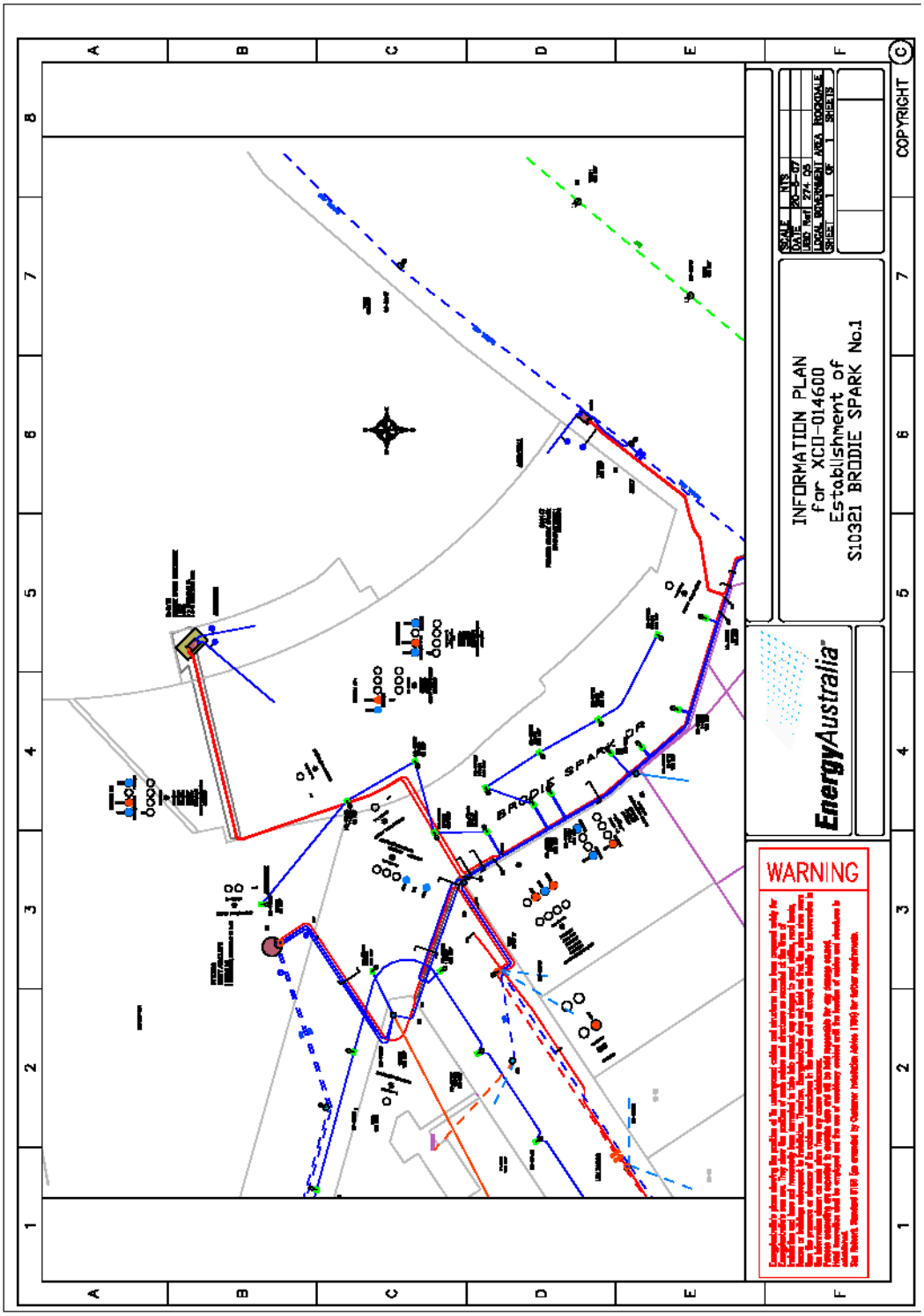
CARPARK VENTILATION

Car park ventilation will utilise conventional plenum exhaust systems with central supply air systems. Control of ventilation rates will be with gas sensors to minimise energy consumption.

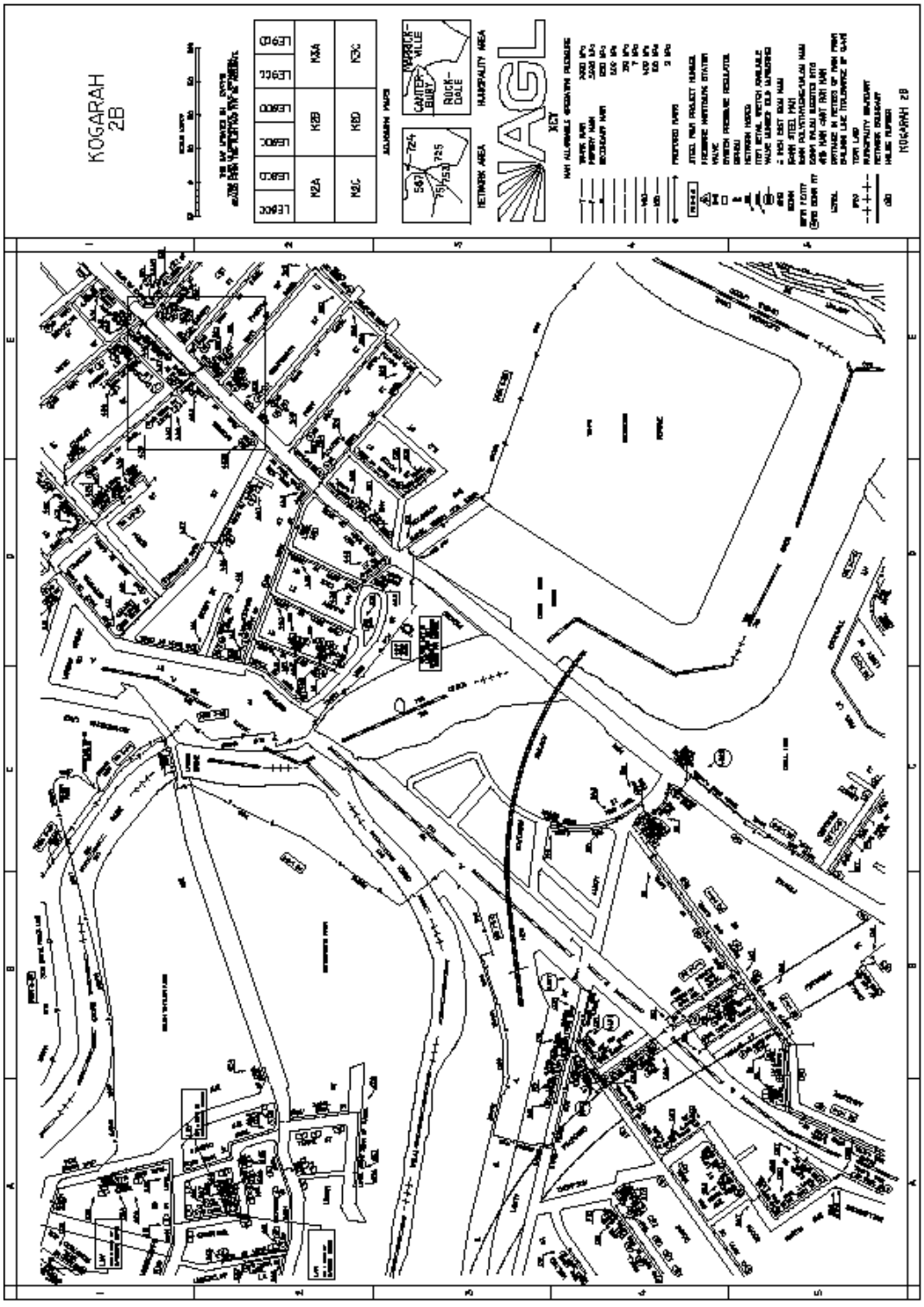
APPENDIX 1: ENERGY AUSTRALIA SUBSTATION



APPENDIX 2: SITE ELECTRICAL SUPPLY



APPENDIX 3: AGL SERVICES DIAGRAM



APPENDIX 4: PRESSURE AND FLOW ENQUIRY

Statement of Available Pressure and Flow

Sydney WATER

MPI Engineering
Lvl 1/17-23 Merriwa St
Gordon, 2072

WMS No: 10846
Contact No: 93536973
Fax No: 99504564

Attention: Bede McMahon

Date: 15/07/2008

Pressure & Flow Application Number: 2335410
Your Pressure Inquiry Dated: Fri July 11 2008
Property Address: Lot 200 Magdalene Tce Wolli Creek 2205

To obtain the flows and pressures below the proposed 200mm and proposed 300mm loop water main extensions were added to the model and the 750mm water main connection was closed.

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Brodie Spark	Side of Street: West
Distance & Direction from Nearest Cross Street	10 metres North from Magdalene
Approximate Ground Level (AHD):	4 metres
Nominal Size of Water Main (DN):	300 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	71 metre head
Minimum Pressure	35 metre head

With Property Fire Prevention System Demands	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.60	35
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	10	36
	15	36
	20	36
	25	36
	40	36
	60	35
	80	35
	100	35
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the watermain)	10	36
	15	36
	20	35
	25	35
	40	35
	60	35
	80	35
	100	34
Maximum Permissible Flow	120	34

(Please refer to reverse side for Notes)

for Robert Wickham
Team Leader
Asset Planning

Sydney Water Corporation

APPENDIX 5: PRESSURE AND FLOW ENQUIRY

Statement of Available Pressure and Flow

Sydney WATER

MPI Engineering
Lvl 1/17-23 Merriwa St
Gordon, 2072

Attention: Bede McMahon

WMS No: 10844
Contact No: 93506873
Fax No: 93504564

Date: 15/07/2008

Pressure & Flow Application Number: 2335382
Your Pressure Inquiry Dated: Fri July 11 2008
Property Address: Lot 200 Magdalene Tce Wolli Creek 2205

To obtain the flows and pressures below the proposed 200mm and proposed 300mm loop water main extensions were added to the model and the 750mm water main connection was closed.

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Magdalene	Side of Street: North
Distance & Direction from Nearest Cross Street	80 metres West from Amaliffe
Approximate Ground Level (AHD):	3 metres
Nominal Size of Water Main (DN):	200 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	72 metre head
Minimum Pressure	36 metre head

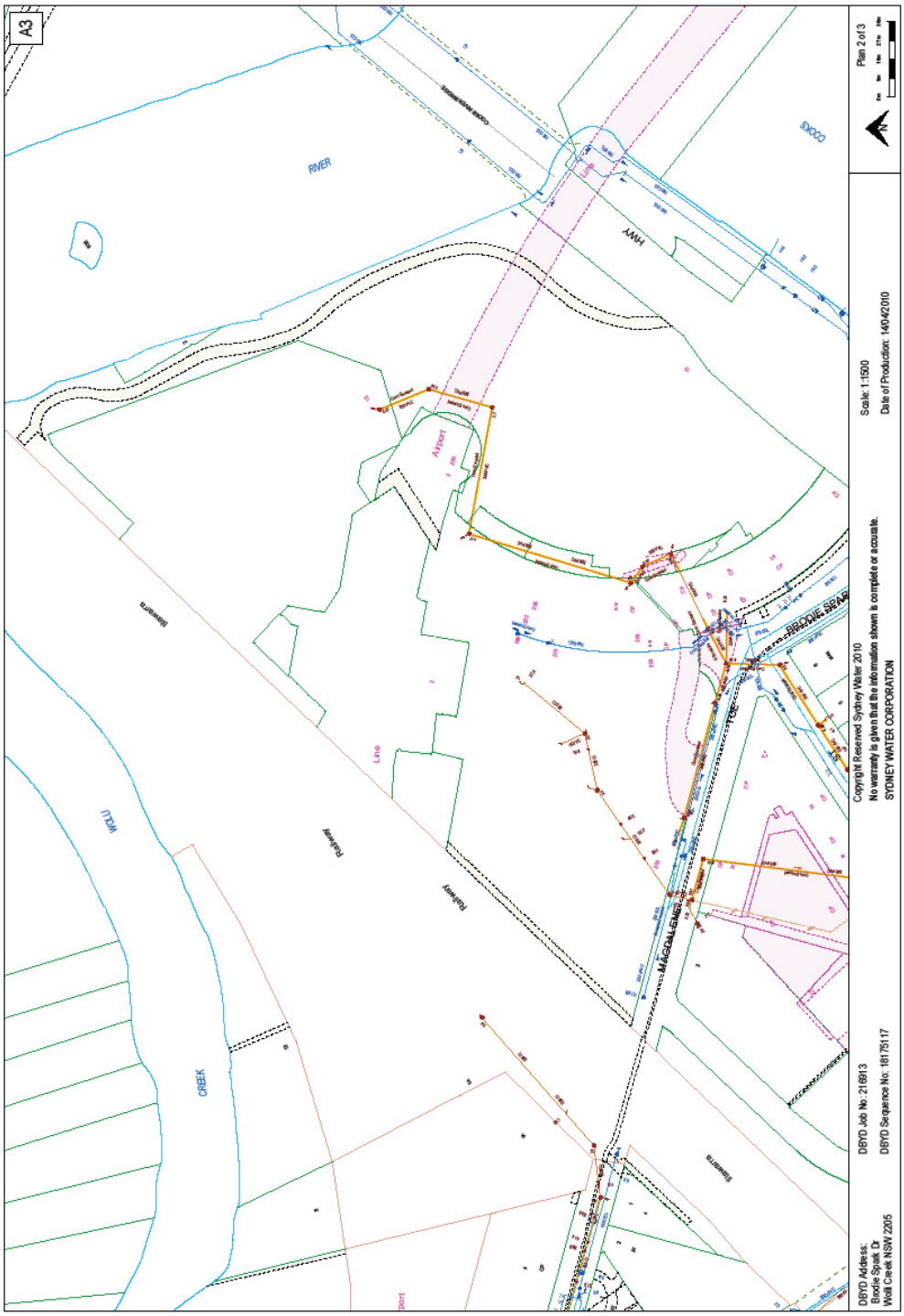
WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	33
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	10	37
	15	37
	20	36
	25	36
	40	36
	60	35
	80	35
	100	34
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the watermain)	10	36
	15	36
	20	36
	25	36
	40	36
	60	35
	80	34
	100	33
Maximum Permissible Flow	118	32

(Please refer to reverse side for Notes)

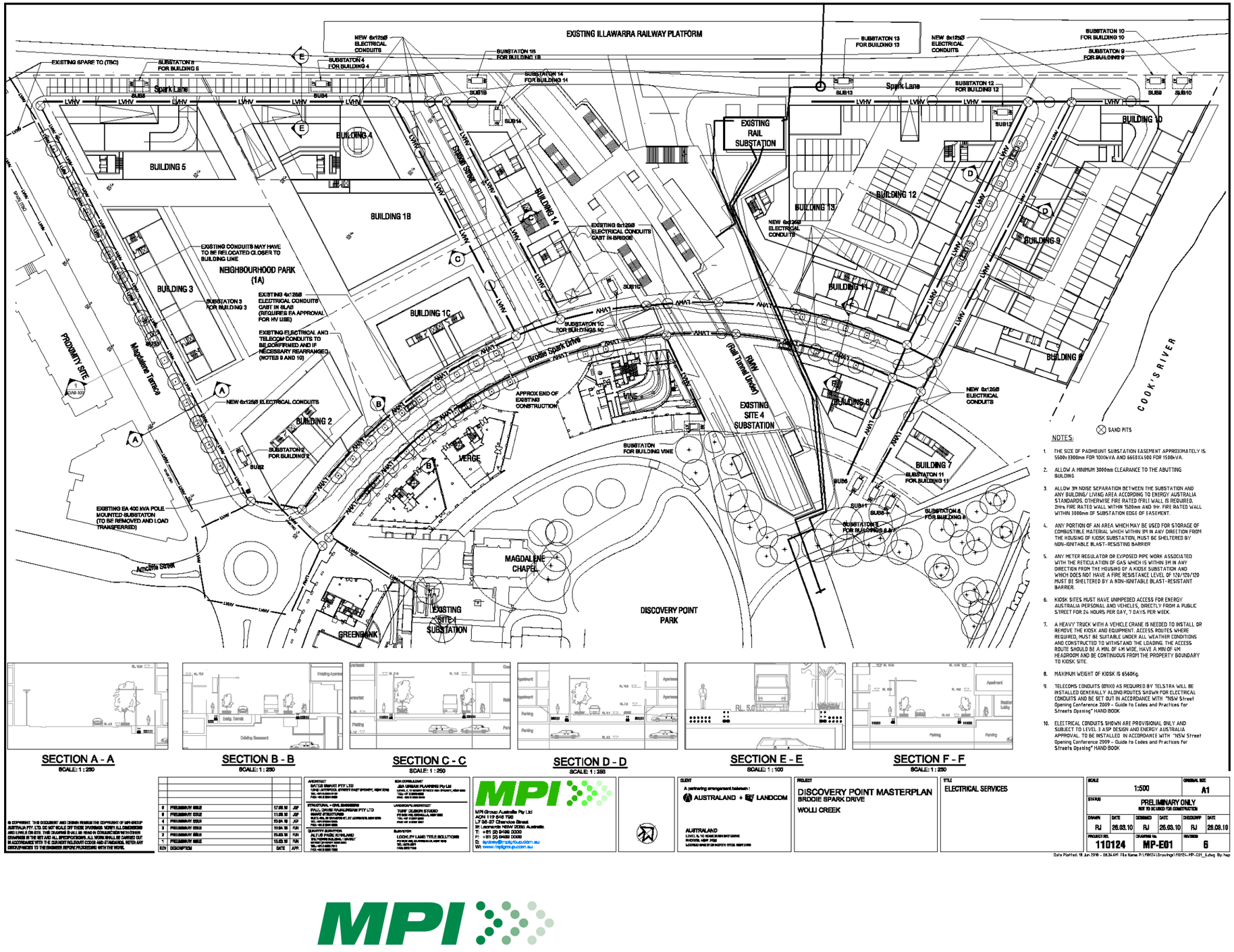
Robert Wickham
Team Leader, Asset Planning

Sydney Water Corporation

APPENDIX 6: SYDNEY WATER SERVICES SITE DRAWING



APPENDIX 7: ELECTRICAL SERVICES SITE DRAWING



APPENDIX 8: HYDRAULIC SERVICES SITE DRAWING