Costin Roe Consulting

Value in Engineering and Management

CIVIL ENGINEERING & INFRASTRUCTURE SERVICES ASSESSMENT REPORT

LAKES BUSINESS PARK (SOUTHERN PRECINCT) 11-13 LORD STREET BOTANY NSW

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1 INTRODUCTION

1.1 Introduction & Scope

Costin Roe Consulting Pty Ltd has been commissioned by DEXUS to undertake a site conditions and infrastructure services assessment to assist in the Planning Application Stage for a change of zoning at the Lakes Business Park (Southern Precinct), Lord Street, Botany, NSW. The proposed zoning change is from B7-Business to B4-Mixed Use.

The information provided in this Report is intended to inform the Master Planners of the opportunities and constraints associated with the civil engineering requirements and for the provision of infrastructure services to the site. Specifically the report provides the following information:

- Stormwater Management Requirements including stormwater quality and quantity;
- Layout and capacity of existing service networks;
- Indicative utility demands for the current development proposals where available;
- Current service infrastructure delivery programs from the primary utility suppliers where available;
- Service infrastructure assets required onsite; and
- Indicative trunk infrastructure service layouts.

The assessment considers the supply and management of the following services and considerations for the development of the site:

- Potable Water (drinking water);
- Waste Water (sewer);
- Power;
- Natural Gas;
- Telecommunications;
- Stormwater quantity and quality; and
- External Stormwater Catchments and Overland Flow.

1.2 Site Description

The property is located on the southern side of Lord Street in the suburb of Botany as shown in **Figure 1.1**.

Figure 1.1 Locality Plan (Source: SIX Maps 2015)

The property comprises an approximate area of 2.98 Ha and is bounded by Lord Street to the north, Booralee Park to the east, light industrial and residential land to the north and west. The northern side of Lord Street comprises light industrial development including the Northern Precinct of the Lakes Business Park.

The site is located within the bounds of Botany City Council (BCC), therefore the engineering requirements of the BCC *Development Control Plan 2013* will need to be considered for the development.

1.3 Proposed Application

The proposed application is for the rezoning of the land from B7-Business to B4-Mixed Use with the intention of future commercial/ residential development of the land to take place. An indicative Masterplan Layout of the development site has been produced for DEXUS by Tony Caro Architecture Pty Ltd as shown in **Figure 1.2**.

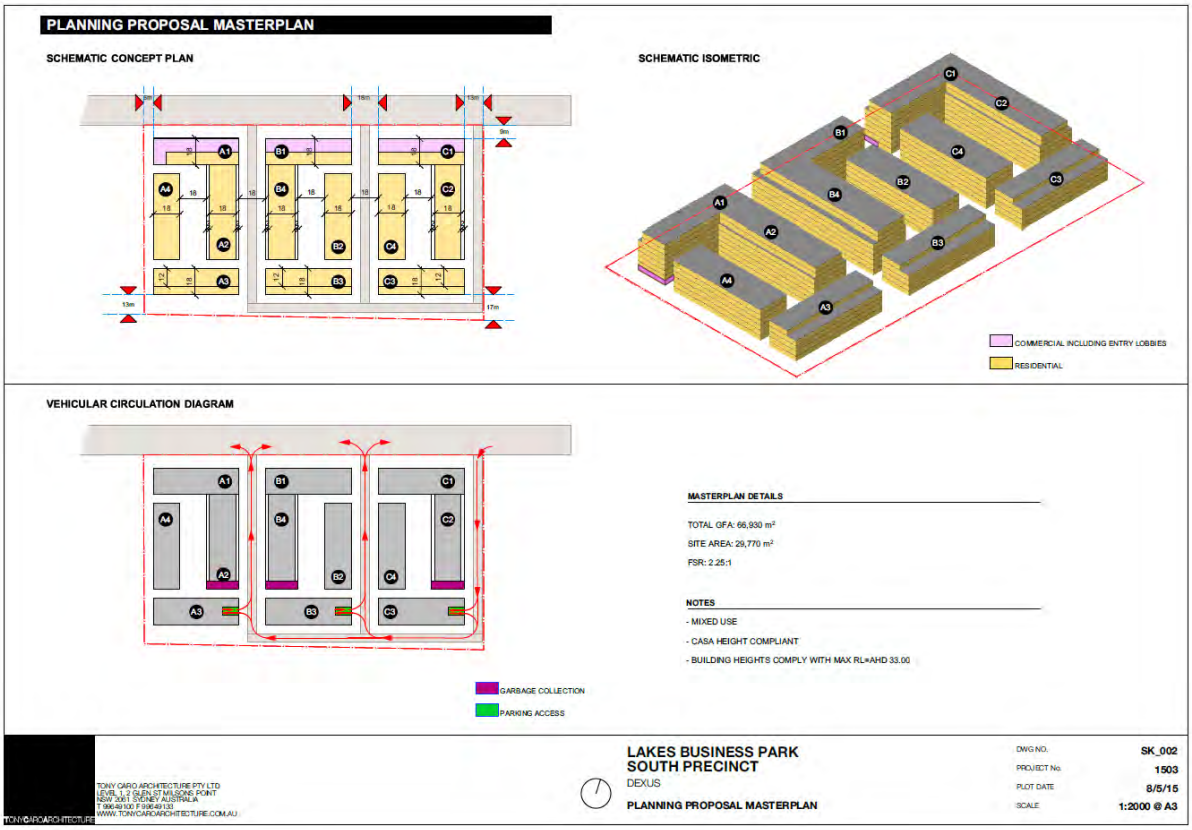


Figure 1.2. Development Masterplan Layout

The proposed layout incorporates 9 residential and commercial buildings of five, six and eight stories. Three, two level basement car parks are also proposed to service the development.

There are approximately 658 units proposed for the development site. Commercial uses totalling an area of 1,174m^2 are proposed for ground floor fronting Lord Street.

2 INFRASTRUCTURE SERVICES

An overview of the existing and proposed infrastructure network layouts are outlined in the following sections. Reference to **Appendix C** should be made for Dial-Before-You-Dig information for each particular service.

2.1 Potable Water (drinking water)

Sydney Water is the servicing authority for potable water in the suburb of Botany.

Water supply infrastructure is present in the vicinity of the development site. Two CICL water supply mains, DN100 and DN200, run parallel to the northern boundary of the site on Lord Street. A hydrant, connecting to a 100mm CICL pipe, is located on the junction of the southern site boundary and Daniel Street.

Subject to capacity requirements of Sydney Water and the final Masterplan Layout, it is proposed that the connection to the development site be made via a tee into the existing 200mm main at the north-west corner of the development site.

Potable Water Demand

Typical water demand rates for different land uses are provided in **Table 2.1** below.

Land Use	Design Criteria	Units	Potable Water Demand
Single Dwelling Residential (14 - 17 dwelling/net ha)	Max Day Demand	kL/dwelling/day	2.2
Town House (<30 units/net ha)	Max Day Demand	kL/unit/day	1.6
Multi/ high Rise Units	Max Day Demand	kL/N Floor Ha/day	33.5
Light Industrial	Max Day Demand	kL/N Ha/day	40
Medium Industrial	Max Day Demand	kL/N Ha/day	66
Suburban Commercial	Max Day Demand	kL/N Ha/day	40
City Rise Commercial/ shopping Centre	Max Daily Demand	kL/floor Ha/day	63

Table 2.1 Water Demand Unit Rates

Utilising the multi-unit rate of 33.5kL/ N Floor Ha/day over approximately 82,650m^2 of residential development, a demand for the development in the order of 276 kL/day is expected.

Potable Water Capacity

In order to gain an understanding of capacity of the existing water mains to service the development, the empirical guide to pipe servicing capacity contained in the Water Supply Code of Australia (Sydney Water Version) was used. This is shown in **Table 2.2** below.

Nominal Size of Main DN			Capacity of Main (single direction feed)			
DICL PN36	PVC PN16	PE PN16 PE80B & PE100	Residential (Lots – 500m2)	Rural Residential (lots)	General/ Light Industrial (ha)	High Usage Industrial (ha)
100	100	125	40	-	-	-
150	150	180	160	125	23	-
200	200	250	400	290	52	10
250	250	315	650	470	84	24

Table 2.2 Empirical Sizing of Reticulation Mains

Based on the empirical sizing guidelines, the required demand can be seen to be somewhere near the capacity expected of the existing DN200 and DN100 mains present in Lord Street. The current information does not enable us to estimate the extent of other properties being services by the water main and further investigations will be required in this regard. Confirmation of the capacity of the existing system will need to be confirmed via a Section 73 Application to Sydney Water performed by a Sydney Water qualified Quickcheck agent.

Potable Water Supply

The strategy and design for the required extension of the system will need to be performed by a Sydney Water Service Coordinator.

A qualified Hydraulic Engineer shall design internal water and fire system water supply to service the proposed development sites. This will be investigated as part of the detailed design and assessed as part of future separate building development applications.

Notwithstanding the further investigations and applications required with Sydney Water, it is considered that water supply will be able to be provided to the development site.

It should also be noted that rainwater reuse will be employed on this development for non-potable applications including toilet flushing and irrigation. This will be further discussed in **Section 7** of the report.

2.2 Waste Water (sewer)

Sydney Water is the servicing authority for sewage disposal in the suburb of Botany.

Waste water infrastructure is present in the vicinity of the development site. A 225mm CI sewer main, approximately 35m in length runs into the site from Lord Street on the North, with a maintenance hole on the southern end. This pipe run connects to a 225mm CI pressure sewer main running along the northern boundary of the site, with approximately four (4) connection points and three (3) maintenance holes. A connection point to a 225mm CI pressure sewer main also exists on the southern site boundary, on Daniel Street.

Waste Water Service Demand

The design criteria used to forecast future sewer loadings are generally taken from the Sydney Water Area Planning Design Criteria Guide and are expressed as an Equivalent Population for a particular land use. The Average Dry Weather Flow (ADWF) per Equivalent Population (EP) is taken as 180 L/day or 0.0021 L/s (ADWF (L/s) = 0.0021 x EP). Alternatively an estimate of the ADWF can be made based on 80% of the expected potable water demand.

Values for typical development types are summarised in **Table 2.3**.

Item	Units	Adopted Value	Source
Single Dwelling Residential	EP/dwelling	3.5	SWC Area Planning Design Criteria Guide
Medium Density Residential (townhouses up to 4 storeys)	EP/dwelling	3.0	SWC Area Planning Design Criteria Guide
High Density Unit Development (up to 200-400 Bedrooms/ Ha)	EP/Bedroom	0.275	SWC Area Planning Design Criteria Guide
Light Industrial	EP/ha	75	SWC Area Planning Design Criteria Guide
Heavy Industrial	EP/ha	150	SWC Area Planning Design Criteria Guide
Commercial	EP/ha	75	SWC Area Planning Design Criteria Guide
High Density Commercial	EP/ha	300 - 800	WSA 02-2002-2.2
Reserves	EP/ha	20	SWC Area Planning Design Criteria Guide

Table 2.3. Sewer Design Loading Criteria

An estimate of the Average Dry Weather Flow (ADWF) for the project has been calculated based on 80% of the expected 276kL demand. An ADWF of 220 kL/day or 2.5 L/s has been estimated for the development.

Note that the design of sewer mains will apply a peaking factor to the ADWF to get the Peak Daily Dry Weather Flow (PDWF), and include the peak (rainfall dependent) inflow and infiltration and the groundwater (non-rainfall) dependent infiltration. The peaking factor will vary depending on the size of the upstream catchment and would normally be within a range of 2 to 5, i.e. 5-12.5 L/s.

Waste Water Capacity

The existing DN225 main in Lord Street is expected to have a capacity in the order of 26 l/s.

Waste Water Removal

Connection of the site waste water is proposed to be made on the northern side of the development at the existing DN225 main on Lord St.

Given the capacity of the connecting main is well above the required output from the development it is expected that the existing main will be sufficient to cater for the development. The extent of the upstream catchment being serviced by the main however is not known and confirmation of the proposed strategy will need to be

performed in conjunction with Sydney Water via a Sydney Water qualified Water Service Coordinator during project application stage.

Notwithstanding the further investigations and applications required with Sydney Water, it is considered that waste water reticulation will be able to be provided to the development site.

2.3 Power

Ausgrid is the servicing authority for energy adjacent to the site.

The Ausgrid plans show that high voltage (HV) cables, with a capacity of 132kV and low voltage (LV) cables are present in Lord Street (north side and south side). The DBYD information also suggests there are conduits present within the property; however details of these are unclear. In any event it would be expected these lines will be made redundant during future works. Further checks would need to be provided by an accredited electrical consultant during detain design stage.

Power Demand

An estimate of the power demand for the Precinct has been estimated using average values for different land uses typically adopted by Integral Energy. These rates are generally considered to be reasonably conservative but are appropriate for preliminary estimation purposes.

Table 2.4 presents the unit rates applied to the power usage calculation and the estimated total power usage for the development.

Land Use	Rate (kW/unit/day)
Residential Dwelling (per dwelling)	5
Light Industrial, Employment, Town Centre, Village Centres, Schools (per m2)	0.04

Table 2.4. Preliminary Power Usage Estimate

To give a reasonable estimate of the daily usage for a multi-unit development such as the Lakes Park Development, a diversity factor should be applied to the usage estimate to make allowance for the variation in usage across the development and the difference between a residential dwelling and unit. For this calculation a typical diversity factor of 0.5 to 0.8 is applied to the sum of the total power usage presented in **Table 2.4**, giving a maximum demand estimate for the Southern Precinct of approximately 1.7-2.8 MW per day.

Power Capacity and Supply

In order to confirm capacity, further investigation and applications will be required with Ausgrid by a qualified electrical consultant. It should be noted that the demand from the proposed development can be compared to the existing light industrial use on the land. Applying a demand rate of 0.04 kW/m2/day for the existing light industrial use over the 3 Ha property, a demand of 1.2 MW/day is calculated. This is lower than the expected demand of the proposed development and some amplification may be required to suite the expected demand range of the development.

Notwithstanding the further investigations and applications required with Ausgrid, it is considered that power supply will be able to be provided to the development site.

2.4 Natural Gas

Jemena is the servicing authority for gas supply adjacent to the site.

Gas infrastructure is available in the form of a secondary high pressure main, 1050kPa capacity, running along the northern site boundary, connecting into the site from Lord Street. A steel main of 100mm also runs along the northern boundary at an average distance of 3.5m from the boundary line.

Natural Gas Demand

Jemena use an energy demand of 20 gigajoules per year to estimate the average annual domestic usage of natural gas for residential dwellings. This usage rate typically equates to the utilisation of a natural gas hot water tank, cook top and heating point.

Table 2.5 presents the natural gas usage estimate for the project, assuming supply to residential units only. This estimate uses a conversion factor of 39.6 m^3 / GJ to convert the estimated energy usage into a volume of gas (Roarty, 2008).

Land Use	Number of Dwellings/ Units	Rate (GJ/dwelling/yr)	Conversion Rate (m3/GJ)	Usage (GK/yr)	Usage (GJ/day)	Usage (m^3/day)
Residential Dwellings	450	20	39.6	9000	25	990

Table 2.5. Natural Gas Usage Estimate

The estimated natural gas usage for residential dwellings in the Southern Precincts is approximately 990 m^3/day.

It should be noted that this natural gas demand estimate excludes demands from commercial premises. Without details of the specific proposed land uses it is difficult to estimate a gas demand for these areas. To meet BASIX requirements, it is expected that the residential units will require a natural gas connection.

Natural Gas Capacity and Supply

The existing DN100 main will have a carrying capacity in the order of 80-100m^3/hour or 1920-2400m^3/day. Sufficient capacity for gas supply is expected however confirmation by specific application to Jemena will be required to confirm this.

Notwithstanding the further investigations and applications required with Jemena, it is considered that gas supply will be able to be provided to the development site if required. We would expect this to be on an as needs basis for individual lots.

2.5 Telecommunications

Existing local telecommunications services are present on Lord Street.

An Optus fibre optic cable runs through the eastern half of the site and along Lord Street, to the north.

The Telstra plans show that a 100mm PVC conduit with 1-2 ducts exist within the site, connecting to a footway access chamber across the road on Lord Street.

We expect that the existing local cable network would not have the capacity to service the proposed development and that new underground cabling would be required to suit the project requirements. Normally this would be completed on a project by project basis.

Demand and capacity calculations have not been provided for telecommunications as these are not readily quantifiable like the other services provided The requirements for telecommunications would need to be formalised via a Telstra Smart Community (or similar) registration.

Notwithstanding the further investigations and applications required with Telstra, it is considered that telecommunication infrastructure will be able to be provided to the development site.

4 ACCESS AND TRANSPORTATION

4.1 Site Access and Parking

The proposed development will require access for passenger vehicles and medium commercial vehicles (12.5m rigid) for uses such as deliveries, garbage pickup and the like. The specific traffic movements and the effect of the development on the overall road network are discussed in a report by Traffix Pty Ltd.

The design vehicle for the estate is the 12.5m rigid vehicle. Access and parking will be provided in accordance with Australian Standards AS/NZS2890.1 Parking Facilities Part 1: Off-street car parking, AS 2890.2 Parking Facilities Part 2: Off-street commercial vehicle facilities and AS/NZS 2890.6 Parking Facilities Part 6: Off-street parking for people with disabilities. The number of parking spaces will be provided in accordance with council policy and these are expected to be via basement level parking within the building footprint.

Access from Lord Street to basement level carparks will be made via standard driveway crossings. Driveway crossings will be defined based on Botany Council Requirements and the above mentioned Australian Standards.

4.2 Pedestrian Facilities and Transportation

The site is located within easy access of public transport. Botany road, which is 225m to the west of the property, provides access to bus routes with regular services to the city and Port Botany. A bus stop is located approximately 50m to the north of the intersection of Lord Street with Botany Road.

A pedestrian path is located along the site frontage on Lord Street which extends to Botany Road. This path allows easy connection to the public transport route discussed above.

5 EROSION AND SEDIMENT CONTROL

5.1 Background

During the construction phase of the development, an Erosion and Sediment Control Program will be implemented to minimise water quality impacts. A detailed Erosion and Sediment Control Program will be employed throughout the construction works and a concept for this will be defined during the Development Application stage of the development site. The Erosion and Sediment Control Program will be defined based on normal engineering guidelines including The Landcom publication, Managing Urban Stormwater: Soils and Construction (The Blue Book) and the requirements of Botany Bay City Council. It is expected that the program will include measure such as temporary sediment basins, silt fences, cut-off drains for polluted stormwater and diversion channels for clean stormwater run-off.

The following sections provide information to identify controls and procedures that will be incorporated into the Erosion and Sediment Control program at Development Application Stage.

5.2 Pre-Construction

The following minimum requirements are to be met prior to commencement of construction:

- Protection of downstream receiving waters. The proximity to Botany Bay will require additional considerations to ensure that receiving waters are protected.
- Sediment fences are to be constructed on the upstream edges of the designated buffer strips and at the base of fill embankments.
- Areas for plant and construction material storage are to be designated along with associated drains and spillage holding ponds.
- Diversion banks are to be created at the upstream boundaries of construction activities to ensure upstream runoff is diverted around any exposed areas. Catch drains are to be created at the downstream boundary of construction activities.
- Silt fences and/or sand bags are to be placed along the catch drains to slow flow, reduce scour and capture some sediment from runoff.
- Construction of temporary sediment basins.
- Site personnel are to be educated to the sediment and erosion control measures implemented on site.

5.3 During Construction

The following minimum requirements are to be met during construction:

- Progressive re-vegetation of filled areas and filled batters.
- Construction activities are to be confined to the necessary construction areas.

- The provision of a construction exit (truck shaker) to minimise the tracking of debris from tyres of vehicles leaving the site onto public roads. Only one construction exit will be nominated to limit the movement of construction equipment.
- Topsoil and temporary stockpile location will be nominated to coincide with areas already disturbed. A sediment fence is to be constructed around the downstream side of the stockpile and a diversion drain at the upstream side if required.
- Regular inspection and maintenance of silt fences, sediment basins and other erosion control measures are to be made. These should be undertaken weekly, monthly and following major rainfall events. Following rainfall events greater than 50mm inspection of erosion control measures and removal of collected material should be undertaken. Replacement of any damaged measures should be performed immediately.

5.4 Post Construction

The following minimum requirements are to be met post construction:

- The contractor/ developer will be responsible for the maintenance of erosion and sediment control devices from the possession of the site until the site is accepted "Off Maintenance" or until stabilisation has occurred to the satisfaction of the superintendent and council.
    - Key stormwater areas requiring maintenance for operational phase of the project following construction are piped stormwater system, bio-retention areas, field inlet pit inserts and rainwater tanks.

6 STORMWATER DRAINAGE

6.1 Site Drainage

6.1.1 Existing Drainage System

As part of the existing industrial/ commercial development on the property, an extensive in-ground drainage system is present. This system comprises grated inlet pits, sealed junction pits, down pipe connections and in-ground pipes which convey stormwater from buildings, car parks, hardstand areas and other extensive paved areas to the legal point of discharge.

A detention basin is located on the Lord Street frontage of the property at the north-west corner of the site prior to discharge from property into council owned infrastructure in Lord Street. The detention basin provides approximately 500m^3 of active storage which attenuates post development flows to pre-developed flows. The detention storage and site discharge rate is based on the council policy which was present at the time of construction of the existing development and allows for a staged discharge for different average recurrence interval (ARI) storms and storm durations.

6.1.2 Proposed Drainage System

As per general engineering practice and the guidelines of BCC, the proposed stormwater drainage system for the development will comprise a minor and major system to safely and efficiently convey collected stormwater run-off from the development to the legal point of discharge. Details of the proposed system for the development will be defined during the Development Application Stage of the project. An option for a stormwater layout and Stormwater Management Concept has been included in this report to show that a suitable Stormwater Management Strategy is achievable for a mixed use residential/ commercial development.

The minor system is to consist of a piped drainage system which has been designed to accommodate the 1 in 20-year ARI storm event (Q20). This results in the piped system being able to convey all stormwater runoff up to and including the Q20 event. The major system will be designed to cater for storms up to and including the 1 in 100-year ARI storm event (Q100). The major system will employ the use of defined overland flow paths, such as roads and open channels, to safely convey excess run-off from the site.

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, the standards of PCC and accepted engineering practice. Runoff from buildings will generally be designed in accordance with AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage. Overall site runoff and stormwater management will generally be designed in accordance with the Institution of Engineers, Australia publication "Australian Rainfall and Runoff" (1988 Edition), Volumes 1 and 2 (AR&R).

Water quality and re-use are to be considered in the design to ensure that the detrimental effects of increased pollution loads in stormwater resulting from the development are mitigated, that BCC Water Quality Objectives are met and that the demand on potable water resources is reduced.

6.1.3 Legal Point of Discharge

The legal point of discharge is a point specified by Council where stormwater from a property can be discharged. The legal point of discharge is usually Council's stormwater infrastructure, where available, or street kerb and channel for smaller developments.

Legal discharge for the development is council infrastructure located in Lord Street. Connection to existing in-ground piped drainage system is available at the north-western corner of the property. This is consistent with the location of the outlet of the on-site detention system for the existing development on the property.

6.2 Stormwater Quantity (On Site Detention)

Botany City Council adopts the principles of water quantity management, also known as "On-site Detention (OSD)", to ensure the cumulative effect of development does not have a detrimental effect on the existing stormwater infrastructure and watercourses located within their LGA downstream from the particular site.

Section 10 of Botany City Councils DCP2013 requires that stormwater runoff generated for all storm durations up to and including the 100- year ARI will be detained to the pre-developed 5-year ARI storm flow.

A simplified conservative DRAINS model was set up to determine an order of magnitude storage requirement for the 3 Ha development. The concept modelling showed that an OSD system with an active storage in the order of 1200m^3 is required to achieve the pre-development 5 year ARI flow for ARI storms to the 100-year ARI storm.

Potential configurations for the management of stormwater detention could comprise an in-ground tank (30L x 20W x 2H) or an above ground basin, or a combination of the two. The provision of an above ground basin would enable the integration of a bio-retention system (required for water quality discussed below) within the OSD basin, maximising the efficiency of land use on the site. An option for an open basin configuration has been included in **Appendix A** of the report.

If an open basin is adopted for stormwater detention in the final engineering strategy for the development (at development application/ construction certificate stage) then the water surface elevation of stored water within the detention basin will need to be designed such that the water surface matches the existing staged water levels. This is to ensure that there is no effect on flooding levels and/or detrimental effect on adjoining properties as a result of flooding.

It should be noted that there is a large difference in the required size of the detention basin between the existing basin and proposed basin. This is due to a change in councils on-site detention policy which occurred in December 2013. The new policy provides a restriction on the site discharge rate which greatly increases the requirement for detention storage. The approximate storage size nominated in this concept reflects this change.

Consideration to flooding requirements will also need to be accounted for in the detail design of the development. Further discussion on this matter has been included in **Section 6.5** of this report.

Notwithstanding the final configuration and design details of the preferred stormwater detention solution for the development, we confirm that several different methods of achieving stormwater management and flood storage requirements are available. The chosen solution will be dependent on the final building form and designed during Development Application Stage.

6.3 Stormwater Quality Management

There is a need to provide a design which incorporates the principles of Water Sensitive Urban Design (WSUD) and to target pollutants that are present in the stormwater so as to minimise the adverse impact these pollutants could have on receiving waters and to also meet the requirements specified by BCC.

Water quantity and water quality treatment measures will be adopted to meet the requirements as per the City of Botany Bay Development Control Plan and the Botany Bay & Catchment Water Quality Improvement Plan (BBWQIP) respectively.

The BBWQIP nominates that the following stormwater pollution reduction targets be met (presented in terms of annual percentage pollutant reductions on developed catchments):

Gross Pollutants	90%
Total suspended solids (TSS)	80%
Total phosphorous (TP)	55%
Total nitrogen (TN)	40%

Roof, hardstand, car parking, roads and other extensive paved areas are required to be treated by the Stormwater Treatment Measures (STM). The STM shall be sized according to the whole catchment area of the Site. The STM for the development are based on a treatment train approach as discussed in the NSW EPA document *Managing Urban Stormwater: Treatment Techniques* to ensure that all of the objectives above are met.

A strategy for the site has been proposed to show that Councils objectives can be met. The strategy would be subject to more detailed design during concept design and project application stage of the development. Treatment of the stormwater runoff generated by the development site will be performed via a treatment train approach. The proposed stormwater measures have been sized using MUSIC modelling software.

A treatment train of STM's which would meet councils policy has been described below and shown in drawings contained in **Appendix A**. The system comprises the following components:

- Pre-treatment of surface runoff via a gross pollutant trap or pit inserts for surface inlet pits. This will provide removal of coarse sediments, some fine sediments,

some nutrients, gross pollutants/ rubbish and hydrocarbons. The provision of upstream pre-treatment will assist in reducing the potential for early on-set sedimentation of the bio-retention system;

- Secondary/ tertiary treatment via rainwater reuse; and
- Tertiary Treatment via filtration through a bio-retention system or proprietary filtration system. MUSIC modelling of the site shows that an filtration area of 300m^2 will be required to meet council policy. The bio-retention system will require an extended detention depth of 300mm and media filter layer 500mm thick. A bio-retention system can be incorporated within the on-site detention basin and can form part of landscape and urban design features.

Incorporation of additional STM's and water sensitive urban design elements on individual sites (such as buffers, bio-retention/ rain-gardens, rainwater reuse, and gross pollutant trap or other suitable hydrodynamic separation units) are encouraged and may be introduced during detailed or Development Application design stages. All stormwater must be treated before discharging into council's stormwater system or downstream receiving waters.

The MUSIC model layout and results can be found in **Appendix D** of the report.

Notwithstanding the final configuration and design details of the preferred stormwater quality management solution for the development, we confirm that several different methods of achieving stormwater quality requirements are available. The chosen solution will be dependent on the final building form and designed during Development Application Stage.

6.4 Rainwater Reuse

Stormwater harvesting refers to the collection of stormwater from the developments internal stormwater drainage system for re-use in non-potable applications. Stormwater from the stormwater drainage system can be classified as either rainwater, where the flow is from roof areas only, or stormwater where the flow is from all areas of the development.

Rainwater harvesting will be provided for this development with re-use for non-potable applications. Specific details of the system will be provided as part of future individual building development applications and the general requirements for the rainwater reuse systems are discussed here. Internal non-potable reuse includes such applications as toilet flushing and car washing while external applications would include landscape irrigation. The aim is to reduce the water demand for the development and to satisfy the requirements of Councils reuse policy.

In general terms the rainwater harvesting system will be an in-line tank for the collection and storage of rainwater. At times when the rainwater storage tank is full rainwater can pass through the tank and continue to be discharged via gravity into the stormwater drainage system. Rainwater from the storage tank will be pumped for distribution throughout the development in a dedicated non-potable water reticulation system.

Rainwater tanks are to be sized with reference to the NSW Department of Environment and Conservation document *Managing Urban Stormwater: Harvesting and Reuse*, using a simple water balance analysis to balance the supply and demand, based on the base water demands and the requirement of Botany Council to provide a reduction in non-potable water demand.

6.5 External Catchments and Overland Flow

An assessment of the development in the context of external catchments and overland flows external to the development site has been completed by WMA Water. Reference to the WMA Water report should be made for confirmation of the 1% Annual Exceedence Probability (AEP) water levels and site management during the a 1% EAP storm events.

The proposed development area is to be defined to be clear of the 1% AEP flood zone and the building envelope defined so that the minimum floor level of the building is set above the 1% AEP water level (RL 5.4m AHD) plus council required freeboard of 500mm.

The threshold of basement level car park is required to be set 300mm above the 1% AEP water level.

As noted previously, if an open basin is adopted for stormwater detention in the final engineering strategy (defined during development application/ construction certificate stage) then the water surface elevation of stored water within the detention basin and landscaped areas will need to be designed such that the water surface matches the existing staged water levels and storage volumes. The staged volumes are defined in the WMA Water report and included in Table 6.1. This is to ensure that there is no effect on the 1% AEP water level and/or detrimental effect on adjoining properties as a result of the development.

Elevation (m AHD)	Storage (m^3)
3.9	0
4	3
4.1	24
4.2	72
4.3	134
4.4	207
4.5	289
4.6	377
4.7	473
4.8	577
4.9	689
5.0	808
5.1	933
5.2	1064
5.3	1202
5.4	1348

Table 6.1. Staged Storage Requirements

7 CONCLUSION

This Site Conditions & Infrastructure Services Assessment Report has been prepared to support the proposal to rezone the existing B7-Business zoning at the Lakes Business Park (Southern Precinct), Lord Street, Botany, NSW to be B4-Mixed Use Zoning.

An overview of services and Botany City Council requirements for stormwater and access has been provided to assist in the stage one due diligence process for the proposed adjusted zoning of the site.

All major services are located in the vicinity of the site, including:

- Potable Water (drinking water);
- Waste Water (sewer);
- Power;
- Natural Gas; and
- Telecommunications.

The existing services have the capacity, or can be amplified, to satisfy the demands of the B4 residential development. Connection of these services to the development site is available and any servicing for the site would be completed at no cost to Government and would not impinge on the services of existing surrounding landowners.

A Stormwater Management Strategy has been provided to show that the requirements of Botany City Council can be met. Specific discussion on the objectives for water quantity (on-site detention) and water quality has been made and also discussion on the potential strategies available to meet these requirements. It is expected that detention storage in the order of 1200m^3 will be required to meet water quantity objectives. This would comprise 500m3 as an open basin (to match existing) and the remaining 700m3 comprising either above ground basins or tank arrangements. Water quality objectives can be met via a number of Water Sensitive Urban Design measures or by proprietary water quality measures. A bio-retention filtration system with a surface area of 300m^2 would be meet councils load based pollution reduction requirements.

Consideration of overland flow requirements will also need to be made as part of the preferred Stormwater Management solution for the development. The floor levels of proposed buildings will be set at the 1% AEP water level of RL 5.4m AHD plus 500mm freeboard in accordance with the requirements of Botany City Council and the NSW Floodplain Development Manual.

Accordingly, based on the site conditions of the land and the availability of infrastructure services to the land, the development site and its extended land area provides an opportunity to make available additional residential and commercial development in a short timeframe given the proposed change in Land Zone is supported by the Botany Bay Masterplanners.

8 REFERENCES

Managing Urban Stormwater: Harvesting and Reuse – 2006 (NSW DEC);

Managing Urban Stormwater: Source Control – 1998 (NSW EPA);

Managing Urban Stormwater: Treatment Techniques – 1997 (NSW EPA);

Managing Urban Stormwater: Soils & Construction – 2004(LANDCOM);

Botany City Council – DCP 2013: Part 3G – Stormwater Management;

Botany City Council – DCP 2013: Part 10 – Stormwater Management Technical Guidelines; and

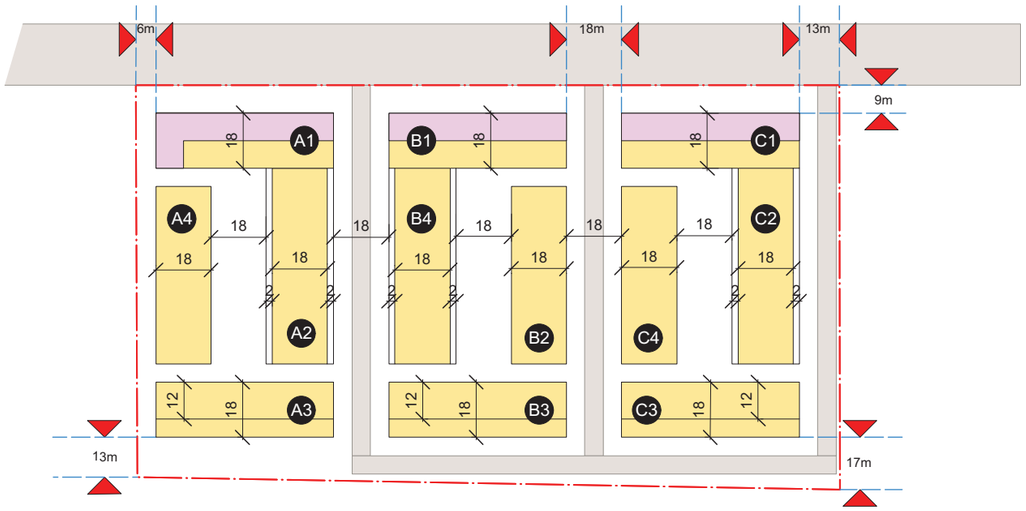
Water Sensitive Urban Design – "Technical Guidelines for Western Sydney" by URS Australia Pty Ltd, May 2004

Appendix A

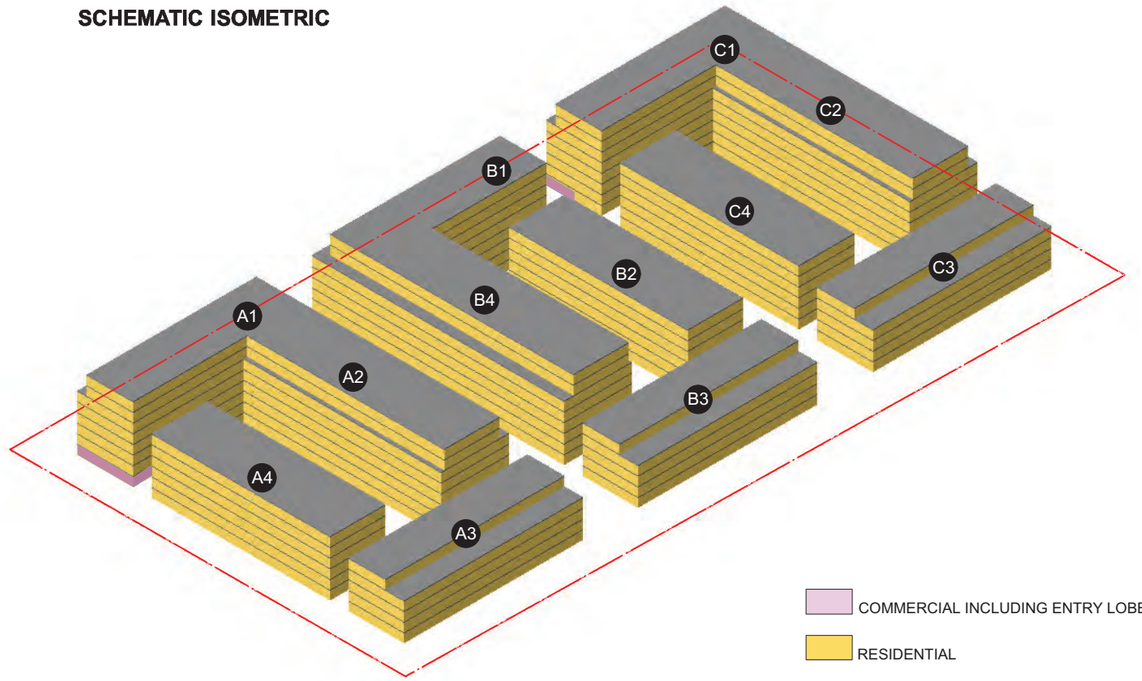
Proposed Development Layout

PLANNING PROPOSAL MASTERPLAN

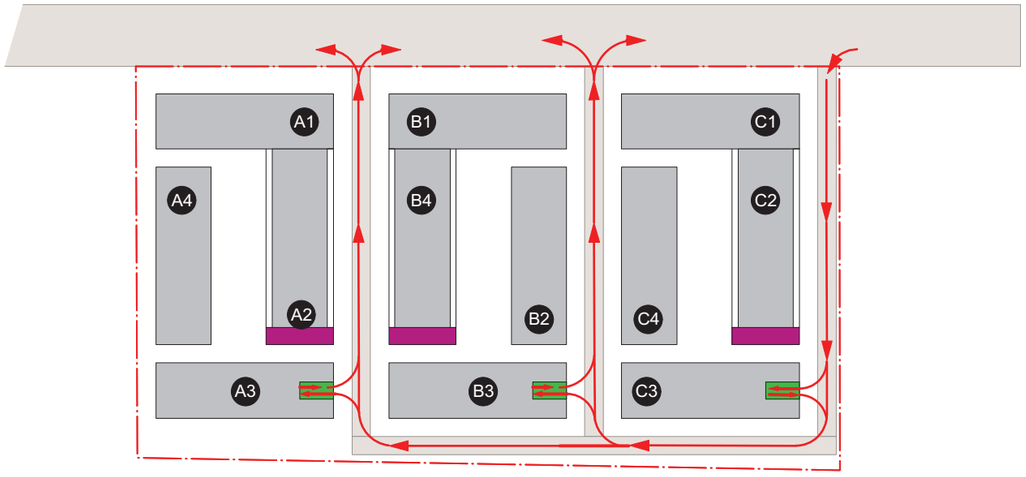
SCHEMATIC CONCEPT PLAN



SCHEMATIC ISOMETRIC



VEHICULAR CIRCULATION DIAGRAM



MASTERPLAN DETAILS

TOTAL GFA: 66,930 m^2

SITE AREA: 29,770 m^2

FSR: 2.25:1

NOTES

- MIXED USE
- CASA HEIGHT COMPLIANT
- BUILDING HEIGHTS COMPLY WITH MAX RL=AHD 33.00

TONYCAROARCHITECTURE

TONY CARO ARCHITECTURE PTY LTD
LEVEL 1, 2 GLEN ST MILSONS POINT
NSW 2061 SYDNEY AUSTRALIA
T 99649100 F 99649133
WWW.TONYCAROARCHITECTURE.COM.AU

LAKES BUSINESS PARK SOUTH PRECINCT

DEXUS

PLANNING PROPOSAL MASTERPLAN

DWG NO.	**SK_002**
PROJECT No.	**1503**
PLOT DATE	**8/5/15**
SCALE	**1:2000 @ A3**

Appendix B

Drawings by Costin Roe Consulting

CONNECT TO EXISTING COUNCIL DRAINAGE

OUTLINE OF EXISTING DETENTION BASIN. APPROXIMATE CAPACITY 500m²

PROVISION FOR OPEN DETENTION BASIN SHOWN THUS

LORD STREET

DRAINAGE SWALE

SITE BOUNDARY (LORD STREET)

SITE BOUNDARY

STORMWATER MANAGEMENT & DETENTION BY PREFERRED MEASURES TO MEET MINIMUM REQUIREMENTS AS PER STORMWATER QUALITY/QUANTITY TABLE

PROPOSED BUILDING

PROPOSED BUILDING

PROPOSED BUILDING

PROPOSED BUILDING

PROPOSED BUILDING

PROPOSED BUILDING

PROPOSED BUILDING

Ø600 Ø525 Ø750 Ø675 Ø450 Ø375

SITE BOUNDARY

SITE BOUNDARY (BORRAL LEE PARK)

3 D P 717692

EXISTING INDUSTRIAL DEVELOPMENT

2 D P 717692

EXISTING RESIDENTIAL DEVELOPMENT

DAPHNE STREET

DANIEL STREET

143.43 SURVEY
143.52 TITLE

85.835 SURVEY
85.815 TITLE

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY LINKER SURVEYING DATED 16.04.15

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- DRAINAGE LINE
- DENOTES STORMWATER MANAGEMENT BASIN AREA

STORMWATER MANAGEMENT REQUIREMENTS

STORMWATER QUALITY

GROSS POLLUTANTS	90%
TOTAL SUSPENDED SOLIDS (TSS)	80%
TOTAL PHOSPHOROUS (TP)	55%
TOTAL NITROGEN (TN)	40%

REDUCTIONS ARE PRESENTED IN TERMS OF ANNUAL PERCENTAGE POLLUTANT REDUCTIONS ON THE DEVELOPED CATCHMENT.

STORMWATER QUANTITY

STORMWATER RUNOFF GENERATED FOR ALL STORM DURATIONS UP TO AND INCLUDING THE 100 YEAR ARI WILL BE DETAINED TO THE PRE-DEVELOPED 5 YEAR ARI STORM FLOW.
CAPACITY OF EXISTING DETENTION BASIN & LANDSCAPE STORAGE TO BE PROVIDED IN NEW OPEN DETENTION BASIN TO ENSURE NO CHANGE IN THE OVERLAND FLOW OR FLOODING FOLLOWING DEVELOPMENT AS PER THE BELOW STORAGE TABLE.

STORAGE TABLE

ELEVATION (m AHD)	STORAGE (m³)
3.9	0
4.0	3
4.1	24
4.2	72
4.3	134
4.4	207
4.5	289
4.6	377
4.7	473
4.8	577
4.9	689
5.0	808
5.1	933
5.2	1064
5.3	1202
5.4	1348

NOTE:

DRAWINGS TO BE READ IN CONJUCTION WITH REPORT C09759.01-03.rpt BY COSTIN ROE CONSULTING.
THESE DRAWINGS ARE CONCEPTUAL IN NATURE & PREPARED FOR THE SOLE PURPOSE OF DEMONSTRATING THAT STORMWATER MANAGEMENT FOR A PROPOSED MIXED USE DEVELOPMENT IS ACHIEVABLE.

CONCEPT STORMWATER LAYOUT

SCALE 1:500

5m 0 10 20 30 40 50m

SCALE 1:500 AT A1 SHEET SIZE

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	11.05.15	D
DRAWING REVISED AS CLOUDED	30.04.15	C
DRAWING REVISED AS CLOUDED	24.04.15	B
ISSUED FOR REVIEW	22.04.15	A

ARCHITECT
TONY CARO ARCHITECTURE
LEVEL 1, 2 GLEN STREET
MILSONS POINT, NSW 2061

CLIENT
DEXUS PROPERTY GROUP

PROJECT
LAKES BUSINESS PARK - SOUTH PRECINCT
LORD STREET
BOTANY, NSW 2019

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MW	RB	21.04.15		A1	AS SHOWN	C09759.01 - SKC01

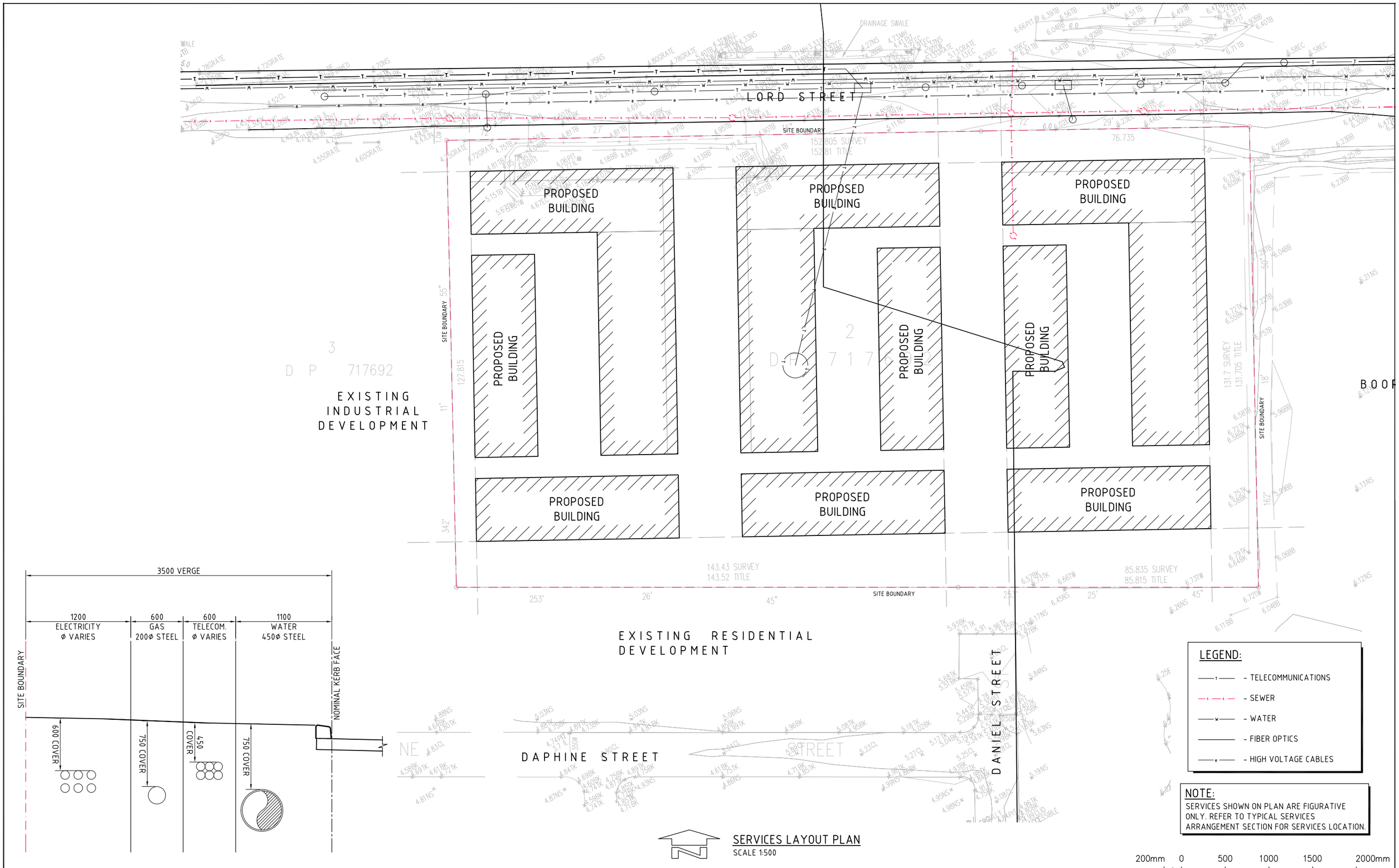
Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

CostinRoe Consulting
Value in Engineering and Management

DRAWING TITLE
CONCEPT STORMWATER LAYOUT

DRAWING No C09759.01 - SKC01

ISSUE D



TYPICAL SERVICES ARRANGEMENT
FOR 3500 WIDE VERGE
SCALE 1:20

SERVICES LAYOUT PLAN
SCALE 1:500

LEGEND:
- TELECOMMUNICATIONS
- SEWER
- WATER
- FIBER OPTICS
- HIGH VOLTAGE CABLES

NOTE:
SERVICES SHOWN ON PLAN ARE FIGURATIVE ONLY. REFER TO TYPICAL SERVICES ARRANGEMENT SECTION FOR SERVICES LOCATION.

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A1 SHEET SIZE

5m 0 10 20 30 40 50m
SCALE 1:500 AT A1 SHEET SIZE

FOR INFORMATION

ISSUED FOR INFORMATION	11.05.15	B
ISSUED FOR REVIEW	22.04.15	A
AMENDMENTS	DATE	ISSUE

ARCHITECT
TONY CARO ARCHITECTURE
LEVEL 1, 2 GLEN STREET
MILSONS POINT, NSW 2061

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DEXUS PROPERTY GROUP

PROJECT
LAKES BUSINESS PARK - SOUTH PRECINCT
LORD STREET
BOTANY, NSW 2019

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MW	RB	21.04.15		A1	AS SHOWN	C09759.01 - SKC02

Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 448
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Walsh Bay, Sydney NSW 2000
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email: mail@costinroe.com.au ©

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DRAWING TITLE
SERVICES LAYOUT PLAN

DRAWING No C09759.01 - SKC02

ISSUE B

Appendix C

Dial Before You Dig Information

A3

BOTANY WATER RESERVE

LORD

ST

DAPHNE

LANE

ROSE

DANIEL

IVY

DBYD Address:
11-13 Lord Street
Botany NSW 2019

DBYD Job No: 8962497

DBYD Sequence No: 44505636

Scale: 1:1500

Date of Production: 19/03/2015

Plan 1 of 1

N

0m 9m 18m 27m 36m

You are working near Transmission Cables. You must contact Ausgrid on (02) 4951 9200 at least two weeks before work commences. See Ausgrid Network Standard NS156.

WARNING

Ausgrid's plans show the position of assets at the time of installation and may not account for subsequent changes to road alignments, fences or buildings. The plans show no more than the presence or absence of Ausgrid assets in the street.
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MA13311	MA13312	MA13321	ISG GRID
MA13313	MA13314	MA13323	
MA13331	MA13332	MA13341	

276A8	276B8	276C8	GRID
276A9	276B9	276C9	
276A10	276B10	276C10	

MA13321GMLA0

Transmission - 44505632

INFORMATION ON THIS PLAN ONLY VALID FOR 30 DAYS FROM ISSUE DATE

19 Mar 2015

Page 1 of 1

1:251

0 — 15 metres

N

Ausgrid

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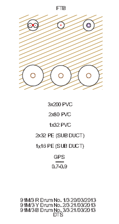
MA133 - JK1



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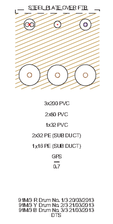

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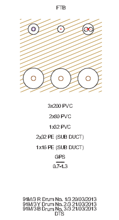

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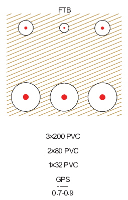

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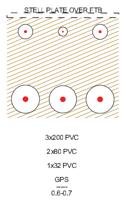

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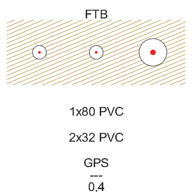

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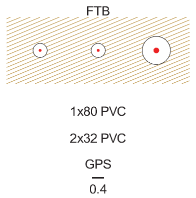

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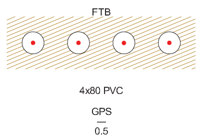

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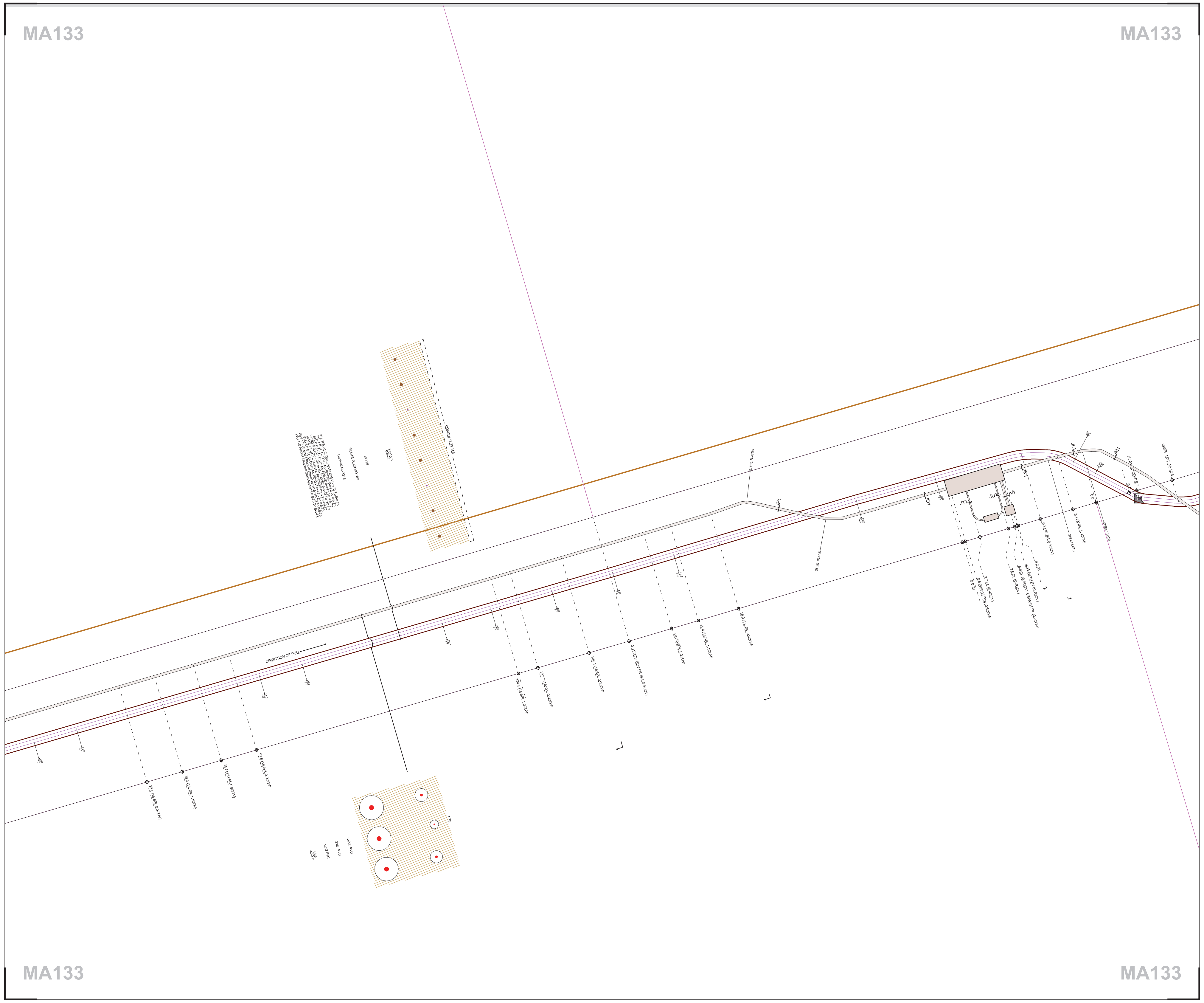

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ISG GRID		
MA13311	MA13312	MA13321
MA13313	MA13314	MA13323
MA13331	MA13332	MA13341

GRID		
275Q8	276A8	276B8
275Q9	276A9	276B9
275Q10	276A10	276B10

MA13312GMLA0

Transmission - 44505632

INFORMATION ON THIS PLAN ONLY VALID FOR 30 DAYS FROM ISSUE DATE

19 Mar 2015

Page 1 of 1

N

1:251

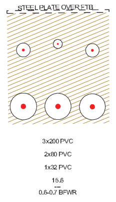
0 — 15 metres

Ausgrid

A0 TR_MOCS_std_plot

You are working near Transmission Cables. You must contact Ausgrid on (02) 4951 9200 at least two weeks before work commences. See Ausgrid Network Standard NS156.

MA133 - IX1



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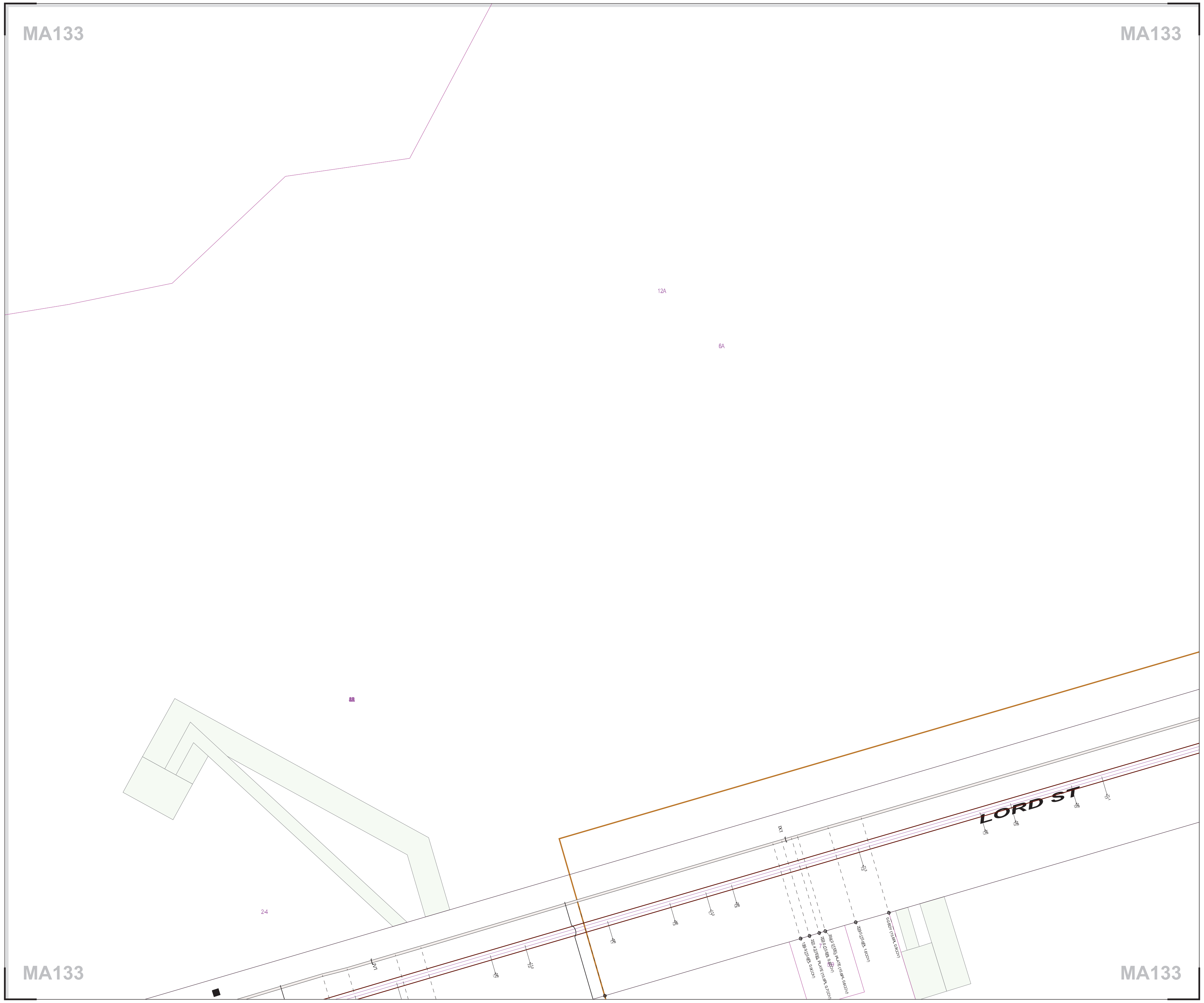

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MA13313	MA13314	MA13323	
MA13331	MA13332	MA13341	
275Q8	276A8	276B8	GRID
275Q9	276A9	276B9	
275Q10	276A10	276B10	

MA13311GMLA0

Transmission - 44505632

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19 Mar 2015

Page 1 of 1

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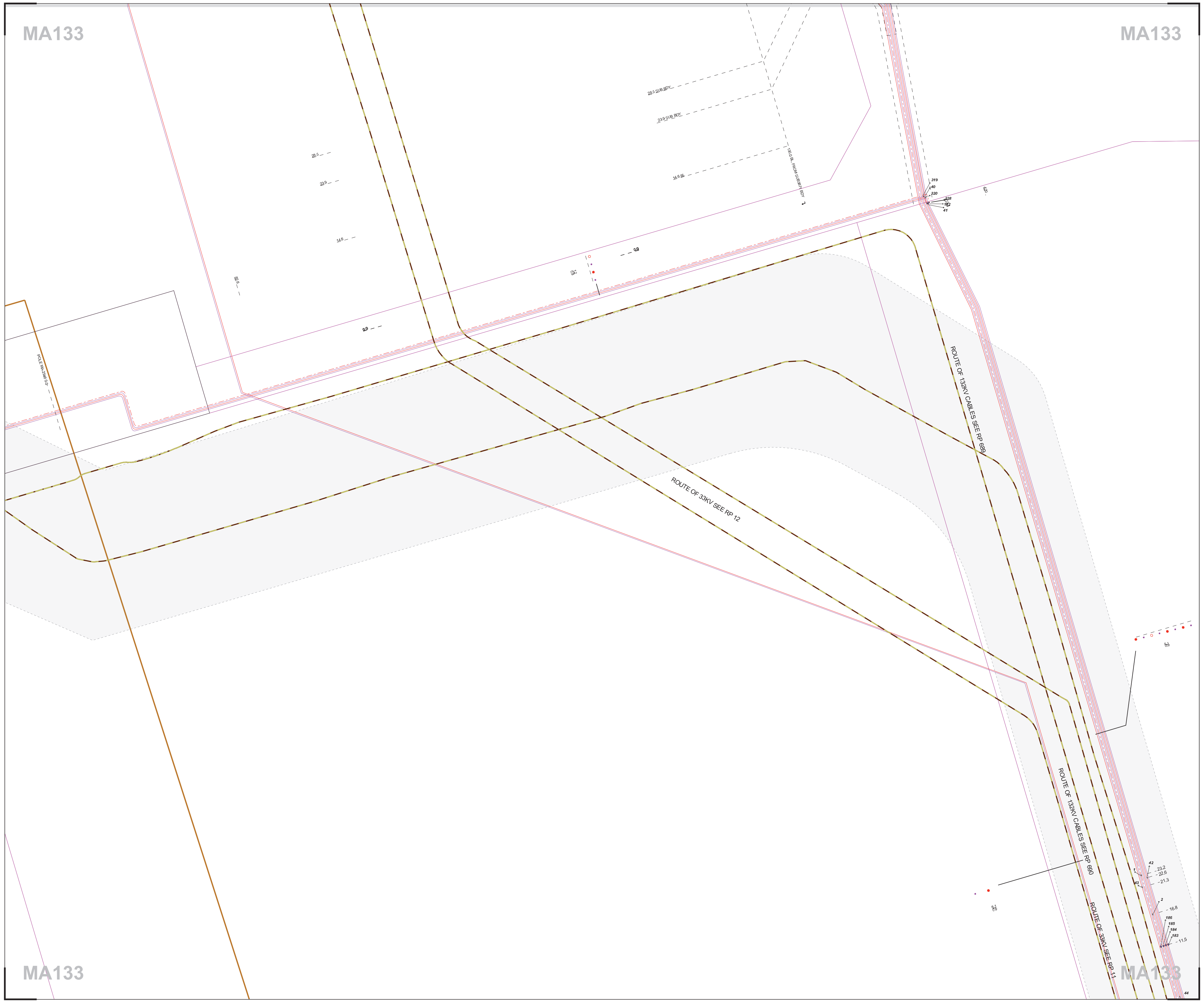
0 — 15 metres

Ausgrid



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MA13313	MA13314	MA13323	
MA13331	MA13332	MA13341	
276A8	276B8	276C8	GRID
276A9	276B9	276C9	
276A10	276B10	276C10	

MA13321GMLA0

Distribution - 44505632

INFORMATION ON THIS PLAN ONLY VALID FOR 30 DAYS FROM ISSUE DATE

19 Mar 2015

Page 1 of 1

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1:251

0 15 metres

Ausgrid

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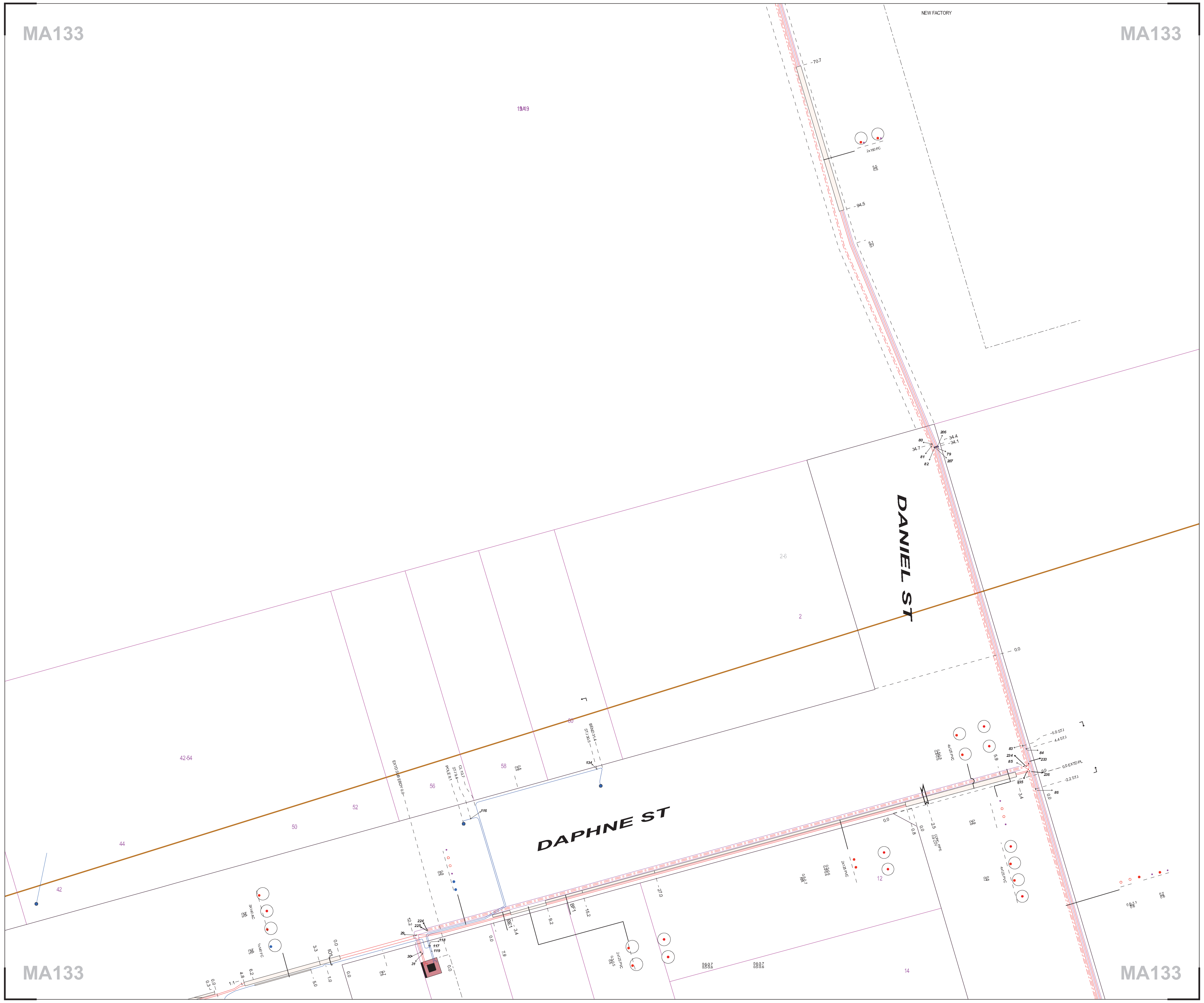

JOINT DETAIL REPORT

No.	Bk-Pg	Pl/Cvr	Joint Location
Map: MA133			
79		0.60/0.50	to244
80		1.10/	
81		1.20/	
82		0.80/0.50	
206	421-128	0.50/0.50	
207	421-128	0.80/0.50	

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MA13311	MA13312	MA13321
MA13313	MA13314	MA13323
MA13331	MA13332	MA13341

GRID

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275Q10	276A10	276B10
275Q11	276A11	276B11

MA13314GMLA0

Distribution - 44505632

INFORMATION ON THIS PLAN ONLY VALID FOR 30 DAYS FROM ISSUE DATE

19 Mar 2015

Page 1 of 1

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1:251

0 — 15 metres

Ausgrid

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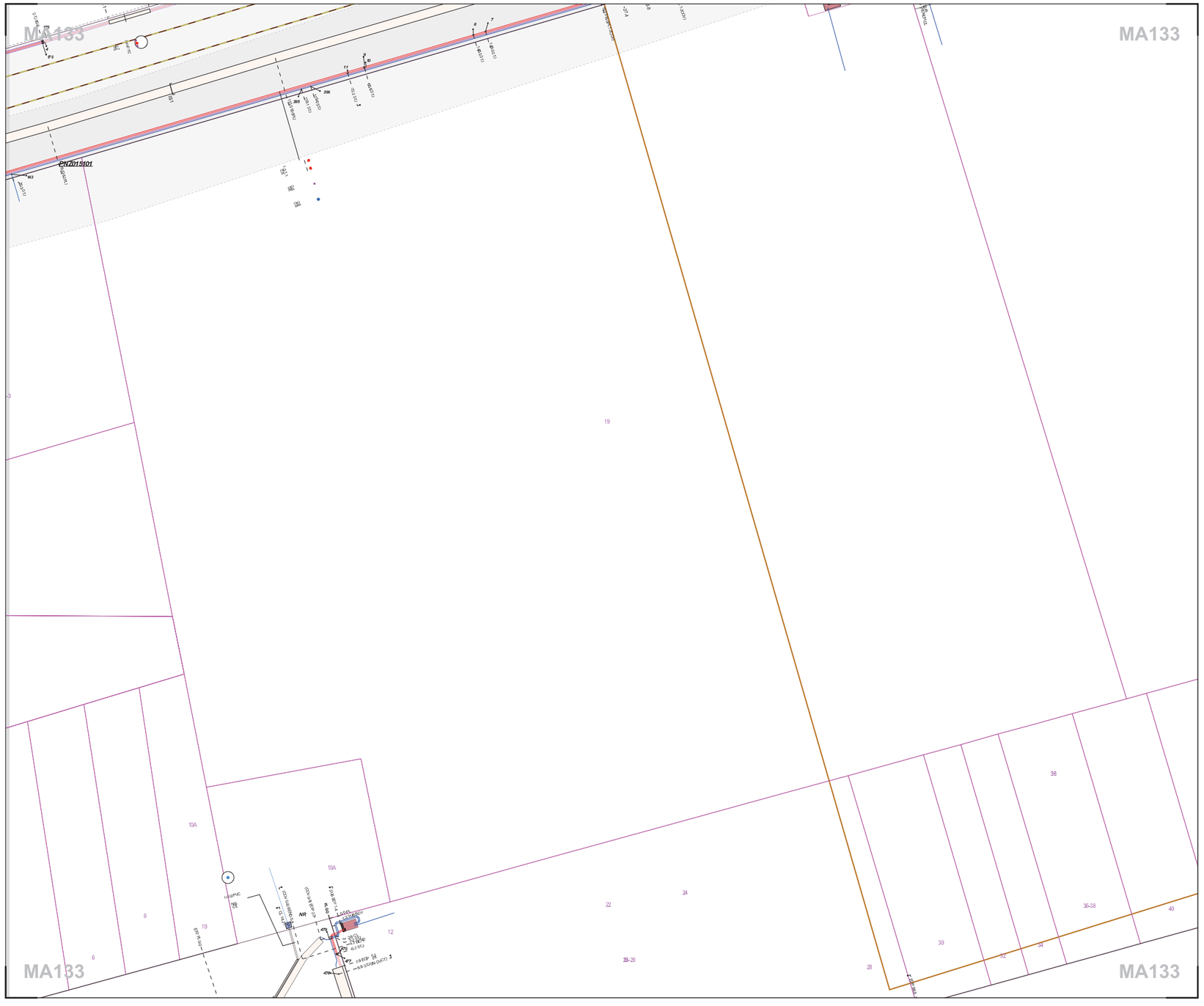

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ISG GRID

MA13311	MA13312	MA13321
MA13313	MA13314	MA13323
MA13331	MA13332	MA13341

GRID

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275Q10	276A10	276B10
275Q11	276A11	276B11

MA13313GMLA0

Distribution - 44505632

INFORMATION ON THIS PLAN ONLY VALID
FOR 30 DAYS FROM ISSUE DATE

19 Mar 2015

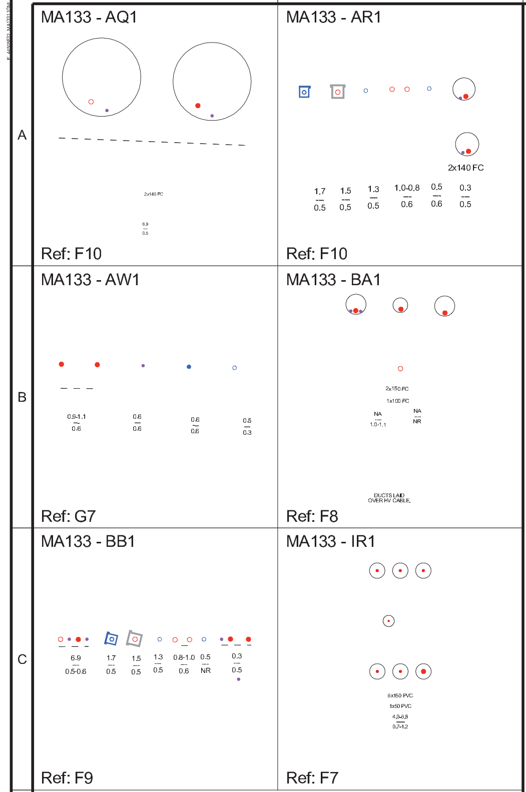
Page 1 of 1

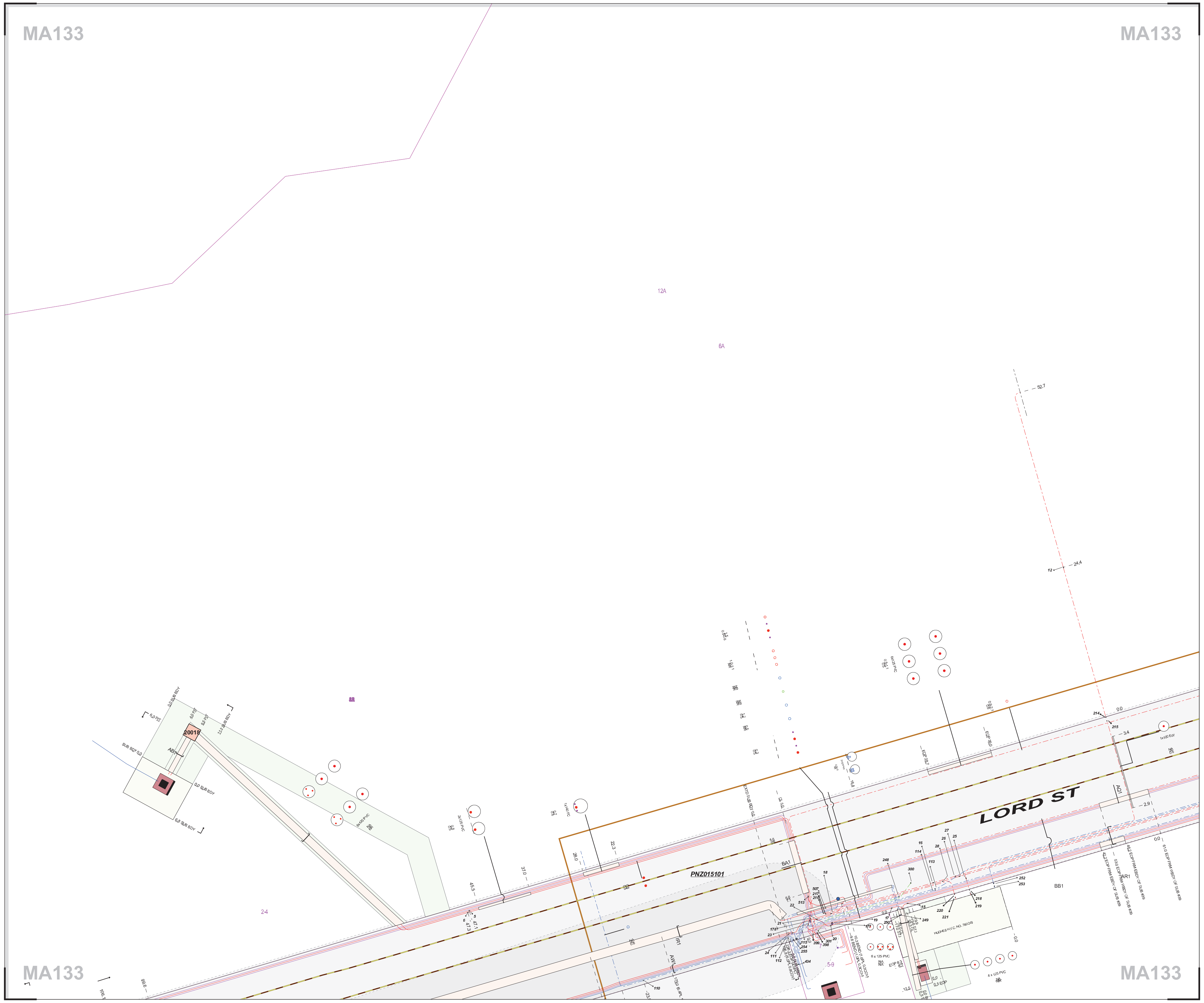
N

1:251

0 **15 metres**

Ausgrid





JOINT DETAIL REPORT

No.	Bk-Pg	Pl/Cvr	Joint Location
Map: MA133			
15	ER99-35	0.30/0.60	19.6 FROM EAST WALL OF S.39
16	207-78	2.00/	24.5E OF SUB W BL
17	ER99-35	0.30/0.60	17M FROM EAST WALL OF S.39
18	2156-17	1.80/0.70	3.6E OF SUB W WALL
19	455-37	0.90/0.50	7.3W OF SUB W BL
20	2112-7	0.60/0.50	7.2E OF SUB W WALL
21	2112-7	2.70/0.60	4.8E OF SUB W WALL
22		1.00/0.60	5.3E OF SUB W BL
23	2156-17	1.40/0.70	1.8W OF SUB E PL
24	2112-7	1.30/0.70	1.0E OF SUB W WALL
25	318-27	1.70/0.80	30.8E OF SUB W BL
26	207-78	2.00/0.60	28.0E OF SUB W BL
27	207-78	1.40/0.60	28.7E OF SUB W BL
28	207-78	1.80/	25.9E OF SUB W BL
110	202-173	0.90/0.60	
111	248-NR	0.60/0.60	ON SUB W BL
112	207-77	0.50/0.50	OPP. SUB W BL
113	207-78	1.40/	24.5E OF SUB W BL
114	207-78	1.20/	24.5E OF SUB W BL
115	207-77	2.70/	2.6E OF SUB W BL
177	581-84	1.10/0.60	1.8E OF SUB W BL
178	937-75	2.30/0.50	1.2W OF SUB WALL W BL
214	2083-22	1.00/0.60	
215	2083-22	1.00/0.60	
216	431-40	1.50/0.60	2.1W OF SUB E BL
217	987-73	1.40/0.50	2.4W OF SUB E BL
218	2083-22	0.90/0.60	21.0E OF SUB 39 E PL
219	2083-22	0.90/0.60	21.0E OF SUB 39 E PL
220	2083-22	0.80/0.60	20.5E OF SUB 39 E PL
221	2083-22	0.80/0.60	20.5E OF SUB 39 E PL
248	1676-22	1.30/0.50	14.7FROM E WALL OF SUB
249			
250			
252	2083-22	1.00/0.60	26.1E OF SUB 39 E PL
253	2083-22	1.00/0.60	26.1E OF SUB 39 E PL
254			
255			

No.	Bk-Pg	Pl/Cvr	Joint Location
300	317-104	3.10/0.50	11.9E OF TRANS YARD E BL
301	304-178	0.30/0.30	4.0 W of SUB EPL
398			
399			
400			
401			
434			
507	ES11-0024+...	2.00/0.40	1.0 E OF SUB 39 EWALL - (USING NEAR MAP COORDINATES)
513	ES11-0143	6.00/1.00	4.5 E OF SUB S39 W BDY

WARNING

Ausgrid's plans show the position of assets at the time of installation and may not account for subsequent changes to road alignments, fences or buildings.
The plans show no more than the presence or absence of Ausgrid assets in the street.
Persons working near electricity networks must exercise care and will be held responsible for any damage caused.
You must excavate by hand or use vacuum excavation to establish the location of Ausgrid underground cables and associated assets.
Underground: Working near a cable may result in electric shock even if no contact is made. Any work in the vicinity of any cable should only be performed using safe work methods developed in accordance with the recommendations included in WorkCover Code of Practice for Excavation and WorkCover Guide for Work Near Underground Assets
as well as recommendations of Ausgrid's Network Standard NS156.
Overhead: Do not excavate near poles or towers until the stability of the foundation has been assessed by Ausgrid. Cables or earth conductors may be present close to substations, poles or towers.
Workers must maintain safe approach distances and follow applicable WorkCover Codes of Practice.
NOTE: You must keep this plan on site during excavation works and have on site a person trained to read this plan.

ISG GRID

MA13311	MA13312	MA13321
MA13313	MA13314	MA13323
MA13331	MA13332	MA13341

GRID

275Q8	276A8	276B8
275Q9	276A9	276B9
275Q10	276A10	276B10

MA13311GMLA0

Distribution - 44505632

INFORMATION ON THIS PLAN ONLY VALID FOR 30 DAYS FROM ISSUE DATE

19 Mar 2015

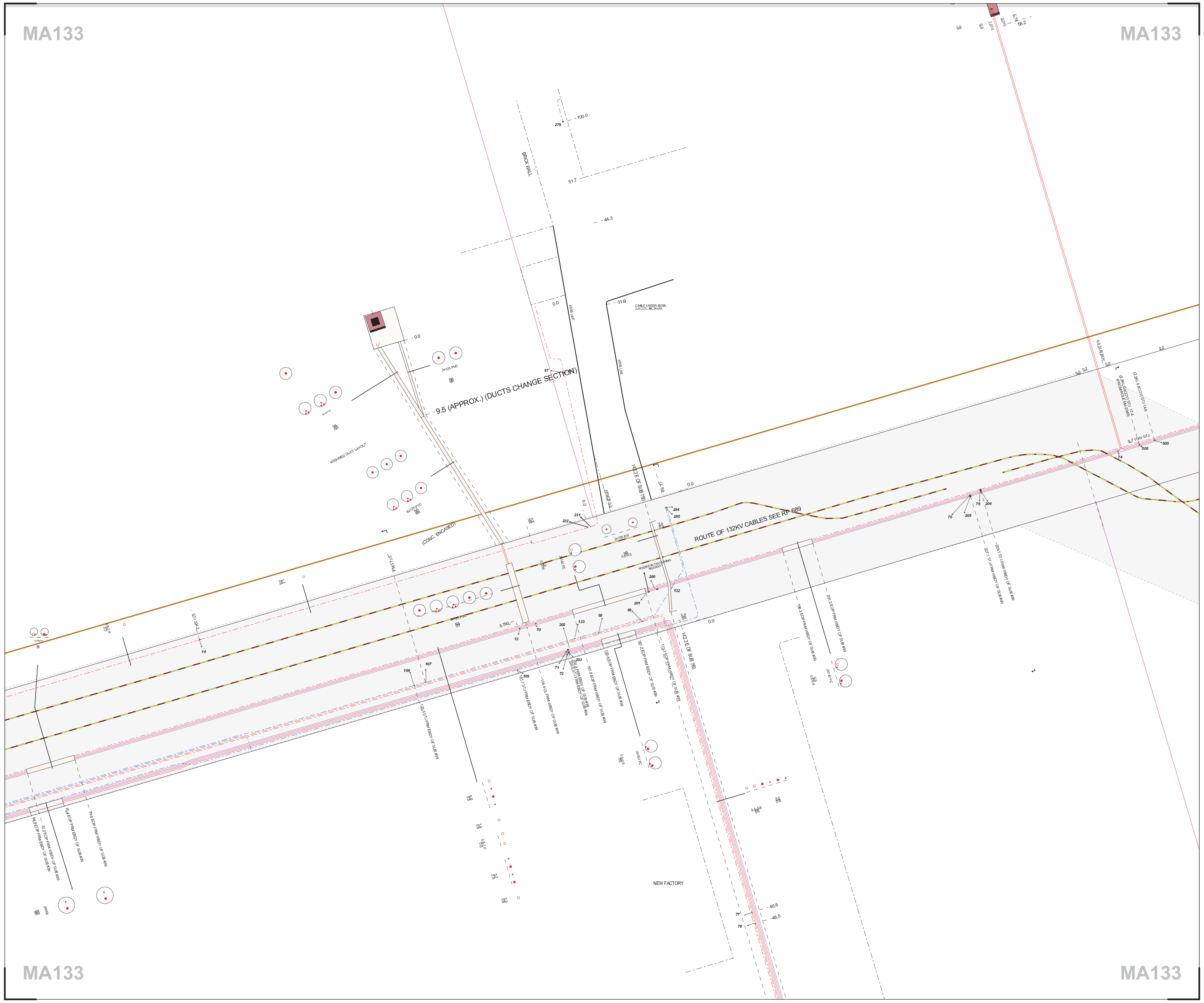
1:251

0 — 15 metres

N

Ausgrid

A0 MOCS_std_plot



JOINT DETAIL REPORT

No.	Bk-Pg	Pl/Cvr	Joint Location
Map: MA133			
13	ER50-25	/0.80	17.0W OF X BRICK WALL
14	289-140	1.00/0.60	
68	303-126	1.10/0.60	2.2. W of Ext PL x
69	303-126	1.00/0.60	4.9E OF EXT BL X
70	ER50-25	/0.80	13.5W OF X BRICK WALL
71	431-33	0.70/0.50	150E OF SUB E BL
72	431-33	1.00/0.50	150.0E OF SUB E BL
74			
75	832-38	6.80/0.70	
76	832-38	6.60/0.70	
77	303-120	5.50/0.90	
78	303-120	5.50/0.90	
107	249-94	1.40/0.60	127.4E OF SUB E BL
108	62-17	1.40/0.70	
109	62-NR	0.50/0.60	
132	244-53	5.90/0.90	106E OF SUB E BL
133	249-94	1.40/0.60	149.7E OF SUB E BL
200	2083-17	6.80/0.70	140.8E OF SUB 760
201	2083-17	6.80/0.70	139.0E OF SUB 760
202	431-33	1.00/0.50	150.3E OF SUB E BL
203	431-33	0.70/0.50	150.3E OF SUB E BL
204	832-38	6.50/0.70	
205	832-38	6.60/0.70	
231	ER51-75	1.40/1.00	
232	ER51-75	1.40/1.00	
284	302-110	1.10/0.90	
285	302-110	1.10/0.90	
505	ES10-1162	2.20/0.80	14.9 W OF POLE MA-2948
506	ES10-1162	2.20/0.80	17.4 W OF POLE MA-2948

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ISG GRID

MA13311	MA13312	MA13321
MA13313	MA13314	MA13323
MA13331	MA13332	MA13341

GRID

275Q8	276A8	276B8
275Q9	276A9	276B9
275Q10	276A10	276B10

MA13312GMLA0

Distribution - 44505632

INFORMATION ON THIS PLAN ONLY VALID FOR 30 DAYS FROM ISSUE DATE

19 Mar 2015

Page 1 of 1

N

1:251

0 — 15 metres

Ausgrid

A0 MOCS_std_plot

MAROUBRA IC

SCALE 1:2000

50 0 50 100 150 200

THIS MAP UPDATED ON 10/02/2015
THIS PLAN IS DIAGRAMATIC ONLY. DISTANCES SCALED FROM THIS PLAN MAY NOT BE ACCURATE.

DATE ALTERED:..... BY:.....

K3B	MAIA	MAIB
K3D	MAIC	MAID
K6B	MA4A	MA4B

ADJOINING MAPS

560 / 562

NETWORK AREA

BOTANY

MUNICIPALITY AREA

Jemena

KEY

MAX ALLOWABLE OPERATING PRESSURE

T	TRUNK PIPELINE	7000 kPa
P	PRIMARY MAIN	3500 kPa
S	SECONDARY MAIN	1050 kPa
400	NETWORK MAIN	400 kPa
	NETWORK MAIN	300 kPa
	NETWORK MAIN	210 kPa
100	NETWORK MAIN	100 kPa
30	NETWORK MAIN	30 kPa
	NETWORK MAIN	7 kPa
	NETWORK MAIN	2 kPa
	PROPOSED MAINS	

PR 11-2 3	STEEL MAIN PROJECT NUMBER
P	PRESSURE MONITORING STATION
	VALVE
	SYSTEM PRESSURE REGULATOR
S	SIPHON
123	NETWORK NODE
123S	NETWORK VALVE NODE
298	VALVE NUMBER
6NB	6 INCH CAST IRON MAIN
150MM	150MM STEEL MAIN
110MM PE/NY	110MM POLYETHYLENE/NYLON MAIN
6NB 50MM NY	50MM NYLON INSERTED INTO 6NB MAIN CAST IRON MAIN
1.2MBL	DISTANCE IN METRES OF MAIN FROM BOUNDARY LINE
1957	YEAR LAID
	MUNICIPALITY BOUNDARY
	NETWORK BOUNDARY
123	HOUSE NUMBER

MAROUBRA IC

Cable Plan

Telstra	For all Telstra DBYD plan enquiries - email - Telstra.Plans@team.telstra.com For urgent onsite contact only - ph 1800 653 935 (bus hrs)
TELSTRA CORPORATION LIMITED A.C.N. 051 775 556	
Generated On 19/03/2015 16:48:37	Sequence Number: 44505633
	CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

The above plan must be viewed in conjunction with the Mains Cable Plan on the following page

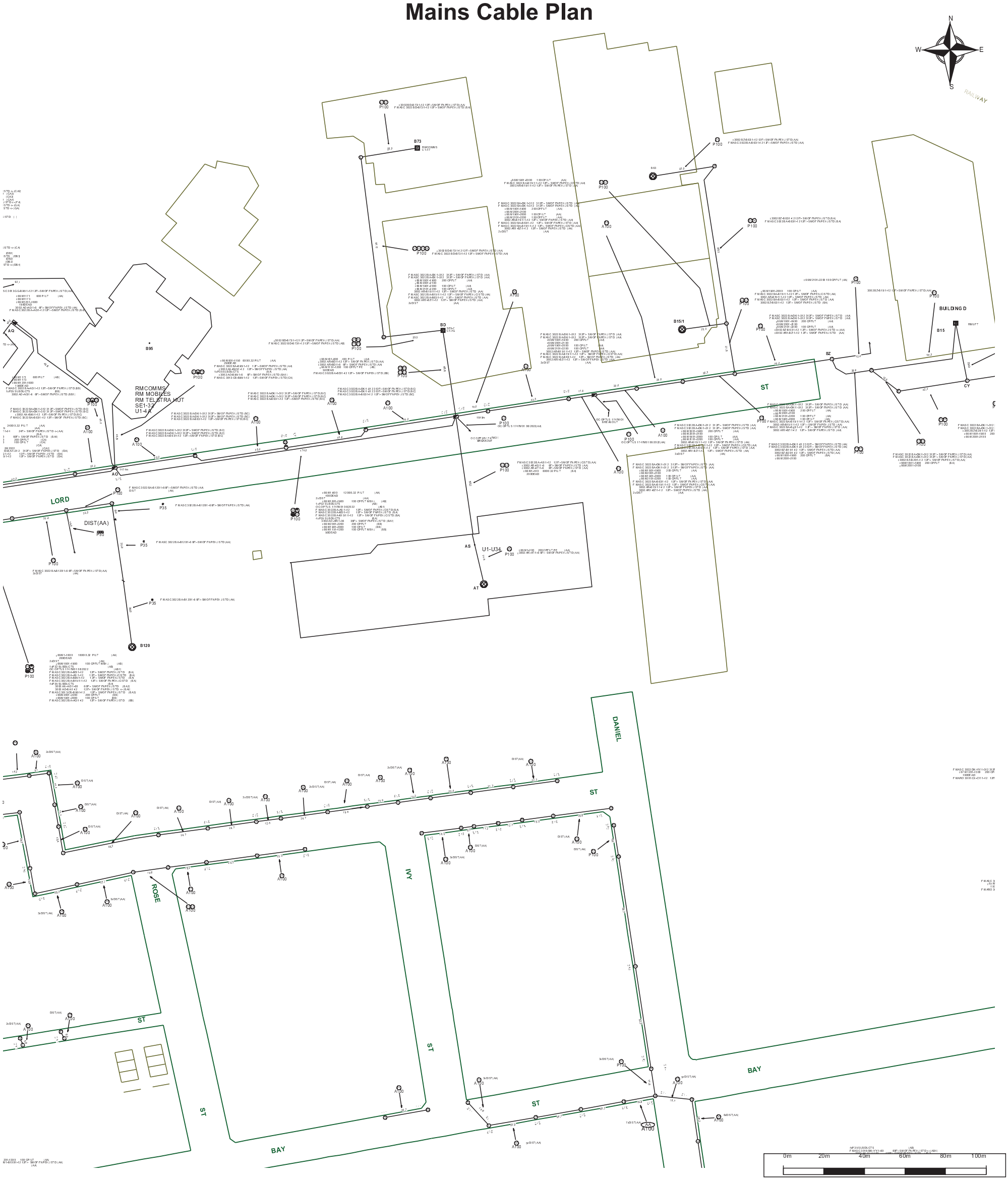
WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.

Mains Cable Plan



For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

Generated On 19/03/2015 16:49:03

Sequence Number: 44505633

CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

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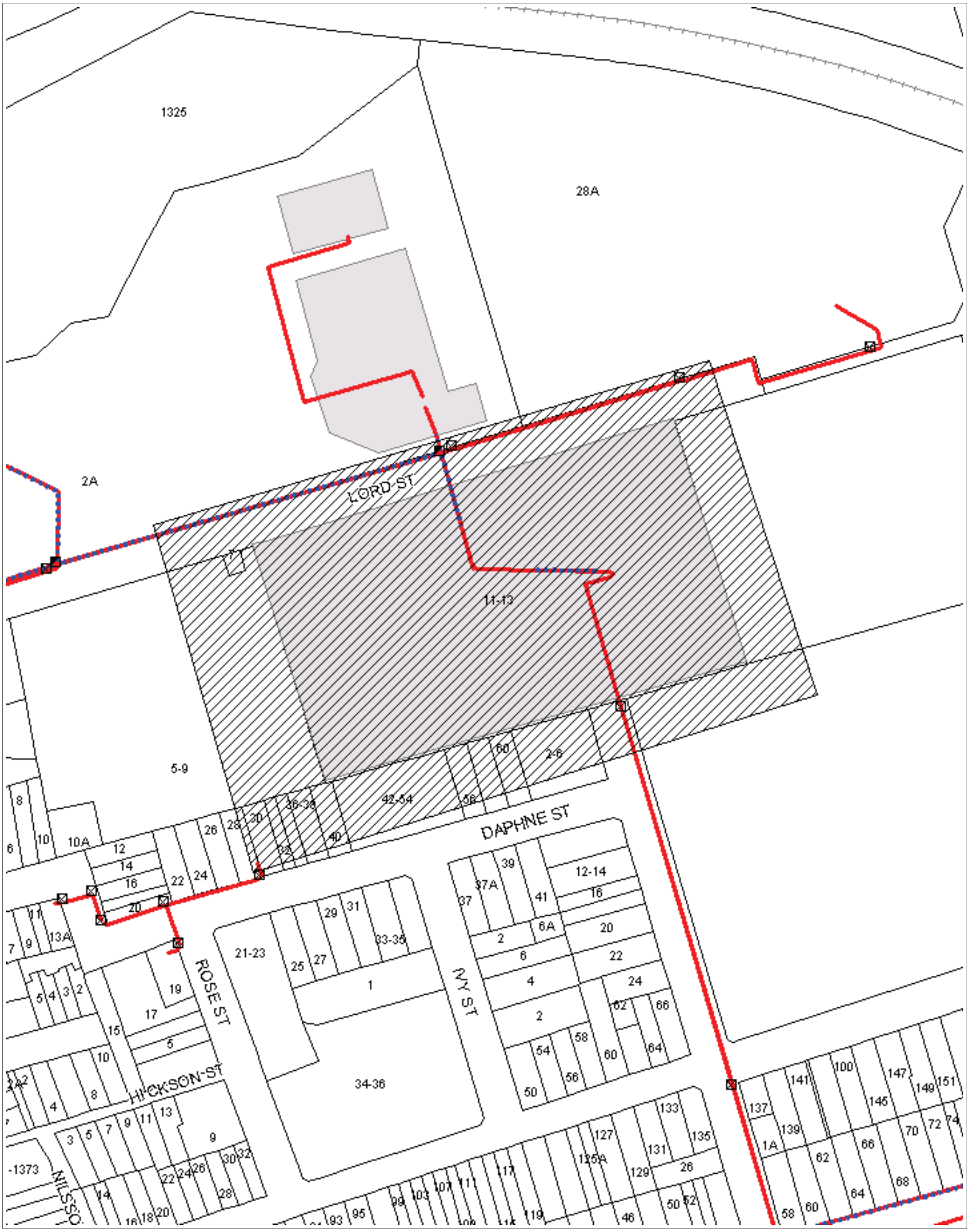


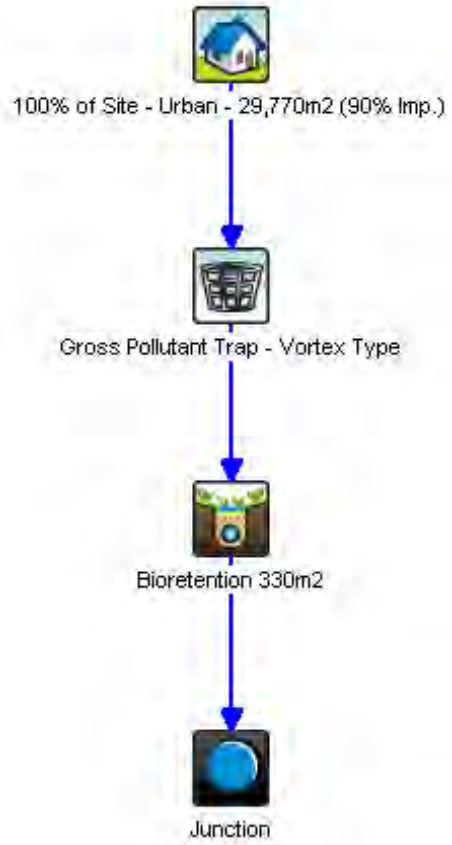
Sequence Number: 44505634

Date Generated: 19/03/2015

For all Optus DBYD plan enquiries –
Email: Fibre.Locations@optus.net.au
For urgent onsite assistance contact 1800 505 777
Optus Limited ACN 052 833 208

Appendix D

MUSIC MODELLING INFORMATION



	Sources	Residual Load	% Reduction
Flow (ML/yr)	32.6	31.8	2.5
Total Suspended Solids (kg/yr)	6660	673	89.9
Total Phosphorus (kg/yr)	13.5	5.37	60.2
Total Nitrogen (kg/yr)	94	46.6	50.5
Gross Pollutants (kg/yr)	792	0	100