St Vincent's and Mater Health Sydney

Darlinghurst Medical Research Precinct Existing Utilities and Infrastructure Services Capacity Report

ISSUE 1

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Contents

1 Executive Summary

This report has been prepared to identify the implications of the proposed precinct development on the existing services infrastructure, and for the purposes of supporting the Concept Application for the precinct works.

1.1 Hydraulic services

In summary at this stage there appears to be sufficient capacity in the authorities' sewer, water and gas services for the proposed precinct development. The 450mm stormwater drain located between Chaplin lane and West Street has sufficient capacity for the precinct however the new developments will consider implementing water sensitive urban design principals such as rainwater harvesting to minimise flows to the stormwater system as an alternative to stormwater onsite detention.

1.2 Electrical and communication Services

Energy Australia have indicated that the additional load required from their network for the ultimate precinct supply would likely require HV upgrade works to be undertaken. Application to Energy Australia is required to confirm the extent of these required works and associated costs. This would need to be undertaken at design development stages.

The existing precinct substations currently servicing the Garvan Institute and the VCCRI are not adequate to service the new Virology and GSVCCC buildings. New substations are required to provide the LV power requirements for each of the GSVCCC and Virology facility.

The existing telecommunications services are adequate for the future requirements of the GSVCCC and the Virology buildings. Upgrades to the existing Garvan Institute telecommunications lead-in cables and telephone tie-cable links to the GSVCCC and Virology may be provided, or new GSVCCC and Virology lead-in cables may be provided to each building independently, depending on the interconnection requirements of the buildings. An application is to be provided to the Telstra (or other service provider) account manager currently servicing the Garvan site for these new telephone connections.

All backbone cabling for the GSVCCC and Virology may be connected into the precinct LAN via multi-core fibre optic cabling with the Garvan Institute as the central point in the star topology. Additional equipment and upgrade works are required within the Garvan Institute to the enable the interconnectivity of these precinct buildings.

2 Introduction

Arup have been engaged by St Vincents and Mater Health Sydney to investigate the capacity of the existing hydraulic and electrical authorities infrastructure surrounding the Garvan Institute, proposed Garvan St Vincents Campus Cancer Centre(GSVCCC), Victor Chang Building and the proposed Institute for Virology.

This report has been prepared to address items 9 and 10 of the DGR checklist in relation to the Darlinghurst Research Precinct concept application.

The precinct plan includes:

- The existing Garvan Institute;
- The existing Victor Chang Cardiac Research Facility;
- The proposed 14,800 sqm (11 storey) Garvan St Vincent's Campus Cancer Centre;
- The proposed 11,000 sqm (8 storey) UNSW Institute for Virology;
- The proposed 623 space under ground car park ;
- Chaplin lane; and
- Retention of the Green Park Hotel.

This report has been prepared in consideration of the St Vincent's and Mater health Sydney Medical Research Precinct, Precinct plan January 2009.

Specifically, the report addresses:

9. Utilities and Infrastructure

Utility and infrastructure servicing, demonstrating development can be adequately serviced for water supply, wastewater, stormwater, electricity, gas and communications.

10. Drainage, Stormwater and groundwater management

Indentify drainage, stormwater and groundwater management issues including topography, onsite detention, water sensitive urban and drainage infrastructure.

The information in this report is based on available documentation and preliminary discussions with Energy Australia. No site survey has been carried out to verify any of the assumptions made

We have made assumptions of populations based on BCA building population requirements and based our load demand requirements on these population figures.

Design development will be required to verify the assessments made in this report.

3 Hydraulic Services

3.1 Water Supply

Victoria Street has a 200mm CICL water main and should provide sufficient hydraulic and fire flows to the GSVCCC. West Street has a 150mm UPVC water main and should provide sufficient hydraulic and fire flows to the proposed Institute for Virology. The existing Garvan Institute is served by a 150mm DICL water main in Burton Street and the existing Victor Chang building is served by a 150mm CICL water main in Liverpool Street.

A combined hydraulic and fire flow rate of 56 litres/second will be required to the GSVCCC and we assume a similar flow rate will be required for the proposed Institute for Virology.

Our load estimates of the building indicate there is sufficient capacity in the authorities water mains to cater for the additional loads of the new buildings however Sydney Water conditions may require section 73 submissions to be submitted to Sydney water to

determine the exact impact the additional buildings will have on the surrounding infrastructure and if amplification to existing services will be required.

3.2 Sewer Drainage

There are existing sewer mains in Victoria, Burton, West, Chaplin and Liverpool streets of sufficient capacity to service the existing and proposed buildings.

The existing Garvan Institute drains to an existing 225mm VC sewer main in Chaplin lane and this drain eventually drains to West Street. The existing Victor Chang building drains to a 300mm PVC sewer drain located in the link between Chaplin lane and West Street. It would be advisable for the sewer drainage from the proposed Institute for Virology to drain directly to the authorities 225mm VC sewer drain in West street however there will be sufficient capacity in the 300mm sewer drain within the Chaplin lane to West street. The proposed GSVCCC building will also need to drain to the existing Chaplin Street 225mm VC sewer and this drain has sufficient capacity to cater for the additional load of this new building.

Our preliminary load estimates of the building indicate there is sufficient capacity in the authorities sewer mains to cater for the additional loads of the new buildings however Sydney Water conditions may require section 73 submissions to be submitted to Sydney water to determine the exact impact the additional buildings will have on the surrounding infrastructure and amplification to existing services will be required.

3.3 Stormwater Drainage

There are existing stormwater mains in Burton, Chaplin, West and Liverpool streets. A 450mm stormwater drain located between Chaplin lane and West street has been installed during the construction of the Victor Chang building and this drain currently collects drainage from the Victor Chang building and Chaplin Lane. This 450mm drain will be required to drain the proposed GSVCCC building and the majority of the proposed Institute for Virology. Our preliminary calculations indicate that the 450mm drain has sufficient capacity for the additional proposed buildings. The authority's stormwater in West Street and Burton Street will need to be at least 450mm diameter as this drain will drain all four buildings.

Water sensitive urban design principals such as rainwater harvesting will be implemented to minimise flows to the stormwater system as an alternative to stormwater onsite detention.

Groundwater to the perimeter of the under ground car park can be directed to pump stations at the lowest level and pumped out to gravity stormwater systems

The entry into Chaplin lane from Liverpool Street will require modification to ensure overland flow from Liverpool Street is not diverted into Chaplin lane during periods of heavy rainfall.

3.4 Gas Supply

There are existing gas mains in Victoria, Burton, Chaplin, West and Liverpool streets.

Victoria Street has a 110mm Nylon 300kPa gas main which should be sufficient for the proposed GSVCCC building. Liverpool Street has a 200mm 1050 kPa secondary gas main and has a 110mm Nylon 300 kPa gas main both of these gas mains should have capacity to service both the existing Victor Chang building and the proposed Institute for Virology.

4 Electrical and Communication Services

4.1 High Voltage Infrastructure

All existing Energy Australia high-voltage (HV) distribution cables, adjacent to the precinct, run along Liverpool Streets. The HV cables servicing the existing precinct substations are provided in conduits along Chaplin Lane.

The existing Garvan Institute substation (TX 7468) is serviced via an extension of two (2) of the Liverpool Street EA HV cables installed within conduits along Chaplin Lane. These cables are connected to the substation in an open switchable ring configuration, allowing a changeover between the two (2) installed cables in the event of a fault on one of the lines.

Two (2) kiosk substations (TX 35244 and TX 35243) supporting the Victor Chang Cancer Research Institute (VCCRI) are serviced from another pair of HV cables directly from Liverpool Street. These are also provided in an open-ring configuration for reliability.

Each HV circuit is capable of supplying approximately 6MVA of power per feeder cable from the allocated EA zone substation. In an open ring topology, only one of these may be utilised at any one time with a final capacity of approximately 6MVA per pair of cables.

The existing EA HV cabling servicing the site is connected to other EA substations, external to the precinct, on the Energy Australia Network. The spare capacity of the existing HV feeder cables, and associated EA zone substation, is unknown and an application for connection and subsequent EA HV assessment must be performed by the EA HV planning section to ascertain the spare allowance at this point of their network.

Current maximum demand estimates indicate that approximately 8MVA is required to service the four precinct buildings from an existing load of 3.5MVA.

Energy Australia have indicated that this increase in load requirements would likely require upgrades to the existing EA HV network, which may include zone HV substation works, new cabling from the zone HV substations and new HV pits, including all rectification works.

An application to Energy Australia including the payment of EA design monopoly fees is required to confirm the extent of these required works and associated costs.

4.2 Substations

The Garvan Institute is currently serviced via a basement chamber substation within the Garvan Institute building. This is a three (3) transformer substation which has a firm rating of 2900Amps. The peak maximum load supplied from this substation is indicated as being 2400Amps in 2002. No upgrade to this substation is presently allowable, due to current firm rating limitations and current outgoing LV supply provisions.

The Garvan Institutes most recent peak load is indicated to be in the order of 1310kVA (1900Amps) recorded in January 2008. The Garvan is currently fed by two 3000Amp supplies to each of the MSB-A and MSB-B. Additional LV street feeders from the Garvan Institute substation are currently supplying external EA customers.

The substation is provided with a heavy equipment hatch and two (2) combined personnel, small equipment hatches, including an entry chamber at substation level for each hatch and an associated ladder for entry and egress to street level. The existing ladder access length appears to be approaching the maximum length allowable by Energy Australia of 4.3m.

The VCCRI is serviced by two (2) kiosk type substations each rated at 1000kVA (~1400Amps each). The current peak load was achieved on January 2009 for the supply to the VCCRI in the order of 940amps per phase (~700kVA) from both substations.

Kiosk substation TX 35244 is fitted with a 1200Amp fuse feeding the VCCRI MSB-A and the kiosk substation TX 35243 is fitted with both a 400Amp and an 800Amp fuses feeding VCCRI MSB-B and MSB-C respectively.

Recent Energy Australia advice in regards to chamber substation output, estimates that between 4200Amps and 5000Amps may be derived from a new three (3) transformer substation. A new two (2) transformer substation would provide approximately 67% of this rating, supplying approximately 2800 to 3300Amps. The minimum supply ratings should be referenced to estimate the actual transformer quantity for each building until final substation output confirmation from Energy Australia is received.

The estimated maximum demand of the proposed GSVCCC is approximately 3000Amps and the proposed Virology is approximately 2400Amps. To sufficiently provide the maximum power requirements of the precinct works new substations will be required to service both the GSVCCC and the Virology building. Removal of the existing garvan substation and relocation/integration of the existing VCCRI kiosks will be considered during design development stages.

An application to Energy Australia is to be submitted, with all associated monopoly fees paid, to confirm all final firm ratings of transformer substations, approval of preferred overall topological strategy and any required associated costs for EA to provide these new substations.

4.3 Telecommunications Supply

The existing telecommunication service provider cabling is currently provided in Liverpool Street, Victoria Street and to a lesser extent Burton Street.

The Garvan Institute site has existing incoming communications provision of 150-pairs (100+50 pairs) of voice-grade cabling from Victoria Street and the Victor Chang Cancer Research Institute is currently provided with 100-pairs from Liverpool Street.

Victoria and Liverpool Streets are provided with Telstra voice-grade cabling, Telstra multi-core single-mode and multi-mode optical fibre cabling, and Optus services conduits. Spare ∅100mm conduits are provided in Victoria and Liverpool Streets.

Burton Street is provided with 100-pairs total of Telstra voice-grade cable adjacent to the Garvan Institute entering the Garvan site from West Street. This appears to be a redundant feed at present.

In addition to the telecommunications cabling supporting the Garvan Institute and the Victor Chang Building, 230-pairs of voice-grade cables are currently provided to the existing buildings currently located on the GSVCCC development site. In consideration of the current provision to the Garvan Institute and the Victor Chang facility, this quantity of telephone lines appears sufficient.

Providing IP based voice services will be considered, reducing the telephone line requirement for the site.

Additional telephone lines and reconnections from Victoria or Liverpool Streets may be provided above the present allowances on application to the telecommunications provider.

4.4 Communications Network Infrastructure

There are existing fibre interconnections between the St Vincent's Hospital Precinct, the Garvan Institute and the Victor Chang Cancer Research Centre.

The fibre cabling is provided between St Vincent's Precinct and the Garvan Institute within wall-mounted conduits within the service tunnel that currently interconnects these two facilities across Burton Street on Level 0 of the Garvan Institute.

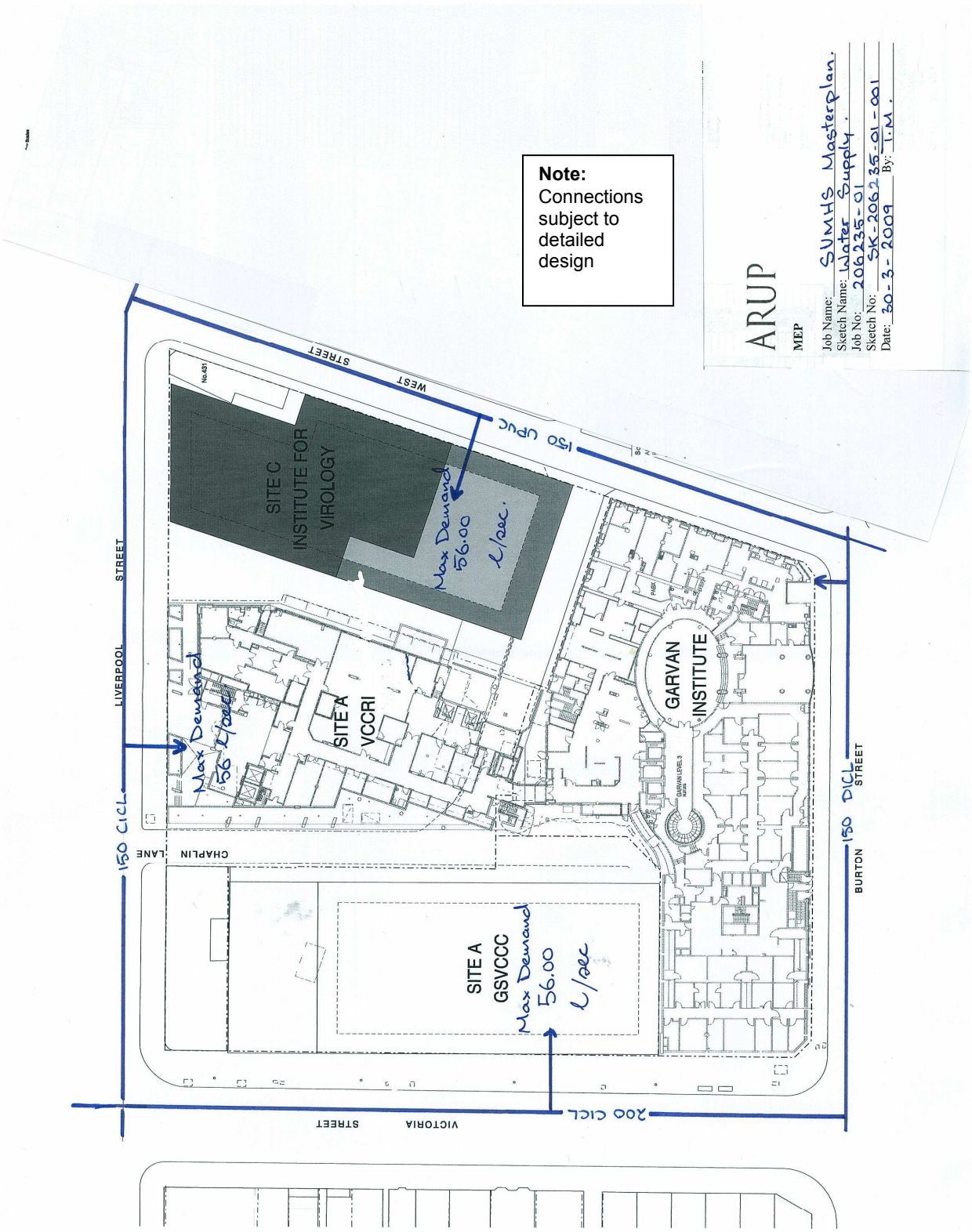
A fibre interconnection also exists between the Garvan Institute and the Victor Chang Building through service tunnels on Level 0 within wall-mounted conduit.

New fibre cable interconnections are provided between the Garvan Institute and the new GSVCCC with adequate spare capacity within the cable and the cabling containment system for future expansion. The Garvan Institute would be utilised as the central hub of the network for the precinct and the gateway to the St Vincent's Precinct.

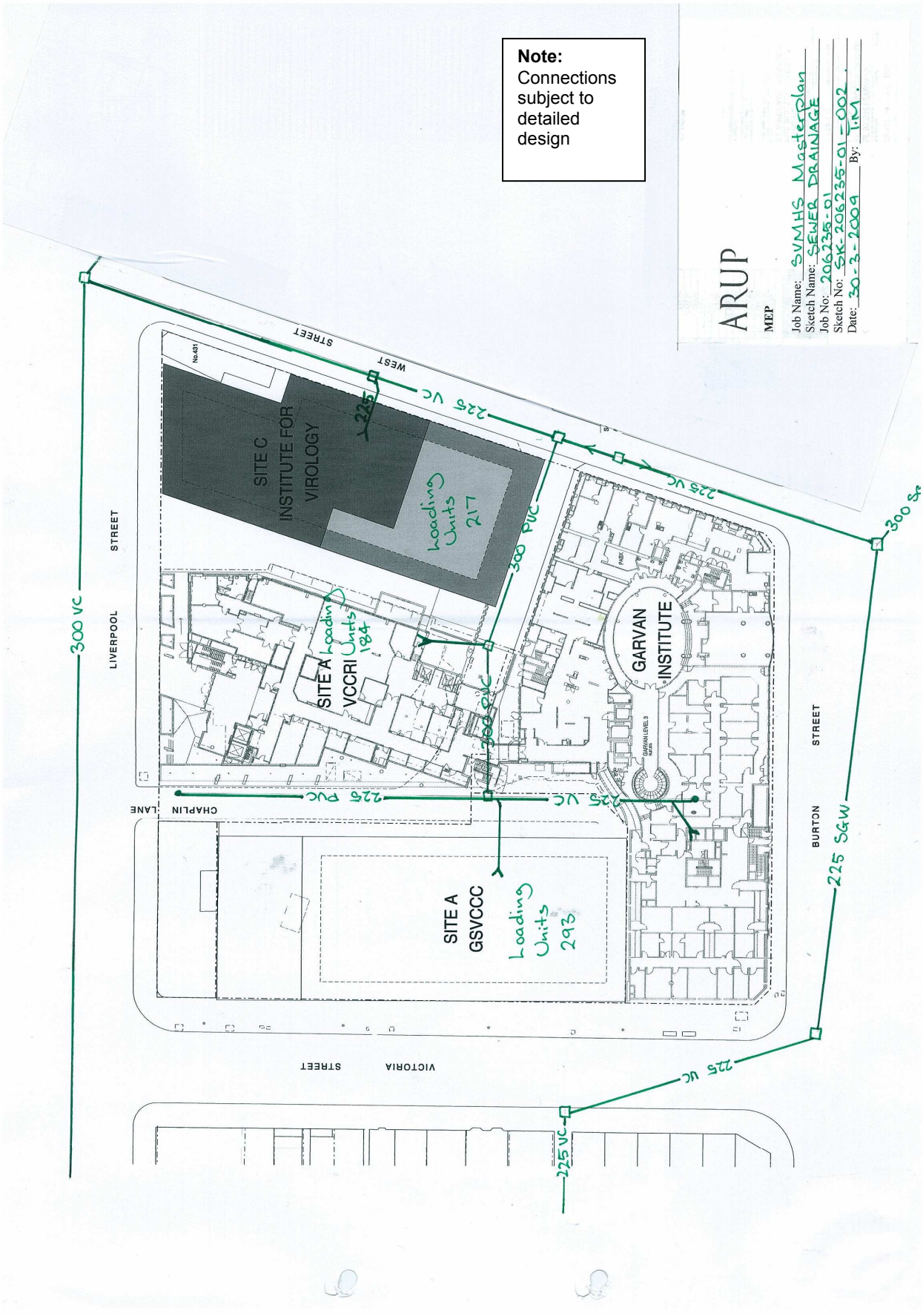
The GSVCCC requires network support of Garvan, St Vincent's and University of New South Wales networks. Sharing of physical infrastructure is recommended and the LAN separation may be implemented on a logical level with appropriate network security and services provided, depending on stakeholder requirements.

5 Service Diagrams

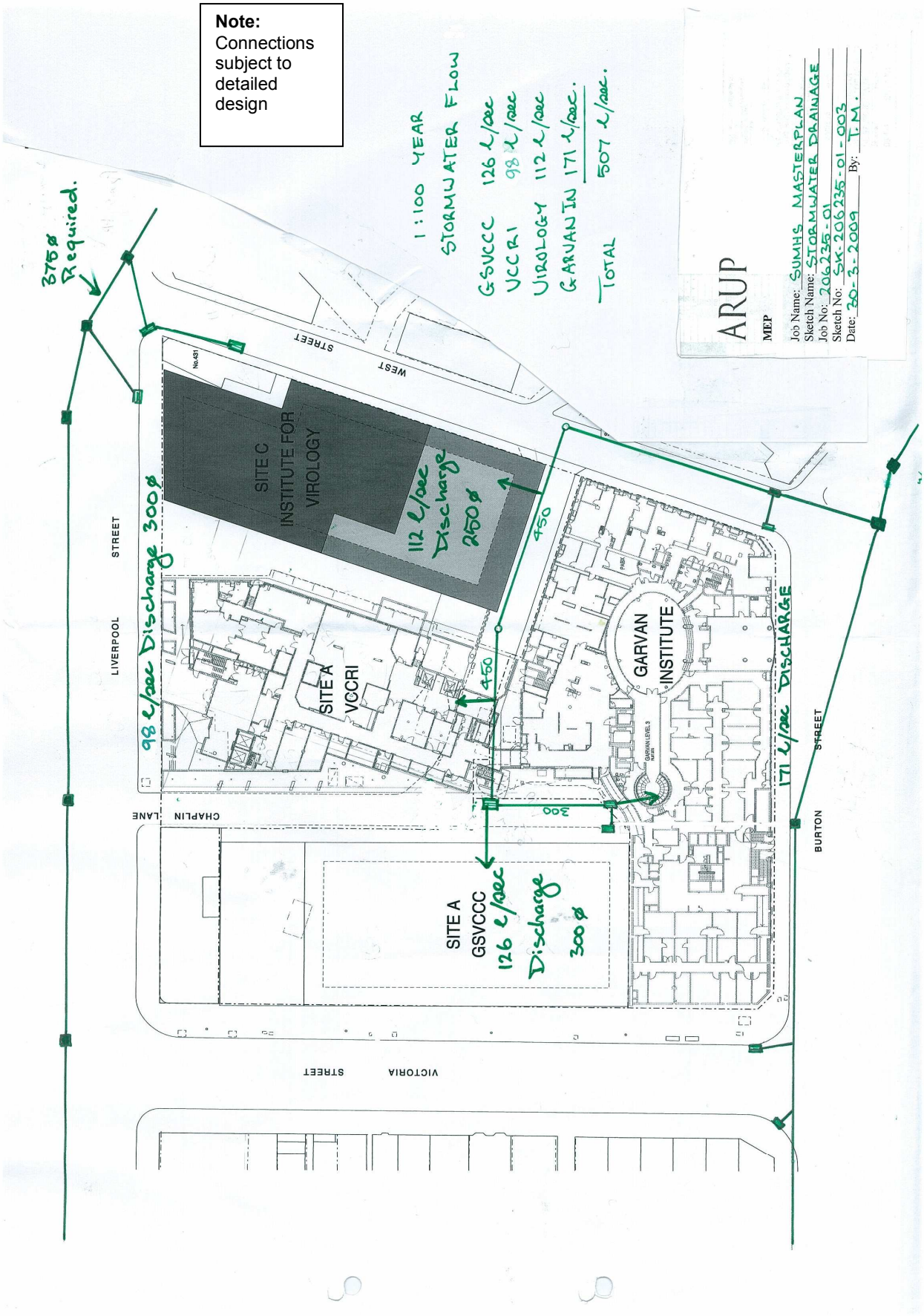
5.1 Water Supply



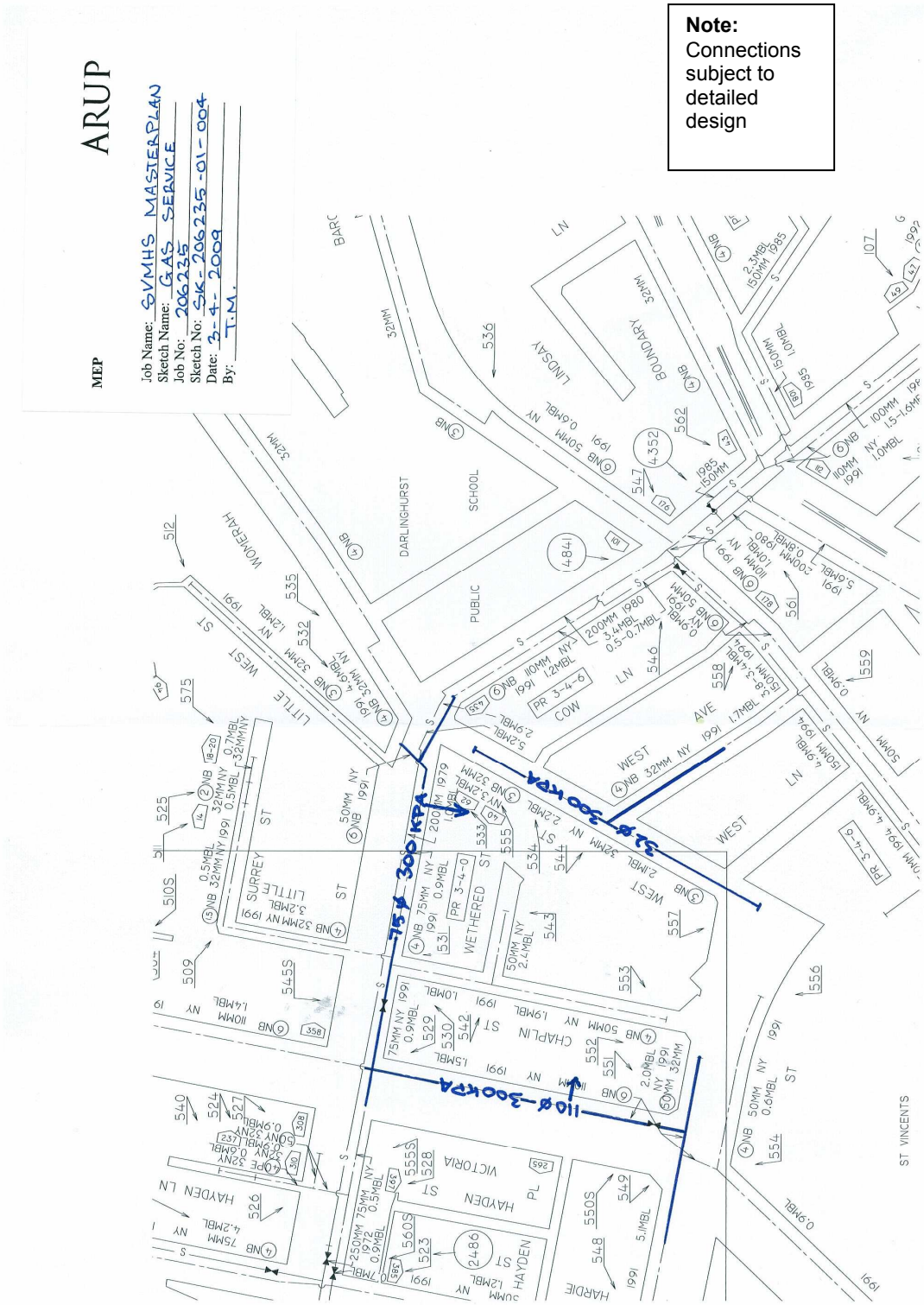
5.2 Sewer Drainage



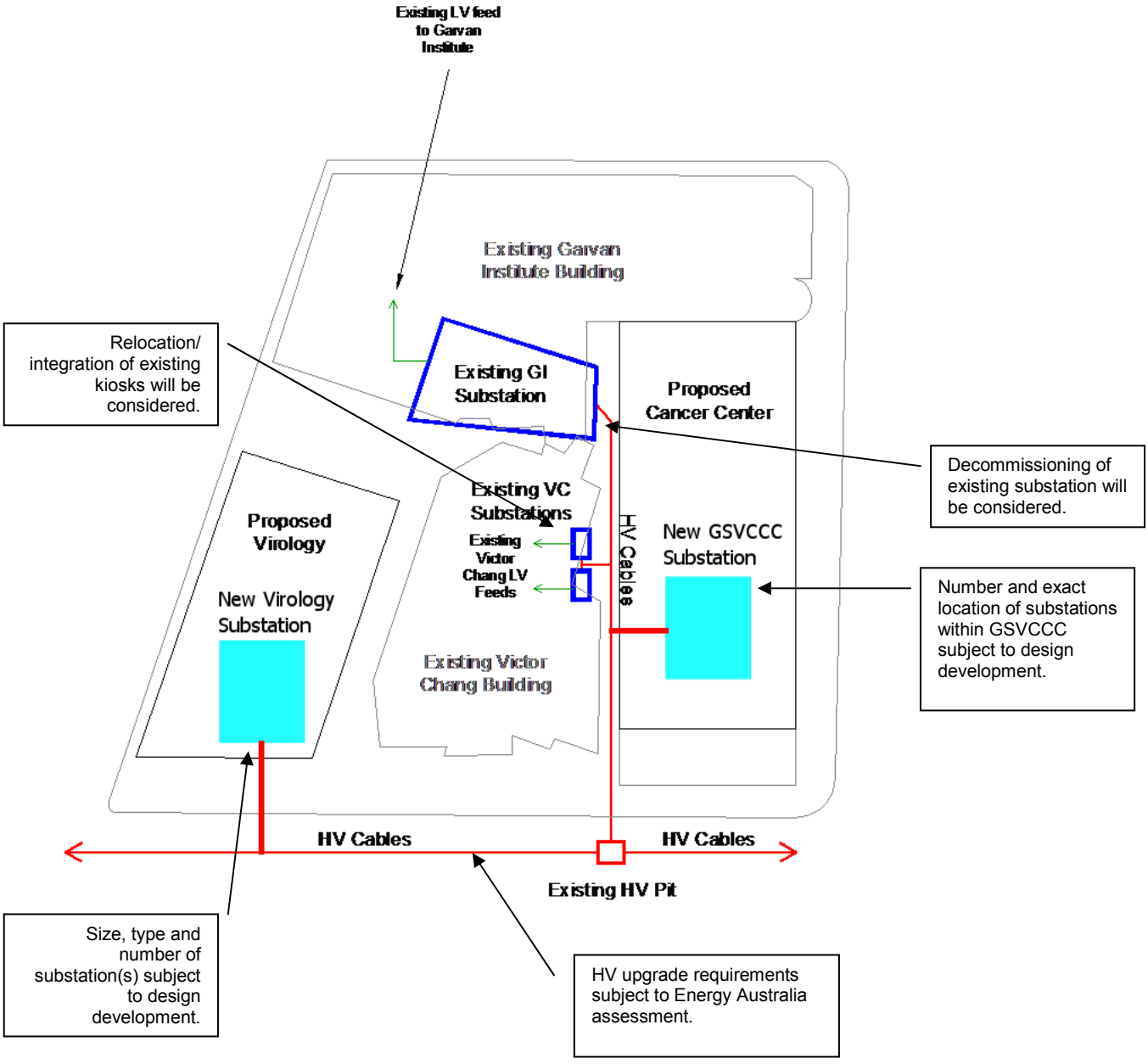
5.3 Stormwater Drainage



5.4 Gas Service



5.5 HV Cabling and LV substations



5.6 Existing Telecommunications Cabling