

**Infrastructure Management
Report
for
Armidale Secondary College
Butler Street
ARMIDALE NSW 2350**

Project No:
MN10030

Services:
Electrical, Mechanical & Hydraulic

Client:
NSW Department of Education

Architect:
NBRS Architecture

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Report Details

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1 INTRODUCTION

The intent of this report is to provide a concept of the electrical, hydraulic and mechanical services to serve the new development on the existing Armidale High School site. The existing staff and student population will be relocated to Duval whilst the Armidale site is redeveloped.

1.1 EXISTING SITE OVERVIEW

The existing Armidale site comprises various buildings, dating from 1921 to the latest building, built in 2010. The existing buildings will be demolished with the exception of;

- Heritage listed Block B which will be retained and redeveloped.
- The gym will be retained with future additional adjacent performing areas proposed.

The existing site includes existing power supply which is inadequate and will require upgrading. The existing telecommunication will also require upgrading.

2 ELECTRICAL SERVICES

2.1 ELECTRICAL POWER

The existing pad mounted substation is rated at 500 KVA and is located near the Butler Street entry to the school.

The existing main switchboard as well as distribution boards that are located in various areas on the site are not fit for reuse and will be removed from the site.

The existing heritage building on the site will be provided with new compliant switchboards as well as new wiring.

The existing gym on the site will retain the existing switchboard and electrical installation. The proposed extension will be provided with a new switchboard supplied from the new main switchboard. The existing separate incoming supply from the street will be disconnected.

2.1.1 Existing Main Switchboard

The existing mains switchboard is not suitable for the new work nor increase in power and will be replaced with a new board.

2.1.2 Proposed Main Switchboard

It is proposed that a new main switchboard will be provided for the development in a new main switch room. The new main switchboard will be located at ground level.

The new main switch room must have 2 hour fire rated construction with two separate outward opening entry/exit doors as required by AS/NZS 3000 and the room be mechanically ventilated.

This main switchboard will be designed to accommodate the school power requirements. The colour of main switchboard is to be Orange X15. It will be a Form 3Bih to AS/NZS ISO 61439 board with 2000 amp main busbar rating. The main switchboard will contain a life safety services section and a general lighting power section. The life safety services section will support the fire indicator panel (FIP), lifts, hydraulic and mechanical fire safety services. The general lighting and power section will support lighting, power, air conditioning, hydraulic and general site services.

Supply Authority metering shall be housed in the immediate vicinity of the Main Switchboard. A new meter and National Metering Identifier (NMI) will be provided for the Main Switchboard, to serve the site as a whole.

In accordance with NCC 2016 Section J8.3, separate energy meters will be provided in each Distribution Board to monitor lighting, power, mechanical and other plant deemed to constitute a substantial electrical demand.

The submain cables from the new main switchboard will reticulate on cable trays within the new school building and underground feeds will be provided to the existing heritage building with new distribution boards. Underground submain cables will be provided for the other new buildings on the site.

All redundant existing cables will be removed.

2.1.3 Distribution Boards

A number of distribution boards will be installed in strategic locations on every level and zone of the new school building.

The strategy is to limit the length of final sub circuits; in accordance with the EFSG a distribution board cannot serve equipment outside of a 25 metre radius from the board.

The location of the internal distribution boards will be coordinated with the Architects during design development.

2.2 COMMUNICATIONS

2.2.1 Existing Communication Systems

The existing main communications racks, switches, patch panels etc appear to be in good condition however it is not proposed to retain any existing component as this may compromise the warranties for the new installation.

2.2.2 Proposed Communications Methodology

A new incoming fibre link will be installed via a new cable route to the new building. The new main communications room/campus distributor will be established in the administration section of the new building on the upper ground level; spatial requirements will be shown on the Electrical Concept Drawings.

Floor distributors will be located in each zone on the lowest levels in the new buildings to provide structured cabling in a Star Network Configuration within the 90m maximum cable length zones. Building distributors will be located in external buildings. All floor and building distributors will be linked back to the new campus distributor via underground OS2 and OM4 fibre optic cabling. It shall be clarified with the Department of Education whether copper tie cabling is still required for VoIP telephones.

Within the new buildings, the fibre cables, twisted pair cables will be installed on cable trays.

For inter-building installations, fibre link cables originating from the main communications room will run via a new communications grid using a pit and underground duct system to facilitate the installation of fibre cables, communications and security cables to new and refurbished buildings.

A minimum of 2xs100mm Ø ducts will connect the communications pits located within the school site in addition to spare conduits.

A rack mounted Uninterruptable Power Supply (UPS) with 60 minutes continuously running capacity during blackouts, shall be installed in the main communications room to provide continuous power to critical communications services such as;

- Communications racks
- Servers and active equipment
- Security and access control system

2.3 LIGHTING

Our lighting design aim is to improve the learning environment with modern school lighting that is designed specifically for classrooms, fully complies with the relevant standards but at the same time minimises power consumption and CO₂ emissions.

Main design objectives:

- Use of energy efficient LED light sources in well designed, purpose built luminaire housing. The EFSG typical luminaire schedule shall be used as a guide.
- Selection of light fittings that suit the internal and external environment, purpose of space.
- Choice of light fittings that are cost effective to purchase, maintain and use minimal energy to reduce running cost.
- Implement daylight harvesting by using light sensors to control the lights in areas where natural light may be available.
- Use of occupancy sensors, time switches for occupancy based lighting control.

External lighting will be automatically controlled by time switches and night/day sensors. In addition, the lighting will be connected to “access” and “security” circuits where the security circuits are on extended operating time. The external courts will be provided with sports lighting controlled by manual start and timed duration.

All external lighting will be in accordance with AS 4282 “Obtrusive Outdoor Lighting” to ensure there is no light spillage to adjoining properties.

2.4 SAFETY SERVICES

2.4.1 Emergency Lighting and Exit signs

An emergency and exit lighting system in accordance with the NCC and AS/NZS 2293 shall be documented for all internal areas. The system shall be complete with emergency light test switches in local switchboards.

Emergency lighting shall be ceiling recessed or surface-mounted LED point type where practicable. Otherwise, emergency lighting shall be incorporated within general lighting (e.g. integrated in LED battens and/or wall lights etc).

Illuminated exit signage shall be slimline LED pictorial type, illuminated with ceiling recessed control gear where practicable. The layout of the exit escape signage will be guided by the Fire Engineering Report and/or Building Compliance Report once made available.

2.4.2 Fire Detection Systems

The full extent of the fire detection equipment is subject to the directions of a BCA report as well as a Fire Engineering Report (FER) by a suitably qualified Fire Engineer.

Where detection is required, the system in the School must comply with the requirements of AS/NZS 1670 and the NCC and consist of smoke detectors, thermal detectors, manual break glass alarms, fire bells and beacons distributed throughout the new development. Concealed

smoke detectors will also be incorporated within all the roof spaces with a height greater than 800mm as required by AS/NSZ 1670.

The fire detection system will interface with wet fire, mechanical, hydraulic and security systems which shall provide “fire trip” communications to initiate operation of their respective hazard management protocols, for example, mechanical smoke control, access/egress control, gas shut off and the like.

The fire detection system will be an addressable/conventional site-wide network, with a Fire Indicator Panel (FIP) located in the main entrance to the building in the building’s Fire Control Centre in accordance with Fire Brigade requirements.

Sub-Fire indicator panels will be provided at the entrance of satellite buildings and where required by AS/NZS 1670 and/or the Fire Engineering Report.

2.5 SECURITY SYSTEMS

The new security system shall be an integrated electronic security system.

The extent of security measures and the access control, site security and surveillance systems to be implemented will be directed by the Schools management and DoE.

Traffic in-out of the site, buildings, occupancy levels, time of use of buildings, classrooms, venues attended by public and parents, dealing with bomb or terror threat etc. will be considered.

Fire emergency also must be considered – evacuation routes established, fire emergency procedures and effective fire detection and alarm system needs to be installed.

DoE policies, case studies on completed projects and input from school staff will be a starting point to commence the design. The system will be designed with the input of the School Security Directorate.

2.5.1 Proposed Security System

The proposed development will entail a new security system. The schools existing security shall be partially removed and reused as shown on the drawings.

Main design objectives:

- 1 – Site Security – Access control.
- 2 – Students, teachers and property security – CCTV system
- 3 – Controlled access to school grounds.
- 4 – Controlled access to carpark.
- 5 – Controlled access to rooms and buildings with high value infrastructure, AV, IT or science related equipment.
- 6 – Intercom system, emergency phones
- 7 – Fire detection and alarm system and effective fire prevention system and procedures.
- 8 – CCTV cameras in designated areas.

2.6 LIGHTING FIXTURES AND OUTLETS

All new light fixtures and services outlets will be selected to comply with the Education Department Specific Design Guidelines (EFSG).

In addition we will consider the following tabulated values;

Fixture/Equipment Type	Type & Function
Internal light fittings	LED based and dimmable
External light fittings	LED based and photo cell controlled
General lighting levels in classroom and learning spaces	240 lux
General lighting levels in circulation spaces	80 lux
Outlets (power, communications, TV, AV etc.) types	Clipsal or HPM standard white
Lighting control	Schneider/Clipsal C-Bus

All light fittings and power accessories will be selected to be consistent throughout the entirety of the project to allow for streamlined maintenance where feasible.

2.7 AUDIO VISUAL SERVICES

2.7.1 Digital Signage AC Concept

We expect audio visual technology in the classroom, which can bring not only interactivity and collaboration but also films. YouTube videos, documentaries and television programmes used in the learning environment.

The primary objectives of classroom Audio-Visual and Control systems are:

- Work closely with the Department of Education and School Stakeholders to ensure each teaching space is provided with a system that is fit for purpose.
- Focus on ease of use by teaching staff with minimal complexity or specialist training: the system shall not impede or disrupt the learning environment due to "technical difficulties".
- Mindfulness of budgetary constraints
- In gymnasiums, communal spaces, movement studios etc; the EFDG guidelines will be strictly adhered to. We seek further information from the NSW Department of Education's Informed Technology Directorate in order to confirm the latest interactive classroom infrastructure guidelines.
- For visual-performance to be tertiary education-grade as per AETM best practises.

The Audio-Visual and control systems shall be wholly internet protocol (IP) based to ensure the cabling infrastructure remains future-proof as the devices themselves gradually fall out of date over the next 20-30 years.

2.8 CLASSROOM AV CONCEPT

Classrooms shall contain an intuitive, easy to use audio-visual system suitable for everyday teaching applications.

The classrooms are expected to contain either a single short throw projector projecting onto an anti-reflectivity coated whiteboard, or smart/interactive whiteboards similar to what is already present in some parts of the school. HDMI (and VGA, if required) hard-wired inputs shall be provided at the control panel to allow screen sharing and multimedia presentations from portable devices.

A wireless presentation device shall be provided to allow interactive collaboration, screen sharing and multimedia presentations from staff and student devices. The audio system would

comprise powered front of house speakers. The control system would comprise a basic wall-mounted control panel.

2.9 TELEVISION DISTRIBUTION SYSTEM

An internet Protocol Television System (IPTV) is proposed to be provided to distribute free to air TV channels which may have news or educational programmes for the student's benefit, and also to record/time-shift TV programmes for scheduled class viewing.

A single roof mounted antenna shall be installed for the building housing the new main communications room. This will distribute TV signals over the IP network, requiring IPTV receivers to be installed on television displays or recorders as required.

2.10 PERIOD BELL & PUBLIC ADDRESS SYSTEM

It is proposed that an IP-based public address system could be useful to announce school-wide, or zoned messages if the School stakeholders desire such functionality.

If this system is desired, the system will consist of the following components;

- **Head-End:** The PA system head-end is an IP configurable server which controls the entire network of PA components. It will be located in the main communications room, directly connected to the school's structured cabling infrastructure.
- **Staff Station(s):** Staff stations consist of a microphone and a personal computer system to control the PA system's functions. The staff member will be able to record a live message, or configure the system to schedule pre-recorded messages and tones, for example a period bell to signal the start and finish of break times. Additional configuration is possible, for example, to silence bells during examination periods to minimise disruption. The main staff station is proposed to be located at the school's main administration/reception desk. Additional staff stations can be installed according to the Client's direction. Staff station locations are flexible, and can be installed at any location a data outlet is provided.
- **IP Receivers:** IP Receivers will be provided for each amplifier zone. IP Receivers connect to the data network and output line-level audio. IP Receivers can also come with built-in amplifiers for smaller-scale systems not requiring a zone amplifier, for example, isolated classrooms.
- **Zone Amplifiers and Speakers:** The School would be consulted to determine the required PA zones. Zones can be configured to be context-sensitive, for example, a Sporting zone may relay different messages and announcements to a Secondary School zone, but both zones may share a period bell. Each zone will be provided with an amplifier connected to the IP Receiver, and also fire trip to relay occupant warning system messages. The amplifier will output the 100 V sound signal to its connected speakers. The system is specified to be configured for maximum speech intelligibility. Zone amplifiers can also be retrofitted to existing PA system infrastructure, allowing old analogue PA systems to be added to the IP PA system network.

3 HYDRAULIC SERVICES

3.1 AUTHORITIES STATUTORY REQUIREMENTS

The Hydraulic Services installations covered by this Contract shall comply with the regulations and by-laws of all Federal, State, and Local Authorities holding jurisdiction over the works and in particular those listed below;

- The National Construction Code
- Standards Australia
- Armidale Regional Council

3.2 HYDRAULIC SERVICES

Marline Newcastle Pty Ltd has performed non-invasive investigations in regards to the existing site conditions and additional loading from the proposed building onto the existing utility infrastructure available for connection to the site.

Our assessment has been based on discussions with, and information provided by, the relevant utility authorities.

3.2.1 Existing Infrastructure

All works will be subject to Armidale Regional Council requirements under a Section 68 Certificate Application.

Based on our recent our assessment of the infrastructure documentation provided by Council & existing drawings provided by the Department of Education we anticipate that the following requirements will be applicable:

Sewer:

The site has access to the following sewer mains:

- 150mm Armidale Regional Council sewer main is currently serving the property just inside the Northern boundary of the site at the corner of Butler & Mann Streets.

We believe this connection will serve the redeveloped site.



Photo: Sewer Connection

3.2.2 Sanitary Plumbing and Drainage

The sanitary plumbing and drainage will be designed to AS 3500.2 and Armidale Regional Council Requirements

The building will be drained via an inground sewer drainage system. The complex will be designed as a single stack system connecting to the proposed fixtures and shall be installed inground, above ground, and within wall/ducts as necessary. Venting of the main drain will be provided by a vent pipe terminating above roof level. Branch drains will be vented via vent pipes or air admittance valves as appropriate.

The system will include the following:

- A boundary trapped property connection complete with low level vent
- The vertical stacks connecting all sanitary fixtures from the units shall be connected by using a fully vented modified stack system.

All waste pipes and vents within habitable spaces shall be concealed in ceiling spaces, plumbing ducts, walls and cupboards where possible. Floor wastes shall be provided in front of basins and floors shall be graded to these. The traps shall be maintained with the discharges from waste fixtures located adjacent being routed through them.

- An overflow gully will be provided as part of these services. The gully will be external to the building at ground level to prevent any surcharge of sewerage, within the building, in the event of blockage.
- Inspections openings in pipes and fittings will be fitted in accessible positions to facilitate maintenance procedures for each individual section of pipework. These will generally be located adjacent each WC, at each point a sewer pipe exits the footprint of the building, and at 30m intervals where external to the building.

3.2.3 Domestic Cold Water

A domestic cold water service will be documented in accordance with AS3500 and Armidale Regional Council requirements.

The incoming service shall be modified to suit the new development with meter and complete with a backflow prevention device in accordance with AS3500 and Armidale Regional Council requirements.

The system will reticulate to all points of usage and be complete with connection to water main, piping, fittings, valves, etc. Non domestic user points considered a backflow hazard will be fitted with protection within the recommendations of AS3500.

Sub-metering will be provided to the following if required;

- Irrigation
- Potable Top-up Supply to Rainwater Harvesting Tank (If Required)

3.2.4 LPGas Service

The gas service will be designed and reticulated in accordance with AS1596 requirements to supply the following anticipated services:

- Central hot water plant

This will be subject to client confirmation and design development

The internal system of pipework will supply 2.75kPa gas to all points of usage and be complete with piping, fittings, valves etc. unless noted otherwise.

3.2.5 Stormwater Drainage

Refer to the civil engineers report/documents for details relating to the external storm water drainage and OSD/RWR requirements.

4 Mechanical HVAC

The project will be provided with a fully air conditioned solution to all occupied areas. The systems proposed are VRV heat recovery systems that allow the façade heat load to be transferred throughout the building, reducing the need for compressor input increasing the overall efficiency of the HVAC system.

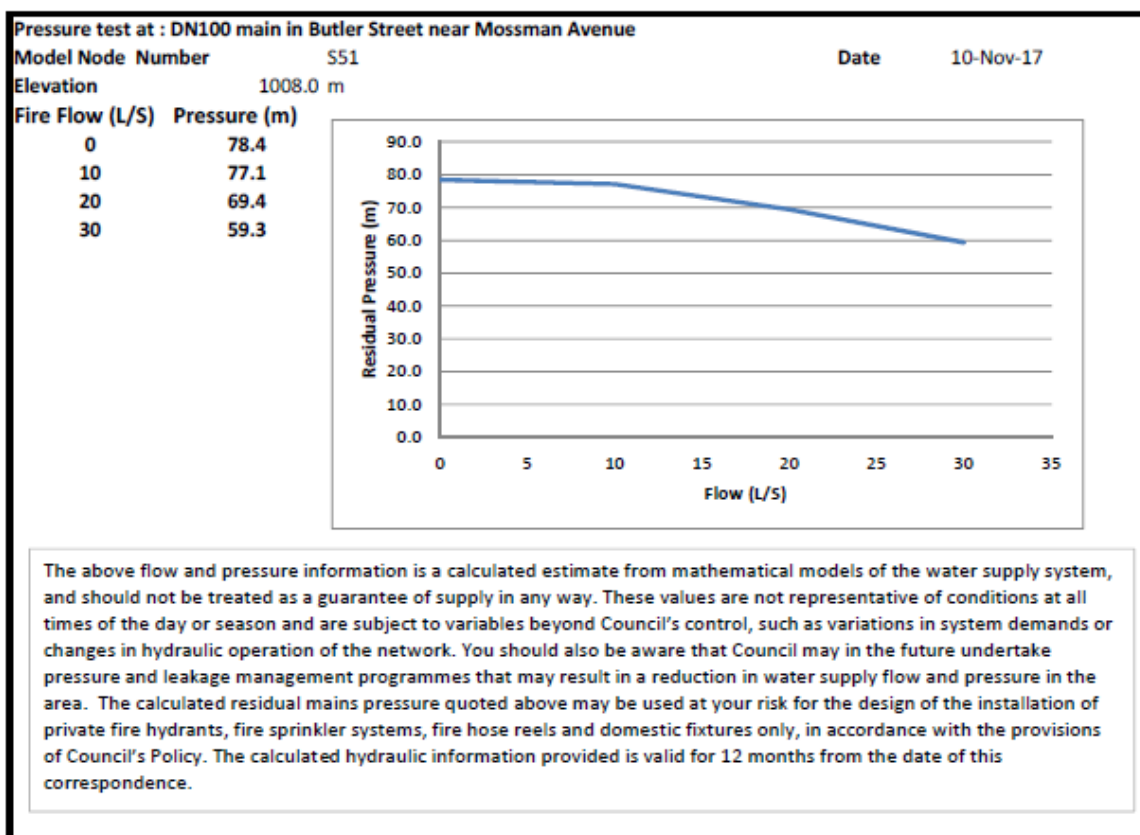
Communication rooms will be provided with air cooled single split cassette units and a high temperature alarm system.

The air conditioning system will be provided with a central controller to enable building management to set schedules and levels to avoid excess energy usage. Motion sensors will be used in areas of low occupancy to ensure that when the room is not occupied the set points are set back and the HVAC system reverts to standby mode.

The metal work, wood work and assisted learning rooms are all provided with under floor heating. This system will be provided with smart controls which adjust the start times based on the external temperatures. This helps to reduce energy consumption and only allows the system to operate when required.

The mechanical ventilation fans are provided with a number of different control strategies such as occupancy control, motion sensors, interlocks with lighting and 365 day programmable timers.

5 APPENDIX A – ARMIDALE HIGH SCHOOL FLOW & PRESSURE TEST



6 APPENDIX B – ARMIDALE REGIONAL COUNCIL WATER & SEWER DIAGRAMS

LEGEND

- Private Infrastructure
- Parking Monitors

WATER SERVICES

WATER NODE

- Confirmed
- Indicative

WATER NODES TYPES

- Potable - Air Release Valve
- Potable - Butterfly Valve
- Potable - Check Valve
- Potable - Zone Valve
- Potable - Gate Valve
- Potable - Public Hydrant
- Potable - Single Hydrant
- Potable - Reducer
- Potable - Reservoir
- Potable - Scour Valve
- Potable - Pump
- Raw - Air Release Valve
- Raw - Butterfly Valve
- Raw - Check Valve
- Raw - Zone Valve
- Raw - Gate Valve
- Raw - Public Hydrant
- Raw - Single Hydrant
- Raw - Reducer
- Raw - Reservoir
- Raw - Scour Valve
- Raw - Pump

WATER SYMBOLS

- Fire Service
- Potable - Water Crossing
- Potable - Residential Meter
- Potable - Service Pit
- Raw - Water Crossing
- Raw - Residential Meter
- Raw - Service Pit

WATER PIPES

- Potable - Inferred
- Potable - Indicative Only
- Raw - Inferred
- Raw - Indicative Only
- Abandoned Water Pipes

WATER SERVICE CONNECTIONS

- Potable - Service Connection
- Raw - Service Connection

SEWER SERVICES

SBOX

- Confirmed
- Indicative Only

MANHOLES

- Confirmed
- Indicative Only

SEWER NODES

- Maintenance Shaft
- Public Manhole
- Open Valve
- Pump Station
- Private Station
- Rodding Eye

SEWER PIPES

- Service Connections
- Gravity Pipe - Confirmed
- Gravity Pipe - Indicative only
- Gravity Pipe - Abandoned
- Rising Pipe
- Rising Pipe - Abandoned

DRAINAGE SERVICES

S/WATER NODES

- Confirmed
- Indicative Only

S/WATER NODES

- Drop Inlet
- Drop Inlet - Gross Pollutant Trap
- Kerb Inlet
- Manhole
- Manhole Gross Pollutant Trap
- Wingwall
- Wingwall - Gross Pollutant Trap

INTER ALLOTMENT PIPES

- Inter Allotment Pipes

INTER ALLOTMENT NODES

- Drop Inlet
- Kerb Inlet
- Manhole
- Wingwall

STORMWATER PIPES

- Confirmed
- Indicative Only
- Stormwater Culvert
- Stormwater Channel

CADASTRE

- Parcel Boundary

DISCLAIMER:

Information is a pictorial representation & Ground truthing is required.
Contours are a general indication of ground shape.
Map provided for intended purpose only and should not be used for any other purposes.

COORDINATE SYSTEM:

COORDINATE SYSTEM: Map Grid of Australia (Zone 56)

DATUM :

DATUM: Geocentric Datum of Australia (GDA94)

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Cadastral Information - Land & Property Information
State Forestry - State Forestry NSW
National Parks - National Parks & Wildlife Service
Geology - Department of Mineral Resources
Council Information - Armidale Dumaresq Council, Guyra Shire Council
& New England Weeds Authority.

Date : 10/11/2017

Scale : 1:2500

