INSYNC SERVICES
PTY LTD

Fire Services

Concept Design Report

Mixed Residential Development

Site 9, Sydney Olympic Park

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Review and Approval Record

Rev	Date	Description of Release	Prepared By	Reviewed By	Approved By
A	17/02/16	Concept Design	IW	BL	BL
B	03/03/16	Concept Design	IW	BL	BL
C	01/04/16	DA Issue	IW	BL	BL

Contents

1 Executive Summary

1.1 Summary

The proposed mixed residential development at site 9, Sydney Olympic Park will be constructed on an existing parcel of land having existing carpark demolished to allow for the new development. The site is bounded by Sarah Durack Avenue to the north, Olympic Boulevard to the west, an existing building to the east and existing carpark to the south.

The site will be subject to strata sub-division only, and therefore the entire lot can be serviced from a single point of Authority mains connection.

We have reviewed the existing infrastructure with regard to its capacity and location to service each stage of the proposed development in accordance with the connection requirements detailed above, our comments are as follows;

Service	Infrastructure Location	Infrastructure Capacity	Comments	Cost Estimate
Combined Fire Hydrant / Fire Sprinkler Service	☑	☑	1 x 150mm connection to existing 150mm Sydney Water potable cold water main within Olympic Boulevard.	$22,500
Total Cost Estimate (ex GST).				**$22,500**

Infrastructure Services have been assessed as follows;

☑ Infrastructure connection is readily available.

⃠ Infrastructure connection requires minor adjustment of existing services.

☒ Infrastructure connection requires significant amplification or diversion of existing services.

In undertaking our assessment of the existing Authority infrastructure, we have considered the feasibility of providing hydraulic and fire services connections to the proposed development in accordance with the following calculated infrastructure loads and connection sizes;

COMBINED FIRE HYDRANT / FIRE SPRINKLER SERVICE

Variable	Requirement
Largest Fire Compartment	<10,000m^2
Building Height	>50m
Town's Main Connection	150mm
On-Site Water Storage Tank	150,000L
Design Flow Rate	50L/s
Town's Main Connection	150mm
Fire Brigade Booster Valve	150mm (4–point)
Relay Booster 1	150mm (4-point)
Relay Booster 2	150mm (4-point)
Fire Mains	50L/s
Primary Diesel Pump	50L/s
Primary Electric Pump	50L/s
Diesel Relay Pump 1	40L/s
Diesel Relay Pump 2	40L/s
Fire Sprinkler Control Assembly	Every Floor Level
Sprinkler Locations	All areas of the building

2 Introduction

2.1 Background

Ecove Group Pty Ltd has engaged Insync Services Pty Ltd to provide building services consultancy on the mixed residential development at Site 9, Sydney Olympic Park. Specifically, Insync Services Pty Ltd have been engaged to provide engineering consultancy with regard to the following building services disciplines;

- Fire Services
- Hydraulic Services
- Mechanical Services

2.2 Aims

The aim of this Concept Design report is to provide a detailed description of the fire services design proposals associated with the development. Specifically the report is intended to provide a summary of the following;

- High level assessment of existing Authority infrastructure.
- Identification of services to be provided.
- Description of the codes to which they will be installed.
- Description of the basis for design.
- Description of the required performance.
- Description of the materials to be used.

2.3 Briefing Documents

The fire services engineering elements considered within this report have taken into account the following preliminary documentation and investigations;

- Authority main diagrams.
- Existing Authority correspondence.
- Architectural documentation prepared by Bates Smart Pty Ltd.

2.4 Scope of Services

The fire services engineering elements considered within this report are as follows;

- Combined Fire Hydrant / Fire Sprinkler Service

3 Schedule Of Accommodation

3.1 Area Schedule

Preliminary load estimates within this report have been based upon the Area Schedule detailed below;

Building Level	Floor Level	Building Area (m^2)
Ground Level	12.05	2392
Level 02	17.00	1593
Level 03	20.00	3076
Level 04	23.00	3076
Level 05	26.00	3076
Level 06	29.00	3076
Level 07	33.10	2506
Level 08	36.20	2391
Level 09	39.30	891
Level 10	42.40	891
Level 11	45.50	891
Level 12	48.60	891
Level 13	51.70	891
Level 14	54.80	891
Level 15	58.20	891
Level 16	61.30	891
Level 17	64.40	891
Level 18	67.50	891
Level 19	70.60	891
Level 20	74.00	891
Level 21	77.10	891
Level 22	80.20	891
Level 23	83.30	891
Level 24	86.40	891
Level 25	89.50	891
Level 26	92.60	891
Level 27	96.00	891
Level 28	99.10	891
Level 29	102.20	891
Level 30	105.30	891
Level 31	108.40	891
Level 32	111.50	891
Level 33	114.60	891
Level 34	117.70	891
Level 35	120.80	891
Level 36	124.20	891
Level 37	127.30	891
Level 38	130.40	891
Roof Level	133.50	
Totals	117.7m	47,912

3.2 Accommodation Schedule

Preliminary load estimates within this report have been based upon the Schedule of Accommodation detailed below;

Building Level	Totals
Ground Level	0
Level 02	0
Level 03	0
Level 04	0
Level 05	0
Level 06	0
Level 07	6
Level 08	6
Level 09	7
Level 10	8
Level 11	8
Level 12	8
Level 13	8
Level 14	8
Level 15	8
Level 16	8
Level 17	8
Level 18	8
Level 19	8
Level 20	8
Level 21	8
Level 22	8
Level 23	8
Level 24	8
Level 25	8
Level 26	8
Level 27	7
Level 28	7
Level 29	7
Level 30	7
Level 31	7
Level 32	7
Level 33	7
Level 34	7
Level 35	7
Level 36	4
Level 37	4
Level 38	3
Totals	**229**

4 Authority Infrastructure Requirements

4.1 Combined Fire Hydrant / Fire Sprinkler Service

▪ Design Assessment

The proposed development will provide facilities in accordance with the Schedule of Accommodation as detailed in Section 3.

Combined fire services are sized based upon the fire compartment area, hazard classifications and building effective height. We have calculated the combined fire hydrant / fire sprinkler service requirements as follows;

Variable	Requirement
Largest Fire Compartment	<10,000m^2
Building Height	>50m
Town's Main Connection	150mm
On-Site Water Storage Tank	150,000L
Design Flow Rate	50L/s
Town's Main Connection	150mm
Fire Brigade Booster Valve	150mm (4–point)
Relay Booster 1	150mm (4-point)
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Fire Mains	50L/s
Primary Diesel Pump	50L/s
Primary Electric Pump	50L/s
Diesel Relay Pump 1	40L/s
Diesel Relay Pump 2	40L/s
Fire Sprinkler Control Assembly	Every Floor Level
Sprinkler Locations	All areas of the building

Due to the proposed height of the building being in excess of 8 stories, a connection may need to be sourced from an Authority water main of at least 200mm diameter. The proposed connection size referred to above reflects consolidated loads and is provided for reference only. A formal Section 73 application will need to be made to Sydney Water after receipt of the Development Approval, in order to confirm their requirements for the provision of potable cold water connections to the proposed development.

▪ Existing Services

Sydney Water are the Authority who provide potable cold water infrastructure in the locality of the development site. Currently there are two existing Sydney Water mains located within close proximity to the development site, described as follows;

- **Sarah Durack Avenue** – an existing 150mm potable cold water main located along the southern side of Sarah Durack Avenue. The main is accessible for the full length of the sites northern boundary.

- **Olympic Boulevard** – an existing 150mm potable cold water main located along the eastern side of Olympic Boulevard. The main is accessible for the full length of the sites western boundary.

A copy of the Sydney Water mains diagram has been included for reference within the Appendix of this report.

Anticipated Works

A formal Section 73 application will be made to Sydney Water, in order to confirm their requirements for the provision of potable cold water service connections to the proposed development. A summary of the Sydney Water sewer main works required to facilitate the proposed developments is as follows;

- **Site Connection** – a new 150mm combined fire hydrant / fire sprinkler service connection will be required into the existing 150mm water main within Olympic Boulevard.

All Sydney Water Corporation water main works are required to be designed by a Sydney Water accredited Water Servicing Coordinator. We recommend that contact be made with a suitable Water Servicing Coordinator at the earliest possible convenience to further develop and assess the various water main connection options.

5 Combined Fire Hydrant /Fire Sprinkler Service

5.1 Combined Fire Hydrant / Fire Sprinkler Service Generally

Specifically this section of the Concept Design report shall cover the following services;

- Combined Fire Hydrant /Fire Sprinkler Service

5.2 Standards

Works under this section of the Concept Design report shall be designed in accordance with the following standards;

- National Construction Code (2014)
- AS 2118.1 (1999) – Automatic Fire Sprinkler Systems Part 1 General Requirements
- AS 2118.6 (2012) – Automatic Fire Sprinkler Systems Part 6 Combined Sprinkler and Hydrant Systems In Multistorey Buildings
- AS 2419.1 (2005) – Fire Hydrant Installations Part 1 System Design, Installation and Commissioning
- Plumbing Code Of Australia (2015)
- Fire & Rescue NSW

5.3 Building Height

Combined fire hydrant / fire sprinkler services for this development will be designed in accordance with the requirements for buildings exceeding 50m in effective height, as defined by the Building Code of Australia.

5.4 Fire Hydrant System Design

Fire hydrants shall be located such that every point of the building can be reached by a 10 metre hose stream from a 30 metre fire hose laid out in the actual path of travel to the point of coverage. In addition every room within the development must be reachable by a fire hose, with at least 1 metre of fire hose able to be extended into the room.

Fire hydrants shall be typically located within each floor landing of all fire stairs, and as otherwise necessary to achieve full coverage throughout the building.

Fire hydrants shall not pass through fire doors or smoke doors, where required fire hydrants shall be provided on each side of fire and smoke doors as necessary to achieve full coverage.

A system of ring-main supply risers and on floor reticulation shall be used to achieve the most reliable fire hydrant service installation.

5.5 Fire Sprinkler System Design

Fire sprinklers shall be located such that every point of the building can be reached by a fire sprinkler spray pattern, with the exception of;

- Fire separated rooms containing only dry type electrical equipment.
- Where deemed not applicable to the fire safety system as determined by a fire engineering assessment.

Fire sprinkler control assemblies shall be provided to each fire sprinkler installation on each floor of the building, with pipework then reticulated throughout the floor to the individual fire sprinklers.

Monitored isolation valves and flow switches as well as provision for drainage of test water will

be provided at each fire sprinkler control assembly. The fire sprinkler flow switch and monitored valves will be connected to Fire & Rescue NSW via the Fire Alarm Panel.

All sprinklers will be 'fast response' type.

5.6 Fire Hydrant Building Classification

Fire hydrant building classifications are determined based upon the building classification and the size of fire compartment being serviced, combined with respect to any fire sprinkler protection of that fire compartment. Fire compartments have been determined in accordance with Building Code of Australia as follows;

Carpark Areas	All classes sprinkled >10,000m^2
Retail / Commercial Areas	All classes sprinkled >5,000m^2 <10,000m^2
Residential Areas	All classes sprinkled >5,000m^2 <10,000m^2
Plant Areas	All classes sprinkled >5,000m^2 <10,000m^2

5.7 Fire Hydrant Flow Rates

Fire hydrant flow rates are determined based upon the number of fire hydrant landing valves that are required to discharge simultaneously for the fire compartment that they are serving. Fire hydrant flow rates have been determined in accordance with AS 2419.1 as follows;

Carpark Areas	3 fire hydrants
Retail /Commercial Areas	2 fire hydrants
Residential Areas	2 fire hydrants
Plant Areas	2 fire hydrants

Based upon a largest fire compartment being more than 10,000m^2, the fire hydrant service shall be sized to operate three (3) fire hydrant landing valves simultaneously.

Fire hydrant mains shall have capacity to supply a flow of 10L/s to each fire hydrant landing valve under fire brigade boosted operations, combining to a total system flow rate of 30L/s.

Fire hydrant service pipework shall be sized such that the maximum velocity within any pipework is as follows;

Location	Maximum Velocity
All Locations	4.0m/s

Fire hydrant pipework shall be sized so that the pressure loss due to friction in the reticulation system between the booster valve assembly and the most hydraulically dis-advantaged fire hydrant is limited to a maximum pressure loss of 150kPa.

5.8 Fire Sprinkler Hazard Classification

Building hazard classifications have been determined in accordance with the requirements of AS2118.1 as follows;

Commercial Areas / Plant Areas	Ordinary Hazard I (OHI)
Carpark Areas	Ordinary Hazard II (OHII)
Retail	Ordinary Hazard III (OHIII)
Residential Areas	Residential Coverage

5.9 Fire Sprinkler Flow Rates

Fire sprinkler system sizing for the building fire sprinkler service shall be determined based upon the relevant standard of coverage to be provided;

Residential	4.1mm/m^2/minute over 120m^2 (492L/m)

Ordinary Hazard I (OH1)	5mm/m^2/minute over 72m^2 (360L/m)
Ordinary Hazard II (OH2)	5mm/m^2/minute over 144m^2 (720L/m)
Ordinary Hazard III (OH3)	5mm/m^2/minute over 216m^2 (1080L/m)

Fire sprinkler service pipework shall be sized such that the maximum velocity within any pipework is as follows;

Location	Maximum Velocity
All Locations	6.0m/s

5.10 Water Supply

Combined fire hydrant / fire sprinkler service water supplies for buildings exceeding 25m in effective height must comprise two acceptable water supplies (Grade 1 or dual supply). Dual supply can be provided by any of the following alternatives;

1. Dual on-site water storage tanks, each having at least 2/3 of the required total combined flow rate for the specified duration.

2. Two town main connections each having the required total combined flow rate for the specified period, and also arranged such that in the event of a failure of one town main within the overall system, the other supply remains operative.

3. One town main supply having the required total combined flow rate for the specified period, and one on-site water storage tank having at least 2/3 of the required total combined flow rate for the specified duration.

For this development we anticipate that the existing 150mm Sydney Water main located within Olympic Boulevard will have sufficient permissible flow to service the total combined flow rate of the combined fire hydrant / fire sprinkler service. As such the combined fire hydrant / fire sprinkler water supply shall be provided by a single on-site water storage tank located at low level within the building in addition to a single town's main connection. In accordance with code requirements, the water storage tank must provide the required total combined flow rate for the specified duration, which for this development has been calculated as follows;

1. The full fire sprinkler flow of the highest hazard classification contained within the building, for the minimum duration required by that hazard classification. This capacity will be reduced by 1/3 as permitted for tank installations.

2. A minimum of 25,000L for the fire hydrant service provided that a town main connection is available, capable of supplying the required fire total fire hydrant service flow rate for the specified period.

In accordance with the methodology described above, total combined fire hydrant / fire sprinkler service on-site storage for this development has been calculated at 1 x 150,000L tanks. Detailed water supply calculations have been provided in the Appendix of this report.

5.11 Pressure Zones

Combined fire hydrant / fire sprinkler services shall be designed to incorporate pressure zones no more than 50m in height for each pressure zone within the development. Pressure zones ensure that maximum system pressures are not exceeded as follows;

- 1000kPa to fire sprinkler installations.
- 1200kPa to fire hydrant installations.

For this development there will be three (3) pressure zones will be required throughout the building as follows;

- Zone 1 - Low Rise – Levels Ground to 10 – 29.9 metres
- Zone 2 - Mid-Rise – Levels 11 to 24 – 40.9 metres
- Zone 3 – High Rise – Levels 25 to 38 – 40.9 metres

A concept diagram indicating proposed pressure zones has been provided in the Appendix of this report

5.12 Metering

An Authority meter shall be provided on the incoming fire hydrant / fire sprinkler service water supply to the development. Metering shall be achieved by a detector check valve assembly installed within the site boundary, adjacent to the fire brigade booster valve assembly.

5.13 Fire Brigade Booster Valve

A combined fire hydrant / fire sprinkler service fire brigade booster valve assembly shall be provided within the site boundary, in a location that will be addressed under a fire engineer solution and agreed with the NSW Fire Brigade. The booster valve shall incorporate the following requirements;

- A 150mm 6 way suction connection from town main supply.
- A 150mm 6-way booster connection to pressure Zone 1 – Low Rise.
- A 150mm 4-way booster connection to pressure Zone 2 – Mid Rise.
- A 150mm 4-way booster connection to pressure Zone 3 – High Rise.

The booster valve assembly shall be located affixed to the building façade. A 90/90/90 radiant heat shield wall shall be provided behind the booster assembly, extending a minimum of 2m either side of the farthest hose connection points, and 3m above the highest hose connection points.

5.14 Booster Pumps

Booster pumps shall be provided to ensure adequate pressure within the combined fire hydrant / fire sprinkler service. Pumps shall be installed on the fire hydrant /fire sprinkler service water supply, in parallel to the fire brigade booster valve assembly so that Fire & Rescue NSW appliance boosting is not effected by operation of the on-site pumps.

Buildings more than 25m in effective height require a more reliable pump installation in accordance with Building Code of Australia requirements. This increased reliability is achieved by the installation of pumps in duplicate, both being driven by diesel engines. Pumps shall be sized as a duty/standby arrangement whereby each pump has the capacity to provide 100% of the full required duty, therefore providing 100% redundancy to the system in the event of a single pump failure. Pumps shall be automatically controlled via a dedicated fire hydrant service pump control panel, complete with an interface connection to the Fire Indicator Panel and Building Monitoring System.

5.15 Relay Pumps

Relay pumps shall be provided to ensure adequate pressure within each pressure zone of the combined fire hydrant / fire sprinkler service. Pumps shall be installed on the fire hydrant /fire sprinkler service water supply, in series to the fire brigade booster valve assembly so that Fire & Rescue NSW appliance is assisted by operation of the on-site pumps to supply firefighting water to high rise areas of the building.

Relay pumps are required to each pressure zone, and require a single pump being driven by a diesel engine. Pumps shall be sized as a duty only arrangement whereby each pump has the

capacity to provide 100% of the full required duty. Pumps shall be manually controlled via a dedicated pump control panel, complete with an interface connection to the Fire Indicator Panel and Building Monitoring System.

5.16 Backflow Prevention

Site containment backflow protection shall be provided to the combined fire hydrant /fire sprinkler service water supply for this development in accordance with the requirements of AS 3500.1 – Water Services. The required backflow prevention device shall be a double detector check valve assembly.

5.17 Materials

Combined fire hydrant / fire sprinkler service for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Fire Hydrant / Fire Sprinkler Service	In-Ground	All	PN16 Blue Brute or equivalent CPVC pipe and fittings with rubber ring joints.
Fire Hydrant / Fire Sprinkler Service	Suspended Mains	All	Galvanised Steel Pipe with mechanical coupling joints.
Fire Hydrant / Fire Sprinkler Service	Downstream of fire sprinkler control assemblies	All	Medium Wall Black Mild Steel Pipe with mechanical coupling joints and screwed fittings.
Fire Hydrant / Fire Sprinkler Service	Test Drains	All	Galvanised Steel Pipe with mechanical coupling joints.

The above-nominated materials have been selected for the intended purpose, durability, cost effectiveness and are in line with current trade practice.

6 Spatial Requirements

6.1 Combined Fire Hydrant / Fire Sprinkler Service:

Item	Description	Area	Configuration	Comments
1	Fire Brigade Booster Valve Cupboard	3.85m^2	4.8m x 0.8m 1.8m high	Ground level affixed to building façade with fire rated radiant heat shield facing Street 21.
2	Booster Valve Radiant Heat Shield	35m^2	8.3m x 4.2m	90/90/90 fire rated wall behind fire brigade booster valve assembly.
3	Pump Room	58.5m^2	9m x 6.5m 2.4m high	Mechanically ventilated plant room Ground level adjacent to water storage tank and with direct egress to open space
4	Water Storage Tank	51m^2	8.5m x 6m 3m high	150,000 litre water storage tank at Ground level adjacent to fire services pump room.
5	Fire Hydrant Landing Valves	0.15m^2	0.5m x 0.3m 1.2m high	Fire hydrant located within each fire stair at each level of the building, and as otherwise required to achieve full coverage from 30m hose length.
6	Sprinkler control Valves	0.24m^2	0.8m x 0.3m 1.8m high	Fire sprinkler control valves located within a fire stair at each level of the building. Valves wall mounted above fire hydrant landing valve.

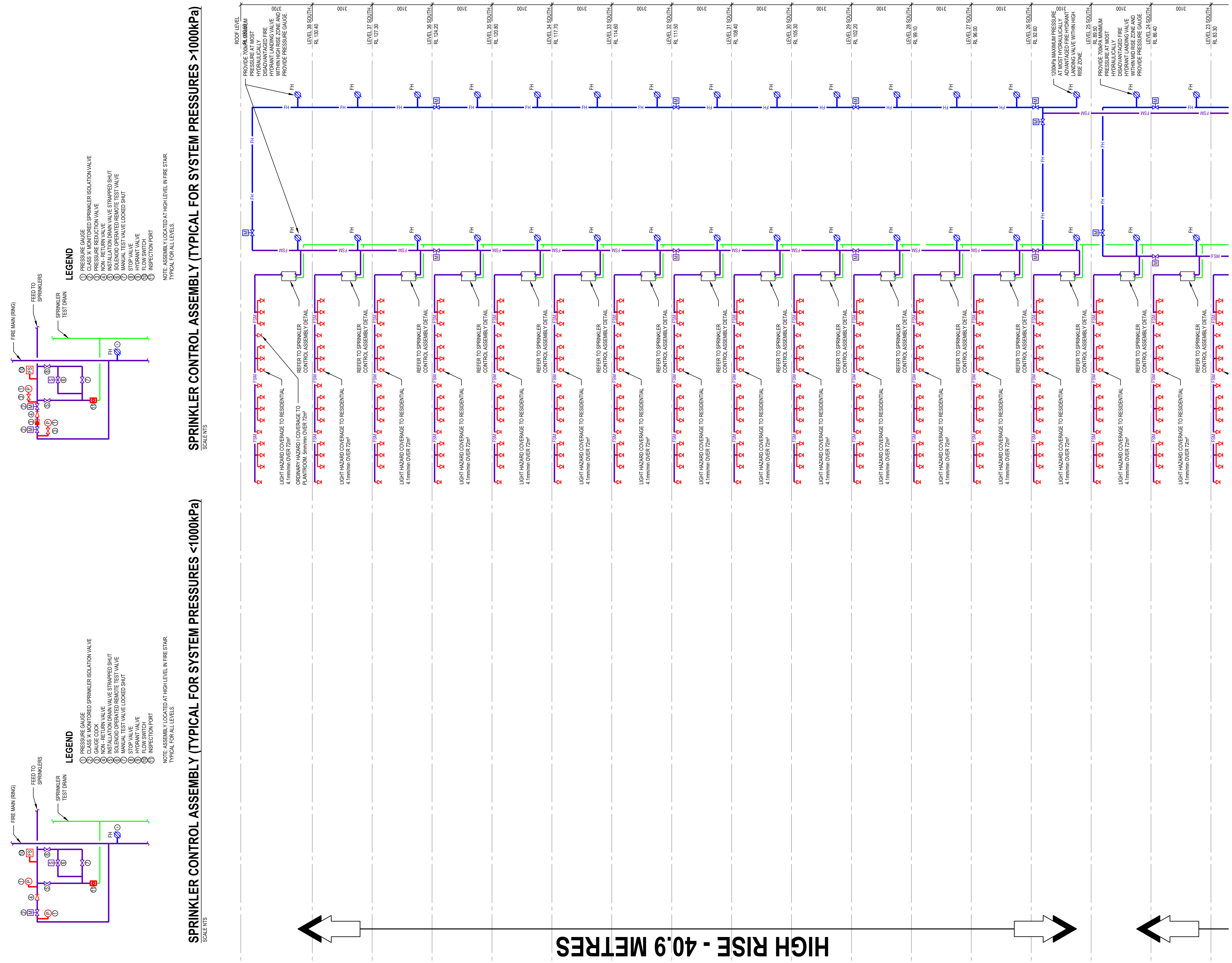
6.2 Portable Fire Extinguishers:

Item	Description	Area	Configuration	Comments
1	Portable Fire Extinguishers	Included	Included	Typically located within fire hose reel cupboards as required throughout non-residential areas of the development.
2	Portable Fire Extinguishers	0.09m^2	0.3m x 0.3m	Located within dedicated cupboards on all residential levels of the building such that a fire extinguisher is provided within 10m from each apartment entry door.

7 Appendix

7.1 Combined Fire Hydrant / Fire Sprinkler Service Concept Schematic Drawing

7.2 Sydney Water Mains Diagram



DA ISSUE

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INSYNC SERVICES

FIRE SERVICES

Issue	Date	Amendment	Int.	App.
01	17/02/16	CONCEPT DESIGN	IW	BL
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03	01/04/16	DA ISSUE	IW	BL

COORDINATED REFERENCE DRAWINGS

SERVICE	DRAWING NUMBER	ISSUE	DATE
ARCH			
MECH			
STRUCT			
ELEC			
CIVIL			

Project:
Site 9,
3 Olympic Boulevard
Sydney Olympic Park

Drawing Title:
FIRE SERVICES
SCHEMATIC DIAGRAM
PART 1

North Point:

Quality ISO 9001
Certified System
FS 581006

Job No: 20150077

Scale: (A1) NTS

Dwg No: FSK-001

Issue: 03

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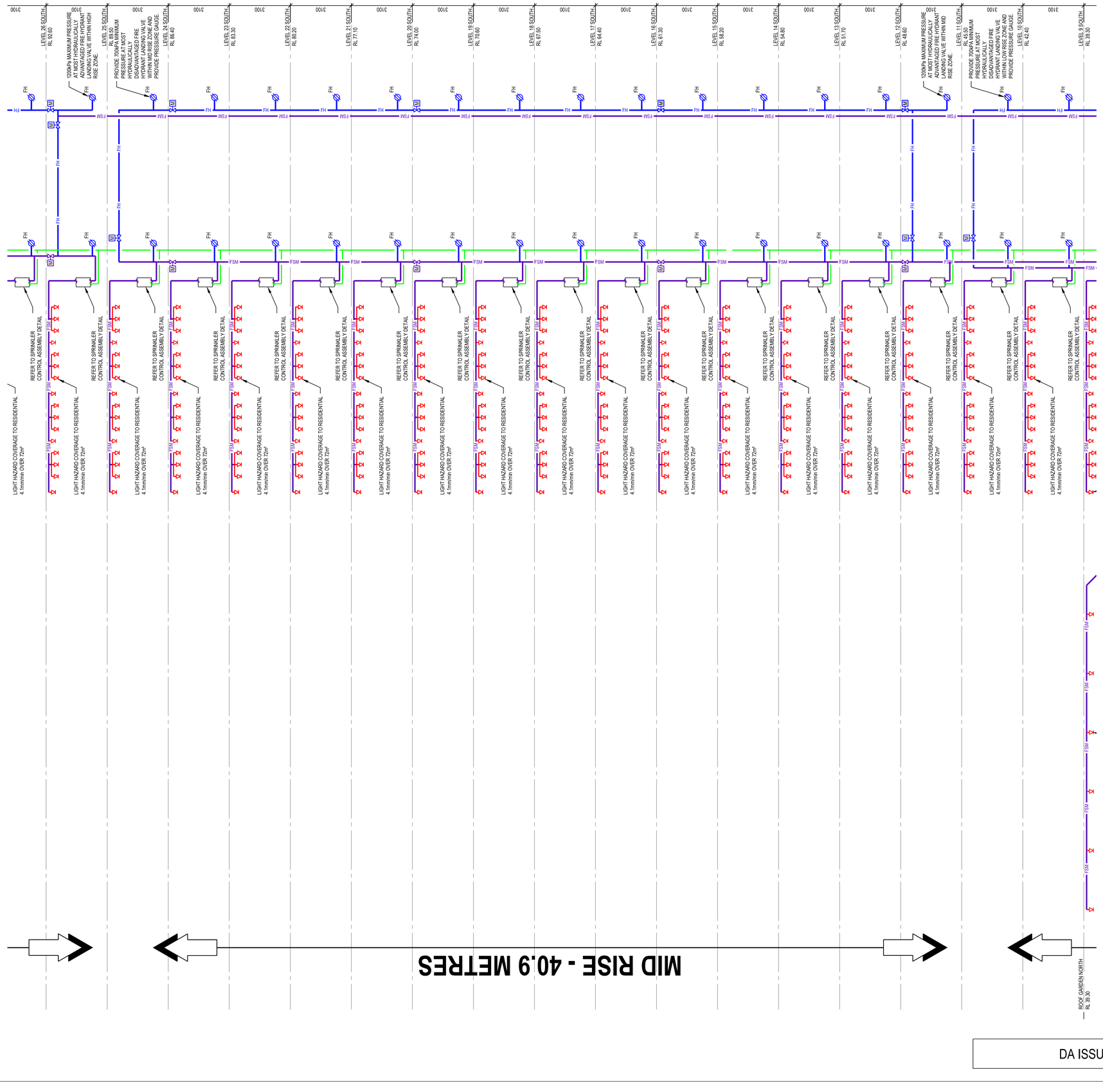

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Project:
Site 9,
3 Olympic Boulevard
Sydney Olympic Park

Drawing Title:
FIRE SERVICES
SCHEMATIC DIAGRAM
PART 2

North Point:

Quality ISO 9001 Certified System FS 581006

Job No: 20150077
Scale: (A1) NTS
Dwg No: FSK-002
Issue: 03

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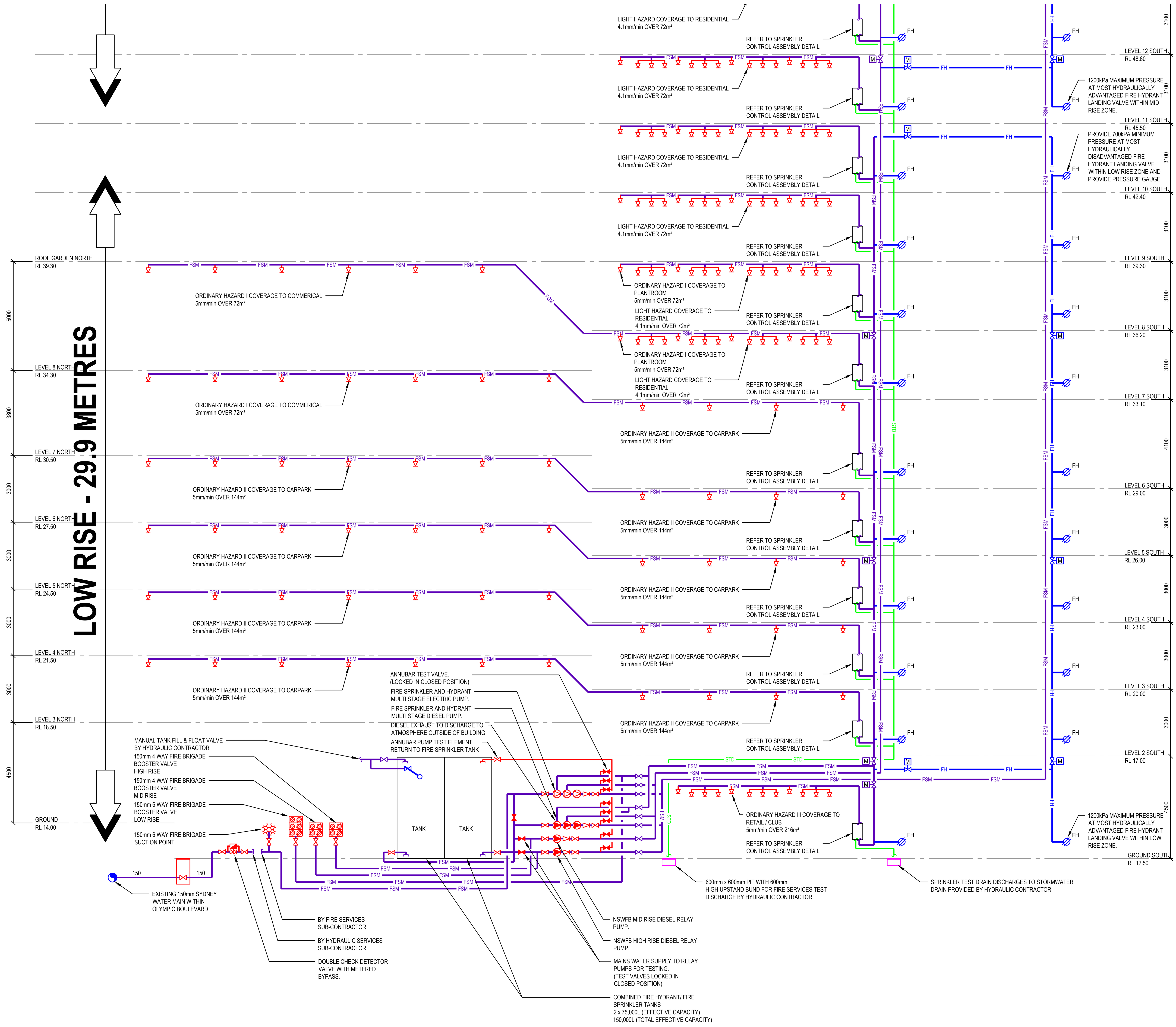
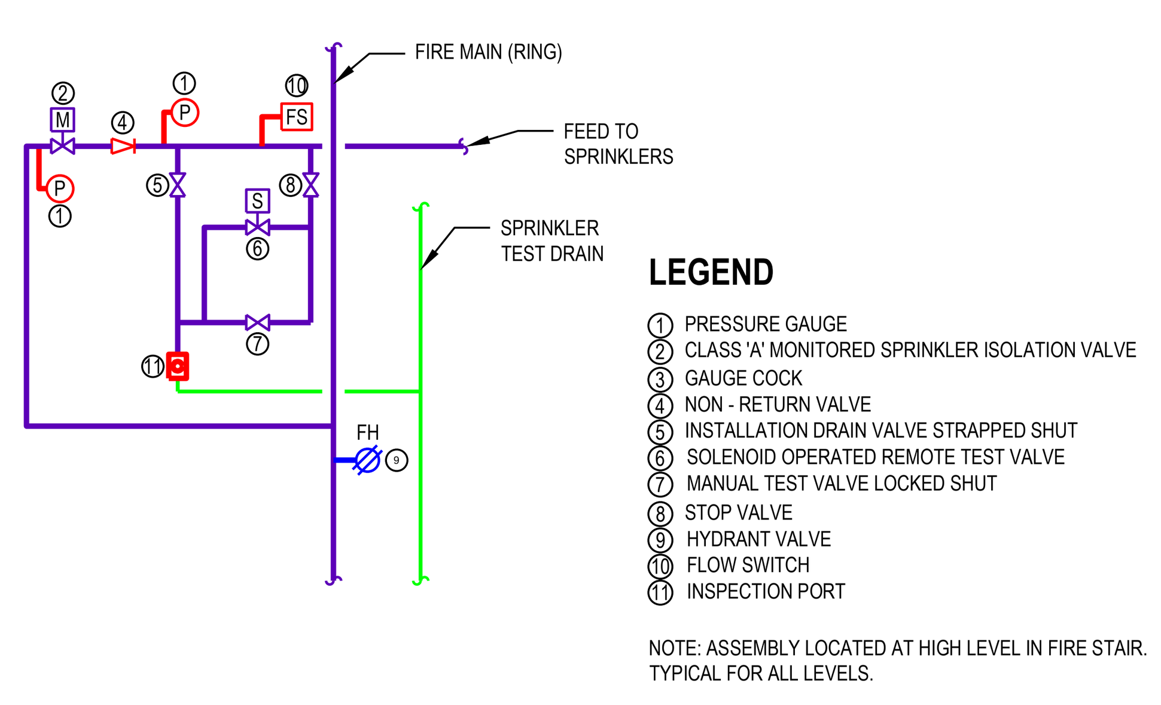
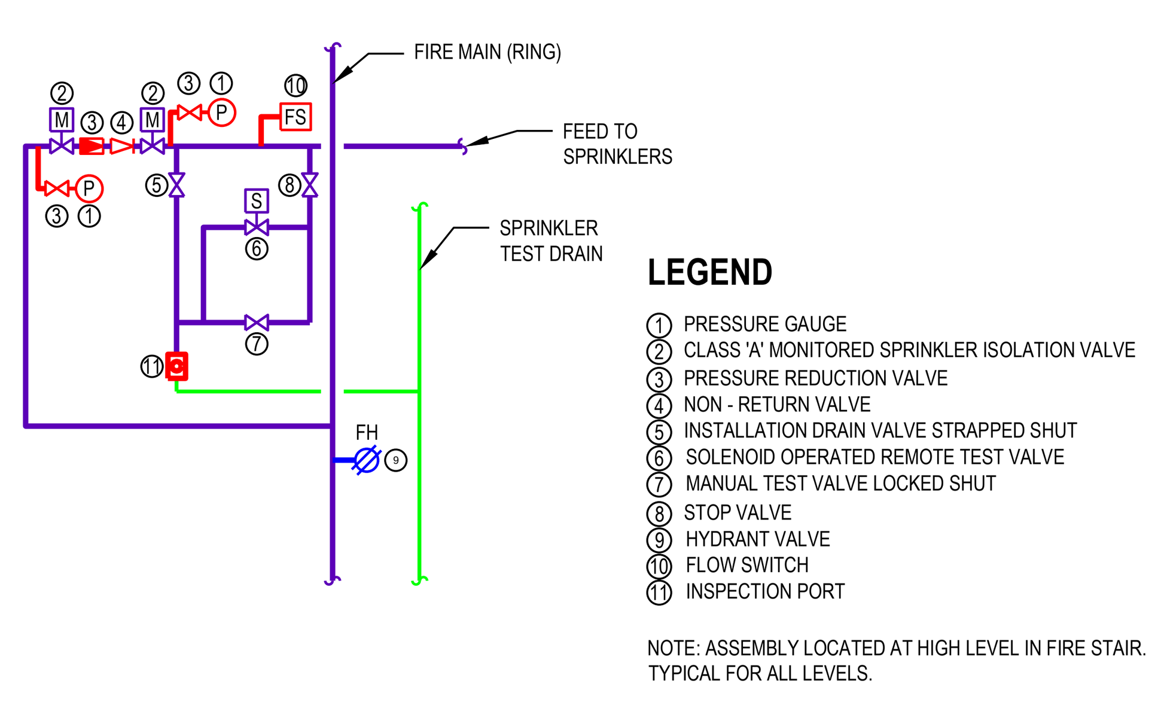




SPRINKLER CONTROL ASSEMBLY (TYPICAL FOR SYSTEM PRESSURES <1000kPa)

SCALE NTS



SPRINKLER CONTROL ASSEMBLY (TYPICAL FOR SYSTEM PRESSURES >1000kPa)

SCALE NTS

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Drawing Title:
FIRE SERVICES
SCHEMATIC DIAGRAM
PART 3

North Point:

Quality ISO 9001 Certified System FS 581006

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Dwg No: FSK-003
Issue: 03

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