CARDINAL FREEMAN VILLAGE

Supporting Documentation

Appendix L

Hydraulic Services Report

Prepared by **Whipps Wood Consulting**

aevum LIMITED

HYDRAULIC SERVICES MASTER PLAN REPORT

CARDINAL FREEMAN VILLAGE
137 VICTORIA STREET
ASHFIELD

Issue **C**

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Document History

Revision	Date	Amendments
P1	11/02/09	Preliminary
P2	1/05/09	Preliminary
P3	8/05/09	Preliminary
A	15/05/09	
B	15/05/09	General Amendments
C	08/09/09	General Amendments

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1. PURPOSE OF REPORT

This report has been prepared by Whipps Wood Consulting on of behalf of Aevum Limited Property Group for the proposed refurbishment and expansion of the Cardinal Freeman Village, Ashfield.

The purpose of this report is to provide details in relation to the hydraulic services to address the requirements of the Department of Planning as outlined in the Director-General Requirements, Application No MP 08_0245 in addition to a review of the site servicing requirements and strategies.

2. REPORT OVERVIEW

This report addresses the following specific areas, related to hydraulic services:

- The existing site
- Authority mains infrastructure
- Site Services infrastructure
- Proposed services strategies
- Development stages 1 and 2

3. EXISTING SITE & AUTHORITY INFRASTRUCTURE

The following provides a brief overview of the existing site and hydraulic services details;

3.1 SITE LOCATION

The existing site consists of a series of separately titled parcels of land bounded by Clissold, Seaview, Victoria, and Queen Streets.

3.2 SEWER MAINS

Currently the site drains to Sydney Water sewer main infrastructure in Clissold, Seaview and Queen Streets. In addition a Sydney Water sewer main extends from Clissold Street into the site before terminating adjacent to the access road which traverses the site between Victoria and Queen Streets.

3.3 WATER MAINS

Currently there are a number of water main connections and water meters around the site which provide potable water.

3.4 GAS MAINS

Currently gas mains are located in Victoria and Queen Streets. A number of gas meters are located around the site to serve the various buildings and plant.

3.5 FIRE HYDRANT SYSTEM

Following the recent refurbishment and extension of two buildings in the north eastern quadrant of the site, identified in this report as buildings A and B, a fire hydrant service was installed between the main entrance off Victoria Street and Buildings A and B. This new service consists of a fire hydrant booster valve, booster pump and two external fire hydrants. This service provides coverage to Buildings A and B only.

3.6 RAINWATER REUSE SYSTEM

Following the recent works associated with Buildings A and B a 45,000 litre rainwater harvesting tank was installed in the carpark adjacent to Clissold Street. Rainwater collected into this tank from the Building A and B roof areas is reticulated to external landscaped areas and toilet flushing within the buildings.

4. MASTERPLAN DETAILS

The following outlines the design intent for the hydraulic services based on the current master plan scheme.

4.1 SEWER DRAINAGE

As previously noted the site drains to a number of separate sewer connection points in the surrounding streets. In addition a Sydney Water sewer main traverses part of the northern boundary of the site, adjacent to the existing nursing home in Clissold Street and then extends through the site toward the chapel.

The key item to be addressed relates to the existing Sydney Water sewer mains which traverse the site. The current site consists of a number of separate lots. Based on the location of the surrounding site sewer infrastructure and the site topography, it is necessary for the sewer drainage from some of the individual lots to traverse another lot to connect to a sewer main. Sydney Water does not permit private sewer main extensions across adjoining lots regardless of the title ownership arrangements; their guidelines stipulate that all lots must a direct access to Sydney Water sewer infrastructure at the lot boundary.

Unless the site is consolidated and the individual lot boundaries are extinguished the existing sewer main infrastructure will remain an asset of Sydney Water. However, if the site is either fully of partially consolidated then Sydney Water will hand the ownership of the sewer mains as required.

4.2 STORMWATER DRAINAGE

Based on information obtained from site investigations the stormwater drainage system consists of a series of stormwater drainage lines located around the site, these drains connect to a main stormwater line which extends along the route of the internal road system and connects to the Council main infrastructure in Clissold Street, opposite William Street.

In order to provide an environmentally sensitive solution for the site redevelopment the primary focus shall be retaining rainwater on site for sanitary flushing and irrigation purposes. Based on this the intent of proposed stormwater management plan is to;

- Harvest rainwater for sanitary flushing and landscape watering
- Reduce the outflow from the site and;
- Discharge cleaner water into the downstream catchments.

Statutory Requirements

Ashfield Council nominates the requirements for stormwater management in their Stormwater Management Code adopted by Council in April 1995. This Code nominates the following items which are relevant to the development;

Section 4.2 Relates to on-site detention (OSD) and states that “OSD of stormwater is required to limit discharges from developments to predevelopment conditions. Council’s OSD requirements have been formulated to ensure there is no increase in discharges adjacent to the site or elsewhere in the

catchment for virtually all rainfall events through to 100 years ARI." (ARI = Average Recurrence Interval)

Section 4.3 Relates to surface flow paths and states that "Surface flow paths are an integral part of the drainage system. They are to be preserved, or alternatives provided, wherever they pass through or affect the development site. Site discharges are not to be concentrated to a greater degree than that which naturally occurs."

Supplement 4 Relates to OSD storage requirements and states that "Hydrologic calculations;

Section S4.1 Are required to demonstrate the post development site runoff does not exceed that prior to development for all recurrence intervals over the range 5 to 100 years ARI. Calculation methods considered acceptable for this demonstration are:-

a. Triangular Hydrographs
b. Swinburne
c. Time Area models such as ILSAX

The following outlines how these requirements are to be included in the proposed design;

Council Condition	**Response**
Section 4.2	Council requires that if the site impervious area increases then OSD will be provided. In the development of Buildings A and B it was successfully argued that the impervious areas were decreasing and therefore the requirement for detention was waived. In relation to a whole of site assessment it is estimated that the existing site area is 40856m2, of which 62% is considered impervious. The proposed impervious areas indicated on the master plan will as a minimum not exceed the existing impervious areas and may actually decrease.
Section 4.3	Based on the current site topography the site drains toward Clissold Street. It anticipated that the development of the site will retain the intent of the existing overland flow corridors.
Supplement 4 Section S4.1	As previously noted the intent of the master plan is to not increase the amount of impervious area. Based on this OSD is technically not required.

Design Intent

Based on the Ashfield Council guidelines and to comply with the aforementioned design intent, it is proposed to provide OSD to reduce the site outflow, which will be further assisted with the inclusion of rainwater harvesting.

To determine the volume of detention for the site it was necessary to firstly establish the design criteria, which was difficult based on the fact that the site does not technically require OSD. However, the following was used as the design criteria.

On-site detention has been calculated using the Triangular Hydrograph method as incorporated into the RAREWIN (Rainfall And Runoff Estimation for Windows) software program developed by Smartkey Solutions.

This method calculates a storage volume on the basis of an increased impervious area, and cannot generate results for a negative increase (or a more pervious site).
Therefore, the lower impervious area (for the proposed, not existing, situation) was adopted for both existing and proposed calculations to determine the storage volume.

If the existing impervious area was adopted to determine the permissible 5 year discharge, the storage volume would actually become smaller for the proposed site runoff.

It is proposed that the detention volume then be reduced by incorporating rainwater harvesting.

Until recently many Councils have refused to allow rainwater harvesting tanks to be considered as part of the OSD strategy for a site, primarily due to the contention that the rainwater tank maybe full at the commencement of a storm event, thereby negating the intention of the OSD Strategy to limit the permissible site discharge. However, it has since been generally acknowledged that a rainwater tank will not always be full at the commencement of a storm if the water is being used for non – potable purposes i.e. sanitary flushing or landscape irrigation. The results of a study conducted by Peter Coombes and Associate Professor George Kuczera of the University of Newcastle indicated that the average percentage of a rainwater tank volume that can be counted as part of the site's OSD volume ranges from 32% to 50% if the tank has no air space.

Proposed Design

Based on the aforementioned criteria is it assumed that 599 m3 of storage shall be required for the site, of which it is proposed that a maximum of 30% or 179.9 m3 be offset for rainwater harvesting. The 30% figure is based on the results of the study conducted by Peter Coombes and Associate Professor George Kuczera previously noted.

As noted further in this report 179.9 m2 equates to less than a month of sanitary flushing

Overland Flow Considerations

A review of the overland flow through the site has also been undertaken in conjunction with Robert Bird and Partners. This review indicates that it is possible to retain the proposed overland flow paths within the road easements. Further, a preliminary analysis indicates that the anticipated flow velocities with the lower areas of the road easements are expected to be 0.310m2/s which is less that the maximum velocity of 0.4m2/s as outlined in the Australian Rainfall and Runoff Manual.

4.3 POTABLE WATER SUPPLY

As previously noted there are a number of separate water main connections and water meters located around the site, serving both the separate lots and individual building clusters.

During the recent refurbishment of Buildings A and B a new water main connection was provided at the Victoria Street entrance. A new 100mm line has then been extended between the entrance and the Buildings A and B. It is proposed that as the site develops that this main will be extended until it loops back to the Victoria Street entrance to form a ring main around the site.

Preliminary pressure advice from Sydney Water indicates that a pump shall not be required for the majority of the site. However, a pump may be depending upon a hydraulic analysis for each building during the design phase.

4.4 FIRE HYDRANT SYSTEM

As previously noted a new fire hydrant service has recently been installed as part of the recent refurbishment of Buildings A and B. In a similar arrangement to the potable Cold Water Service a 150mm service has been installed which is to be extended around the site to form a ring main as the site develops.

4.5 GAS SERVICES SYSTEM

In a similar arrangement to the potable water service there are a number of separate gas main connections and gas meters located around the site, serving both the separate lots and individual building clusters.

During the recent refurbishment of Buildings A and B a new gas main connection was provided at the Victoria Street entrance. A new 100mm line has then been extended between the entrance and the Buildings A and B. It is proposed that as the site develops that this main will be extended until it loops back to the Victoria Street entrance to form a ring main around the site. However, unlike the potable water supply the Gas provider for the area has indicated that the gas main in Victoria Street is not large enough to cater for the entire site and has advised that another gas main connection shall be required in Queen Street as the site develops. Based on this it is proposed that the site be feed from two ring mains one which serves the southern end of the site and another which serves the northern end of the site assuming the existing right of way as the division line.

4.6 RAINWATER HARVESTING

PROFILE OF POTENTIAL RAINWATER USAGE

The following water usage profile has been based on population figures provided by Aevum Limited and an assumed usage of 274 litres per day per person.

DEMAND ANALYSIS		
Existing ILU's (retained)	Units / Beds	*Occupancy Multiplier 1.3*
Building A	18	23.4
Building B	18	23.4
Buildings G-K	56	72.8
Glentworth	23	29.9
Sub Total	115	149.5

Aged Care		*Occupancy Multiplier 1.0*
Hostel	60	60
Nursing Home	59	59
Serviced Apartments	48	48
Sub Total	167	167

Masterplan – ILU's		*Occupancy Multiplier 1.3*
Building C	25	32.5
Building D	29	37.7
Building V1	18	23.4
Building V2	18	23.4
Building V3	15	19.5
Building V4	9	11.7
Building V5	9	11.7
Queen 1	22	28.6
Queen 2	26	33.8
Queen 3	12	15.6
Building F	23	29.9
SSC	23	29.9

Sub Total	229	297.7
Grand Total	**521**	**614**

Total Usage Profile

Population	Litres Per Day	Litres Per Year	Annual Waste Water Generation	
			Grey 30%	Black 70%
614	168,236	61,406,140	18,421,842	42,984,298

Specific Usage Profiles

Water Usage	People	Water Used Per Person Per Day (L)	Water Used Per Month (L)	Water Used Per Year (L)	Tank Size Month Storage (L)
WC Flushing	614	12	7,368	88,416	7,368

* Allowance of 2 flush's per day per resident and staff

Water Usage	Irrigation Area (m2)	Water Requirement Per Month (mm)	Water Used Per Month (L)	Water Used Per Year (L)	Tank Size Month Storage (L)
Irrigation Grass	9,000	65	585,000	7,020,000	
irrigation Plants	9,000	43	387,000	4,644,000	
Total			972,000	11,664,000	12,636,000

Catchment Profile

Catchments	Area (m2)	Runoff Coef	Average Monthly Rainfall (mm)	Average Available Rainfall for Capture Per Month x Coef (L)	Average Available Rainfall for Capture Per Year x Coef (L)
Roof	11,175	0.90	101	1,017,819	12,213,828

5. WATER SENSITIVE URBAN DESIGN

The following assessment has been prepared based on the summation of the Toolbox Matrix contained within the Water Sensitive Planning Guide: for the Sydney Region complied as a cooperative project between the Sydney Coastal Councils, Western Sydney Regional Organisation of Councils and the Stormwater Trust.

Water Management Measure	**Design Response**
Aquifer storage & recovery system	The provision of Aquifer storage systems for the site has not been deemed as practical due to the site building constraints and presence of reactive clay deposits
Chemical spill prevention measures	Not applicable
Compliance mechanisms	The stormwater design has been prepared in accordance with the intent of the Ashfield Council Stormwater Management code
Detention devices	It is proposed to reduce the requirement for onsite detention systems by providing onsite retention systems where it can be demonstrated that this approach will not detrimentally affect the surrounding properties and have a positive impact on the Ashfield Council infrastructure.
Erosion & sediment control plan	This plan will be prepared in accordance with the necessary requirements for each stage of development
Extended detention devices	It is envisaged that the amount of water leaving the site will both be reduced and harvested.
Filtration and bioretention devices	It is envisaged that gross pollutant traps and sediment control will be provided to remove debris and hydrocarbons collected on site before discharging to the Council's infrastructure in Clissold Street.
Grassed swales	Refer to Aquifer storage & recovery system
Infiltration devices	Refer to Aquifer storage & recovery system
Landscape practises	Not applicable to this report
Responsive building design	Not applicable to this report
Responsive major stormwater design	It is proposed that the stormwater design incorporate measures which will involve the reuse of rainwater from roofs throughout the site for irrigation and sanitary flushing. In addition it is proposed to provide gross pollutant traps and sediment control to remove debris and hydrocarbons collected on site before discharging to the Council's infrastructure in Clissold Street.
Responsive street layout	Not applicable to this report
Ponds and wetlands	Not applicable to this report
Porous paving	It is envisaged that Porous paving may be provided in non vehicular traffic areas
Roofwater tanks	Rainwater harvesting shall be provided for sanitary flushing and landscape watering
Site analysis	Not applicable to this report
Stormwater tanks	It is envisaged that only rainwater harvesting from roofed areas shall be provided
Termite-resistance	Not applicable to this report
Wastewater reuse systems	Grey and Black water systems are not considered to be commercially viable for this project
Water-efficient fixtures & appliances	The selection of all tapware and sanitaryware shall be based on the WELS rating system to ensure the installation of Water efficient fixtures and appliances.

6. STAGE 1 – VILLAGE PRECINCT

The first stage of works shall be the development of the Village Precinct. As noted on the attached sketch drawings this will involve the modification of the existing services and the construction of OSD and Rainwater harvesting tanks.

The following outlines how this stage of works shall be serviced and constructed to minimise the impact on the existing unaffected village;

1. The adjoining Independent Living Units which are not included in the master plan works are connected to a separate water main, gas main and have a separate connection to the sewer main in Queen Street. It is anticipated that the development of the village precinct shall not affect these services. Stormwater from the site drains toward the existing internal street drainage system. As noted below this drainage system is to be replaced. However, the new drainage system shall provide a connection point for the existing discharge.

2. The internal street drainage system is to be reconstructed with new kerb inlet pits to accommodate the revised street alignment. The design of this new drainage shall make provision for the street drainage and the associated flows from existing drainage systems

3. The overland flow paths around the developed site from the upstream development shall generally flow around the site toward the internal street, and shall be retained within the street easement where required and maintain a velocity of less than 0.4m2/s

4. Onsite detention shall be provided. The volume of detention has been calculated as a percentage of the site area, approximately 6% of the site or 2400m2, based on this 63m3 of detention is required.

   In addition to the OSD it is proposed to provide rainwater harvesting. The volume of rainwater harvesting is proposed to be 31m3 which has been sized based on the population figures and roof catchment area.

   As noted in the report the minimum amount of OSD offset with rainwater harvesting 30%. Based on this it is proposed to provide 44.1 m3 of detention, but provide additional rainwater harvesting storage of 31m3

   The outlet from the OSD shall connect to the existing new stormwater main infrastructure.

5. The fire hydrant, cold water and gas mains are to be extended from Victoria Street parallel to the revised internal street with provision for future connection to from the site ring main infrastructure

6. The site shall connect to the existing sewer main.

7. STAGE 2 – CARE PRECINCT

The second stage of works shall be the development of the Care Precinct. As noted on the attached sketch drawings this will involve the modification of the existing services and the construction of OSD and Rainwater harvesting tanks.

The following outlines how this stage of works shall be serviced and constructed to minimise the impact on the existing unaffected village;

1. Some minor diversions will be required to accommodate the services from the existing retained building in the Precinct.

2. The fire hydrant, cold water and gas mains are to be extended from the area adjacent to Buildings A and B parallel to the revised internal street which shall complete the site ring main infrastructure

3. The internal street drainage system is to be reconstructed with new kerb inlet pits to accommodate the revised street alignment. The design of this new drainage shall make provision for the street drainage and the associated flows from existing drainage systems

4. The overland flow paths around the developed site from the upstream development shall generally flow around the site toward the internal street, and shall be retained within the street easement where required and maintain a velocity of less than 0.4m2/s

5. Onsite detention shall be provided. The volume of detention has been calculated as a percentage of the site area, approximately 22% of the site or 8800m2, based on this 132m3 of detention is required.

   In addition to the OSD it is proposed to provide rainwater harvesting. The volume of rainwater harvesting is proposed to be 184m3 which has been sized based on the population figures and roof catchment area.

   As noted in the report the minimum amount of OSD offset with rainwater harvesting 30%. Based on this it is proposed to provide 39.6m3 of detention, but provide additional rainwater harvesting storage of 184m3

   The outlet from the OSD shall connect to the existing new stormwater main infrastructure

6. The site shall connect to the existing sewer main.

APPENDIX

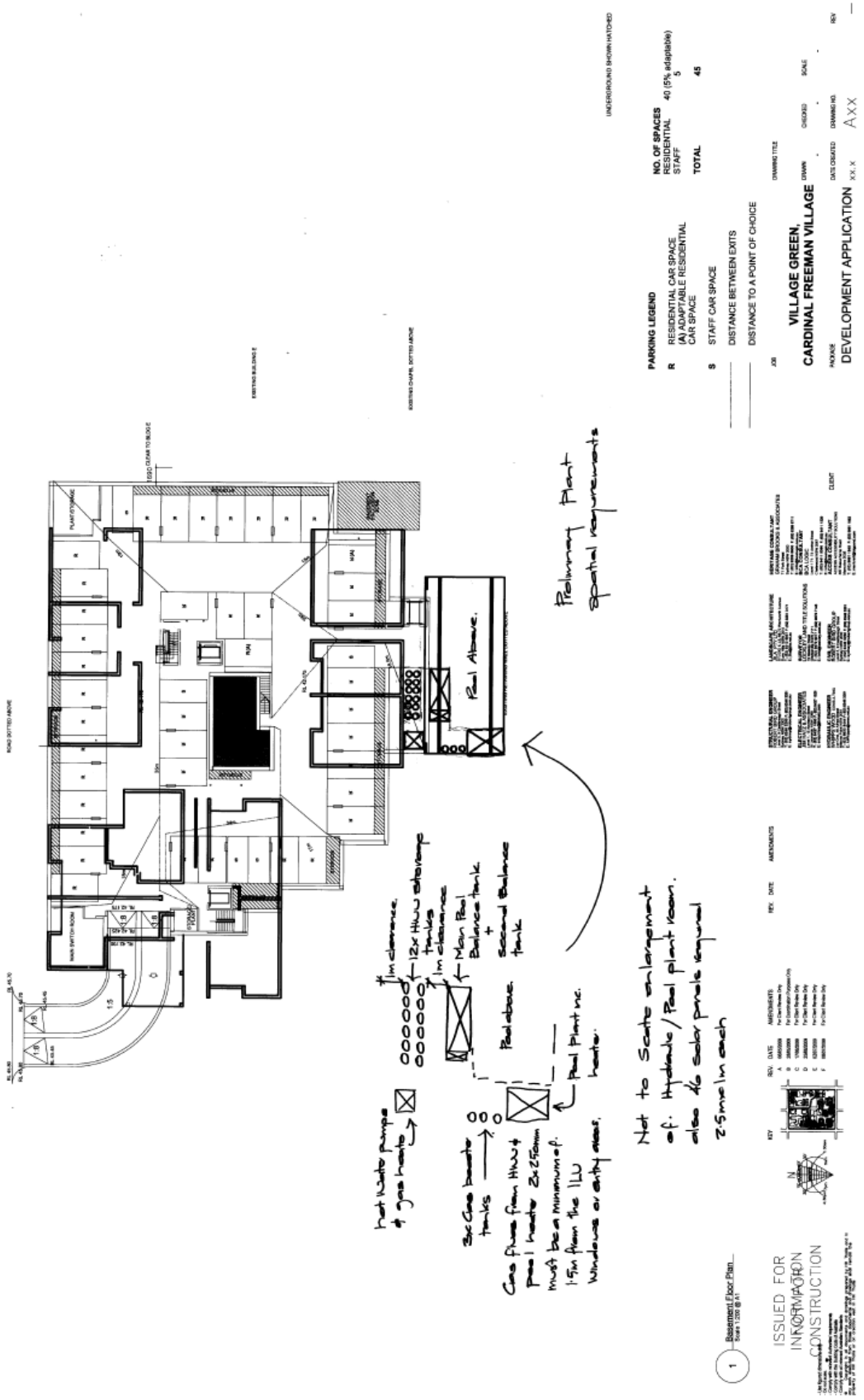
1. Stage 1 – Village Precinct Sketch Drawings

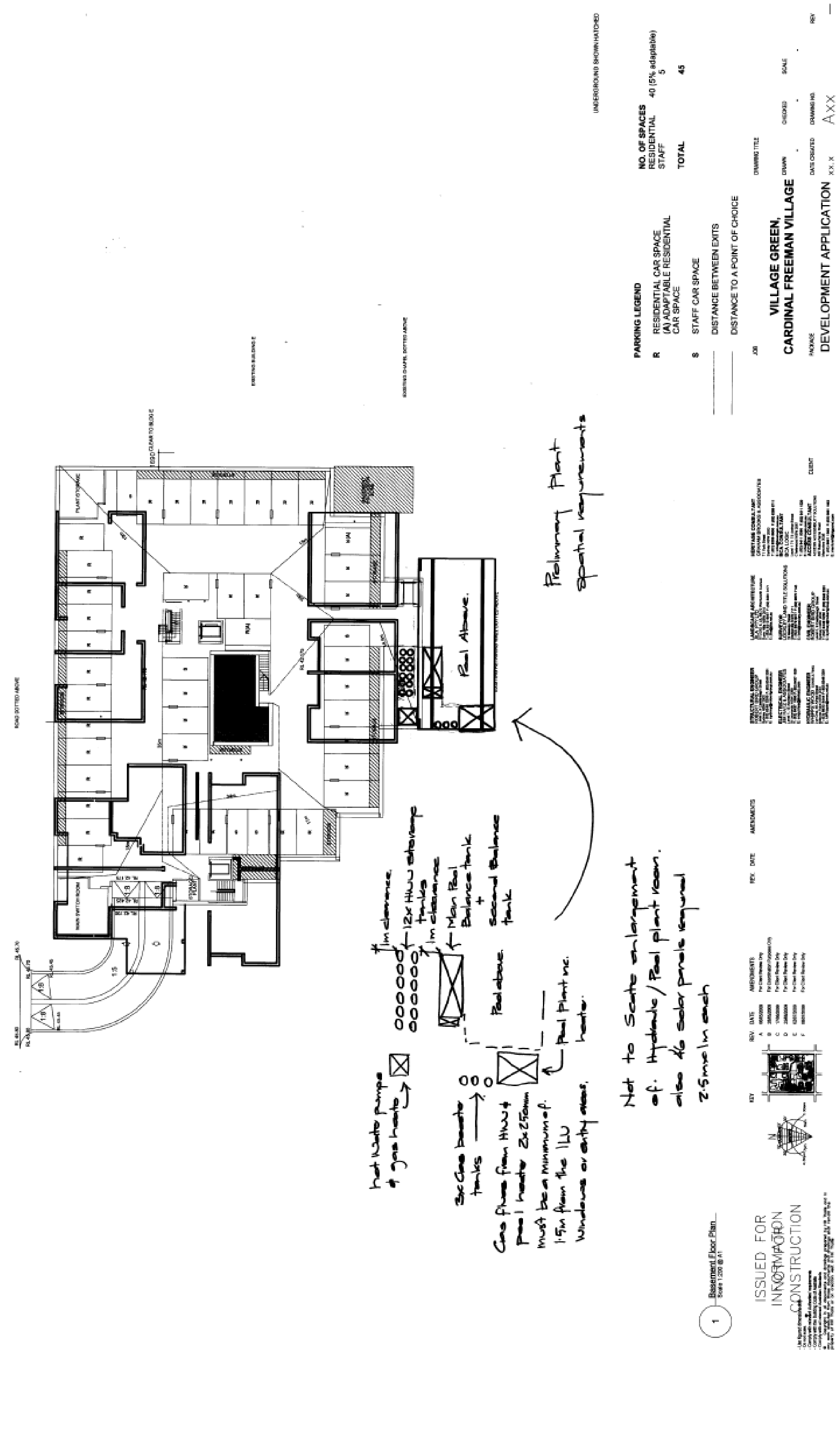
2. Stage 2 – Care Precinct Sketch Drawings

3. Sewage service diagram

APPENDIX

4. Stage 2 – Care Precinct - Sketch Drawings





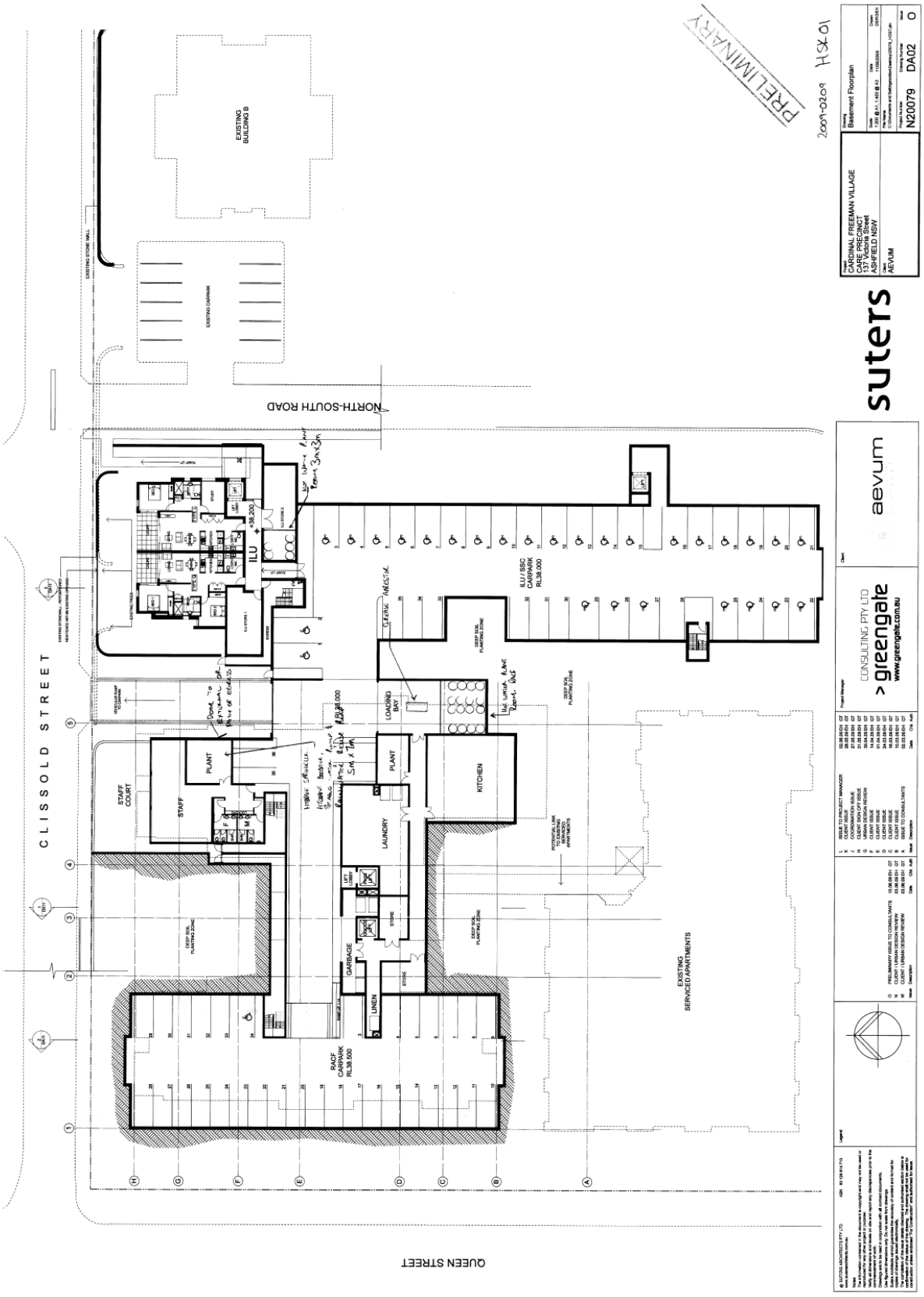
Basement Floor Plan
ISSUED FOR CONSTRUCTION
PARKING LEGEND
R RESIDENTIAL CAR SPACE
(A) ADAPTABLE RESIDENTIAL CAR SPACE
S STAFF CAR SPACE
DISTANCE BETWEEN EXITS
DISTANCE TO A POINT OF CHOICE
NO. OF SPACES
RESIDENTIAL 40 (5% adaptable)
STAFF 5
TOTAL 45
UNDERGROUND SHOWN HATCHED
VILLAGE GREEN, CARDINAL FREEMAN VILLAGE
DEVELOPMENT APPLICATION
Pool Above.
Preliminary Plant Spatial requirements
Not to Scale enlargement of: Hydraulic / Pool plant room.
Pool plant inc. heater.

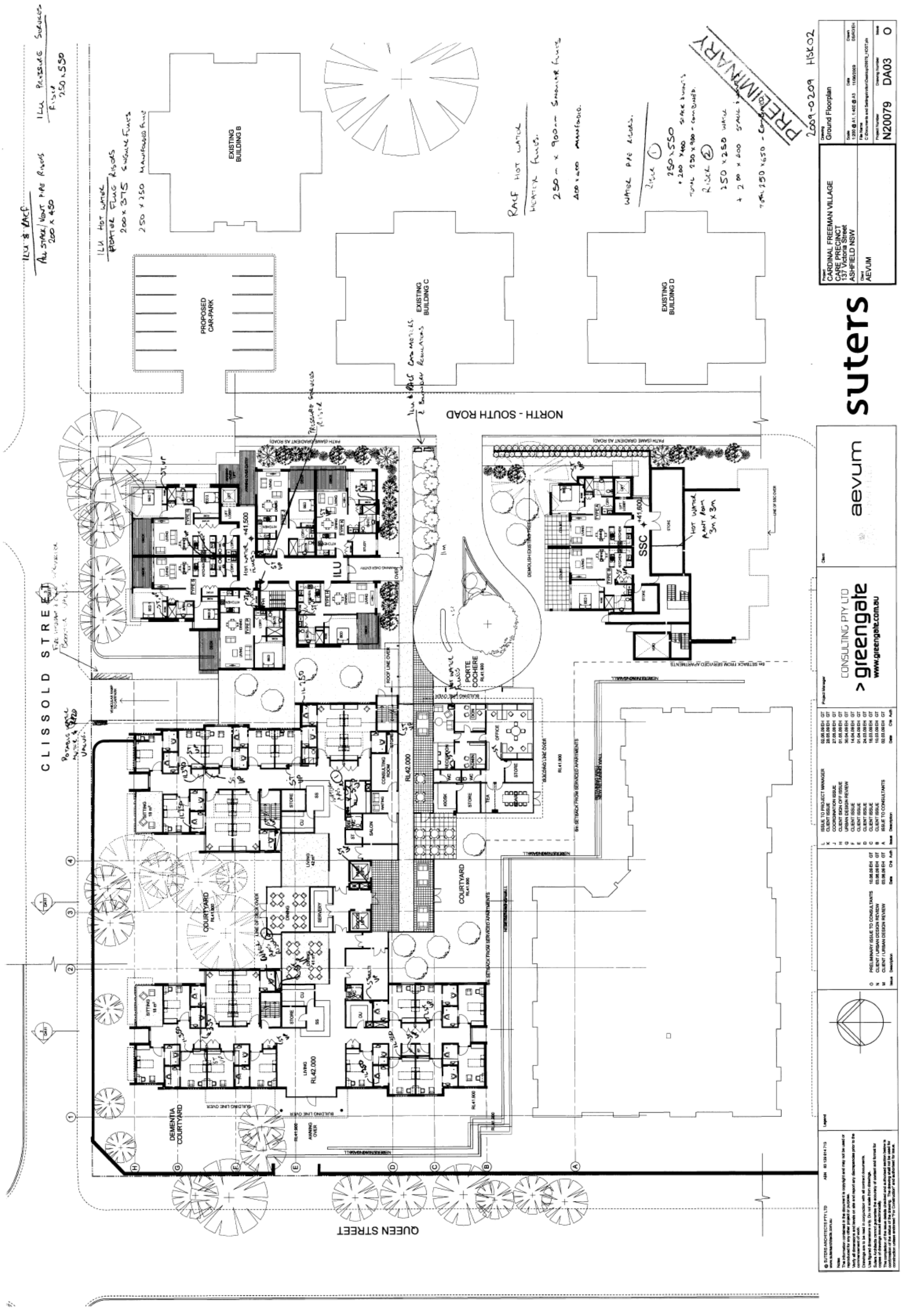
VILLAGE GREEN,
CARDINAL FREEMAN VILLAGE
DEVELOPMENT APPLICATION
Level 2 Floor Plan
Level 1 Floor Plan
ISSUED FOR INFORMATION
CONSTRUCTION

VILLAGE GREEN,
CARDINAL FREEMAN VILLAGE
DEVELOPMENT APPLICATION
ISSUED FOR
INFORMATION
CONSTRUCTION
Level 4 Floor Plan
Level 3 Floor Plan

APPENDIX

5. Stage 2 – Care Precinct - Sketch Drawings




PRELIMINARY
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CARE PRECINCT
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ASHFIELD NSW
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Ground Floorplan
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EXISTING BUILDING C
EXISTING BUILDING D
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CLISSOLD STREET
QUEEN STREET
ILU
SSC
COURTYARD
DEMENTIA COURTYARD
PORTE COCHERE
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Level 1 Floorplan
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NORTH - SOUTH ROAD
EAST - WEST ROAD
QUEEN STREET
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6. Sewage service diagram