CARDINAL FREEMAN VILLAGE

Supporting Documentation

Appendix M

Civil Infrastructure Statement

Prepared by **Robert Bird Group**

aevum LIMITED

RobertBirdGroup

CIVIL INFRASTRUCTURE REPORT
For

CARDINAL FREEMAN VILLAGE, ASHFIELD, NSW

Prepared For: Aevum Limited

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1	N/A	Original Issue - Draft
2	2.0	Summary moved up from Section 8.0 to Section 2.0.
	3.0	Added Section 3.0: Director General's Requirements
	Various	Section renumbering, minor revisions
3	Various	Planning references changed to Concept Plan
	2.0	2nd paragraph deleted. Minor wording amendments.
	6.1 – 6.2, 6.5.1 – 6.5.2, 6.5.4	Various amendments to match traffic engineer's report.
	7.3.6	Reference to other hydraulic engineer's report added.
4	Various	Paragraphs added and minor wording amendments
	8.0, 9.0, 12.0, 13.0	Sections added.
	10.0, 11.0	Section renumbering,
5	5.0	Staging references amended
6	12.0 , 13.0	Staging

FINAL DRAFT ACCEPTED BY: **AUTHOR:** **REVIEWER:**

…….. ……..
LAURENCE MELVILLE
Signing for and on behalf of
Robert Bird Group Pty Ltd
Date:

BRUCE GUNN
Signing for and on behalf of
Robert Bird Group Pty Ltd
Date:

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1.0 Introduction

It is proposed to redevelop the Cardinal Freeman Village in Ashfield, NSW. The Village currently serves as a self-contained aged care community providing a range of services and amenities for residents from medical, spiritual, commercial, and recreation. The site is being redeveloped and modernised to meet market expectations, increase capacity and improve the various amenities and services provided.

Hill Thalis Architecture + Urban Projects and Jane Irwin Landscape Architects have prepared concept plans for the Village, showing new and retained freestanding structures, open spaces, a network of access roads and path ways, as well as retained heritage significant buildings and features.

Robert Bird Group has been commissioned to investigate and report on Civil Infrastructure matters that may potentially affect the redevelopment of the Site. The following report provides details on the principles being applied in relation to the civil infrastructure including vehicle and pedestrian access, stormwater drainage management, and Water Sensitive Urban Design (WSUD) principles.

2.0 Summary

It is proposed to redevelop the Cardinal Freeman Village in Ashfield, NSW with the expectation that the redevelopment will result in an increase in capacity and improvements to the various amenities and services provided. The redevelopment work includes new building structures with associated on-ground and basement car parking, a reconstructed internal road network, re-designed footpath network, and landscape works.

Drawings have been prepared showing proposed upgrades and extensions to vehicle and pedestrian access and stormwater drainage networks. The proposed upgrades and extensions are conceptual only and serve to demonstrate how the civil infrastructure issues affecting the site may be addressed. Further investigation and detailed design will be necessary to refine the concepts, including coordination of footpath and road alignments and location and sizing of stormwater mains and points of connection to external infrastructure, to the approval of the relevant authorities.

Careful infrastructure planning and stormwater management will be required on an overall site basis to maximise the benefits of WSUD. It is proposed to incorporate WSUD principles in the design of the external landscape and civil infrastructure. Some of the major features include the treatment and re-use of the site's stormwater runoff and the treatment and reduction of peak flows and volume of stormwater drainage draining out of the site. Other WSUD features have also been incorporated within the proposed new buildings and are discussed in reports by other consultants. These features benefit not only the site itself, but also the surrounding areas and downstream natural watercourses.

This report and enclosed concept plans are complementary to the vehicle and pedestrian access principles and rainwater harvesting and detention strategies prepared in the by McLaren Traffic Engineering and Whipps Wood Consulting respectively.

Services infrastructure within and surrounding the site have been identified and drawn up on a series of combined services plans. The information on services has been collated from "Dial Before You Dig" responses from the relevant authorities, supplemented by field survey, site inspections and information from the other services consultants. Where possible, computer files of the existing services networks have been obtained under licence from the relevant authorities to enable the most accurate representation possible using the available information. Detailed calculations and design of infrastructure and services are to be undertaken as part of each project stage application.

3.0 Director General's Requirements

In addition to providing details of proposed civil infrastructure, this report also aims to address civil works related issues raised by the NSW Department of Planning in their Director General's Requirements (DGR) list. References to particular issues are listed below:

- Transport and Accessibility Impacts – Refer Section 6.0: Site Access, Internal Roads, Driveways and Footpaths
- Environment and Ecologically Sustainable Development – Refer Section 6.0: Site Access, Internal Roads, Driveways and Footpaths; Section 7.0: Stormwater Drainage and Overland Flow Paths; Section 8.0: Water Sensitive Urban Design; and Section 9.0: Erosion and Sediment Control
- Drainage – Refer Section 7.0: Stormwater Drainage and Overland Flow Paths; Section 8.0 Water Sensitive Urban Design

Civil works related drawings requested in the DGR are attached in the Appendix in particular, the concept Stormwater Drainage Plan (Sheets 1-4), the Erosion and Sediment Control Plan, and the Erosion and Sediment Control Details.

4.0 Site Description

The Cardinal Freeman Village is located at 137 Victoria Street, Ashfield and comprises several blocks of land forming an entire suburban block bounded by Clissold Street, Victoria Street, Seaview Street, and Queen Street. It has a total site area of approximately 4.1 hectares. The site has direct access to various services and transportation in a suburb that contains a number of special use precincts.

The site is enclosed by sandstone walls, iron gates, and fences along its perimeter boundary. Within are aged care facilities and building structures with associated access roads, footpaths, retaining walls, gardens and other features of varying age and condition. The chapel and adjoining Glentworth House fronting Seaview Street as well as some trees and other landscape features have been identified for preservation due to their heritage value.

The site falls generally in a South to North direction, from approximately RL 54m on Australian Height Datum (AHD) at the southern side (Seaview Street) to approximately RL 38m at the northern side (Clissold Street). It has been progressively developed and redeveloped resulting in a patchwork of infrastructure solutions some of which are no longer appropriate for the current land use and the engineering standards.

5.0 Proposed Concept Plan

The concept plan proposes new building structures, existing structures to be retained and refurbished, re-constructed access roads, footpaths, courtyards and external and garage parking. The aim of this plan is to re-envisage the Village to provide accommodation and amenities that meet current and future demand.

It is proposed that the Village redevelopment be carried out in several stages starting with the Village Green Precinct (Stage 1) and the Care Precinct (Stage 2). Project applications for these initial two stages are being prepared and will be submitted subordinate to the Plan application.

A summary of the proposed construction staging is listed below:

- Stage one: the 'Village Green Precinct'
- Stage two: the 'Care Precinct'
- Stage three: 'Victoria 1 Precinct'
- Stage four: 'Victoria 2 Precinct'
- Stage five: 'Heritage Precinct'

It is expected that the development programme will result in an increase of about 175 additional units / beds to the Village as well as improvements to pedestrian and vehicular access, parking, open spaces, and other services infrastructure and amenities.

6.0 Site Access: Internal Roads, Driveways and Footpaths

The proposed internal access roads generally follow the existing access roads throughout the site. The road layout is shown in the drawing C0-0-02 (Site Plan – Proposed) while alignments have been defined along each road axis with typical cross sections and indicative longitudinal sections prepared and can be found on drawings C0-0-15 and C0-2-20 respectively. These drawings have been enclosed in the Appendix.

The road longitudinal sections show a preliminary concept of gradients through the site, from which the surrounding site levels may be derived. Existing levels have been generally maintained where possible at the access road entries, and where possible, near heritage features and significant trees. The internal access roads also act as major overland flow paths through the site as discussed in more detail in Section 7. Service pit and conduit adjustments may be necessary where road levels have changed.

6.1 East-West Street

East-West Street connects Victoria Street to the East with Queen Street to the West. It is proposed to generally follow the existing access road with adjustments to alignments and levels to improve traffic flow and pedestrian access to each building. It has a 4.0m wide carriageway, restricted to one-way West bound and entry only from the Victoria Street end to the intersection with North-South Street in the middle of the site. Entry and exit with two-way traffic is allowed from the Queen Street end to this same intersection with the carriageway being wider at 6.5m wide and a 2.5m wide kerbside parking strip along its northern side.

6.2 North-South Street

North-South Street provides access Clissold Street to the North and intersects East-West Street in the middle of the site at its southern end. It is proposed to generally follow the existing North-South access road which currently terminates about 45m short of Clissold Street. The new access road will have two-way traffic, restricted to a left-in and left-out entry-exit arrangement at Clissold Street, controlled by a concrete island median in front of the entrance. It will have a 5.5m wide carriageway and a 2.5m wide kerbside parking strip along its eastern side.

6.3 Driveways

A number of existing driveways leading to existing car parks around the site's perimeter will be retained as shown in the Site Plan. A new access driveway, West of William Street, has also been proposed for the Care Precinct's basement car park.

6.4 Footpaths and Pedestrian Hardstands.

The existing network of footpaths and courtyards have been reviewed and re-designed as part of the overall architectural and landscape plans. The new layout is shown in drawing C0-0-02. This new footpath network and hard paved surfaces aims to improve disabled access, connections to external road footpaths and public transportation as well as interconnectivity to the various buildings and facilities throughout the site.

The new footpaths are generally 1.5m wide, designed to for disabled access where required, and shall be appropriately surfaced to ensure slip resistance and provide all weather access.

6.5 Site Access Planning Principles

All internal access roads, access driveways, footpaths and car parks shall remain privately owned but designed in accordance with the requirements of Ashfield Municipal Council, Austroads, the Roads and Traffic Authority (RTA) of NSW and Australian Standards with particular considerations for emergency vehicles, disabled access, and aged residents.

6.5.1 Internal Road Design Speeds

The internal access roads shall generally have a speed limit of 25km/h except at raised pedestrian crossings which will be treated as "Shared Zones" with appropriate signage to be installed to ensure equal road user status for pedestrians. Accordingly, vehicle speeds within these sections shall be limited to a maximum 10km/h. All precinct vehicle entries and exits shall have typical driveway layback and crossings to ensure priority to pedestrians on the footpaths.

6.5.2 Internal Road Design Geometry

Circulation road widths and geometry shall be designed in accordance with the traffic engineer's recommendations as detailed in their report: "Vehicular Access, Parking, Pedestrian Servicing & External Traffic Impact Principles". Road widths will be locally increased around bends, hydrants and service dock areas to suit swept path modelling using the design vehicle as described in Section 6.5.4 with consideration for larger vehicles for the interim and construction stages. Swept path models for the site is shown in drawings C0-2-80 and C0-2-81 enclosed in the Appendix.

6.5.3 Design Gradients

The design gradients for roads and footpaths will be as follows:

- Access road longitudinal grade: minimum 0.5%, maximum 15%
- Road crossfall: nominal 2.5%, minimum 1.0%, maximum 5.0%
- Footpath crossfall: nominal 2.5%
- Other external hard surfaces: nominal 2.5%, minimum 1.0%, maximum 5.0%

6.5.4 Design Vehicles

It is expected that the worst case pavement loading for this project will occur during construction. Therefore, all internal roads will be designed to full legal load limits for the typical construction vehicles that would be expected to enter the site with due consideration to a multi-stage redevelopment period.

Design vehicles for turning movements for the final road configuration will be a Small Rigid Vehicle as defined by the Australian Standards.

6.5.5 Pavements

Circulation roads and external car parks are to be surfaced with 50 mm of asphaltic concrete laid on a crushed rock flexible pavement base designed to the appropriate traffic loadings. The asphalt will be laid as a 25mm final wearing course (at the project completion) on a 25mm sealing course (interim surface).

Light trafficked and non-trafficable pavements may also be paved with permeable concrete pavers to increase the overall site surface permeability and help in improving stormwater drainage quality.

Kerbs, driveway laybacks, and crossings will be constructed in concrete in accordance with Ashfield Municipal Council and RTA standards.

Footpaths and other hard surfaces will be paved in various surface finishes in accordance with the landscape architect's requirements but designed to suit pedestrian traffic and vehicle loadings.

The use of recycled materials such as crushed concrete, glass sand, pavers, etc for the various pavement layers will be encouraged.

Additional complementary information on vehicle and pedestrian traffic management principles may be found in a separate report, "Vehicular Access, Parking, Pedestrian Servicing & External Traffic Impact Principles", prepared by McLaren Traffic Engineering. These two reports support each other to present an overall picture of the vehicle and pedestrian access strategy for the site.

7.0 Stormwater Drainage and Overland Flow Paths

The concepts for stormwater drainage system through the site are shown on drawings C0-0-05 to C0-0-08 and C0-5-01 to C0-5-04 enclosed in the Appendix. These plans also show existing and proposed piped drainage systems as well as the general direction of surface falls and overland flow paths. The proposed internal stormwater catchment layout is shown on drawing C0-5-50, also in the Appendix.

7.1 Existing Stormwater Drainage Infrastructure and Overland Flow Paths

Based on the latest survey and site investigations, the site is currently serviced by a considerable piped drainage network and overland flow paths of varying age, type and condition with some even dating as far back as the late 1930s. Most of those inspected have been found to be in satisfactory condition although it is expected that some may no longer have sufficient capacity due to subsequent development works within the site and may need upgrading.

The site survey also shows a 525mm pipe running along the internal roads and connecting to a Council pit on the South side of the Clissold Street – Williams Street intersection. Inquiries to Council confirmed that this would be their preferred point connection for the site stormwater drainage system. Council also indicated that only minor connections to other Council drainage systems (eg. Queen Street) can be accommodated. A 300mm pipe was also found running through the north-eastern portion of the site and connecting into the 525mm pipe just before the Clissold Street connection. This pipe will eventually be demolished and replaced by a new piped drainage system. Various smaller drainage pipes connect into these two main lines described above, servicing each building and open areas.

Overland flows around the southern portions of the site fall towards the current East-West Street which then drains into the current North-South Street. It eventually finds its way to the Clissold Street car park entry where it is joined by overland flows from the north-eastern and north-western portions of the site as it all flows into Williams Street.

7.2 Proposed Stormwater Drainage System

The stormwater drainage system will be designed using the common practice of providing separate minor and major drainage systems to accommodate the full range of storm events up to the 1:100yr ARI. The minor system will generally be in the form of a pit and pipe drainage network and shall be designed for storms up to the 1:20yr ARI. The major system will generally be in the form of landscaped swales, channels, and roads, creating a network of overland flow paths to safely convey runoff in excess of the minor system's capacity (with allowances for blockage) up to the 1:100yr ARI storm event.

It is proposed to retain most of the 525mm pipe where possible although some diversions may be required where it will be affected by redevelopment works. Other existing pipes will also be retained where possible although most of the smaller pipe networks, particularly within the areas being redeveloped, will be replaced with a new pipe network.

7.2.1 Onsite Stormwater Detention System

Onsite Stormwater Detention (OSD) systems shall be provided for each application stage of the site to ensure that the volume of stormwater leaving the site does not adversely affect downstream properties and watercourses. These OSD systems shall be designed in accordance with the requirements of Council's Stormwater Management Code. They work by temporarily storing stormwater runoff within the site and discharging it into the downstream drainage system in a slower, controlled manner.

Based on Council's Stormwater Management Code, it has been noted that the concept plan proposal for the site would not technically require OSD systems on the following basis:

- The proposed re-development's impervious areas are expected to be less compared to current site conditions. This reduction results in a lower volume of runoff coming out of the site compared to existing conditions and already achieves the main objective of providing OSD

- The development is not expected to adversely affect downstream properties or increase downstream flooding since the volume of water coming out of the site will decrease.

Additional details of the site's proposed OSD system and its incorporation into the rainwater re-use systems have been provided in a separate report, "Hydraulic Services Concept Plan Report", prepared by Whipps-Wood Consulting.

7.2.2 Overland Flow Paths

Overland flow paths shall generally follow existing flow regimes and site topography, as described in section 5.1. Overland flows will still flow from South to North, mostly flowing into the internal road network and down towards Clissold Street where it will cross the intersection and flow into Williams Street.

Appropriate freeboard shall be provided to all thresholds to new structures as detailed in section 7.3.2 and depth*velocity restrictions of less than $0.4m^2/s$ shall be maintained through the site.

7.3 Site Stormwater Management Principles

Stormwater drainage for the site shall be designed in accordance with Ashfield Municipal Council and Australian Rainfall and Runoff guidelines with particular considerations to incorporate Water Sensitive Urban Design (WSUD) principles.

7.3.1 Rainfall Return Periods

Sub-surface drainage systems will be designed for the peak flow from a 1:20-year Average Recurrence Interval (Q20) storm event. Where trapped areas are unavoidable, the piped drainage system shall be designed with enough capacity for the 1:100yr ARI storm event.

Where building drainage is designed to a higher ARI standard than road drainage, the excess flow will be designed to flow down roadways without entering buildings.

Overland flow paths will be designed to accommodate the difference between the capacity of the underground piped system and the peak flow from a 100-year Average Recurrence Interval (Q100) storm event.

7.3.2 Freeboard

The design freeboard for car park thresholds and habitable floor levels shall be as follows:

- minimum 150mm above maximum spillway operating level when near OSD
- minimum 150mm above surrounding finished ground levels.
- minimum 300mm above maximum water surface level along major overland flow paths

7.3.3 Roadway Trafficability

Gully pits will be located at spacings which will ensure that all roads are trafficable during the Q20 storm event. The width of flow down roadways during that storm event will be limited to 2.5 metres along the low side of each road carriageway. At sag points, gully pits will be sized to ensure that the depth of ponding during the Q20 storm event will not exceed the top of kerb level.

7.3.4 Hydraulic Calculations

Hydraulic calculations will be carried out to ensure that all surface and piped drainage systems perform to the required standard. In particular, friction losses at junctions will be calculated in accordance with the latest published data for pipe / junction configurations. Friction losses in pipes and surfaces will be based on the Manning formula with the following 'n' values:

Concrete pipes and gutters	0.013
Asphalt surfaces	0.015
Grassed surfaces	0.030

7.3.5 Materials

Pipe materials will typically be rubber-ring jointed uPVC and reinforced concrete pipes. The pipe class will be generally Class 2, except where expected loads on the pipe (caused by constraints of joining into existing systems, construction traffic, etc) warrant a heavier class of pipe.

Gully pits will be conventional cast-in-situ, reinforced rectangular pits. Grates to inlet pits and trench drains within access roads and truck delivery areas will be Class D (heavy duty) as defined in AS 3996 Metal Access Covers, Road Grates and Frames. Grates in other areas will be a minimum class B (medium Duty) as defined in AS 3996.

The use of recycled materials such as crushed concrete and glass sand for pipe bedding and backfill will be encouraged.

7.3.6 Rainwater Harvesting

It is proposed to retain roof runoff in rainwater tanks to be used for sanitary flushing, landscape irrigation.

The waste water generated on site will predominantly consist of toilet sewage and can discharge to Sydney Water sewers without pre-treatment.

Where trade waste is generated on site, removal or on-site treatment will be provided in accordance with Council's and Sydney Water Trade Waste Division requirements.

Grey and Black water will not be treated or re-used on site.

Additional details of the site's proposed rainwater harvesting and its incorporation into the rainwater re-use systems have been provided in a separate report, "Hydraulic Services Concept Plan Report", prepared by Whipps-Wood Consulting.

7.3.7 Pollution Controls

A Gross Pollutant Trap (GPT) capable of removing oil, sediment, litter and other particles is proposed at the downstream end of the 525mm pipe, just before connecting into the Clissold Street Council pit. The treatable flow rate for this GPT will be the peak runoff from the catchment that would be exceeded on average four times per year (3-month ARI peak flow).

Other stormwater drainage treatment measures, such as pit litter baskets, permeable pavements, and sediment and erosion management shall also be incorporated throughout the drainage system to treat stormwater at various points along the system and improve stormwater quality as it leaves the site. These measures are ultimately intended to contribute in the water quality improvement and pollution reduction to downstream natural watercourses.

8.0 Erosion and Sediment Control

Erosion and sediment controls will be provided during the construction phase. An Erosion and Sedimentation Control Plan (C0-1-01 and C0-1-02) has been prepared and is included in the Appendix. The plan includes measures such as sediment fences at the downstream edges of all disturbed areas, sand bags at all existing pits collecting stormwater runoff from disturbed areas, and a truck shaker tray at each point of access to the work area. A portable sedimentation tank shall also be provided at basement excavations to ensure that tail water pumped out of excavations are suitable for draining into the Council drainage system.

Permanent erosion controls will be incorporated in the civil and landscape design. Batters, embankments and disturbed areas shall be structurally retained, paved or re-vegetated to stabilise the soil. Concentration of surface runoff and overland flows has been avoided and additional stabilisation or flow dissipaters shall be provided where required.

Permanent sediment traps shall be incorporated in the stormwater drainage design. All OSD tanks and some stormwater pits shall have built-in sediment traps. The proposed GPT is capable of screening and trapping fine sediment particles.

All sediment and erosion control measures shall be provided and installed in accordance with Council's guidelines and the Department of Housing's guidelines: "Managing Urban Stormwater - Soils and Construction".

9.0 Water Sensitive Urban Design

Water Sensitive Urban Design (WSUD) principles have been incorporated in the various design elements of the proposed civil infrastructure – from construction to staged commissioning and full operation. Below is a summary of the proposed measures. These have been discussed in detail in the previous sections.

WSUD Measure	**Design response**
Permeable / porous pavements	Some permeable concrete paving may be used for light trafficked and non-trafficable pavements to increase site surface permeability and improve stormwater drainage quality.
Water and soil management compliance	Stormwater drainage, sediment and erosion management measures have been designed in accordance with the intent of Ashfield Council's design guidelines.
Water quality management	Measures such as gross pollutant traps, sediment traps, trash screens and pit litter baskets shall be incorporated in the design of civil infrastructure to remove gross litter, sediment and other pollutants from stormwater prior to discharge into the downstream drainage systems.
On-site Stormwater Detention systems	OSD systems will be used to reduce the peak stormwater flows being discharged into the downstream drainage systems and watercourses and help reduce the load on council's drainage systems and flooding downstream.
Rainwater re-use tanks	Rainwater reuse tanks will be used to store roof runoff for use in landscape irrigation and sanitary flushing resulting in an overall reduction to the volume of stormwater being discharged into the downstream drainage systems and water courses.
Sediment and Erosion Management	Various sediment and erosion control measures will be provided to suit the requirements of each application stage.

Details of additional WSUD measures used within the site have been provided in a separate report, "Hydraulic Services Concept Plan Report", prepared by Whipps-Wood Consulting.

10.0 Other Services

A search of existing services has been carried out through the "Dial Before You Dig" information service. This has been supplemented by additional information provided by services authorities. Proposed services conduits were also provided by the services consultants involved in the Village plan.

All these services information, including the road and stormwater drainage infrastructure, have been compiled into Combined Services Plans as shown on drawings C0-8-01 to C0-8-04 enclosed in the Appendix.

11.0 Copyright

The services authorities which have provided data on their assets, both in CAD files and as hard copy drawings, retain the copyright ownership of that data.

The information has been collated and shown on the services drawings appended to this report, for advance planning purposes only. This information may not be transferred to others without the permission of the copyright owners.

The information on these drawings is valid only for a limited time, typically 30 days. Any further investigation will require a new search of authority records to confirm whether any services currently depicted have been made redundant, or whether any new services have been installed since the time the data contained in this report was supplied.

12.0 Stage 1 – Village Green Precinct

The Village Green Precinct is located centrally within the Cardinal Freeman Village. Works include the construction of three new building structures with a common basement car park, refurbishment to a section of the existing chapel, construction of an open air park, and the East-West access road.

12.1 Site Access Internal Roads, Driveways and Footpaths

As part of this stage, the existing East-West access road will be reconstructed in stages as shown in the Phasing Diagrams prepared by Hill Thalis and to the new road alignment as shown in drawing C2-0-05 enclosed in the Appendix. New footpaths and roadside parking will also be constructed around the Village Green precinct. These works will re-connect to existing Village infrastructure in the interim until such time that these areas also get redeveloped under future stages.

Additional site access details can be found in Section 6.0 of this report.

12.2 Stormwater Drainage and Overland Flow Paths

New stormwater pits will be constructed to suit the new road alignment. These will be connected to the existing trunk drainage running under the current East-West access road. A section of the existing drainage line will be upgraded where shown on drawing C2-0-05 to accommodate flows from diverted stormwater pipes upstream.

A new stormwater drainage system will be constructed within the Village Green Precinct. Roof drainage will be directed into a rainwater re-use tank (RWT) while the surface drainage system will be directed into an OSD tank. Tank volume requirements have been calculated by Whipps-Wood Consulting as being 53.7m^3 for the OSD and 31m^3 for the RWT. These include the nominated offset rates as explained in the "Hydraulic Services Concept Plan Report", prepared by Whipps-Wood Consulting. Discharge from the OSD and RWT shall be connected into the internal road drainage system.

Overland flow paths shall be incorporated in the Village Green precinct's design. Upstream overland flows shall generally be directed around the precinct and towards the new East-West Street. Freeboard from overland flows to habitable floor levels and the basement car park ramp has been set at 300mm and 150mm respectively.

Additional stormwater drainage and overland flow path details can be found in Section 7.0 of this report.

12.3 Erosion and Sediment Control

Erosion and sediment controls will be provided during the construction phase. An Erosion and Sedimentation Control Plan (drawing C2-1-01) has been prepared and is included in the Appendix.

Permanent erosion and sediment control features for the Village Green Precinct include a sediment trap in the OSD tank, earth retaining structures and soft landscaping.

Additional erosion and sediment control details can be found in Section 8.0 of this report.

12.4 Water Sensitive Urban Design

Water Sensitive Urban Design shall be incorporated in the various design elements of the Village Green precinct. These include the provision of sediment and erosion control measures, an OSD tank with trash screen, pit litter baskets and rainwater re-use tanks.

Additional water sensitive urban design details can be found in Section 9.0 of this report.

13.0 Stage 2 – Care Precinct

The Care Precinct is located at the North-west quadrant of the Cardinal Freeman Village. Works include the construction of three new building structures with a common basement car park, a cul-de-sac with a set-down area, and the North-South access road.

13.1 Site Access Internal Roads, Driveways and Footpaths

As part of this stage, the northern half of the East-West access road will be completed and existing North-South access road will be constructed to the new road alignment and extended to connect with Clissold Street as shown in drawing C1-0-05 enclosed in the Appendix. New footpaths and roadside parking will also be constructed around the Care precinct and along North-South Street. These works will re-connect to remaining original Village infrastructure and to the finished Village Green precinct.

Additional site access details can be found in Section 6.0 of this report.

13.2 Stormwater Drainage and Overland Flow Paths

New stormwater pits will be constructed to suit the new road alignment. These will be connected to the existing trunk drainage running under the current North-South access road. A section of the existing drainage line will be relocated as shown on drawing C1-0-05 to allow basement excavations to proceed.

A new stormwater drainage system will be constructed within the Care Precinct. Roof drainage will be directed into two rainwater re-use tanks (RWT) while the surface drainage system will be directed into an OSD tank. Tank volume requirements have been calculated by Whipps-Wood Consulting as being 79.8m^3 for the OSD and 184m^3 for the RWT. These include the nominated offset rates as explained in the "Hydraulic Services Concept Plan Report", prepared by Whipps-Wood Consulting. Discharge from the OSD and RWT shall be connected into the internal road drainage system.

Overland flow paths shall be incorporated in the Care Precinct's design. Upstream overland flows shall generally be directed around the precinct and towards the new North-South Street. Freeboard from overland flows to habitable floor levels and the basement car park ramp has been set at 300mm and 150mm respectively.

Additional stormwater drainage and overland flow path details can be found in Section 7.0 of this report.

13.3 Erosion and Sediment Control

Erosion and sediment controls will be provided during the construction phase. An Erosion and Sedimentation Control Plan (drawing C1-1-01) has been prepared and is included in the Appendix.

Permanent erosion and sediment control features for the Care Precinct include a sediment trap in the OSD tank, earth retaining structures and soft landscaping.

Additional erosion and sediment control details can be found in Section 8.0 of this report.

13.4 Water Sensitive Urban Design

Water Sensitive Urban Design shall be incorporated in the various design elements of the Care Precinct. These include the provision of sediment and erosion control measures, an OSD tank with trash screen, pit litter baskets and rainwater re-use tanks.

Additional water sensitive urban design details can be found in Section 9.0 of this report.

REFERENCES

1. Hydraulics services Plan Report – Whipps Wood Consulting (May 2009).
2. Vehicular Access, Parking, Pedestrian Servicing & External Traffic Impact Principles – McLaren Traffic Engineering (May 2009).

APPENDIX

Robert Bird Group Drawings

Sheet Number	Sheet Title
Proposed Concept Plan	
C0-0-00	Coversheet and Drawing List – Concept Plan
C0-0-01	Site Plan Existing
C0-0-02	Site Plan Proposed
C0-0-05	General Arrangement Plan Sheet 1 of 4 – Concept Plan
C0-0-06	General Arrangement Plan Sheet 2 of 4 – Concept Plan
C0-0-07	General Arrangement Plan Sheet 3 of 4 – Concept Plan
C0-0-08	General Arrangement Plan Sheet 4 of 4 – Concept Plan
C0-0-10	Civil Works Details Sheet 1 of 2
C0-0-11	Civil Works Details Sheet 2 of 2
C0-1-01	Erosion and Sediment Control Plan
C0-1-02	Erosion and Sediment Control Details
C0-0-15	Typical Sections
C0-2-20	Road Longitudinal Sections
C0-2-80	Vehicle Turning Paths Plan Sheet 1 of 2
C0-2-81	Vehicle Turning Paths Plan Sheet 2 of 2
C0-3-01	Pavement Types Plan and Details
C0-5-01	Stormwater Drainage Plan Sheet 1 of 4
C0-5-02	Stormwater Drainage Plan Sheet 2 of 4
C0-5-03	Stormwater Drainage Plan Sheet 3 of 4
C0-5-04	Stormwater Drainage Plan Sheet 4 of 4
C0-8-01	Combined Services Plan Sheet 1 of 4
C0-8-02	Combined Services Plan Sheet 2 of 4
C0-8-03	Combined Services Plan Sheet 3 of 4
C0-8-04	Combined Services Plan Sheet 4 of 4
Care Precinct	
C1-0-00	Cover Sheet and Drawing List - Care Precinct
C1-0-05	Stormwater Drainage Concept Plan - Care Precinct
C1-0-10	Civil Works Details
C1-1-01	Erosion and Sediment Control Plan and Details
C1-5-10	Stormwater Works Details
C1-5-15	On Site Detention Tank Details
Village Green Precinct	
C2-0-00	Coversheet and Drawing List - Village Green Precinct
C2-0-05	Stormwater Drainage Concept Plan - Village Green Precinct
C2-0-10	Civil Works Details
C2-1-01	Erosion and Sediment Control Plan and Details
C2-5-10	Stormwater Works Details
C2-5-15	On Site Detention Tank Details

CARDINAL FREEMAN VILLAGE
MASTERPLAN
137 Victoria Street, Ashfield
CIVIL WORKS DRAWINGS

Sheet List Table	
Sheet No.	Sheet Title
C0-0-00	COVERSHEET AND DRAWING LIST – CONCEPT PLAN
C0-0-01	SITE PLAN EXISTING
C0-0-02	SITE PLAN PROPOSED
C0-0-05	GENERAL ARRANGEMENT PLAN SHEET 1 OF 4 – CONCEPT PLAN
C0-0-06	GENERAL ARRANGEMENT PLAN SHEET 2 OF 4 – CONCEPT PLAN
C0-0-07	GENERAL ARRANGEMENT PLAN SHEET 3 OF 4 – CONCEPT PLAN
C0-0-08	GENERAL ARRANGEMENT PLAN SHEET 4 OF 4 – CONCEPT PLAN
C0-0-10	CIVIL WORKS DETAILS SHEET 1 OF 2
C0-0-11	CIVIL WORKS DETAILS SHEET 2 OF 2
C0-1-01	EROSION AND SEDIMENT CONTROL PLAN
C0-1-02	EROSION AND SEDIMENT CONTROL DETAILS
C0-0-15	TYPICAL SECTIONS
C0-2-20	ROAD LONGITUDINAL SECTIONS
C0-2-80	VEHICLE TURNING PATHS PLAN SHEET 1 OF 2
C0-2-81	VEHICLE TURNING PATHS PLAN SHEET 2 OF 2
C0-3-01	PAVEMENT TYPES PLAN AND DETAILS
C0-5-01	STORMWATER DRAINAGE PLAN SHEET 1 OF 4
C0-5-02	STORMWATER DRAINAGE PLAN SHEET 2 OF 4
C0-5-03	STORMWATER DRAINAGE PLAN SHEET 3 OF 4
C0-5-04	STORMWATER DRAINAGE PLAN SHEET 4 OF 4
C0-8-01	COMBINED SERVICES PLAN SHEET 1 OF 4
C0-8-02	COMBINED SERVICES PLAN SHEET 2 OF 4
C0-8-03	COMBINED SERVICES PLAN SHEET 3 OF 4
C0-8-04	COMBINED SERVICES PLAN SHEET 4 OF 4

DO NOT SCALE DRAWINGS, USE FIGURED DIMENSIONS

REFER COVER SHEET FOR NOTES UNLESS NOTED OTHERWISE

FOR APPROVAL

Rev.	Revision Description	By.	App.	Date
4	ISSUED FOR APPROVAL	CFB	CFB	14.10.09
3	ISSUED FOR COORDINATION	TQD	CFB	31.07.09
2	ISSUED FOR COORDINATION	TQD	CFB	25.05.09
1	ISSUED FOR COORDINATION	CW	CB	06.04.09

Structural & Civil Engineering Consultant

BRISBANE OFFICE:
Robert Bird Group Pty Ltd
PO Box 7035, Riverside Centre, Brisbane, QLD 4001
Level 5, 333 Ann St Brisbane QLD

Ph. (07) 3319 2777
Fax. (07) 3319 2799
ACN 010 580 248

RobertBirdGroup

Web Site: www.robertbird.com

Client
AEVUM LIMITED
Level 6, 23-35 O' Connell St, Sydney, NSW 2000
PH (02) 8223 0900
FAX (02) 8753 2222

Project
CARDINAL FREEMAN VILLAGE MASTERPLAN

Title
COVERSHEET AND DRAWING LIST – CONCEPT PLAN

Date	Design	Checked
Scale @ A1	Drawn	Approved

Job Number	Drawing Number	Revision
09162	C0-0-00	4

A1

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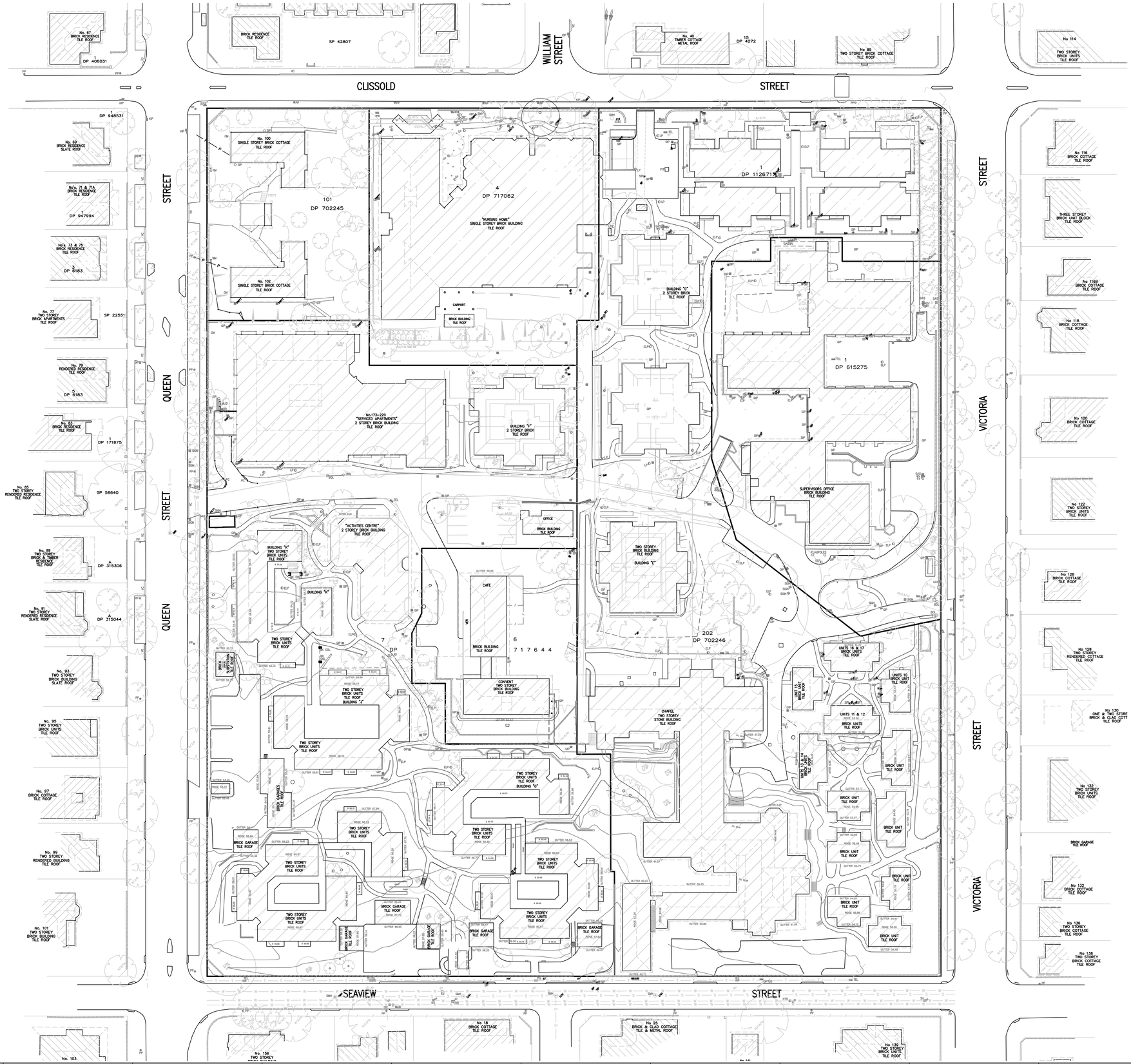

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FOR APPROVAL

SCALE 1:500

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4	ISSUED FOR APPROVAL	CFB	CFB	14.10.09
3	ISSUED FOR COORDINATION	TQD	CFB	31.07.09
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Structural & Civil Engineering Consultant

BRISBANE OFFICE:
Robert Bird Group Pty Ltd
PO Box 7035, Riverside Centre, Brisbane, QLD 4001
Level 5, 333 Ann St Brisbane QLD

Ph. (07) 3319 2777
Fax. (07) 3319 2799
Australia

RobertBirdGroup
Web Site: www.robertbird.com

Client
AEVUM LIMITED
Level 6, 83-85 O'Connell St, Sydney, NSW 2000
PH (02) 8223 0900
FAX (02) 8753 2222

Project
CARDINAL FREEMAN VILLAGE MASTERPLAN

Title
SITE PLAN EXISTING

Date	Design	Checked
Scale @ A1	Drawn	Approved
Job Number: 09162	Drawing Number: CO-0-01	Revision: 4

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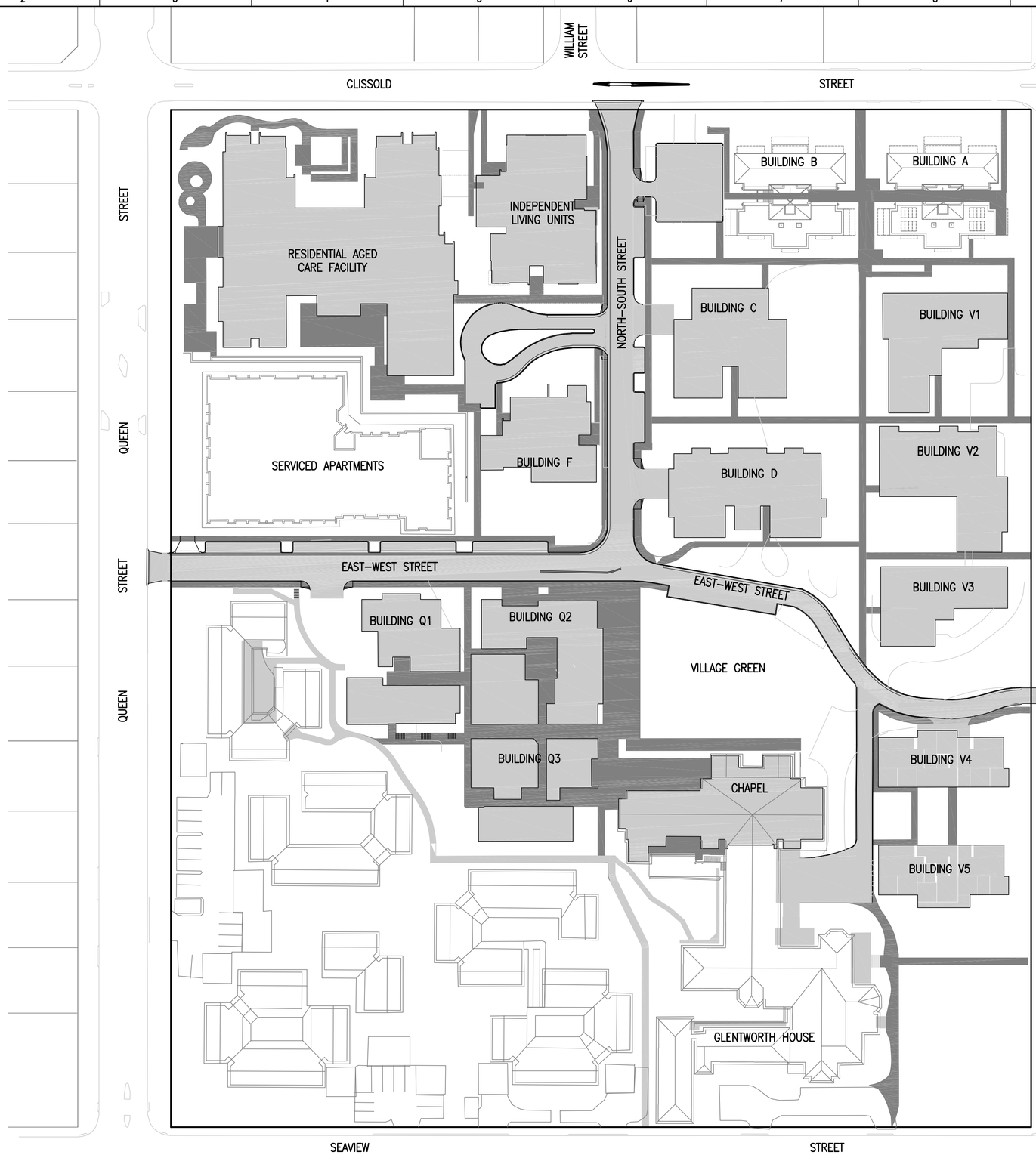

SCALE 1:500

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FOR APPROVAL

Rev.	Revision Description	By.	App.	Date
4	ISSUED FOR APPROVAL	CFB	CFB	14.10.09
3	ISSUED FOR COORDINATION	TQD	CFB	31.07.09
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Robert Bird Group Pty Ltd
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Level 5, 333 Ann St
Brisbane QLD

Ph. (07) 3319 2777
Fax. (07) 3319 2799
ACN 010 580 248

RobertBirdGroup

Web Site: www.robertbird.com

Client

AEVUM LIMITED
Level 6, 23–35 O' Connell St, Sydney, NSW 2000
PH (02) 8223 0900
FAX (02) 8753 2222

Project

CARDINAL FREEMAN VILLAGE MASTERPLAN

Title

SITE PLAN PROPOSED

Date	Design	Checked
13.10.09	C.Bartolome	
Scale @ A1	Drawn	Approved
AS SHOWN	C.Wolte	

Job Number	Drawing Number	Revision
09162	C0–0–02	4

A1 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

LEGEND

- PROPOSED STORMWATER LINE — SW
- PROPOSED SEWER LINE — S
- PROPOSED WATER MAIN — W
- PROPOSED FIRE HYDRANT LINE — FH
- PROPOSED GAS LINE — G
- PROPOSED ELECTRICITY DISTRIBUTION LINE — E
- PROPOSED UNDERGROUND TELECOMMUNICATION LINE — T
- EXISTING STORMWATER LINE — SW
- EXISTING SEWER LINE — S
- EXISTING WATER MAIN — W
- EXISTING TELSTRA LINE — T
- EXISTING UECOMM FIBRE OPTIC CABLE — FO
- EXISTING GAS LINE — G
- EXISTING ELECTRICITY DISTRIBUTION LINE — E
- EXISTING ELECTRICITY TRANSMISSION LINE — E
- EXISTING OVERHEAD ELECTRICITY LINE — OH/E
- PROPOSED OSD/RAINWATER TANK — OSD/RWT
- PROPOSED OVERLAND FLOW PATH — O/L FLOW
- PROPOSED FINISHED LEVEL — • 45.00
- PROPOSED GRADE — 1:20 / 5%
- FLUSH KERB — FK
- ROLL KERB — RK
- STROMWATER PIT & PIT NUMBER — 2/A
- PROPOSED GRATED TRENCH DRAIN — GD
- PROPOSED DISH DRAIN — DD
- PROPOSED KERB & GUTTER — K&G
- PROPOSED KERB ONLY — KO
- PROPOSED MEDIAN KERB — MK

CLISSOLD STREET

WILLIAM STREET

QUEEN STREET

EAST–WEST STREET

NORTH–SOUTH STREET

0.6m WIDE MEDIAN ISLAND TO COUNCIL STANDARDS

PROPOSED 3.5x5.5m SUBSTATION EASEMENT

RESIDENTIAL AGED CARE FACILITY

INDEPENDENT LIVING UNITS

SERVICED APARTMENTS

BUILDING F

BUILDING Q1

BUILDING Q2

BUILDING FFL.44.0

BUIL FFL

RETAIN STORMWATER DURING CONSTRUCTION

RELOCATE EXISTING SUBSTATION TO NEW EASEMENT AT CLISSOLD ST

EXISTING TRUNK DRAINAGE TO BE RETAINED

RELOCATE 525ø PIPE AWAY FROM EXCAVATION. RECONNECT TO EXISTING DOWNSTREAM

JOINS TO DRAWING C0–0–06

JOINS TO DRAWING C0–0–07

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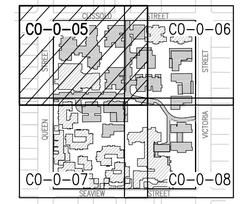
FOR APPROVAL

KEYPLAN



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Rev.	Revision Description	By.	App.	Date
7	ISSUED FOR APPROVAL	CFB	CFB	14.10.09
6	ISSUED FOR COORDINATION	TQD	CFB	31.07.09
5	ISSUED FOR COORDINATION	TQD	CFB	25.05.09
4	ISSUED FOR COORDINATION	CW	CB	21.04.09
3	ISSUED FOR COORDINATION	CW	CB	06.04.09
2	ISSUED FOR COORDINATION	CW	CB	17.03.09
1	ISSUED FOR COORDINATION	CB	CB	25.02.09

Structural & Civil Engineering Consultant

BRISBANE OFFICE:
Robert Bird Group Pty Ltd
PO Box 7035, Riverside Centre, Brisbane, QLD 4001
Level 5, 333 Ann St Brisbane QLD

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Fax. (07) 3319 2799
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Web Site: www.robertbird.com

Client

AEVUM LIMITED
Level 6, 23–35 O' Connell St, Sydney, NSW 2000
PH (02) 8223 0900
FAX (02) 8753 2222

Project

CARDINAL FREEMAN VILLAGE MASTERPLAN

Title

GENERAL ARRANGEMENT PLAN SHEET 1 OF 4 – CONCEPT PLAN

Date	Design	Checked
13.10.09	CFB	
Scale @ A1	Drawn	Approved
1:250	CPW	

Job Number	Drawing Number	Revision
09162	C0–0–05	7

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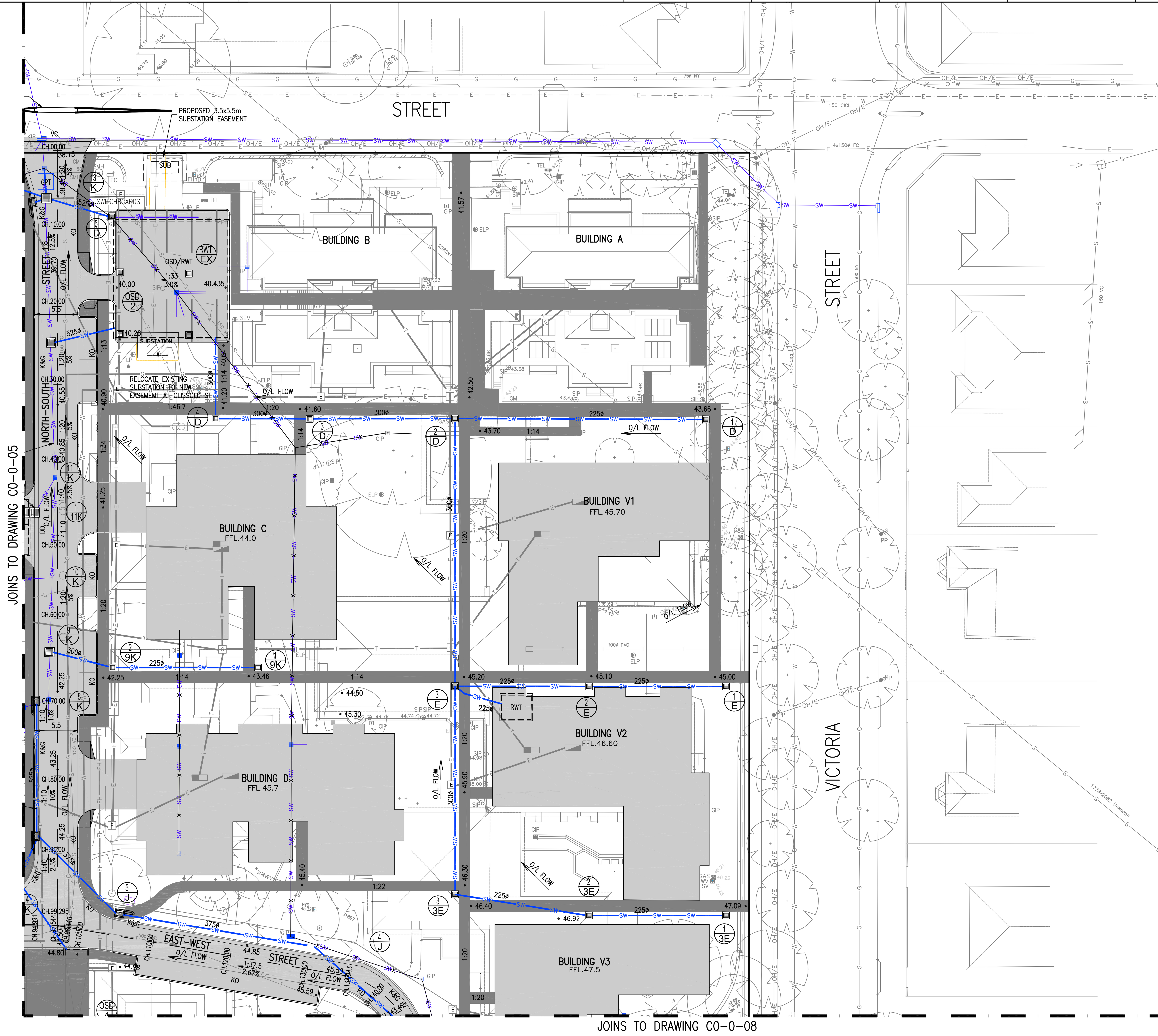

LEGEND

- PROPOSED STORMWATER LINE
- PROPOSED SEWER LINE
- PROPOSED WATER MAIN
- PROPOSED FIRE HYDRANT LINE
- PROPOSED GAS LINE
- PROPOSED ELECTRICITY DISTRIBUTION LINE
- PROPOSED UNDERGROUND TELECOMMUNICATION LINE
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- EXISTING SEWER LINE
- EXISTING WATER MAIN
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- EXISTING UECOMM FIBRE OPTIC CABLE
- EXISTING GAS LINE
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- EXISTING ELECTRICITY TRANSMISSION LINE
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- PROPOSED FINISHED LEVEL — • 45.00
- PROPOSED GRADE — 1:20 5%
- FLUSH KERB — FK
- ROLL KERB — RK
- STROMWATER PIT & PIT NUMBER
- PROPOSED GRATED TRENCH DRAIN — GD
- PROPOSED DISH DRAIN — DD
- PROPOSED KERB & GUTTER — K&G
- PROPOSED KERB ONLY — KO
- PROPOSED MEDIAN KERB — MK

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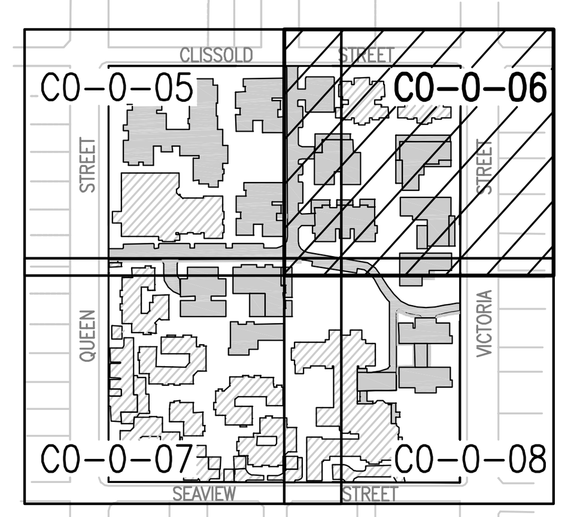
KEYPLAN



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Rev.	Revision Description	By.	App.	Date
5	ISSUED FOR APPROVAL	CFB	CFB	14.10.09
4	ISSUED FOR COORDINATION	TQD	CFB	31.07.09
3	ISSUED FOR COORDINATION	TQD	CFB	25.05.09
2	ISSUED FOR COORDINATION	CW	CB	21.04.09
1	ISSUED FOR COORDINATION	CW	CB	06.04.09

Structural & Civil Engineering Consultant

RobertBirdGroup

BRISBANE OFFICE:
Robert Bird Group Pty Ltd
PO Box 7035, Riverside Centre,
Brisbane, QLD 4001
Level 5, 333 Ann St
Brisbane QLD

Ph. (07) 3319 2777
Fax. (07) 3319 2799
ACN 010 580 248

Web Site: www.robertbird.com

Client

AEVUM LIMITED
Level 6, 23–35 O' Connell St, Sydney, NSW 2000
PH (02) 8223 0900
FAX (02) 8753 2222

Project

CARDINAL FREEMAN VILLAGE MASTERPLAN

Title

GENERAL ARRANGEMENT PLAN SHEET 2 OF 4 – CONCEPT PLAN

Date	Design	Checked
13.10.09	C.Bartolome	
Scale @ A1	Drawn	Approved
1:250	C.Waite	

Job Number	Drawing Number	Revision
09162	CO-0-06	5

A1

JOINS TO DRAWING C0-0-05

JOINS TO DRAWING C0-0-08

LEGEND

- PROPOSED STORMWATER LINE — SW
- PROPOSED SEWER LINE — S
- PROPOSED WATER MAIN — W
- PROPOSED FIRE HYDRANT LINE — FH
- PROPOSED GAS LINE — G
- PROPOSED ELECTRICITY DISTRIBUTION LINE — E
- PROPOSED UNDERGROUND TELECOMMUNICATION LINE — T
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- EXISTING SEWER LINE — S
- EXISTING WATER MAIN — W
- EXISTING TELSTRA LINE — T
- EXISTING UECOMM FIBRE OPTIC CABLE — FO
- EXISTING GAS LINE — G
- EXISTING ELECTRICITY DISTRIBUTION LINE — E
- EXISTING ELECTRICITY TRANSMISSION LINE — E
- EXISTING OVERHEAD ELECTRICITY LINE — OH/E
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- PROPOSED FINISHED LEVEL — • 45.00
- PROPOSED GRADE — 1:20 / 5%
- FLUSH KERB — FK
- ROLL KERB — RK
- STROMWATER PIT & PIT NUMBER — 2/A
- PROPOSED GRATED TRENCH DRAIN — GD
- PROPOSED DISH DRAIN — DD
- PROPOSED KERB & GUTTER — K&G
- PROPOSED KERB ONLY — KO
- PROPOSED MEDIAN KERB — MK

QUEEN ST

BUILDING Q1

BUILDING Q2

BUILDING Q3

STORMWATER DIVERSION AND UPGRADE

DEMOLISH DRAINAGE LINE

O/L FLOW

LIMIT OF WORK

EXISTING STORMWATER DRAINAGE TO BE RETAINED

DEMOLISH DRAINAGE LINE

VILLAGE GREEN

O/L FLOW MIN. 1:100

DRAIN

RWT 1

RWT 2

OSD 4

FALL

SEAVIEW

GLENTWORTH

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FOR APPROVAL

KEYPLAN

SCALE 1:250

0 5 10 15 m

Rev.	Revision Description	By.	App.	Date
5	ISSUED FOR APPROVAL	CFB	CFB	14.10.09
4	ISSUED FOR COORDINATION	TQD	CFB	31.07.09
3	ISSUED FOR COORDINATION	TQD	CFB	25.05.09
2	ISSUED FOR COORDINATION	CW	CB	21.04.09
1	ISSUED FOR COORDINATION	CW	CB	06.04.09

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AEVUM LIMITED
Level 6, 23-35 O' Connell St, Sydney, NSW 2000
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FAX (02) 8753 2222

Project
CARDINAL FREEMAN VILLAGE MASTERPLAN

Title
GENERAL ARRANGEMENT PLAN SHEET 3 OF 4 - CONCEPT PLAN

Date	Design	Checked
13.10.09	C.Bartolome	
Scale @ A1	Drawn	Approved
1:250	C.Waite	
Job Number	Drawing Number	Revision
09162	C0-0-07	5

A1

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150