



GREGORY HILLS STAGE 2 ENGINEERING DEVELOPMENT REPORT

L06028.023

October 2010

Prepared for Dart West Developments Pty Ltd



BROWN CONSULTING

Engineers & Managers

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ENGINEERING DEVELOPMENT REPORT FOR GREGORY HILLS STAGE 2 PREPARED FOR DART WEST DEVELOPMENTS

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Appendix D	Stormwater Quantity and Quality Compliance Letter

1 INTRODUCTION

1.1 The Application

Brown Consulting has been engaged by Dart West Development to prepare preliminary road grading, bulk earthworks, pavement drainage strategy as well as water and sewer strategy for their stage 2 development at Gregory Hills. Stage 2 of the development consists of a total yield of 285 lots to be developed in 4 Stages as shown in Appendix A.

This report has been prepared to document the work completed by Brown Consulting to date. The Stormwater Management Strategy is covered in detail in Brown Consulting's "Stormwater Management Strategy, Gregory Hills Stage 1, Development Application" dated November 2007 and Cardno's "Central Hills Business Park – Water Sensitive Urban Design Strategy dated February 2010. Compliance with these two reports for the Stage 2 design is confirmed in the letter prepared by Brown Consulting dated 23rd September 2010 reference L06028.023 titled Gregory Hills Stage 2 Development Application. This letter is provided in Appendix D.

This report covers the road grading strategy, bulk earthworks strategy and the water and sewer reticulation strategies.

2 OVERVIEW OF ENGINEERING CONSTRAINTS

2.1 The Site

The Gregory Hills site is bounded by Camden Valley Way to the West, Turner Road residential land holdings to the South, the Sydney Water supply canal to the East and North. Stage 2 of the development sits to the south of Gregory Hills abutting the Turner Road Residential land holdings. Refer to Appendix A.

The site is generally undeveloped and predominantly used for grazing purposes, with most areas within the site cleared of vegetation. The site has a gentle undulation with grades ranging from 2% to 5%.

The Stage 2 development site generally falls in an East West direction. The site is split into two catchment areas with Stages 2A, 2B and portions of Stages 2C and 2D draining towards the west. The remaining area drains towards the north.

A full description and analysis of the catchments is covered in Brown Consulting “Stormwater Management Strategy Gregory Hills Stage 1 Development Application” November 2007 and Cardno’s “Central Hills Business Park – Water Sensitive Urban Design Strategy.”

2.2 Development Guidelines

2.2.1 Camden Council Guidelines

Camden Council has prepared “Engineering Design Specifications” Feb 2009 to guide owners, applicants, consultants and other stakeholders in the design of subdivisions and the development of land within Camden’s Local Government Area.

These guidelines have been used in this report to set the basis of engineering concepts for the development.

2.3 Hydrology

Brown Consulting as part of the Stage 1 DA design has previously undertaken a hydrologic analysis for the proposed development site which drains in a northerly direction. This analysis included:

- Development of a hydrologic model for the existing conditions.
- Development of a hydrologic model for the proposed development conditions
- Modify the hydrologic model for the proposed conditions to provide flood mitigation measure where it was considered necessary.

Brown Consulting developed a stormwater strategy to ensure that the post development flow from the proposed development site does not exceed pre-development conditions. Details can be found in Brown Consulting’s “Stormwater Management Strategy” report previously mentioned.

Likewise the catchment draining in a westerly direction is covered by Cardno’s “Central Hills Business Park – Water Sensitive Urban Design Strategy.”

2.4 Stormwater Quality

Brown Consulting as part of the Stage 1 DA design has previously prepared a stormwater strategy for the development draining to the north which was designed to ensure that the post-development pollutant loads are reduced to meet acceptable levels. In addition, the stormwater management strategy aims to achieve the objectives of water sensitive urban design by providing

for stormwater treatment by biological systems, which improve water quality, reduce potable water demand and enhance habitat within the development.

2.4.1 Water Quality Objectives

Brown Consulting has adopted the key objectives as follows:

- The health (quality and quantity) of receiving water should be maintained or improved;
- Development should not result in increased pollutant loads or concentrations;
- Development should not result in significant changes to runoff quantities or patterns, or flow quantities or patterns; and
- Qualitative water quality targets are set in the SMP's, EPA's Urban Stormwater Management Guideline and Landcom WSUD Strategy.

Details of the Stormwater Strategy can be found in Brown Consulting's "Stormwater Management Strategy, Gregory Hills Stage I Development Application" dated November 2007.

Likewise the catchment draining in a westerly direction is covered by Cardno's "Central Hills Business Park – Water Sensitive Urban Design Strategy."

2.5 Civil infrastructure

2.5.1 Road Grading and Bulk Earthworks

Generally all internal roads with Stage 2 have been designed as local roads with a design and posted speed limit of 50km/hr. The horizontal geometry of these roads complies with Table 2.2 of Camden Council engineering design specifications.

The grading of roads will be designed to follow the natural fall of the site, aimed at balancing the quantity of bulk earthworks required to achieve proposed levels. However the road grading will need to be more considered to ensure that the drainage catchment strategy proposed can be achieved. Brown Consulting has prepared preliminary road grading strategies. These are included in Appendix B.

Preliminary bulk earthworks have also been considered for the site. The gradings attempt to direct water to the proposed basin sites whilst limiting runoff from the site to adjoining properties.

2.5.2 Intersections

All intersections within Stage 2 will be controlled intersections. Four intersections have been designed for connection to Donovan Boulevard which did not form part of the Stage 1 Design. Details are provided with the engineering plans.

2.5.3 Drainage

The piped drainage will be designed to accommodate as a minimum the 5yr ARI Storm Event with the roads carrying excess flows generated by the 100 year major storm event. Both the major and minor drainage systems will be designed in accordance with Councils design guidelines adopted in February 2009.

A portion of the catchment area of Stages 2C and 2D will be drained into Basin D, which has been designed and approved as part of the Stage 1 DA. Both the basins and the pipe network within Donovan Boulevard have been designed to accommodate this catchment area, as demonstrated in the Brown Consulting "Stormwater Management Strategy, Gregory Hills Stage 1, Development Application" report dated November 2007 and the Stage 1C-D CC design drawings. The remaining catchment for Stage 2C and 2D will drain towards the west.

The catchment draining towards the west, inclusive of a portion of Stage 2A, 2B and portions of Stage 2C and 2D, will be drained into the Basins designed as part of the Central Hills Business Park Development. These basins have been designed to accommodate this catchment area as demonstrated in the Cardno "Central Hills Business Park - Water Sensitive Urban Design Strategy" report dated February 2010. The remaining portion of this catchment, which is contained with Stage 2A, will bypass these Central Hills Business Park basins. The basins have been designed to accommodate these bypassed flows for both water quantity and quality as per the supporting report contained within the DA submitted information produced by Cardno, reference YN210019/10-0247, titled "Onsite Detention/Bioretenention Basin Design - Stage 1 Central Hills Business Park" dated 22 September 2010.

It should be noted that prior to discharging the drainage into the northern basin of the Central Hills Business Park Basins the piped drainage will flow through a splitter pit with the low flows being diverted to a gross pollutant trap and to the Southern basin of the Central Hills Business Park Basins for water quality treatment.

2.5.4 Earthworks

Stage 2 has been graded so that the site can be drained to the respective basins as per the stormwater management strategies prepared by Brown Consulting and Cardno as mentioned

previously. In order to comply with this the bulk earthworks will differ from that previously designed by Cardno.

The design of Stage 2 shows the existing contours, the proposed Cardno contours as well as the new final contours. In addition the road longitudinal sections also show all three surfaces in order to assist Council with assessment.

There will be approximately 41,000m³ of cut and 57,000m³ of fill required over the Cardno proposed bulk earthworks levels and this volume is measured only over the area previously identified by the Cardno Bulk Earthworks design. The above figures are solid in situ measurements and include 500mm boxing of roads.

While considering the total area of Stage 2 between the existing natural surface and the new finished surface there will be approximately 104,000m³ of cut and 103,000m³ of fill in total. The above figures are solid in situ measurements and including 500mm boxing of roads.

2.6 Servicing Provisions

Brown Consulting has undertaken a review of the water and sewer servicing strategy for the whole of the Gregory Hills Development and the finding of this review were presented in a report to Dart West Developments dated July 2010. A brief review of requirements is given below.

2.6.1 Potable Water

Sydney Water has indicated that Narrellan Reservoir has sufficient storage to provide for the Gregory Hills Development and can supply initially up to approximately RL110. This level is an estimate and is being monitored by Sydney Water based on the rate of development and the progressive provision of larger supply mains by Sydney Water from the Narellan system to the site. It is proposed to service the area above RL 110 by means of a temporary water booster station in the short term and by constructing an elevated reservoir to the east of Gregory Hills as the permanent scheme. This elevated reservoir would serve the whole of the Gregory Hills development.

The temporary booster station is currently being designed as part of the watermains to be extended through Stage 1C of the development. Potable watermains will be extended throughout Stage 2 from mains constructed in the previous Stage 1 as shown on the preliminary layout attached as Appendix C.

2.6.2 Recycled Water

Recycled watermainns are to be provided throughout Stage 2 by extension from the mains laid in Stage 1. Initially these mains are supplied by cross connections to the potable system and are subject to the same temporary arrangements of the booster station for land above RL 110 as the potable system until the permanent solution of an elevated recycled reservoir is constructed adjacent to the potable elevated reservoir to the east of the Gregory Hills.

On completion of the permanent scheme and availability of a separate recycled supply from West Camden Treatment Works, the cross connection will be removed and residents will obtain the benefit of a substantial reduction in potable water use (well below BASIX requirements) and reduced water rates.

The preliminary layout of recycled watermainns is also known in Appendix C.

2.6.3 Waste Water

Gregory Hills is located within the area served by West Camden Sewerage Treatment Works.

Stage 2 falls within two sub-catchments of the area draining to West Camden. The northern part of the Stage drains by gravity to sewers constructed in Stage 1 and adjacent to land to SPS 1156, which is currently nearing completion of construction and will pump to the existing sewer system near Turner Road and Camden Valley Way at Narellan. The Southern part of the stage drains to the south to an existing sewer at Anderson Road which in turn drains to the same point near Turner Road mentioned above.

The southern part of Stage 2 requires approximately 850 metres of lead-in gravity sewer through adjoining lands between the site and Anderson Road which will be constructed to Sydney Water requirements as part of the Stage 2 Sections 73 requirements.

A preliminary layout of sewer mains for Stage 2 is shown in Appendix C.

3 REFERENCES

1. Brown Consulting (Nov 2007) “Stormwater Management Strategy – Gregory Hills Stage I Development Application”
2. GHD (2007) Turner Road Water Cycle Management Plan” Prepared for the Growth Centres Commission.
3. Camden Council (2000) – “*Upper Nepean River Catchment, Stormwater Management Plan – Final Report*”.
4. Camden Council (June 2006) - “*Engineering Design Specification*”, Final Issue 1.
5. Camden Council (June 2005) - “*First Draft Engineering Construction Specification*”, Draft Issue 1.
6. Cardno (February 2010) - “*Central Hills Business Park - Water Sensitive Urban Design Strategy*”

4 APPENDICIES

Appendix A	Stage 2 Subdivision Plan
Appendix B	Concept Road Grading Strategy
Appendix C	Concept Water and Sewer Reticulation Strategy
Appendix D	Stormwater Quantity and Quality Compliance Letter

APPENDIX A

STAGE 2 – SUBDIVISION PLAN

APPENDIX B

CONCEPT ROAD GRADING STRATEGY

APPENDIX C

CONCEPT WATER & SEWER RETICULATION STRATEGY

APPENDIX D

STORMWATER QUANTITY AND QUALITY COMPLIANCE LETTER