STORMWATER AND GROUNDWATER ASSESSMENT

For

ENVIRONMENTAL ASSESSMENT REPORT

WEST RYDE REDEVELOPMENT PROJECT

63 – 77 WEST PARADE, WEST RYDE

JUNE 2009

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STORMWATER AND GROUNDWATER ASSESSMENT

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DOCUMENT CONTROL SHEET

Title	Stormwater and Groundwater Assessment for West Ryde Redevelopment at 63 – 77 West Parade, West Ryde
Job No.	CS0456

REVISION HISTORY

Revision Number	Prepared by	Date
A	Dave Gerardis	10/06/09

DISTRIBUTION DETAILS

Destination	Revision						
	A	B	C	D	E	F	G
Housing NSW - MPD *Greig Martin*	✓						
File *BMD Consulting Pty Ltd*	✓						

Issue Approved	RMS						

Previous versions of this document are superseded by the most recent revision.

1.0 INTRODUCTION

BMD Consulting has been engaged by Housing NSW Major Projects Directorate to provide site assessment advice for the inclusion in the Environmental Assessment for the proposed West Ryde Redevelopment Project. The objective of the Environmental Assessment Report is to respond to the NSW Department of Planning Director-General's Requirements (DGR's) in order to gain approval from the Department of Planning. A copy of these DGR's can be included in Appendix A of this report. This assessment aims to provide advice more specifically related to the following DGR items;

- Item 9. Drainage : *The EA shall address drainage/flooding issues associated with the development/site including: stormwater, drainage infrastructure and incorporation of Water Sensitive Urban Design measures, including measures to control impacts on channel bed and bank erosion and measures to improve the quality of stormwater runoff to achieve best practice standards.*
- Item 10. Groundwater : *The EA is to identify groundwater issues and potential degradation to the groundwater source and shall address any impacts upon groundwater resources, and when impacts are identified, provide contingency measures to remediate, reduce or manage the potential impacts.*

BMD Consulting has commissioned Dr Peter Bacon of Woodlots and Wetlands Pty. Ltd. to provide advice on groundwater issues, as detailed in Section 3.

1.1 Site Description

The subject site is located on the properties described as 63–77 West Parade, West Ryde. Currently these individual properties are occupied by residential dwellings. The subject blocks are located in a strip of land between the rail corridor and West parade, grading gently towards West Parade.

1.2 Proposed Development

The proposed development is anticipated to include approximately 140 residential dwellings, 500m² of commercial property and two (2) floors of carparking facilities, provided in four (4) residential tower buildings, one (1) commercial basement area and two (2) basement carparks. Architectural layout plans for the proposed development are included in Appendix B of this report.

2.0 STORMWATER ASSESSMENT

Onsite detention and rainwater tanks will need to be incorporated in the proposed development in accordance with both City of Ryde and BASIX requirements. It is proposed that a combined onsite detention/rainwater tank be incorporated in or below the car park level of the development.

2.1 Water Sensitive Urban Design

A significant number of Water Sensitive Urban Design measures are now common place within new development in NSW. These measures include rainwater harvesting, grey (recycled) water supply and stormwater harvesting and re-use to water quality treatment devices such as bio-retention systems, infiltration pits, vegetated swales and permeable pavements.

Due to the location and size of the proposed development site and the limited open space areas available for water quality treatment devices such as those listed above, and the lack of grey-water supply in the West Ryde area, it is proposed that rainwater re-use tanks be utilised as part of the Water Sensitive Urban Design scheme for this site.

Multi-unit developments are now guided by the requirements of BASIX to harvest and reuse rainwater appropriately within the development. A rainwater tank that stores runoff from the proposed development will need to be incorporated into the development footprint. Typically rainwater storage is integrated with the detention storage in the lower level of the building. This can potentially be located in the lower level carpark, or below ground.

The potential yield from a rainwater harvesting system is influenced by available harvest area, storage size and usage patterns within the development. Rainwater could potentially be utilised within the development for non potable uses such as toilet flushing and irrigation of landscaped areas. Due to the significant number of individual units proposed compared with the available area for harvesting rainwater, it will not be practical to supply rainwater for toilet flushing to all units as demand would far outstrip supply. Therefore it is recommended that rainwater harvested from the site be utilised for the purposes of irrigation of landscaped areas as well as toilet flushing for the proposed smaller commercial areas.

Based on previous experience, we would recommend the reuse of rainwater for outdoor irrigation of landscaped areas and toilet flushing within the commercial facilities. To suit the requirements of these reuses we would recommend that a rainwater tank of around 50m^3 in storage be incorporated with the necessary detention storage for the building.

A preliminary MUSIC model was setup to investigate the potential savings on reticulated water supply through the use of rainwater harvesting using 10 years of observed rainfall and evaporation data collected for Sydney. MUSIC is designed to simulate urban stormwater systems operating at a range of temporal and spatial scales; catchments from 0.01 km2 to 100km2 and modelling time steps ranging from 6 minutes to 24 hours to match the catchment scale.

Irrigation demands were estimated using Brisbane City Council's Landscape Design Guidelines for Water Conservation and locally specific climatic data sourced from the Bureau of Meteorology. In addition a daily demand of 300 litres for toilet flushing and other potential reuses was included within the model.

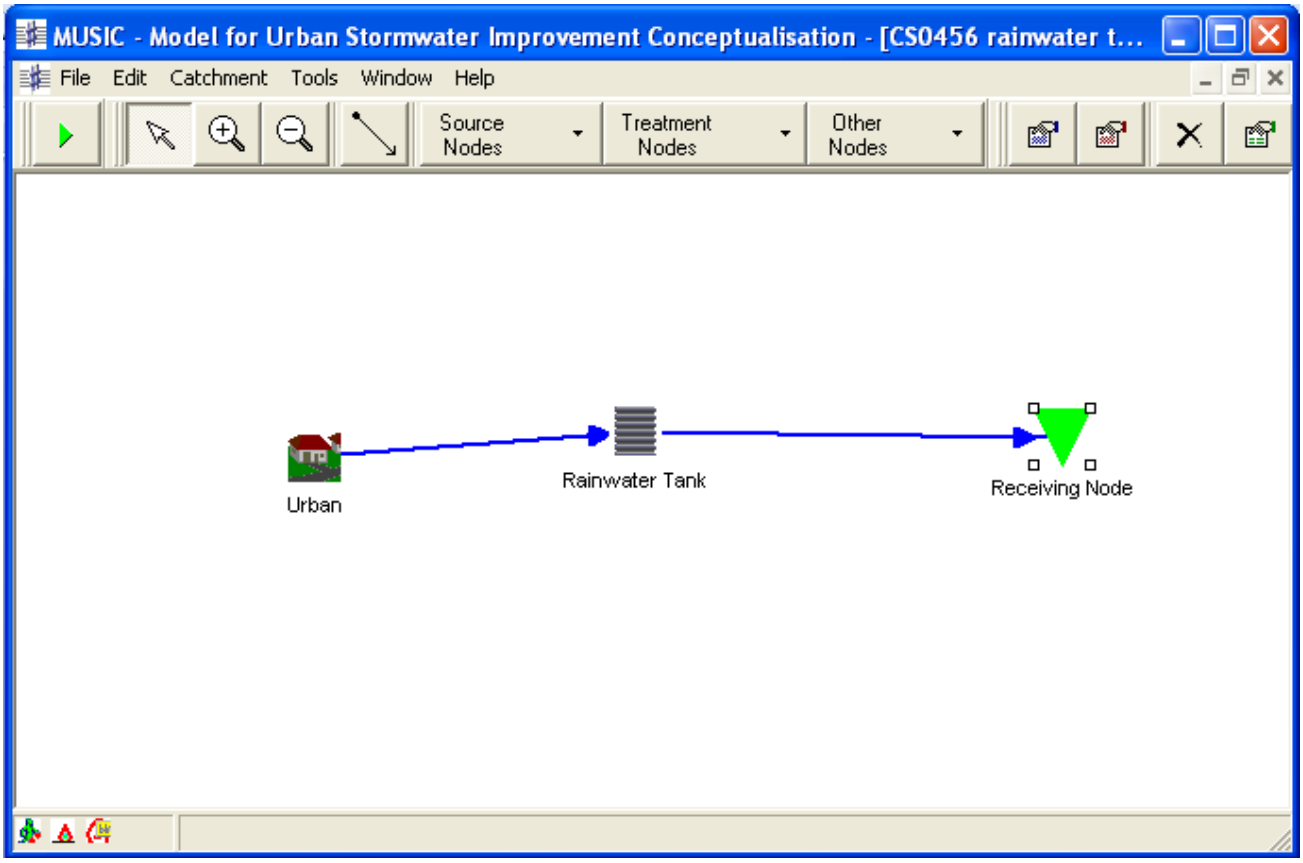

Figure 2A – Conceptual MUSIC Model for the Proposed Development

The model indicated that through the employment of rainwater harvesting for irrigation of landscaping and other uses (such as toilet flushing in the commercial areas) there is potential for annual savings of up to 220,000 litres of reticulated water.

The final components and configuration for the combined rainwater/detention tanks will be further developed and sizing of individual components further refined during the detailed design phase, in consultation with other design consultants. Further details on the concept MUSIC model developed for the site are contained within Appendix C of this report.

2.2 On-site Stormwater Detention

Onsite detention for the proposed development will be required in accordance with Section 3 of the City of Ryde's Stormwater Management Code. This code generally requires that the post development discharge from the site not increase or worsen flooding on downstream properties. To achieve this requirement, onsite detention will need to be provided to limit post development discharges to predevelopment levels for minor and major storm events (5 and 100 yr ARI events).

A simple model of the site was setup in DRAINS to model the performance of the pre and post development scenarios for the site (refer Figure 2B below).

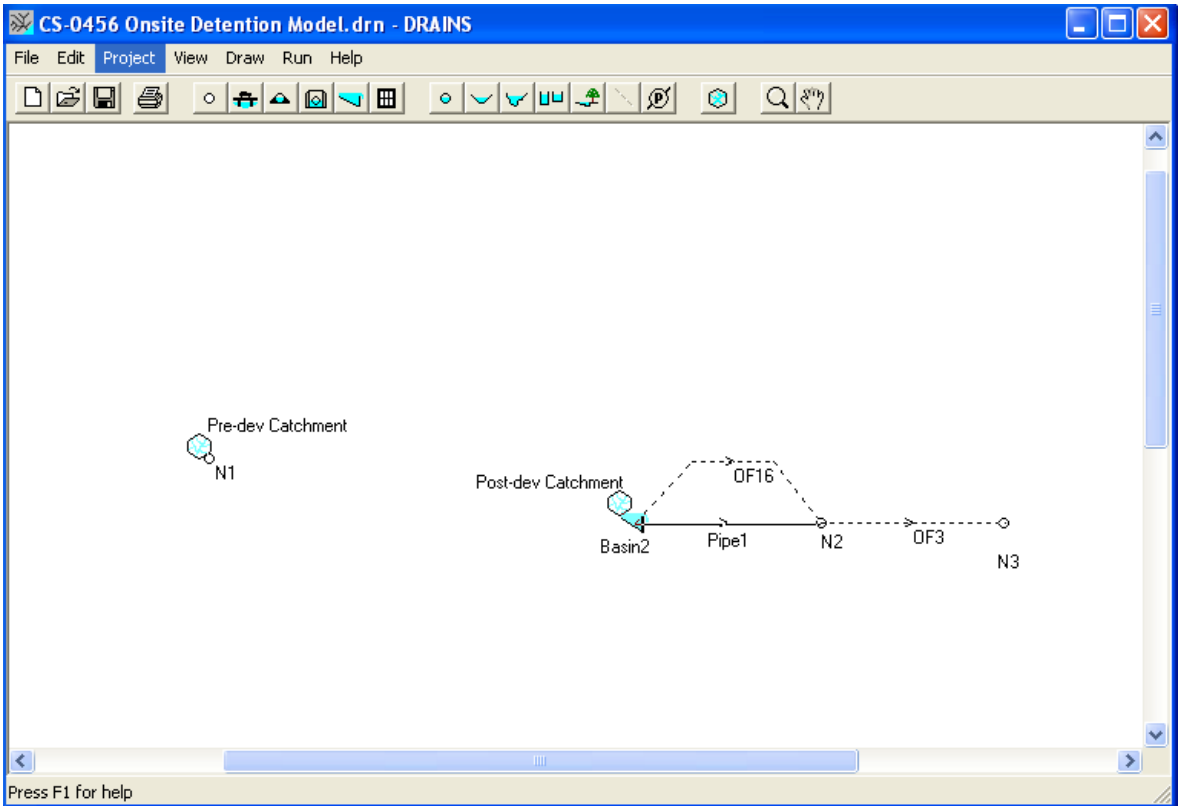

Figure 2B – Conceptual DRAINS Model for the Proposed Development

Pre-development discharges for the site are given below. These flow rates are a conservative estimate for the site, assuming are pervious area of it is 100% pervious.

TABLE 2A – Predeveloped Site Discharges

Site Area (m^2)	5 Year ARI (m^3/s)	100 Year ARI (m^3/s)
3746	0.125	0.209

A model was developed for the post development scenario to determine the required size of detention storage necessary to reduce post development discharges from the development to pre-developed levels.

Trial and error runs were completed, with a final detention storage of 35m^3 (@ 1.0m deep) and an outlet orifice 300mm in diameter required to achieve Council's discharge requirements. A summary of the post development discharges with the adopted storage and orifice outlet are below:

TABLE 2B – Post-developed Site Discharges

5 Year ARI (m^3/s)	100 Year ARI (m^3/s)
0.124	0.18

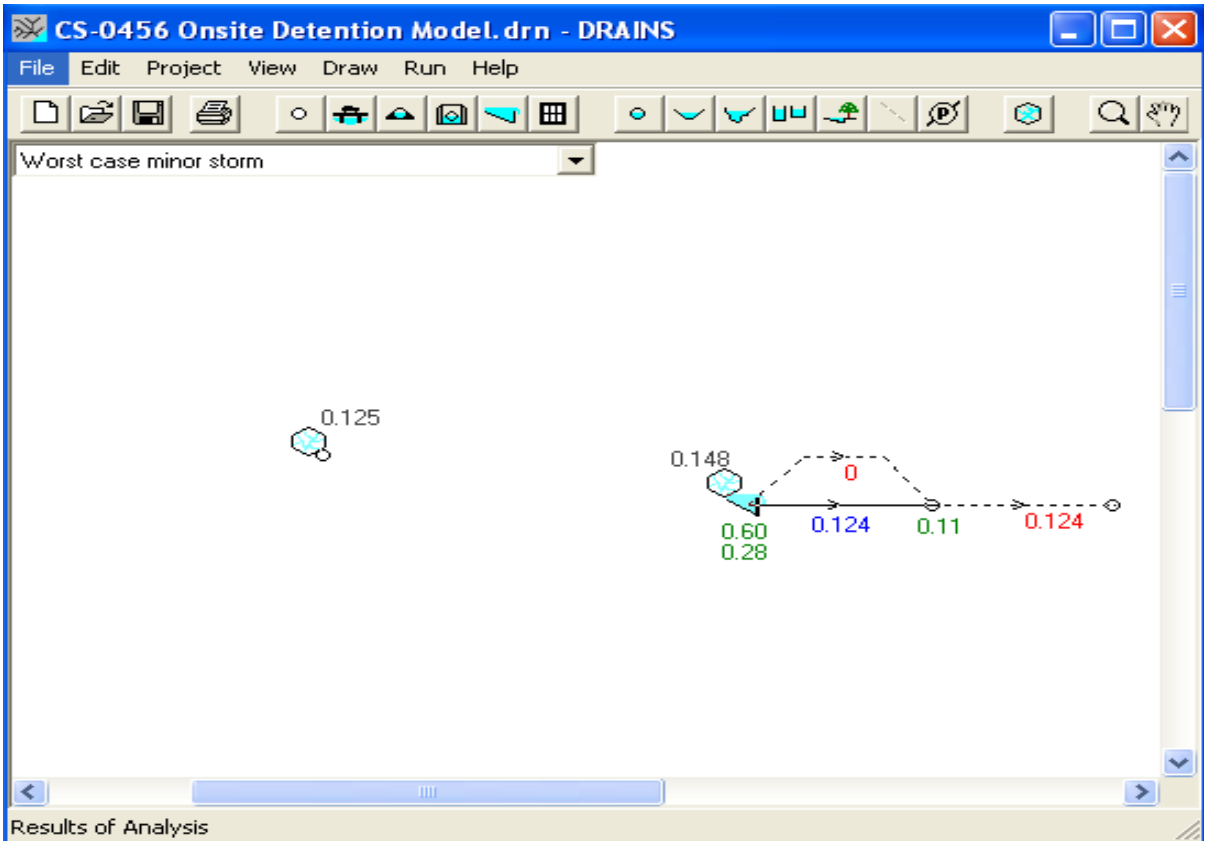

Figure 2C – DRAINS Model Results – 5yr ARI Storm Event

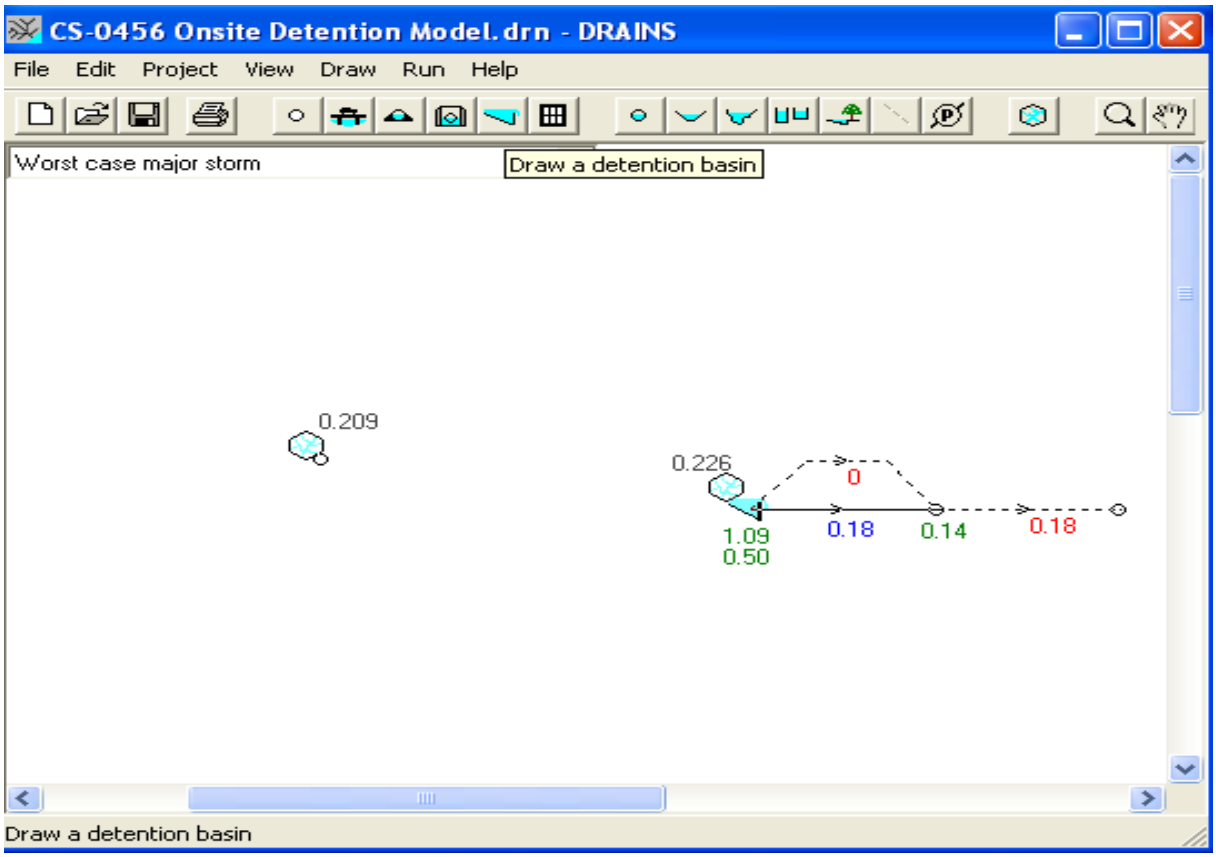

Figure 1B – DRAINS Model Results – 100yr ARI Storm Event

It is recommended that 35m^2 of space be set aside in the development footprint to accommodate the required detention storage. Further details on the concept DRAINS model for the proposed development are included in Appendix D of this report.

3.0 GROUNDWATER ASSESSMENT

3.1 NSW Groundwater Policy

Groundwater is an essential part of the water cycle. It plays an important role in much of NSW, contributing some 11% of the states water usage (DLWC, 1997).

Groundwater management in NSW is undertaken by the Department of Water and Energy. The over-arching document is the NSW State Groundwater Policy Framework Document (DLWC, 1997). The role of the policy is:

'To manage the State's groundwater resources so that they can sustain environmental, social and economic uses for the people of NS'W.

The NSW Government encourages the ecologically sustainable management of the State's groundwater resources, so as to:

- *slow and halt, or reverse any degradation of groundwater resources;*
- *ensure long term sustainability of the systems ecological support characteristics;*
- *maintain the full range of beneficial uses of these resources;*
- *maximise economic benefit to the Region, State and Nation.*

The current report examines the development proposal in terms of its impact on groundwater quality and quantity. It addresses groundwater issues with respect to the NSW Policy as stated above.

3.2 Development Locality

Figure 3A shows the locality of the development and the closest monitoring bores.

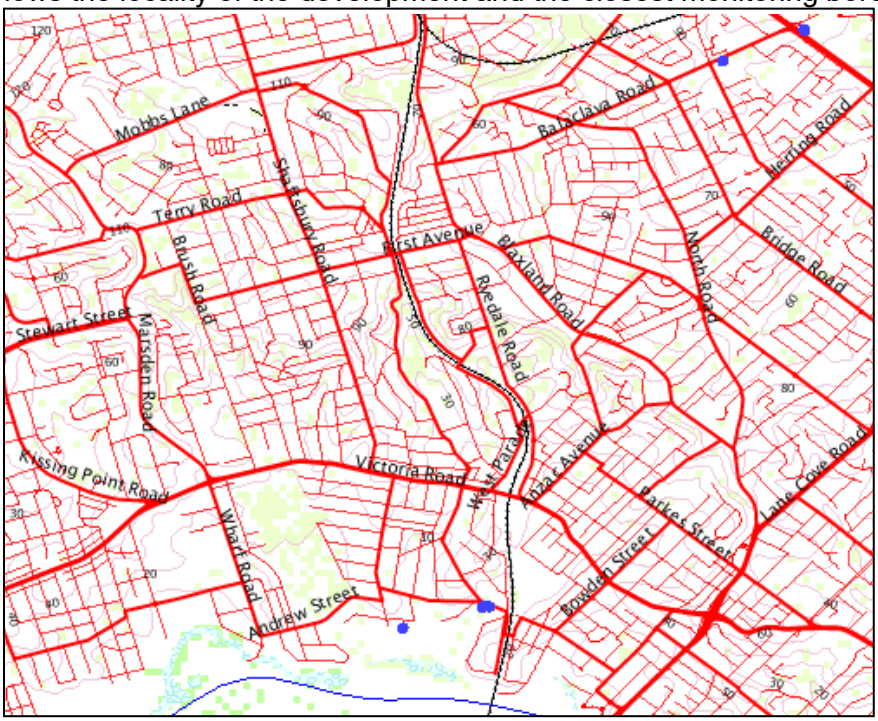

Figure 3A – development locality and locations of nearest bores.
Map created with the NSW Natural Resource Atlas – www.nratlas.nsw.gov.au 29.5.2009. Copyright © 2009 New South Wales Government. Map has been compiled from various sources and may contain errors or omissions. No representation is made as to its accuracy or suitability.

Figure 3A shows there is a series of bores approximately 1 km to the south of the development site. Additionally there are several bores along Balaclava Road approximately 2 km to the NE of the site.

The bores along Andrew Street are located in areas which would have received runoff from the site under natural conditions, so the discussion below focuses on the area to the south.

The subject site is underlain by Wianamatta Group shales and sandstones (Chapman and Murphy, 1989). These materials have low transmissivity and the groundwater at depth is commonly saline.

Examination of the subsoil by SMEC indicated there is 0.3 to 0.4 m of topsoil. Silty clay subsoils extend to 1.6m. Shale occurs below the subsoil.

3.3 Groundwater Bore Information

The NSW Natural Resources Atlas provides information on local bores. Table 3A summarises information for the nearest one, i.e. the one near Meadowbank railway station.

GROUNDWATER NUMBER	GW104997
LIC-NUM	10BL160464
AUTHORISED-PURPOSES	MONITORING BORE
DATE COMPLETION-DATE	2001-08-20
FINAL-DEPTH	2.40m
STANDING-WATER-LEVEL	2.32 m
SALINITY	260.00 uS/cm
YIELD	not recorded
NORTHING	6256692.00
EASTING	323049.00

Table 3A. Attributes of the groundwater bore closest to the subject site - *Source: DWE*

The bore was sunk in 2001. It is unusually shallow (2.4m) and the water quality is non saline.

Table 3B shows data from a second bore. This bore is much deeper than that documented in Table 3A. It was hoped that the bore would enable access to water to irrigate the adjacent sports areas. Table 3C sets out the attributes of the water bearing zones. The pump yields of 0.1 to 0.3 L/sec are low compared with the 5 to 10 L/sec considered necessary for irrigation. The results are likely to discourage further pumping in the area.

GROUNDWATER NUMBERG	W072314
LIC-NUM	10BL156495
AUTHORISED-PURPOSES	IRRIGATION
DATE COMPLETION-	1994-07-26
FINAL-DEPTH (metres)	150.00
PROPERTY	MEADOWBANK PARK
SALINITY	490
NORTHING	6256534.00
EASTING	322576.00

Table 3B. Specification and attributes of the bore in Meadowbank Park - *Source: DWE*

FROM-DEPTH (metres)	TO-DEPTH (metres)	THICKNESS (metres)	YIELD (L/sec)	TEST HOLE-DEPTH (metres)	DURATION (hr)	SALINITY (uS/cm)
36.9	37.3	0.4	0.1	42	0.25	220
61.2	61.6	0.4	0.1	66	0.25	300
118	123.5	5.5	0.1	126	0.25	540
125.5	130.3	4.8	0.3	132	0.25	490
135.6	138.2	2.6	0.2	150	0.5	490

Table 3C. Attributes of the water bearing zones of the bore at Meadowbank Park - *Source: DWE*

Additionally discussions with Ryde Council staff indicated there were undesirable water quality attributes which interfered with the use of the water.

3.4 Local Groundwater Depths

SMEC sampled the soils to equipment refusal which typically occurred at 2.0 to 2.7m. No groundwater was detected.

3.5 Likely Groundwater Flow Directions

The bulk of the water entering the soil is likely to travel by interflow between the top and subsoil in a southerly direction towards Parramatta River. This 'fresh' water will lie as a shallow lens on top of any intruding salt water. Table 3C shows that there is water at depth, however the pump test data in Table 3B suggest that flows are low.

3.6 Likely Groundwater Uses

The area is highly urbanised and the data in table 3 suggests flow rates are low. The most likely use would be irrigation of parklands along the Parramatta River. However the pump rates are low and according to Ryde Council Staff (assessed 26.5.2009) the water is too 'mineralised' to be ideal for sports fields.

The potable water supply is adequately catered for by Sydney Water so bore water is unlikely to be used for drinking.

These comments suggest that there is minimal likely use of the groundwater.

3.7 Potential Impact of the Development on Groundwater

3.7.1 Potential for Impact on Current Usage

The proposed development is approximately 1 km 'upslope' from the nearest bore site. According to Ryde Council staff this bore is currently inactive because of water quality concerns. The combination of distance and the lack of use of bore water in the vicinity suggests that the proposed development is unlikely to influence usage rate of groundwater.

3.7.2 Potential for Impact on Current Usage

The proposed development involves the removal of current single dwellings and other structures and creation of multistorey public housing and ancillary facilities. The developed is contained within a 3746 sq.m allotment.

The development is designed to not increase peak out flow of stormwater that exceeds predevelopment conditions with 100% perviousness. An onsite detention system of 35 cu.m is specified in order to attenuate outflows to less than the peak outflow of 5 and 100 ARI storms (See stormwater section).

Additionally the building design includes a rainwater capture and reuse system. A tank of approximately 50 cubic m capacity will be used to capture water, allowing reuse of irrigation and car washing.

The irrigation activities will allow at least some of the rainfall to percolate into the soil. Some of this will eventually reach groundwater.

Whilst the percolation volume/year will be less than that from a 'bushland' site, it is significantly higher than that likely from nearby commercial buildings which are almost completely impervious.

It is concluded that that development will reduce infiltration to the groundwater. However demand, water quality and water flows are all very low so that the impact of the proposed development on regional groundwater availability will be minimal.

3.7.3 Potential for Impact on Water Quality

The proposed drainage system will involve capture of roof water via an onsite detention & rainwater vault. The onsite detention system will have a regulated discharge to the local stormwater infrastructure. The water in the rainwater tank will be used for irrigation.

Table 3D shows that roof water is typically less contaminated than road water. In a major review Duncan, (1997) reported that the median Total Suspended Solids concentration in runoff from urbanised roads was 235 mg/L compared with 41 mg/L from roofs. The median total phosphorus concentration was 0.24 mg/L from roads runoff but only 0.14 mg/L in roof runoff. This is further evidence of the benefit of capturing and using roof water rather than allowing it to become contaminated with street runoff and eventually enter Parramatta River. .

These results suggest it is preferable to capture rainwater from the roof, store then use it rather than let the simple collect road runoff and use it for irrigation.

If roof water is used for irrigation it is less likely to be adding contamination to the groundwater. (It is noted that any contamination in infiltrating water would need to pass through filtration via over more than 30m of rock before it reached groundwater. This filtration is likely to remove the bulk of contaminants).

It is concluded that the capture of some rainwater in tanks will have minimal impact on regional hydrology, but it will assist in reducing the contaminant load in the water used for irrigation.

Informa-tion source	ANZECC Guideli-ne for raw drinking	Phillips & Maher, (1995)	Phillips & Maher, 91995)	Xanthopoulos & Hahn (1993)	Xanthopoulos & Hahn (1993)	van Dam et al (1989	van Dam et al (1989	Whitely et al (1993) sustained flow	Whitely et al (1993) sustained flow
Water type	Potable water	Storm water	Base flow	Roof water	Street water	Roof	Street	Roof	Street
Attribute									
pH	6.5-8.5	7.0-7.9	7.0-9.1	6.2	6.4				
Cond. uS/cm	640		81-400	80	108			17	108
Suspended solids (mg/L)		63-399	19-90	60	564				
Faecal coliforms (/100 mL)	Zero	1 to 25,000 Coliforms	1 to 10^6 Coliforms					20 (average)	102 (average)
COD (mg/L)				22	49			1	8
DOC (mg/L)				18	12				
NH_4 –N (mg/L)	0.1	0.0021-5		4	0.2	0.9	1.2		
Oxidised N (mg/L)	10 as NO_3-N			0.5	0.6	0.7	0.9		
P (mg/L)		0.05-1.64	0.13-2.26	0.3	1.5	0.08	0.34		

Table 3D. Contaminants in water derived from various sources in the urban environment. The ANZECC Guidelines for drinking water are also shown.

3.7.3 Impact in Relation to the Water Act 1912 Part 5

Part 5 of the *Water Act 1912* deals with artesian WELLS. There is no intention to draw from or interfere with the groundwater. Therefore this act does not apply to this project.

4.0 CONCLUSION

The preliminary investigations documented in this report detail the stormwater and groundwater issues and requirements necessary to service the proposed multi storey redevelopment project. Water Sensitive Urban Design measures are appropriate to be applied to this development together with the on-site stormwater detention measures as detailed in this report. The development is unlikely to have a measurable impact on groundwater availability, its quality or its quantity.

A Water Sensitive Urban Design approach was adopted for addressing stormwater management measures associated with the proposed development. This includes measures to reduce the quantity and increase the quality of runoff discharging from the site. Site specific constraints including space for treatment measures, roof area for harvesting runoff and likely demands for rainwater were considered in developing a strategy of combined onsite detention and rainwater tank storage. It is proposed that the rainwater harvested be reused for both irrigation of landscaped areas and toilet flushing for the proposed commercial portion of the development.

Due to the small size of the site compared to the catchment, the development will not interfere with groundwater flows. Provision of opportunity to use roof water for irrigation will reduce demand on potable supply as well as reduce the risk of contamination from stormwater runoff. It is considered that no remedial action to the existing groundwater source is required as no impacts are likely.

7.0 REFERENCES/BIBLIOGRAPHY

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APPENDIX A

NSW Department of Planning – Director-General's Requirements

NSW GOVERNMENT
Department of Planning

Contact: Andrew Beattie
Phone: 02 9228 6384
Fax: 02 9228 6544
Email: andrew.beattie@planning.nsw.gov.au

Our ref: MP 09_0029
File: S09/00191-1

Nigel Sharpe
Housing NSW
PO Box K100
HAYMARKET
NSW 1240

Dear Mr Sharpe,

63 - 77 WEST PARADE, WEST RYDE - MP 09_0029

Thankyou for your request for Director-General's environmental assessment requirements (DGR's) for the above project. The DGR's were prepared from the information provided within your application and in consultation with relevant Government agencies, including Council (attached).

Under section 75F(3) of the Act, the Director-General may alter or supplement these requirements if necessary and in light of any additional information that may be provided prior to the proponent seeking approval for the project.

Prior to exhibiting the Environmental Assessment, the Department will review the document to determine if it adequately addresses the DGR's. If the Director-General considers that the Environmental Assessment does not adequately address the DGR's, the Director-General may require the proponent to revise the Environmental Assessment to address the matters notified to the proponent.

Following this review period the Environmental Assessment will be made publicly available for a minimum period of 30 days. Please contact the Department at least two weeks before you propose to submit the Environmental Assessment to determine the fees applicable to the application.

While the provision of key issues and assessment requirements means you are able to commence preparation of your Environmental Assessment, I would like to take this opportunity to remind you of the Department's concerns regarding the form and height of the development envelopes and the need for appropriate contextual studies to be undertaken. The Council have identified West Parade as forming a "gateway" to the West Ryde Centre.

Further, the quality of the public domain in West Parade and integration with the site is to be given careful consideration.

Please also find attached with this letter, copies of submissions from other agencies addressing their key issues for the proposal. Please note that these responses have been provided to you for information only and do not form part of the DGRs for the Environmental Assessment.

If you have any enquiries about these requirements, please contact Mr Andrew Beattie on 02 9228 6384 or via e-mail at andrew.beattie@planning.nsw.gov.au.

Yours sincerely

Jason Perica
Executive Director 4/5/09
(as delegate for the Director-General)

NSW GOVERNMENT
Department of Planning

Director-General's Requirements

Section 75F of the *Environmental Planning and Assessment Act 1979*

Application number	MP 09_0029
Project	Construction of 140-150 new dwellings, associated commercial floorspace and community facilities
Location	63-77 West Parade, West Ryde
Proponent	Housing NSW
Date issued	7/5/09
Expiry date	If the Environmental Assessment (EA) is not exhibited within 2 years after this date, the applicant must consult further with the Director-General in relation to the preparation of the environmental assessment.
Key issues	The Environmental Assessment (EA) must address the following key issues: **1. Relevant EPI's policies and Guidelines to be Addressed** Planning provisions applying to the site, including permissibility and the provisions of all plans and policies including: • Objects of the EP&A Act; • NSW State Plan, Urban Transport Statement; • Draft Inner North Sub-regional Strategy; • SEPP 53 Metropolitan Residential Development; • SEPP 55 Remediation of Land; • SEPP 65 Design Quality of Residential Flat Development; • SEPP (Building Sustainability Index: BASIX) 2004; • Draft SEPP 66 Integration of Land Use and Transport; • Ryde Planning Scheme Ordinance 1979, relevant Development Control Plans; and • Nature and extent of any non-compliance with relevant environmental planning instruments, plans and guidelines and justification for any non-compliance. **2. Built Form Urban Design/Public Domain** The EA shall address the height, bulk and scale of the proposed development within the context of the locality. In particular, detailed envelope/height and contextual studies should be undertaken to ensure the proposal integrates with the local environment. The EA shall address the design quality with specific consideration of the façade, massing, setbacks, building articulation, use of appropriate colours, materials/finishes, landscaping, safety by design and public domain, including an assessment against the CPTED Principles. A key desired outcome is a high quality public domain in West Parade and the EA should present strategies for the successful integration of public and private open space. The EA shall provide the following documents: • Comparable height study to demonstrate how the proposed height relates to the height of the existing/approved developments surrounding the subject site and in the locality; • View analysis to and from the site from key vantage points; and • Options for building envelopes, massing and articulation, with particular consideration given to the integration of the public domain along West Parade.

3. Staging
The EA must include details regarding the staging of the proposed development (if proposed).

4. Environmental and Residential Amenity
The EA must address solar access, acoustic privacy, visual privacy, view loss and wind impacts and achieve a high level of environmental and residential amenity.

5. Transport & Accessibility Impacts (Construction and Operational)
The EA shall address the following matters:

- Provide a Transport & Accessibility Impact Study prepared in accordance with the RTA's *Guide to Traffic Generating Developments*, considering traffic generation (including daily and peak traffic movements), any required road / intersection upgrades, access, loading dock(s), car parking arrangements, measures to promote public transport usage and pedestrian and bicycle linkages;
- Provide an assessment of the implications of the proposed development for non-car travel modes (including public transport, walking and cycling), including an assessment of existing and proposed pedestrian and cycle movements within the vicinity of the subject site, and possible linkage to the "Rail Trail Shared Use Path Cycle/Pedestrian Route" which runs along the rail corridor;
- Demonstrate that a minimalist approach to carparking provision is taken based on the accessibility of the site to public transport;
- Demonstrate how users of the development will be able to make travel choices that support the achievement of relevant State Plan targets;
- Demonstrate consistency with the accessibility and traffic/transport principles which are currently being developed as part of the West Ryde Masterplan Principles report (by Council);
- Details of service vehicle movements;
- Consideration into a one way internal road system; and

The EA should consider and investigate the opportunities for providing a pedestrian bridge across the rail corridor to link to the West Ryde Centre and improve pedestrain flows.

6. Ecologically Sustainable Development (ESD)
The EA shall detail how the development will incorporate ESD principles in the design, construction and ongoing operation phases of the development.

In particular, the EA must consider Council's minimum energy performance, water use and stormwater quality standards of the CoR DCP 2008. In addition, a minimum rating of 4.0 stars equivalent to the industry accepted Green Star Multi Residential Pilot Tool of the Green Building Council is encouraged for the category of development.

7. Contributions
The EA shall address the provision of public benefit, services and infrastructure having regard to Council's Section 94 Contribution Plan and/or any Planning Agreement, or other legally binding instrument which would be required for a development of this size.

8. Consultation
Undertake an appropriate and justified level of consultation in accordance with the Department's *Major Project Community Consultation Guidelines October 2007*.

9. Drainage
The EA shall address drainage/flooding issues associated with the development/site, including: stormwater, drainage infrastructure and incorporation of Water Sensitive Urban Design measures, including measures to control impacts on channel bed and bank erosion and measures to improve the quality of stormwater runoff to achieve best practice standards.

	10. Groundwater The EA is to identify groundwater issues and potential degradation to the groundwater source and shall address any impacts upon groundwater resources, and when impacts are identified, provide contingency measures to remediate, reduce or manage potential impacts. The EA shall also address whether a licence is required under Part 5 of the Water Act 1912. **11. Noise and Vibration Assessment** The EA shall address the issue of noise and vibration impact from the railway corridor and provide detail of how this will be managed and ameliorated through the design of the building, in compliance with relevant Australian Standards and the Department's *Interim Guidelines for Development near Rail Corridors and Busy Roads.* **12. Statement of Commitments** The EA must include a draft Statement of Commitments detailing measures for environmental management, mitigation measures and monitoring for the project.
Deemed refusal period	60 days

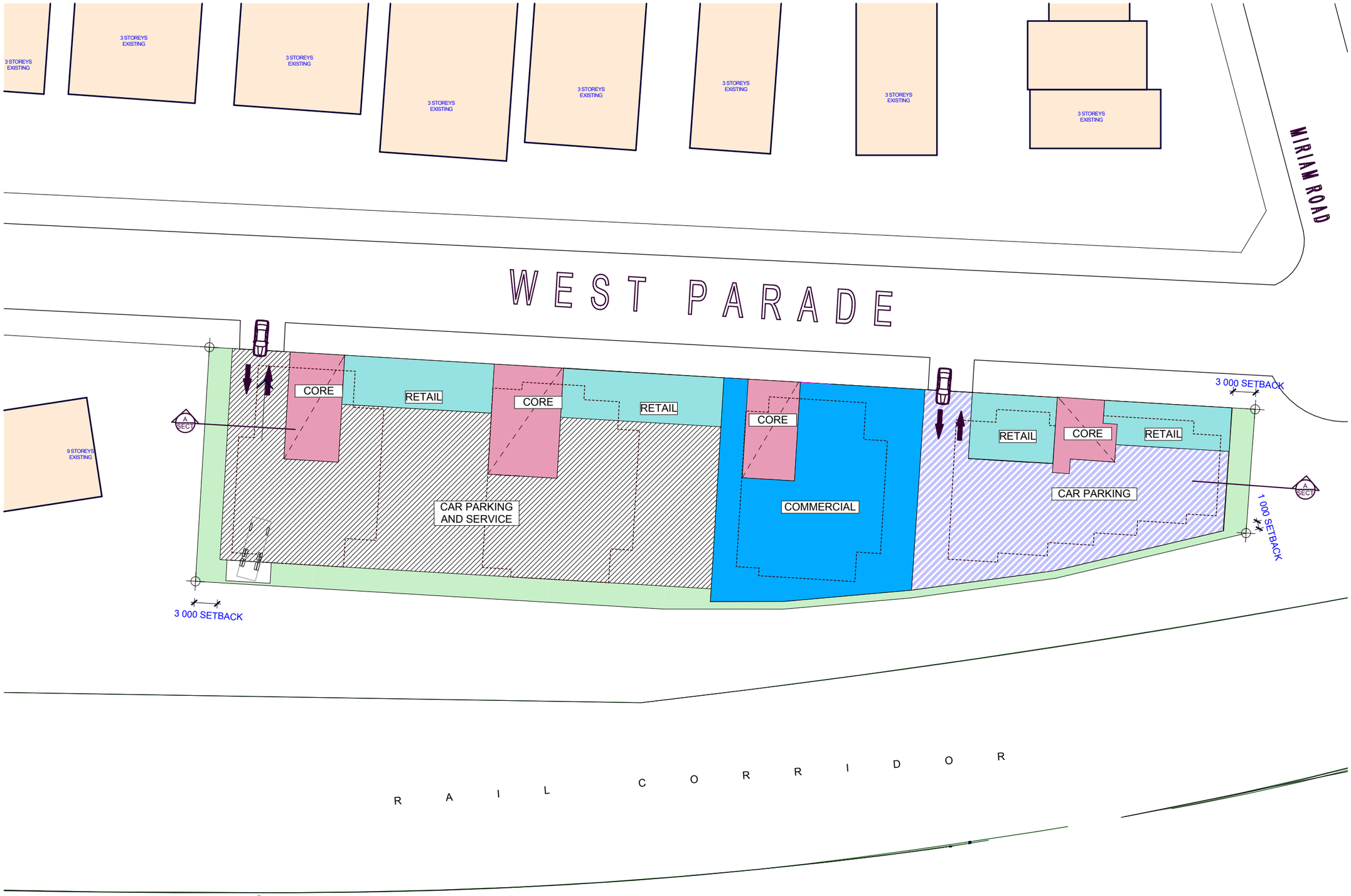
Plans and Documents to accompany the Application

General	The Environmental Assessment (EA) must include: 1. An executive summary; 2. A thorough site analysis including site plans, areal photographs and a description of the existing and surrounding environment; 3. A thorough description of the proposed development: 4. An assessment of the key issues specified above and a table outlining how these key issues have been addressed; 5. An assessment of the potential impacts of the project and a draft Statement of Commitments, outlining environmental management, mitigation and monitoring measures to be implemented to minimise any potential impacts of the project; 6. The plans and documents outlined below; 7. A signed statement from the author of the Environmental Assessment certifying that the information contained in the report is neither false nor misleading; 8. A Quantity Surveyor's Certificate of Cost to verify the capital investment value of the project (in accordance with the definition contained in the Major Projects SEPP; and 9. A conclusion justifying the project, taking into consideration the environmental impacts of the proposal, the suitability of the site, and whether or not the project is in the public interest.
Plans and Documents	The following plans, architectural drawings, diagrams and relevant documentation shall be submitted; 1. An **existing site survey plan** drawn at an appropriate scale illustrating; • The location of rail boundaries and rail infrastructure; • the location of the land, boundary measurements, area (sq.m) and north point; • the existing levels of the land in relation to buildings and roads; • location and height of existing structures on the site; • location of existing trees; • location and height of adjacent buildings and private open space, and • all levels to be to Australian Height Datum. 2. A **Site Analysis Plan** must be provided which identifies existing natural elements of the site (including all hazards and constraints), existing vegetation, footpath crossing levels and alignments, existing pedestrian and vehicular access points and other facilities, slope and topography, utility services, boundaries, orientation, view corridors and all structures on neighbouring properties where relevant to the application (including windows, driveways, private open space etc). 3. A **locality/context plan** drawn at an appropriate scale should be submitted indicating: • significant local features such as parks, community facilities and open space and heritage items; • the location and uses of existing buildings, shopping and employment areas; and • traffic and road patterns, pedestrian routes and public transport nodes. 4. **Architectural drawings** at an appropriate scale illustrating: • the location of any existing building envelopes or structures on the land in relation to the boundaries of the land and any development on adjoining land; • detailed floor plans, sections and elevations of the proposed buildings; • elevation plans providing details of external building materials and colours proposed; • fenestrations, balconies and other features; • accessibility requirements of the Building Code of Australia and the Disability

	Discrimination Act; • the height (AHD) of the proposed development in relation to the land; • the level of the lowest floor, the level of any unbuilt area and the level of the ground; and • any changes that will be made to the level of the land by excavation, filling or otherwise. 5. **Stormwater Concept Plan** - illustrating the concept for stormwater management. 6. **Landscape plan** – including the use of native species appropriate to the site, illustrating treatment of open space areas on the site, screen planting along common boundaries and tree protection measures both on and off the site. 7. **Shadow diagrams** showing solar access to the site and adjacent properties at summer solstice (Dec 21), winter solstice (June 21) and the equinox (March 21 and September 21) at 9.00 am, 12.00 midday and 3.00 pm. 8. **View Analysis** - Visual aids such as a photomontage must be used to demonstrate visual impacts of the proposed building envelopes in particular having regard to the siting, bulk and scale relationships from key areas. 9. **Other plans and documents** (to be required where relevant): • **Erosion and Sediment Control Plan** – plan or drawing that shows the nature and location of all erosion and sedimentation control measures to be utilised on the site; • **Geotechnical Report** – prepared by a recognised professional which assesses the risk of Geotechnical failure on the site and identifies design solutions and works to be carried out to ensure the stability of the land and structures and safety of persons. Should the development involve any excavation greater than 2m, RailCorp will require the following: • The Geotechnical Report must address RailCorp's brief; • Construction methodology with details pertaining to structural support during excavation; • Track monitoring requirements during excavation and construction phases; • Cross sectional drawings showing ground surface, rock tracks, sub soil profile, proposed basement excavation and structural design of sub ground support adjacent to rail corridor; • Rail safety plan including instrumentation and monitoring regime to be submitted for review. 10. **A massing model** of the proposed development for the entire site (i.e. Concept Plan).
Documents to be submitted	• 1 copy of the EA, plans and documentation for the **Test of Adequacy ("TOA")**; • 12 hard copies of the EA **(once the EA has been determined adequate)**; • 12 sets of architectural and landscape plans to scale, including one (1) set at A3 size (to scale); and • 1 copy of the Environmental Assessment and plans on CD-ROM (PDF format), each file not exceeding 5Mb in size.

APPENDIX B

Architectural Layout Plans



LEGEND

- RESIDENTIAL PARKING AND SERVICE AREA, APPROX. 24 SPACES
- COMMERCIAL PARKING AREA, APPROX. 13 SPACES
- COMMERCIAL SPACE, 640m^2 APPROX.
- RESIDENTIAL FOYERS WITH LIFTS AND STAIRS
- RETAIL SPACE, 445m^2 APPROX.

QUALITY CHECK

Drawings Approval for:

Item	Drawn	Project Architect	Director	Client	Date
SK	JY/AH			Housing NSW	04/06/09
PDA					
CD					
TENDER ISSUE					
CONSTRUCTION ISSUE					

AMENDMENTS

No.	Item	Drawn	Date
A			

LEGEND

NOTES

Verify all dimensions and levels on site and report any discrepancies prior to the commencement of work.

Drawings are to be read in conjunction with all contract documents.

Use figured dimensions only. Do not scale from drawings.

Caldis Cook Group Pty. Ltd. cannot guarantee the accuracy of content and format for copies of drawings issued electronically.

The completion of the issue details checked and authorised section is confirmation of the status of the drawing. The drawing shall not be used for construction unless endorsed 'For Construction' and authorised for issue.

Principal Architect: Stephen Caldis Registration No: 4265

CALDIS COOK GROUP
ACN 051 302 900

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TRAFFIC ENGINEER:
Arup Pty Ltd
Level 10 201 Kent Street,
Sydney NSW 2000
Tel +61 2 9320 9320 Fax +61 2 9320 932
www.arup.com

CLIENT

NSW DEPARTMENT OF HOUSING

PROJECT

WEST RYDE HOUSING DEVELOPMENT

63 - 77 West Parade, NSW

DRAWING Plot Date: 3:06 PM 4/06/2009

Ground Floor Plan
CONCEPT APPLICATION (DRAFT)

PROJECT No.	DWG.No. Ground Floor Plan
08-150	SCALE 1:500

CCG Info: P:\08-150 West Ryde\ArchiCAD\08-150_090602_AmendedConcept Appli

LEGEND

- LANDSCAPED PODIUM ROOFTOP 1327m^2 APPROX.
- TOWER A - 55 DWELLINGS
- TOWER B - 24 DWELLINGS
- TOWER C - 35 DWELLINGS
- TOWER D - 28 DWELLINGS
- BALCONY/APARTMENT PROTRUSION ZONES

QUALITY CHECK

Drawings Approval for:

Item	Drawn	Project Architect	Director	Client	Date
SK	JY/AH			Housing NSW	04/06/09
PDA					
CD					
TENDER ISSUE					
CONSTRUCTION ISSUE					

AMENDMENTS

No.	Item	Drawn	Date
A			

LEGEND

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CLIENT

NSW DEPARTMENT OF HOUSING

PROJECT

WEST RYDE HOUSING DEVELOPMENT

63 - 77 West Parade, NSW

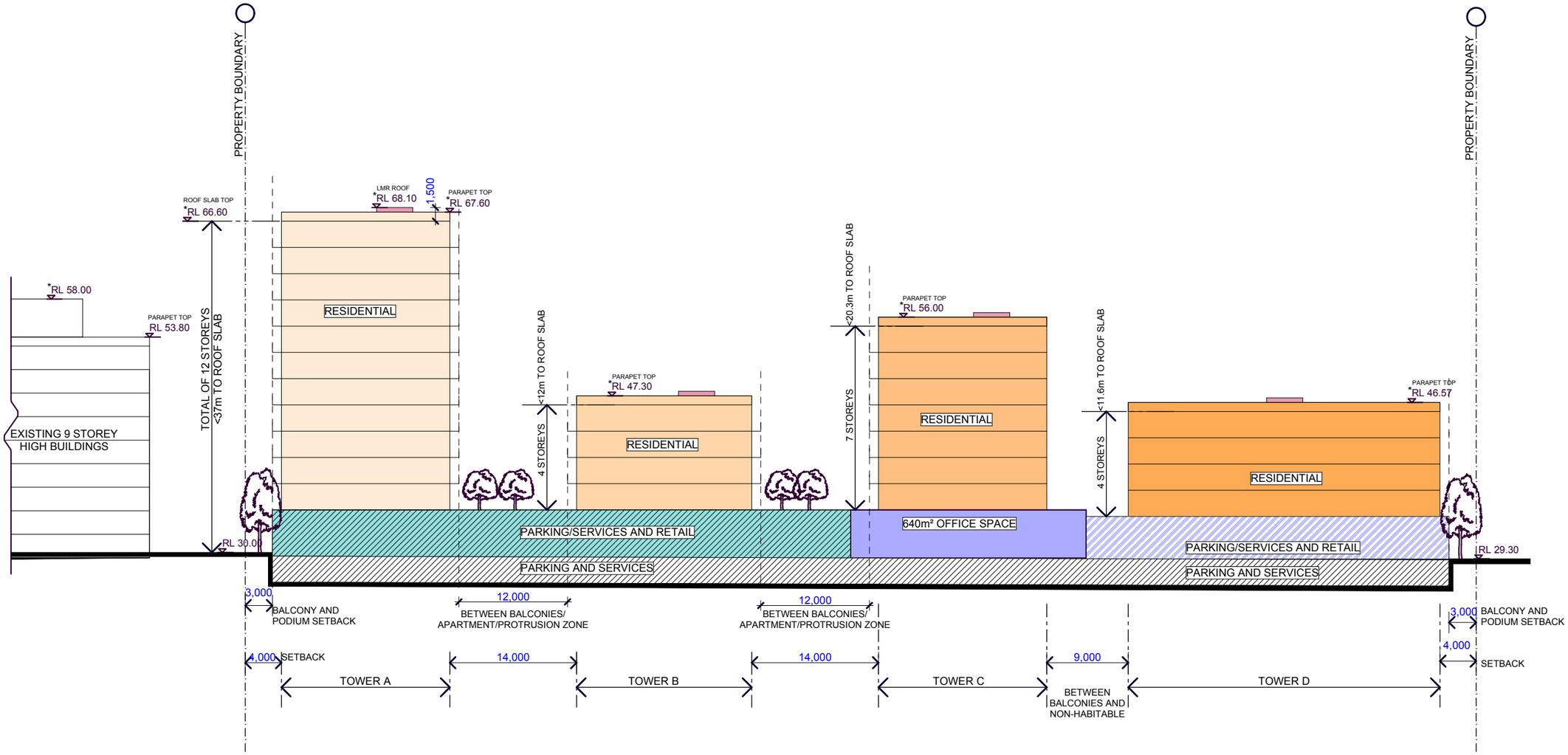
DRAWING Plot Date: 3:19 PM 4/06/2009

Typical Level

CONCEPT APPLICATION (DRAFT)

PROJECT No.	DWG.No. Typical Level
08-150	SCALE 1:500

CCG Info: P:\08-150 West Ryde\ArchiCAD\08-150_090602_AmendedConcept Applic



LEGEND

- TOWER A - 55 DWELLINGS
- TOWER B - 24 DWELLINGS
- TOWER C - 35 DWELLINGS
- TOWER D - 28 DWELLINGS
- BALCONY ZONES
- RESIDENTIAL PARKING/SERVICE AND RETAIL AREA, APPROX. 24 PARKING SPACES AND RETAIL
- COMMERCIAL SPACE, 640m² APPROX.
- COMMERCIAL PARKING AREA, APPROX. 13 SPACES, AND RETAIL
- RESIDENTIAL PARKING AND SERVICE AREA, APPROX. 80 SPACES

QUALITY CHECK

Drawings Approval for:

Item	Drawn	Project Architect	Director	Client	Date
SK	JY/AH			Housing NSW	04/06/09
PDA					
CD					
TENDER ISSUE					
CONSTRUCTION ISSUE					

AMENDMENTS

No.	Item	Drawn	Date
A			

LEGEND

* PROPOSED RL'S ARE APPROXIMATE

NOTES

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Drawings are to be read in conjunction with all contract documents.

Use figured dimensions only. Do not scale from drawings.

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CLIENT

NSW DEPARTMENT OF HOUSING

PROJECT

WEST RYDE HOUSING DEVELOPMENT

63 - 77 West Parade, NSW

DRAWING Plot Date: 2:48 PM 4/06/2009

Section A:A

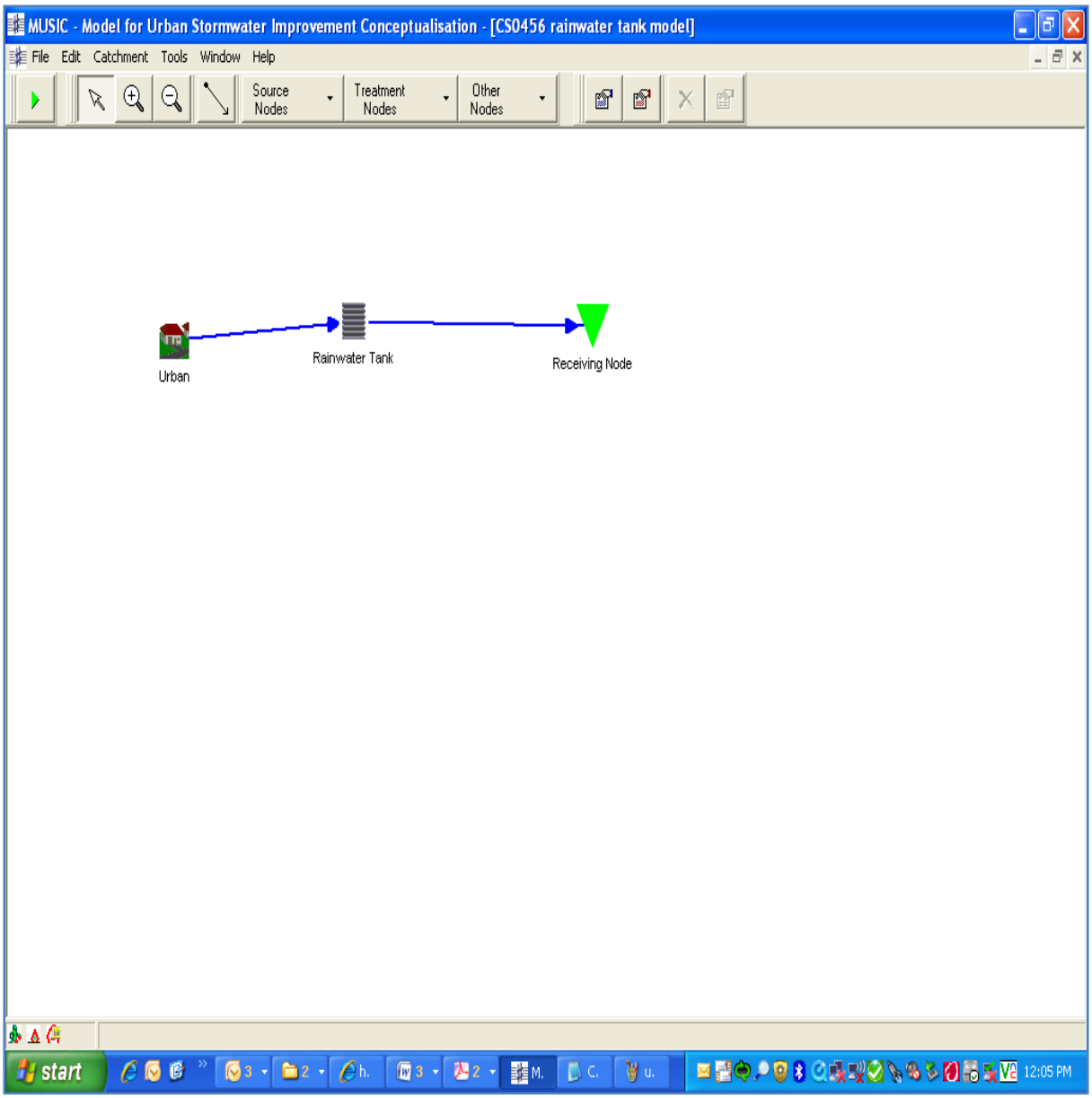
CONCEPT APPLICATION (DRAFT)

PROJECT No.	DWG.No. Section A:A
08-150	SCALE 1:500

CCG Info: P:\08-150 West Ryde\Archi\CAD\08-150_090602_AmendedConcept Appli

APPENDIX C

MUSIC Data Report


MUSIC - Model for Urban Stormwater Improvement Conceptualisation - [CS0456 rainwater tank model]
File Edit Catchment Tools Window Help
Source Nodes
Treatment Nodes
Other Nodes
Urban
Rainwater Tank
Receiving Node
start
12:05 PM

MUSIC Report File

Source nodes

Location,Urban

ID,1

Node Type,UrbanSourceNode

Total Area (ha),0.17

Area Impervious (ha),0.17

Area Pervious (ha),0

Field Capacity (mm),80

Pervious Area Infiltration Capacity coefficient - a,200

Pervious Area Infiltration Capacity exponent - b,1

Impervious Area Rainfall Threshold (mm/day),1

Pervious Area Soil Storage Capacity (mm),120

Pervious Area Soil Initial Storage (% of Capacity),30

Groundwater Initial Depth (mm),10

Groundwater Daily Recharge Rate (%),25

Groundwater Daily Baseflow Rate (%),5

Groundwater Daily Deep Seepage Rate (%),0

Stormflow Total Suspended Solids Mean (log mg/L),2.2

Stormflow Total Suspended Solids Standard Deviation (log mg/L),0.32

Stormflow Total Suspended Solids Estimation Method,Stochastic

Stormflow Total Suspended Solids Serial Correlation,0

Stormflow Total Phosphorus Mean (log mg/L),-0.45

Stormflow Total Phosphorus Standard Deviation (log mg/L),0.25

Stormflow Total Phosphorus Estimation Method,Stochastic

Stormflow Total Phosphorus Serial Correlation,0

Stormflow Total Nitrogen Mean (log mg/L),0.42

Stormflow Total Nitrogen Standard Deviation (log mg/L),0.19

Stormflow Total Nitrogen Estimation Method,Stochastic

Stormflow Total Nitrogen Serial Correlation,0

Baseflow Total Suspended Solids Mean (log mg/L),1.1

Baseflow Total Suspended Solids Standard Deviation (log mg/L),0.17

Baseflow Total Suspended Solids Estimation Method,Stochastic

Baseflow Total Suspended Solids Serial Correlation,0

Baseflow Total Phosphorus Mean (log mg/L),-0.82

Baseflow Total Phosphorus Standard Deviation (log mg/L),0.19

Baseflow Total Phosphorus Estimation Method,Stochastic

Baseflow Total Phosphorus Serial Correlation,0

Baseflow Total Nitrogen Mean (log mg/L),0.32

Baseflow Total Nitrogen Standard Deviation (log mg/L),0.12

Baseflow Total Nitrogen Estimation Method,Stochastic

Baseflow Total Nitrogen Serial Correlation,0

OUT - Mean Annual Flow (ML/yr),1.41

OUT - TSS Mean Annual Load (kg/yr),291

OUT - TP Mean Annual Load (kg/yr),0.587

OUT - TN Mean Annual Load (kg/yr),4.04

OUT - Gross Pollutant Mean Annual Load (kg/yr),36.6

No Imported Data Source nodes

USTM treatment nodes

Location,Rainwater Tank

ID,2

Node Type,RainWaterTankNode

Lo-flow bypass rate (cum/sec),0

Hi-flow bypass rate (cum/sec),100

Inlet pond volume,0

Area (sqm),35

Extended detention depth (m),0.2

Permanent pool volume (cum),50

Proportion vegetated,0

Equivalent pipe diameter (mm),300

Overflow weir width (m),10

Notional Detention Time (hrs),20.7E-3

Orifice discharge coefficient,0.6

Weir coefficient,1.7

Number of CSTR cells,2

Total Suspended Solids k (m/yr),400

Total Suspended Solids C* (mg/L),12

Total Suspended Solids C** (mg/L),12

Total Phosphorus k (m/yr),300

Total Phosphorus C* (mg/L),0.13

Total Phosphorus C** (mg/L),0.13

Total Nitrogen k (m/yr),40

Total Nitrogen C* (mg/L),1.4

Total Nitrogen C** (mg/L),1.4

Threshold hydraulic loading for C** (m/yr),3500

Extraction for Re-use,On

Annual Re-use Demand - scaled by daily PET (ML),0.15

Constant Daily Re-use Demand (kL),0.3

User-defined Annual Re-use Demand (ML),0

Percentage of User-defined Annual Re-use Demand Jan,8.33333333333333

Percentage of User-defined Annual Re-use Demand Feb,8.33333333333333

Percentage of User-defined Annual Re-use Demand Mar,8.33333333333333

Percentage of User-defined Annual Re-use Demand Apr,8.33333333333333

Percentage of User-defined Annual Re-use Demand May,8.33333333333333

Percentage of User-defined Annual Re-use Demand Jun,8.33333333333333

Percentage of User-defined Annual Re-use Demand Jul,8.33333333333333

Percentage of User-defined Annual Re-use Demand Aug,8.33333333333333

Percentage of User-defined Annual Re-use Demand Sep,8.33333333333333

Percentage of User-defined Annual Re-use Demand Oct,8.33333333333333

Percentage of User-defined Annual Re-use Demand Nov,8.33333333333333

Percentage of User-defined Annual Re-use Demand Dec,8.33333333333333

Filter area (sqm),

Filter depth (m),

Filter median particle diameter (mm),

Saturated hydraulic conductivity (mm/hr),

Voids ratio,

Length (m),

Bed slope,

Base Width (m),

Top width (m),

Vegetation height (m),

Proportion of upstream impervious area treated,

Seepage Rate (mm/hr),0

Evap Loss as proportion of PET,0

Depth in metres below the drain pipe,

IN - Mean Annual Flow (ML/yr),1.41

IN - TSS Mean Annual Load (kg/yr),291

IN - TP Mean Annual Load (kg/yr),0.587

IN - TN Mean Annual Load (kg/yr),4.04

IN - Gross Pollutant Mean Annual Load (kg/yr),36.6

OUT - Mean Annual Flow (ML/yr),1.19

OUT - TSS Mean Annual Load (kg/yr),115

OUT - TP Mean Annual Load (kg/yr),0.315

OUT - TN Mean Annual Load (kg/yr),2.91

OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00

No Generic treatment nodes

Other nodes

Location,Receiving Node

ID,3

Node Type,ReceivingNode

IN - Mean Annual Flow (ML/yr),1.19

IN - TSS Mean Annual Load (kg/yr),115

IN - TP Mean Annual Load (kg/yr),0.315

IN - TN Mean Annual Load (kg/yr),2.91

IN - Gross Pollutant Mean Annual Load (kg/yr),0.00

OUT - Mean Annual Flow (ML/yr),0.00

OUT - TSS Mean Annual Load (kg/yr),0.00

OUT - TP Mean Annual Load (kg/yr),0.00

OUT - TN Mean Annual Load (kg/yr),0.00

OUT - Gross Pollutant Mean Annual Load (kg/yr),0.00

Links

Location,Drainage Link,Drainage Link

Source node ID,1,2

Target node ID,2,3

Muskingum-Cunge Routing,Not Routed,Not Routed

Muskingum K, ,

Muskingum theta, ,

IN - Mean Annual Flow (ML/yr),1.41,1.19

IN - TSS Mean Annual Load (kg/yr),291,115

IN - TP Mean Annual Load (kg/yr),0.587,0.315

IN - TN Mean Annual Load (kg/yr),4.04,2.91

IN - Gross Pollutant Mean Annual Load (kg/yr),36.6,0.00

OUT - Mean Annual Flow (ML/yr),1.41,1.19

OUT - TSS Mean Annual Load (kg/yr),291,115

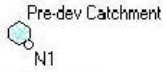
OUT - TP Mean Annual Load (kg/yr),0.587,0.315

OUT - TN Mean Annual Load (kg/yr),4.04,2.91

OUT - Gross Pollutant Mean Annual Load (kg/yr),36.6,0.00

APPENDIX D

DRAINS Data



Sub-Catchment Data

Sub-catchment name: Pre-dev Catchment
Sub-catchment area (ha): 0.3746

Hydrological Model
- (•) Default model
- ( ) You specify

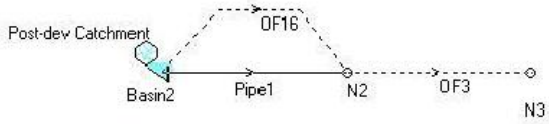
Use
- (•) abbreviated data
- ( ) more detailed data

	Paved	Supplementary	Grassed
Percentage of area (%)	0	0	100
Time of concentration (mins)	5	0	5

Lag time (minutes): 0

OK
Cancel
Customise Storms
Help

Notes



Sub-Catchment Data

Sub-catchment name: Post-dev Catchment
Sub-catchment area (ha): 0.3746

Hydrological Model
- (•) Default model
- ( ) You specify

Use
- (•) abbreviated data
- ( ) more detailed data

	Paved	Supplementary	Grassed
Percentage of area (%)	90	0	10
Time of concentration (mins)	5	0	5

Lag time (minutes): 0

OK
Cancel
Customise Storms
Help

Notes