



## **3.2 LICENCE ACTIVITIES**

- Appendix 3.2.5 Green Square Town Centre Plan (revised)





## **3.4 THIRD PARTIES UNDERTAKING ACTIVITIES**

 Appendix 3.4.1(a) Certificate of Change of Name – Flow Systems Pty Ltd BROOKFIELD PIH PTY LIMITED Level 22 135 King Street SYDNEY NSW 2000

Remove this top section if desired before framing



Greg Medcraft Chairman

## **PUBLIC VERSION**



## **3.5 OTHER REGULATORY APPROVALS**

- Appendix 3.5.1(a) Approval DA

#### City of Sydney

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24 September, 2013

CITY of SYDNEY C/- David White, Green Square Unit 456 Kent St SYDNEY NSW 2000

SECTION 96 MODIFICATION APPROVAL FOR 312-318 BOTANY ROAD, ALEXANDRIA NSW 2015, 318B BOTANY ROAD, ALEXANDRIA NSW 2015, 320-322 BOTANY ROAD, ALEXANDRIA NSW 2015, 324 BOTANY ROAD, ALEXANDRIA NSW 2015, 6-12 O'RIORDAN STREET, ALEXANDRIA NSW 2015, 956-960 BOURKE STREET, ZETLAND NSW 2017, 301-303 BOTANY ROAD, ZETLAND NSW 2017, 377-497 BOTANY ROAD, ZETLAND NSW 2017, 501 BOTANY ROAD, ZETLAND NSW 2017, 511-515 BOTANY ROAD, ZETLAND NSW 2017, 355 BOTANY ROAD, ZETLAND NSW 2017, 509 BOTANY ROAD, ZETLAND NSW 2017, 3 JOYNTON AVENUE, ZETLAND NSW 2017, 811 ELIZABETH STREET, ZETLAND NSW 2017, 97-103 PORTMAN STREET, ZETLAND NSW 2017, 105-115 PORTMAN STREET, ZETLAND NSW 2017

## APPLICATION NO: D/2012/1175/A

#### Dear Sir/Madam

I refer to your application dated 12 September 2013 to modify the consent for Development Application No. D/2012/1175 in the following manner:

- Inclusion of additional plan references and corrections under Condition 1 (Approved Development); and
- Deletion of Conditions 8 (Future Open Space Drying Green) and 9 (Drying Green Storage Basin).

You are advised that your application for modification has been **approved** under Section 96(1) and 96(1A) of the Environmental Planning and Assessment Act 1979. A copy of the Notice of Determination of the original development application is attached with the amendments resulting from the modification shown in **bold italics**.

This approval is limited to only those amendments requested in your Section 96 application dated 12/9/13. Approval is not granted for any other items which may have been amended on the submitted drawings and for which approval has not been specifically sought.



This approved modification will require an amended Construction Certificate which must be obtained from your Certifying Authority (Council or private accredited certifier). Building work must not commence until an amended Construction Certificate has been approved.

The Council officer dealing with this application is Calvin Houlison ph. 9246 7857, email choulison@cityofsydney.nsw.gov.au.

Please contact this officer if further information is required.

Yours faithfully

GRAHAM JAHN

Director - City Planning, Development & Transport

Notes:

Modification of development consent in accordance with Section 96 of the Act shall not be construed as the granting of development consent, but reference to a development consent, is a reference to the development consent so modified.

Section 96(6) of the Act confers on an applicant who is dissatisfied with this determination a right of appeal to the Land and Environment Court and the Court may determine the appeal.

For the reasons for imposing conditions, refer to the Notice of Determination for the original development consent.

Modification of a development consent does not remove the need to obtain any other statutory consent necessary under the Environmental Planning and Assessment Act 1979, or any other Act.

The conditions of consent of the development application have been modified with the consent of the applicant.



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**NOTICE OF DETERMINATION - APPROVAL** issued under Section 80(1)(a) of the Environmental Planning and Assessment Act 1979

Development Application No.	D/2010/1175/A
Development Application No.	D/2012/11/5/A
Applicant	CITY of SYDNEY C/- John Dwyer Green Square 456 Kent St SYDNEY NSW 2000
Land to be developed	312-318 Botany Road , ALEXANDRIA NSW 2015, 318B Botany Road , ALEXANDRIA NSW 2015, 320-322 Botany Road , ALEXANDRIA NSW 2015, 324 Botany Road , ALEXANDRIA NSW 2015, 6-12 O'Riordan Street , ALEXANDRIA NSW 2015, 956- 960 Bourke Street , ZETLAND NSW 2017, 301-303 Botany Road , ZETLAND NSW 2017, 377-497 Botany Road , ZETLAND NSW 2017, 501 Botany Road , ZETLAND NSW 2017, 501 Botany Road , ZETLAND NSW 2017, 511-515 Botany Road , ZETLAND NSW 2017, 355 Botany Road , ZETLAND NSW 2017, 509 Botany Road , ZETLAND NSW 2017, 3 Joynton Avenue , ZETLAND NSW 2017, 811 Elizabeth Street , ZETLAND NSW 2017, 97-103 Portman Street , ZETLAND NSW 2017, 105-115 Portman Street , ZETLAND NSW 2017
	Lot 1 DP456791,Lot 1 DP575225,Lot D DP81525 (Green Square Stn U/G), Lot X DP 447410, Lot 3 DP 1015619, Lot 4 DP 25272, Lot 4 DP 1015619, Lot 10 DP 874704, Lot 2 DP 1015633, Lot 1 DP 628547, Lot 2 DP 505350, Lot 12 DP 610938, Lot Y DP 413956, Lot 11 DP 610938, Lot 2 DP 1174641, Lot 1 DP 808432, Lot 2 DP 1181144, Lot 3 DP 1181144
Approved development	Provision of essential infrastructure for the Green Square Town Centre, including demolition of minor structures and tree removal, construction of new roads and associated infrastructure, concept landscaping and streetscape design, provision of above and below ground services (including stormwater, sewer, water, electrical and telecommunications) and staged construction.
Cost of development	\$106,998,000



#### NOTICE OF DETERMINATION - APPROVAL D/2012/1175/A

Determination	The application was determined by Central Sydney Planning Committee and was granted consent subject to the attached conditions.
	This Section 96 modification application was determined under delegation of Council and was granted consent <b>subject to the attached conditions</b> .
Consent is to operate from	8 March 2013
Consent will lapse on	8 March 2018
Date of Section 96(1) & (1A) Modification	24 September 2013

#### **Reasons for conditions**

Unrestricted consent may affect the environmental amenity of the area and would not be in the public interest.

#### **Right of Appeal**

If you are dissatisfied with this decision, Section 96(6) of the Environmental Planning and Assessment Act 1979 gives you the right to appeal to the Land and Environmental Court within 6 months after the date of this Notice of Determination.

Alternatively, you may request a review under Section 96AB of the Act within 28 days of the date of this notice (NB section 96AB is not applicable to integrated or designated development).

**GRAHAM JAHN** Director - City Planning, Development & Transport

#### CONDITIONS OF CONSENT

#### SCHEDULE 1A

# Approved Development / Design Modifications/Covenants and Contributions/Use and Operation

**Note**: Some conditions in Schedule 1A are to be satisfied prior to issue of a Construction Certificate and some are to be satisfied prior to issue of Occupation Certificate, where indicated.

#### (1) APPROVED DEVELOPMENT

(a) Development must be in accordance with Development Application No. D/2012/1175 dated 6 August 2012 (amended 31 October 2012) and Statement of Environment Effects - Green Square Town Centre Essential Infrastructure prepared by City of Sydney, dated August 2012 and the following drawings: prior to the commencement of any work on site:

Drawing Number	wing Rev. Title Prepared by mber		Prepared by	Date
L100- L305 (incl.)	D	Various	Occulus	22/06/2012
CIV-010 - CV-055 (incl.)		Services Demolition and Relocation Plans	Aurecon	<del>21.08.12</del>
CIV-010	4	Site Plan	Aurecon	21/8/12
CIV-020	3	Services Demolition and Relocation Plan Sheet 1 of 21	Aurecon	14/6/12
CIV-022	3	Services Demolition and Relocation Plan Sheet 3 of 21	Aurecon	14/6/12
CIV-023	3	Services Demolition Aurecon and Relocation Plan Sheet 4 of 21		14/6/12
CIV-024	3	Services Demolition and Relocation Plan Sheet 5 of 21	Aurecon	14/6/12
CIV-025	3	Services Demolition and Relocation Plan Sheet 6 of 21	Aurecon	14/6/12
C/V-026	3	Services Demolition and Relocation Plan Sheet 7 of 21	Aurecon	14/6/12
CIV-027	3	Services Demolition and Relocation Plan Sheet 8 of 21	Aurecon	14/6/12

## NOTICE OF DETERMINATION - APPROVAL D/2012/1175/A

Drawing Number	Rev.	Title	Prepared by	Date
C/V-028	3	Services Demolition and Relocation Plan Sheet 9 of 21	Aurecon	14/6/12
CIV-029	3	Services Demolition and Relocation Plan Sheet 10 of 21	Aurecon	14/6/12
CIV-031	3	Services Demolition and Relocation Plan Sheet 12 of 21	Aurecon	14/6/12
CIV-032	3	Services Demolition and Relocation Plan Sheet 13 of 21	Aurecon	14/6/12
CIV-033	3	Services Demolition and Relocation Plan Sheet 14 of 21	Aurecon	14/6/12
CIV-035	3	Services Demolition and Relocation Plan Sheet 16 of 21	Aurecon	14/6/12
CIV-036	3	Services Demolition and Relocation Plan Sheet 17 of 21	Aurecon	14/6/12
CIV-037	3	Services Demolition and Relocation Plan Sheet 18 of 21	Aurecon	14/6/12
CIV-038	3	Services Demolition and Relocation Plan Sheet 19 of 21	Aurecon	14/6/12
CIV-039	3	Services Demolition and Relocation Plan Sheet 20 of 21	Aurecon	14/6/12
CIV-040	3	Services Demolition and Relocation Plan Sheet 21 of 21	Aurecon	14/6/12
CIV-050	1	Erosion and Sediment Control Plan Sheet 1 of 4	Aurecon	14/6/12
CIV-051	4	Erosion and Sediment Control Plan Sheet 2 of 4	Aurecon	21/8/12

## NOTICE OF DETERMINATION – APPROVAL D/2012/1175/A

Drawing Number	Rev.	Title	Prepared by	Date
CIV-052	1	Erosion and Sediment Control Plan Sheet 3 of 4	Aurecon	14/6/12
CIV-053	1	Erosion and Sediment Control Plan Sheet 4 of 4	Aurecon	14/6/12
CIV-055	2	Erosion and Sediment Control Details	Aurecon	14/6/12
CIV-100	6	Staging Plan	Aurecon	21/8/12
CIV-110	3	Staging Plan – Stage 1	Aurecon	14/6/12
CIV-120	3	Staging Plan- Stage 2	Aurecon	14/6/12
CIV-130 - CIV-160 (incl)	4	Staging Plans- Stages 3-6	Aurecon	21/8/12
CIV-200	3	General Arrangements – Sheet 1 of 21	Aurecon	14/6/12
CIV-202	3	General Arrangements – Sheet 3 of 21	Aurecon	14/6/12
CIV-203 – CIV-204	4	General Arrangements – Sheets 4-5 of 21	Aurecon	21/8/12
CIV-205 – CIV-206	3	General Arrangements – Sheets 6-7 of 21	Aurecon	14/6/12
CIV-207 – CIV-209 (incl)	4	General Arrangements – Sheets 8-10 of 21	Aurecon	21/8/12
CIV-211 – CIV-217 (incl)	4	General Arrangements – Sheets 11-18 of 21	Aurecon	21/8/12
CIV-218 – CIV-220 (incl)	3	General Arrangements – Sheets 19-21 of 21	Aurecon	14/6/12
CIV-100 CIV-160	04	Staging Plans	Aurecon	14.06.12
CIV-200- CIV-220	03	General Arrangements	Aurecon	14.06.12

## NOTICE OF DETERMINATION - APPROVAL D/2012/1175/A

Drawing Rev. Number	Rev.	Title	Prepared by	Date	
CIV-260- 271 (incl.)	03	Typical Cross Sections and Set Out	Aurecon	14.06.12	
CIV-272- 341	03	Longitudinal Sections and Cross Sections	Aurecon	14.06.12	

and as amended by the conditions of this consent:

(b) In the event of any inconsistency between the approved plans and supplementary documentation, the plans will prevail.

(Amendment "A" – 24 September 2013)

## (2) PLANS / DOCUMENTS NOT APPROVED

The plans and documents set out below are NOT APPROVED as part of the subject development consent and shall be resubmitted for Council approval prior to the commencement of any works on site:

Drawing Number	Rev.	Title	Prepared by	Date
L300	D	Street Section A	Occulus	22/06/2012
L306-308	D	Shared Zone Sections	Occulus	22/06/2012
L400	D	Landscape Details Village Centre 01	Occulus	22/06/2012
L401	D	Landscape Details Village Centre 02	Occulus	22/06/2012
L402	D	Landscape Details Village Centre 03	Occulus	22/06/2012
L404	D	Landscape Details Local Area 02	Occulus	22/06/2012
L405	D	Landscape Details Local Area 03	Occulus	22/06/2012
CIV-230	03	03 Joynton Avenue – Aurecon Detention Basin		14.06.12
CIV-235	03	Green Square Plaza Plan and Sections	Aurecon	14.06.12
CIV-240	04	Typical pavement details	Aurecon	21.08.12
CIV-243	03	Access Way Vehicle Crossing Details	Aurecon	14.06.12
CIV-250- 252 (incl.)	03	Stormwater Miscellaneous Details	Aurecon	14.06.12
CIV-400- 403 (incl.)	04	Pavement Layout	Aurecon	14.06.12

Drawing Number	Rev.	Title	Prepared by	Date
CIV-450 and 455	03	The Drying Green Plan and Sections	Aurecon	14.06.12
CIV 460- 461 (incl.)	03	Culvert Diversion Chambers	Aurecon	14.06.12
Green Square Town Centre – Public Domain Strategy, Draft		McGregor Coxall	January 2013	

#### (3) ESSENTIAL INFRASTRUCTURE AND SERVICES

In principle support is given for the provision of Essential Infrastructure on the stamp approved plans including the provision of new, augmentation of existing and the removal of redundant services, road and public domain infrastructure.

Essential Infrastructure and Services must be designed and constructed in accordance with the City's current technical specification and standard details for civil works, and the relevant Authorities requirements.

Staged Public Domain Plans and Civil Documentation are to be submitted and approved by Council for each Stage prior to approval for works being granted for the relevant Stage. The submission must clearly indicate any temporary or sacrificial work (such as temporary vehicle turning areas, public footways, stormwater lines, services, remediation areas and stormwater overland flow paths) required due to Staging.

All Essential Infrastructure and Services for each Stage are to be completed to the Council's satisfaction prior to the use commencing.

#### (3A) REMEDIATION ACTION PLAN

An overarching Remedial Action Plan (RAP) covering the full extent of the proposed Essential Infrastructure works, with the exception of 956-996 Bourke Street (Lot 10 DP 874704), 355 Botany Road (Lot Y DP 413956), and 377-497 Botany Road (Lot 1 DP 628547) subject to the "Green Square Essential Infrastructure and Public Domain – Draft Remedial Action Plan (19 December 2012)", also known as the consortium lands, shall be submitted to and approved by the Council and the NSW EPA accredited Site Auditor prior to Construction Certificate.

A statement must also be submitted by the Site Auditor certifying that this overarching RAP is practical and that the entire site will be suitable after remediation for the proposed development.

#### (3B) RMS REQUIREMENTS

(a) Comments provided within the previous Transport for NSW (TfNSW) letter to Council dated 5 January 2012 (see attached) with regard to the Green Square Town Centre – Public Exhibition of Planning Proposal and Draft Development Control Plan continue to be applicable to this development application.

- (b) In accordance with the Green Square Town Centre DCP Access and Circulation, direct vehicular access to the subject site is not permitted via Botany Road and Bourke Street.
- (c) The proposed intersection of Bourke Street / Ebsworth Street shall be physically restricted to left-in / left-out movements through the installation of a raised concrete median island similar to that indicated on Drawing No: CIV-390, Rev: 03, Dated: 14/06/12. The raised central concrete median shall have a minimum width of 900mm.
- (d) To ensure traffic efficiency is not compromised along Botany Road, the RMS will not agree to any at-grade pedestrian crossing facilities at the proposed bus signals at the intersection of Botany Road / East-West Boulevard (Civic Plaza).
- (e) To address pedestrian desire lines across Botany Road between the proposed Town Centre and the Rail Station, the applicant will be required to install pedestrian fencing along Botany Road which would direct pedestrians to the at-grade crossings at the signalised intersection of Botany Road / Bourke Street / O'Riordan Street (TCS# 346). Note: The scope and length of pedestrian fencing is to be resolved prior to the issue of any construction certificates.
- (f) Prior to the issue of the relevant construction certificates excluding demolition, remediation, excavation and shoring works, the applicant will be required to submit concept design plans to the RMS for in-principle approval for the following signalised intersections:
  - (i) Bourke Street / Portman Street,
  - (ii) Zetland Avenue / Joynton Avenue,
  - (iii) Zetland Avenue / Paul Street,
  - (iv) Botany Road / Geddes Avenue,
  - (v) Botany Road / Bourke Street / O'Riordan Street / Wyndham Street,
  - (vi) Botany Road / East-West Boulevard (Civic Plaza).
    - a. Note: The applicant must also submit detailed 2031 (AM / PM Peak) traffic modelling for the abovementioned intersections which details Average Delays, Level of Service, queue lengths, lane configurations, turn bay lengths, etc.
    - b. The abovementioned intersections along Botany Road will need to accommodate the provision of right turn storage lanes along Botany Road, which will require land dedication from the subject site as public road at full cost to the developer.
- (g) Redundant driveways are to be removed with kerb and gutter reinstated to Council's requirements.
- (h) Appropriate provision must be made for parking, cyclists, service vehicles, including garbage vehicles, maintenance vehicles, deliveries and buses

on the internal roads and intersections. Council must also ensure that a review of all the intersections is satisfactorily carried out using Austroads turning circles for the largest vehicle likely to use the intersection.

- (i) Full time 'No Stopping' restrictions shall be installed along the entire Botany Road and Bourke Street property frontage of the Green Square Town Centre (except where Bus Zones are required). The applicant is to contact the RMS's Traffic Engineering Services on Phone: (02) 8849 2907 for a Work Instruction, prior to implementing the full time "No Stopping" regulatory signage.
- (j) A Construction Traffic Management Plan detailing construction vehicle routes, number of trucks, hours of operation, access arrangements and traffic control shall be submitted to Council, for approval, prior to the issue of any construction certificate.
- (k) Subject to approval from Council's Local Pedestrian, Cycling and Traffic Calming Committee, full time "No Stopping" restrictions are to be installed in accordance with the Road Marking and Signage Plans (Sheets 1-4).
- (I) The developer shall be responsible for all public utility adjustment/relocation works, necessitated by the above work and as required by the various public utility authorities and/or their agents.
- (m) The Applicant is to comply with the requirements of the Technical Direction (GTD 2012/001) – Excavation Adjacent to RMS Infrastructure. The developer is to meet the full cost of this assessment by the RMS. Details of this Technical Direction can be emailed to the applicant upon request.
- (n) Council should ensure that the post-development storm water discharge from the subject site into the RMS drainage system does not exceed the pre-development discharge.
  - (i) Should the post-development stormwater discharge exceed the predevelopment discharge, detailed design plans and hydraulic calculations of any changes to the stormwater drainage system are to be submitted to the RMS for approval, prior to the commencement of any works.
  - (ii) Details should be forwarded to:

Sydney Asset Management Roads and Maritime Services PO Box 973 Parramatta CBD 2124.

- (iii) A plan checking fee will be payable and a performance bond may be required before the RMS's approval is issued. With regard to the Civil Works requirement please contact the RMS's Project Engineer, External Works Ph: 8849 2114 or Fax: 8849 2766.
- Proposed Traffic Signal works at the intersections of Bourke Street / Portman Street, Zetland Avenue / Joynton Avenue, Zetland Avenue / Paul Street, Botany Road / Geddes Avenue, Botany Road / Bourke Street
  / O'Riordan Street / Wyndham Street, Botany Road / East West

Boulevard (Civic Plaza) and associated civil works along Bourke Street and Botany Road shall be designed in accordance with Austroads with RMS supplements, RMS' Traffic Signal Design Manual other Australian Codes of Practice. Design plans shall be prepared by a suitably qualified practitioner and submitted to RMS for consideration and approval prior to commencement of any Traffic Signals and associated civil works. RMS fees for administration, plan checking, signal works inspection and project management will need to be paid by the developer prior to the commencement of any Traffic Signals and associated civil works. A ten (10) year operation charge (payable to Roads and Maritime Services) will apply to each new signalised intersection.

- (i) RMS fees for administration, plan checking, signal works inspection and project management will need to be paid by the developer prior to the commencement of any road works. A ten (10) year operation charge (payable to Roads and Maritime Services) will apply to each new signalised intersection.
- (p) The Applicant will be required to enter into a Works Authorisation Deed (WAD) for the abovementioned traffic signal and civil works. The Works Authorisation Deed (WAD) will need to be executed prior to RMS' assessment of the detailed design plans.
- (q) All works / regulatory signage associated with the proposed development are to be at no cost to the RMS.

#### (3C) RAILCORP REQUIREMENTS

- (a) Final construction methodology with construction details pertaining to the installation of services and undertaking of works with the area shown in green or yellow in the plan provided in Attachment D submitted to Railcorp for review and comment on the impacts of the rail corridor. Works are not to commence until written confirmation has been received from Railcorp confirming that this condition has been satisfied.
- (b) Prior to commencement of works, Risk Assessment/Management Plan and detailed Safe Work Method Statements (SWMS) for the proposed works are to be submitted to Railcorp for review and comment on the impacts on rail corridor. Works are not to commence until written confirmation has been received from Railcorp confirming that this condition has been satisfied.
- (c) Details of the machinery to be used during the works are to be submitted to Railcorp for review and endorsement. Works are not to commence until written confirmation has been received confirming that this condition has been satisfied.
- (d) On completion of works the Applicant is to submit the as-built drawings to Railcorp. The as-built drawings are to be endorsed by a Registered Surveyor confirming that there has been no encroachment into Railcorp property or easement, and that there has not been works deeper than 2m in depth within the are shown in green or yellow in the plan provided in Attachment D.

#### (4) SUBMISSION OF FINAL DESIGN DRAWINGS

Final design drawings shall be submitted for all infrastructure works.

#### (5) PUBLIC DOMAIN PLAN

The Public Domain Plan accompanying this Development Application has not been approved by this consent.

Three copies of a detailed Public Domain Plan for each Stage of the development must be prepared by an architect, urban designer or landscape architect and must be approved by Council prior to a Construction Certificate being issued or works commencing on the relevant Stage excluding approved preparatory, demolition, remediation or shoring work.

The Public Domain Plan for each Stage must be prepared in accordance with the City of Sydney's Public Domain Manual, Sydney Streets Design Code and other relevant Public Domain Policies. Public Domain Plans are to be prepared and submitted concurrently with the Civil Design Documentation required for the Alignment Levels, Road Works, Subsoil Drainage, Rain Gardens, Stormwater Management and Utility Services.

The works to the public domain must be completed in accordance with the approved plans, the Public Domain Manual and the City's satisfaction before the use commences for each Stage.

#### (6) RAIN GARDENS AND LANDSCAPED VERGE

The location of the rain gardens and landscaped verges as shown on the stamped approved plans is supported in principle. Opportunities for additional rain gardens and landscaped verges are to be investigated and incorporated into the design where appropriate. Final locations and design of the raingardens and landscaped verge is to consider the following;

- Crossings and driveway entrances
- Sight lines
- Street lights and other services
- Maximum rainfall harvesting and overall stormwater management
- Street tree locations
- Good design practise

The design and construction of the rain gardens and landscaped verge is be undertaken in accordance with the City's current technical specification and standard details for civil works and submitted concurrently with the Public Domain Plans and Essential Infrastructure Plans for each Stage for approval. The submission shall include as a minimum the following information:

- (a) Detailed construction plans, drawn to scale, by suitably qualified landscape architect and engineers (as appropriate).
  - Details of proposed levels and site grading including temporary surface treatments (if applicable);
  - (ii) Details of bio filtration and soil material;
  - (iii) Location, numbers and type of plant species;

- (iv) Details of drainage systems including subsoil drainage.
- (b) Prior to the issue of a Construction Certificate, a maintenance plan addressing the Council's operational capabilities is to be submitted to and approved by the Principal Certifying Authority. The maintenance plan is to be complied with during the specified maintenance and defects liability periods.
- (c) All works in the approved plan is to be completed prior to any Occupation Certificate being issued or the use commencing for the relevant Stage.

#### (7) TWEED PLACE BARKER STREET AND HINCHCLIFF STREET (NORTH) DESIGN

The design of Tweed Place, Barker Street (north of the Plaza), and Hinchcliff Street (north) has not been approved by this consent. The design of these streets is to be revised to incorporate the traffic conditions, and address the following;

- (a) Crime Prevention Through Environmental Design principles
- (b) In accordance with the City's Access DCP 2004 and Access Policy 2004.
- (c) Environmental Sustainable Design principles (investigate opportunities for additional soft landscaping).
- (d) Ausgrid and City's lighting requirements and standards
- (e) Minimise streetscape clutter
- (f) Prioritise pedestrian movement
- (g) Adequate footway widths and direct line of pedestrian movement

The revised plans are to be submitted to Council and approved as part of the public domain plan submission for the relevant stage.

The proposed design of Tweed Place (south) is to extend not further than 45m in length measured from the centreline of Ebsworth Street to provide appropriate access to Development Site 6.

## (8) FUTURE OPEN SPACE - DRYING GREEN

Works to the future open space - Drying Green, have not been approved by this consent.

The design of all works to the Drying Green must be submitted to Council and approved prior to any works commencing on this land. Works which require approval include but are not limited to remediation, earthworks, service installation, stormwater detention, construction of GPT's.

The design of works to the Drying Green must demonstrate that the final landscape design of the Drying Green has been adequately considered and designed for.

(Amendment "A" – 24 September 2013)

#### (9) DRYING GREEN STORAGE BASIN

Prior to any works on the Drying Green, detailed design of the proposed stormwater works within this area shall be submitted and approved by Council. As a minimum the design shall include the following:

- (a) Detailed design of the proposed detention basin to meet the storage allowed in the flood modelling including:
  - (i) Flood assessment report to ensure that there will be no over flows from the basin up to and including the 1 in 20 year flood event. The assessment report must also calculate any adverse flood impacts to any existing developments upstream or downstream. No adverse flood impacts are allowed outside the development site.
  - (ii) Designs to show all overflows up to and including the 1 in 100 flows from the proposed basin are contained within the proposed road carriage ways. The depths and velocity of flows are to comply with the safety requirements for overland flows within road carriageways.
  - (iii) Contour plans including long section of the basin wall and cross sections at 20m intervals.
  - (iv) Inlet and outlet details.
- (b) Detailed design of the proposed stormwater pipelines within and through the detention basin, including HGL analysis.
- (c) Detailed design of any temporary drainage works that are required for the construction of the proposed basin and also for any staged construction.

(Amendment "A" - 24 September 2013)

#### (10) PORTMAN STREET EXTENT OF WORKS

Essential Infrastructure and Public Domain works are to include the streetscape of Portman Street between Portman Lane and Hansard Street.

#### (11) SHARED ZONE

- (a) The proposed shared zones on Tweed Place and Barker Street are not approved as part of this consent.
- (b) Additional information must be submitted prior to the commencement of stage 2 to show the three shared zones can meet the requirements of the RMS warrants.
- (c) The design and typical cross sections of the proposed Shared Zones for the Tweed Place and Barker Street are not approved as part of this consent.

The detailed design must be submitted as part of the stage 2 detailed design documentation.

## NOTICE OF DETERMINATION - APPROVAL D/2012/1175/A

The design of the shared zone will require a referral to the Local Pedestrian, Cycling and Traffic Calming Committee (LPCTCC) for endorsement and then a referral to the RMS for final approval.

Additional reports, information or design changes may be required by Council officers, the LPCTCC or the RMS during the approvals process. The cost for these changes must be undertaken by the applicant at their own cost.

The plan must be approved as part of the in conjunction with the Public Domain Plan prior to the issuing of the Construction Certificate.

[Note: The process of gaining a shared zone approval can take a number of months. It is recommended the applicant begin the process as soon as practical to avoid holding up the issuing of the Construction Certificate.]

[Note: RMS shared zone policy and guidelines can be found on their website]

(d) If these streets are not approved to be shared zones an alternative design must be undertaken and submitted to Council as part of the stage 2 detailed design documentation.

## (12) ENTRY TREATMENT - TWEED PLACE AND BARKER STREET

The entry treatments for Tweed Place and Barker Street are not approved. The design of these intersections is to be reviewed and resubmitted to Council for approval prior to the commencement of construction. The revised design is to reduce the width of the entry as much as possible and to ensure pedestrian and driver legibility of the spaces.

## (13) ASSOCIATED ESSENTIAL INFRASTRUCTURE COSTS

All costs associated with the construction of any new or temporary Essential Infrastructure works road works including kerb and gutter, road pavement, drainage system, footway, services, vehicle turning movements, remediation, landscaping and similar shall be borne by the developer.

### (14) 40KM/H DESIGN SPEED

All streets within the Green Square Town Centre area must be designed to 40km/h speed restrictions.

#### (15) TRAFFIC CALMING

An indicative area wide traffic calming plan must be submitted to Council for review and approval prior to the detailed design of the first stage of road infrastructure being submitted. This plan must show all the proposed traffic calming devices to be installed on the internal road network within the Green Square Town Centre area. Council will liaise with the RMS with regards to the 40km/h speed zone approval.

All works must be endorsed by the LPCTCC and included in the Essential Infrastructure plans prior to their submission.

[Note: The process of reporting an item to the Local Pedestrian, Cycling and Traffic Calming Committee takes approximately 8 weeks from the relevant officer being satisfied with the proposal.]

#### (16) BUS ROUTES

The typical cross sections submitted as part of the development application provide for a bus route throughout the site.

Prior to the detailed design of any road within the site the applicant must liaise with the City to confirm whether this bus route is still the preferred option for the applicant and the City. Any changes to the bus route will result in changes to the typical cross sections.

All bus routes must have a minimum travel lane width of 3.3m.

#### (17) BUS STOPS

The application does not include any proposed locations for bus stops. The bus zones will need to be included in the parking plans and included in the detailed design of the streets.

To enable an area wide assessment of the bus stop locations to be considered the proposed locations must be submitted to the City prior to the detailed design of any stage which contains a street with a bus route.

The design requirements for the bus stops must be done in consultation with the City.

#### (18) DESIGN VEHICLES

All streets and intersections must be designed to accommodate a Council waste collection vehicle, as described in Councils Waste Minimisation Policy, with the following exceptions:

- (a) The applicant can provide evidence to Council's satisfaction that neither a waste collection vehicle nor a medium rigid vehicle will be required to use the intersection. In this instance a swept path of the largest service vehicle using the street must be submitted or a B99 car if no service vehicles will be using the street; or
- (b) The intersection is located on a bus route. In this instance the intersection must be designed to accommodate a 12.8m bus.

#### (19) TURNING PATHS

A swept path analysis, for each of the intersections, must be submitted to Council with the detailed design package for each stage. The swept paths must be done to suit the largest design vehicle performing that turn.

This information must be submitted and approved as part of the detailed design documentation.

[Note: The kerb radii shown in the submitted developments applications plans are large and should be refined, where possible, as part of this process.]

## (20) TYPICAL STREET SECTIONS

The typical street sections submitted as part of this plan are agreed in principle. Any changes to the typical sections as a result of changes to the cycle network, bus routing or other, will require these sections be amended to the approval of Council prior to the detailed design documentation being submitted.

Section A on plan L-300-D and Section F on plan L-303-D are not approved as part of this application.

### (21) CYCLE WAY DESIGN

The minimum section for a bi-direction cycleway must be 2.4m for the cycleway with a 0.4m buffer zone.

The detailed design of the cycle ways must be submitted with detailed design documentation for each stage of the development. All intersection treatments are to be included as part of the detailed design documentation for the relevant stage.

The relevant signage must be included as part of the traffic signage plan required for each stage of the development.

[Note: The location of the Geddes Avenue cycle way must be done in consultation with the City to ensure it is designed to work with the future cycle way currently being designed on the Geddes Avenue extension.]

### (22) PARKING SIGNS

All parking restriction signs included as part of this application are not approved.

#### (23) PARKING PLAN

An indicative area wide parking plan must be submitted to the Traffic Operations team for review and approval. This plan must show all the proposed parking restrictions proposed to be put in place across the entire Green Square Town Centre site as a whole. This plan must be approved prior to any of the street specific parking plans being submitted.

Street specific parking plans must be submitted to the Traffic Operations team for approval. These plans must include the location and information present on each stem and sign. The plans must include chainages to each sign and stem from the kerb line of the nearest intersection. The street specific parking plans must be in line with the area wide parking plan, with any changes identified with the submission. The street specific parking plans must be submitted for each of the streets prior to the construction commencing for the street.

All parking signs must be approved and installed prior to the road being open for public use and prior to the occupation certificate being granted. The plans will require a referral to the LPCTCC for endorsement.

[Note: The process of reporting an item to the Local Pedestrian, Cycling and Traffic Calming Committee takes approximately 8 weeks from the relevant officer being satisfied with the proposal.]

#### (24) FLOOD ASSESSMENT REPORT

- (a) A site-specific flood assessment report shall be prepared and submitted by the applicant for each Stage, which ensures that no long term additional adverse impacts are created upstream or downstream of the site;
- (b) The flood assessment is to include a site specific Flood Risk Management Plan in accordance with the recommendations outlined in the Green Square Town Centre Floodplain Risk Management Plan prepared by Cardno dated July 2012.

The flood assessment is to be undertaken by a suitably qualified and experienced hydraulic engineer and must show pre-development and post-development scenarios.

#### (25) TRAFFIC PRIORITIES AND SIGNAGE

All traffic signage and line marking included as part of the development application is not approved as part of this consent.

A separate application must be made to the City's Traffic Operations Unit for the approval of all traffic signage and line marking within and on the boundary to the Green Square Town Centre site.

The signage and line marking plans must be submitted for each of the stages prior to the construction commencing for that stage.

The signs and line marking for each stage must be approved and installed prior to the road being open for public use and prior to the occupation certificate being granted. The plans will require a referral to the LPCTCC for endorsement.

[Note: The process of reporting an item to the Local Pedestrian, Cycling and Traffic Calming Committee takes approximately 8 weeks from the relevant officer being satisfied with the proposal.]

#### (26) PEDESTIAN CROSSING FACILITES

All pedestrian crossing facilities shown within the site are not approved as part of this consent.

A separate application to Council must be made to plan the pedestrian crossing facilities throughout the site.

Prior to any detailed design documentation being submitted for any of the stages the applicant must undertake a review of pedestrian crossing facilities for the whole site. An area wide plan must be submitted to Council for approval. This plan must provide an indicative location and crossing type along with evidence the RMS warrants for each crossing can be satisfied.

As part of the detailed design documentation for each stage the final location and design of each crossing must be submitted for approval.

All pedestrian crossing facilities along with evidence the RMS warrants can be satisfied must be submitted to the LPCTCC for endorsement.

[Note: The process of reporting an item to the Local Pedestrian, Cycling and Traffic Calming Committee takes approximately 8 weeks from the relevant officer being satisfied with the proposal.]

#### (27) MEDIAN STRIP

The intersection of Ebsworth Street onto Bourke Street must restricted to left in left out only. Right turn movements to and from Ebsworth Street must be prohibited by a concrete median.

The design and location of this median is not approved as part of this consent.

The design and location of the median will require a separate submission to be made to the Traffic Operations Unit and a referral to the Local Pedestrian and Traffic Calming Committee (LPCTCC) and approval from Council officers prior to the construction certificate being issued.

The median must be constructed as per the conditions of the LPCTCC.

The median must be constructed prior to Ebsworth Street between Bourke Street and Zetland Avenue being open for public use.

#### (28) SIGNALISED INTERSECTIONS PLANNING

The applicant must undertake a traffic study of the Green Square Town Centre and surrounding area to review which intersections are required to be signalised and when each of the signalised intersections will need to be activated.

The intersections being reviewed must include but not be limited to:

- (a) Paul Street and Zetland Avenue;
- (b) Zetland Avenue and Joynton Avenue;
- (c) Geddes Avenue and Botany Road; and
- (d) Portman Street and Bourke Street.

The review must be submitted to Council for review and approval. The report will require discussion with the RMS and additional work may need to be undertaken at this planning stage.

The review must be approved by Council and gain RMS in-principle approval prior to the detailed design documentation of any of the stages within the development site being submitted.

#### (29) SIGNALISED INTERSECTIONS DESIGN AND DELIVERY

The proposed signalised intersections will each need to be designed and submitted with the detailed design documentation for their respective stage.

The signal design must be submitted to the City and will require approval from the RMS and a referral to the LPCTCC for endorsement.

The traffic signal infrastructure must be installed as part of the stage they appear in even if the planning does not require them to be activated until a later stage of development.

The design of the signals must be approved by the City as part of the detailed design documentation of that stage.

#### (30) STAGED DELIVERY OF SURROUNDING SITES

This consent does not provide approval for the consent to the staging of the development lots adjacent to the road network.

Each development lot must provide a review of their proposed traffic generation, and any approved applications generation, to ensure the intersection capacity can perform suitably.

The development lots may be required to wait until the next stage of the road network is provided.

#### (31) TEMPORARY TURNING AREAS

Any road which is constructed and dedicated as a dead end street, as a result of the staged delivery of the site, must provide a temporary vehicle turning area.

Details of the vehicle turning must be submitted with the detailed design of the affected road.

All temporary turning areas must be designed to accommodate a Council waste collection vehicle as a minimum.

The vehicle turning area must remain until the relevant subsequent stages are complete and the turning area is no longer required.

#### (32) JOYNTON AVENUE INFRASTRUCTURE WORKS

Any infrastructure works associated with the intersection of Joynton Avenue and Zetland Avenue adjacent to the localised low point (depression) shall not proceed until a drainage solution has been developed to the satisfaction of Council. Documentary evidence of the drainage design is to be submitted to Council before any construction works can commence for the relevant Stage.

#### (33) HISTORIC SANDSTONE AND BRICK WALL ON JOYNTON AVENUE

The proposed works to raise the level of Joynton Avenue are to include raising the level of the historic sandstone and brick wall on Joynton Avenue to the final road level to the satisfaction of Council.

### (34) ADDITIONAL LANDSCAPING DETAILS TO BE PROVIDED

Prior to the commencement of works final design documentation must be submitted to the satisfaction of the City's Tree Management Team including:

(a) Details of the proposed tree / plant species. This shall include both botanical and common names, quantities of species, pot sizes, height at maturity, and the like.

- (b) The selection of species shall have regard to the adopted Council Street Tree Masterplan policy at the time, the suitability of the respective species having regard to site constraints, and the overarching vision for the Green Square Town Centre as reflected in South Sydney LEP 1998 and DCP 1997 (as may be amended).
- (c) Details of the planting and maintenance methodologies, including pit details, soil preparation methods, soil depths, stock sizes and the like. It should be noted that the use of advance stock is preferred that are a minimum pot size of 100 litres.
- (d) That designs provide details of deep soil plantings on development sites and are in accordance with the standards specified in the DCP.

## (35) NEW STREET TREE PLANTINGS

- (a) All street trees are to be supplied and installed in accordance with the requirements of the City of Sydney Street Tree Master Plan 2011 (or the most relevant adopted version), Part D Technical Guidelines.
- (b) The design must include the following Street tree species detailed in the table below; noting that several streets have had the species amended from that detailed within the plan (Geddes Avenue, Paul Street, Zetland Avenue).

Deserver	
Recommended tree	Common name
species	
Liriodendron tulipiferia	Tulip Tree
Acer buergerianum	Trident Maple
Zelkova serrata 'Green	Japanese Zelkova
Vase'	
Celtis australis	Southern
	Hackberry
Acer buergerianum	Trident Maple
Brachychiton acerifolius	Illawarra Flame
	Tree
Celtis australis	Southern
	Hackberry
Zelkova serrata 'Green	Japanese Zelkova
Vase'	
Ulmus parvifolia 'Todd'	Chinese Elm
Corymbia maculata	Spotted Gum
Liriodendron tulipiferia	Tulip Tree
Eucalyptus microcorys	Tallow Wood
Waterhousia floribunda	Weeping Lilly Pilly
'Green Avenue'	5,,
	Recommended tree speciesLiriodendron tulipiferiaAcer buergerianumZelkova serrata 'Green Vase'Celtis australisAcer buergerianumBrachychiton acerifoliusCeltis australisZelkova serrata 'Green Vase'Ulmus parvifolia 'Todd' Corymbia maculata Liriodendron tulipiferia Eucalyptus microcorys Waterhousia floribunda 'Green Avenue'

Street location	Recommended tree species	Common name
median, between traffic lane and cycle lane)		Tree
Zetland Ave (northern footway)	Populus simonii	Simons Poplar

### (36) STREET TREE PLANTING PIT DESIGN

- (a) The volume of uncompacted soil provided within the Stratacell modules in each street location be revised in accordance with the recommended soil volumes presented on drawing L-100, and increased where necessary to at least meet the recommended soil volumes.
- (b) The location of the Stratacell modules be modified to create linked street tree planting pits aligned parallel to the street kerb, rather than individual pits that encourage root growth towards the boundaries of private property.
- (c) All imported soils (including subgrade) be specified by an accredited and experienced consultant specialising in science of urban soils, with proper regard given to the design of the tree planting pits and long term health and viability of the specified street tree species.
- (d) The detailed design gives full consideration to sub-soil drainage to ensure that all street tree planting pits are free draining and suitable for tree establishment.
- (e) Opportunities for the harvesting of surface storm water be investigated and used for the passive watering of street trees and other planted areas where appropriate.
- (f) The specified tree grate be substituted with the new City of Sydney standard street tree grate (yet to be determined). The applicant / developer shall contact the City's Street Tree Contract Coordinator to obtain the relevant details of this standard.

### (37) REMOVAL OF TREES ON THE SITE

The following requirements apply:

- (a) All trees, including the three Poplar trees adjacent to Portman Street, shall be retained and protected in situ for as long as possible during excavation, earthwork, and construction, and where possible, retained until further development on the site is approved and commenced.
- (b) Details of tree protection measures to be implemented during construction and development on site shall be provided to Council's Tree Management Team for approval prior to commencement of work for the respective stages. This shall include a Arboricultural Impact Assessment by a qualified Arborist with a minimum Australian Qualification Framework (AQF) of Level 5 must be provided to Council that includes;

- (i) A detailed list of trees recommended for removal and/or retention.
- (ii) Tree locations and numbers provided on a site plan
- (iii) An assessment and discussion of the likely impacts the proposed development will have on the trees. This should include above and below ground constraints on trees that should be retained.
- (iv) Recommendations of any design modifications, construction techniques and/or other protection methods required to minimise adverse impact on trees that should be retained during the demolition & construction works, and into the long term.
- (v) Any soil level changes and construction methods, and
- (vi) Details of the tree protection measures in accordance with AS4970-2009 Protection of trees on development site,
- (c) The local community shall be regularly informed of the removal of trees, including any staged removal. This may be in the form of regular neighbourhood newsletters and/or community information sessions and/or the like.

## (38) TREE PROTECTION ZONES

(a) Before the commencement of works, the Tree Protection Zone/s (TPZ) must be established around all tree/s to be retained not less than the distance indicated in the TPZ schedule below.

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TP7 Schodulo

Tree No	Species Name	Location	Radius (m) from Trunk
Group 1	Poplar trees	Portman Street (at rear of 97-115 Botany Rd).	8 metres
Group 2	Eucalypt trees	Frontage of 377-497 Botany Road	8 metres
Group 3	Eucalypt trees	northern side of Waverly Depot	8 metres

Each TPZ must be:

- (b) Enclosed as outlined above with a 1.8m high fully supported chainmesh protective fencing. The fencing shall be secure and fastened to prevent movement. The fencing shall have a lockable opening for access. Woody roots shall not be destroyed during the establishment or maintenance of the fencing.
- (c) Kept free of weed and grass and mulch maintained to a depth of 75mm for the duration of works
- (d) Have two signs identifying the name and contact details of the site Arborist attached facing outwards in a visible position. All signs must remain in place throughout all work on site
- (e) The following works shall be excluded from within all TPZs, unless prior approval is obtained from the City's Tree Management team;

- (i) Soil cut or fill including excavation and trenching
- (ii) Soil cultivation, disturbance or compaction
- (iii) Removal or pruning of trees, except where consent has been given
- (iv) Stockpiling. storage or mixing of materials
- (v) The parking, storing, washing and repairing of tools, equipment and machinery
- (vi) The disposal of liquids and refuelling
- (vii) The disposal of building materials
- (viii) The siting of offices or sheds
- (ix) Any action leading to the impact on tree health or structure
- (f) All work undertaken within or above the TPZ must be:
  - (i) Carried out in accordance with a work methodology statement prepared by a qualified Arborist with a minimum Australian Qualification Framework (AQF) of Level 5 and approved by Council's Tree Management Officer before its implementation (including, without limitation, handling and pedestrian/ machinery access).
- (g) Any root/s over 50mm in diameter must be pruned by the site Arborist. The Site Arborist must also detail all root pruning undertaken in report form to Council within 1 month of the excavation being undertaken.

#### (39) REMOVAL OF TREES ON 'DEVELOPMENT SITES' TO BE SUBJECT OF SEPARATE DEVELOPMENT APPLICATIONS

- (a) Besides tree removal related to the provision of the essential infrastructure approved as part of this development, the removal of any other trees on the 'Development Sites' identified in South Sydney LEP 1Green Square Town Centre shall be considered as part of the future Development Applications for the respective sites. Where possible, the future building and landscape designs shall retain healthy trees.
- (b) Setbacks, including allowances for the full height of buildings, shall be considered with all future development applications to allow existing healthy trees to be retained.
- (c) All trees shall remain on private development sites in the short term and their retention will be assessed and considered in relation to each development Application. Overall, any tree that is permitted for removal shall be kept on site for as long as possible, prior to the physical commencement of building works.

#### (40) STREE TREE REMOVAL AND RETENTION

(a) No street trees are approved for removal as part of this development application / consent.

- (b) Any street tree which requires removal for the purposed of essential infrastructure works or for any other reasons shall not be removed without written consent from Council's Tree Management Unit.
- (c) The applicant / developer shall provide sufficient evidence detailing why a street tree requires removal. this information shall include but is not limited to;
  - An Arboricultural Impact Assessment by a qualified Arborist with a minimum Australian Qualification Framework (AQF) of Level 5 must be provided to Council that includes;
  - (ii) A detailed list of trees recommended for removal and/or retention.
  - (iii) Tree numbers provided on a site plan.
  - (iv) An assessment and discussion of the likely impacts the proposed development will have on the trees. This should include above and below ground constraints on trees that should be retained.
  - (v) Recommendations of any design modifications, construction techniques and/or other protection methods required to minimise adverse impact on trees that should be retained during the demolition and construction works, and into the long term.
  - (vi) Details of the tree protection measures in accordance with AS4970-2009 Protection of trees on development site,

## (41) ADDITIONAL LANDSCAPING DETAILS TO BE PROVIDED

- (a) All development sites, where appropriate, shall include a provision within the designs / landscape plans, for at least one tree to be planted that will reach a minimum mature height of 8 metres.
- (b) Any landscaping to be undertaken should utilise species native to the locality with reference to the Draft City of Sydney DCP 2010 (Section 2.7) and the Draft Urban Ecology Strategy (in preparation). Non-native plants that have the potential to become invasive weeds should not be used in landscaping. A diversity of trees, shrubs and groundcover should be incorporated in the landscaping plans to provide foraging and nesting opportunities for native fauna.

## (42) VEHICLE FOOTWAY CROSSING

A separate application is to be made to, and approved by, Council for the construction of any proposed vehicle footway crossing or for the removal of any existing crossing and replacement of the footpath formation where any such crossings are no longer required.

All disused or redundant vehicle crossings and laybacks must be removed and footway and kerb reinstated in accordance with Council's standards, to suit the adjacent finished footway and edge treatment materials, levels and details, or as otherwise directed by Council officers. All construction and replacement works are to be completed in accordance with the approved plans prior to the issue of an Occupation Certificate.

<u>Note:</u> In all cases the construction materials should reinforce the priority of pedestrian movement over that of the crossing vehicle.

#### (43) COST OF SIGNPOSTING

All costs associated with signposting for any kerbside parking restrictions and traffic management measures associated with the development shall be borne by the developer.

#### (44) TRAFFIC WORKS

Any proposals for alterations to the public road, involving traffic and parking arrangements, must be designed in accordance with RMS Technical Directives and must be referred to and agreed to by the Local Pedestrian, Cycling and Traffic Calming Committee prior to any work commencing on site.

#### (45) VEHICLE ACCESS

The site must be configured to allow a vehicle to be driven onto and off the site in a forward direction.

#### SCHEDULE 1B

#### Prior to Construction Certificate / Commencement of Work / Health and Building

Note: Prior to the issue of the Construction Certificate, sufficient information must be forwarded to the certifying authority (whether Council or a private accredited certifier) illustrating compliance with the relevant requirements of the Building Code of Australia (and a copy forwarded to Council where Council is not the certifying authority). If Council is to be the certifying authority, please contact the Building Unit to discuss the requirements prior to submission of the application for construction certificate.

#### (46) STORMWATER AND DRAINAGE MANAGEMENT

- (a) The existing stormwater management and drainage connections servicing the upper catchment areas are to be maintained at all times (during and after approved works). Where temporary or interim stormwater works are required, permission is to be sought from the relevant authority (Council or Sydney Water) prior to works commencing. If a drainage line is to be removed or altered, replacing drainage line must have similar or better capacity.
- (b) Prior to a Construction Certificate being issued for each Stage, details of the proposed stormwater disposal and drainage from the development including where required a system of on-site stormwater detention in accordance with Council's standard requirements and details of the provision and maintenance of overland flow paths must be submitted to and approved by Council. All approved details for the disposal of stormwater and drainage are to be implemented in the development.
- (c) The requirements of Sydney Water with regard to the on-site detention of stormwater must be ascertained and complied with. Evidence of the approval of Sydney Water to the on-site detention must be submitted prior to a Construction Certificate being issued for each Stage.

(d) Any proposed connection to the Council's underground drainage system will require the owner to enter into a Deed of Agreement with the Council and obtain registration on Title of a Positive Covenant prior to Construction Certificate being issued and prior to the commencement of any work within the public way.

## (47) SUBSURFACE DRAINAGE

Subsurface drainage systems shall be provided for all road formations, cuttings, the base and sub base of pavement layers, retaining walls and the street closure parks. The design and construction of the subsurface drainage system shall be undertaken in accordance with City's current technical specification and standard details for civil works. Detailed plans and construction specifications for the subsurface drainage systems shall be prepared and certified as complying with Council's specifications prior to the issue of the first Construction Certificate excluding approved remediation, preparatory, demolition and excavation work for each Stage.

A design certification report for the subsurface drainage system shall be prepared by an appropriately qualified civil engineer and shall be submitted to the Principal Certifying Authority for approval prior to the issue of the first Construction Certificate excluding approved remediation, preparatory, demolition and excavation work for each Stage.

The plans shall include as a minimum the following information:

- (a) The proposed location of all subsoil drains and sub-pavement drains, including the nominal width and depth of trenches, pipe diameters and materials, longitudinal design grades, and the locations of outlets and cleanouts;
- (b) The location of public utility services shall also be included on the plans and cross sectional drawings;
- (c) Specifications for the construction of all components of the system in accordance with Council's Development Specification for Civil Works; and
- (d) All assumptions and/or calculations made in the determination of the need or otherwise for subsurface drainage in special circumstances shall be submitted to Council for approval with the documentation.

## (48) DRAINAGE AND SERVICE PIT LIDS

Drainage and service pit lids throughout the public domain shall be heelguard and bicycle safe, finish flush with the adjacent pavement to avoid trip hazards and be clear of obstructions for easy opening and cleaning. Pit lids shall be in accordance with any Council standards and details provided to Council prior to issue of a Construction Certificate excluding approved remediation, preparatory, demolition and excavation work for each stage where relevant.

## (49) DESIGN AND CONSTRUCTION OF ROADS AND DRAINAGE WORKS

(a) The final design and construction of all road and drainage works, including temporary road works, shall be undertaken in accordance with City's current technical specification and standard details for civil works. Detailed
plans and construction specifications for the works shall be prepared and certified as complying with Council's specifications prior to the issue of the first Construction Certificate for each Stage of works. A design certification report for the road works shall be prepared by an appropriately qualified civil engineer and shall be submitted for approval of Council prior to the issue of the first Construction Certificate excluding approved remediation, preparatory, demolition and excavation work for that Stage.

- (b) The submission to Council is to provide plans and specifications sufficient to describe in detail the design, scope and extent of all proposed road, drainage and infrastructure works for the construction of the road and drainage works prepared and certified by a Professional Engineer, and is to include:
  - (i) Details of existing and final site contours, levels and volumes of proposed earthworks providing confirmation that the site contours and levels will not adversely impact upon the flow of floodwater on the site.
  - Geometric design and pavement design of the road network including formation widths, batter slopes, longitudinal sections, cross-sections, materials, specifications and thicknesses of pavement and surfacing.
  - (iii) Kerb and gutter design and specifications and any necessary works and matching into existing formations including a minimum 500mm existing road pavement restoration.
  - (iv) Geometric and hydraulic design of all stormwater drainage structures and systems including drainage swales and temporary downstream drainage, if required, and specifications and materials and details of connections into Council's public stormwater system.
  - Details of the provision of stormwater stub connections for each Stage is to be included into the design.
  - (vi) Details of design and specifications for footpaths, retaining walls, pedestrian and associated verge works,
  - (vii) Details of structures and conduits for the provision and installation of any public utility services and any adjustment to existing services required,
  - (viii) Specifications showing assumptions, calculations and testing.
- (c) The certification for each Stage is to include confirmation from a Professional Engineer that the design complies with Council's Development Specifications for Civil Works Design and Construction or Council's specification current at the time.
- (d) The documentation is to be fully coordinated with the approved Public Domain and Landscape plans for the development.

### (50) DRAINAGE SYSTEM DESIGN

Drainage systems that convey flood waters from upstream catchments through the site must be designed such that:

- (a) The drainage systems convey flood waters up to and including the 1 in 100 year ARI and flows safely to downstream trunk drainage system. The design must comply with the safety standard recommended in the Australian Rainfall and Runoff, a guide to Flood Estimation by the Institution of Engineers and NSW Flood Development manual, 2005
- (b) Minimum of 1 in 20 year ARI flows must be contained within below ground pipes and the remaining flows above the pipe capacity and up to and including the 1 in 100 year ARI flows as overland flows. If roads are to be used to convey overland flows the safety requirements outlined in (a) above must be met.
- (c) Any special drainage structures or collection drainage pits within road reserves or in public spaces to capture or divert overland flows must meet safety requirements in (a) above.

# (51) ESSENTIAL INFRASTRUCTURE AND PUBLIC DOMAIN WORKS - HOLD POINTS AND HANDOVER

- (a) Prior to a Construction Certificate for each Stage being issued, excluding approved remediation, preparatory, demolition and excavation work, a set of hold points for approved public domain and civil construction work is to be determined and approved by Council in accordance with the City's Public Domain Manual.
- (b) Completion of the constructed Essential Infrastructure and Public Domain works is to be undertaken in accordance with the City's Public Domain Manual, including requirements for as-built documentation, certification and defects liability period.

### (52) ALIGNMENT LEVELS

Plans approved in principle

- (a) Prior to a Construction Certificate being issued for each Stage, road and footpath alignment levels must be submitted to Council for approval. The submission must be prepared by a Registered Surveyor and must be in accordance with the City of Sydney's Public Domain Manual.
- (b) These alignment levels, as approved by Council, are then to be incorporated into the plans submitted with the application for a Construction Certificate, excluding a Construction Certificate for approved preparatory, demolition or shoring work.
- (c) If a Public Domain Plan condition applies to the development the Alignment Levels application must be made concurrently or before the submission of a Public Domain Plan.

### (53) DESIGN CAPACITY FOR DRAINAGE SYSTEM

(a) Prior to the release of the Construction Certificate excluding approved remediation, preparatory, demolition and excavation work the applicant

must submit for Councils' approval the design capacity for the proposed trunk drainage system to accommodate events up to and including the one in twenty year ARI event, including:

- (b) Detailed engineering drawings both for all new drainage infrastructure an retained sections of existing drainage infrastructure;
- (c) Hydrologic and hydraulic calculations, including (but not limited to allowances for the effects of climate change, HGL levels, pit losses, inlet losses, bend losses, junctions losses and appropriate pit blockage factors.

### (54) SYDNEY WATER TRUNK DRAINAGE SYSTEM

- (a) Prior to a Construction Certificate being issued for Stages affected by Sydney Water's trunk drainage system, the approval of Sydney Water for the proposed work and relocation of its system shall be provided to Council.
- (b) Prior to a Construction Certificate being issued for Stages affected by Sydney Water's trunk drainage system, the approval of Sydney Water for any proposed connection into its system shall be provided to Council.

### (55) EASEMENTS FOR STORMWATER

- (a) An Easement for stormwater purposes to the benefit of Sydney Water must be registered on title for all relocated sections of its trunk drainage system.
- (b) Creation of Drainage Easement rights in favour of the City for any parts of the proposed local drainage system within private property.

### (56) SUBMISSION OF SUBDIVISION APPLICATION

A separate subdivision application shall be submitted to and approved by the City for the creation of the proposed roads and public reserves, including all easements reasonably necessary to recognise and support any infrastructure.

#### (57) FOOTWAY WIDTH

Minimum footway widths as detailed in the City LEP and DCP are to be provided including at road intersections. Where kerb and gutter alignments need to be adjusted to accommodate vehicle turning movements, appropriate adjustments to future property boundaries will need to occur. All adjustments are to be submitted to Council for approval.

### (58) FOOTPATH DAMAGE BANK GUARANTEE

(a) A Footpath Damage Bank Guarantee for each Stage of the development, calculated on the basis of lineal metres of site frontage of each stage, must be lodged with Council in accordance with the City of Sydney's adopted Schedule of Fees and Charges. The Footpath Damage Bank Guarantee must be submitted as an unconditional bank guarantee in favour of Council as security for repairing any damage to the public domain in the vicinity of the site.

- (b) In lieu of the bank guarantee required by a), Council may accept an unconditional performance bond that is in accordance with Council's policy on performance bonds.
- (c) The guarantee must be lodged with Council prior to works commencing on site.
- (d) The guarantee for each Stage will be retained in full until the works for the relevant Stage are complete and all rectification works carried out to the satisfaction of Council.

## (59) PHOTOGRAPHIC RECORD / DILAPIDATION REPORT - PUBLIC DOMAIN

Prior to an approval for works being granted, including demolition, for each Stage a photographic recording of the public domain site frontages is to be prepared and submitted to Council's satisfaction.

The recording must include clear images of the footpath, nature strip, kerb and gutter, driveway crossovers and laybacks, kerb ramps, road carriageway, street trees and plantings, parking restriction and traffic signs, and all other existing infrastructure along the street.

The form of the recording is to be as follows:-

- (a) A PDF format report containing all images at a scale that clearly demonstrates the existing site conditions;
- (b) Each image is to be labelled to identify the elements depicted, the direction that the image is viewed towards, and include the name of the relevant street frontage;
- (c) Each image is to be numbered and cross referenced to a site location plan;
- (d) A summary report, prepared by a suitable qualified professional, must be submitted in conjunction with the images detailing the project description, identifying any apparent existing defects, detailing the date and authorship of the photographic record, the method of documentation and limitations of the photographic record;
- (e) Include written confirmation, issued with the authority of both the applicant and the photographer that the City of Sydney is granted a perpetual nonexclusive license to make use of the copyright in all images supplied, including the right to make copies available to third parties as though they were Council images. The signatures of both the applicant and the photographer must be included.

# (60) PRESERVATION OF SURVEY MARKS

All works in City streets must ensure the preservation of existing permanent survey marks (a brass bolt, or a lead plug holding a brass tack, covered by a cast iron box). At least forty-eight hours prior to the commencement of any works in the public way within 1 metre of a permanent survey mark contact must be made with the City's Project Manager Survey / Design Services to arrange for the recovery of the mark.

Prior to the issue of a Construction Certificate, a survey plan, clearly showing the location of all permanent survey marks fronting the site and within 5 metres on each side of the frontages must be submitted to Council.

At least forty-eight hours prior to the commencement of any works in the public way within 1 metre of a permanent survey mark contact must be made with the City's Senior Surveyor to arrange for the recovery of the mark.

A fee must be paid to the Council for the replacement of any permanent survey mark removed or damaged in accordance with the City's Schedule of Fees and Charges (Reinstatement of Survey Box).

### (61) ESSENTIAL INFRASTRUCTURE / PUBLIC DOMAIN SECURITY

Security for Essential Infrastructure works is to be lodged prior to the issue of a Construction Certificate or works commencing (whichever is earlier) for each Stage.

A detailed cost estimate (certified by a Quantity Surveyor) of each Stage of Essential Infrastructure and Public Domain Works is to be prepared and submitted to Council for approval. The approved value of will determine the Essential Infrastructure Security amount.

The Essential Infrastructure Security must be submitted as an unconditional bank guarantee or insurance bond in favour of Council in accordance with Council policy, as security for completion of the relevant Stage of Essential Infrastructure works.

The Security will be retained in full until all Essential Infrastructure works for that Stage is complete and the required certifications, warranties and works-as executed documentation are submitted and approved by Council in writing. On satisfying the above requirements, 90% of the total securities will be released. The remaining 10% will be retained for the duration of the specified Defects Liability Period.

### (62) STREET AND PEDESTRIAN LIGHTING

The applicant shall provide a system of underground street and pedestrian lighting along all roads, footpaths, and street closures in accordance with Ausgrid and Council standards. Detailed plans, specifications, light level calculations are to be submitted to and approved by Council for each stage prior to the issue of a construction certificate for that stage.

The extent of smart pole lighting, Ausgrid standard lighting and wall mounted non-standard lighting types are to be reviewed and agreed with by Council.

The lighting plans shall show layout, location, connections, conduits, types, luminaries, fixtures and footings.

If lighting is to be fixed to adjoining buildings the above details plus details of the fixture and timing for delivery are to be included in the submission.

Temporary lighting to facilitate Staging or until adjoining developments are constructed and permanent lighting installed are to form part of the submission.

# (63) DILAPIDATION SURVEYS

If required by RailCorp, prior to the commencement of works and prior to the issue of the occupation certificate, a joint inspection of the rail infrastructure and property in the vicinity of the project is to be carried out by representatives from RailCorp and the Applicant. These dilapidation surveys will establish the extent of any existing damage and enable any deterioration during construction to be observed. The submission of a detailed dilapidation report will be required unless otherwise notified by RailCorp.

### (64) ELECTROLYSIS RISK

Prior to the issue of a Construction Certificate the Applicant is to engage an Electrolysis Expert to prepare a report on the Electrolysis Risk to the development from stray currents. The Applicant must incorporate in the development all the measures recommended in the report to control that risk. A copy of the report is to be provided to the Principal Certifying Authority with the application for a Construction Certificate.

# (65) RISK ASSESSMENT / MANAGEMENT PLAN AND DETAILED SAFE WORK METHOD STATEMENTS

If required by RailCorp, prior to the issue of a Construction Certificate a Risk Assessment / Management Plan and detailed Safe Work Method Statements (SWMS) for the proposed works are to be submitted to RailCorp for review and comment on the impacts on the rail corridor. The Principal Certifying Authority is not to issue the Construction Certificate until written confirmation has been received from RailCorp that this condition has been satisfied.

# (66) TUNNEL/TRACK MONITORING PLAN

If required by RailCorp, a tunnel/track monitoring plan (including instrumentation and the monitoring regime during excavation and construction phases) is to be submitted to RailCorp for review and endorsement prior to the issuing of a Construction Certificate. The Principal Certifying Authority is not to issue the Construction Certificate until written confirmation has been received from RailCorp advising of the need to undertake the track monitoring plan, and is required, that it has been endorsed.

# (67) PUBLIC LIABILITY INSURANCE COVER

Prior to the issue of a Construction Certificate the Applicant must hold current public liability insurance cover for a sum to be determined by RailCorp. This insurance shall not contain any exclusions in relation to works on or near the rail corridor. The Applicant is to contact RailCorp's Rail Corridor Management Group to obtain the level of insurance required for this particular proposal. Prior to issuing the Constriction Certificate the Principle Certifying Authority must witness written proof of this insurance in conjunction with RailCorp's written advice to the Applicant on the level of insurance required.

### (68) UTILITY SERVICES

(a) Prior to the commencement of any subdivision work on the site or public domain work, documentary evidence is to be submitted to the accredited certifier/Principal Certifying Authority and Council that the requirements of all public utility authorities (e.g. Energy Australia, Sydney Water, and Telecommunications Carriers) with services within and adjacent to the site have been satisfied with regard to the design of any deviation, diversion, construction or removal of service infrastructure within the site.

(b) Documentary evidence is to be submitted to the accredited certifier/Principal Certifying Authority and Council that the requirements of all public utility authorities providing services to the site have been satisfied with regard to the completion of construction and installation of those services.

### (69) REMEDIATION ACTION PLANS - STAGED WORKS

Final Remediation Action Plans for each Stage of the proposed works, are to be submitted for approval by the Council and the NSW EPA accredited Site Auditor Graeme Nyland in accordance with the approved Overarching Remediation Action Plan for the Essential Infrastructure works (referred to in Condition 1 above), prior to the commencement of work.

### (70) LAND REMEDIATION

The site must be remediated and validated in accordance with the final Remediation Action Plan approved by the Site Auditor and the Council as required in accordance with this consent.

Any variations to the proposed remediation Action Plan shall be approved in writing by the Accredited Site Auditor and Council prior to the commencement of such work.

# (71) SITE AUDIT STATEMENT

PRIOR TO ANY ABOVE GROUND WORKS COMMENCING a Site Audit Statement prepared by a NSW EPA accredited auditor is to be submitted to Council certifying that the site is suitable for the intended use. Conditions on the Site Audit Statement shall form part of the consent.

Note: Where the Site Audit Statement is subject to conditions that require ongoing review by the Auditor or Council these should be discussed with Council before the Site Audit Statement is issued.

### (72) CLEAN FILL

Documentation is to be submitted to Council for approval demonstrating that clean fill will be established with an adequate clearance around all infrastructure, services, roads and public domain works.

### (73) ASBESTOS REMOVAL WORKS

All works removing asbestos containing materials must be carried out by a suitably licensed asbestos removalist duly licensed with Workcover NSW, holding either a Friable (Class A) or a Non- Friable (Class B) Asbestos Removal Licence which ever applies.

Five days prior to the commencement of licensed asbestos removal, Workcover must be formally notified of the works. All adjoining properties and those opposite the development must be notified in writing of the dates and times when asbestos removal is to be conducted. The notification is to identify the

# NOTICE OF DETERMINATION - APPROVAL D/2012/1175/A

licensed asbestos removal contractor and include a contact person for the site together with telephone number and email address.

All works must be carried out in accordance with the Work Health and Safety Regulation 2011 and the NSW Government and Workcover document entitled How to Safely Remove Asbestos, Code of Practice and the City of Sydney Asbestos Policy.

Standard commercially manufactured signs containing the words "DANGER ASBESTOS REMOVAL IN PROGRESS" measuring not less than 400mm x 300mm are to be erected in prominent visible positions on the site.

Asbestos to be disposed of must only be transported to waste facilities licensed to accept asbestos. The names and location of these facilities are listed in Part 6 of the City of Sydney's Asbestos Policy.

No asbestos products are to be reused on the site (i.e. packing pieces, spacers, formwork or fill etc.).

No asbestos laden skips or bins are to be left in any public place without the approval of Council.

A site notice board must be located at the main entrance to the site in a prominent position and must have minimum dimensions of 841mm x 594mm (A1) with any text on the notice to be a minimum of 30 point type size.

The site notice board must include the following:

- (a) contact person for the site;
- (b) telephone and facsimile numbers and email address; and
- (c) site activities and time frames.

# (74) EROSION AND SEDIMENT CONTROL - MORE THAN 2,500SQM

The Soil and Water Management Plan accompanying this Development Application has not been approved by this consent.

[Planner: Only use this first paragraph if a Soil and Water Management Plan was submitted with the DA, otherwise delete]

Prior to the commencement of any works on site, including, but not limited to demolition, excavation or construction work, a Soil and Water Management Plan (SWMP) must be submitted to and be approved by the Principal Certifying Authority.

- (a) The SWMP must identify and respond to all items for Erosion and Sediment Control Plans listed in the condition above, as well as:
  - (i) existing site contours;
  - (ii) location and diagrammatic representation of all necessary erosion and sediment control systems or structures used to mitigate or prevent pollution to stormwater;

(b) Location and engineering details with supporting design calculations for all necessary sediment basins, constructed wetlands, gross pollutant traps, trash racks or bio filtration swales (as relevant).

### (75) ROAD OPENING PERMIT

A separate Road Opening Permit under Section 138 of the Roads Act 1993 must be obtained from Council prior to the commencement of any:

- (a) Excavation in or disturbance of a public way, or
- (b) Excavation on land that, if shoring were not provided, may disturb the surface of a public road (including footpath).

### (76) STORMWATER AND DRAINAGE - MAJOR DEVELOPMENT

On-site detention, treatment and re-use is encouraged.

- (a) Prior to a Construction Certificate being issued, details of the proposed stormwater disposal and drainage from the development including a system of on-site stormwater detention in accordance with Council's standard requirements and details of the provision and maintenance of overland flow paths must be submitted to and approved by Council. All approved details for the disposal of stormwater and drainage are to be implemented in the development.
- (b) Any proposed connection to the Council's underground drainage system will require the owner to enter into a Deed of Agreement with the Council and obtain registration on Title of a Positive Covenant prior to Construction Certificate being issued and prior to the commencement of any work within the public way.
- (c) The requirements of Sydney Water with regard to the on-site detention of stormwater must be ascertained and complied with. Evidence of the approval of Sydney Water to the on-site detention must be submitted prior to a Construction Certificate being issued.
- (d) An "Application for Approval of Stormwater Drainage Connections" must be submitted to the Council with the appropriate fee at the time of lodgement of the proposal for connection of stormwater to the Council's drainage system.
- (e) A Positive Covenant must be registered on the title for all drainage systems involving On-site Detention (OSD) to ensure maintenance of the approved OSD system regardless of the method of connection.

# (77) APPLICATION FOR HOARDINGS AND SCAFFOLDING ON A PUBLIC PLACE

(a) A separate application under Section 138 of the Roads Act 1993 is to be made to Council to erect a hoarding and/or scaffolding in a public place and such application is to include:-

- Architectural, construction and structural details of the design in accordance with the Policy for the Design and Construction of Hoarding (September 1997) and the Guidelines for Temporary Protective Structures (April 2001).
- (ii) Structural certification prepared and signed by an appropriately qualified practising structural engineer.

Evidence of the issue of a Structural Works Inspection Certificate and structural certification will be required prior to the commencement of demolition or construction works on site.

Assessment of the impacts of construction and final design upon the City of Sydney's street furniture such as bus shelters, phone booths, bollards and litter bins and JCDecaux street furniture including kiosks, bus shelters, phones, poster bollards, bench seats and littler bins. The applicant is responsible for the cost of removal, storage and reinstallation of any of the above as a result of the erection of the hoarding. In addition, the applicant is responsible for meeting any revenue loss experienced by Council as a result of the removal of street furniture. Costing details will be provided by Council. The applicant must also seek permission from the telecommunications carrier (e.g. Telstra) for the removal of any public telephone.

- (b) Should the hoarding obstruct the operation of Council's CCTV Cameras, the applicant must relocate or replace the CCTV camera within the hoarding or to an alternative position as determined by Council's Contracts and Asset Management Unit for the duration of the construction of the development. The cost of relocating or replacing the CCTV camera is to be borne by the applicant. Further information and a map of the CCTV cameras is available by contacting Council's CCTV Unit on 9265 9232.
- (c) The hoarding must comply with the Councils policies for hoardings and temporary structures on the public way. Graffiti must be removed from the hoarding within one working day.

# (78) BARRICADE PERMIT

Where construction/building works require the use of a public place including a road or footpath, approval under Section 138 of the Roads Act 1993 for a Barricade Permit is to be obtained from Council prior to the commencement of work. Details of the barricade construction, area of enclosure and period of work are required to be submitted to the satisfaction of Council.

### (79) UTILITY SERVICES

To ensure that utility authorities are advised of the development:

(a) Prior to the issue of a Construction Certificate a survey is to be carried out of all utility services within and adjacent to the site including relevant information from utility authorities and excavation if necessary, to determine the position and level of services. (b) Prior to the commencement of work the applicant is to obtain written approval from the utility authorities (e.g. Energy Australia, Sydney Water, and Telecommunications Carriers) in connection with the relocation and/or adjustment of the services affected by the construction of the underground structure. Any costs in the relocation, adjustment or support of services are to be the responsibility of the developer.

### (80) CONTAMINATED WASTE

The generation, storage, transport, treatment or disposal of industrial, hazardous or Group A liquid waste must be in accordance with the requirements of the Protection of the Environment Operations Act 1997 and the NSW Department of Environment and Climate Change and Water (DECCW) waste tracking requirements. The generation, storage, transport, treatment or disposal of industrial, hazardous or Group A liquid waste must be in accordance with the requirements of the Protection of the Environment Operations Act 1997 and the NSW Department of Environment Climate Change and Water (DECCW) waste tracking requirements of the Protection of the Environment Operations Act 1997 and the NSW Department of Environment Climate Change and Water (DECCW) waste tracking requirements. For further information contact DECCW on 131 555.

### (81) CONSTRUCTION TRAFFIC MANAGEMENT PLAN

A Construction Traffic Management Plan must be submitted to and approved by Council prior to a Construction Certificate being issued.

### SCHEDULE 1C

### During Construction/Prior to Occupation/Completion

### (82) TEMPORARY DRAINAGE DIVERSIONS

At all times during the construction/reconstruction of the trunk drainage system, adequate temporary diversions are to be installed and maintained to the satisfaction of Council to ensure that the design 20 year capacity of the drainage system is retained at all times.

### (83) HAZARDOUS AND INDUSTRIAL WASTE

Hazardous and/or industrial waste arising from the development activities must be removed and/or transported in accordance with the requirements of the NSW Environmental Protection Authority, NSW Work Cover Authority pursuant to the provisions of the following:

- (a) Protection of the Environment Operations Act 1997.
- (b) Protection of the Environment Operations (Waste) Regulation 2005.
- (c) Waste Avoidance and Recovery Act 2001.
- (d) Work Health and Safety Act 2011
- (e) Work Health and Safety Regulation 2011

### (84) WASTE CLASSIFICATION

Prior to the exportation of waste (including fill or soil) from the site the material should be classified in accordance with the provisions of the Protection of the

'Environment Operations Act1997 and the NSW EPA Environmental Guidelines Assessment, Classification and Management of Non- Liquid Wastes'. The classification of the material is essential to determine where the waste may be legally taken. The Protection of the Environment Operations Act 1997 provides for the commission of an offence for both the waste owner and the transporter if the waste is taken to a place that cannot lawfully be used as a waste facility for the particular class of waste. For the transport and disposal of industrial, hazardous or Group A liquid waste advice should be sought from the EPA.

### (85) DUST MANAGEMENT

All reasonable and feasible steps must be taken to ensure that dust from activities conducted on site is kept to a minimum. This includes the covering and wetting-down of disturbed soils.

### (86) WATER POLLUTION

No waste water, chemicals or other substances harmful to the environment shall be permitted to discharge to Council's stormwater system. Only clean, unpolluted water is permitted to discharge into the stormwater system.

### (87) USE OF INTRUSIVE APPLIANCES - TIME RESTRICTION.

- (a) The operation of high noise intrusive plant and machinery such as pile drivers, rock breakers and hydraulic hammers and those which are not listed in Groups B, C, D, E or F of Schedule 1 of the City of Sydney Code of Practice for Construction Hours/Noise 1992 and Australian Standard 2436-2010 "Guide to Noise Control on Construction, Maintenance and Demolition Sites is restricted to the hours of:
  - (i) 9:00am 12:30pm and 1:30pm to 4:30pm Mondays to Fridays and
  - (ii) 9am 1pm on Saturdays and No operation is permitted on Sundays or public holidays.
- (b) All reasonable and feasible steps must be undertaken to ensure that all works complies with the City of Sydney Code of Practice for Construction Hours/Noise 1992 and Australian Standard 2436- 2010 'Guide to Noise Control on Construction, Maintenance and Demolition Sites'
- (c) All reasonable and feasible steps must be taken to ensure that noise levels from activities conducted on site are kept to a minimum including the adoption of less noise intrusive plant and equipment or technologies.

### (88) HOURS OF WORK AND NOISE - OUTSIDE CBD

The hours of construction and work on the development must be as follows:

(a) All work, including building/demolition and excavation work, and activities in the vicinity of the site generating noise associated with preparation for the commencement of work (e.g. loading and unloading of goods, transferring of tools etc.) in connection with the proposed development must only be carried out between the hours of 7.30am and 5.30pm on Mondays to Fridays, inclusive, and 7.30am and 3.30pm on Saturdays, with safety inspections being permitted at 7.00am on work days, and no work must be carried out on Sundays or public holidays.

(b) All work, including demolition, excavation and building work must comply with the City of Sydney Building Sites Noise Code and Australian Standard 2436 - 1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites".

### (89) NOISE USE

(a) General criteria

The emission of noise associated with the use of the premises including the operation of any mechanical plant and equipment shall comply with the following criteria:

- (i) The LAeq, 15minute noise level emitted from the use must not exceed the background noise level LA90, 15minute by more than 5dB when assessed at the boundary of any affected residence.
- (ii) The background noise level shall be measured in the absence of noise emitted from the use in accordance with Australian Standard AS 1055.1-1997-Description and measurement of environmental noise.
- (iii) The LAeq,15minute noise level shall be adjusted to account for any applicable modifying factors in accordance with Part 4 of the EPA NSW Industrial Noise Policy.
- (iv) In this clause, the term "noise level emitted from the use" means the contributing noise level from the use in isolation to any other ambient noise and account must therefore be taken of the LAeq, 15minute when the use is not in operation.
- (v) In circumstances where this development application refers to a modification or addition to an existing use, the background noise level referred to in this clause pertains to the LA90, 15minute noise level measured in the absence of all noise from the site.

### (90) ACID SULFATE SOILS

- (a) If any new information comes to light during, demolition, excavation or construction works which has the potential to alter previous conclusions about Acid Sulfate Soils then this must be immediately notified to the Council and the Principal Certifying Authority.
- (b) All works arising from the identification of Acid Sulfate Soils are to be carried out in accordance with the NSW Acid Sulfate Soils Management Advisory Committee, Acid Sulfate Soils Assessment Guidelines 1998 for works that are classified as being in an Acid Sulfate Soils Zone Class 3.

### (91) COVERING OF LOADS

All vehicles involved in the excavation and/or demolition process and departing the property with demolition materials, spoil or loose matter must have their loads fully covered before entering the public roadway.

# (92) EROSION AND SEDIMENT CONTROL

The Soil and Water Management Plan (SWMP) or Erosion and Sediment Control Plan (ESCP) which has been approved by the Principal Certifying Authority must be implemented in full during the construction period.

During the construction period;

- (a) erosion and sediment controls must be regularly inspected, repaired and maintained in working order sufficient for a 10 year Average Recurrence Interval (ARI) rainfall event;
- (b) erosion and sediment control signage available from Council must be completed and attached to the most prominent structure visible at all times when entering the site for the duration of construction; and
- (c) building operations and stockpiles must not be located on the public footway or any other locations which could lead to the discharge of materials into the stormwater system.

# (93) HAZARDOUS AND INDUSTRIAL WASTE

Hazardous and/or industrial waste arising from the demolition/operational activities must be removed and/or transported in accordance with the requirements of the Department of Environment and Conservation (DEC) and the NSW Work Cover Authority pursuant to the provisions of the following:

- (a) Protection of the Environment Operations Act 1997.
- (b) Protection of the Environment Operations (Waste) Regulation 1996.
- (c) Waste Avoidance and Recovery Act 2001.
- (d) New South Wales Occupational Health & Safety Act 2000.
- (e) New South Wales Construction Safety Act 1912 (Regulation 84A-J Construction Work Involving Asbestos or Asbestos Cement 1983).
- (f) The Occupational Health & Safety Regulation 2001.
- (g) The Occupational Health & Safety (Asbestos Removal Work) Regulation 1996.

# (94) PROTECTION OF STREET TREES DURING CONSTRUCTION

All street trees adjacent to the site not approved for removal must be protected at all times during demolition and construction, in accordance with Council's Tree Preservation Order. Details of the methods of protection must be submitted to and be approved by Council prior to the issue of the Construction Certificate and such approval should be forwarded to the Principal Certifying Authority. All approved protection measures must be maintained for the duration of construction and any tree on the footpath which is damaged or removed during construction must be replaced.

### (95) VEHICLE CLEANSING

Prior to the commencement of work, suitable measures are to be implemented to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site. It is an offence to allow, permit or cause materials to pollute or be placed in a position from which they may pollute waters.

# (96) ACCESS DRIVEWAYS TO BE CONSTRUCTED

Approved driveways are to be constructed for all vehicular access to the construction site in accordance with the requirements of Council's "Driveway Specifications" to the satisfaction of Council.

# (97) LOADING AND UNLOADING DURING CONSTRUCTION

The following requirements apply:

- (a) All loading and unloading associated with construction activity must be accommodated on site.
- (b) If, during excavation, it is not feasible for loading and unloading to take place on site, a Works Zone on the street may be considered by Council.
- (c) A Works Zone may be required if loading and unloading is not possible on site. If a Works Zone is warranted an application must be made to Council at least 8 weeks prior to commencement of work on the site. An approval for a Works Zone may be given for a specific period and certain hours of the days to meet the particular need for the site for such facilities at various stages of construction. The approval will be reviewed periodically for any adjustment necessitated by the progress of the construction activities.
- (d) In addition to any approved construction zone, provision must be made for loading and unloading to be accommodated on site once the development has reached ground level.
- (e) The structural design of the building must allow the basement and/or the ground floor to be used as a loading and unloading area for the construction of the remainder of the development.

# (98) NO OBSTRUCTION OF PUBLIC WAY

The public way must not be obstructed by any materials, vehicles, refuse, skips or the like, under any circumstances. Non-compliance with this requirement will result in the issue of a notice by Council to stop all work on site.



# **3.5 OTHER REGULATORY APPROVALS**

- Appendix 3.5.1(b) Statement of Environmental Effects

# Statement of Environmental Effects

City of Sydney Town Hall House 456 Kent Street Sydney NSW 2000

Green Square Town Centre Essential Infrastructure August 2012



Sydney2030/Green/Global/Connected



city of Villages

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# Certification

This report has been prepared and reviewed by the City of Sydney as prescribed below.

Action	Name	Title	Signature	Date
Prepared by	David White	Planner Green Square		03.08.2012
Reviewed by	John Dwyer	Senior Program Manager Green Square		03.08.2012
Approved for issue by	Garry Harding	Director City Operations		03.08.2012

# Abbreviations

The following abbreviations are used in this Statement of Environmental Effects:				
AADT	Annual Average Daily Traffic			
AEP	Annual Exceedance Probability			
ANZECC	Australia and New Zealand Environment Conservation			
ARI	Average Recurrence Interval			
ARR	Australian and Runoff			
AS	Australian Standard			
AWCS	Automated Waste Collection System			
BoM	Bureau of Meteorology			
BTEX	Benzene, Toluene, Ethyl benzene and Xylenes			
CBR	California Bearing Ratio			
Cd	Cadmium			
CEMP	Construction Environmental Management Plan			
Cr	Chromium			
Cu	Copper			
СТМР	Construction Traffic Management Plan			
DA	Development Application			
DEC	NSW Department of Environment& Conservation			
DCP	Development Control Plan			
ESD	Ecologically Sustainable Development			
EMP	Environmental Management Plan			
ENM	Excavated Natural Materials			
EP&A Act	NSW Environmental Planning & Assessment Act 1979			
EPI	Environmental Planning Instrument			
FPL	Flood Planning Level			
FDA	Full Depth Asphalt			
HLA	HLA Envirosciences			
Km /	Kilometres / hour			
LEP	Local Environmental Plan			
LGA	Local Government Area			
m	Metres			
MWT	Masson Wilson Twinney			
Ni	Nickel			
ОСР	Organochlorine pesticides			
РАН	Polycyclic Aromatic Hydrocarbon			
РСВ	polychlorinated biphenyl			

# Abbreviations

PMF	Probable Maximum Flood	
PQL	Practical Quantification Limit	
PSO	Planning Scheme Ordinance	
RAP	Remedial Action Plan	
REF	Review of Environmental Factors	
REP	Regional Environmental Plan	
RMS	Roads & Maritime Services	
SEPP	State Environmental Planning Policy	
SEE	Statement of Environmental Effects	
SIL	Soil Investigation Levels	
SIS	Species Impact Statement	
SVOC	Semi Volatile Organic Compound	
the Blue Book	Managing Urban Stormwater Soils and Construction (Landcom)	
Council	The City of Sydney Council (Elected Council)	
the City / City of Sydney	The City of Sydney (Staff)	
the hospital	Royal South Sydney Hospital	
the Regulations	NSW Environmental Planning & Assessment Regulations 2000	
ТМАР	Transport Management & Accessibility Plan	
TN	Total Nitrogen	
ТР	Total Phosphorous	
ТРН	Total Petroleum Hydrocarbon	
TSS	Total Suspended Solids	
the Town Centre	Green Square Town Centre	
UST	Underground Storage Tank	
VENM	Virgin Excavated Natural Materials	
VOC	Volatile Organic Compound	

# **Executive Summary**

### Background

In 2008, the City of Sydney Council (Council) approved a Development Application (D/2008/1195) for Essential Infrastructure at Green Square Town Centre (the Town Centre). Since this time, the City reviewed its planning controls in response to changes to development plans as proposed by the main landowners, which also resulted in changes to the road layout.

The consent period for the previous Development Application (DA) has lapsed and a new DA must now be lodged with Council for approval under Part 4 of the NSW Environmental Planning & Assessment Act 1979 (EP&A Act).

The new DA proposes a slightly amended road layout and also includes 'Green Infrastructure' works which includes the underground pipes and wires that will provide electricity, non-drinking recycled water, waste collection and thermal energy to future residential and commercial development in the Town Centre. Other changes include:

- Staging of the project to occur over a 15 year timeframe;
- the removal of Sites 1 4 adjacent to the Green Square Rail Station from the DA area;
- a changing of road names; and
- removal of a previously required community building from the central plaza area.

The proposed Essential Infrastructure works will help achieve the Strategic Directions of Sustainable Sydney 2030 which include 'Division 2 – A leading environmental performer and Direction 9 – Sustainable development, renewal and design'.

The proposed Essential Infrastructure works will help achieve the Metropolitan Strategy, which nominates Green Square as a 'Planned Major Centre' within the City of Sydney Local Government Area, which will have a residential population of 40,000 and a workforce of up to 20,000<sup>1</sup> for the wider urban renewal area.

The DA is for the Essential Infrastructure works, as well as the Green Infrastructure works and the utilities that will be provided above and below ground within the Town Centre. The DA does not involve the construction of any new residential and commercial buildings which will be subject of separate DAs to be lodged with Council.

The Green Square Essential Infrastructure project is proposed to be delivered in a co-ordinated manner over a 15 year period to match proposed development with future infrastructure provision. This SEE has been drafted to achieve Council's objective of undertaking a staged approach to development in the Town Centre.

The proposed Essential Infrastructure works will support future development and will help achieve a high level of public amenity and basic requirements for access, circulation and services.

### **Proposed Works**

The works that form part of this Statement of Environmental Effects (SEE) include:

• Rearrangement and construction of new streets, including footpaths, ramps, access stairs and the like together with associated infrastructure such as drainage, services, vehicular crossings, bus stop set-outs, street tree pits and

<sup>&</sup>lt;sup>1</sup> In the Green Square Urban Renewal Area covering an area of 278 hectares Statement of Environmental Effects Green Square Town Centre Essential Infrastructure Ref: 2012/215031-08

# **Executive Summary**

street trees etc. Detailed road marking and signage plans, including pedestrian crossings, cycle lanes, bus stops, traffic lights;

- Green Infrastructure works including the above and below ground utility connections that will connect with the proposed Green Infrastructure Centre (GIC)<sup>2</sup> which is proposed to be located at the former Royal South Sydney Hospital site (No.3 Joynton Avenue, Zetland);
- Concept landscape and streetscape design works including pavement design and construction, street furniture (seats, light poles and bins etc.) tree planting etc;
- Existing services, such as electrical, water, stormwater, sewer and telecommunications demolition and relocation, both above and below ground;
- Removal of specified trees and minor structures;
- Construction of new underground and above services;
- Stormwater diversion construction sequencing details;
- Services coordination details;
- Staging details to match the planned construction delivery for the Town Centre; and
- Erosion and sediment control measures during the proposed works.

### Assessment

The proposed works are permissible with Council consent under City of Sydney Planning Scheme Ordinance (PSO) 1971, which zones most of the land 'Industrial'. Roads works and infrastructure are not a prohibited use (Column V). The proposed works are also consistent with the following environmental planning instruments which have been assessed in this SEE, which include South Sydney Local Environmental Plan (LEP) No.114 (Southern Industrial and Rosebery/Zetland Planning Districts) and South Sydney LEP 1998 Amendment No.17 Green Square Town Centre.

The SEE also provides an assessment of the Planning Proposals (Draft LEPs) which apply to the Town Centre and the Green Square Town Centre Development Control Plan 2012<sup>3</sup>, which was approved by Council in 2012.

The DA is classed as 'Integrated Development' under Clause 91 of the EP&A Act and approval is required from the NSW Roads and Maritime Services (RMS) for a proposed road connection to Botany Road (State road).

### **Statement of Environmental Effects**

The SEE includes the assessment of key engineering, environmental and planning issues such as transport, contamination, geotechnical, archaeological, flooding and hydrology, archaeological and water sensitive urban design. The SEE also includes a public domain strategy and concept design plans for streetscape and landscape works. Mitigation measures are included in the separate reports which will reduce any potential adverse impacts from the works during the construction and operation stage.

Importantly the assessment undertaken in the SEE builds upon the previous DA

<sup>&</sup>lt;sup>2</sup> The GIC includes the Trigeneration facility, a Water Re-use facility and an Automated Waste Collection System.

<sup>&</sup>lt;sup>3</sup> The Planning Proposals (Draft LEP) is awaiting gazettal from the Minister for Planning & Infrastructure

# **Executive Summary**

studies undertaken but incorporates the assessment of new State and local environmental and planning policy and legislation. Further the assessment and design in the new DA incorporates best practice design in the provision and layout of infrastructure.

### Consultation

The City has maintained consultation with the community and key land owners on the redevelopment of the Green Square Town Centre as well as key NSW Government agencies such as Sydney Water, NSW Office of Environment & Heritage, Ausgrid and the NSW Roads & Maritime Services. Relevant issues raised by the community, land owners and NSW Government agencies have been incorporated into the SEE.

Consultation has also been maintained with key landowners to ensure that the works meet their future requirements for development to occur. Land owners in the Town Centre have been notified under Clause 49(2) (a) of the NSW Environmental Planning & Assessment Regulation 2000.

### Conclusion

The proposed Green Square Town Centre Essential Infrastructure works are critical to the development of Green Square as a 'Planned Major Centre' and to provide a high level of amenity for a future population. The proposed Green Infrastructure works will help achieve the sustainable renewal of the Town Centre in accordance with Sustainable Sydney 2030.

This SEE has assessed key engineering, environmental and planning issues as well as key environmental planning instruments, relevant environmental and planning legislation and City of Sydney policies. The assessment concludes that the proposed Essential Infrastructure works are unlikely to have a significant or adverse environmental effect.

Consultation undertaken as part of the preparation of this DA has been incorporated into the assessment of this SEE and further consultation will continue as part of the future planning and development of the Town Centre.

The proposed Essential Infrastructure works will provide the foundation from which the Town Centre will be developed, which will occur in a staged manner over the next 15 years. Importantly the proposed Essential Infrastructure works will provide an opportunity for more sustainable outcomes in the Town Centre through less waste, water and energy use.

We request that Council supports the proposed development as described in this SEE and grants approval under Section 80 of the EP& A Act.

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# **1** Introduction

### 1.1 Background

In 2008, the City of Sydney Council (Council) approved a Development Application (D/2008/1195) for Essential Infrastructure at Green Square Town Centre (the Town Centre). Since this time, the City reviewed its planning controls in response to changes to development plans as proposed by the main landowners, which also resulted in changes to the road layout.

The consent period for the previous Development Application (DA) has lapsed and a new DA must now be lodged with Council for approval under Part 4 of the NSW Environmental Planning & Assessment Act 1979 (EP&A Act).

The new DA now proposes a slightly amended road layout which includes the 'Green Infrastructure' works which includes the underground pipes and wires that will provide electricity, non-drinking recycled water, waste collection and thermal energy to future residential and commercial development in the Town Centre. Other changes include:

- staging of the development in Town Centre over a 15 year period;
- the removal of Sites 1 4 adjacent to the Green Square Rail Station from the DA area;
- a changing of road names;
- changes to proposed developments within the Town Centre;
- removal of a previously required community building from the central plaza area; and
- changes to the road layout.

The proposed Essential Infrastructure works will help achieve the Strategic Directions of Sustainable Sydney 2030 which include 'Direction 2 – A leading environmental performer and Direction 9 – Sustainable development, renewal and design'.

The proposed Essential Infrastructure works will help achieve the Metropolitan Strategy, which nominates Green Square as a 'Planned Major Centre' within the City of Sydney Local Government Area, which will have a residential population of 40,000 and a workforce of up to 20,000<sup>4</sup>.

The DA is for the Essential Infrastructure works, as well as the Green Infrastructure works and utilities that will be provided above and below ground within the Town Centre. The DA does not involve the construction of any new residential and/or commercial buildings which will be subject of separate DAs to be lodged with Council.

The SEE acknowledges that development in the Town Centre will be staged over a fifteen year period.

The proposed infrastructure works will support future development and to achieve a high level of public amenity and basic requirements for access, circulation and services.

#### Statement of Environmental Effects Green Square Town Centre Essential Infrastructure Ref: 2012/215031-08

<sup>&</sup>lt;sup>4</sup> In the Green Square Urban Renewal Area covering an area of 278 hectares

### 1.1.1 The Proposed development

The proposed development, which is assessed in this SEE, covers the above and below ground infrastructure works for the Green Square Town Centre. These infrastructure works will allow future development and to achieve a high level of public amenity. The key infrastructure works cover new roads, new and upgrades utilities (gas, telecommunications, drinking water, stormwater, sewerage, electrical). Further details of these proposed works have been provided in Chapter 3 of this SEE.

### **1.2** Need for the Development Application

The proposed works are permissible with Council consent under the City of Sydney Planning Scheme Ordinance (PSO) 1971, which zones most of the General Industrial 4(a). Those sites within the Town Centre that have frontage to Botany Road are also affected by a Road Reservation - 2(b) County Road Widening.

In the 4(a) zone, all of the proposed works are permissible with consent, pursuant to the PSO 1971. Pursuant to Clause 12 and 13 of the instrument, buildings may be erected on land affected by a County Road Widening Reservation, subject to consent.

This application is classed as 'Integrated Development' in accordance with Clause 91 of the EP&A Act and approval is required from Roads and Maritime Services (RMS) for a proposed road connection (Geddes Avenue) with Botany Road which is a 'State road'. The DA is also likely to be referred to Sydney Water and RailCorp (Airport Rail Link).

### 1.3 Contents of this Statement of Environmental Effects

The City of Sydney has prepared this SEE to assess the proposed Essential Infrastructure works, which includes a number of technical reports including hydrology, traffic, contamination and landscape etc. The current SEE confirms the assessment undertaken in the previous SEE<sup>5</sup> and includes further design development undertaken since the previous DA, as well as design best practice principles to ensure a quality outcome for infrastructure provision in the Town Centre.

The SEE technical reports (Refer to the Appendices) also respond to each of the relevant conditions that form part of the previous Development Consent (D/2007/1195). In some cases, a is presented that some of the previous conditions are no longer relevant due to the updated assessment completed as part of this SEE.

This SEE contains the following information:

- Chapter 2 provides an overview of the existing Town Centre and surrounding area;
- Chapter 3 details the key elements of the proposed development;
- Chapter 4 provides an assessment of Section 79C of the EP&A Act; and
- Chapter 5 provides a conclusion and recommendation for the proposed development.

<sup>&</sup>lt;sup>5 5</sup> Statement of Environmental Effects, Essential Infrastructure Green Infrastructure Hub prepared by SJB Planning Pty Ltd, dated 17 July 2008

# **1** Introduction

### 1.4 Scope of this Statement of Environmental Effects

### **Design Plans**

This SEE has assessed the proposed concept design plans for the Green Square Town Centre Essential Infrastructure works prepared by Aurecon (Refer to Appendix A) which includes the following design plans and provided

- Engineering and services drawing package by Aurecon (Refer to Appendix A); and
- Landscape and streetscape drawing package by Oculus (Refer to Appendix B).

### **Technical Studies**

This SEE has been prepared based on the following engineering, environmental and planning studies:

- Engineering Infrastructure report by Aurecon (Refer to Appendix C);
- Green Square Town Centre Flood Mitigation Options prepared by Cardno (Refer to Appendix D);
- Green Square Town Centre Floodplain Risk Management Plan prepared by Cardno (Refer to Appendix E);
- Transport Report for the Green Square Town Centre Essential Infrastructure by Colston, Budd, Hunt & Twinney (Refer to Appendix F);
- Baseline Archaeological Report Green Square Town Centre prepared by AMAC Archaeological (Refer to Appendix G);
- Additional Geotechnical Study Green Square Town Centre (Revision 1) prepared by AECOM (Refer to Appendix H);
- Interim Contamination Audit Report Green Square Essential Infrastructure and Public Domain by Environ (Refer to Appendix I);
- Public Domain Water Sensitive Urban Design Report by AECOM (Refer to Appendix I); and
- Green Square Town Centre Public Domain Strategy by McGregor Coxall (Refer to Appendix K).

Photos of the Town Centre area are also provided in Appendix L.

### **1.5 Consultation**

The following consultation tasks have been undertaken to advise the community of the City of Sydney's plans for the Green Square Town Centre:

- Green Square Town Centre, Public Domain Design Workshop October 2007;
- Green Square Community Forum July and November 2008;
- Green Square Community Update February and August 2009;
- Green Square Town Centre update (November December 2010) on Landcom, Mirvac, Leighton Planning Proposal;
- Green Square Community Update Meeting May 2011;
- Green Square Town Centre Update June 2011; and

# **1** Introduction

• March 2012 Community meetings (Village Conversations).

These events have provided the community with a constant flow of information regarding development and planning in the Town Centre and surrounding area.

### 2.1 The Existing Site

The proposed Essential Infrastructure works cover land within the Green Square Town Centre and partly within the surrounding area (Refer to Figure 1). For the purposes of this assessment, the DA does not apply to Green Square Development Sites Nos 1-4 at Green Square Rail Station.

The area is dominated by existing and vacant industrial land uses on varying block sizes. Existing uses include Sydney City Nissan motor showroom (John Newell site) and the Waverley Council Depot. Vacant uses include the Landcom land (former Waverley and Woollahra Incinerator site and the former City of Sydney Depot site); the former hospital site and NSW Police site (Refer to Figure 2.1). Photos of the site are provided as Appendix L.

There is no open space within the Town Centre area with only small pocket parks located to the east, near Victoria Park. At the western end of the Town Centre is the Green Square Station (underground rail station).

### 2.2 Adjoining Sites and Surrounding Development

The adjoining area is characterised by industrial uses, motor showrooms, business part estates, as well as newer and older style residential dwellings (apartments, townhouses, terraces and detached dwellings).

Residential redevelopment is occurring along Joynton Avenue as former warehouse sites are being redeveloped into high rise apartment towers (Victoria Park). Portman Street and Hansard Street contain older style residential dwellings (terraces / worker cottages).

### 2.3 Existing Infrastructure

The existing infrastructure in the Town Centre is summarised below and is taken from the Engineering Infrastructure report (Refer to Appendix C) and the Transport Report (Refer to Appendix F).

### 2.3.1 Roads

The existing road network within the Green Square is provided below and is based on the Transport report for the Green Square Town Centre Essential Infrastructure (Refer to Appendix F).

### **Existing Road Network**

Major roads in the area, as shown on Figure 2 (Refer to Appendix F), include South Dowling Street, O'Riordan Street, Botany Road, Bourke Road/Bourke Street, Wyndham Street, O'Dea Avenue, Joynton Avenue and Epsom Road. Other roads include Elizabeth Street, Portman Street, Hansard Street and a number of laneways through or adjacent to the site.

South Dowling Street is a major north-south link in Sydney's arterial road network, connecting Southern Cross Drive from the airport with the City. South of O'Dea Avenue it provides a freeway standard, six lane divided carriageway with grade separated intersections and interchange facilities at major junctions. Access between South Dowling Street and the Green Square Town Centre is provided via Epsom Road/Link Road (via a left in/left out arrangement), Lachlan Street/Bourke Street (via a signalised intersection with South Dowling Street/Dacey Avenue) and O'Dea Avenue (via a signalised intersection with South Dowling Street/Todman Avenue). North of O'Dea Avenue, South Dowling Street provides two surface traffic lanes in each direction either side of the Eastern

Distributor, clear of intersections.

O'Riordan Street and Botany Road provide north-south arterial road links through the area. O'Riordan Street links Green Square in the north with Mascot and Sydney Airport in the south. Botany Road is a national freight corridor and forms part of a route linking the City with Botany. Both roads generally provide four lane undivided carriageways with two traffic lanes in each direction. Clearways operate in peak periods in the direction of peak traffic flow (both directions on O'Riordan Street). Outside clearway hours, parking is permitted clear of intersections in some sections.

Botany Road and Wyndham Street, north of Henderson Road/Raglan Street is a one-way pair with Botany Road providing a southbound carriageway and Wyndham Street northbound. South of Henderson Street these streets are two-way undivided roads.

Bourke Street runs east from Botany Road and provides access to commercial and industrial properties. It generally provides a four lane undivided carriageway with two traffic lanes in each direction and peak period clearways in both directions.

The intersection of Bourke Street with Botany Road, O'Riordan Street and Bourke Road is controlled by traffic signals. Right turns from Botany Road (southbound), Bourke Street (westbound) and O'Riordan Street (northbound) are not permitted.

Bourke Road and Wyndham Street provide undivided carriageways with one traffic lane and one parking lane in each direction, clear of intersections. Both roads provide access to commercial and industrial properties. The intersection of Bourke Road with Wyndham Street is controlled by traffic signals. Right turns from Bourke Road south into the link to O'Riordan Street, and right turns from the link east into Bourke Road, is not permitted.

O'Dea Avenue connects South Dowling Street with Bourke Street. Both intersections are signalised. It provides one to two traffic lanes in each direction, clear of intersections. There are bus stops on both sides of the road.

Joynton Avenue connects O'Dea Avenue in the north with Epsom Road in the south. Both intersections are signalised. At the Joynton Avenue/Epsom Road intersection, Rothschild Avenue forms a fourth (southern) approach. Joynton Avenue generally provides one traffic lane and one parking lane in each direction, clear of intersections.

Epsom Road is south of the site and, with Link Road, provides an eastwest connection between South Dowling Street and Botany Road. It provides one traffic lane and one parking lane in each direction, clear of intersections. Bus stops are provided on both sides of the road. The intersection of Epsom Road with Botany Road is controlled by traffic signals.

Elizabeth Street runs north-west from Joynton Avenue and provides access to commercial, industrial and residential properties. It is an important bus route as it provides a direct link to/from the City. Elizabeth Street has an un-signalised t-intersection with Joynton Avenue. Traffic calming facilities are provided and a three tonne load limit applies in the southern section.

Portman Street connects Bourke Street in the north with Hansard Street in the south. It provides access to residential development in the northern part and commercial and industrial development in the southern part. Its intersections with Bourke Street and Hansard Street are priority controlled, with Bourke Street and Hansard Street having priority.

Hansard Street connects Joynton Avenue with Botany Road. Turns at the Botany Road intersection are restricted to left only onto Botany Road. Hansard Street provides one traffic lane and one parking lane in each direction, clear of intersections.

There are a number of laneways in the Town Centre, including Christies Lane, Portman Lane, Navins Lane, Tosh Lane and Chester Lane. These laneways basically provide access to properties fronting adjacent streets.

#### **Regional Traffic Context**

The main arterial traffic routes servicing the Town Centre include Botany Road, Bourke Street, Bourke Road, O'Riordan Street, Elizabeth Street and Wyndham Street. These are important traffic routes in the RMS regional road network.

A review of RMS's latest published traffic data found that in 2005, these roads carried the following two-way (sum of both directions) daily traffic volumes:-

- Botany Road, south of Bourke Street, some 22,590 vehicles;
- Bourke Road, north of O'Riordan Street, some 17,440 vehicles;
- Bourke Street, north of Lachlan Street, some 16,550 vehicles;
- Elizabeth Street at Bourke Street, some 27,880 vehicles;
- O'Dea Avenue, east of Joynton Avenue, some 15,950 vehicles;
- O'Riordan Street, north of Johnson Street, some 21,970 vehicles; and
- Wyndham Street, north of Bourke Road, some 11,820 vehicles.

These figures show that the highest traffic flows in the area occur on Elizabeth Street, O'Riordan Street and Botany Road with some 20,000 to 30,000 vehicles per day two-way. Bourke Road, Bourke Street, O'Dea Avenue and Wyndham Street carried some 10,000 to 20,000 vehicles per day.

### 2.3.2 Public Transport and Bike Lanes

A summary of the following transport infrastructure within Town Centre has been taken from the Transport report for the Green Square Town Centre (Refer to Appendix F).

### **Public Transport**

Green Square is well served by public transport including heavy rail and public buses. Green Square Station provides heavy rail access via the Airport Rail Line between Central (15 minute and Campbelltown (45 minutes).

Botany Road is a major bus route in the area providing bus access between the City and Mascot / Botany. Bus access is also provided between the Station and the University of NSW Campus at Kensington

and to the Eastern Suburbs (Route 370).

Two proposed Metrobus Routes will link Green Square to Bondi Junction and Burwood and also to Miranda (Strategic Bus Corridor 21). In the longer term Botany Road will also further be developed as a transit corridor. There is also a proposal to provide an Eastern Transit Corridor linking the Town Centre and Central Station.

### **Bike Lanes**

The Bourke Road, Mandible and Bowden Streets separated bike lane is the main bike lane in the Town Centre area. Further connections are proposed linking Green Square to Redfern via Joynton Avenue and Phillip Street.

### 2.3.3 Other Utilities and Infrastructure

A summary of the following other utilities and infrastructure within Town Centre has been taken from the Essential Infrastructure Engineering Infrastructure report (Refer to Appendix C).

#### Stormwater Drainage

The site is traversed by an existing stormwater overland flow path which is largely uncontrolled. Severe flooding occurs within the site and on adjacent public roads (Joynton Avenue). The infrastructure provided will accommodate the runoff expected during storms up to the 100 year ARI and convey this through the site in a safe manner. It is proposed to relocate the existing culvert through the site and to provide additional culverts and pipes to collect and carry major storm events.

Existing storage within the roads adjacent to the site which is currently experienced during severe storms will remain, with further detention storage provided within the development. A new culvert system will be provided in later stages of the project to route all collected stormwater directly to the Alexandra canal at Maddox Street.

### Sewer

At present the site is crossed by several sewers ranging in size from 100mm to 300mm, serving the Town Centre and upstream development. These sewers drain south-west to the main carrier line in O'Riordan Street and have sufficient capacity to accommodate the flows generated by the proposed development.

### Electricity

Ausgrid currently own and maintain a high voltage electrical reticulation network to the site. Additional high voltage supply mains will be required to adequately serve the electrical layout included in the DA submission.

High voltage connection to the Stage 1A lands will occur in accordance with Ausgrid Master Plan for the Green Square Town Centre.

Provisional high voltage, low voltage and communication service connections for future stages will be subject to their own Authority applications for connection. Capacity for these future stages is not included in the LML infrastructure. Conduits for future cabling will be provisioned within future development sites.

#### Gas

There are existing gas mains in the area, some of which are no longer in

use. The existing infrastructure has sufficient capacity to cater for the proposed development, with new pipelines provided for reticulation within the development.

The City of Sydney proposes to develop a Green Infrastructure Centre (GIC) on the former Royal South Sydney Hospital to provide more sustainable outcomes for the Town Centre. The GIC includes a Trigeneration facility which will help reduce energy demand in the Town Centre.

### Water

Water mains exist in the existing road reserves. Sydney Water has indicated that these have sufficient capacity to provide a conventional water supply for the proposed Green Square Development. Future grey water reticulation will serve to reduce this demand as drinking water will not be required for non-contact uses such as toilet flushing and irrigation.

### **Telecommunications**

Several communications cables currently exist within the road reserves within the site and in surrounding roads. These services will remain in place with minor depth relocations being required at new road crossings.

### 2.4 Regional Catchments and Waterways

The following information is taken from the Green Square Town Centre Public Domain Water Sensitive Urban Design report prepared by AECOM (Refer to Appendix J).

The Green Square Town Centre is located within the Alexandra Canal catchment. Alexandra Canal drains an area of 1,674 ha into the Cooks River adjacent to Sydney Airport. The Alexandra Canal catchment includes the Munni Street, Sheas Creek, Botany Road-Doody Street, Gardeners Road and Mascot West sub catchments, as shown in Figure 2 (Refer to Appendix J). The Town Centre is located within the Sheas Creek sub catchment, on a major drainage channel known as the Victoria Branch of Sheas Creek. The Victoria Branch of Sheas Creek drains a catchment of approximately 250 ha, equivalent to approximately 15% of the Alexandra Canal catchment.

### 2.5 Past use and History

The following information is taken from the Baseline Archaeological Assessment, Green Square Town Centre, Zetland prepared by AMAC Archaeological (Refer to Appendix G).

The site was located between Waterloo Swamp to the east, and Shea's Creek Swamp to the west. It is situated on a grant of 1400 acres made to William Hutchinson in 1825. Hutchinson appears to have taken possession of the land about five years earlier, and constructed a flour mill, named Waterloo Mill by Governor Macquarie. The Mill was probably located to the north of the site. A dam, named Waterloo Dam, was created on the site by c1830, presumably for the use of the Waterloo Mill.

Between 1848 and 1877, a wool-washing works was established on the site, on the southern edge of the dam. This continued operation until about 1900. The Waterloo Fire Brick Company was then established at this location; the brickworks continued to operate until

### the early 1950s.

The drainage of the area was improved in the late nineteenth and early twentieth centuries, probably owing to the construction of Shea's Creek Canal in the early 1890s. Filling of the area of the Dam may have also started at this time. This allowed the construction of another brickworks on the site in about 1911; The Industrial Brick Company. This brickworks site also continued to operate until at least c1950.

In c1912, the Royal South Sydney Hospital was established on the eastern part of the site. The Hospital, later the hospital, continued to operate on the site until 1993. Further buildings were gradually added to the property over this time.

In c1920, the Waterloo Municipal garbage destructor was established in the northern part of the site. At least part of this property has remained in the possession of the City of Sydney, and is presently a City of Sydney depot, although it is leased to the neighbouring car showroom. To the south of this, a garbage incinerator was constructed in c1970, for the use of Waverley and Woollahra Councils. The incinerator continued operation until 1996.

The part of the site between Botany Road and O'Riordan Street appears to have remained undeveloped until about 1915. A row of factories was then built along Botany Road in this area. The O'Riordan Street frontage was less heavily developed.

### 2.6 Existing Site Condition

The current condition of land in the Town Centre is discussed in Table 1, which is taken from the Interim Contamination Audit Report – Green Square Essential Infrastructure and Public Domain (Refer to Appendix I).

Site	Location	Condition
Ebsworth (northern extent)	Located at the western boundary of the former City of Sydney Depot, extends through the middle of the Incinerator (and the middle of the actual incinerator building) and then along the south-eastern boundary of the Police land.	City of Sydney Depot: Amenities building, unsealed BBQ/garden area and a brick workshop building. Three oil vehicle pits were present within the workshop building. The Depot was higher than the adjacent John Newell Mazda to the south indicating potential use of fill in this section in additional to land filling. The south-east section included concrete paving and landscaping. The incinerator building has been demolished and all concrete removed. Landfill materials have been excavated as required to facilitate demolition. The materials were stockpiled, tested and re- instated. Police land: Bomb rescue squad building, sealed car parking area and landscaped areas. The City of Sydney land: Access way/car
		parking area.
Green Square (Plaza) and Neilson	Southern boundary of the Incinerator and northern boundary of the Police land.	Landscaped section of the Incinerator. Landscaped and asphalt access driveway on the Police land. A small section of the "Special Technical Investigation Branch"

#### **TABLE 1 SITE LOCATION AND CONDITION**
# 2 Site Location and Context

Square (future pooled carpark Under)		building. Half of Civic Plaza and all Neighbourhood Plaza extend over the former landfill.
Sluice Street (Tweed Place)	Northern boundary of the Incinerator site and southern boundary of the City of Sydney Depot	Incinerator: Landscaped and car parking City of Sydney Depot: Workshop building.
Felmonger Place	<i>Centre of the Incinerator</i>	Incinerator: Landscaped Area with the western section extending an area from which landfill materials have been excavated as required to facilitate demolition. The materials were stockpiled, tested and re-instated.
The Drying Green (Park)	City of Sydney land.	Large warehouses The north-west corner is located over the former landfill.
Barker Street	Extends south from the middle of the former incinerator building through the middle of the Police land.	The incinerator building has been demolished and all concrete removed. Landfill materials have been excavated as required to facilitate demolition. The materials were stockpiled, tested and re- instated.
		At the Police land the road extends through areas that are currently landscaped, sealed or support buildings used for technical and engineering investigations.
		Landscaped and asphalt access driveway on the Police land. A small section of the "Special Technical Investigation Branch" building, the Engineering Investigation building.
Hinchcliffe Street	Western boundary of Senayear Land and eastern boundary of Hatbands	Warehouse and mechanical repairs buildings.
Woolpack Street	Through southern portion of Police	The road extends through sealed areas currently used for car parking. The eastern extent extends over the former landfill.
Zetland Avenue	Southern boundary of the Police land.	The road extends through sealed areas currently used for landscaping and car
	Southern boundary of former Daimler Chrysler.	Paved car parking area of the Hospital. Buildings remain in place.
	Northern boundary of the hospital.	
Portman Street	Currently Portman Street	Roadway and sidewalks
Geddes Avenue	City of Sydney land.	Landscaping, car parking and a section of a warehouse.
Paul Street (southern extent)	City of Sydney land	Car parking and a section of a building.
Sonny Leonard	Southern boundary of Hatbands	Warehouse

### 2 Site Location and Context

Street		
Matron Ruby Park	Hospital Park	Hospital Centre
Felmonger Place	<i>Centre of the Incinerator</i>	Incinerator: Landscaped Area with the western section extending an area from which landfill materials have been excavated as required to facilitate demolition. The materials were stockpiled, tested and re-instated.

Further assessment of contamination issues is provided in Chapter 4 of this SEE and within Appendix I.

#### 2.6.1 Existing Flooding

The following information is taken from the Green Square Town Centre Floodplain Risk Management Plan prepared by Cardno (Refer to Appendix D).

#### **Overview**

The flood conditions reported in this Plan are those under the ultimate development scenario (showing indicative building allotments) for the Town Centre with the incorporation of engineering works (described in Chapter 3).

Flooding in the Town Centre is caused by a combination of the geographic features of the catchment and floodplain creating a complex system of flow regimes and flooding mechanisms.

The majority of the catchment that drains to Joynton Avenue, and subsequently to the Town Centre, lies to the north-east of the Town Centre. The catchment is highly urbanised and has an extensive network of street drainage. There are a number of trapped depressions (e.g. low points in roads) that act as temporary storages during flood events and these features play a significant role in governing the flood behaviour of the area (Connell Wagner and Cardno, 2009).

#### **Historical Flooding**

Few records are available indicating historical flooding at the site itself. Anecdotal evidence is available for the October 1987 and November 2007 flood events for local road flooding in trapped depression areas. This information suggests depths of the order of 0.5 - 0.6 m in these areas which is consistent with the modelling of flooding reported in this plan.



Figure 1 - Existing location plan of the Green Square Town Centre

This chapter provides the key proposed Essential Infrastructure works that form part of this SEE.

#### 3.1 Proposed Works

The proposed works that form part of this SEE include:

- Rearrangement and construction of new streets, including footpaths, ramps, access stairs and the like together with associated infrastructure such as drainage, services, vehicular crossings, bus stop set-outs, street tree pits and street trees etc. Detailed road marking and signage plans, including pedestrian crossings, cycle lanes, bus stops, traffic lights;
- Green Infrastructure works including the above and below ground utility connections that will connect with the proposed Green Infrastructure Centre (GIC)<sup>6</sup> which is proposed to be located at the former Royal South Sydney Hospital site (No.3 Joynton Avenue, Zetland);
- Landscape and streetscape works within the existing public domain (roads & footpaths);
- Existing services, such as electrical, water, stormwater, sewer and telecommunications demolition and relocation, both above and below ground;
- Removal of specified trees and minor structures;
- Details of pavement types to be constructed;
- Construction of new services in all streets and thoroughfares, or as required;
- The Drying Green construction details (although park itself is under the concurrent Public Domain DA);
- Stormwater diversion construction sequencing details;
- Services coordination details; and
- Erosion and sediment control measures during the proposed works.

#### 3.2 Staging of the Project

It is noted that the Green Square Essential Infrastructure project for the Town Centre is proposed to be delivered in accordance with a number of stages over a 15 year period.

In this regard, Council as the applicant for the proposed development will seek to respond to development consent conditions in a staged manner that allows the coordinated redevelopment of all lands in the Green Square Town Centre.

This SEE has been drafted to achieve Council's objective of undertaking a staged approach to development in the Town Centre.

An indicative Staging Plan (CIV 100) is provided in Appendix A which will be implemented in a co-ordinated manner to meet the preferred staging requirements of landowners.

<sup>&</sup>lt;sup>6</sup> The GIC includes the Trigeneration facility, a Water Re-use facility and an Automated Waste Collection Facility.

#### 3.3 Proposed Infrastructure

The following documents are relevant to the Civil Works included in the DA for the Engineering Infrastructure Report for the Council of the City of Sydney (Refer to Appendix C).

#### Scope of Civil Works

The Civil Works included in this application generally comprises the following work:

- Minor earthworks to form the profiles of the proposed roads and detention basin;
- Road profiles and cross sections of public roads serving the development lots;
- Road markings and bicycle lanes;
- Services (water, sewer, electricity, gas, telecommunications and sustainable services) serving the development lots;
- Stormwater pipelines collecting treated runoff and carrying overflows to discharge points;
- Relocation of Sydney Water trunk drainage culvert;
- Temporary staging works required for sequential occupation of roads and services;
- Landscaping, paving and street furniture;
- Street lighting; and
- Green Infrastructure.

#### Exclusions:

The following works are excluded from this application:

- Public Domain contained within the two plazas and The Drying Green.
- Development of buildings;
- Development sites 1 4 adjacent to the railway station. Services for these sites will be submitted under a separate application;
- Any works to the O'Riordan/Bourke Road intersection, which will be submitted under a separate application;
- Upgrading of kerbs and footpaths on Portman Street; and
- No work to kerbs and footpaths for Bourke Street, Portman Lane, Navins Lane and Botany Road adjacent to Development Site 8A and 8B.

#### **Design Specifications**

The civil works have generally been designed in accordance with the following specifications. Some additional items have been added and these are presented in the project Specification submitted for the project.

• Standard Specification: Aus-Spec;

- City of Sydney Technical Specification;
- RMS Specification 106: Sprayed Bituminous Surfacing; and
- RMS Specification 116: Asphalt.

#### **Quality Assurance**

In accordance with the Project Specification, a Quality System will be established and operated throughout the construction period. The Contractor will be required to provide a Quality Plan including Method Statements and Checklists to ensure that the construction process is monitored thoroughly.

Procedures will be included for the processing and approval of variations to ensure that these are dealt with before they are required on site, avoiding potential delays.

Regular inspections and Hold Points will be required throughout the construction stage to provide sign off of critical items.

#### Roads

Footpaths and roads will be constructed with a granular base suitable for residential areas, with honed concrete paving to City's standard specifications in areas of higher pedestrian traffic. An asphalt wearing course will be provided in areas where lower volumes of pedestrians are expected.

Road widths and lane details will generally be provided in accordance with the recommendations of the City of Sydney Planning Proposal Sydney LEP 2010 (Green Square Town Centre) (still to be gazetted), which accommodates the City's cycle strategy and the Public Domain concept design, updated as required by City of Sydney and the Green Square Consortium.

#### Road Hierarchy & Lane Widths

The following standard cross sectional information for the proposed roads has been provided by the City and will be included in the City of Sydney Planning Proposal Sydney LEP 2010 (Green Square Town Centre).

#### Zetland Avenue

A revised cross section has been developed by the City to accommodate the future implementation of light rail within the road reserve. This has led to the reconfiguration of the lanes and lane widths of 7.4m for future light rail, 3.2m traffic lanes, 2.2m parking and a 3.0m cycle lane.

• Ebsworth Street

3.0 m traffic lanes, 2.3 m parking and 4.2 m footpaths each side. Bus routes to have 3.3 m traffic lanes with 4.4 m footpaths.

• Paul Street

2.9 m traffic lanes, 2.6 m parking and 3.0 m footpaths each side.

Woolpack Street

2.9 m traffic lanes, 2.1 m parking and 3.0 m footpaths each side.

#### • Barker Street (south)

2.9 m traffic lanes, 2.1 m parking and 3.0 m footpaths each side.

• Tweed Place

3.0 m traffic lanes, 3.0 m footpath on one side and 11.0 m on opposite side.

Sonny Leonard Street

2.9 m traffic lanes, 2.1 m parking and 2.5 m footpaths each side.

Hinchcliffe Street

2.9 m traffic lane, 2.6 m parking and 3.25 m footpaths each side.

#### **Turning Circles**

A review of all the intersections has been carried out using the AUSTROADS turning circles and completing an analysis using AutoTrack software. Radii suitable for a standard 14.5 m bus have been provided for intersections along the bus route, with an 8.8 m delivery vehicle used for minor intersections.

It is recognised that some areas within the Town Centre are proposed as pedestrian orientated precincts and kerb radii have been reduced in these areas to increase footpath accessibility. Service vehicles are still able to turn but will be required to encroach into the oncoming lane. Within these areas it will be necessary for service vehicles to encroach into oncoming lanes in order to navigate the intersection. A 40 km/h speed limit is proposed for all the roads within the Town Centre.

#### **Bus Routes**

The Zetland Area Traffic Study, 2006 proposed a bus route through the Town Centre, entering from Botany Road into Geddes Avenue and exiting through Zetland Avenue, using Ebsworth Street.

An alternative route is suggested in the report, following Geddes Avenue through to Portman Street directly, without diverting onto Ebsworth Street. The route from Botany Road, Geddes Avenue, Ebsworth street and Zetland Avenue will be provided in the short term, until the area within the Plaza which is required for the long term route is available.

A bus route using the central Plaza, with access directly from Botany Road is proposed for the longer term, when the plaza becomes incorporated into the design of the Town Centre. This route provides better accessibility for buses.

In the final development, it is anticipated that the bus route through the plaza will be replaced with a light rail system. The cross section of Zetland Avenue has been designed to allow the light rail to be installed without significant disruption to kerbs and traffic.

#### Cycle Paths

The City of Sydney Cycle Strategy outlines the cycle paths which are required within the Town Centre. These requirements have been implemented with the standard lane markings and intersection crossings specified by the City in the Strategy by the inclusion of a

cycle path with a 0.4 m separator on one side of the following roads:

- Geddes Avenue;
- Zetland Avenue; and
- Portman Street.

#### Earthworks

Minor earthworks will be undertaken within the road reserves only and to create the required detention basins. Some erosion and sedimentation control measures will be required on the development sites to ensure surface drainage and prevent localised ponding.

#### **Erosion and Sediment Control**

Erosion and sedimentation control measures will be provided during and after construction, to prevent pollution of downstream areas in the event of high rainfall events. The measures proposed would be in accordance with Managing Urban Stormwater Soils and Construction produced by Landcom ('the Blue Book').

Semi-permanent fixtures will include silt and wind fences, silt ponds, stormwater inlet filters, entry cleaning facilities and site barricading will be provided where appropriate for the duration of the contract. Additional, temporary measures will be provided as required when specific sections of the site are exposed and are vulnerable to erosion.

#### Stormwater Drainage

The stormwater system has been designed to include current best practice in Water Sensitive Urban Design (WSUD). This allows the optimum re-use of stormwater within the development and an appropriate level of stormwater treatment prior to use on the site and discharge from the site.

The system incorporates grass collection swales to filter stormwater runoff and permits the draw-off of runoff for treatment and collection in an irrigation tank for re-use in irrigation. WSUD tree pits for the street tree plantings will feature in both the in-road and in-pavement street trees and will filter and detain a portion of the site stormwater runoff. Details of this system will be included in the Public Domain DA application.

#### Proposed drainage concept

In accordance with Australian Rainfall and Runoff 1997 (ARR) and City of Sydney's requirements, a major/minor design philosophy has been adopted. The minor system comprises underground pipes located in road reserves, which will be designed for the 20 year Average Recurrence Interval (ARI) storm event, with a provision for safe overland flows during the 1 in 100-year ARI event. The 1 in 100 year storm event flows will be safely discharged through the Drying Green in dedicated overland flow path routes (Refer to Figure 3.2).

Bio-filtration swales form part of the minor drainage infrastructure where the road reserve widths are able to accommodate these. They are designed to treat the 1 in 3-month runoff.

Subsoil collector pipes will route the treated flow into the stormwater

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pipe system for discharge to the watercourse. Rain events of greater intensity than the 1 in 3-month storm will be more diluted and treatment will not be required for these flows. The swales are designed to collect all runoff up to the 1 in 20-year storm and route this into the piped minor system.

#### **Overland Flood control**

The 'Option 1a' proposal requires the provision of detention storage within the area to be developed as Sheas Park, with a 1500 mm diameter overflow park connecting the detention basin to the existing culverts in Botany Road.

#### Existing Sydney water culverts

Two existing culverts cross the site from Joynton Avenue to Botany Road and extend downstream to the Alexandra Canal. These culverts will be retained where they lie within the plazas and road reserves, but will be relocated with a culvert if similar capacity where they are located under development sites. Existing easements will be deleted after demolition of these sections of the culverts.

#### **On-site detention**

Existing low areas in the upstream catchment serve as detention ponds during storm events. These detention volumes are included in the design of the stormwater system.

Details of these are presented in the 'Draft Flood Mitigations Options' report submitted with the DA, with the volumes of detention achieved by each of the main areas.

On site detention will be required to reduce peak runoff from the proposed Town Centre development, which will be included as part of the proposed building works.

#### Gross Pollutant Traps

Gross Pollution Traps will be provided and located at the discharge points to Sheas Park and the existing City of Sydney drainage system. These will capture sediment and gross pollutants which have been collected into the piped system. The stormwater pollution control devices have been sized to treat the 3-month ARI flows in accordance with the City of Sydney's requirements and are located adjacent to proposed roads to enable maintenance by the City of Sydney.

#### Sewer

The existing sewers may be repaired and retained as agreed with Sydney Water where they do not interfere with the development sites. Additional mains will be provided within the road reserves as required to service all properties.

#### Heritage Elements

The hospital site, located at the eastern edge of Town Centre is a listed item of environmental heritage. In addition, the site has potential archaeological deposits although there are no known Aboriginal archaeological deposits.

Nevertheless, excavation and exception permits will need to be applied for the various development sites once project approval has

been granted by the City of Sydney as noted in the AMAC Archaeological Report.

#### 3.4 Public Domain

The public domain strategy for the Green Square Town Centre is taken from the Green Square Town Centre Public Domain Strategy (Refer to Appendix K).

Achieving a high quality public realm for Sydney's emerging Green Square Town Centre is fundamental to the success of this significant urban renewal project.

Current nearby residents long for local opportunities to socialise, relax, work, shop and celebrate. As the Town Centre develops, new residents who join the existing community must be welcomed and encouraged by the quality of facilities and spaces they are adopting as their own. And the strategic location of the Town Centre creates an imperative to attract business investment in the 'creative class' – the new wealth generating businesses that will not only provide high quality jobs but will also contribute to the economic competitiveness of Metropolitan Sydney.

Underpinning all of this is a commitment to progressive environmental principles – to the creation of a clean and green new community that is a flagship for sustainable development. New public spaces should be not only designed to be accessible, sociable, convivial places to meet, they are explicitly intended to be spaces where the entire Green Square community can celebrate its environmental credentials. The key principles are:

- A sustainable and liveable space, which offers the versatile, sustainable urban landscape desired by the Green Square community;
- A place for pedestrians, which allows an easy connection between the station and Civic Plaza at grade across Botany Road;
- A centrally located transport corridor on the northern edge of the plaza providing direct access by bus or light rail [future stage];
- A connected place, which includes an integrated public transport hub connecting all modes of transport to the city network;
- A place of many places, each with its own functionality and character. Key spaces are:
- a. Transport Place (Green Square Station) where pedestrians converge and connect with public transport;
- b. Civic Plaza the heart of the Town Centre, where the Community gathers for larger civic events, meets regularly in the community centre, and enjoy day to day shopping and dining
- c. Neilson's Square a more intimate meeting place for smaller gatherings,

- a cafe and a place for children to play
- d. Drying Green Park a generous sloping lawn suitable for active and passive play, outdoor concerts and festivals
- Unified by Sheas Stream, a proposed playful water course running through Civic Plaza and connecting all four major spaces in the Town Centre.
- An active place, where all buildings and street frontages at ground level provide an active fine grain interface with the street.
- A place where colonnades along the southern edge of the plaza offer outdoor amenity for pedestrians.
- An integrated place where the urban structure and scale of the east-west spine coalesces with the human scale of landscape and architectural elements.
- A place with a community focus, where the jewel in the public domain is a special community building defining and protecting the main plaza edge while also providing a visual connection between Transport Place and Green Square.
- An active place, where all buildings and street frontages at ground level provide an active fine grain interface with the street.
- A place where colonnades along the southern edge of the plaza offer outdoor amenity for pedestrians.
- An integrated place where the urban structure and scale of the east-west spine coalesces with the human scale of landscape and architectural elements.
- A place with a community focus, where the jewel in the public domain is a special community building defining and protecting the main plaza edge while also providing a visual connection between Transport Place and Green Square.

#### The Town Centre Components

The primary elements of the urban structure of the Town Centre are:

A new Town Centre building on the existing station infrastructure at Green Square.

#### A significant civic space at the Green Square train station.

- A plaza will provide a focus to a higher density of mixed uses and support the pedestrian activity associated with the train station. It will connect over Botany Road at grade to achieve this connectivity;
- The plaza will be the primary public domain component within the urban structure, acting as a community focus that will accommodate passive and formal social activities, including community or performance events and markets;
- The plaza will have active edges, with retail at ground floor level and a colonnade running along its southern edge;

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- A public library will be located in the plaza as the primary community building in the Town Centre and integrated with the design of the plaza;
- Three towers will define the southern edge of the civic plaza and visibly link the Town Centre across Botany Road to another tower above the station. Taller buildings on the north side will be set back from the plaza to maximise sunlight to the public domain in winter. A comfortable scale of the public domain will be maintained by 8-9 storey frontages along the plaza edge.

#### A defined 'core' of the Town Centre

- The built form in the Town Centre will rise towards the railway station and, together with the Plaza, make a 'core' that is legible from the wider urban context;
- The core will be defined by a taller and more varied built form contained within existing and new streets. It incorporates the Plaza, the railway station to the west, new development to the alignment of existing Dunning Avenue to the east, and Portman lane to the north. To the south a new street, Geddes Avenue, will form the edge of the core;
- Retail uses will activate the public domain at ground floor level throughout the core.

#### A fine grain network of north south streets and laneways create permeability throughout the core

- Fine grain street blocks extend and mesh with existing streets to the north and south, creating connectivity within the public domain. This creates a series of direct and interesting routes available to pedestrians in and around the town centre, allowing them to 'filter' towards the core;
- Building heights through the core will vary, creating interest and different character to each street, but consistently creating activated streets with retail uses at ground floor. Generally, awnings and street trees will frame the public domain from a pedestrian perspective;
- The fine grain streets and lanes to the north of the Plaza will hinge on a 'High Street' or shopping street, Ebsworth Street. This will be a busy pedestrian environment;

#### A strong east-west connection through the core of the Town Centre

• Zetland Avenue will be a grand street connecting the Green Square Train Station with the wider renewal area to the east, particularly Epsom Park Precinct. The scale of the street will reinforce it's identity as the primary street in the town centre public domain. The wide street will be defined by zero setback buildings and views at street level will be framed by formal avenue tree planting. It will support dedicated pedestrian, cycle, vehicular and bus or light rail access to and from the town centre;

• A mix of uses along Zetland Avenue with commercial at ground floor and residential above will activate the street throughout the day and create overlooking.

#### A Park within the town centre

- The taller built form within the core will break on its eastern edge and open into a formal park. The Drying Green will be a flexible green space for informal recreational and social activities within the town centre. It will be edged by streets on all sides and highly accessible from all parts of the town centre;
- The Drying Green will provide relief from the density of the core, and allow space for stormwater to collect and infiltrate;
- It will also facilitate informal pedestrian connections through to Epsom Park Precinct via the hospital Site.

# Residential precincts around the core that connect with the surrounding urban context

- The scale of buildings steps down from the core to maximise sunlight access into the streets and transition to a residential character. Buildings will have a more consistent and lower height through the residential areas;
- The new streets in the residential precinct will connect with existing streets and adopt a similar scale and character to those residential areas;
- A landscape setback will create private gardens to the street and provide private and communal entries along the edge of the public domain. Buildings will be designed to overlook the street and the ground floor will be slightly elevated to create a separation and transition from the public domain.

# A smaller park to be created with heritage buildings on the former hospital sit

 A heritage precinct is identified on the former hospital site, to the east of the Drying Green. The buildings will be reused to house community facilities. A smaller, more intimate, green space will be integrated in a campus-like environment. The site will allow pedestrians and cyclists to filter through to the Town Centre from Epsom Park residential areas.

#### **Civic Plaza**

Designed to become the heart of the Green Square Town Centre, the plaza has to offer a range of public domain program. Its edges are programmed with fine grain retail to achieve highest activation. The southern edge with it's exposure to direct sun throughout the year is suggested to provide dining and outdoor seating.

The centre space is proposed to retain as an open, uncluttered space to allow for larger events such as outdoor cinemas, community gatherings etc.

The following should be considered when designing the plaza:

- avoid permanently fixed street furniture which would reduce the multi functionality of the space;
- provide amenities for markets and cultural events [power, water supply in retractable units];
- provide a variety of outdoor uses such as seating for groups and single patrons and informal gathering spaces;
- integrate the interpretation of the Shea's Stream culvert as a WSUD element along the southern edge of the plaza; and
- provide formal and informal play elements integrated in the overall plaza design; — Integrate the public library building as a visual and acoustic termination of the plaza.

#### **Neilson Square**

This smaller square should be visually connected with the Civic plaza by utilising the same pavements and public domain elements however it is to be defined as a space of its own identity. Here, more intimate functions may be held in a softer environment. This part of the central plazas is dedicated to smaller community markets, al fresco dining and family play in combination with cafe and restaurant functions.

The square needs to be designed to become the threshold between the 'outer' public domain with it's streets and parks and the 'inner' core

#### .East West Transport Corridor

Both, Civic Plaza and Neilson's Square, contain the transport corridor along their northern edges. This corridor is to provide east west traffic access for public transport only. It is staged in two stages and provides a road corridor for busses until a light rail system is installed connecting to the city centre.

Whilst the transport corridor is to be designed as an integral part of the plazas, clear demarcation of the traffic lanes is to be provided by the use of kerbs, variety in the selection of the pavement material and physical barriers such as bollards.

#### Shea's Stream

The Shea's Stream is the linear continuous element that connects all town centre areas such as the boulevard, the Drying Green park and the plazas. The Shea's Stream is an interpretation of the original creek that ran through this area in pre-European times prior to being confined into an in-ground culvert system.

The Shea's Stream is proposed to combine the following elements:

- WSUD treatment elements such as bio retention or wetland cells;
- possible day lighting of base flows of the culvert and hence reinstalling the original creek;
- tall open tree canopy for shading and provision of microclimates;
- informal play/ water play;

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- informal seating and gathering spots; and
- natural, softer and contrasting element to the hard surfaced plazas.

#### **Drying Green Park**

The park forms the 'Green Heart' of the Town Centre. Surrounded by higher developments it will become the green open centre space and provides amenities to the community that are more softscape related. The following components should be integrated in the park:

- community facilities such as meeting spaces and bbq, possibly a community garden;
- provide formal and informal play;
- provide large open lawns for picnics and play;
- integrate the required WSUD elements such as bio retention, stormwater detention and wetland cells; and
- allow for pedestrian cross connections.

#### Street Corridors

A fine grained network of streets maximises access to and within the Town Centre. All streets should be designed in a way to prioritise pedestrian and bicycle movement and to enhance the use of public transport. The new streets will connect well into the existing adjacent neighbourhoods and, where possible, continue the hierarchy and characteristics of the existing street typologies.

Street intersections should be designed to increase pedestrian and cyclist safety. Street crossings should be considered as extensions of the footpaths and accordingly highlighted. WSUD should be integrated in the street design where possible. Elements such as WSUD tree pits, rain gardens, permeable pavement etc can be used to define the atmosphere of these streets and highlight their role within the Town Centre. A hierarchy of streets has been established in reference to their context within the Town Centre and also their regional importance.

#### The Boulevard - Zetland Avenue

This 36m wide corridor is one of the major collector streets that provide access between the north south running arteries Botany Road and, via the slightly smaller Joynton Avenue, the Southern Cross Drive. The gateway into the inner Town Centre, this corridor shall be established with high quality pavement and lighting.

The Boulevard provides the following:

- 2 transit lanes for public transport [interim for buses, light rail as second stage in a grass corridor];
- 2 vehicular travel lanes;
- 1 parking lane;
- separated bi-directional bike lane;
- bio swale/ Shea's Stream as part of the overall stormwater

management; and

• Avenue type street tree planting to the north and introduction of the Urban Stream plant communities along the south edge as part of the bio swale/ Shea's Stream Interpretation.

#### The High Street - Ebsworth Street

This 20 m wide street corridor is established as the main shopping street accessing a variety of fine grain and larger retail facilities. This street is the heart of the retail precinct and should prioritise pedestrian movement over vehicles.

The High Street provides the following:

- 2 vehicular travel lanes;
- 2 parking lanes for short term and special parking such as car sharing and electric vehicles etc.;
- shared bicycle traffic;
- Bicycle parking for short term and mid term;
- street furniture such as seating and waste collection points; and
- WSUD tree pits.

#### The Retail District

The shopping district can be defined by the grid of the following smaller scale local streets; Hinchcliffe Street and Tweed Place, Barker Street, Fellmonger Place and Wool Pack road to the south of the plazas, all enclosed by the streets Geddes Avenue, Ebsworth Street and Paul Street.

The precinct streets provide vehicular access to fine grain retail facilities on ground level and commercial and residential uses in the upper levels. The streets should prioritise pedestrian movement in order to accommodate a high level of activation and fluctuation.

These streets of various widths provide:

- 1 or 2 travel lanes;
- parking lanes for short term parking;
- shared bicycle traffic;
- WSUD tree pits established as covered elements with integrated community amenities such as seating, recyclables collectors; and
- Bicycle parking for short and longer term stays.

#### The Residential District

South of Geddes Avenue, a residential precinct forms a transition into the existing neighbourhoods. These streets, Hinchcliffe Street southern section, Paul Street and Sonny Leonard Street, provide:

- 2 way travel lanes;
- 2 parking lanes;

- WSUD tree pits established as rain gardens with understorey planting;
- some community amenities such as waste/ recyclables collectors and seating zones; and
- Portman Street and Geddes Avenue will provide a separated bi-directional bicycle lane.

#### Shared Zones/ Naked Streets

Within the retail core, Tweed place, Barker Street, Fellmonger Place and Hinchcliffe Street, all can be identified as special zones. Here, a laneway character should be established with shared movement between pedestrians, bikes and vehicles. The lanes are recommended as extensions of the public plazas to provide a more intimate character. These lanes are to be established as 'naked' streets' with little demarcation of traffic lanes. Special street lighting should further enhance the character of these laneways as pedestrian priority.



# Figure 3.1 – Proposed Green Square Town Centre Essential Infrastructure Works





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In determining a DA, a consent authority (City of Sydney Council) is to take into consideration the following matters which are relevant to the development the subject of this DA. This chapter provides an assessment of those matters for consideration contained in Section 79C of the EP&A Act, which is presented below in relation to the proposed development.

#### 4.1 Provisions of relevant environmental planning instruments

#### 4.1.1 State Environmental Planning Policies

Relevant State Environmental Planning Policies (SEPP) that apply to the Town Centre include SEPP (Infrastructure) 2007 and SEPP No.55 Remediation of Land. These are assessed below in relation to the proposed development.

#### State Environmental Planning Policy (Infrastructure) 2007

SEPP (Infrastructure) 2007 or 'the Infrastructure SEPP' is the principal EPI that applies to the assessment and approval of infrastructure in NSW. The SEPP aims to provide a consistent approval regime for the assessment of infrastructure and to promote better coordination and integration with adjacent development to efficient development and redevelopment of surplus government owned land. The Infrastructure SEPP also stipulates consultation requirements with key government agencies during the assessment process or prior to development commencing.

The Infrastructure SEPP includes development controls and exempt development provisions relating to the construction of a range of infrastructure and related service works. Included are stormwater management systems, water supply systems, sewerage systems, roads and telecommunications and other communication facilities.

Consultation has occurred with public authorities during the preparation of this SEE which includes Energy Australia, Sydney Water and RMS.

As previously mentioned, approval from the RMS is required for the proposed road connection from proposed Geddes Street to Botany Road, which is a classified road. In particular, RMS has confirmed that no signalised intersection is required at the intersection of proposed Ebsworth Street and Bourke Street. This application complies with Clause 101 Development with frontage to classified road.

In accordance with Clauses 13 and 14, the City is proposing to provide for the integrated delivery of the Essential Infrastructure works that does not impact on existing infrastructure and local heritage items. The Essential Infrastructure works are also being proposed to reduce the impacts of flooding in the Town Centre area in response to Clause 15. There is no consultation required with public authorities listed in Clause 16.

#### State Environmental Planning Policy No.55 – Remediation of Land

State Environmental Planning Policy No.55 – Remediation of Land (SEPP 55) applies to NSW and establishes a planning approach to the remediation of contaminated land. In particular, SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment. SEPP 55 identifies consent requirements for a remediation work and also specifies standards and notification requirements for proposed remediation work.

Clause 7 Contamination and remediation to be considered in determining a DA requires that Council must not consent to the carrying out of any development on land unless it has considered whether the land is contaminated, and if the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out. Furthermore Council must consider that if the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

Other provisions require Council (a consent authority) must consider a report, to be prepared in accordance with the contaminated land planning guidelines, of a preliminary investigation that would involve a change of use of land in an investigation area or a known area of potential contamination and land proposed for a range of sensitive uses such as residential, child care hospital etc.

In response to SEPP 55, a Contamination Assessment has been prepared by Environ Australia (Refer to Appendix I) which concluded that.

The Auditor considers that the Town Centre area can be made suitable for commercial/industrial and recreation open space uses if the site is remediated in accordance with the Remediation Action Plans (RAP) referenced in this document and in consideration of the comments outlined by the Auditor in this letter.

A condition of consent to the previous development application (D/2008/1195) was that the site is to be remediated and validated in accordance with the RAPs reviewed by the Auditor. While the plans previously reviewed were considered by the Auditor to be practical and could make the site suitable for the proposed uses, the plans are conceptual and are required to be updated with further detail prior to implementation. This is particularly as further investigations are required in some areas of the site. Revisions to the RAPs have been proposed by Douglas Partners (2009), and further amendments may be desirable based on further investigations and specific staged development plans.

Correspondence from Council regarding remediation of contamination at the Green Square Town Centre is provided in Appendix I.

#### 4.1.2 Local Environmental Planning Instruments

The relevant environmental planning instrument (EPI) that applies to the Town Centre include:

- City of Sydney PSO 1971; and
- South Sydney LEP No.114 Southern Industrial and Rosebery/Zetland Planning Districts.

Both plans are assessed below.

#### **City of Sydney Planning Scheme Ordinance 1971**

The City of Sydney PSO 1971 is the principal deemed EPI that applies to the study area. The major part of the site covered by the Essential Infrastructure DA is zoned Industrial General 4(a). This zoning still exists due to the deferral of the area from the South Sydney LEP 1998.

The proposed works are classified as 'utility installation' which means a building or work intended for use by a public utility undertaken but does not include a building designed wholly or principally as administrative ob business premises or as a showroom.

• The provision of utility installations is permissible with consent; and

The proposed works are also categorized as "Roads and ancillary structures" which are also permissible with consent under the City of Sydney PSO 1971.

The SEE has been prepared in accordance with Clause 31 and has addressed those maters raised including Clause 32 and 33. The proposed road connection to Botany Road must also be approved by the RMS.

Relevant clauses of the City of Sydney PSO have been assessed in Table 2.

#### TABLE 2: ASSESSMENT OF CITY OF SYDNEY PLANNING SCHEME ORDINANCE 1971

Relevant City of Sydney PSO 1971	Comment on Proposed Essential Infrastructure works
Clause 10 Buildings etc., not to be erected on reserved land without consent / Clause 23. Erection of use of buildings or works / Clause 24. Restrictions on buildings and works	The City of Sydney is obtaining consent for the proposed Essential Infrastructure works
Clause 31 – Submission of plans	Plans have been prepared in support of this DA which are provided as Appendix A and B.
Clause 32 – Consideration of applications generally	The works are being undertaken on public land and consent will be obtained from the Council and relevant NSW Government agencies (RMS). Relevant plans will be sent to the RMS for concurrence under Clause 91 of the EP&A Act.
Clause 33 – Consideration of certain applications (Aesthetic appearance	(a) and (b) – This area to which the application relates is an established urban area which already contains above and below ground infrastructure in the form of roads, stormwater and electrical utilities.
	(c) – A Traffic and parking assessment (Refer to Appendix F) confirms that the proposed layout and access arrangement is adequate to support future access for residents, workers and visitors.
	(d) – The proposed design has been developed in accordance with key public authorities including the RMS and Sydney Water. These agencies have provided in-principle support for the proposed Essential Infrastructure works.
	(e) – The proposed connection to Botany Road does not undermine plans by the RMS to develop this road as a future transit corridor The proposed Essential Infrastructure works conform with the City's future plans for the area

Clause 33 (Continued)	<ul> <li>(f) - Substantial landscape treatment of the above ground works will be included as part of the project and once completed the Essential Infrastructure will not generate significant adverse environmental impacts on the amenity of existing and future residents.</li> <li>(g) &amp; (h) - The proposed Essential Infrastructure works are a critical part to the redevelopment of the former industrial lands into a vibrant town centre. The works will contribute to the future amenity for residents, workers and visitors through the provision of electricity, drinking water and energy supply.</li> <li>(i) - the proposed works are consistent with the provisions of the City of Sydney PSO 1971. The SEE has involved an appropriate level of environmental and planning expression.</li> </ul>
	proposed works and has addressed relevant issues contained in the PSO.
Clause 36. Consents to be void in certain circumstances	Concurrence (approval) will be obtained from the RMS for the proposed connection from Geddes Avenue to Botany Road which is a State road under the Roads Act 1993. The proposed landscape plans (Refer to Appendix B) will ensure design integration between the proposed Town Centre roads and the future
Clause 37. Determination of application	This SEE has assessed previous development consent conditions (D/2008/1195) and the applicant accepts that Council is likely to impose conditions for the proposed Essential Infrastructure works. The applicant considers that a through environmental and planning assessment has been completed as part of the SEE to warrant a favourable determination for the proposed Essential Infrastructure works.
Clause 39 – Places of scientific or historic interest	Based on the AMAC Archaeological report (Refer to Appendix G) , the following comment is provided in response to Clause 39
	The site is significant at a State level because of the creation and use of Waterloo Dam, associated with the operation of Waterloo flour mill, which was constructed in c1820. The later wool washing works established on the site is significant at a local level, as an early and characteristic industry for the area. The later brickworks are also characteristic for the area. The late 19th century residential buildings are also considered locally significant. It is likely that the significance of the site is represented by archaeological evidence preserved in some areas.
	AMAC Archaeological has recommended a range of measures to ensure the identification and protection of un-identified relics during the construction stage. This includes undertaking

	documentary research and seeking Excavation Permits from the Heritage Branch of the Office of Environment & Heritage.
Clause 41 - Preservation of trees	The preparation of the Landscape and Streetscape report (Oculus – Refer to Appendix B) provides the opportunity for substantial tree planting in the Town Centre. Existing trees within the Town Centre that will be protected include:
	• Poplar trees (Portman Street – at rear of 97-115 Botany Road)
	<ul> <li>Eucalypt trees (Frontage of 377 – 497 Botany Road)</li> </ul>
	• Eucalypt trees (northern side of Waverley Depot)
	Note: These trees must be protected in accordance with the D/2008/1195.
Clause 48. Alignment of main roads / Clause 49. Junctions and intersections	Refer to response provided to Clause 36.
Clause 53. Restriction of ribbon development	The proposed development will not result in ribbon development but rather allows for the strategic placement of active street frontages through the establishment of a road hierarchy. For instance, Ebsworth Street will emerge as the primary retail street in the Town Centre.
	The Traffic report concluded that the proposed access arrangement of the proposed roads is unlikely to significantly impact on traffic using existing state roads. The traffic impact from future

#### **South Sydney Local Environmental Plan 1998**

The South Sydney LEP 1998 was gazetted on 22 December 2006, however it does not currently operate in respect of land within the Town Centre as this land is a "deferred matter" under section 68(5) (now section 59) of the EP&A Act.

The South Sydney LEP 1998 does not fully apply to the Green Square Town Centre as most of the provisions are "deferred" until activated when a Planning Agreement is agreed between the City and a landowner. However Division 1 Heritage conservation, Division 2 Development at Green Square and Division 2A Green Square Town Centre apply to development in the Town Centre.

Relevant provisions are assessed below in Table 3.

#### TABLE 3 – ASSESSMENT OF SOUTH SYDNEY LEP 1998

Relevant Clause	Comment on Proposed Essential Infrastructure works
22. Heritage Aims	Based on the AMAC Archaeological report (Refer to Appendix G), the following comment is provided in response to Clause 39

The site is significant at a State level because of the

development will be assessed on an individual basis once DAs have been lodged with Council.

creation and use of Waterloo Dam, associated with the operation of Waterloo flour mill, which was constructed in c1820. The later wool washing works established on the site is significant at a local level, as an early and characteristic industry for the area. The later brickworks are also characteristic for the area. The late 19th century residential buildings are also considered locally significant. It is likely that the significance of the site is represented by archaeological evidence preserved in some areas.

AMAC Archaeological has recommended a range of measures to ensure the identification and protection of un-identified relics during the construction stage. This includes undertaking documentary research and seeking Excavation Permits from the Heritage Branch of the Office of Environment & Heritage.

The proposed Essential Infrastructure works are unlikely to impact on the heritage listed Royal South Sydney Hospital which will emerge as a key mixed use site on the fringe of the Town Centre. This site is covered by a Conservation Management Plan (City Plan Heritage, 2011) which provides for the heritage assessment framework and future development of the site in accordance with the Green Square Town Centre DCP 2012.

# 23. Heritage Items The proposed Essential Infrastructure works will not impact on Item 554A which covers No.3 Joynton Avenue, Zetland, which covers the former hospital site, including:

- Administration Building, Queen Anne style building, 1913, with later alterations and additions, and
- Pathology Building, single story building to Joynton Avenue, 1913, and
- Outpatients Building, single storey Inter-War Georgian Revival style building, c 1935, and
- Nurses Home (eastern wing), three storey Inter-War Georgian Revival style building, c 1938, and
- Brick and sandstone boundary fence to Joynton Avenue, 1913, and
- Landscaped area fronting Joynton Avenue between the Nurses Home and the Pathology Building, including the significant trees and open landscaped areas around the buildings

The former hospital site is covered by a Conservation Management Plan (City Plan Heritage 2011). Green infrastructure connections within the Town Centre will connect with the proposed Green Infrastructure Centre at the property boundary. The proposed Green Infrastructure Centre has been assessed separately in accordance with the Conservation Management Plan.

The proposed Essential Infrastructure works will not impact on the following heritage conservation areas within and adjacent to the Town Centre:

- CA28 Hansard Street Conservation Area, Zetland which covers Tosh Lane, Dunning Ave, Hansard Street, the eastern boundary of No 59 Hansard St, Chester Lane and Emanuel Lane
- CA53 Zetland Estate Conservation Area at Waterloo and Zetland which covers Short St, the

#### 23A. Heritage Conservation Areas

northern boundary of No 2 Hawksley Street, the northeastern boundary of No 985 Bourke St, Bourke St, the north western boundary of No 904 Bourke St, McPherson Lane, the eastern boundary of No 13 Merton St, Tilford Street, Joynton Ave, Elizabeth St, the northern boundary of No 811 Elizabeth St, Portman St, the southern boundary of No 75 Portman St, Portman Lane, the western boundary of Nos 936–938 Bourke St and Elizabeth St.

24. Development in the vicinity of heritage items, heritage conservation areas, heritage streetscape areas, archaeological sites or potential archaeological sites

Green Square is not within an identified heritage conservation area but lies next to the Zetland Heritage Conservation Area and some listed heritage items (SSLEP 1998) which include 'Ada Terrace' at Nos 13-19 Portman Street.

The proposed Essential Infrastructure works will not impact on these listed heritage items as the works are mostly underground and located to the south of these properties.

Refer to comment provided in response to Clause 22.

27. Development of a site or place of potential or known archaeological significance

Division 2 – 27A Vision for Green Square

27B. Planning principles for Green Square The proposed Essential Infrastructure works are in accordance with the Vision for Green Square. The works will provide the foundation for future development to occur which will enhance connectivity and allow for long term growth to occur in the Town Centre. The proposed works will help achieve a vibrant Town Centre with a mix of land uses.

The proposed Essential Infrastructure will help achieve the planning principles contained in Schedule 4 of SSLEP 1998. The proposed works will support the emergence of the Town Centre as a centre destination with a substantial residential population.

The proposed works will provide the opportunity for quality public domain areas that will enhance social mix and interaction and provide for an integrated land use pattern.

Public domain areas are easily accessible in the Town Centre which is supported by a hierarchy of streets and lanes to enhance legibility and connectivity.

The proposed works will support the provision of shopping streets (Ebsworth Street) to support the Town Centre's emergence as a centre economic activity for an existing and future population. The works will support the provision of employment, residential, cultural & community and open space uses. The proposed road layout also supports provision of large and small retail facilities.

The proposed works will provide the foundation for future public transport to link the centre to surrounding regions through the provision of a transport corridor (buses / light rail) and roads to support pedestrian and cycle use.

The proposed works incorporate 'best practice' design to ensure amenity for residents, workers and visitors to reduce potential effects from wind, sun and noise. The road design supports ecologically sustainable development measures including WSUD and

	stormwater management, street tree planting to support natural habitat and the use of recycled materials during the construction stage. The layout provides for adequate wind circulation to ensure greater air quality.
27C. Determination of development applications	The proposed Essential Infrastructure works are not subject to a master plan but they have been designed in accordance with the Green Square Town Centre DCP 2012 which is the most recent principal plan that will shape the development of the Town Centre.
27KE Architectural design standards	The design of the public domain has been determined through the implementation of a Public Domain Strategy. The street layout provides for the development of public plazas and squares that will encourage social interaction and community development. The road layout allows for ease of movement throughout the Town Centre from residential areas to key nodes such as the railway station, the town plaza and community centres. The public domain will be enhanced by a Pavement, Planting and Lighting Strategy to add the fine grain to public domain (Refer to Appendix K). The proposed works allow for the inclusion of ESD and WSUD to enhance the environmental performance of the public domain.
27KH Floodwater management	Based on the Flood Mitigations Options Report for the Town Centre (Refer to Appendix D), Cardno concluded the following:
	Subsequent to the 2009 Report, the extent of the Town Centre and its road layout have been amended. The proposed drainage works for GSTC, Option 1a in the 2009 Report, has been revised for the new development. The Town Centre and proposed drainage network has been modelled for a range of storm events with flood behaviour generally consistent with the previous report of 2009.
	The proposed drainage network for Town Centre includes additional inlets and pipelines from Joynton Avenue to Botany Road and incorporates the Drying Green storage area. This system is recommended for adoption in the Town Centre development based on review of the LEP and DCP conditions for the site.
	The Mid-term (10 Years) Drainage Response for Green Square and Alexandra Catchment was developed in consultation with the City of Sydney and Sydney Water. This system of augmented culverts and open channels along the trunk drainage corridor results in a significant reduction of peak flood levels and flood risk.
	A Draft Floodplain Risk Management Plan was prepared in 2009 which detailed flood behaviour and identified guidelines for the management of flood risk at specific sites and generally within the Town Centre. This Plan has been updated in-line with the changed Town Centre layout identified in this Report. Further details are provided in Cardno (2012b).
South Sydney LEP 1998 - Amendment No.17 Green Square Town Centre - Zoning	Under South Sydney LEP 1998 – Amendment No.17 Green Square Town Centre, there are two key land use zones that apply to the Town Centre. These include Zone No.11 (a) Green Square Town Centre Zone and Zone No 11 (b) Green Square Town Centre Public

Domain Zone. The proposed works are permissible with consent in each respective zone.

South Sydney LEP 1998 - Amendment No.19 Green Square Town Centre SSEL 1998 Amendment No.19 applies to the Town Centre and aims to permit with development consent the development of a communal car park or retail facilities on land within the Town Centre zoned 11(b) Public Domain. The proposed Essential Infrastructure works will not impact on the potential to provide a communal car park that is proposed on land within the Town Centre

# South Sydney LEP No.114 Southern Industrial and Rosebery/Zetland Planning Districts

The South Sydney LEP No.114 (LEP No.114) was gazetted in 1994 and covers the Southern Industrial and Rosebery/Zetland Planning Districts including a small part of the Town Centre, which includes the former Royal South Sydney Hospital site, which is zoned 5(a) Special Uses.

LEP No.114 aims to provide a clear set of planning controls for future development, minimise land use conflict and provided appropriate zoning to enhance the existing environment and amenity of the area. Other objectives cover residential, employment social, built environment, zoning, open space, services and transport.

The proposed Essential Infrastructure works affect a small area of the formal hospital site through with proposed utility connections from the Town Centre to the GIC. The utility connections will allow future Town Centre uses to allow the sustainable renewal of the Town Centre in accordance with Sustainable Sydney 2030.

#### 4.2 Any proposed environmental planning instrument

The following proposed environmental planning instruments have been assessed in this SEE:

- Draft City of Sydney LEP 2011;
- City of Sydney Planning Proposal Sydney Local Environmental Plan 2010 (Green Square Town Centre);
- Draft Planning Proposal Green Square Town Centre (Site 301 Botany Road, 501 Botany Road, 511-515 Botany Road, 97-115 Portman Street, 811 Elizabeth Street, Zetland; 312 -318 (Green Square Consortium lands); and
- City of Sydney Planning Proposal Sydney Local Environmental Plan 2010 (Green Square Town Centre) for 301 Botany Road, Zetland (John Newell Site).

#### 4.2.1 City of Sydney Planning Proposal Sydney Local Environmental Plan 2010 (Green Square Town Centre)

In March 2012, the City approved the Planning Proposal Sydney LEP 2010 (Green Square Town Centre). This Planning Proposal applies to all sites within the Town Centre except the Green Square Consortium lands, which are subject to a separate Planning Proposal.

The Planning Proposal (Draft LEP) is currently with the NSW Department of Planning & Infrastructure awaiting approval (gazettal) from the Minister for Planning & Infrastructure. This Planning Proposal has been prepared in

accordance with the Standard Instrument (Local Environmental Plans) Order 2006 and will replace the City of Sydney PSO 1971, South Sydney LEP 1998, and South Sydney LEP No.114, in so far as they apply to the Town Centre.

The proposed Essential Infrastructure works are consistent with the key objectives of the Planning Proposal which will support the redevelopment of the Town Centre for housing and employment purposes supported by a quality public domain and accessible road layout to support public transport use and increased access to, within and across the Town Centre for pedestrians and cyclists.

The proposed works will allow for the development of active frontages at key streets (Ebsworth Street) and future buildings that will integrate with the public domain areas.

The proposed works provide a Town Centre solution to the flooding risk along with sustainable development measures to encourage best practice design The proposed Essential Infrastructure works will support a range of land uses as proposed on the Planning Proposal to provide for mixed uses east of Botany Road and Commercial Core uses west of Botany Road. The proposed road layout as contained in this SEE supports these uses which are detailed in the Green Square Town Centre DCP 2012. This SEE is also consistent with the key provisions of the Planning Proposal, which are assessed below in Table 4.

# TABLE 4KEY ELEMENTS OF THE PLANNING PROPOSAL (GREEN<br/>SQUARE TOWN CENTRE)

Relevant Clause	Comment on Proposed Essential Infrastructure works
5.9 – Preservation of Trees	<ul> <li>The preparation of the Landscape and Streetscape plans (Refer to Appendix B) and Public Domain Strategy (Refer to Appendix K) provides the opportunity for substantial tree planting in the Town Centre. Existing trees within the Town Centre that will be protected include: <ul> <li>Poplar trees (Portman Street – at rear of 97 - 115 Botany Road)</li> <li>Eucalypt trees (Frontage of 377 – 497 Botany Road)</li> <li>Eucalypt trees (northern side of Waverley Depent</li> </ul> </li> </ul>
6.21 – Design Excellence	The proposed Essential Infrastructure works achieves design excellence with a road layout as which will create increased permeability and connectivity throughout the Town Centre. The proposed Essential Infrastructure works allow for the Drying Green which is a proposed new town park as proposed in the Planning Proposal. The implementation of the Public Domain Strategy will provide for an attractive and unique public domain
7.16 – Acid Sulfate Soils	The proposed Essential Infrastructure works apply to land within the Town Centre which is west of Botany Road. This land is not affected by Acid Sulfate Soils, which applies to a small part of land within Alexandria, west of O'Riordan Street., which is

7.17 – Flood Planning	located outside of the DA study area. The proposed Essential Infrastructure will support improved stormwater and flood risk management
	which has been a major impediment to development
	layout utilises a combination of culverts and cross-
	site overland flow paths. The proposed stormwater
	works will achieve a built form layout that is not
	affected by the 1 in 100 year storm event and
	and Plan prepared in accordance with the Manual
	The proposed works will minimise flood risks
	through Town Centre measures to better manage
	flooding. Longer term initiatives are also proposed
	with Sydney Water to resolve broader Alexandra
	Canal Catchment.
	future DAS for building works will be required to demonstrate the risk of flooding is minimised and
	that they comply with the following
	1. is compatible with the flood hazard of the land;
	2. will not significantly and adversely affect flood
	behaviour to the detriment of other properties or the
	environment; and
7.26 A stime Streat	3. manages risks from flooding
7.20 – Active Street Frontages	provide for the development of Active Street
Trontinges	Frontages in accordance with the Green Square Town
	Centre DCP 2012.
7.27 – Public Utility	The proposed Essential Infrastructure works provide
Infrastructure	the infrastructure necessary for the long term and
	sustainable renewal and development of the Town
Schodulo 5 Environmental	Centre.
Schedule 5 Environmental Heritage	impact on items of environmental heritage as located
minage	in the Town Centre.

#### 4.2.2 City of Sydney Planning Proposal Sydney Local Environmental Plan 2010 (Green Square Town Centre) – Green Square Consortium Lands

This Planning Proposal (Draft LEP) applies to the sites at 956 – 960 Bourke Street, 355 Botany Road and 377 – 497 Botany Road Zetland. The planning provisions within this Planning Proposal are very similar to the provisions contained in the Draft Planning Proposal for the Town Centre. In this regard, the assessment of the Essential Infrastructure works has already been addressed above in Table 4.

#### 4.3 Any development control plan

#### **Green Square Town Centre Development Control Plan 2012**

The Green Square Town Centre DCP 2012 is the main DCP that applies to future development in the Town Centre. Once the above Planning Proposals are gazetted, this DCP will replace all existing DCPs that apply to the Town Centre. The DCP was approved by Council in early 2012 and this SEE provides an assessment of the relevant clauses of the in Table 5.

2012	
Green Square Town Centre DCP 2012	Response to Essential Infrastructure works
GSTC 1.4 Objectives)	The proposed Essential Infrastructure works will provide a street network to support active transport and enhanced legibility to connect with the Town Centre and existing Green Square rail station. The proposed works include green infrastructure to achieve the sustainable renewal of the Town Centre. The proposed works will also alleviate the flooding risk in the Town Centre. The proposed provide for the future development foundation to achieve a unique Town Centre area with bespoke public domain measures (Refer to the Public Domain Strategy in Appendix K).
GSTC 2 Desired Future Character / GSTC 2.1 Locality Statement and GSTC 2.2 Principles	The proposed Essential Infrastructure works will achieve the Desired Future Character for the Green Square Town Centre through the provision of a street layout with good access and safety for pedestrians and cyclists etc. The landscape and streetscape elements will provide the opportunity for an attractive public domain design. The Essential Infrastructure works support the long term vision to develop Green Square as a major centre. The proposed works will alleviate the flooding risk but longer term initiatives will reduce flooding and water quality issues in the broader Alexandra Canal catchment. The inclusion of green infrastructure will help reduce the ecological footprint of future residential and commercial development. The proposed works will also achieve the planning principle for active street frontages to enhance the pedestrian experience of the Town Centre. The implementation of the Public Domain Strategy will provide an enhanced public domain area with high amenity for future residents, workers and visitors.
GSTC 3 Local Infrastructure (GSTC 3.1.1 - 3.1.8)	The proposed Essential Infrastructure works will achieve a public domain with attractive public
GSTC 3.2 Development in the Public Domain	which will enhance social interaction and provide for the celebration of culture and the holding of community events. Landscape and design treatments will enhance the urban experience and provide a Town Centre with a high amenity for residents, workers and visitors. A separate DA will be lodged to Council for the Drying Green and also for the proposed Transport Plaza (Green Square).
GSTC 3.3 Street Network (3.3.1 – 3.3.6)	The Essential Infrastructure is consistent with the objectives in GSTC 3.3. The street network has been designed to achieve optimum pedestrian

# TABLE 5 ASSESSMENT OF GREEN SQUARE TOWN CENTRE DCP

and cyclist safety and access. This includes designated bike lanes and wide pedestrian paths. The street hierarchy with Ebsworth Street as the nominated "high street" and Zetland Avenue adopting a more transit oriented function with bus/light rail will provide a good legibility for pedestrians in the Town Centre. The proposed Essential Infrastructure works will provide an opportunity for integrated stormwater management and inclusion of WSUD. The proposed road layout will allow controlled vehicle access through the Town Centre at a controlled speed limit of 40 km / hr. The proposed east - west road (Geddes Avenue which extends west towards O'Riordan Street) will enhance traffic movements in the broader region. In accordance with GSTC 3.3.1 the proposed Essential Infrastructure works nominate Zetland Avenue as a transit corridor to link the Town Centre to Epsom Park future development area. Zetland Avenue will also provide an opportunity for stormwater management in the Town Centre. The proposed road layout contains a north - south Town Centre (Barker Road) in accordance with 3.3.3. The proposed road layout also includes an opportunity for "Slow zones (GSTC 3.3.4) and "Through site links" (GSTC 3.3.5) as well as arcades (GSTC 3.3.6) in accordance with the DCP.

The SEE incorporates a Flood Mitigations Options Report (Refer to Appendix D) which identifies flooding and drainage measures to minimise the flooding risk in the Town Centre. The main elements of the flood mitigation works include: A designated overland flow path, stormwater detention and flood a flood free community and retail zone in accordance with Figure 3.7: Flood Management Principles and other measures are also proposed by the City to minimise the broader catchment related flooding issues and these include raising Joynton Avenue and working with Sydney Water to undertake more significant infrastructure works to improve flooding and water quality in the Alexandra Canal catchment.

It is noted that developments that form part of Stages 1 and 2 (Landcom / Hatbands) are not impacted upon overland flows or flood impacts and as such do rely on proposed upgrades to existing drainage infrastructure (Refer to Figure 3.2).

The proposed delivery of the Essential Infrastructure works will match the redevelopment of the Town Cent re which is planned to occur in a staged manner over a 15 year period. The City and its contractors will

GSTC 3.4 Flooding and Stormwater Management

GSTC 3.5 Staging and Implementation

	implement a staged delivery of conditions compliance to match the release of development sites in the Town Centre. This will be managed through the implementation of a Construction Environmental Management Plan, which will contain provisions listed in GSTC 3.5.
GSTC 4 Land Uses	The proposed Essential Infrastructure works will support the proposed redevelopment of the Town Centre in accordance GSTC 4 Land Uses. This includes a street layout which favours the preferred land uses in the Town Centre but which also includes appropriately sized streets and intersections
GSTC 4.3 Active frontages	The proposed Essential Infrastructure works will support the proposed "Active Frontage" of the Town Centre in accordance GSTC 4 Land Uses. This includes a provision for street furniture, road and pavement design treatments as well as a nominated street hierarchy and street tree planting.
GSTC 5 Heritage (GSTC 5.1, 5.2 & 5.3)	The Town Centre only contains a small number of items of local environmental heritage which are located on the former hospital site at Joynton Avenue, Zetland (Item 554A of the SSLEP 1998). A Heritage Impact Statement has been prepared for key projects on the former hospital site which supports the proposed Green Infrastructure Centre. A Baseline Archaeological Report has been prepared in support of the SEE (Refer to Appendix G), which recommends a range of mitigation measures to protect the cultural heritage significance of the Town Centre during the construction stage.
GSTC 8 Environmental Management (8.1, 8.3, 8.4, 8.5, & 8.7)	<ul> <li>The preparation of the SEE involves the inclusion of ESD measures to achieve a sustainable outcome for the Town Centre. This includes the following measures: <ul> <li>Water sensitive urban design including swales and rain gardens and filtration and bio - retention devices</li> <li>Protection of existing trees</li> <li>Significant street tree planting to reduce the "heat island" Effect</li> <li>Green infrastructure which will support the operation of the Trigeneration facility the Water Re-use facility and the Automated Waste Collection System on the former hospital site</li> <li>The use of proposed parks for water retention (The Drying Green)</li> </ul> </li> <li>Note: Due to the nature of the existing environment (Refer to Section 2) which contains land use that have been significantly modified by past industrial uses, an Ecological Assessment report has not been prepared in support of this SEE</li> </ul>

GSTC 9 Social Sustainability and Impact	The proposed Essential Infrastructure works will support an opportunity for social interaction through the creation of a legible street network with over 10 intersections. Creation of desire lines to the railway station and town centre as well as public plazas and parks for community gathering.
GSTC 10 Transport and Parking (10.3, 10.4)	The traffic and transport measures identified in the DCP are shown on the transport structure plan, as shown on Figure 6 (Refer to Appendix F). <i>Transport for NSW (RMS) indicated that the</i> <i>majority of the proposed/modified traffic control</i> <i>devices shown on the transport structure plan</i> (Figure 6) (Refer to Appendix F) are supported in principle. However, the proposed traffic control signals at the intersection of Bourke Street and Ebsworth Street are not supported. Any new local street connection to classified roads that are not to be controlled by traffic signals, including Ebsworth Street at Bourke Street, should be restricted to left in and left out. These restrictions should be enforced by physical barriers, such as control medians or splitter islands. As the pedestrian and bicycle movements to and from Green Square Station may substantially increase with the development of the Town Centre, the City will need to work with RMS to provide adequate pedestrian crossings (including possible pedestrian signals on Botany Road) at major intersections near the Town Centre. In accordance with Council's requirements and in association with the proposed bus signals at the intersection of Botany Road and Green Square, at-grade pedestrian crossing facilities should be incorporated into the traffic signals to improve pedestrian and bicycle access to and from Green Square Station. The existing underpass does not satisfy pedestrian desire lines and is not considered appropriate. Ease of pedestrian movement is considered essential. The design of pedestrian crossing should be resolved with the RMS at the planning stage, prior to construction. Any changes to existing traffic signals, the detailed design of proposed traffic signals, speed limits or reduction of travel lanes on regional roads are subject to approval by RMS. Proposed shared zones and slow zones should be in accordance with Figure 10.1: Transport Structure Plan (Refer to Appendix F) with a street hierarchy which includes Ebsworth Street and Geddes Avenue as the

Centre connected by second tier streets

(Hinchcliffe Street, Barker Street) and laneways. The road layout will support bus movements in the Town Centre which will link the Town Centre with other centres including the City, Bondi and

#### Botany.

The road layout has been designed to support safe and accessible pedestrian movements in the Town Centre including markings, pedestrian crossings and sign posting. The proposed Eastern Transport Corridor provides the primary transit function for the Town Centre initially for bus movements but in the longer term for light rail connecting to Epsom Park and the Sydney CBD. The proposed road layout provides for ease of pedestrian and cycle access with a controlled speed limit (40 km/h) to enhance safety and designated bike lanes to assist with safety and movement through the Town Centre. The proposed Essential Infrastructure works includes provisions for bike parking and bike facilities in the centre.

#### **Other Development Control Plans and Codes**

Other DCPs and Codes that have shaped the preparation of the Essential Infrastructure works include:

- City of Sydney Contaminated Land DCP 2004;
- South Sydney DCP 1997: Urban Design Green Square South Sydney DCP;
- City of Sydney Heritage Development Control Plan 2006: 1997 Urban Design;
- South Sydney DCP No.11 Transport Guidelines for Development;
- City of Sydney's Public Domain Manual;
- City of Sydney Design Codes;
- The City of Sydney Access DCP 2004; and
- Waste Code for New Developments.

#### 4.4 Any Planning Agreements

The City of Sydney and John Newell Pty Limited (landowner) have entered into a Planning Agreement (dated 20 October 2011) to facilitate the rezoning of land under the EP&A Act for high density residential and open space uses on land at No, 301-303 Botany Road, Waterloo (Lot 2 in DP 1015633), which is currently occupied by the Sydney City Nissan dealership.

In summary, the relevant works include utility upgrades, road infrastructure works, street lighting and signage works and underground connections from the John Newell site to the broader Town Centre. This proposed works covered by this Planning Agreement form part of the Essential Infrastructure works proposed in this SEE.

#### 4.5 The NSW Environmental Planning & Assessment Regulations 2000

There are no specific matters contained in the NSW Environmental Planning & Assessment Regulations 2000 that related to the proposed Essential Infrastructure works as covered in this SEE.
## 4.6 Any coastal zone management plan

The Green Square Town Centre is not located within land covered by a Coastal Zone Management Plan. The proposed works will enhance water quality in the broader Alexandra Canal catchment (which flows to the coast via Cooks River / Botany Bay) through infrastructure enhancements and WSUD measures.

## 4.7 The likely impacts of the development

The likely impacts of the development are assessed below. Minor amendments have been made to extracts from the various report sections to ensure consistency throughout the SEE.

## 4.4.1 Drainage

The assessment of drainage issues has based on the 'Green Square Town Centre Floodplain Risk Management Plan prepared by Cardno Pty Ltd (Refer to Appendix D).

## Flood Drainage Option

The assessment of flood behaviour within and surrounding the town centre was undertaken using the hydraulic model SOBEK. The setup and parameters for this model are discussed in detail in Cardno (2009).

Modelling of the proposed Town Centre design shows that it affects flow behaviour resulting in adverse impacts to peak flood levels upstream and downstream of the site. Additional drainage systems are proposed to manage flow behaviour within the Town Centre.

The proposed drainage layout for the Town Centre is based on Option 1a of the 2009 Report as this was selected as a feasible solution to facilitate the Town Centre development. It is designed in consideration of a potential future augmentation of the main trunk drainage to Alexandra Canal described in the Mid-term (10 Years) Drainage. Response concept in Appendix D.

## Proposed Drainage Layout

The proposed drainage system is based on Option 1a presented in the previous assessment (Cardno, 2009) and included in Appendix D, but is reconfigured for the new Town Centre layout. Changes to Option 1a reported in 2009 include realignment of the pipeline from the Drying Green storage area to Botany Road along the trunk corridor to facilitate a future alignment of the Mid-term (10 Years) Drainage Response concept along New Cross Street. Additional inlets have been repositioned closer to Joynton Avenue in the revised Town Centre road layout to improve capture rates.

Appendix D shows the elements of the drainage layout:

- Additional inlets in Joynton Avenue to convey runoff to the Drying Green storage basin;
- Drying Green storage basin (shown in Figure 6.1B) (Refer to Appendix D);
- Outlet pipe from storage basin to the existing trunk drainage culvert;

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- Outlet from storage basin to additional pipe conveying flow to Botany Road; and
- Pits to surcharge flows to Botany Road where flow from storage basin exceeds restricted capacity of pipe connecting to existing trunk drainage culvert.

The model evaluates mainstream overland flow through the Town Centre and does not explicitly model the individual drainage pits downstream of Joynton Avenue.

#### Climate Change

Climate change is expected to adversely affect rainfall intensities and global sea levels which may consequently impact flood behaviour.

The Alexandra Canal Catchment Flood Study (2011, Draft) modelled the effect of elevated water levels in Alexandra Canal due to increased sea levels. The study showed that for the modelled events, sea level rise in a 100 year ARI event did not alter peak flood levels upstream of Mandible Street.

Thus for the Study Area, increased rainfall intensity is likely to be a more significant factor influencing flood behaviour for the Town Centre. It was agreed with City of Sydney for the 2009 Report to model the Town Centre systems with an increase of 10% to the hydrology (inflow hydrographs for the hydraulic model) to represent a potential 10% increase in rainfall intensity due to climate change. This increase has been adopted for this updated assessment.

## Model Results

#### **Peak Water Levels**

The peak water level differences of the proposed development (with the revised drainage) compared to the existing case is shown in Appendix D.

Increased peak flood levels on Joynton Avenue, evident particularly during the more frequent events, result from the changed road grading of Zetland Avenue (between Joynton Avenue and Portman Street). The configuration of the inlet structures and transition of the road grading would be refined at detailed design stage. It is understood increases resulting at Joynton Avenue would be managed as part of the Epsom Park and Joynton Avenue road modifications being assessed by Worley Parsons (in preparation). Additional drainage inlets and refinement of the road grading is recommended at detailed design to manage peak water level increases shown on Portman Street.

An increase of around 0.01m is shown to occur post-development on Botany Road. Downstream of Bourke Road, the peak water level increase is up to 0.04m in the 100 year ARI event, except for a small area at Burrows Road. Similarly, in the 10 year ARI an isolated location on Bowden Street shows an increase of 0.10m. These potentially result from the setup of the model and resulting numerical calculations which may not be reflective of actual increases at these locations.

## Peak Depth

Figure 6.7 (Refer to Appendix D) shows the peak modelled depths for the 20 year ARI event. The results show that mainstream flooding is not conveyed overland in the 20 year ARI event across Neilson Square, Green Square or Geddes Avenue.

#### **Provisional Hazard**

Roadways within the catchment experience high hazard flow conditions under existing conditions as shown in the 2009 Report. Figure 6.8 (Refer to Appendix D) shows the extent of high provisional hazard for the 100 year ARI event for the revised development layout. Similarly to the 2009 Report, high provisional hazard is shown in the Town Centre on part of Geddes Avenue and Zetland Avenue.

#### Mid-term Drainage Response

The additional culvert and open channel capacity of the Mid-term (10 Years) Drainage Response for Green Square and Alexandra Catchment results in significant reductions in flood inundation and risk. Flood modelling results for the 20 year ARI and 100 year ARI events are detailed in Appendix D.

The proposed drainage system is based on Option 1a presented in the previous assessment (Cardno, 2009), but is reconfigured for the new Town Centre layout. Changes to Option 1a reported in 2009 include realignment of the pipeline from the Drying Green storage area to Botany Road along the trunk corridor to facilitate a future alignment of the Mid-term (10 Years) Drainage Response concept along New Cross Street. Additional inlets have been repositioned closer to Joynton Avenue in the revised Town Centre road layout to improve capture rates.

Figure 3.2 (See Chapter 3 of the SEE) shows the elements of the drainage layout:

- Additional inlets in Joynton Avenue to convey runoff to the Drying Green storage basin;
- Drying Green storage basin (shown in Figure 6.1B);
- Outlet pipe from storage basin to the existing trunk drainage culvert;
- Outlet from storage basin to additional pipe conveying flow to Botany Road; and
- Pits to surcharge flows to Botany Road where flow from storage basin exceeds restricted capacity of pipe connecting to existing trunk drainage culvert.

The model evaluates mainstream overland flow through the Town Centre and does not explicitly model the individual drainage pits downstream of Joynton Avenue.

#### Assessment

#### Proposed Drainage System

A brief description of the LEP objectives (clause 27KH) and the performance of the proposed development system in the Town

Centre to these objectives are provided below. Individual property sites and buildings within the Town Centre may incorporate additional flood mitigation measures.

- Adverse effect on flood behaviour Similar to the 2009 assessment, minor increases in peak flood levels result in the catchment post-development. Refinement of the road grading and inlet structures at detailed design phase is recommended to mitigate increases to flood levels;
- Significant increase in flood hazard or flood damage to any property – The flood hazard does not increase significantly as a result of the proposed development for the 100 year ARI and is limited to the areas already affected under existing conditions. An important outcome is that no new significant areas of provisional high hazard are created. Flood damage is primarily related to depth of flooding. With insignificant increases in flood levels, the change in flood damage is also likely to be insignificant;
- Decreases in the capacity of floodway The floodways through the Town Centre are modified due to the proposed development. However, the proposed layout provides sufficient flood mitigation to counteract the restriction of floodways through the Town Centre. Elsewhere, the capacity of existing floodways is not significantly affected;
- No increase in risk to life and safety of public and emergency services personnel The true flood hazard for the Town Centre indicates that the flood risk is expected to increase with the proposed Town Centre development due to the change in the number of people in the area. However, due to the nature of flooding, the risk is generally of short duration and the risk may be managed by providing appropriate refuge and assembly places in the proposed buildings in the area. The Green Square Town Centre Floodplain Risk Management Plan (Cardno, 2012b) describes the management of the flood risk; and
- Incorporate freeboard levels and flood proofing measures The proposed layout is not affected by this requirement. The elements of the Green Square Town Centre DCP 2012 relevant to the Town Centre provide sufficient details on the requirements of freeboard and flood proofing.

## Mid-term Drainage Response

A brief description of the LEP objectives (clause 27KH) and the performance of the Mid-term Drainage Response system to these objectives is provided below:

- Adverse effect on flood behaviour The System results in significant reductions to peak flood levels in the catchment from Link Road to Alexandra Canal;
- Significant increase in flood hazard or flood damage to any property – The system results in significant reductions in peak flood levels thus reducing flood hazard and potential flood damage;

- Decreases in the capacity of floodway The floodways through the Town Centre are modified due to the proposed development. The system results in a significant increase to floodway conveyance with the augmentation of culverts and channels;
- No increase in risk to life and safety of public and emergency services personnel The true flood hazard for the Town Centre indicates that the flood risk is expected to increase with the proposed Town Centre development due to the change in the number of people in the area. The potential flood risk is reduced compared to the existing situation due to the improved conveyance along the trunk drainage corridor to Alexandra Canal. However, due to the nature of flooding, the risk is generally of short duration and the risk may be managed by providing appropriate refuge and assembly places in the proposed buildings in the area. The Green Square Town Centre Floodplain Risk Management Plan (Cardno, 2012b) describes the management of the flood risk; and
- Incorporate freeboard levels and flood proofing measures The proposed layout is not affected by this requirement. The elements of the Green Square Town Centre DCP 2012 relevant to the Green Square Town Centre provide sufficient details on the requirements of freeboard and flood proofing.

## Conclusion

Subsequent to the 2009 Report, the extent of the Town Centre and its road layout have been amended. The proposed drainage works for Town Centre, Option 1a in the 2009 Report, has been revised for the new development. The Town Centre and proposed drainage network has been modelled for a range of storm events with flood behaviour generally consistent with the previous report of 2009.

The proposed drainage network for Town Centre includes additional inlets and pipelines from Joynton Avenue to Botany Road and incorporates the Drying Green storage area. This system is recommended for adoption in the Town Centre development based on review of the LEP and DCP conditions for the site.

The Mid-term (10 Years) Drainage Response for Green Square and Alexandra Catchment was developed in consultation with the City of Sydney and Sydney Water. This system of augmented culverts and open channels along the trunk drainage corridor results in a significant reduction of peak flood levels and flood risk.

A Draft Floodplain Risk Management Plan was prepared in 2009 which detailed flood behaviour and identified guidelines for the management of flood risk at specific sites and generally within the Town Centre. This Plan has been updated in-line with the changed Town Centre layout identified in this Report. Further details are provided in Cardno (2012b).

## 4.4.2 Flood Risk Management

The assessment of hydrology and flooding issues has based on the Green Square Town Centre Floodplain Risk Management Plan prepared by Cardno Pty Ltd (Refer to Appendix E).

This Floodplain Risk Management Plan (FRMP) for the Town Centre has been prepared by Cardno for the City of Sydney and Landcom to provide a Plan for the management of flood risks. The Plan has been prepared in accordance with the NSW Government Floodplain Development Manual (2005).

Flooding in the Town Centre, although rare, can be expected to affect the area in some circumstances and can therefore pose a hazard to future retailers, employees, visitors and residents around Green Square that needs to be managed. This has prompted the City of Sydney and Landcom (as the City's Development and Project Manager for the development) to prepare a comprehensive Floodplain Risk Management Plan for the Town Centre, which is located within the Green Square / West Kensington Floodplain, and the wider Alexandra Canal.

#### Floodplain.

The aim of this Plan is to provide certainty that the development sites, public streets, plazas and parks can be safely developed in accordance with specific flood-related requirements with respect to management of flood risks. The objectives of the Plan are to:

- Review the City of Sydney's existing environmental planning policies and instruments including the City's long-term planning strategies for the study area;
- Identify flood mitigation measures (or structural measures) for implementation;
- Identify property and public domain design measures (e.g. minimum floor levels) for implementation;
- Identify emergency management measures (e.g. evacuation strategies) for implementation; and
- Be consistent with the objectives of relevant policies, in particular, the NSW Flood Prone Lands; and
- Policy and satisfy the objectives and requirements of the EP&A Act.

This Plan has been prepared for two purposes, for the long-term management of flood risk in the area and to accompany the Public Domain and Essential Infrastructure DAs.

## Flood Mitigation Measures (Structural Measures)

Flood modification measures (also known as structural options) assist in modifying the flood behaviour to manage the impacts of a development. The impact of the Town Centre development was assessed in the Flood Mitigation Options Report (Connell Wagner and Cardno, 2009) and a number of flood modification measures were identified.

The preferred option described in Cardno (2009), known as Option 1a, incorporates infrastructure required to manage flows within the Town Centre to maintain existing conditions. The core elements of Option 1a have been amended for the revised Town Centre development layout as described in Cardno (2012). The general features of the revised drainage concept are shown in Figure 2.2 which includes:

- Inlets in Zetland Avenue (east of Portman Street) to collect runoff from Joynton Avenue and discharging into The Drying Green storage area;
- A 0.9m diameter outlet pipe from the storage area to the 1.5m diameter pipe conveying flows to Botany Road (reducing the overland flow along Geddes Avenue);
- A 0.375m diameter pipe from the flood storage area to the existing trunk culvert; and
- Surcharge pits in Botany Road for flows from the storage area to mitigate impacts downstream of Botany Road.

The overall works for the area also incorporates the provision of flood detention within the Drying Green storage area and on-site detention as per Sydney Water's requirements within individual building sites as well as the total package of structural works outlined for the concept drainage.

The recommended measures were successful in managing the impact of Town Centre on downstream properties. However, the flood risk on the Town Centre itself was not completely removed, leaving a residual risk on the site for rare events in some locations and for extreme events across most of the ground level areas of the Town Centre (as described in Section 2). This is common in the design of flood mitigation measures as it is not considered economically feasible to remove all flood risks up to the PMF with structural options given their infrequent nature.

Management of the residual flood risk on the site requires consideration of non-structural measures of Property Modification and Emergency Response Modification. These measures are discussed in the following sections.

## **Property Modification Measures**

Property modification measures available for the Town Centre include those provisions contained in the Green Square Town Centre DCP 2012 as well as those mentioned in Appendix E:

#### Flood Risk Management Plan

## **Overview**

This section of the report documents the action items for implementation based on the flood behaviour described in Section 2, the flood risks described in Section 3 and those options to manage flood risks described in Section 4.

Social, economic and environmental impacts have been taken into account in the development of this flood risk management plan.

- Environmental It is expected that the environmental impacts are likely to be minimal due to the nature of the proposed and existing development, the conditions being highly modified and urbanised;
- Economic The economic impacts (e.g. in the form of flood damages to property) are intended to be minimised by using appropriate flood planning for the proposed development (including setting of suitable floor levels, flood proofing measures etc);
- Social Among the social impacts, the primary impacts to be managed within the plan are the minimisation of nuisance and inconvenience on a day to day scale and the minimisation of the risk to life during rare and extreme conditions (and not increase more prosaic risks in the process of reducing flood risk). This risk to life would increase with the proposed Town Centre development merely by increasing the number of people in the area. Hence measures need to be undertaken to manage this risk. The proposed measures therefore mainly address risk to life arising from the likely flooding of the Town Centre in rare and extreme events; and
- Summary sheets outlining specific actions for each of the 31 Sites located within the Town Centre, as well as the open space plazas Green Square and Neilson Square, and The Drying Green are provided in Appendix E.

It is noted that the DAs for subsequent public spaces, streets and private developments will need to prepare their own Flood Risk Management Plan, using the summary sheets provided in Appendix E as a starting point. Further detailed assessment is recommended to identify flood behaviour and management options at particular sites as these sheets contain summarised information.

## **Property Modification Actions**

The South Sydney LEP 1998 and Green Square Town Centre DCP 2012 were reviewed for their requirements associated with the range of planning measures. The following proposed measures are generally in addition to those required under the relevant LEP and DCP clauses. However, some of the proposed measures recommend modification to the development controls presented in the DCP.

#### **Building and Development Controls**

The following building and development controls are to be applied for all developments as required in the Town Centre:

- Habitable floor levels to be set at the 100 year ARI +0.5 m;
- For those access points leading to below ground facilities (e.g. the entrance to a public underground carpark below the plazas or the Green Square Station) located within flood prone areas and where it has been determined that there is a risk to life, the PMF is to be adopted as the appropriate FPL;.

- All buildings to provide a temporary refuge for persons escaping from the floodwaters. The rapid rate of rise of floodwaters only allows a short period (ranging from approx. 10 – 45 mins) to walk to safety after the onset of rainfall. Any pedestrian should be able to walk to the nearest building to seek temporary refuge once it becomes apparent that a major rainfall event is underway. It is expected that all buildings within the Town Centre will be able to provide temporary refuge for members of the public as required. The temporary refuge could be an open space or foyer at the entrance of the building or a mezzanine level, open to the public, which needs to be at or above the PMF. Emergency lighting for the refuge is to be provided. Persons seeking refuge are expected to only need to take shelter for a short time (up to six hours). Therefore, for those buildings that are to provide refuge, consideration could be given to providing access to basic amenities such as a public telephone, seating, drinking water, toilet amenities etc;
- A Flood Emergency Response Plan is to be prepared for each development for submission with each development application. The plan should detail the measures that would need to be taken in case of a flood emergency. The plan should be similar to the fire plan for the development and would require a similar approach for implementation; and
- Design of public space areas should be such that in case of flood emergency, the pedestrian movement is directed towards PMF refuge areas at or in adjacent buildings.

## Flood Compatible Materials

Flood compatible materials are to be used for all parts of the building exposed to flood waters (i.e. up to the PMF).

#### Main Access

To minimise the risk to the public, it is highly recommended that (where possible) the main access to each building is located away from the high hazard areas as shown in Figure 2.14 (Refer to Appendix E). Where this is not possible, a secondary access point should be provided. This would reduce the pedestrian movement in the area and reduce the risk.

## Flood Signage

Street signage is to be placed at appropriate locations within the Town Centre, warning of possible flooding hazard. Individual developments are to incorporate appropriate signage on their premises.

#### Lower Ground Public Domain

A large below-ground public domain area under the plaza area may form part of the Town Centre. There is a flood risk associated with the ingress of waters via stairs or other similar entry points for flood events rarer than the 100 year ARI. In an extreme event, such as the PMF, the risk to life associated with the ingress of waters to underground areas would be extremely high and the potential

consequences of the flooding of the below ground domain would be catastrophic.

In order to manage this risk to life, the access points to any below ground public domain, retail or public parking areas are to be set at the PMF. In adopting this level, below ground areas are unlikely to be inundated during any flood event. In addition, a secondary exit to a flood free area away from the point where flood flows would enter must also be provided.

#### Access to Green Square Station

Access from the Green Square plaza to the Green Square Station for pedestrians is via Botany Road. In a 100 year ARI event, the Botany Road trapped depression, which is close to the pedestrian crossing area, is subject to provisional high flood hazard. However, there is also a proposed pedestrian underpass through which pedestrians can access the Railway Station from the other side of Botany Road within Development Site 6.

The access to the Railway Station would, therefore, need to be carefully planned to manage the increased risk to the public. As in Section 5.2.5 (Refer to Appendix E), all access points to below ground public areas located within flood prone locations, including that to the Railway Station, are to be placed at the PMF to prevent inundation during a flood event. Pedestrian evacuation routes to flood free areas or flood refuges are to be clearly marked and the design developed such that pedestrians are naturally directed to flood refuges.

#### Vehicular Entry

The Green Square Town Centre DCP 2012, indicates locations where vehicle entry to basement car parks is not permitted. Additional locations, including major flow paths such as the flowpath along Zetland Avenue and Geddes Avenue, also should preclude any access to basement car parks unless some form of nonmechanical barrier can be installed (e.g. a hump) to prevent ingress of floodwaters up to the FPL calculated for that specific basement parking area. A similar approach is required for the building entry points, i.e. they should be kept away from the major flow paths, where possible.

With respect to vehicular entry points for basement car parks, an appropriate FPL should be adopted with the minimum level being the 100 year ARI plus 0.5 m. Where the 100 year ARI plus 0.5 m is adopted, the proponent will need to calculate the water depth in the carpark (based on the rate of inflow and area) if the crest is overtopped for greater events. Alternatively, the carpark entry could be set at the PMF.

In addition, a well signposted secondary pedestrian exit to a flood free area away from the carpark vehicle entry should be provided.

#### Transport Network

The Green Square Town Centre DCP 2012, provides details of the transport network for the Town Centre including the location of proposed traffic signals, bus stops and access routes.

Where flooding affects the bus stops intended to be located along Botany Road between Transport Place / Green Square plaza, it is recommended that the SES coordinate the temporary de-activation of these bus stops and re-routing of buses around affected areas in association with the State Transit Authority.

Pedestrians intending to use the bus services within these areas are to evacuate to flood refuges. Similarly, depending on the magnitude of the flood event and the lead time with respect to the provision of flood warnings, the SES may wish to limit pedestrian access to those bus stops and other transport-oriented locations inundated by flood waters, particularly those subject to water depths of 0.3 m or more and especially the Botany Road and Joynton Avenue trapped depression areas.

Street parking is to be avoided along the major flow paths during a flood event to avoid localised increases in flood levels, associated impact on adjacent buildings and damage to vehicles. Where they are provided with advanced warning, the City's rangers are tasked with notifying the SES of any potential problems associated with parked cars in the lead up to a flood event. The SES may then determine whether action needs to be taken.

Where any pedestrian underpasses are to be constructed to access the transport network (e.g. underground passages to connect with the Railway Station), the entrance to these underpasses is to be set at the PMF (see Section 5.2.5).

## **Emergency Response Modification Actions**

As outlined in Section 3.1(Refer to Appendix F), it is important to note that there will be a range of people present in the Town Centre development at any one time, including residents of multi-storey buildings, workers in commercial buildings and retail centres, people commuting by public or private transport and pedestrians, as well as those members of the public utilising the open spaces such as the Green Square and Neilson Square plazas and The Drying Green. Therefore, the emergency response actions consider a range of scenarios.

#### **Community Awareness**

Community awareness is the single most important factor in distributing the management of flood risk.

Education campaigns should be undertaken on a regular basis. These campaigns should be carried out for the entire Town Centre and also by individual developments through residential strata and commercial building managers, rail station managers and staff working in community buildings. The Flood Emergency Response Plan for individual developments discussed in Section 4.2.3 should (Refer to Appendix F) includes provision for such an activity.

Various measures that could be undertaken for community education include:

 Advise residents from time to time of the potential for overland flooding;

- Articles in local newspapers;
- Flood information leaflets;
- Erecting signs showing historic flood levels;
- Signposting of evacuation routes;
- Development and distribution of FloodSafe Guides by the SES; and
- Distribution of Business FloodSafe Kits and holding annual Business FloodSafe breakfasts for commercial premises which have floor levels which can be exceeded in the PMF (i.e. greater than the 100 year ARI + 0.5m).

FloodSafe guides are generally prepared by the SES in consultation with the City. They provide the basic information about the local flood risk and advise the residents and business owners how to manage the risk by undertaking various actions. The SES has prepared a general Community FloodSafe Guide as well as a Guide for businesses. The Guides help improve the community readiness to combat floods for the risks expected during rare and extreme events.

#### Flood Warning

There are a number of staged activities that take place as part of the flood warning process. These activities are discussed in detail below.

#### Flood Warnings Issued by Bureau of Meteorology

The Town Centre is affected by flash flooding (i.e. floods where the warning time is less than 6 hours). As such it is difficult to provide any flood warning in advance of floods. Where possible, the Bureau of Meteorology (BoM) will issue a severe weather / flood warning to the Regional SES headquarters in Bankstown. Where that alert is relevant to the Town Centre area, the SES Regional Command will pass the BoM's warning on to the Local Command based in Erskineville. In some cases, 2-3 days advanced notice may be available (e.g. where an East Coast Low develops off Sydney). However, at other times it may only be possible to issue a flood warning hours in advance, if at all.

# Activation of Local SES Command

Once the SES Local Command has been issued with a flood warning by the BoM, they then place their staff on alert and forward via SMS the BoM's flood warning to the relevant individuals and organisations, including the CoS Security and Emergency Management Centre located at Town Hall. It is recommended that all Building Managers responsible for developments within the Town Centre also be included on the distribution list for flood warnings.

It is noted that the SES is the designated lead combat agency in an emergency such as a flood event. However, local authorities may wish to act on the advice provided by the SES to minimise the level of risk in the lead up to the flood event.

Depending on the amount of lead time provided, the City may undertake any relevant priority works, such as cleaning out stormwater pits to reduce the risk of blockage. In addition, the City's rangers are placed on standby and report any issue directly to the SES (e.g. cars parked in overland flow paths, etc.). Building managers will be responsible for implementing any flood risk management measures in accordance with their

#### Flood Emergency Response Plan.

#### Management of the Public Domain

A number of open, public areas are located within the proposed Town Centre development, including Green Square and Neilson Square plazas and The Drying Green. With respect to these areas of public domain, with the provision of temporary refuges which can be accessed in a few minutes, even a small warning time will provide the public with sufficient time to seek refuge. The provision of rapid flood warnings at Town Centre may be delivered through an automated process that triggers a warning (e.g. with the installation of water level sensors placed at the Joynton Ave or Botany Road trapped depression areas).

The warning itself can be delivered through the use of suitably located electronic information boards at key locations.

Specifically with reference to roads, it is recommended that permanent flood depth markers be installed on either side of the road in the verge at the Joynton Avenue and Botany Road trapped depressions to provide an indication to motorists of water levels at these locations when the road is flooded. The SES may wish to coordinate closure of affected roads, especially at the location of the Botany Road and Joynton Avenue trapped depressions.

Another option is to have a public address system, which can relay a recorded message. The system could be similar to what the City of Sydney has already installed to manage emergencies in the busy streets of the City. An example of this system can be found near the main entrance of the City's building at Town Hall Square, where the public address speakers are installed on a traffic light pole.

#### Event Management

It is understood that the public domain areas within the Town Centre are also intended for use for special events to be attended by members of the community. In the unlikely instance that a flood event coincides with a community event, the number of people gathered in the open space areas will pose an additional challenge to emergency management. Considering the example of an annual Carols by Candlelight function, it is estimated that the Plaza's may hold a capacity of around 1,000 people. Whilst it is noted that the plazas are not located within the floodplain for a 100 year ARI event, these areas may be inundated by localised flood waters during larger events.

The event manager for each event will be required to prepare an Event Management Plan, to incorporate an Emergency Response Plan. These Plans should make reference to this Floodplain Risk Management Plan.

Should a flood warning be issued for the time of the event, all event staff should be briefed on the Emergency Response Plan. People will need to be directed to refuges located in adjacent buildings (as shown on the summary sheets provided in Appendix E).

In some circumstances, the event may need to be called off if the likelihood of a flood event occurring on the day is determined to be significant. This would commonly be preceded by rainfall (intense or otherwise) that would generally preclude an outdoor event (except in the case of sudden thunderstorms).

## **Building Management**

The flood warning signal should also be available in the individual buildings to stop the occupants from leaving the building. The Flood Emergency Response Plan for the development should include recommendations for regular 'flood' drills for the occupants of the building similar to the fire drills, which are currently undertaken as a standard practice.

#### **Emergency Management Centre**

The emergency response to any flooding of the Town Centre will be coordinated by the lead combat agency, the SES, from their Local Command Centre located at Erskineville.

However, the City of Sydney Security and Emergency Management Centre located at Town Hall is on the notification list for SES flood warning alerts and that direct liaison between the SES and the Security and Emergency Management Centre may be conducted via a dedicated radio frequency. The Manager – Security and Emergency Management may then pass on the flood warnings to any affected City of Sydney or community

#### Building / Event Managers at Green Square Town Centre

The Security and Emergency Management Centre will continue to receive regular updates from the SES throughout a flood event.

## Conclusion

This Plan builds upon the Flood Mitigation Options Report (Connell Wagner and Cardno, 2009) and Addendum (2012) by providing further details on property mitigation measures and emergency response measures that may be implemented to manage the residual flooding risk for the Town Centre. The Plan provides certainty that the Town Centre development sites, public streets, plazas and parks may be safely managed with respect to the longterm management of flood risks in the area.

This Plan will also accompany DAs being prepared for the Green Square Town Centre Public Domain and Essential Infrastructure. However, upon preparation of detailed designs for any development site, open space or street, site specific and detailed Flood Risk Management Plans will need to accompany that DA.

## 4.4.3 Traffic and Parking

The assessment of traffic and transport issues has based on the 'Transport Report for Green Square Town Centre Essential Infrastructure' prepared by Colston Budd Hunt & Kafes (Refer to Appendix F).

#### Green Square Town Centre DCP

#### **Public Transport**

As discussed in the Green Square Urban Renewal Area Transport Management and Accessibility Plan and the Green Square Town Centre Masterplan Transport Report, the site has good access to existing bus and rail services and will benefit from significant planned improvements in the future. These reports have been prepared to promote accessibility to and within the Green Square redevelopment area. The Transport Management & Accessibility Map (TMAP) examines mode split targets and sustainable means of transport such as public transport, walking and cycling. It recommends a two-pronged strategy to encourage a mode switch to public transport, by the provision of increased services and improved infrastructure, and a restrictive parking policy to minimise the use of private vehicles.

The DCP parking controls for Green Square have been adopted and will form the planning framework for the allocation of maximum car parking rates, whilst the railway station at Green Square and major bus routes through the area provide the spine of the public transport network.

For detail in regards to public transport improvements, reference should be made to the Green Square Urban Renewal Area TMAP.

#### **Pedestrians and Cyclists**

The pedestrian network serving the town centre comprises two main components. The first of these is the traditional network of footpaths on the street network. The second component is a separate off-street network of through site links which will be developed through the proposed staging of the town centre.

A series of pedestrian paths will be developed through the town centre linking the commercial, retail and residential precincts to car parking, public transport facilities and access to the surrounding pedestrian network

Primary and secondary pedestrian movements will be developed, with primary pedestrian routes provided through the Civic Place and public domain areas linking to the station and public transport facilities. Secondary pedestrian routes will be developed adjacent to the road network and via dedicated through site links.

Protection will be provided to pedestrians and cyclists from vehicles and driveways by providing regular safe crossing points, signalised intersections and access through the public domain. This encourages walking and cycling for both destinations and recreational movements, including Green Square Station. The pedestrian and cycle network will be integrated with the road network and open space areas to encourage the use of the network when accessing public transport routes, commercial, retail and residential precincts and open space areas.

The cycle network through the town centre will be developed to connect to existing cycle routes through the surrounding area. It will link to Green Square station, allowing cyclists to switch mode from

cycle to either bus or train, in order to complete their journeys.

In time the area will benefit from a comprehensive cycle network allowing cyclists to travel through and within the town centre, and into the surrounding areas. A combination of on and off road cycle routes along Botany Road, Portman Street, Joynton Avenue, Bourke Street, Zetland Avenue, civic plaza (Green Square), Geddes Avenue and Hansard Street, will link the Town Centre with surrounding areas and provide safe travel in all directions. In addition to these routes and in accordance with the City's requirements a bi-directional separated cycle way shall be provided on the western side of Paul Street between Hansard Street and Geddes Avenue and between Zetland Avenue and Bourke Street. A well developed cycle network is likely to be successful in increasing users and therefore making a contribution to sustainable transport for the area.

## Approved Road Layout

The road layout for the Green Square Town Centre will retain Botany Road and O'Riordan Street as major north-south traffic routes through the area. RMS have advised that the intersection of Botany Road/Bourke Street/O'Riordan Street is intended to be upgraded to improve the station forecourt, improve traffic movements and allow for pedestrian crossings on all legs of the intersection. The design however is contingent on the longer term development of the station site. Interim, shorter term treatments need to be considered to improve the current pedestrian environment.

A new east-west link will extend from Bowden Street across Bourke Road and O'Riordan Street to join Botany Road to provide direct access to the Town Centre, via Geddes Avenue, from the west. The intersection of the new road link with Botany Road and Geddes Avenue will be signalised.

Additional relief routes will also be developed across Green Square using Joynton Avenue (to the east) and Lachlan Street, McEvoy Street and Euston Road (to the north).

The internal road layout within the Town Centre, as set out in the DCP and shown in Figure 6, includes seven new roads and a number of service access ways.

These new roads include:-

- two new collector streets (Zetland Avenue and Geddes Avenue) to be provided, linking Joynton Avenue and Botany Road, including signalised intersections at Joynton Avenue/Zetland Avenue, Zetland Avenue/Paul Street and Botany Road/Geddes Avenue;
- extension of Dunning Avenue (Paul Street) from Hansard Street in the south to Bourke Street in the north. The intersection of Paul Street with Bourke Street will be leftin/left-out; and
- a number of new local roads, including Barker Street, Woolpack Street, Sonny Leonard Street and Hinchcliffe

Street providing access to at-grade, above ground and basement parking within the Town Centre development sites.

The road layout has been designed to preserve sensitive residential areas within and around the Town Centre and where possible utilise existing road alignments and connections.

In association with the approved road layout, a new loop road will be provided within the Town Centre, improving connectivity and linking the northern and southern parts of the Town Centre. The loop road will encourage pedestrian movements across the public domain, activate pedestrian access through Civic Plaza (Green Square) and promote a finer grain road network with improved vehicular and pedestrian connectivity. Traffic signals including pedestrian crossing facilities will be provided at the intersections of Botany Road/Geddes Avenue, Joynton Avenue/Zetland Avenue and Zetland Avenue/Paul Street.

Intersections within the Town Centre, particularly intersections along Zetland Avenue, Geddes Avenue and Paul Street, will be designed to incorporate two approach lanes into the intersections. They will cater for the swept path of service vehicles and bus services through the intersections. On-street parking will be kept clear of the intersections in order to provide for the two approach lanes.

The internal road layout will be staged, as various land parcels within the Town Centre become available. It is anticipated that construction will commence at the northern end of the Town Centre. Access will be available to/from the northern section of Paul Street onto Bourke Street. The intersection of Paul Street with Bourke Street will be un-signalised with access restricted to left-in and leftout of Paul Street.

#### Proposed Changes to the Road Network

Changes to the approved Town Centre road layout include:

- extension of Barker Street between Woolpack Street and Geddes Avenue (between Development Sites 8D and 19B); and
- re-alignment of Paul Street adjacent to Development Sites 18, 19A and 19B.

The extension of Barker Street between Woolpack Street and Geddes Avenue will be a local street, providing improved access and circulation for Development Sites 8C, 8D, 19A and 19B. The proposed local street (16 metre reservation width) will provide an undivided road with two traffic lanes and one kerbside parking lane. Its intersection with Geddes Avenue will be a priority sign controlled intersection, with priority traffic movement along Geddes Avenue.

The extension of Barker Street will improve accessibility to proposed on-site parking within Development Sites 9 and 19. The new road will not noticeably affect traffic distribution through the Town Centre. In addition, the new road is not expected to result in any change in development potential for Development Sites 8D and 19B. It should be noted that the Green Square Urban Renewal Area

TMAP incorporated the extension of Barker Street through to Geddes Avenue in its traffic assessment.

Barker Street will be designed to slow traffic and priority given to pedestrians/cyclists and public transport. The re-alignment of Paul Street adjacent to Development Sites 18, 19A and 19B will also improve traffic circulation through the Town Centre and in particular through the intersection of Zetland Avenue and Paul Street. Paul Street will provide an undivided road with one traffic lane and one parking lane in each direction, clear of intersections. It will provide continuous pedestrian footpaths on both sides of the road. Its intersection with Zetland Avenue will be signalised. The traffic signals will incorporate pedestrian facilities across all approaches. There will be transit lanes through the intersection, between Zetland Avenue and civic plaza.

The re-alignment of Paul Street will not result in changes to traffic distribution through the Town Centre, nor will the re-alignment result in changes in development potential for Development Sites 18, 19A and 19B. As a result there will be no change to the traffic generation of these developments.

The proposed changes to the Town Centre road layout are considered appropriate to provide safe and convenient arrangements for vehicles, pedestrians and public transport services.

#### Access Arrangements and Internal Circulation

As set out in the Green Square Town Centre DCP 2012, car parking for the Town Centre will be provided in a mix of at-grade, above ground and basement/subbasement parking areas. For efficient operation and to spread traffic on the road network, parking areas will be provided through the site with separate points of entry and exit.

Separate car parking areas will be provided for residential and commercial/retail development. However, in order to take advantage of complementary use of the parking areas, commercial, retail and residential visitor parking will be generally combined within centralised off-street car parks within the Town Centre.

Access points will be located on local streets within the Town Centre, with no access available directly to/from collector streets. Access points will be located in appropriate locations relative to intersections. Appropriate sight lines and queuing space will be provided at the car park entries. The access driveways and car parking areas will be designed at the time development applications are prepared for the individual buildings. They will be required to be provided in accordance with the Australian Standard for Off-Street Car Parking Facilities (AS2890.1-2004).

Appropriate provision for service vehicles, including garbage collection, maintenance vehicles and deliveries, will be made on the internal roads and intersections within the Town Centre and within the individual buildings. The design of the on-site service areas will require service vehicles to enter and exit the sites in a forward direction. Service bays, manoeuvring areas, circulation aisles and

height clearances will be provided for the swept path of these vehicles in accordance with the Australian Standard for Off-Street Commercial Vehicle Facilities (AS2890.2-2002). Service vehicle areas will be finalised at the time development applications are prepared for the individual buildings.

#### Traffic Generation and Effects

The peak traffic generation of the Town Centre, including the Town Centre core sites, will occur during the morning and afternoon peak periods when retail, commercial and residential traffic combines with the on-road commuter peak. Other components such as community facilities would not generate a significant amount of traffic during these periods.

The MWT transport report (May 2006) estimated an afternoon peak hour traffic generation of some 2,050 vehicles per hour two-way. Based on the same traffic generation rates adopted in the transport report, the afternoon peak hour traffic generation would include a generation of some 830 vehicles per hour two-way for the identified Town Centre core sites.

The morning peak hour traffic generation of the approved Master Plan area was estimated in the MWT transport report (May 2006) to be some 1,540 vehicles per hour two-way. This morning peak hour traffic generation includes some 610 vehicles per hour two-way for the identified Town Centre core sites.

The MWT original transport report (October 2002) estimated the weekday peak hour traffic generation for the overall town centre at 1,560 vehicles per hour two-way for both the morning and afternoon peak hours. The road system traffic modelling allowed for some 1,700 vehicle trips per peak hour which included buses, taxis, service vehicles, etc. The increase over the original estimate for the afternoon peak hour did not change the MWT conclusions and recommendations of the original transport study, as design vehicle traffic volumes for roads in the Town Centre adopted were some 30% higher than the forecast traffic volumes. Thus in effect the design of the internal roads and intersections allow for the higher traffic generation in the afternoon peak periods.

It was further noted by MWT that most of the retail development would have a localised market catchment, so that much of its traffic generation in peak periods would be intercepted from passing traffic traveling to or from work/home in the Green Square area. This traffic would be on the arterial road system anyway.

The afternoon traffic generations for the core and non-core areas (Refer to Table 3.2 in Appendix F) shows that the total afternoon traffic generation for the core and non-core areas will be similar, some 2050 vehicles per hour two-way.

As a result, the MWT traffic assessment and road infrastructure recommendations are unchanged. At the levels of traffic anticipated, roads and intersections would be sized based on function rather than to meet capacity requirements. As previously discussed, intersections within the Town Centre, particularly intersections along Zetland Avenue, Geddes Avenue and Paul

Street, will be designed to incorporate two approach lanes into the intersections. They will cater for the swept path of service vehicles and bus services through the intersections. The intersections will also be designed to cater for the proposed cycle paths. On-street parking will be kept clear of the intersections in order to provide for the two approach lanes.

## Summary and Conclusion

This update report has been prepared to provide a transport plan to support the development application for essential road infrastructure works for the Town Centre. The report has been prepared taking into consideration the Green Square Town Centre DCP 2012 and previous transport studies including the Green Square Urban Renewal Area TMAP (currently being updated).

The main points relating to the transport aspects of the proposed infrastructure within the Green Square Town Centre are as follows:-

- *i)* the site has good access to rail and bus services and the road network;
- *ii)* the road infrastructure works for the Green Square Town Centre have been prepared taking into consideration the Green Square Town Centre DCP 2012;
- *iii)* appropriate provision will be made for pedestrians and cyclists in accordance with the Green Square Town Centre Development Control Plan 2012;
- *iv)* the road layout within the Town Centre has been provided in accordance with the transport structure plan;
- the proposed changes the Town Centre road layout, as described in this report, are considered appropriate to provide safe and convenient arrangements for vehicles, pedestrians and public transport services;
- the roads and intersections within the Town Centre will be subject to detailed design and approval by the City and/or RMS for Botany Road;
- vii) access, car parking arrangements and internal circulation will be provided in accordance with AS2890.1-2004;
- viii) the traffic effects of the Town Centre have previously been assessed in the transport report prepared in association with the approved master plan and the Green Square Urban Renewal Area TMAP;
- the traffic report for the approved master plan recommended a series of road works to cater for the traffic generation of the Town Centre. These road works have been adopted and incorporated into the Green Square Town Centre DCP 2012;
- the traffic generation of the additional floor space and building heights on some town centre core sites would be similar to the traffic generation of the approved master plan;
- the traffic report for the approved master plan found that at the level of traffic anticipated, roads and intersections should be sized and designed based on function rather than to meet capacity requirements;

- xii) the proposed changes to the road layout will not result in any change to development potential within the Town Centre and will not noticeable affect traffic distribution; and
- xiii) the surrounding road network incorporating the recommended road works for the Town Centre will be able to cater for this traffic.

## 4.4.4 Geotechnical

The assessment of geotechnical issues has based on the Additional Geotechnical Study - Green Square Town Centre prepared by AECOM (Refer to Appendix H).

## **Review of Geotechnical Issues**

A response to the previous Development Consent conditions (D/2008/1195) for the Green Square Town Centre Essential Infrastructure works is provided below:

#### **General Geotechnical Issues**

The Town Centre has a history of prior land uses with implications for potentially adverse geotechnical and variable foundation conditions. These include episodes of placement of extensive fill, assumed to be non-engineered.

The extent of the old brick quarries, which have been backfilled with uncontrolled fill apparently using various industrial refuse, including bricks, sandstone rubble, slag, metals, rubber, plastic and wood, etc, extended to some 20 m in depth. The pits covered the majority of the northern and the north-eastern section of the site. Further detailed geotechnical study would be required to confirm the limits of the former quarries at the scheme design stage.

Based on the available geotechnical investigation records, it is understood that the southern section of the site is likely to be underlain by mainly fill, varying from 0.5 m depth to in excess of 20 m, overlying natural superficial sandy deposits (possibly Botany Sand) and weathered Hawkesbury Sandstone between 8 m to 15 m depths approximately. The sandstone is locally overlain by shale and siltstone mudrocks which would likely have been the material originally worked in the brick pits.

## **Pavement Recommendations**

In view of the variable sub-surface conditions at the site, two flexible concept pavement types are considered appropriate for this development site, however further geotechnical investigations and detailed pavement design is required to support the future design stage.

Concept Pavement Design Options:

- Option 1 Full Depth Asphalt (FDA) pavement; and
- Option 2 Flexible pavement with unbound granular materials.

Concept pavement design assumptions (subject to confirmation by the City and RMS in the future design stage):

A design traffic of 1 x 106 ESAs for a 20-year design life;

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- A design sub-grade California Bearing Ratio (CBR) of 5% and this is considered satisfactory subject to adequate compaction of the existing fill materials;
- Existing fill materials with 4-day soaked CBR results will not greater than or equal to 5%, otherwise insitu lime modification will be required; and
- Placement and compaction of fill material as well as subgrade preparation must be carried out in accordance with specification AUS-SPEC C213.

Recommended concept pavement profiles:

Layer	Thickness (mm)	Description	Materials
01	50	Wearing Course	AC10 – 320
02	100	Base	AC20 – 320
03		Prime Coat	AMC00 Prime
04	150	Sub-base	DGS20
05	100	Sub-base	DGS20
06		Sub-grade	Insitu, CBR>5%

For Option 1 - FDA pavement:

For Option 2 - Flexible pavement with unbound granular materials and asphalt wearing course:

Layer	Thickness (mm)	Description	Materials
01	50	Wearing Course	AC10 – 320
02		Prime Coat	AMC00 Prime
03	150	Base	DGB20
04	150	Sub-base	DGS20

Note: This flexible pavement with unbound granular pavement materials will require more regular maintenance than for the Option 1 - FDA pavement, especially after a continuous period of wet weather.

## **Conclusions**

A geotechnical desktop study has been undertaken in the context of the proposed Green Square Town Centre Essential Infrastructure DA to review items of relevance to the lapsed 2008 infrastructure DA (D/2008/1195), which has also been slightly modified. The review has also considered relevant recommendations to the Essential Infrastructure concept design based on available information on ground conditions documented in previous reports.

Item No 68, Geotechnical and Structural Stability and Integrity, is not relevant to the Essential Infrastructure DA since the proposed works are greater than 25 m from the Airport and East Hills railway tunnel centreline and are anticipated to involve excavations of less than 2.5 m depth. Future stages of the development involving building construction will require reconsideration of this item.

Item No 88, Filling of Land, relates to stipulations on design landforms to limit erosion and slope angles. These requirements should be reviewed in the context of the scheme design proposals but are unlikely to be relevant to the verges and landscaping proposed in the Essential Infrastructure DA.

Item No 122, Rock Cutting into Blocks, limits the production of masonry blocks on site whilst undertaking excavations. This clause is considered not applicable to the nature of the proposed Essential Infrastructure DA works and will also likely be irrelevant due to anticipated ground conditions. Rock suitable for masonry block production not anticipated in the excavations for the Essential Infrastructure DA works.

The review of the letter report 'Geotechnical Conditions for Pavement Construction – Green Square Town Centre Development', dated 19 June 2008, prepared by ENSR Australia Pty Ltd (now AECOM) has concluded the recommendations and conclusions remain still valid for the revised proposed Essential Infrastructure arrangements. The previous recommendations and conclusions are extracted below for easy reference:

- A geotechnical assessment of the new Development Sites 5, 5a, 5b, 9, 10 & 11 (refer to the attached site layout plan) would need to be carried out prior to construction;
- The existing preliminary investigation records carried out for the rest of the Town Centre were not intended for detailed design, it was recommended that further site specific investigation and analysis, including the above new sites, would need to be carried out prior to final design and construction; and
- The existing fill materials at the Hospital site appeared similar in nature (in terms of physical characteristics) and were generally shallower than those encountered near the northern part of the Town Centre, it was likely that the near surface soils would also be suitable for construction of pavements at the Hospital site. The proposed Essential infrastructure DA is related to the construction of new roads and footpath, the provision of underground services / utilities, the general layout of open spaces, paving and other ground cover, planting, water features, which shall not have any adverse impact to the existing site conditions, though further investigation of geotechnical and environmental issues will be required to support future design and construction phases of the Town Centre project.

## 4.4.5 Water Sensitive Urban Design

The assessment of WSUD issues has based on the 'Green Square Town Centre Water Sensitive Urban Design' report prepared by AECOM (Refer to Appendix J).

This report describes the WSUD Strategy for the Green Square Town Centre. It is an update of the previous WSUD strategy (EDAW 2008) that was prepared for Green Square Town Centre in support of the Public Domain Concept Development Application

and Essential Infrastructure Project Applications. The targets for Green Square and the principles for how these targets can be met remain the same.

However, the urban design for Green Square has been altered, and the landscape strategy needs to be revised to accommodate the new urban design. Therefore, this report is limited to presenting principles for stormwater treatment appropriate for different landscape types, and gives direction to these designs.

#### Planning context

The LEPs and DCPs for the Town Centre identify WSUD as an important component of the Town Centre public domain. Objectives for water management in the Green Square Town Centre Public Domain go beyond typical WSUD objectives for new developments. This WSUD Strategy developed for the Town Centre Public Domain can also serve as an environmental design template for new urban villages, providing ecosystem services beyond their own footprint. Stretch targets applied to the Town Centre public domain form the basis for innovation, leadership and an exemplar of future environmental design of urban villages in Sydney, and other urban environments in Australia.

#### **Targets**

The basic targets for WSUD in Green Square include:

- Water Conservation: 40% reduction on base case water demands through water efficiency and reuse;
- Priority must be given to the use of non-drinking water sources for public domain irrigation;
- Where reticulated recycled water is available from the local water utility, it must be used for appropriately matched nondrinking demands; and
- Stormwater Pollution Control: 85% reduction in the mean annual load of Total Suspended Solids (TSS), 65% reduction in the mean annual load of Total Phosphorus (TP), 45% reduction in the mean annual load of Total Nitrogen (TN).

The stretch targets appropriate for WSUD in Green Square include:

- Water Conservation: Utilising an alternative source of water to meet all non-drinking demands in the public and private domains, achieve substantially more than 40% reduction on base case water demands;
- Stormwater Pollution from external catchments: Treatment of stormwater from the external catchment, to make a substantial improvement to water quality in Sheas Creek and Alexandra Canal; and
- Integration of stormwater treatment into the landscape so as to create functional landscapes that provide ecosystem services such as water filtration, water provision, amenity and microclimate amelioration.

#### Strategy

Water conservation targets are to be met through water efficient fixtures and fittings and dual reticulation in all buildings to provide for future connection to an alternative water source.

To provide an alternative water source, base flows from Shea's creek culvert will be harvested and treated to supply most of the non-drinking demands of the Town Centre residences and commercial premises. This alternative supply will also deliver water supplies to two ornamental water features. It is proposed that treatment be provided in the GIC for this purpose.

Stormwater Pollution Control targets can be met by treating all stormwater runoff in the public domain with bio-retention systems or wetlands. These need to be sized at 2 % or 7 % of the contributing catchment size to provide adequate treatment to meet the targets. Treatment systems can be provided in Green Square, Neilson Square, Transport Place, the Drying Green and Matron Ruby Grant Parks. Where an urban stream is required in Green Square and Neilson Square, this should be designed in such a way so as to create the form of an urban stream that provides the function of treating runoff from these plazas. Runoff from the streets can be treated by incorporating bio-retention systems into the street tree planter boxes that are proposed for the streetscapes.

Stormwater Pollution from external catchments can be treated by diverting water and pumping storm flows from Shea's creek culvert into bio-retention systems within the public domain.

#### Integration with the landscape

The stormwater treatment systems recommended for the Town Centre should be integrated with the landscape designs.

All the treatment systems proposed have the potential to provide a high level of amenity and thermal comfort through shade and evaporative cooling. The amenity of the public domain will assist in activating these spaces and will thus help provide an economic stimulus that contributes to the future success of the town centre.

## 4.4.6 Contamination

The contamination assessment is based on the Interim Contamination Audit Report – Green Square Essential Infrastructure and Public Domain prepared by Environ (Refer to Appendix I).

#### 5 Contaminants of Potential Concern

Based on a review of the site history and current site conditions (Refer to Section 3) the Auditor has outlined the potential sources of these contaminants in Table 7.

# AreaActivityContaminants of<br/>ConcernLandfilled areasLandfilling to refill<br/>quarry and filling in<br/>general (sand<br/>mining).Unknown, could include heavy<br/>metals, petroleum<br/>Hydrocarbons, Volatile<br/>Organic Compounds (VOCs)

#### **TABLE 7 – POTENTIAL SOURCES OF CONTAMINANTS**

	Landfilling with putrescible materials	including Benzene, Toluene, Ethyl benzene and xylene (BTEX), Semi-volatile Organic Compounds (SVOCs) including Polycyclic Aromatic Hydrocarbons (PAHs), phenols and asbestos Landfill gas, especially methane
Unsealed areas - unsealed during or prior to operation of the Process Plant	Atmospheric deposition and runoff from sealed surfaces, surface spills of fuels and lubricants, spraying of herbicides or pesticides	Metals, petroleum hydrocarbons, Organochlorine Pesticides (OCPs), possibly dioxins/furans, phenols
Workshops, vehicle storage building and USTs	Spills at fuel and chemical store	Hydrocarbons, OCPS, some heavy metals (e.g. arsenic, mercury)
Boiler Room	Lagging on pipes	Friable Asbestos
Groundwater	Leaching	All contaminants in soil and degradation products from landfill, e.g. ammonia.

The analyte lists used in the investigations generally covered the range of contaminants of concern, although the VOCs and SVOCs analysed were restricted to only the most common contaminants.

## Stratigraphy and Hydrogeology

#### Stratigraphy

Most of the site contained a quarry which was backfilled with material generally logged as gravely sand, and described in different locations as containing ash, wood, brick, clinker, rubber, tin, slag, tiles, and rubble. The depth of the backfilled quarry is 11-14.5 m over the central and eastern part of the Incinerator, and approximately 7-8 m over most of the western part of the site.

The only potentially putrescible material noted on logs was 'wood', noted in about half the bore logs, most of which were on the northern side of the Incinerator. No descriptions or volume estimates were provided, but 'wood' is not noted as a major component in any location.

At its deepest part, the fill overlies sandstone. Outside the quarry and where the quarry was shallower than 14.5 m, the natural soil profile is sand to a few metres depth, overlying residual clay developed on shale. The shale probably overlies sandstone and laminite at about 15 m depth. Sandstone extends to at least 37 m depth.

## Hydrogeology

Groundwater occurs in fill and sands at a depth between about 2.4 and 8.5 m below ground surface. The groundwater flow direction is to the north-west, appearing to be channelled towards a low point in the residual clay. There does not appear to be noticeable mounding of groundwater within the backfilled quarry. The Consultant notes that groundwater flow in the vicinity of the Incinerator appears to converge

on site and may be due to the influence of the modified bedrock profile in the former quarry or the presence of a previously in-filled watercourse. The flow direction data is not conclusive.

Groundwater in the Botany Sands aquifer has been widely used historically, and it is reported that there are approximately 50 registered bores within 2 km. The Auditor notes that the site is located within Zone 2 of the Botany Groundwater Management Zone where groundwater use is banned for domestic uses. The nearest groundwater receptor is likely to be Alexandra Canal to the south west of the site.

In the Auditor's opinion, the subsurface conditions are generally well characterised.

#### **Environmental Quality Criteria**

The Auditor has assessed the soil and groundwater investigation data in reference to criteria from the following sources:

- Soil Investigation Levels for Urban Redevelopment Sites in NSW (SIL Column 4 – commercial/industrial) in DEC (2006) 'Guidelines for the NSW Site Auditor Scheme' were used to asses the risk of dermal contact and direct ingestion of soils for on-site workers including trench workers;
- Soil Investigation Levels for Urban Redevelopment Sites in NSW (Soil Investigation Level Column 3 – "recreational open space in Department of Environment & Conservation (2006) 'Guidelines for the NSW Site Auditor Scheme' were used to asses the risk of dermal contact in a recreational open space setting. It is understood that bulk earthworks will be undertaken with plazas to be located over basement car parking. While it is anticipated that landscaping materials would be imported to the site, if site materials are used as a planting medium then consideration of the provisional phytotoxicity based investigation levels in DEC (2006) will be required. It is noted that some of the metals exceed these PPILs in site soils; and
- EPA (1994) 'Guidelines for Assessing Service Station Sites' for assessing Total Petroleum Hydrocarbon (TPH) and Benzene, Toulene, Ethyl benzene and Xylenes (BTEX) results in soil.

The Auditor has assessed the groundwater investigation data in reference to Australia and New Zealand Environment Conservation (2000) 'Australian and New Zealand Guidelines for Fresh and Marine Water Quality' for marine waters.

There are no national or DEC endorsed guidelines for asbestos in soil relating to human health. DEC (2006) state that Auditors must exercise their professional judgement when assessing whether a site is suitable for a specific use. The DEC states that the position of the Health Department is that there should be no asbestos in surface soil.

As the NSW EPA do not provide guidelines for the assessment of dioxins and furans in soils, guidelines used by HLA Envirosciences (HLA) as a screening criteria include:

- New Zealand Soil Acceptance Criteria published by New Zealand Health and Environmental Guidelines for Selected Timber Treatment Chemicals (Ministry for the Environment and Ministry, 1997); and
- Germany National Dioxins Program (2001-2004) study undertaken by the Australian Department of Environment and Heritage in Australia (ADEH) found no Australian guidelines level for dioxin in soil. Reference was made to German remediation requirements for residential (1000 pg/g) and industrial (10000 pg/g) areas.

Action levels in NSW EPA (1996) 'Environmental Guidelines: Solid Waste Landfills' (methane concentrations) for methane at the surface (12500ppm (i.e. 25% of Lower Explosive Level)) and in the subsurface (500ppm (i.e. 1% of Lower Explosive Level) have been considered. It is recognised that any building construction above a landfill also requires consideration of risks from vapour inhalation.

Imported materials would be been assessed in relation to attributes expected of virgin excavated natural material (VENM) and excavated natural material (ENM) as defined under the POEO Regulation (2005).

## Evaluation of Soil and Gas Results

#### Landfill

Landfill materials investigated prior to SAR (GN46) at the incinerator were characterised by metals above the PPILs, elevated Polycyclic Aromatic Hydrocarbons (PAH) concentrations, particularly benzo(a)pyrene (95%

UCL above the SILs for recreational open space) and a few minor detections of phenols and low volatility Total Petroleum Hydrocarbon (TPH).

Later investigations at the Bourke Street Depot reported TPH C10-C36 at particularly elevated concentrations in the vicinity of USTs (offsite), landfill materials (off-site) and associated with a thin layer of gravel fill under the bitumen surface on-site that reported very strong tar/naphthalene odour (maximum 6230 mg/kg at 0.1-0.3m). More elevated concentrations of benzo(a)pyrene were (maximum of 16 mg/kg and PAHs at 282 mg/kg) in shallow fill with elevated TPH reporting a tar/naphthalene odour. Odours and staining were noted during drilling at the City of Sydney Depot.

There were no detections of C6-C9 TPH or BTEX in soil samples, but there were elevated PID readings recorded in the field. Investigations at the City of Sydney Depot only reported TPH C6-C9 (260 mg/kg) in the vicinity of USTs. All other results were non-detected which is consistent with the earlier investigations.

Organochlorine Pesticides were not detected and arsenic and mercury were only detected at low concentrations within the surface. Methane measured over the Incinerator site was reported at low concentrations. The Auditor (GN 46) concluded that the overall results indicated that gas concentrations are low and off-site migration of landfill gas is minimal.

## Non-Landfill

A number of other potential impacts were targeted for sampling and analysis from activities undertaken since landfilling and in areas outside of the quarry area.

## Fill Material

Sand mining was undertaken in other areas of the site including the Hospital and Chrysler (future location of Zetland Avenue). Shallow filling has also occurred to facilitate development (southern half of Police land).

Sampling of the fill materials directly under the footprints of the proposed developments and in the vicinity indicates that fill may be impacted by contaminants including PAHs, TPH and lead.

At the northern end of the Hospital uncontrolled fill includes layers of ash and crushed sandstone with ash. PAHs were not reported at elevated concentrations (maximum PAHs of 6 mg/kg); however, Douglas note that PAH impacts may still be encountered. An elevated concentration of total PAHs of 162 mg/kg was reported in near surface topsoil materials (0.1- 0.2 m) however no ash was detected. Lead at 3800 mg/kg was detected at 3.5 m in an ash layer well above the SIL of 600 mg/kg for recreational open spaces. This sample also reported elevated concentrations of zinc and copper above the PPILs. Douglas indicate that the lead and PAH results are "hotspots". All other lead results in sub-surface fill the northern section of the site were less than 130 mg/kg.

Fill in the Police land consists of silt, ash and blue metal to deeper fill containing ash, furnace slag, crushed tile and concrete fragments and the presence of asbestos as analysed in the laboratory (not visible in the field). TPH was also encountered in two samples to the west of the site in black oily materials and at the surface.

Immediately under the Barker Street Footprint the fill consists of a shallow layer of sand fill that did not report elevated concentrations. The results obtained were consistent with those obtained at the Incinerator.

The results indicate that visual validation of the fill materials should be undertaken during development works and that any materials that contain ash or oily materials should be specifically targeted. Given that the density of sampling is limited by the presence of buildings and that sampling has not been undertaken over City of Sydney land, Hatbands or Senayear (Hinchcliffe Street, Geddes Avenue, Paul Street (southern extent) and Sonny Leonard Street), The Drying Green and part of Zetland Avenue) validation should be undertaken of any fill materials encountered prior to use in the services trenches and within 1.5 m of the surface. This is discussed further in Section 11.

## **Unsealed Areas**

All sites are located within approximately 250 m of the Incinerator. Samples have been collected from the former Incinerator, Bourke Street City of Sydney Depot and Police land for dioxin analysis. Only two of 66 samples from the Incinerator marginally exceeded the

reference values (dioxins), the depths of which are not clear. All other detections within the surface and sub-surface soils are below the criteria.

Dioxins and furans were detected throughout the soil profile at various concentrations in surface and near surface soils at the incinerator site. Considering the low mobility of dioxins in the environment, the Auditor (GN 46) concluded that fill materials, rather than atmospheric deposition, are the most likely source of the dioxin and furan contaminants. Considering the results, it is in the Auditors opinion that there is unlikely to be significant dioxin contamination within the fill materials.

#### Underground Storage Tanks

Underground Storage Tanks (UST) were located immediately to the north-east of Paul Street (northern section) (Bourke Street Depot) which will be inspected and remediated in accordance with a RAP (HLA 2007)

One borehole (south of the Zetland Avenue at the Hospital) was excavated in a suspected UST area however was terminated at 0.5 m. Douglas recommend further investigations including geophysical survey to determine whether USTs are located in the vicinity.

USTs are known to have been located at State Rail Authority, Chrysler and Senayear and this should be considered during the excavation of services in this area.

#### **Un-assessed Areas**

A number of buildings, concrete and asphalt surfaces remained during the investigations which limited access for drilling and visual observations of materials below the slabs and paving.

No intrusive investigations were undertaken in the workshop building at the Bourke Street Depot and buildings on Police land. Demolition of the incinerator has been undertaken and the materials encountered were consistent with those located in the vicinity.

Visual validation following removal of the slabs and buildings would be required to confirm that the materials are similar to those encountered in surrounding investigations.

No sampling was undertaken in the adjacent boiler room in the vicinity of Zetland Avenue (at the Hospital site) and any demolition works undertaken would need to ensure that licensed contractors are engaged to remove asbestos containing materials including lagging such that it does not impact on the site.

The Auditor considers that soils have been characterised sufficiently such that a plan of remediation can be prepared.

#### Groundwater

Overall groundwater results were obtained by sampling at the Incinerator, Police land and the Bourke Street Depot sites that are located over the landfill. The results obtained were similar to each other in magnitude and confirmed the earlier investigations at the Incinerator site that concluded that shallow groundwater at the Incinerator site had been well characterised for the potential

contaminants although not fully characterised for potential beneficial uses such as irrigation. The results are summarised as follows:

- Ammonia, commonly associated with putrescible waste in landfills, was detected in wells down gradient of the landfill. However, the concentrations are relatively low for landfill leachate commensurate with the low amount of putrescible waste noted on borelogs. The consultants indicate that concentrations of ammonia detected may have been derived from a nitrate source up-gradient of the landfill with some potential for ammonia to be generated from the landfill waste; and
- A number of contaminants, such as iron, manganese, zinc, nickel and cyanide were detected at elevated levels upgradient of the landfill. A number of contaminants, such as zinc and lead that were detected at marginally elevated levels within the soil were only detected at relatively low concentrations within the groundwater. Bourke Street City of Sydney Depot groundwater contained higher concentrations of metals in comparison to the other sites.

Metals that were reported above the ANZECC (2000) trigger values for aquatic organisms in marine environments were arsenic, lead, mercury and zinc. All other metals analysed for (Cadmium, Chromium, Copper and Nickel) were detected below the trigger values.

Outside of the landfill, groundwater wells were installed at the Hospital with one located to the immediate south of the site and down-gradient of ash fill and the grate in the Douglas 1998 suspected UST area. Petroleum hydrocarbons, PAHs, VOCs, OCPs, total PCBs and total phenols were not reported above the Practical Quantification Limit. Metals were all reported below the ANZECC (2000) trigger values for aquatic organisms in fresh and marine environments with the exception of zinc that was reported at 9.9 µg/L below the freshwater TV of 15 and marginally above the marine TV of 8 µg/L. The results are consistent in the three groundwater wells.

The potential sources of groundwater impacts will be further assessed during remedial works for the larger Green Square development. Volatile contaminants were not detected in groundwater and other contaminants were not reported at elevated concentrations and groundwater is located below the depth to which trenches and services would be excavated.

The results obtained were similar in magnitude and confirmed the earlier investigations at the Incinerator that concluded that shallow groundwater at the Incinerator had been well characterised for the potential contaminants although not fully characterised for potential beneficial uses such as irrigation.

HLA consider that ammonia in groundwater does not pose a significant risk to future users of the sites or the environment. Douglas agrees that proactive remediation is not warranted. Management of groundwater during the proposed development works is discussed in Section 10. The Auditor considers that groundwater has been

sufficiently characterised to allow development works to proceed.

## **Evaluation of Proposed Works**

Following investigation works it was identified by HLA and Douglas that remedial works would be required to ensure that the properties they investigated can be made suitable for the proposed uses. RAPs were prepared for the Hospital, Bourke Street Depot and Police land however not for the Incinerator or other properties within the Essential Infrastructure Boundary. More detailed reviews of those RAPs are included in the Interim Advice Letter dated 5 August 2009.

The works proposed to ensure that the proposed uses (streets, services, landscaping/park and plazas) are suitable are discussed in Table 8.

Infrastructure	Remediation Works Proposed	Auditor's Comments	
Streets	At least 1 m of non-impacted material is required to be located beneath future basement and road areas "	Proposed depth of works considered adequate to ensure that materials accessible for road	
	Excavation and re- instatement requirements beneath the road will be subject to agreement with relevant authorities "	maintenance are appropriate. The Auditor notes that the suitability of bulk earthworks as	
	Bulk earthworks proposed for some of the road areas (HLA). Douglas note that segregation and adequate validation would enable re-use of materials. While Douglas note that comprehensive segregation would be difficult, selective segregation of targeted soil pockets could be effective.	an option will depend on the validation works undertaken.	
Services	VENM would be placed in corridors where underground services are required"	Proposed works considered appropriate to ensure that materials	
	Douglas recommends that services be over excavated by 0.5 m and a marker layer placed over the trench.	used in service trenches are adequately validated.	
	Validation of the thickness of the capping/trench materials and appropriate management measures commensurate with the reduced cap thickness will be required to ensure that this strategy is adequate.		
Landscaping	Not discussed	It is understood that the Drying Green will be built	

## **TABLE 8 – WORKS REQUIRED**

over different levels. Works should

In the Auditor's opinion, the proposed remediation and development

works should be able to ensure that accessible materials are suitable for the proposed land uses and that other specific off-site potential sources of contamination are removed such that they do not impact on the suitability of this site.

## Further Investigation

- Beneath buildings and pavements after they are demolished. Observations must be recorded with follow up investigations where indicated by field conditions;
- To assess the extent of contamination on the former Police Site; and
- To assess contamination at currently un-assessed areas.

## **Development of Remediation Processes**

- Detailed design of capping required to provide a separation layer between landfill material and site users;
- Detailed design of capping/separation for below ground features such as services including beneath buildings;
- Preliminary development of long term management plan detailing management measures related to each capping;
- Revision of the RAP to address any contamination found in the further investigations. As the site will be developed in stages, an overarching RAP that addresses the principles to be applied could be prepared; and
- A Site Audit Report and Section B Site Audit Statement could be prepared to verify the suitability of the overarching RAP.

## Implementation of Remediation

- Preparation of remedial action works plans or detailed RAPs for individual stages of development, in consideration of the specific development plan;
- An Audit Interim Advice or further Section B Site Audit Statement could be prepared to verify that the relevant stage/site can be made suitable for the proposed use by implementation of the remediation plan;
- Implementation of capping or alternative measures in accordance with the remediation plan;
- Removal of underground fuel storage tanks and any related contamination;
- Completion of remediation in accordance with remediation plan and any approved revisions, for example because of unexpected finds during development;
- Adequate validation of remedial works including the thickness and location of the cap, nature and extent of asbestos outside of capped areas and the base of the UST excavations; and
- Demonstration that imported material particularly topsoil is suitable for use.

## Management Plan

- Preparation of long term management plan, documenting the as-constructed conditions, management required and responsibilities;
- Acceptance of the management plan by relevant stakeholders; and
- Preparation of a Site Audit Report and Section A Site Audit Statement to certify the suitability of the relevant site for the proposed use. Separate Site Audit Statements would be required consistent with the staging of the development.

# Conclusions

The Auditor considers that the Green Square Town Centre Area can be made suitable for commercial/industrial and recreation open space uses if the site is remediated in accordance with the RAPs referenced in this document and in consideration of the comments outlined by the Auditor in this letter.

A condition of consent to the previous DA (D/2008/1195) was that the site is to be remediated and validated in accordance with the RAPs reviewed by the Auditor. While the plans previously reviewed were considered by the Auditor to be practical and could make the site suitable for the proposed uses, the plans are conceptual and are required to be updated with further detail prior to implementation. This is particularly as further investigations are required in some areas of the site. Revisions to the RAPs have been proposed by Douglas Partners (2009), and further amendments may be desirable based on further investigations and specific staged development plans.

As there are a number of existing RAPs and proposed modifications, as further investigations are required, and as the site will be developed in Stages, it is recommended that:

- An overarching RAP is prepared for the Essential Infrastructure DA Area;
- A Site Audit Report and Section B Site Audit Statement is prepared verifying the suitability of the overarching RAP;
- Remedial Action Works Plans are prepared for individual stages of development, in consideration of the specific development plan;
- An Audit Interim Advice or further Section B Site Audit Statement is prepared to verify that the relevant stage/site can be made suitable for the proposed use by implementation of the Remedial Action Works Plan; and
- At the completion of remediation of each stage, a Site Audit Report and Section A Site Audit Statement is completed clearly indicating that the site is suitable for the proposed use.

## 4.4.7 Contamination

The archaeological assessment is based on the Baseline Archaeological Assessment Green Square Town Centre Zetland prepared by AMAC Archaeological (Refer to Appendix I).

## Physical Evidence and Archaeological Potential

The site is presently occupied by factories, showrooms, warehouses, the hospital buildings, Green Square train station, some offices, and paved car-parking. The incinerator has recently been demolished. There are some grassed areas, and rows of trees along some of the boundaries. In general, the site slopes down to the north-west. There has been some excavation or terracing to create level areas. In particular, along Portman Lane the ground drops considerably. The difference in level decreases gradually to the north along the Lane.

Some large-scale excavation is known to have taken place. The construction of the brickworks would have involved excavation for the construction of underground flues. The construction of the incinerator involved the excavation of a large pit for rubbish. As mentioned above, the area between the former Dam and Portman Lane has also been dug away to make it level with the remainder of the site. Excavation has also taken place for the construction of the Green Square train-line and station. However, the historical evidence concerning the site indicates that, in general, it has been built up rather than excavated. The presence of the Dam on the site indicates that it was originally lower-lying than the surrounding land. It is probable that the Dam was gradually filled from about the end of the nineteenth century. This allowed the centre of the site to be occupied.

It is therefore likely that archaeological evidence of earlier activity on the site has survived. This may include remains of the mechanisms used to control the Dam, such as the sluice gate shown in the c1830 plan, and the wooden shoot lock shown in the 1894 plan. Remains of Hinchcliff's wool washing works may also survive. However, these are likely to have been at least partly disturbed by the construction of the Waterloo Fire Brick Company brickworks. Remains of the two brickworks are also likely to survive.

Archaeological remains of many of the later uses of the site may also exist. For instance, footings of the houses on the corner of Bourke and Portman Streets may exist under the present bitumen paving. Footings of the earlier factories may also remain in the area between Botany Road and O'Riordan Street.

#### Significance

The site is significant at a State level because of the creation and use of Waterloo Dam, associated with the operation of Waterloo flour mill, which was constructed in c1820. The later wool washing works established on the site is significant at a local level, as an early and characteristic industry for the area. The later brickworks are also characteristic for the area. The late 19th century residential buildings are also considered locally significant. It is likely that the significance of the site is represented by archaeological evidence preserved in some areas.

#### Recommendations

The following management recommendations are based on the relics thought to be present on the site, and on the assessed heritage significance of these relics. These potential archaeological relics are given protection by local government regulations, in this case South

Sydney LEP 1998 (as amended) and City of Sydney Heritage DCP 2006, and the provisions of the NSW Heritage Act 1977. The requirements concerning archaeology of the South Sydney LEP 1998 and the City of Sydney Heritage DCP 2006 reflect those of the Heritage Act. The following section therefore refers only to the Heritage Act. The Council may apply additional conditions of consent, relating to archaeology, to development approvals.

The different properties comprising the study site in general have the potential to contain relics of various degrees of significance. This is reflected in the recommended management. For example, an Exception may be required for one set of relics on a development site, while a Permit may be required for another set on the same development site. In practice, a single application would be made to the Heritage Branch, addressing the impact of a proposed development on all the relics on a particular development site. 1 The extent of impact of the proposed development on relics will also influence whether an Exception Notification or Permit 1 A summary of the process of managing relics according to the legislation can be found in Appendix I. Archaeological Management & Consulting Group Pty Limited July 2012 is more appropriate. In order to clarify the existence of relics on the various properties prior to development, it is also possible to conduct Archaeological Test Excavation under an Exception Notification.

Archaeological research, excavation, recording and reporting is timeconsuming, and can cause lengthy delays to development, if the requirements are not addressed at an early stage. If relics are found to be of State significance, it may be necessary to preserve them where they lie. There may also be requirements to incorporate relics or interpretation displays into new developments. It is therefore recommended that any archaeological requirements are considered early in the re-development process. This will allow delays and reconfigurations to be minimised, and will ensure the best possible outcome for the management of the relics.

Unexpected relics remain protected by the Heritage Act. Should any such relics be discovered in the course of work, work in the area of the relics should stop and the Heritage Branch of the Office of Environment and Heritage should be notified.

#### 4.8 The suitability of the site for the development

The study area for the Town Centre is a built-up area containing formed land industrial land uses. The area has a dilapidated appearance with many vacant and also older style industrial buildings.

The proposed Essential Infrastructure works provide for an opportunity to provide the foundation for the redevelopment of this industrial area into a vibrant mixed used centre that will contain residential, commercial, open space, transport and public domain uses.

The proposed Essential Infrastructure works are consistent with State and local planning strategy which aim to provide planned Major Centre with a significant residential and employment population. The proposed works are also consistent with existing and proposed EPI's and City of Sydney policies including the Green Square Town Centre DCP 2012.
## 4 Assessment of Section 79C of the NSW Environmental Planning & Assessment Act 1979

The proposed works will provide a high level of amenity for future residents, workers and visitors through provision of a high quality public domain, a legible street network with street tree planting and street furniture to add visual interest. Importantly that proposed Essential Infrastructure works will also support the sustainable renewal of the Town Centre through the inclusion of green infrastructure works that will connect to Council's Green Infrastructure Centre.

The proposed Essential Infrastructure do not require significant upgrade to existing utilities which will allow the works to be developed in an efficient manner without the need for additional approvals from NSW Government.

The key engineering, environmental and planning studies also confirms that the proposed Essential Infrastructure works can be accommodated within the existing land use without significant adverse environmental impact. The implementation of mitigation measures will manage potential environmental impacts both during the construction and operational stage.

The delivery of the project is likely to occur over a 15 year period, which will occur in stages and will limit the full potential environmental impact of the works.

As part of the long term development of the Town Centre, City of Sydney will continue to work with Sydney Water to improve broader water catchment issues in the area and also with Transport for NSW and Roads & Maritime Services to enhance public transport and road access in the area.

The inclusion of mitigation measures will ensure any potential risk to the environment during the construction and operational stage will be kept to a minimum.

#### 4.9 Any submissions made in accordance with this Act or the regulations

There have been no submissions made in accordance with this Act or the regulations.

#### 4.10 The public interest

The public interest is represented in the following areas which represent the strategic planning context of the proposed Essential Infrastructure works.

#### Metropolitan Plan for Sydney 2036

Green Square is a nominated 'Planned Major Centre' within the Metropolitan Plan for Sydney 2036 (December 2010) which will accommodate a future population of 40,000 and a workforce of up to 20,000. Green Square forms part of the 'Global Economic Corridor' that links the Airport to Macquarie Park, via the City. Green Square is also a nominated strategic bus corridor (Burwood – Bondi & Miranda to the City) to improve connectivity between existing and future centres in the Sydney region.

The proposed infrastructure works that form part of this DA are important to realise the metropolitan strategic objectives for Green Square as a nominated 'Planned Major Centre'.

## 4 Assessment of Section 79C of the NSW Environmental Planning & Assessment Act 1979

#### Sustainable Sydney 2030

Sustainable Sydney 2030 is the principal strategic policy document that provides a framework for planning and development in the LGA. The broad vision is to provide a city that is 'Green, Global and Connected' that responds to global warming, recognizes the city's role in the state, national and international economy and which provides for improved accessibility within the city.

Some of the key challenges which are recognized in the Sustainable Sydney 2030 that are relevant to this DA include:

- Climate change; and
- Replacing aging infrastructure.

Sustainable Sydney 2030 is underpinned by a Ten Targets, Five Big Moves, Ten Strategic Directors and Ten Project Ideas. Green Square is nominated as a future 'Activity Hub that ....will make a significant contribution to affordable housing and proposed a shopping, business and cultural focus for communities south of Redfern'. Important to this objective is the need to connect Green Square with the broader LGA through road and infrastructure improvements to support redevelopment over the next 20 years to support the City's sustainability.

The proposed infrastructure works contained in this SEE will help achieves the City's vision as outlined in the Sustainable Sydney 2030 strategic policy document.

#### Green Square Town Centre Development Control Plan 2012

The Green Square Town Centre DCP 2012 provides for the development planning direction for the town centre. The DCP objectives aim to ensure that the Town Centre becomes a mode of sustainable urban renewal with a high public domain. There is also a need to provide a street network which provides attractive tree-lined streets with an emphasis on pedestrian and bicycle priority, access to public transport and 'water-sensitive urban design' elements.

The DCP also aims to ensure that new development alleviates the impact of stormwater and flooding risk through the design, treatment of public areas including parks and open space and also through the design of buildings. New development must also respond in an appropriate manner to their context in order to minimise their impact on the amenity of neighbouring dwellings and urban character of the surrounding area.

#### Other public interest related matters

The public interest is represented with the proposed Essential Infrastructure works in the following key areas:

- The need to provide a Town Centre with an attractive public domain design that provides a unique disposition as compared to other centres in the City of Sydney LGA;
- The need to provide an efficient upgrade to existing infrastructure to support Green Square's growth as a Planned Major Centre;
- The need to manage the staged construction delivery of the project will in a coordinated manner and with minimal environmental impact;

## 4 Assessment of Section 79C of the NSW Environmental Planning & Assessment Act 1979

- The need to provide increased accessibility in the Town Centre through improved pedestrian and cycle facilities; and
- The need to provide 'Green Infrastructure' to achieve more sustainable outcomes for the Town Centre and the broader area through the establishment of the Green Infrastructure Hub.

## **5** Conclusion

The proposed Essential Infrastructure works are an important part of the sustainable renewal of the Green Square Town Centre as a planned major centre in accordance with the City of Cities Sydney Metropolitan Strategy 2036 and Sustainable Sydney 2030.

The infrastructure works provide the framework for future residential and commercial development to occur that will be serviced by an accessible and legible road layout, a well connected stormwater and drainage network to allow water re-use; a sustainable energy supply powered by a trigeneration facility and a evacuated waste system to ensure a more environmentally friendly source of waste management.

Future residents, visitors and workers will be provided with a high quality public domain with street tree planting, public art and street furniture and a cohesive street pavement. This will enhance amenity and make the Town Centre an attractive to place to live, work and visit.

The SEE has assessed key engineering, environmental and planning issues based on a number of integrated technical studies and supporting concept design plans. A range of mitigation measures have been recommended which will provide for the staged construction and delivery of the project.

The SEE is consistent with existing and proposed NSW and local environmental planning legislation and planning policy including the relevant Green Square Town Centre Planning Proposals and the Green Square Town Centre Development Control Plan 2012.

Consultation will continue with key NSW Government agencies on relevant matters with further approvals to be obtained for particular construction works. Consultation will also be maintained with the community with regular updates provided about key project milestones and issues.

The Essential Infrastructure works are an important stage in the development of the Green Square Town Centre which will emerge as a vibrant and place to live, work and visit that has a high amenity The works will contribute to the successful sustainable renewal of the town Centre and will achieve substantial environmental benefits through the provision of green infrastructure.

#### 5.1 Recommendation

conditions under Section 80 of the NSW Environmental Planning & Assessment Act 1979.

#### List of Civil Drawings (Aurecon, June 2012)

DOC No.	TITLE
CIV-001	Cover Sheet
CIV-002	Drawing List
CIV-003	Legend
CIV-005	General Notes Sheet 1
CIV-006	General Notes Sheet 2
CIV-010	Site Plan
CIV-020	Services Relocations and Existing Structures Plan - Sheet 1 of 21
CIV-022	Services Relocations and Existing Structures Plan - Sheet 3 of 21
CIV-023	Services Relocations and Existing Structures Plan - Sheet 4 of 21
CIV-024	Services Relocations and Existing Structures Plan - Sheet 5 of 21
CIV-025	Services Relocations and Existing Structures Plan - Sheet 6 of 21
CIV-026	Services Relocations and Existing Structures Plan - Sheet 7 of 21
CIV-027	Services Relocations and Existing Structures Plan - Sheet 8 of 21
CIV-028	Services Relocations and Existing Structures Plan - Sheet 9 of 21
CIV-029	Services Relocations and Existing Structures Plan - Sheet 10 of 21
CIV-031	Services Relocations and Existing Structures Plan - Sheet 12 of 21
CIV-032	Services Relocations and Existing Structures Plan - Sheet 13 of 21
CIV-033	Services Relocations and Existing Structures Plan - Sheet 14 of 21
CIV-035	Services Relocations and Existing Structures Plan - Sheet 16 of 21
CIV-036	Services Relocations and Existing Structures Plan - Sheet 17 of 21
CIV-037	Services Relocations and Existing Structures Plan - Sheet 18 of 21
CIV-038	Services Relocations and Existing Structures Plan - Sheet 19 of 21
CIV-039	Services Relocations and Existing Structures Plan - Sheet 20 of 21
CIV-040	Services Relocations and Existing Structures Plan - Sheet 21 of 21
CIV-050	Erosion and Sediment Control Plan - Sheet 1 of 4
CIV-051	Erosion and Sediment Control Plan - Sheet 2 of 4
CIV-052	Erosion and Sediment Control Plan - Sheet 3 of 4
CIV-053	Erosion and Sediment Control Plan - Sheet 4 of 4
CIV-055	Erosion and Sediment Control Details
CIV-100	Staging Plan
CIV-110	Staging Plan - Stage 1
CIV-120	Staging Plan - Stage 2
CIV-130	Staging Plan - Stage 3
CIV-140	Staging Plan - Stage 4
CIV-150	Staging Plan - Stage 5
CIV-160	Staging Plan - Stage 6
CIV-200	General Arrangement Plan - Sheet 1
CIV-202	General Arrangement Plan - Sheet 3
CIV-203	General Arrangement Plan - Sheet 4

#### List of Civil Drawings (Aurecon, June 2012)

DOC No.	TITLE
CIV-204	General Arrangement Plan - Sheet 5
CIV-205	General Arrangement Plan - Sheet 6
CIV-206	General Arrangement Plan - Sheet 7
CIV-207	General Arrangement Plan - Sheet 8
CIV-208	General Arrangement Plan - Sheet 9
CIV-209	General Arrangement Plan - Sheet 10
CIV-211	General Arrangement Plan - Sheet 12
CIV-212	General Arrangement Plan - Sheet 13
CIV-213	General Arrangement Plan - Sheet 14
CIV-215	General Arrangement Plan - Sheet 16
CIV-216	General Arrangement Plan - Sheet 17
CIV-217	General Arrangement Plan - Sheet 18
CIV-218	General Arrangement Plan - Sheet 19
CIV-219	General Arrangement Plan - Sheet 20
CIV-220	General Arrangement Plan - Sheet 21
CIV-230	Joynton Avenue Detention Basin
CIV-235	Green Square Plaza Plan and Sections
CIV-240	Typical Pavement Details Sheet 1 of 4
CIV-241	Typical Pavement Details Sheet 2 of 4
CIV-242	Typical Pavement Details Sheet 3 of 4
CIV-243	Access Way Vehicle Crossing Details
CIV-250	Stormwater Miscellaneous Details - Sheet 1 of 3
CIV-251	Stormwater Miscellaneous Details - Sheet 2 of 3
CIV-252	Stormwater Miscellaneous Details - Sheet 3 of 3
CIV-260	Ebsworth Street Longitudinal Section, Typical Cross Sections and Setout
CIV-261	Paul Street Longitudinal Section, Typical Cross Sections and Setout
CIV-262	Zetland Avenue Longitudinal Section, Typical Cross Sections and Setout
CIV-263	Geddes Avenue Longitudinal Section, Typical Cross Sections and Setout
CIV-264	Baker Street South Longitudinal Section, Typical Cross Sections and Setout
CIV-265	Hinchcliffe Street North Longitudinal Section, Typical Cross Sections and Setout
CIV-266	Woolpack Street Longitudinal Section, Typical Cross Sections and Setout
CIV-267	Tweed Place North Longitudinal Section, Typical Cross Sections and Setout
CIV-268	Baker Street North Longitudinal Section, Typical Cross Sections and Setout
CIV-269	Tweed Place South Longitudinal Section, Typical Cross Sections and Setout
CIV-270	Hinchcliffe Street South Longitudinal Section, Typical Cross Sections and Setout
CIV-271	Sonny Leonard Street Longitudinal Section, Typical Cross Sections and Setout
CIV-271	Sonny Leonard Street Long Section Typical Cross sections and Setout
CIV-272	Botany Road kerb and gutter control line longitudinal section and setout
CIV-273	Joynton Avenue Long Section

#### List of Civil Drawings (Aurecon, June 2012)

DOC No.	TITLE
CIV-275	Ebsworth Street Cross Sections Sheet 1 of 5
CIV-276	Ebsworth Street Cross Sections Sheet 2 of 5
CIV-277	Ebsworth Street Cross Sections Sheet 3 of 5
CIV-278	Ebsworth Street Cross Sections Sheet 4 of 5
CIV-279	Ebsworth Street Cross Sections Sheet 5 of 5
CIV-280	Paul Street Cross Sections Sheet 1 of 2
CIV-281	Paul Street Cross Sections Sheet 2 of 2
CIV-282	Zetland Ave. Cross Sections Sheet 1 of 5
CIV-283	Zetland Ave. Cross Sections Sheet 2 of 5
CIV-284	Zetland Ave. Cross Sections Sheet 3 of 5
CIV-285	Zetland Ave. Cross Sections Sheet 4 of 5
CIV-286	Zetland Ave. Cross Sections Sheet 5 of 5
CIV-287	Geddes Ave. Cross Sections Sheet 1 of 3
CIV-288	Geddes Ave. Cross Sections Sheet 2 of 3
CIV-289	Geddes Ave. Cross Sections Sheet 3 of 3
CIV-290	Barker Street South Cross Sections Sheet 1 of 3
CIV-291	Barker Street South Cross Sections Sheet 2 of 3
CIV-292	Barker Street South Cross Sections Sheet 3 of 3
CIV-293	Hinchcliffe Street North Cross Sections Sheet 1 of 4
CIV-294	Hinchcliffe Street North Cross Sections Sheet 2 of 4
CIV-295	Hinchcliffe Street North Cross Sections Sheet 3 of 4
CIV-296	Hinchcliffe Street North Cross Sections Sheet 4 of 4
CIV-297	Woolpack Street Cross Sections Sheet 1 of 2
CIV-298	Woolpack Street Cross Sections Sheet 2 of 2
CIV-299	Sluice Street North Cross Sections
CIV-300	Barker Street North Cross Sections
CIV-301	Tweed Place South Cross Sections
CIV-302	Hinchcliffe Street South Cross Sections Sheet 1 of 2
CIV-303	Hinchcliffe Street South Cross Sections Sheet 2 of 2
CIV-304	Sonny Leonard Street South Cross Sections Sheet 1 of 2
CIV-305	Sonny Leonard Street South Cross Sections Sheet 2 of 2
CIV-306	Portman Street Cross Sections Sheet 1 of 4
CIV-307	Portman Street Cross Sections Sheet 2 of 4
CIV-308	Portman Street Cross Sections Sheet 3 of 4
CIV-309	Portman Street Cross Sections Sheet 4 of 4
CIV-310	Joynton Ave. Cross Sections Sheet 1 of 4
CIV-311	Joynton Ave. Cross Sections Sheet 2 of 4
CIV-312	Joynton Ave. Cross Sections Sheet 3 of 4
CIV-313	Joynton Ave. Cross Sections Sheet 4 of 4

#### List of Civil Drawings (Aurecon, June 2012)

DOC No.	TITLE
CIV-330	Kerb returns KR1, KR2, KR3 & KR4 Plans Sections and Setout Sheet 1 of 12
CIV-331	Kerb returns KR5, KR6, KR7 & KR8 Plans Sections and Setout Sheet 2 of 12
CIV-332	Kerb returns KR9, KR10, KR11 & KR12 Plans Sections and Setout Sheet 3 of 12
CIV-333	Kerb returns KR13, KR14, KR15 & KR16 Plans Sections and Setout Sheet 4 of 12
CIV-334	Kerb returns KR17, KR18, KR19 & KR10 Plans Sections and Setout Sheet 5 of 12
CIV-335	Kerb returns KR21, KR22, KR23 & KR24 Plans Sections and Setout Sheet 6 of 12
CIV-336	Kerb returns KR25, KR26, KR27 & KR28 Plans Sections and Setout Sheet 7 of 12
CIV-337	Kerb returns KR29, KR30, KR31 & KR32 Plans Sections and Setout Sheet 8 of 12
CIV-338	Kerb returns KR33, KR34, KR35 & KR36 Plans Sections and Setout Sheet 9 of 12
CIV-339	Kerb returns KR37, KR38, KR39 & KR40 Plans Sections and Setout Sheet 10 of 12
CIV-340	Kerb returns KR41, KR42, KR43 & KR44 Plans Sections and Setout Sheet 11 of 12
CIV-341	Kerb returns KR45 & KR46 Plans Sections and Setout Sheet 12 of 12
CIV-390	Road Marking and Signage Sheet 1 of 4
CIV-391	Road Marking and Signage Sheet 2 of 4
CIV-392	Road Marking and Signage Sheet 3 of 4
CIV-393	Road Marking and Signage Sheet 4 of 4
CIV-400	Pavement Plan Sheet 1 of 4
CIV-401	Pavement Plan Sheet 2 of 4
CIV-402	Pavement Plan Sheet 3 of 4
CIV-403	Pavement Plan Sheet 4 of 4
CIV-420	Stormwater Profiles Sheet 1 of 9
CIV-421	Stormwater Profiles Sheet 2 of 9
CIV-422	Stormwater Profiles Sheet 3 of 9
CIV-423	Stormwater Profiles Sheet 4 of 9
CIV-424	Stormwater Profiles Sheet 5 of 9
CIV-425	Stormwater Profiles Sheet 6 of 9
CIV-426	Stormwater Profiles Sheet 7 of 9
CIV-427	Stormwater Profiles Sheet 8 of 9
CIV-428	Stormwater Profiles Sheet 9 of 9
CIV-450	The Drying Green Bio-retention Swale Miscellaneous Details
CIV-455	The Drying Green Stormwater Overflow Details
CIV-460	Stormwater Diversion Chambers Sheet 1 of 2
CIV-461	Stormwater Diversion Chambers Sheet 2 of 2
CIV-500	Services Coordination Plan Sheet 1
CIV-501	Services Coordination Plan Sheet 2
CIV-502	Services Coordination Plan Sheet 3
CIV-503	Services Coordination Plan Sheet 4
CIV-504	Services Coordination Plan Sheet 5
CIV-505	Services Coordination Plan Sheet 6

#### List of Civil Drawings (Aurecon, June 2012)

DOC No.	TITLE
CIV-506	Services Coordination Plan Sheet 7
CIV-507	Services Coordination Plan Sheet 8
CIV-508	Services Coordination Plan Sheet 9
CIV-509	Services Coordination Plan Sheet 10
CIV-511	Services Coordination Plan Sheet 12
CIV-512	Services Coordination Plan Sheet 13
CIV-513	Services Coordination Plan Sheet 14
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CIV-530	Services Trench Details Ebsworth Street Typical Section
CIV-531	Services Trench Details Geddes Ave. Typical Section
CIV-532	Services Trench Details Zetland Ave. Typical Section
CIV-533	Services Trench Details Hinchcliffe Street Typical Section

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L-205	Landscape Plan 06	L-308	Shared Zone Sections
L-206	Landscape Plan 07	L-400	Landscape Details Village Centre 01
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#### List of Landscape Civil Drawings (Aurecon, June 2012)

# APPENDIX C Engineering Infrastructure Report (Aurecon)

# APPENDIX D Flood Mitigation Options – Green Square Town Centre (Cardno)



Flood Risk Management Plan – Green Square Town Centre (Cardno)



Transport Report Green Square Town Centre Essential Infrastructure (Colston Budd Hunt & Kafes)

# APPENDIX G Baseline Archaeological Report Green Square Town Centre, Zetland (AMAC Archaeological)

# APPENDIX H Additional Geotechnical Study - Green Square Town Centre (Revision 1) (Environ Australia)



Interim Contamination Audit Report – Green Square Essential Infrastructure and Public Domain (Environ)

# **APPENDIX J**

Green Square Town Centre Public Domain Design Water Sensitive Urban Design Strategy (AECOM)

# APPENDIX K Green Square Town Centre Public Domain Strategy (McGregor Coxall)

APPENDIX L Site Photos of Green Square Town Centre



# **3.5 OTHER REGULATORY APPROVALS**

- Appendix 3.5.1(c) REF for Water Reuse Facility

# Review of Environmental Factors

City of Sydney Town Hall House 456 Kent Street Sydney NSW 2000

Water Re-use Facility at the former Royal South Sydney Hospital Administration Building, No.3 Joynton Avenue Zetland



June 2012

Sydney2030/Green/Global/Connected



city of Villages

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## Certification

This report has been prepared and reviewed by the City of Sydney Council as prescribed below.

Action	Name	Title	Signature	Date
Prepared by	David White	Planner Green Square	2 fal-	20.06.2012
Reviewed by	John Dwyer	Senior Program Manager Green Square	A	20.06.2012
Supported by	Garry Harding	Director City for Operations	A	20.06.2012
Approved for Issue by	Michael Leyland	Director of Projects and Property	ducilagan	20.06.2012

## Abbreviations

Abbreviation Meaning Annual Average Daily Traffic AADT ACM Asbestos containing material Annual Exceedance Probability AEP Australian Height Datum AHD Average Recurrence Interval ARI Australian Standard AS Automated Waste Collection System AWCS below ground level bgl Borehole BH **Construction Environmental Management Plan** CEMP **Construction Traffic Management Plan CTMP Development Application** DA **Development Control Plan** DCP NSW Department of Planning & Infrastructure DoP&I **Deposited** Plan D.P. **Douglas Partners** DP City of Sydney Decentralised Water Master Plan DWMP **Ecologically Sustainable Development** ESD Environmental Management Plan EMP NSW Environmental Planning & Assessment Act 1979 **EP&A** Act Commonwealth Environment Protection & Biodiversity Conservation Act EP&BC Act 1999 **Environmental Planning Instrument** EPI Flood Planning Level FPL Groundwater investigation level GIL Kilometres Km Kilolitres / Day KI/D Local Environmental Plan LEP Litres/second L/S LGA Local Government Area Metres m Milligrams per kilogram (or parts per million) mg/kg Metropolitan Water Plan MWP National Environmental Significance NES New South Wales NSW Polycyclic Aromatic Hydrocarbon PAH

The following abbreviations are used in this REF.

# Abbreviations

Abbreviation	Meaning
PMF	Probable Maximum Flood
REF	Review of Environmental Factors
REP	Regional Environmental Plan
SAC	Soil Assessment Criteria
SEPP	State Environmental Planning Policy
SEE	Statement of Environmental Effects
SIS	Species Impact Statement
SWSOOS	South-Western Suburbs Ocean Outfall System
The City/City of Sydney	The City of Sydney Council
The Minister	The NSW Minister for Planning & Infrastructure
the Regulations	NSW Environmental Planning & Assessment Regulations 2000
ТРН	Total Petroleum Hydrocarbon
TPZ	Tree Protection Zone
the Town Centre	Green Square Town Centre
UST	Underground Storage Tank
WRAPP	Waste Reduction and Purchasing Policy

### Executive Summary

This Review of Environmental Factors (REF) has been prepared to assess the environmental impacts of a proposed Water Re-use facility, which forms part of the Green Infrastructure Centre (GIC), which is proposed to be located at the former Royal South Sydney Hospital, No.3 Joynton Avenue Zetland.

The City of Sydney Council (The City of Sydney/The City) is the proponent for the Water Re-use facility project and is also the "determining authority" for the REF under Part 5 of the NSW Environmental Planning & Assessment Act 1979 (EP& A Act).

#### Background

In 2009, the City of Sydney released Sustainable Sydney 2030 in response to the community's ideas for creating a better city. In accordance with Sustainable Sydney 2030, the City is aiming to achieve a substantial reduction in greenhouse gas emissions and attain a more sustainable future with less waste, water and energy use.

In particular, Sustainable Sydney 2030 aims to generate 10 per cent of the city's water supply from within its own area with the development of "Green Transformers" to be located in the city area, such as the Town Centre.

In 2010, the City identified the former Royal South Sydney Hospital site, as a potential location for a Green Transformer (Green Infrastructure Centre), to accommodate a Trigeneration facility, a Water Re-use facility and an Automated Waste Collection System.

The City now proposes to redevelop the former hospital Administration Building to provide a location for a proposed Water Re-use facility to reduce water consumption consistent with Sustainable Sydney 2030 initiative.

#### The Proposal

The Water Re-use facility project includes a treatment plant, an underground water reservoir, two (2) balance tanks and an underground pipe connection from the Water Re-use facility to the street to allow connection with the broader Town Centre area. It will provide an opportunity to use non-drinking water in the Town Centre area for watering of parks and gardens, street cleaning and all non-drinking domestic use. It will help manage periods of excessive drought through better management and consumption of water.

Overall the Water Re-use facility project will help reduce the city's water use, which is expected to rise by 10 per cent by 2030. This will be achieved through better management and use of stormwater water in the Town Centre area.

#### Assessment

The REF covers the assessment of key engineering, environmental and planning issues such as flooding and hydrology, archaeological and heritage, geotechnical and contamination, which have been assessed in relation to the proposed activity. The assessment largely relies on the findings of the technical studies that were completed as part of the Development Application for the proposed redesign of the Administration Building at the former hospital site (D/2012/835) which was lodged with Council in June 2012.

Key environmental planning instruments which have been assessed include South Sydney Local Environmental Plan No.114 (Southern Industrial Rosebery/Zetland Planning Districts) and State Environmental Planning Policy (Infrastructure) 2007.

Council requires the following licenses / approvals for the delivery of the proposed Water Reuse facility:

- Approval for an off-take structure or "in-channel asset" from Sydney Water Corporation to connect to the Water Re-use facility; and
- Licence to extract water from the Sheas Creek Channel from the NSW Office of Water.

#### Consultation

Throughout the development of the Green Square Town Centre project, the City of Sydney has constantly kept the community informed of latest development and planning issues. This has included project update newsletters, website notifications and attendance at community

## **Executive Summary**

meetings. Consultation has also occurred with Sydney Water Corporation and the New South Wales (NSW Office of Water.

Mitigation measures are included in this REF and within the separate technical reports which seek to minimise the potential impact from the works during the construction and operation stage. These include:

- Preparation of relevant construction management plans i.e. erosion and sediment control;
- Protection of existing trees on site and associated tree protection measures;
- Further contamination investigation as part of a revised Remedial Action Plan;
- Temporary landscaping around the curtilage of the building;
- Future remediation to prepare the site for its future use; and
- Placement of Water Re-use operational plant within the Administration Building above the Flood Planning Level.

Redevelopment of the former Royal South Sydney Hospital Site

The Water Re-use facility project forms part of a broader City of Sydney initiative to redevelop the former hospital site (Development Site 13)<sup>1</sup> into a "Green Transformer" which includes the following projects:

- Redesign of the Administration Building to accommodate the proposed Water Re-use facility and also the Trigeneration facility. The DA was lodged in June 2012 (D/2012/835) which is to be assessed by Council under Part 4 of the EP& A Act;
- A proposed Trigeneration facility which is to be assessed under Part 4 of the EP& A Act with Cogent as the applicant for the DA and Council as the consent authority. and
- A proposed Automated Waste Collection System which is to be assessed by Council under Part 4 of the EP&A Act.

Other projects to be provided on Development Site 13 include:

- Redevelopment of former hospital buildings for community uses as well as a park; which
  is to be assessed by Council under Part 4 of the EP&A Act;
- A proposed affordable housing residential development (City West); which is to be assessed by Council under Part 4 of the EP&A Act; and
- A proposed high-rise residential development which is to be assessed by Council under Part 4 of the EP&A Act.

These projects will transform the former hospital site into a vibrant mixed-use precinct located on the fringe of the Green Square Town Centre.

#### Conclusion

This REF has been prepared to assess the environmental impacts of the proposed Water Reuse facility under Part 5 of the EP&A Act and forms part of a City of Sydney initiative to provide a Green Infrastructure Centre at the former Royal South Sydney Hospital site. The proposed Water Re-use facility will be housed within and external to the former hospital Administration Building.

The proposed Water Re-use facility is consistent with Sustainable Sydney 2030 which aims to generate 10 per cent of the city's water supply from within its own area through stormwater re-use projects. The REF is also consistent with key State and local environmental planning instruments and relevant City of Sydney policies.

This REF has assessed key engineering, environmental and planning issues and relevant environmental planning instruments and related City of Sydney policies.

<sup>&</sup>lt;sup>1</sup> As nominated in the Green Square Town Centre Development Control Plan which was approved by Council in early 2012.

## **Executive Summary**

The REF is unlikely to result in detrimental environmental impacts and the implementation of mitigation measures will ensure that the proposed Water Re-use facility will not adversely affect the amenity of the surrounding area. An Environmental Impact Statement is not required to assess the environmental impacts of the proposed Water Re-use facility.

## **1** Introduction

#### 1.1 Overview

This Review of Environmental Factors (REF) has been prepared to assess the environmental impacts of the proposed Water Re-use facility, which forms part of the Green Infrastructure Centre (GIC), which is proposed to be located at the former Royal South Sydney Hospital, No.3 Joynton Avenue, Zetland.

The City of Sydney (The City of Sydney/The City) is the proponent for the Water Re-use facility project and is also the "determining authority" for the REF under Part 5 of the NSW Environmental Planning & Assessment Act 1979 (EP& A Act).

#### 1.2 Background

In 2009, the City of Sydney released the Sustainable Sydney 2030 in response to the community's ideas for creating a better Sydney. In accordance with Sustainable Sydney 2030, the City is aiming to generate 10 per cent of the city's water supply from within its own area through stormwater re-use projects.

A key strategy of Sustainable Sydney 2030 is to develop "Green Transformers" throughout the city, which would become locations for Green Infrastructure facilities including Trigeneration, Water Re-use and an Automated Waste Collection System (AWCS).

In accordance with Sustainable Sydney 2030, the City has identified the former Royal South Sydney Hospital site (former hospital site) at Joynton Avenue, Zetland, as a potential location for a Green Transformer (Green Infrastructure Centre), which could include a Trigeneration facility, a Water Re-use facility and an AWCS.

The proposed Water Re-use facility is to be housed within and immediately adjacent to the Administration Building at the former hospital site.

#### 1.3 Proposal Identification

The Water Re-use facility will provide non-drinking water supply to future development in Green Square Town Centre (the Town Centre) which includes water for watering of parks and gardens, street cleaning and non-drinking domestic use (Refer to Appendix A).

The project also includes a treatment plant, an underground water reservoir (up to three reservoirs), two (2) balance tanks and an underground pipe connection from the Water Reuse facility to the surrounding utility network (Portman Street & Joynton Avenue), and an underground pipe to draw water from Sheas Creek Culvert.

Construction is anticipated to occur from late 2012 to mid 2013, with operations expected to begin in late 2013. The City would manage the Water Re-use facility once operation starts.

#### 1.3.1 Redevelopment of Former Royal South Sydney Hospital Site (Development Site 13)

The Water Re-use facility project forms part of a broader initiative to redevelop the former hospital site, which includes the following projects that need approval from Council (Refer to Appendix B):

- Redesign of the Administration Building to accommodate the proposed Water Re-use facility and also the Trigeneration facility. The DA was lodged with Council in June 2012 (D/2012/835) which is to be assessed by the City under Part 4 of the EP& A Act;
- A proposed Trigeneration facility which to be assessed under Part 4 of the EP& A Act with the Council as the consent authority. Cogent is the applicant for the DA; and
- A proposed Automated Waste Collection System which is to be assessed by Council under Part 4 of the EP&A Act.

Other projects to be provided on Development Site 13 include:

- Redevelopment of former hospital buildings for community uses as well as a park; which is to be assessed under Part 4 of the EP&A Act;
- A proposed affordable housing residential development (City West); which is to be assessed under Part 4 of the EP&A Act; and

## 1 Introduction

 A proposed high-rise residential development which is to be assessed under Part 4 of the EP&A Act.

These projects will transform the former hospital site into a vibrant mixed-use precinct on the fringe of the Green Square Town Centre.



Figure 1 – Location

#### 1.4 Environmental Assessment Process

Under the State Environmental Planning Policy (Infrastructure) 2011 ("the Infrastructure SEPP"), the proposed Water Re-use facility can be defined either as a "water treatment facility" in accordance with Clause 124 or as a "stormwater management system" in accordance with Clause 110. In each case the proposed activity is classified as development permitted without consent pursuant to either Clause 111 of Division 20 Stormwater management systems or Clause 125 of Division 24 Water Supply Systems.

In either case an assessment of the proposed Water Re-use facility is to occur under Part 5 of the EP& A Act as well as the Clause 228 Guidelines under NSW Environmental Planning Assessment Regulation 2000 (the Regulations).

This REF has been prepared by the City of Sydney which describes the proposal and assesses the potential impacts of the construction and operation of the proposal in accordance with Clause 111 of the EP&A Act. This REF has been prepared in accordance with the City of Sydney Part 5 Environmental Impact Assessment Procedures Manual and is classed as a "Level 3 REF".

The REF also identifies whether the proposal is likely to significantly affect the environment, including whether there is likely to be any impact on critical habitat, or threatened species, populations or ecological communities, or their habitats. This REF also specifies mitigation measures to minimise potential impacts.

The assessment has also been undertaken in accordance with the requirements of all potentially relevant NSW and Commonwealth legislation including the Threatened Species Conservation Act 1995 (TSC Act) and the Commonwealth Environment Protection & Biodiversity Conservation Act 1999 (EP&BC Act). In doing so the REF helps to fulfill the requirements of Clause 111 of the EP&A Act to ensure that the City has taken into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of

## **1** Introduction

#### the activity.

The findings of this REF will be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and trigger the requirement for an Environmental Impact Statement (EIS) and approval to be sought by a nominated Determining Authority;
- The significance of any impact on threatened species listed under the TSC Act in accordance with Clause 5A Significant effect on threatened species, populations or ecological communities, or their habitats of the EP&A Act, and subsequent need for a Species Impact Statement (SIS); and
- The potential for the proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Department of Sustainability, Environment, Water, Population and Communities for a decision by the Minister for the Environment on whether assessment and approval is required.

An outline of the information provided in each section of this REF is provided in Table 1.

#### TABLE 1: SUMMARY OF THE ISSUES ADDRESSED IN EACH SECTION

Section	Issues Addressed	
Section 1	Proposal identification and purpose of REF	
Section 2	Provides an assessment of the alternative options for the proposed activity	
Section 3	Provides description of the proposed activity in the REF	
Section 4	Provides the statutory planning framework	
Section 5	Provides the authority and community consultation	
Section 6	Provides the environmental impact assessment	
Section 7	Provides the assessment of Clause 228 matters under the Regulations	
Section 8	Provides the provides the summary of mitigation measures	
Section 9	Provides the conclusion and certification	

#### 1.5 Scope of this Review of Environmental Factors

Since the Water Re-use facility is proposed to be housed within the Administration Building, this REF relies on the following reports and plans that were prepared for the proposed redesign of the Administration Building (D/2012/835)<sup>2</sup>:

- Concept drawings (as amended) for the redesign of the Administration Building (Choi Ropiha Fighera) provided as Appendix A;
- A Heritage Impact Statement prepared by City Plan Heritage (Refer to Appendix C);
- Hydrological and flooding report for the proposed Green Infrastructure Centre prepared by Cardno Pty Ltd (Refer to Appendix D);
- Review of Contamination Issues Report by Douglas Partners (Refer to Appendix E);
- A Photomontage of the proposed Green Infrastructure Centre when viewed from the proposed Matron Ruby Grant Park (Refer to Appendix F);
- A survey plan of the site provided as Appendix G (Project Surveyors); and
- An Arboricultural Assessment including a Tree Survey and Report provided as Appendix H.

Note: Direct quotations have been taken from the above reports and included in this REF where relevant. Minor changes have been made to these quotations to ensure consistency within the REF.

Review of Environmental Factors Water Re-use Facility Ref: 2012/180561

 $<sup>^2</sup>$  D/2012/835 was lodged with the City of Sydney Council on 1 June 2012

## 2 Site Analysis

This section describes the existing site and surrounding area.

#### 2.1 Site Location and Context

This section provides a summary of the existing Administration Building site and the surrounding area.

#### 2.1.2 The Existing Site

The proposed Water Re-use facility is proposed to be housed within the eastern part of the former Administration Building, which fronts onto Joynton Avenue (Refer to Figure 2). The hospital precinct includes the following former hospital buildings (Refer to Figure 3):

- Administration Building;
- Pathology Building;
- Outpatients and Casualty Building;
- Joynton Smith Building\*;
- Esme Cahill Building+;
- JJ Collins Ward\*;
- Intensive Care Unit\*;
- Neurological Building\*;
- Rehabilitation Building (Naomi Wing)\*;and
- Storage Room & Maintenance Building\*.

\*Approved for demolition under D/2011/1022

+Partial demolition of western wing subject to Council approval

#### 2.2 The Administration Building

The Administration Building is an elongated building structure that extends westwards from Joynton Avenue to Portman Street. It lies approximately in the middle section of the site (Refer to Figure 3).

The Administration Building is approximately three storeys with a gabled roof and a face brick exterior. It is connected by a series of covered ground walkways to the Joynton Smith Building<sup>3</sup> on its northern side and the Outpatients and Casualty buildings to the northeast, which fronts onto Joynton Avenue. The Administration Building also connects with the Pathology building at its south-eastern corner.

Vehicle access to the former hospital site is at:

- Joynton Avenue at the north-western corner;
- Midway along Portman Street;
- Portman Street at the north-eastern corner; and
- Midway along Hansard Street.

The main pedestrian access to the site is off Joynton Avenue along with a series of secondary accesses from Joynton Avenue and Portman Street. There is no pedestrian access from Hansard Street other than the vehicular access point.

<sup>&</sup>lt;sup>3</sup> This building has been approved for demolition

## 2 Site Analysis



Figure 2 – Administration Building when viewed from Joynton Avenue

#### **Demolition works**

The former hospital site is currently subject to demolition work with large areas of the site closed to the public (Refer to Figure 3). Fourteen (14) buildings on the hospital site are proposed for demolition with four (4) heritage listed buildings to be re-used, which include:

- Administration Building;
- 2 Pathology Building;
- 3 Outpatients Building; and
- 4 Esme Cahill Nurses' Home (eastern wing).

Retention of the following other physical features must also occur as part of the redevelopment of the site:

- Brick and sandstone boundary fence to Joynton Avenue, 1913; and
- Landscaped area fronting Joynton Avenue between the Nurses' Home and the Pathology Building, including the significant trees and open landscaped areas around the buildings.

#### 2.3 Land Ownership and Legal Description

The site is registered as Lot 1 in D.P. 136025 (A Survey of the Site is provided at Appendix G). The site is owned by the City of Sydney and is classed as "operational" under the NSW Local Government Act 1993.

#### 2.4 Surrounding Development

As previously mentioned the former hospital site fronts onto three streets (Joynton Avenue, Portman Street and Hansard Street) and only adjoins one property, a Ford dealership, on the northern boundary.

The adjoining area is characterised by light industrial uses (some presently vacant), motor showrooms, business park estates, as well as newer and older-style residential dwellings (apartments, townhouses, terraces and detached dwellings). A Waverley Council Depot is located opposite the hospital site in Portman Street, and industrial sites are located to the north-west off Portman Street. To the north-west off Portman Street is the Police Services site planned for redevelopment by Landcom and the Green Square Consortium lands.

Older-style terrace houses and workers' cottages are located at the northern end of

#### Review of Environmental Factors Water Re-use Facility Ref: 2012/180561

## 2 Site Analysis

Portman Street closer to Bourke Street and also in Hansard Street which also contains factory buildings. There are newer-style residential apartments at the corner of Portman Street/Hansard Street.

Residential redevelopment is beginning to occur along Botany Road as former warehouse sites are turned into high-rise apartment towers (Victoria Park, Meriton ACI site).

In the longer term, the Town Centre will experience major residential and commercial redevelopment in accordance the Green Square Town Centre Development Control Plan (DCP) 2012, which was approved by Council in early 2012.

#### 2.5 Existing Infrastructure

The existing infrastructure at the former hospital site is provided below.

#### Roads

The site has frontage to Portman Street which is a local road which links Bourke Street to Hansard Street. Portman Street has a wide reservation with footpaths on either side of the street and contains a three-tonne load limit at its northern end.

Hansard Street is located on the site's southern frontage and is a local street and connects Joynton Avenue to Botany Road (State road). Joynton Avenue is a local collector road that links O'Dea Avenue to Epsom Road. Joynton Avenue is a key bus route and a bus stop is located close to the main pedestrian entrance.

Street tree planting exists in Portman Street, Hansard Street and Joynton Avenue.

#### **Public Transport**

The site is located close to existing public transport in the Green Square area which includes heavy rail at Green Square Station (400 m west) and public buses which use Joynton Avenue and Botany Road as the primary bus routes in the area.

#### Bike Lanes and Pedestrian Paths (shared paths)

Hansard Street forms part of an existing bike link and Joynton Avenue is a proposed bike link that forms part of the Redfern-Green Square connection.

#### Stormwater Drainage

The hospital site contains drainage access to the public street drainage system and relies on natural overland flow paths.

#### Water

A Sydney Water pipe runs east-west on the Ford dealership site to the north of the hospital site.

#### Sewerage

The site contains access to the public sewerage system which is adequate for the proposed use.

#### Lines and cables

There is an existing telephone line that runs north across the site from Joynton Avenue.

iPrimus has an underground cable running on the western side of the hospital site adjacent to Portman Street, with a manhole located at the southern end of the site.

There are underground Optus cables running north-south down Joynton Avenue and Portman Street.

#### Gas

There are high-pressure gas mains near the Administration Building which traverse the southern portion of the hospital site from east to west.
### 2 Site Analysis

#### 2.6 Existing Zoning

The site is zoned "Zone No. 5(a) (Special Uses Zone)" under South Sydney LEP Amendment No.114 (Southern Industrial and Rosebery/Zetland Planning Districts).

Under South Sydney LEP 1998 – Amendment No.17 Green Square Town Centre, the site is zoned Zone No.11(a) Green Square Town Centre and Zone No.11(b) Green Square Town Centre Public Domain. However these zones are classified as 'Deferred Matter' on the Amendment No.17 Map and their provisions including the land use table are not relevant to the proposed Water Re-use facility.

The heritage provisions in South Sydney LEP 1998 are applicable to the former hospital site and these have been assessed in Section 4 of this REF.

#### Planning Proposal Sydney LEP 2010 (Green Square Town Centre)

The South Sydney LEP 1998 including Amendment No.114 will be replaced by the Planning Proposal Sydney LEP 2010 (Green Square Town Centre), which is currently with the NSW Department of Planning & Infrastructure (DoP&I) awaiting gazettal (approval) from the Minister for Planning & Infrastructure (the Minister). Under the Draft Planning Proposal, the former hospital site is zoned B3 Commercial Core and the proposed Water Re-use facility is consistent with the objectives of this proposed zone.



Review of Environmental Fectors Weter Re-use Facility Reit: 2012/100661

#### 3.1 Project Overview

In accordance with Sustainable Sydney 2030, the City of Sydney requires a Water Re-use facility with an initial delivery capacity of 900 Kilolitres per day (KI/d) of treated stormwater baseflow to be extracted from the Sheas Creek Culvert and capable of an increase to increase flow to 20 L /s without an increase in physical infrastructure.

To achieve this, the City will need to facilitate the provision of green infrastructure including all Town Centre district networks, collections stations, water treatment facilities and trigeneration stations. These "Green Infrastructure" works form part of the Essential Infrastructure DA which is planned to be lodged within Council in July 2012.

This project will deliver water-harvesting infrastructure to service one of the largest urban renewal project in Sydney, also making a significant contribution to the realisation of the Sustainable Sydney 2030 targets for local water capture and re-use.

This project will be a major contributor to a larger suite of initiatives to be formulated under the City of Sydney Decentralised Water Master Plan (DWMP), to be developed concurrently. This project will achieve the above while improving the recreation amenity, ecology and environmental sustainability of Green Square contributing to making the redevelopment truly sustainable.

The Water Re-use facility will allow non-drinking recycled water reticulation to be provided for non-contact uses such as toilet flushing, water features and irrigation, and will reduce the demand for drinking water in the area.

The City is currently negotiating voluntary planning agreements with developers for the provision of green infrastructure as part of the Town Centre. The planning agreements would commit the landowner to design and construct all buildings on the site to allow connection to district based green infrastructure being a recycled water network, an AWCS and trigeneration providing low-carbon electricity, hot water, space heating and cooling.

#### 3.2 Project Justification

#### 3.2.3 Consistency with State Government policies

#### **Metropolitan Water Plan 2010**

The Metropolitan Water Plan (MWP) was released in 2010 (updated from the 2006 plan) provides the long-term plan for water management and use in the Sydney region. Stormwater recycling or harvesting is recognised as a key initiative within the Metropolitan Water Plan (MWP) which contains the following initiative:

Recycling – large-scale recycling will be implemented, smaller-scale and costeffective schemes that use recycled water sourced from sewer mining, stormwater, greywater, and commercial roof rainwater will continue to provide new opportunities.

The MWP 2010 also recognises stormwater recycling can reduce the need for investment in new supply infrastructure, especially with smaller local schemes which provide an alternative water source but also deliver river health, water quality and flood mitigation benefits. The combined value of the water and environmental improvements makes this approach a better use of funds than supporting schemes that focus only on delivering water. The MWP 2010 also acknowledges the role of local councils to promote their local recycling, stormwater and water-efficiency initiatives

The proposed Water Re-use facility is consistent with the MWP 2010 and provides a local stormwater recycling initiative for the Town Centre.

#### 3.2.4 Consistency with City of Sydney policies

#### Sustainable Sydney 2030

The proposed Water Re-use facility is consistent with Sustainable Sydney 2030, which identifies that water consumption in the City of Sydney local government area (LGA) has reduced in line with wider metropolitan water use; however, the general trends have been increasing consumption. Based on current trends, the city's water use will increase by 22

per cent by 2030.

Sustainable Sydney 2030 has recommended setting new targets and implementing innovative measures to reduce water usage. Sustainable Sydney 2030 also aims to achieve 10 per cent of the city's water supply from within its own area. Green Transformers are identified in 20 locations throughout the city, including Green Square, which would provide opportunity for stormwater recycling.

The proposed Water Re-use facility is consistent with the Sustainable Sydney 2030 and provides a local stormwater recycling initiative for the Green Square Town Centre. It will help achieve the City's targets to reduce water use in the city by 10 per cent by 2030.

#### City of Sydney Water Savings Plan 2008

This Water Savings Action Plan 1997 (WSP) is considered a sub-plan to the City's Environmental Management Plan (EMP), which was adopted by the City of Sydney in June 2007. It also provides Council's response to the NSW Government's Metropolitan Water Plan (which was replaced by the Metropolitan Water Plan 2010).

The objectives of the WSP are to:

- Demonstrate leadership by reducing water consumption within its assets;
- Document what must to done to reduce water consumption;
- Meet legislative requirements outlined within the NSW Government's Metropolitan Water Plan and the Energy Administration Amendment (Water and Energy Savings) Act 2005 (administered by the Department of Energy, Utilities and Sustainability); and
- Raise the profile of water conservation issues, prioritise major water savings programs and provide guiding principles for assets not included within this plan.

The proposed Water Re-use facility is consistent with the City of Sydney Water Savings Plan 2008 as it provides an opportunity for substantial water savings in the Green Square Town Centre. It will help achieve the targets to reduce water use in the city by 10 per cent by 2030.

#### Green Square Town Centre Development Control Plan 2006

Green Square Town Centre DCP 2012 establishes some of the principles for environmental management, including water sensitive urban design, at the site:

- To encourage efficient use of water and energy and reduce mains consumption of potable water;
- To ensure stormwater management is appropriate to the site and its surrounds and is integrated into public domain and open space design;
- At least 50 per cent of the water used for irrigation of public open space should be drawn from recycled water or harvested rainwater source. The design of public green space may include:
  - use of drought-tolerant plants and grasses; and
  - use of water retaining media mixed into soil.
- The types of pollutants, estimated pollutant loadings and level of pollutant retention should reflect current best practice and as a minimum, be consistent with the objectives and recommendations presented in Australian Runoff Quality (Engineers Australia 2006) and the WSUD (Water Sensitive Urban Design) Technical Guidelines for Western Sydney (UPRCT 2004).

The Water Re-use facility is also consistent wit the Green Square Town Centre DCP 2012 to reduce the use of resources in development and through improved water efficiency.

#### Green Square Town Centre Water Re-use 2008

In 2008, EDAW completed the Green Square Town Centre Water Re-use which assessed objectives for water management in the Town Centre public domain based on the implementation of WSUD strategies which cover the need to reduce pollutant loads and an

opportunity for water re-use and water savings.

The Study identified that substitution of drinking water with non-drinking water will achieve substantial mains water savings. It is proposed to install a third pipe non-drinking water supply system within the Town Centre, connected to toilets, laundry, cooling towers, irrigation and water feature demands in the public and private domains. Estimated demands for non-drinking water are approximately 240 ML/year.

The core of the WSUD Strategy for the Town Centre public domain aims to provide treated stormwater suitable for re-use, to meet public and private domain non-drinking water demands. The proposed Water Re-use facility will achieve the core of the WSUD Strategy but does not seek to implement the public water feature component for the Town Centre.

#### 3.2.5 Project Objectives

The City requires a recycled water scheme with a delivery capacity of 900 KL a day. This is to be initially treated stormwater baseflow, extracted from Sheas Creek Culvert at a supply-to-treatment rate of 10L/s. The system will be designed and constructed to accommodate and increased supply-to-treatment rate of 20L/s without an increase in physical infrastructure.

The system will be sustainable through various flow conditions and consistently supply the Town Centre with all non-drinking water to the peak expected demand of 900 KI/d.

This system would meet the multiple planning and environmental objectives that formulated the goals of the Green Square Town Centre DCP. These, in turn, support the Water Recycling Master Plan Decentralised currently being prepared by City of Sydney staff.

An adequate and reliable supply of non-drinking water is essential to support the Green Infrastructure technologies proposed for Green Square and to do so with a reduced carbon footprint.

#### 3.2.6 Alternative and options considered

#### Green Square Town Centre Re-use

Council assessed drinking water substitution initiatives based on previous studies. Analysis has shown that harvesting of stormwater and rainwater can deliver all of the nondrinking water needs of the public realm and, depending on the magnitude of the dry weather flow, a substantial proportion of all non-drinking water demand of the Town Centre.

#### Water Sensitive Urban Design

Three WSUD options were considered for the site:

- Scenario 1 is based on current standard practice in stormwater management;
- Scenario 2 is based on an ecosystem services approach, whereby (in addition to meeting the basic targets), the Town Centre public domain would be considered in the context of the broader catchment; and
- Scenario 3 goes one step further, where the Town Centre would be considered within the context of the regional water supply, wastewater management and groundwater systems, as well as the broader catchment. Regional-scale alternative water sources considered include an aquifer storage and recovery scheme of the underlying Botany Sands Aquifer, access to treated groundwater from the Orica treatment plant, sewer mining of the South-Western Suburbs Ocean Outfall System (SWSOOS) and access to reclaimed water from the Liverpool to Ashfield Pipeline.

#### Water Re-use Options

A report by Ecological Engineering (Appendix B, 2006) for Green Square Re-use also assessed four options for water Re-use for the Town Centre which included:

 Option 1 – Rainwater tanks for each building Rainwater tank (60KL) within roof of each building, reticulated for toilet flushing and cooling tower demands

(residential and commercial);

- Option 2 External Stormwater harvesting Stormwater diverted from external catchment, treated, reticulated and stored as required. (Re-use for toilet flushing, laundry, cooling tower and public open space watering demands.);
- Option 3 170ML/yr 6 Sewer Mining from Sydney Water Carrier Sewer mining to supply non-drinking water demands; and
- Option 4 Combining Options 1 & 2 Combining roof water harvesting, external stormwater harvesting.

All these (including Town Centre Re-use) previous reports were then reviewed and assessed for economic cost-benefit by Storm Consulting in their 2011 report *Green Square Town Centre Water Reuse Feasibility Study* ("The Storm Report").

Previous reports (Ecological Engineering 2006; EDAW 2008; EDAW 2009, Golder 2009) investigated the feasibility of harvesting stormwater from Sheas Creek Culvert in the area. The investigations included testing the water quality as well as flow monitoring. Based on the results of water quality monitoring (Table 2, EDAW 2009) and the flow monitoring (Table 1 & Figures 1-4 EDAW 2009), (Appendix B), it was concluded that stormwater has good potential to be used as a source to supply the recycled water to the development site.

The Storm Report refined Option 4 – Combining Options 1 & 2 incorporating roof-water harvesting, external stormwater harvesting – and investigated the feasibility of implementation into Town Centre.

Being an infill development where the City seeks to showcase and demonstrate sustainable ways of managing water. The Storm Report identified that opportunity also exists to divert and treat greywater for producing recycled water from a source that is not dependent on rainfall. The objectives of The Storm Report were, therefore, to determine the feasibility of four water reuse scheme options, viz.:

- Option 1: Recycled water scheme capacity of 864 Kl/d 100 per cent of the water sourced from treating stormwater baseflow (dry weather flow) at the rate of 10 L/s, from Sheas Creek Culvert;
- Option 2: Recycled water scheme capacity of 864 KI/d, 90 per cent of water sourced from treating stormwater baseflow of Sheas Creek Culvert at the rate of 9 L/s and remaining 10 per cent sourced from treated greywater;
- Option 3: Enhanced recycled water scheme capacity of 1,728 Kl/d 100 per cent of the water sourced from treating stormwater baseflow from Sheas Creek Culvert at the rate of 20 L/s; and
- Option 4: Treated stormwater supply 50 per cent or approx 432 Kl/d and 50 per cent by treated greywater (432kL/day).

Feasibility of the options was determined by analysis of technical, financial and risk factors. This analysis showed each of the four options to be feasible but with varying costs, operational requirements and approval and compliance pathways.

Option 1 is the simplest and most cost-effective option to supply the Town Centre nondrinking demands.

The addition of a greywater recycling plant in Option 2 adds complexity and cost, making this option less attractive.

Option 3 effectively supplies double the non-drinking demand of the Town Centre and so relies on securing additional demand outside the Town Centre. This option can be viewed as an extension of Option 1 and brought online as demands are created.

Option 4 supplies all of the non-drinking demands but has a higher capital cost with the greywater treatment plant increased capacity.

Council reviewed this assessment and believed that provision of green infrastructure in a timely fashion was essential to the success of the Town Centre redevelopment. The option of "do nothing" or standard hydraulic infrastructure was not considered to be in keeping with Sustainable Sydney 2030, or the Metropolitan Water Plan.

#### 3.2.7 The Preferred Option

#### **Recycled water network:**

The feasibility study considered the treatment of stormwater from Sheas Creek Culvert and/or greywater from the redevelopment of the Town Centre, and the associated pipe network required for distribution of treated recycled water and use within Green Square. Four (4) options, which covered a range of supply volumes and ratios of greywater versus stormwater treated, were included in the feasibility study.

The recommended option (Option 1) is stormwater supply from Sheas Creek Culvert at 10 litres a second, with the provision for a future supplementary back-up supply (Water Reuse facility). This option would provide for 100 per cent of the recycled water needs of the Town Centre for non-drinking purposes such as toilets, laundries, cooling towers, water features and irrigation.

The preferred option is estimated to provide recycled water at lower greenhouse emissions per litre than the average Sydney Water centralised drinking water supply. Total greenhouse gas saving once the scheme is in full operation would be 211 CO<sub>2</sub> estimate tonnes a year.

The study indicates that the preferred option can provide recycled water to customers at market-competitive rates when compared with other recycled water schemes in Sydney.

The project would directly contribute to achieving the Sustainable Sydney 2030 target of 10 per cent water supply by local water capture, while also reducing stormwater pollution and reducing greenhouse gas emissions. The project also responds directly to the direction 9 of Sustainable Sydney 2030 which includes the objective of ensuring that major urban redevelopment areas contribute to the sustainability of the city.

The recycled water feasibility study has shown favourable environmental, social and economic benefits compared with the base case ("do nothing" option) of standard drinking water provision.

The preferred procurement model is for the City to engage a water services company to design, construct, operate and maintain the recycled water system. The water services company would be responsible for selling the recycled water to the customers, and billing.

#### 3.3 Detailed Description of Project

The detailed works involved with the project are presented below.

#### **Road Works**

There are no proposed road works with the Water Re-use facility. The DA for the modification to the Administration Building (D/2012/835) will provide a new access point to the site from Portman Street. This access point will allow service and maintenance staff access to the Water Re-use facility as required. On-site parking will be provided adjacent to Administration Building as part of the DA for the Community Buildings which can be shared by service workers for the proposed GIC.

#### Stormwater works

The REF seeks approval for the placement of underground pipes within a services corridor from the proposed Water Re-use facility to Portman Street and Joynton Avenue. These will allow connection with the proposed reticulated pipe network to be placed in the Town Centre in accordance with the Green Square Town Centre Essential Infrastructure DA, which is planned to be lodged with Council in July 2012 (Refer to Appendix B).

Separate infrastructure works will be developed by Council to connect the Water Re-use facility to future development sites locate to the west of Joynton Avenue (Epsom Park).

#### Landscaping

Landscaping will include the following elements

- Protection of trees within the former hospital site;
  - Placement of crushed granite around the perimeter of the Administration

- Building (Refer to D/2012/835); and
- New planting at the Portman Street entrance (Refer to D/2012/835).

A broader landscape strategy, which will include additional planting and landscaping within the former hospital site, will be provided as part of the DA for the Community Buildings and proposed Matron Ruby Grant Park (Refer to Appendix B).

#### **Construction Method**

Based on information contained in D/2012/835, the construction of the project will occur over nine months following approval of this DA. The construction stage will generally involve the following works:

- Protection works to be undertaken to preserve the external heritage elements of the building and to also allow internal demolition to occur that will not impact on the structural fabric of the building. This may include bracing, reinforcement and hoarding;
- Preparation of the foundations for the future internal structure and strengthening to support the future trigen plant; and
- Construction of the structure will then occur with the use of steel and concrete including acoustic treatment of the internal walls in addition to future acoustic treatment that will form part of the proposed trigen use of the building.

Works will also occur to protect the internal heritage elements including the floor layout at the eastern end of the building and the protection and strengthening of windows. A heritage consultant will be appointed to provide advice on construction-related issues to protect the heritage fabric and appearance of the building.

Machinery to be used as part of the construction stage will include excavators, pile drivers, forklifts, mobile cranes and dump trucks.

The City of Sydney will also work to ensure co-ordination with the different operating contractors to reduce any potential construction impacts on the former hospital site.

3.3.1 Staging of the project

The Water Re-use facility project consists of two stages.

#### Stage 1

This stage consists of the Design, Construct and Commission of infrastructure and includes works as follows:

- Source water supply take-off and collection;
- Pre-treatment and delivery of source water for processing;
- Treatment of source water and delivery to storage;
- Storage tanks, as required, to mitigate risk at various stages of the scheme;
- Water quality, flow monitoring and response systems;
- Delivery and service reticulation to Town Centre;
- Provision of appropriate system redundancies;
- · Delivery of service manuals, as-builts and operational requirements; and
- Commissioning sign-off including demonstration of system 'fit-for-purpose' and City of Sydney staff education on technical, operational and administration aspects.

#### Stage 2

Stage 2 consists of the provision of Operate, Maintain and Administer services and includes the following:

- Operation of Water Re-use system according to relevant public health compliance regimen;
- Maintenance of Water Re-use system according to manufacturer's specifications, relevant standards and industry 'best practice';

- Supply, installation, operation and maintenance of a metering system;
- Operation and maintenance of a billing system on behalf of the City of Sydney
- Operation and maintenance of a billing system as an independent service provider;
- Ongoing advice coordination to developers in Town Centre regarding connection to non-drinking water supply; and services;
- Customer services to residential, retail, commercial, active spaces and authorities such as the City of Sydney; and
- All services in accordance with relevant legislation, statutory requirements and industry practices.

This section provides a summary of the statutory planning context of the proposal including a consideration of the relevant provisions of Part 5 of the EP&A Act, the environmental planning instruments that apply and other approval requirements.

#### 4.1 NSW Environmental Planning & Assessment Act 1979

The EP&A Act establishes the system of environmental planning and assessment in NSW. Part 5 of the EP&A Act specifies the environmental impact assessment requirements for activities undertaken by public authorities, such as the City of Sydney, which are permissible with development consent under Part 4 of the Act. Figure 4 shows the key steps of the Part 5 approvals process.

This proposal is subject to the environmental impact assessment and planning approval requirements of Part 5 of the EP&A Act. In accordance with Section 111 of the EP&A Act, the City of Sydney Council, as the proponent and determining authority, must examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity.

Under clause 112, the City must consider whether the proposal is likely to significantly affect the environment, including threatened species populations, ecological communities or their habitants. If any critical habitat is affected or where any significant impacts on threatened species, populations or ecological communities or their habitats are likely, a SIS must be prepared.

Where the City forms the opinion that any significant impact is likely, an Environmental Impact Statement (EIS) would in turn need to be assessed and prepared under sections 78A (8) or (8A) or 112 of the Act.

Clause 228 of the Regulations defines the factors which must be considered when determining if an activity assessed under Part 5 of the EP&A Act has a significant impact on the environment. Section 6 of this REF provides a full environmental impact assessment of the proposal in accordance with these guidelines, which establish that an EIS is not required.

A checklist of the key issues outlined in the clause 228 guidelines is provided in Section 7 of this REF.

#### 4.2 State Environmental Planning Policies

Relevant State Environmental Planning Policies are assessed below.

#### 4.2.1 State Environmental Planning Policy (Infrastructure) 2007

State Environmental Planning Policy (Infrastructure) 2007 (Infrastructure SEPP) is the principal State EPI that applies to the assessment and approval of infrastructure in NSW. The main aims of this Infrastructure SEPP are to provide a consistent approval system for the assessment of infrastructure in NSW and to promote better coordination and integration with adjacent development to efficient development and redevelopment of surplus government-owned land. The Infrastructure SEPP also stipulates consultation requirements with key government agencies during the assessment process or prior to development.

The Infrastructure SEPP includes development controls and exempt development provision relating to the construction of a range of infrastructure and related service works, as well as requirements regarding consultation with relevant authorities. Included are: stormwater management systems, water supply systems, sewerage systems, roads and telecommunications and other communication facilities.

Under the Infrastructure SEPP, the proposed Water Re-use facility can be defined either as a "water treatment facility" in accordance with Clause 124 or as a "stormwater management system" in accordance with Clause 110. In each case the proposed activity is classified as development permitted without consent pursuant to either Clause 111 of Division 20 Stormwater management systems or Clause 125 of Division 24 Water Supply Systems.

The proposed Water Re-use facility is not "Exempt Development" pursuant to clause 20 of the Infrastructure SEPP.

#### State Environmental Planning Policy No.55 - Remediation of Land 422

State Environmental Planning Policy No.55 - Remediation of Land (SEPP 55) applies to NSW and establishes a planning approach to the remediation of contaminated land to minimise the risk of harm to human health or any other aspect of the environment. SEPP 55 identifies when consent is required, and when it is not required, for a remediation work, and also specifies. SEPP 55 also establishes standards and notification requirements for proposed remediation work.

Clause 7 Contamination and remediation to be considered in determining a DA requires that a consent authority must not consent to the carrying out of any development on land unless it has considered whether the land is contaminated, and if the land is contaminated, the level of remediation needed to allow the proposed development to be carried out. Furthermore, Council must be satisfied that the land will be remediated before the land is used for that purpose.

Other provisions require that a consent authority must consider a report, to be prepared in accordance with the contaminated land planning guidelines, of a preliminary investigation that would involve a change use of land in an investigation area or a known are of potential contamination and land for a range of sensitive uses residential, childcare, hospital, etc.

Contaminated land issues at the site are being managed in accordance with SEPP 55. A Preliminary and Phase 2 Contamination Assessment have been undertaken and a remedial action plan (RAP) has been prepared.

The RAP has been reviewed by an auditor, and it is proposed to undertake supplementary contamination assessment works (targeting areas not previously accessible - such as under former buildings) and revise the RAP prior to remediation and validation works at the site. The revised RAP would be provided to Council prior to commencement of remediation works. All reports and works will be audited by an EPA accredited site auditor.

#### Local Environmental Plans 4.3

SSLEP 114 is the principal local EPI which applies to the former hospital site. The relevant aims of this plan cover Built Environment and Services. Part 3 of SSELP 114 contains the Special Provisions that are relevant to the proposed Water Re-use facility these are assessed in Table 2.

Relevant SSLEP No.114 Clauses	Comment on Proposed Development	
Clause 10. Floor Space Ratio	The proposed Water Re-use facility is contained within and adjacent to the redesigned Administration Building and will not generate increased Floor Space Ratio at the site.	
Clause 11. Height of Buildings	There is no height specified on the relevant SSLEP 114 map and the proposed Water Re-use facility does not result in an increase in height. Height issues have been separately assessed in the DA for the Administration Building (D/2012/835).	
Clause 12. Heritage items	The provisions of the SSLEP 114 in relation to the heritage items, Conservation Areas or the Heritage Streetscape are similar to that of SSLEP 1998 and have been assessed in Table 3.	
Clause 13. Development in the vicinity of a heritage item	The REF includes a Heritage Impact Statement (Refer to Appendix C) which concluded that the proposed works are in accordance with the Conservation Management Plan (CMP) prepared for the site (Refer to Section 5.2 of Appendix C).	
Clause 17. Tree Preservation Orders	Tree retention issues were assessed when Council granted approval to undertake the demolition of former hospital buildings (Refer to Appendix H). This proposal (D/2011/1022) involved the demolition of 14 buildings, partial internal demolition and rectification works of heritage-listed buildings, removal of 14 trees, removal of all hard surface materials and in-ground services (Refer to Appendix H).	
	The City undertook an arboricultural assessment of 40 trees located within the proposed works zone, which concluded that the majority of the trees are self-seeded, in poor condition/declining and/or are listed	
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#### TABLE 2: ASSESSMENT OF SSLEP NO.114 PART 3 - SPECIAL PROVISIONS

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	as exempt species from the City of Sydney's Tree Preservation Order.
	The plans indicate a total of 14 trees are proposed for removal within the site. However, after a further inspection, the City determined a total of 25 trees are recommended for removal (Refer to Appendix H).
	Fifteen (15) trees were noted in good, healthy condition. It is recommended that these trees are retained and protected during demolition and restoration works within this site. These trees require appropriate tree protection measures (setbacks) which are contained in Section 8. The City also recommended a number of trees be removed from the site (Refer to Appendix H).
	A plan of the surveyed trees (Earthscape Horticultural Services) on the site is provided in Appendix H which shows trees to be removed and those which are to be protected, as well as a report on tree protection fencing and confirmation on the removal of Tree 37.
Clause 19. Subdivision	The proposed Water Re-use facility does not involve the subdivision of land. A future subdivision DA will be lodged for proposed residential developments on Site 13 (City West and Site 13 A) when respective DAs are lodged for these projects.
Clause 26. Development of all Land to which This Plan Applies	The proposed Water Re-use facility will be provided with sufficient water, sewerage and the drainage services. These service connections form part of the proposed Water Re-use facility.
Clause 27. Flood liable land	Based on the Cardno report (Refer to Appendix D) the following response is provided:
	Subclause a. The subject site is located adjacent to Joynton Avenue which is a significant overland flowpath during storm events but determination of the floodway extent has not been determined. The Alexandra Culvert Catchment Flood Study identifies high hazard conditions in Joynton Avenue. However, a floodway is not expected to be located on the subject site itself, so this condition is not expected to apply.
	Subclause b(1). The proposed works are not expected to adversely impede flood flows. However, for Case B (in comments for Clause 27KH) flowpaths are opened which may adversely impact downstream.
	Subclause b(ii). Refer to previous responses for Clause 27KH, Subclauses 1b and 1d.
	Subclause b(iii). The subject site is located in a highly developed area and would not be expected to have an adverse impact on erosion or siltation. Erosion and sediment control should be implemented adequately during construction in accordance with Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book).
	Subclause b(iv). Effects on the water table have not been reviewed as part of this assessment.
Clause 28. Contaminated land	Douglas Partners has provided the following response to this clause: (1) Site contamination studies have been carried out, and are provided in the following reports:
	<ul> <li>Douglas Partners (DP), Report on Phase 1 Preliminary Contamination Assessment, Royal South Sydney Community Health Complex, Joynton Avenue, Zetland (Ref: 27769, December 1998)</li> </ul>
	<ul> <li>Golder Associates Pty Ltd, Report on Preliminary Assessment Geotechnical Constraints and Potential Site Contamination Royal South Sydney Hospital Site Joynton (Ref: 00623118/007, July 2000)</li> </ul>
	<ul> <li>DP, Report on Phase 2 Contamination Assessment, 3 Joynton Avenue, Zetland (Ref: 44621, November 2007)</li> </ul>
	<ul> <li>DP, Report on Remediation Action Plan, 3 Joynton Avenue, Zetland (Ref: 44621, November 2007)</li> </ul>
	<ul> <li>DP, Report on Remediation Action Plan, Proposed Royal South Sydney Hospital Redevelopment, 3 Joynton Avenue, Zetland (Ref: 44621.02, October 2011).</li> </ul>
	Mitigation measures are provided in Section 8.

#### South Sydney Local Environmental Plan 1998

Most of the planning provisions within South Sydney LEP 1998 (SSLEP 1998) do not apply to the former hospital site. However SSLEP lists the former hospital site as a Heritage item (tem 554A), which includes the following buildings:

- Administration Building, Queen-Anne-style building, 1913, with later alterations and additions;
- Pathology Building, single-storey building to Joynton Avenue, 1913;
- Outpatients Building, single-storey inter-war Georgian Revival-style building, c. 1935;
- Nurses' Home (eastern wing), three-storey inter-war Georgian Revival-style building, c. 1938;
- Brick and sandstone boundary fence to Joynton Avenue, 1913; and
- Landscaped area fronting Joynton Avenue between the Nurses' Home and the Pathology Building, including the significant trees and open landscaped areas around the buildings.

In this regard, specific heritage clauses within SSLEP 1998 apply to the former hospital site (Item 554A) as presented below in Clause 2(3):

To the extent that clauses 22-27, definitions in Schedule 1 of terms used in those clauses and entries in Schedule 2, 2A or 2B relate to land subject to South Sydney LEP No 114 (Southern Industrial and Rosebery/Zetland Planning Districts), this plan also applies to that land, despite subclauses (1) and (2).

The relevant clauses 22-27 of SSLEP 1998 are assessed in Table 3 based on information provided by City Plan Heritage and are based on the assessment undertaken in the Heritage Impact Statement (Refer to Appendix C) prepared in support of this REF.

#### TABLE 3: ASSESSMENT OF SSLEP 1998 HERITAGE SPECIAL

Relevant SSLEP 1998 Heritage Special Clauses	Comment on Proposed Development
Clause 22. Heritage aims	<ul> <li>The proposed adaptive re-use design is part of a staged redevelopment process for the former Royal South Sydney Hospital site and is a positive outcome due to the site's long-term vacancy and condition. The building has been subject to demolition and rectification works necessary for the conservation and maintenance of the heritage buildings within the site. The buildings suffered from extensive contamination and damage throughout all levels.</li> </ul>
	<ul> <li>The recent remediation works removed all contaminated partitions, floors and some internal walls in a controlled and extensively studied form with consideration to the building's future adaptive re-use as a Trigen and Water Re-use facility.</li> </ul>
	The eastern side of Joynton Avenue between 130 Joynton Avenue and Epsom Road corner is part of the Joynton Avenue Heritage Streetscape (HS7). The streetscape is opposite the former hospital site and as noted in the inventory form 1 reflects the development of the automotive industry in NSW in the 1950s and the importance of the precinct as an industrial centre in the mid-20th century. The streetscape of the 130-158 Joynton Avenue Group is noted as having the ability to interpret the development of the precinct despite it has lost much of its visual evidence with the redevelopment of the BMC Victoria Park plant. The proposed design of the former Hospital building will have no impact on the identified significance of the Joynton Avenue Heritage Streetscape rather it will complement its industrial warehouse streetscape includes a fine group of postwar international-style industrial buildings, designed by distinguished industrial architect and engineer Francis E. Feledy in the mid 1950s. Due to their consistent scale, finishes, detailing and form, the buildings and their landscaped settings make a positive contribution to the streetscape". This setting will not be affected by the proposed development.

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- Extent of fabric removal has been guided by the condition of the fabric and the damage sustained by the contamination or vandalism as well as the significance ranking in association with the CMP. The internal wall removals have been further exhaustively studied by the consultant team including the author who was also the principal author of the CMP, the City's Strategic Project Manager, the architects, and the structural engineers in order to minimise extent of significant fabric removal. Consultation with the City's Heritage and Urban Design Manager and the area's Heritage Officer has also been made. The current design also considers the recommendations of the City of Sydney Design Advisory Panel.
- An ongoing archival recording of the building has been carried out by the author during and following removal of contaminated debris from the interiors and prior to the demolition works commenced. After completion of demolition works a final archival recording will also be done by the author.
- The proposed use is consistent with the future development scenarios and visions for the Green Square Town Centre and in particular the role that has been envisaged for the former Royal South Sydney Hospital site. The former use of the site as a health facility is no longer a feasible option and the new use will suit the overall dominant character and its original role of the Administration Building as a core of the hospital. It will continue to be the core of the new operations that would occur within the site and it will continue to serve the local community in a different way. In that, the future use of the building as a Trigen and Water Re-use facility could be seen as protection of the community's health. The proposed use of the building will attract significant public and stakeholders interest and set an exemplar for such Green Infrastructure that has been sensitively inserted in a significant heritage building in a most contemporary but sympathetic manner. The design of the addition together with the treatment of the existing openings has the potential to create a 'state-of-the-art' example of modern architecture without diminishing the building's and the site's historical and aesthetic values.
- The proposed design is suitable in terms of its form, overall scale and transparent material that provides an opportunity to create a sculpture-like artwork and maintain the dominance of the Administration Building within its future urban context, in particular, those future mixed use residential and commercial developments within the former hospital site. The chosen anodised aluminium blade material which matches an oxidised copper finish will complement the face brick finish of the Administration Building.
- Treatments of existing openings have been sensitively considered in relation to the significant aspects of the building while a balance had to be maintained for the acoustic requirements of its future use. The windows to the original front eastern portion of the building on the ground floor level and on the front facade have been retained in their existing condition. As noted previously, the remainder of the openings will either be bricked-in with the recycled bricks from the site, dressed with acoustic glazing from inside or from different way. In that, the future use of the building as a Trigen and Water Re-use facility could be seen as protection of the community's health. The proposed use of the building will attract significant public and stakeholders interest and set an exemplar for such Green Infrastructure that has been sensitively inserted in a significant heritage building in a most contemporary but sympathetic manner. The design of the addition together with the treatment of the existing openings has the potential to create a 'state-of-the-art' example of modern architecture without diminishing the building's and the site's historical and aesthetic values.
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Building.

- In addition, the most significant aspect of the proposal is the reinstatement of the original arched opening to the main entrance of the Administration Building. This will bring the building's original façade somehow into the memories of those local community members who were familiar with the building's configuration in the 1950s.
- The proposed design provides for the recovery of the original setting of the retained significant hospital buildings by maintaining the original curtilage around the building in reflection its original E-shape layout with former female and male wards that once stood along northern and southern sides. JJ Collins Ward, demolished as part of the recent remediation works, was one of them.
- Necessary conservation works and treatments will be undertaken as part of the current and future approvals to ensure the Administration Building and the remaining buildings are protected and appropriately managed for long-term preservation.
- This Heritage Impact Statement assesses the proposed works in order to assist the City in its assessment of the works. The CMP acknowledges the necessity for the retained buildings adaptive reuses for the retention and protection of the heritage significance of the former Royal South Sydney Hospital site, which would otherwise continue to be comprised.
- As noted earlier, the proposed adaptive re-use of the Administration Building will reinstate public access through the proposed Matron Ruby Grant Park and allow for the interpretive displays of its heritage significance within the main entrance lobby of the Administration Building. The future detailed design of the building and the site will investigate the possibilities to integrate further interpretive displays of the site's heritage significance.
- The eastern side of Joynton Avenue between 130 Joynton Avenue and Epsom Road corner is part of the Joynton Avenue Heritage Streetscape (HS7). The streetscape is opposite the former hospital site and as noted in the inventory form1 reflects the development of the automotive industry in NSW in the 1950s and the importance of the precinct as an industrial centre in the mid twentieth century. The Streetscape of the 130-158 Joynton Avenue Group is noted as having the ability to interpret the development of the precinct despite it has lost much of its visual evidence with the redevelopment of the BMC Victoria Park plant. The proposed design of the former Hospital building will have no impact on the identified significance of the Joynton Avenue Heritage Streetscape rather it will complement its industrial warehouse streetscape values noted in its Statement of Significance - "The streetscape includes a fine group of post war international style industrial buildings, designed by distinguished industrial architect and engineer Francis E. Feledy in the mid 1950s. Due to their consistent scale, finishes, detailing and form, the buildings and their landscaped settings make a positive contribution to the streetscape". This setting will no not be affected by the proposed development.

Not relevant to the proposed development

• Aboriginal heritage significance of the site has been assessed in the CMP and concluded that it is unclear if the site have some potential for any remains of Aboriginal heritage within the site as the site

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Clause 23A. Protection of heritage conservation areas and heritage streetscapes

Clause 23B. Buildings older than fifty years

Clause 24. Development in the vicinity of heritage items, heritage conservation areas, heritage streetscape areas, archaeological sites or potential archaeological sites

Clause 25. Heritage advertisements

Clause 26. Heritage conservation incentives

Clause 27. Development of a site or place of potential or known archaeological

significance

was located close to Waterloo Swamp and Waterloo Dam. Notwithstanding, the site has a long history of sequence of development and the sub-floor soil of the building and its immediate curtilage had to be cleared due to significant contamination. No remnants that could be considered Aboriginal relics were seen within the cleared areas of the site.

• The archaeological assessment contained in the CMP concluded that the site has some archaeological potential generally relating to the first phase of construction,

c. 1913. The underground archaeology would relate to the foundations and possibly demolition debris of ancillary buildings and structures associated with the first phase of the construction of the former hospital and with the third phase of expansion. These include former laundry, morgue, recreation room and laboratory buildings; however, they have not been considered to be substantial remains or relics that would provide information on the construction system of such structures. The original laundry was located to the west of the Administration Building; however, during the demolition of the store and maintenance building no foundations could be observed. The current proposal incorporates interpretation of the footprint of the 1913 laundry building within the public domain curtilage and landscape for the building.

#### South Sydney LEP 1998 – Amendment No.17 Green Square Town Centre

SSLEP 1998 Amendment No.17 Green Square Town Centre (Amendment No.17) applies to the Town Centre and also to the former hospital site. The two applicable zones include Zone No.11 (a) Green Square Town Centre Zone and Zone No 11 (b) Green Square Town Centre Public Domain Zone.

The former hospital site is zoned part Zone No.11(a) and part Zone 11(b). Zone 11(a) aims to "...to accommodate a vibrant residential, commercial, retail and cultural heart of Green Square". The scale and character of the Town Centre is supported by Zone No.11(b), which promotes high-level public amenity through a circulation grid for vehicles and pedestrians, and a network of open spaces for active and passive recreation". Uses permitted with consent in the 11(a) zone include 'Commercial development, residential development and retail development (each within the meaning of Division 2A of Part 4).'

However, these zones are classified as 'Deferred Matter' on the Amendment No.17 Map and their provisions including the land use table are not applicable to the proposed development.

The proposed Water Re-use facility is generally consistent with the key planning provisions of Amendment No.17 which are assessed below in Table 4.

Relevant SSLEP 1998 Heritage Special Clauses	Comment on Proposed Development	
Clause 27. KE Architectural design standards	<ul> <li>The Queen-Anne-style architecture of the Adı Building represented a high aesthetic quality numerous additions to the building have aesthetic quality of the building.</li> </ul>	ninistration However, eroded the
	<ul> <li>Modifications have been made to the laccommodate future plant inside the build modifications have extended more vertic horizontally, with only a slight increase to building footprint on the northern side. This was favoured as it allowed the option to create around the building and retain the original building scale to consistent with the original hospital plan. benefit is that it provides a building scale to commensurate with future residential buildings that will be placed on Site 13 and broader Town Centre area. The design will building to emerge a landmark that is situated corridor and node point in the immediate local</li> </ul>	building to ding. These cally than the existing is approach a curtilage uilding form The other hat will be apartment within the l allow the on a visual ity.
	<ul> <li>The preferred design option provides a flush s top of the existing roof in order to establish form in what would become a busy future cont</li> </ul>	tructure on a clarity of ext.
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#### TABLE 4: ASSESSMENT OF RELEVANT AMENDMENT NO.17 CLAUSES

Clause 27 KH. Floodwater management.

Clause (1) The Council must not consent to development on land within the Green Square Town Centre unless it is satisfied that the development:

(a) will not adversely affect flood behaviour,

including:

(i) the flood peak at any point upstream or downstream of 'the proposed development, and

(ii) the flow of floodwater on adjoining lands, and

(b) will not significantly increase any flood hazard or the likelihood of flood damage to any property, and

(c) will not restrict the capacity of any floodway, and

(d) will not increase the risk to the lives or personal safety of members of the public or emergency services and rescue personnel, and

(e) incorporates any freeboard levels and other flood proofing measures adopted by the Council in any relevant floodplain risk management policy

- The architectural approach was based on shielding the plant structures from nearby residential buildings that will contain balconies overlooking the Administration Building.
- To comply with technical operating requirements and allow the required ventilation of 80 per cent open area. It was decided to provide vertical blades which also provide an appropriate level of screening of the plant material. The proposed scallop metal curtain has a drape-like quality which allows an opening and closing effect which is created by the deep blades while one is moving around the building.
- The proposed design was presented to the Design Advisory Panel in March 2012, which raised the following issues:
- The need for the structure to contain materials which are not affected by corrosive atmospheric conditions generated from the Botany Bay environment.
- The need for further detailed design development of the blade layout and its appearance.
- The option for a 'shadow gap' with the rooftop addition is preferred over a setback solution.
- The close-up and faraway views must also be considered with the detailed design to allow possible viewing of the trigeneration engines through large openings.

Based on the Cardno report (Refer to Appendix D) the following responses are provided:

(a) The proposed works would not be expected to adversely affect flood behaviour.

(b) Machinery for the utilities in the buildings would be constructed on plinths (or flood proofed) to above the 1% AEP plus 0.5m freeboard and PMF peak flood levels. The AWCS and GIC facilities would thus be able to continue operation during a flood event.

(c) The proposed works would not be expected to restrict the capacity of any floodway.

(d) As described in the Response to (b), the utilities are designed to continue operation in a flood event. The small number of personnel on-site could use these elevated plinths as safe refuge.

(e) Machinery plinth levels (or floodproofing) in the proposed buildings are proposed to be above the 1% AEP plus 0.5m freeboard and PMF peak flood levels. The buildings would be floodproofed below this level.

Clause 2 - Subject site is not situated in the specified location.

Clause 3 - Clause 38 has not been reviewed.

Clause 4 – Noted.

The Heritage Impact Statement (Refer to Appendix C) concluded that the works to the Administration Building which will house the Water Re-use facility is consistent with the relevant heritage objectives of Amendment 17 and will not impact on the cultural heritage significance of the Administration Building. The proposed Water Re-use facility provides a viable re-use of a former hospital building which has been vacant for 20 years.

Amendment No.17 also lists the Royal South Sydney Hospital Group (Item 554A), including those items listed under SSLEP 1998 as heritage items.

#### 4.3.1 Draft City of Sydney LEP 2011

The draft LEP applies to most of the City of Sydney LGA and is the principal EPI that applies to planning and development in the LGA. The draft LEP has been exhibited in accordance with the EP&A Act in 2010 and is currently being finalised. The Draft City of Sydney LEP

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2011 does not apply to the Town Centre area which is covered by the City of Sydney PSO 1971 and SSLEP No.114.

Nevertheless, the REF has considered the key planning provisions within the Draft LEP which include:

- Clause 5.9 Preservation of trees or vegetation;
- Clause 5.10 Heritage conservation;
- Clause 5.12 Infrastructure development and use of existing buildings of the Crown;
- Clause 6.12 Community uses at Green Square;
- Clause 7.16 Acid sulfate soils; and
- Clause 7.17 Flood planning.

The REF has been based on a number of key technical studies (Refer to Appendices C, D, E and F) which have addressed the above clauses where relevant.

#### 4.4 Ecologically sustainable development

Council is committed to ensuring that this project is implemented in a manner that is consistent with the principles of Ecologically Sustainable Development (ESD) outlined in Section 6(2) of the NSW Protection of the Environment Administration Act 1991 and Schedule 2 of the Regulations.

The principles of ESD have been adopted by the City of Sydney throughout the design development and assessment of the proposed Water Re-use facility through the implementation of Sustainable Sydney 2030.

The Water Re-use facility project is a sustainability initiative to provide for better water re-use and management for the Town Centre. The facility will allow future residential and commercial uses to rely less on the public water supply and allow for better management of water during periods of excessive drought.

ESD principles are assessed in Section 6 and Section 8 provides the mitigation measures to ensure ESD principles are incorporated during the detailed design and construction phase of the project.

#### 4.5 Other relevant legislation

Table 5 provides a list of other relevant legislation that has been considered in relation to the proposal.

NSW Legislation	Relevance to proposed Water Re-use facility
Contaminated Land Management Act 1997 (NSW)	The Douglas Partners report (Refer to Appendix E) identifies that the following site contamination studies have been completed.
	<ul> <li>Douglas Partners (DP), Report on Phase 1 Preliminary Contamination Assessment, Royal South Sydney Community Health Complex, Joynton Avenue, Zetland (Ref: 27769, December 1998)</li> </ul>
	<ul> <li>Golder Associates Pty Ltd, Report on Preliminary Assessment Geotechnical Constraints and Potential Site Contamination Royal South Sydney Hospital Site Joynton (Ref: 00623118/007, July 2000)</li> </ul>
	<ul> <li>DP, Report on Phase 2 Contamination Assessment, 3 Joynton Avenue, Zetland (Ref: 44621, November 2007)</li> </ul>
	<ul> <li>DP, Report on Remediation Action Plan, 3 Joynton Avenue, Zetland (Ref: 44621, November 2007)</li> </ul>
	<ul> <li>DP, Report on Remediation Action Plan, Proposed Royal South Sydney Hospital Redevelopment, 3 Joynton Avenue, Zetland (Ref:</li> </ul>
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#### TABLE 5: SUMMARY OF OTHER LEGISLATIVE REQUIREMENTS

44621.02, October 2011).

Douglas Partners also concluded the following (Refer to Appendix E):

Based on the available site history, site observations and previous contamination assessment reports it is considered that the proposed contaminated land management methods to be implemented during redevelopment of the Site are suitable.

It is considered that the main contaminant of concern at the Site is asbestos, although based on the site history and contamination results from other areas of the former hospital site, the Site may also be impacted by chemical contaminants including, but not limited to, Total petroleum Hydrocarbons (TPH) and Poly cyclic hydrocarbons (PAH) and heavy metals.

The scope of the proposed investigation aims to identify whether there is, as yet, unidentified contamination requiring remediation. Any as yet unidentified issues under the buildings at the subject site are expected to be broadly similar to issues in other areas of the former hospital site, and are foreseen to be readily manageable with low-technology remediation methods (e.g. excavation or offsite disposal). Mitigation measures are provided in Section 8.

On this basis it is considered that the site can be rendered suitable for the proposed land use subject to appropriate further investigation, provision of a revised RAP and remediation and validation works.

The land is not the subject of any declaration under the Contaminated Land Management Act 1997. If significant contamination is identified at the site, there is an obligation to notify the OEH under the requirements of the Act.

The site is not Crown land and therefore does not require a lease or licence under this Act.

The Administration Building is not listed on the State Heritage register but is listed in South Sydney LEP 1998 and SSLEP 114. No approval is required under the NSW Heritage Act 1977.

The proposal is unlikely to disturb any Aboriginal objects of listed threatened species. Therefore a permit under this Act is not required.

The proposed site is not affected by any native title holders or claimants. Therefore the provisions of this Act do not apply.

Construction of the proposed Water Re-use facility is not a scheduled activity under the POEO Act. The proposal is not considered likely to cause water pollution. Therefore an environment protection licence under this Act is not required. Part 5 provides a Duty to notify the OEH in the event of a pollution incident occurring.

Roads Act 1993 (NSW) Section 138 requires consent from the road authority for carrying out various activities on public roads.

The proposal will not affect any public roads within the meaning of Section 138 and therefore consent from the road authority is not required.

This act applies to the proposed facility and approval is required for an off-take structure or "in-channel asset" from Sydney Water Corporation to connect to the Water Re-use facility.

The site does not contain suitable habitat for any listed threatened species or community. Therefore an approval under this Act is not required.

Council will carry out the proposed construction of the proposal in accordance with the objects of this Act. A site specific Waste Management Plan will be prepared.

The issue of all water access licences and approvals must be in accordance with the Water Management Act 2000 and any relevant rules of the Water Sharing Plan for the Greater Metropolitan Region Unregulated River Water Sources, which commenced on 1 July 2011.

It is anticipated that the water sharing plan will be amended in line with an Urban Stormwater Harvesting Policy that is currently

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Crown Lands Act 1987 (NSW)

Heritage Act 1977 (NSW)

National Parks and Wildlife Act1974 (NSW)

Native Title Act 1993 (Commonwealth)

Protection of the Environment Operations Act 1997 (PoEO Act) (NSW)

Roads Act 1993 (NSW)

Sydney Water Act 1994 (NSW)

Threatened Species Conservation Act 1995 (NSW)

Waste Avoidance and Resource Recovery Act 2001 (NSW)

Water Management Act 2000 / 2010 (NSW)

under development and that this will facilitate some urban stormwater harvesting proposals in the future; however, such an amendment has not yet occurred.

The Greater Metro Water Sharing Plan currently includes rules relating to the trade of existing water access licences, which allow for access licences to be traded within and between certain management zones and water sources. The proposed site is located in the Cooks River and Botany Bay Management Zone. The water sharing plan currently does not allow for any trading of water entitlements into this management zone , but does allow trading within the zone, including purchase of existing entitlements, subject to availability and assessment.

#### 4.5.1 Commonwealth Legislation

#### **Commonwealth Environment Protection & Biodiversity Conservation Act 1999**

The Commonwealth EP& BC Act requires Commonwealth assessment and referral to the Minister for a Proposal that is likely to have a significant impact on matters of National Environmental Significance (NES) or impacts on Commonwealth land.

The proposal will not impact on any matters of NES or on Commonwealth land. Therefore a referral to the Federal Minister for the Environment is not required.

#### 4.6 Other relevant policies

#### Sustainable Sydney 2030

In 2009, the City of Sydney released the Sustainable Sydney 2030 in response to the community's ideas for creating a better Sydney. In accordance with Sustainable Sydney 2030, the City is aiming to achieve a substantial reduction in greenhouse gas emissions and attain a more sustainable future with less waste, water and energy use.

In particular, Sustainable Sydney 2030 aims to generate 10 per cent of the city's water supply from within its own area with the development of "Green Transformers" to be located in the city area, such as the Green Square Town Centre.

In 2010, the City identified the former Royal South Sydney Hospital site at Joynton Avenue, Zetland, as a potential location for a Green Transformer (Green Infrastructure Centre), which is planned to include a Trigeneration facility, a Water Re-use facility and an AWCS.

The City of Sydney now proposes to redevelop the former hospital Administration Building to provide a location for a proposed Water Re-use facility to reduce water consumption consistent with Sustainable Sydney 2030 initiative.

#### 4.6.1 Development Control Plans

Two key DCP's apply to the site and the broader Town Centre area, which are assessed below.

#### South Sydney DCP 1997 Amendment Part H: Green Square Town Centre 2006

The proposed Water Re-use facility is consistent with the planning provisions contained in South Sydney DCP 1997 Amendment Part H: Green Square Town Centre 2006. In particular Section 7.4 Stormwater and Water Sensitive Urban Design Principles which aims to include WSUD principles into the design of the public domain.

The proposed Water Re-use facility is a key WSUD measure that will improve water resource management and increase water re-use in the Town Centre.

#### Green Square Town Centre DCP 2012

The proposed Water Re-use facility is consistent with the planning provisions contained in Green Square Town Centre DCP 2012, in particular the objectives contained in GSTC 3.4 Flooding and Stormwater Management.

A flooding and hydrology has been completed for the proposed GIC including the Administration Building which is provided as Appendix D. The report recommends mitigation measures to resolve potential flooding issues at the site. The proposed Water Re-use facility

is generally consistent with the following relevant DCP's provided below:

- City of Sydney Access DCP 2004;
- City of Sydney Contaminated Land DCP 2004;
- City of Sydney Heritage DCP 2006; and
- South Sydney DCP 1997: Urban Design.

The proposed Water Re-use facility will also be will be designed and operated in accordance with these DCPs.

Figure 4 - Key Steps in Determining the Planning Approval Process



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### **5** Consultation

This section summarises the consultation that has been adopted for the proposal, discusses the consultation that has been undertaken to date, and outlines the consultation that is proposed prior to determining the proposal and during construction (if determined). It covers includes consultation with the community, relevant government agencies and other stakeholders.

#### 5.1 Authorities

Throughout the preparation of this REF, the City of Sydney has held discussions with Sydney Water Corporation and the NSW Office of Water. Issues raised by both agencies have been incorporated in the design of the Water Re-use facility and the assessment undertaken in this REF.

#### 5.2 Community

Throughout the preparation of this REF and during 2012, the City has undertaken the following consultation activities to inform the community about the proposed GIC and Water Re-use facility.

These include:

- "2030 In Your Village" meeting held in March 2012 at the former Police Control Building (Portman Street, Zetland);
- Display of posters at the Tote Building advertising project update;
- Updates to the Green Square website on upcoming projects.

These community consultation tasks have allowed the Green Square community an opportunity to learn about the City's plans for the Town Centre and in particular, the proposed GIC at the former hospital site.

#### 5.3 Public Exhibition

Council proposes to undertake the following tasks as part of the public exhibition of the REF

- Public exhibition of the REF for a four (4) week period
- Public display at the Tote Building
- Placement of the REF on Council's Green Square website
- Placement of the REF at the Council's Principal Administration Centre.

The REF will also be provided to Sydney Water and the NSW Office of Water for comment.

Once the REF comes of public exhibition, Council staff will report on the submissions back to the Determining Authority (Council). This may require the inclusion of additional mitigation measures and/or the need for further environmental impact assessment to resolve issues raised by the community.

Council will notify all persons who made a submission during the public exhibition period on the outcome of Council's position.

#### 5.4 Construction

If the project is determined (approved), during the construction stage, the construction contractor will be required to prepare a consultation and stakeholder involvement plan. The plan will include the names and contact details of a nominated person for the receipt of all complaints. This plan will establish the communication protocols required to ensure a high level of community understanding regarding the construction delivery of the project.

This section provides an assessment of the key engineering, environmental and planning issues associated with the proposed Water Re-use facility.

This section includes chapters taken from the technical reports prepared in support of this REF. Minor changes have been made to these sections to ensure consistency with the REF.

#### 6.1 Hydrology and Flooding

The assessment of contamination issues has been taken from the Hydrology and Flooding Issues for proposed Green Infrastructure Centre report completed by Cardno for the Redesign of the Administration Building (D/2012/835).

#### 6.1.1 Existing Environment

The current floor level for the existing building proposed to house the Trigeneration Facility (Green Infrastructure Building) is advised as 19.11 m Australian Height Datum (AHD). The flood planning level is conservatively estimated as 19.49 m AHD. A raised platform above the PMF level for plant inside the building or internal barriers to exclude flow could be constructed to provide protection from inundation. The structural soundness of the existing building façade to flood inundation should be confirmed.

#### Existing Flood Extent

During a rainfall event, runoff is conveyed to the lowpoint in Joynton Avenue near the northern boundary of the site. Flows are conveyed in the underground drainage system as well as overland along Joynton Avenue, both from the north (O'Dea Avenue) and south (Epsom Road). The roadway serves as a defacto detention basin in which water ponds in Joynton Avenue, spilling overland to Portman Street in larger events or draining via the underground drainage network when capacity is available.

Flooding occurs regularly at Joynton Avenue. Recently in February 2012, ninemsn reported that a storm event on the preceding day resulted in twometre-high floodwaters on Joynton Avenue, trapping people in their cars. Previous storm events, such as in February 2010, have also resulted in significant inundation of Joynton Avenue.

Peak flood depths in the vicinity of the site based on the Alexandra Culvert Flood Study for the 1 per cent Annual Exceedance Probability (AEP) [alternatively referred to as the 100-year Average Recurrence Interval (ARI)] event are shown in Figure 1. Probable Maximum Flood (PMF) peak depths are shown in Figure 2 (Refer to Appendix D).

The deepest inundation occurs in Joynton Avenue near the northern boundary of the site, being around 1.7 m deep in a 1 per cent AEP event. Flood inundation of Portman Street is less significant. In a PMF event, flood depths of greater than 0.2 m occur on the roadways adjacent to the site, with a peak depth of around 2.5 m in the Joynton Avenue lowpoint.

Peak flood levels adjacent to the site are listed in Table 1(Refer to Appendix D) for the reference locations shown in Figure 3 (with the 1 per cent AEP extent) and in Figure 4 (with the PMF extent) which are both contained in Appendix D.

#### 6.1.2 Assessment

Machinery in the AWCS building would be constructed on plinths above the required flood level and utilities installed below would be flood proofed. The flood planning level for the AWCS building is conservatively estimated as 19.49 m AHD.

The potential changes to flood behaviour in the 1 per cent AEP and PMF events for the opening of Joynton Avenue to Portman Street have not been determined. Additional flood modeling and assessment would be required to define changes to flood extents and resultant water levels. However, the

application of flood levels from Joynton Avenue provides a conservative estimate for the purposes of the current DA.

During construction, typical measures will need to be applied to the site for erosion and sediment control. The existing ground levels (from ALS) on the proposed works site are generally above the 10 per cent AEP flood level in Joynton Avenue (being 18.45 m AHD), thus the works area may be affected by catchment flood events larger than 10 per cent AEP. Consideration should be given to mitigation measures to manage potential flood inundation of the site during the construction phase. This may involve the preparation of a flood emergency response plan that identifies a flood-free area for evacuation of personnel and potentially construction equipment.

#### 6.2 Traffic Access and Parking

#### 6.2.1 Existing Environment

The site has access and a long frontage to Portman Street which is a local road that connects to an un-signalised intersection at Bourke Street to the north and Hansard Street to the south. Portman Street also intersects with Merton Street midway along the street and Navis Lane closer to Bourke Street.

Portman Street has a wide road reservation (20 m) with footpaths on either side with two kerbside directional parking lanes, which are close to full capacity on weekdays but less so on weekends.

Portman Street has a "dog leg" midway along the street with a centre-line marking as well as a number of speed humps to control traffic speeds on the approach to the "dog leg".

Traffic that uses Portman Street includes local residential traffic, through traffic and industrial traffic accessing the factories in the street. There is also minor use of the street for bike and pedestrian movements. The northern end of Portman Street has a three-tonne load limit.

#### 6.2.2 Assessment

The proposed Water Re-use facility will not generate significant operational traffic movements as it contains no permanent staff, other than maintenance staff that will service the site on an occasional basis.

Maintenance parking for all GIC uses will be provided as part of the DA for the re-use of the Community Buildings which will allocate spaces for service vehicles next to the Administration Building site.

Construction traffic issues would be assessed as part of the preparation of the Construction Traffic Management Plan.

The proposed upgrade to Site 13 from Portman Street will provide for all future service access to the Green Infrastructure Centre. This upgraded access point which forms part of the DA for the Modifications to the Administration Building (Refer to D/2012/835) will provide a safe and accessible entry/exit for service vehicles entering that will need to access the Water Re-use site. Issues associated with this access point have been assessed in D/2012/835, which was lodged with Council in early June 2012.

There is the potential for construction traffic impacts due to heavy vehicles accessing the site from local residential streets (Hansard Street/Portman Street). This may cause a temporary increase in noise and air impacts and also from the idling of trucks. There is also the potential for illegal parking and impacts to traffic access and safety. To a lesser extent, there is a slightly increased potential for pedestrian / bike accidents during the construction stage due to increase number of vehicles accessing the site.

These issues will be further addressed in a proposed Construction Traffic Management Plan (CTMP) which will propose measures to minimise construction traffic issues. These may include nominated access points to the site and construction access routes that avoid sensitive residential areas (north end of Portman Street). Other measures may include on-site parking for construction vehicles and signage to manage traffic

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#### movements.

There is no operational mitigation measures associated with the proposed Water Re-use facility. Operational traffic issues for the proposed trigeneration facility and AWCS will be separately assessed. However each facility is unlikely to generate significant operational traffic movements.

#### 6.3 Contamination

Douglas Partners has undertaken a Review of Contamination Issues for the site which concluded the following (Refer to Appendix E):

#### 6.3.1 Existing Environment

#### Site Condition and Surrounding Land Use

Inspections of the Site and surrounding land were undertaken in 2007 and 2011. The former hospital site was located within a commercial / industrial area of Zetland, on the western side of Joynton Avenue. A Mercedes Benz car dealership was located to the north of the former hospital site.

Industrial properties were located beyond Hansard Avenue to the south, while some residential properties were located along Hansard Avenue. Waverly Council depot was located to the west of the site beyond Portman Street. City of Sydney Council Works Depot was located to the east of the site in 2007, beyond Joynton Avenue. At the time of the inspection in 2007, the former hospital site was occupied by buildings of various ages surrounded by bituminous concrete and concrete pavements mainly associated with car parking. Some landscaped areas were present across the Site.

In 2007 the older section of the Esme Cahill building located at the southern end of the former hospital site (i.e. south of the Site) was occupied by residents and businesses. This included Health at Green Square, Lady Gowrie Centre, Folbade Pty Ltd and John Cameron Constructions. The buildings at the northern end of the former hospital site (i.e. north of the Site) were also in use. A former day care centre located on Joynton Avenue was used as a community hall. Based on DP's inspection in 2011 the Esme Cahill building and the community hall are still being used.

The central portion of the former hospital site, containing the Site is surrounded by a 3 m high chain link fence, and all buildings within the area were vacant. Access is restricted due to the presence of potential asbestos containing materials (ACM), which it is understood are currently in the process of being removed.

The area of the Site includes the Administration Building, former Laundry Building (also previously used for maintenance and biohazard waste storage) and a small section of the former J.J. Collins Ward. Around the buildings was a mixture of soft landscaping and hardstand. It is understood that demolition works are currently underway in accordance with a development consent obtained for the works in 2011. The demolition works at the former hospital site are being undertaken by DECC Contractors and are expected to be completed by the end of 2012. Demolition works at the Site comprise demolition of all buildings except for the Administration Building. Hazardous building materials will be removed from the Administration Building as part of the demolition works.

#### Geology and Hydrogeology

Reference to the Sydney 1:100 000 Geological Series map indicates that the site is underlain by Quaternary alluvium, comprising fine to medium grained marine sand with podsols. Field observations from previous investigations confirmed the presence of sand and silty sand extended to a depth of at least 3 m below ground level (bgl). A summary of the conditions encountered is provided below:

- FILL: Fill was encountered in most of the bores to depths of between 0.2 m and 3 m bgl. However, sampling locations Borehole (BH) 2, BH8 and BH15 were discontinued in fill at 3.5 m bgl; BH1 and BH16 were discontinued in fill at 0.5 m bgl, while BH19 was discontinued in fill at 0.2 m bgl.
- SAND: Subsurface conditions encountered in the bores comprised largely loosely compacted sands, and some silty sands.
- PEATY LAYERS: Sandy peat layers overlying sand were encountered in sampling locations BH4, BH9, BH11, BH17, BH18 and BH24.

The site was observed to be generally flat with a slight westerly down gradient. Groundwater was observed between 3.4 m and 4 m bgl (or 18.5 – 19.8 m above mean sea level, AHD). Groundwater flow is inferred to be to the south towards Eastlakes Mill Pond and Botany Bay.

Surface water is expected to flow into the local stormwater system. The nearest surface water feature to the site is Alexandra Culvert, located approximately 1.5 km west of the site. Alexandra Culvert is a tributary of the Cooks River which is subject to tidal influence from Botany Bay.

It is noted that the northern portion of the former hospital site has historically been subject to significant flooding. The neighbouring site to the north is topographically higher than the site. No records of flooding exist for the southern portion of the former hospital site. A review of the Botany Bay Groundwater Management Zones map on 3 May 2012 indicated that the site is located in Zone 2 of the management area. Zone 2 indicates that domestic groundwater use is banned. The four management zones are based upon information obtained by the NSW Government in regard to contamination in the Botany area.

#### 6.3.2 Assessment

#### Contamination Issues at the Site

Previous borehole logs are provided in Appendix B and summaries of laboratory results are provided in Appendix C of this REF.

The buildings at/ formerly at the Site include the administration building, the old kitchen, offices, part of the J.J. Collins Building, and the former laundry, which has also previously been used as a maintenance building and biohazard waste store. Testing has not been undertaken underneath any of these previous buildings, and it is considered that some of the previous uses present an elevated risk of contamination. In general the filling at the Site appears to be relatively shallow, as summarised in Table 4 (Refer to Appendix E).

All chemical contaminants tested at the Site were within the SAC 3 (the relevant thresholds for the commercial/ industrial landuse), taking into account statistical analysis. One TPH C10-C36 result at the site was 1,080 mg/kg compared to the Soil Assessment Criteria (SAC) for sensitive sites (applicable to all site uses) of 1,000 milligrams / kilogram (mg/kg), however the 95% Upper confidence limit of data set (UCL) average for TPH C10-C36 over the former hospital site was however within the SAC 3, indicating that the detected contamination is not statistically significant and does not warrant remediation.

Asbestos contamination has been observed in the sub-floor area of the Administration Building. Two of the previous three groundwater wells were located at the Site. All groundwater samples from the former hospital site were considered to be within the groundwater investigation levels (GIL) and/ or expected background levels.

Groundwater contamination is therefore not considered to be an issue of

concern. On this basis the known issue of contamination concern at the Site is considered to be asbestos.

However, further testing for other potential contaminants of concern, particularly heavy metals, PAH and total petroleum hydrocarbon (TPH), is required to confirm that they are not present at unacceptable levels beneath buildings at the Site.

#### Conclusions

Based on the available site history, site observations and previous contamination assessment reports it is considered that the proposed contaminated land management methods to be implemented during redevelopment of the Site are suitable.

It is considered that the main contaminant of concern at the Site is asbestos, although based on the site history and contamination results from other areas of the former hospital site, the Site may also be impacted by chemical contaminants including, but not limited to, TPH, PAH and heavy metals.

The scope of the proposed investigation aims to identify whether there is, as yet, unidentified contamination requiring remediation. Any as yet unidentified issues under the buildings at the subject site are expected to be broadly similar to issues in other areas of the former hospital site, and are foreseen to be readily manageable with low-technology remediation methods (e.g. excavation or offsite disposal).

On this basis it is considered that the site can be rendered suitable for the proposed land use subject to appropriate further investigation, provision of a revised RAP and remediation and validation works.

#### 6.4 Aboriginal Heritage

The assessment of Aboriginal heritage issues has been taken from the Heritage Impact Statement completed by City Plan Heritage for the Redesign of the Administration Building (D/2012/835), which concluded the following:

Aboriginal heritage significance of the site has been assessed in the CMP and concluded that it is unclear if the site have some potential for any remains of Aboriginal heritage within the site as the site was located close to Waterloo Swamp and Waterloo Dam. Notwithstanding, the site has a long history of sequence of development and the sub-floor soil of the Building and its immediate curtilage had to be cleared due to significant contamination. No remnants that could be considered Aboriginal relics were seen within the cleared areas of the site.

#### 6.5 European Heritage

The assessment of European heritage issues has been taken from the Heritage Impact Statement completed by City Plan Heritage for the Redesign of the Administration Building (D/2012/835).

#### 6.5.1 Existing Environment

Bounded by Joynton Avenue to the east, Ford dealership to the north, Portman Street to west and the former Nurses' Quarters site to the south, the 'Hospital Precinct' consists of buildings which date from the earliest development phase of the site. The buildings within this precinct included the JJ Collins Ward (now demolished), Administration Building, Outpatients Building, Joynton Smith Building (now demolished), Naomi Wing Rehabilitation Centre, Neurological Building (now demolished), Pathology Building, and Morgue, Maintenance Building and Orthotics Building (all now demolished) along with the main car park accessed from Joynton Avenue. The remaining buildings are essentially the significant buildings within the former hospital site, except for JJ Collins Ward, which sustained significant contamination and damage and could not be salvaged.

The Administration building forms the hub of the site with its dominant three to four storey height. It was completed in 1913 and originally constructed in the Queen Anne Style with single storey portion at the front and a two-storey section at the rear. The building has been heavily modified and no longer resembles its original form. It has a gabled roof and face brick exterior. The main east façade of the building has been heavily altered with additional floors and a new main entrance. The additions of floors attempted to retain the character of the building but the changes to the entrance in 1963 are intrusive with the complete eradication of the impressive arched entrance. As part of the current remediation works the wings attached to the building will be demolished and the building will be a freestanding structure with approximately 15 metres curtilage around its rear portion.

Internally, prior to the current remediation works, the building featured a heavily altered layout and was (still is) closed off to public access and out of use. The internal spaces are configured in a T-shape with main hallways running along the north-south and the east-west axis. The east-west hall runs from the original entrance to the rear of the building with various rooms off either side. Some of these rooms are original spaces but many of them have been converted and adapted. The rooms were vandalised by graffiti and fragments of fabric including hazardous building material scattered throughout the floors on all levels along with littered paint cans. In places, the ceiling panels were missing with hanging cables and debris of fabric fallen on the floor. Sections of ceiling were also broken in various rooms, with the pieces lying on the floor. The east west hallway had suffered degradation with missing tiles and removed floorboards leaving the sub-floor crudely exposed with electrical cabling. Fragments of plaster were also fallen off the ceiling.

The recent remediation works has removed all contaminated fabric and later partitions and ceilings thus leaving a shell ready to accommodate the changes for the proposed adaptive reuse of the building. Some of the internal walls will also be demolished as part of the current remediation works in accordance with structural engineers' recommendations. In general, the front original portion of the building will be largely retained in its current configuration on both ground and first floors while the top floor will be a shell to accommodate the new Green Transformer use. The rear portion of the building will largely be of three-storey shell to allow for the installation of the future Trigeneration Facility equipment. The following images provide information on the future and current condition of the building.

#### 6.5.2 Assessment

In summary, the proposed design is part of a staged redevelopment process for the former Royal South Sydney Hospital site and is a positive outcome due to the site's long term vacancy for more than a decade and hazardous condition. The building has been subject to demolition and rectification works that were necessary for the conservation and maintenance of the heritage buildings within the site. The buildings suffered from extensive contamination and damage throughout all levels. The recent remediation works removed all contaminated partitions, floors and some internal walls in a controlled and extensively studied form with consideration to the building's future adaptive re-use as a Trigeneration and Water Re-use facility.

The proposed design is the result of extensive consultation between the architects, the City of Sydney project team including planning and heritage officers, and the author. It is based firstly on the heritage significance of the Administration Building, its condition, future development within the site and the sequence of development phases and forms of the building. The current design, which extends flush above the building's footprint provides a sympathetic and proportioned rooftop addition. The design respects the building's robust and repetitive fenestration and adds to its visual character in a positive manner while providing a new use that would allow for appreciation

of its significant values and role as the core building of the former hospital. The building originally was built in Federation Queen-Anne style with a high aesthetic quality and was added to vertically in a similar way to the current design, two additional storeys directly over the original ground floor level. Therefore, the current form of the vertical extension in a flush rooftop separated from the original base building by a "shadow gap" is considered a continuation of the previous 1930s-50s layers of additions to the building.

The adaptive re-use of the building provides an opportunity for the interpretation of the site's long occupational history as a hospital and its importance for the community. The works will also provide an opportunity for the conservation of the building through maintenance and repair, and through reinstatement of original front arched entry detailing. The proposed design is suitable in terms of its form, overall scale and transparent material that provides an opportunity to create a sculpture like artwork and maintain the dominance of the Administration Building within its future urban context, in particular, those future mixed use residential and commercial developments within the former hospital site. The design has a sensitive approach to the building's significant aspects in the treatment of various elements including the window openings to all elevations while balancing the acoustic requirements of its future use.

The proposed design complies with the recommendations of the CMP and where it is not in compliance it allows for the necessary mitigation measures to be undertaken. The author has been involved in the project from the initial stages including the preparation of the CMP and provided guidance during the identification of the most appropriate way of carrying out the ongoing removal of the contaminated and damaged fabric, and during the development phase of the proposed design while maintaining and preserving the most significant aspects of the former Royal South Sydney Hospital site and the Administration Building.

It is anticipated that a schedule of Conservation Works will be prepared for the Administration building and the other retained heritage buildings including the Pathology, Outpatients and Esme Cahill buildings at an appropriate time in accordance with their future adaptive re-uses. Given consideration to the current very poor and long term vacancy of the site with no public access, the proposed design and its associated adaptive re-use are seen as an opportunity to recover the significance and setting of the site and to allow for public access as well as interpretation of its heritage importance to the local community since 1913. Necessary mitigation measures have been incorporated within the proposed design and ongoing archival recordings as well as interpretive elements embedded into the building's physical fabric. The current proposal incorporates the concept of the interpretive actions and it is anticipated that a detailed Interpretive Strategy will be developed for the whole site to enhance and improve experience of the site's and building's future users.

City Plan Heritage considers that the proposal has a high potential to create a 'state-of-the-art' facility that would enhance the setting of the former hospital site and create an opportunity for appreciation of its heritage significance by wider public through heritage interpretation as part of its future adaptive reuses. The proposal is recommended to the Council of the City of Sydney for approval.

#### 6.6 Visual

#### 6.6.1 Existing Environment

The proposed Water Re-use facility is to be housed within the existing Administration Building (eastern end). The ancillary uses includes Balance Tanks and Water Reservoirs are to be located immediately adjacent to the Administration Building underground but not visible to the public (Refer to Appendix B).

The western frontage of the Administration Building lies adjacent to Portman Street forms the midway point between a proposed "green connection" (Choi Ropiha Fighera Site Analysis Plan for DA/2012/835) to be established between the proposed Matron Ruby Grant Park on the former hospital site and The Drying Green park.

Heritage items near the Administration Building include the following:

- Brick and sandstone boundary fence to Joynton Avenue, 1913; and
- Landscaped area fronting Joynton Avenue between the Nurses' Home and the Pathology Building, including the significant trees and open landscaped areas around the buildings.

#### 6.6.2 Assessment

Visual issues have been assessed by Choi Ropiha Fighera in their Architectural Design Statement (May 2012). The report concluded:

The former Royal South Sydney Hospital site when viewed in the broader context of the Green Square Town Centre and future adjacent Epsom Park Precinct, reveals its location relative to two key nodal points; the Epsom Road/Joynton Avenue intersection and the Green Square station. These two key nodal points are linked via a key desire line that extends across the former hospital site through to the future Green Square Drying Green and main east-west boulevard beyond. This desire line has also been identified in the Draft Green Square Town Centre DCP (October 2012) as a key view corridor to Green Square.

Upon closer examination of the site master plan, this desire line and view corridor in combination with other recommended through site links and pedestrian networks, establish the southern facade of the former Administration Building as a key area of public interface, This is further reinforced by its visual presence as a backdrop the future Matron Ruby Grant Park located to the south and the east-west pedestrian connection to the future Epsom Park cafe strip and bio-swale axis extending to Epsom Park beyond.

The proposed Water Re-use facility will not be visible from the public and private domain and will therefore not impact on the proposed visual corridor. The ancillary features will also be placed underground and will not be visible.

The proposed Water Re-use facility will not impact on nearby heritage items including the landscaped area adjacent to Joynton Avenue and stonewall. Mitigation measures are included in Section 8 to protect these heritage items.

A landscape concept for the site will be prepared and lodged for Council approval as part of the DA for the Community Buildings and proposed Matron Ruby Grant Park. This DA is planned to be lodged with Council in late August 2012 which will contain a site landscaping strategy to improve the visual appearance of the building.

Furthermore the protection of existing on-site trees and within surrounding streets will also provide a landscaped appearance to the proposed site to ensure a suitable visual appearance, when viewed from surrounding locations. In particular there will be no impact on the current industrial streetscape due to the proposed redevelopment of the hospital site on the eastern side, adjacent to Joynton Avenue.

The placement of road base around the edge of the building and landscaping at the Portman Street frontage will provide a temporary landscape treatment until a broader Landscape Strategy is further developed by the City.

A photomontage of the proposed treatment of the former hospital Administration Building is provided as Appendix F which presents a future view from the proposed Matron Ruby Grant Park.

#### 6.7 Water Quality and Quantity

#### 6.7.1 Existing Environment

The site exists within an urban area that does not contain any nearby natural watercourses. Sheas Creek Culvert is located within 100 m from the site which was an original natural watercourse but has since been channelled. The Botany Sands Aquifer exists 3.5 m below the site's ground level, which is a natural aquifer which has been impacted by urban activities and is therefore not suitable for drinking.

In 2007, Douglas Partners completed a Phase 2 Contamination Assessment of the site<sup>4</sup> which indicated:

The analytical results presented indicated that all ground water samples analysed from the three monitoring well locations within the subject site, recorded contaminant concentrations within the adopted ground investigation levels (GIL), within the exception of zinc above the GIL for marine (MW1 and MW3) and fresh (MW1 – MW3) water in all three groundwater samples. The concentrations of heavy metals in the groundwater may be attributed to the overall industrial land use of the surrounding Botany Bay area.

#### 6.7.2 Assessment

The operation of the Water Re-use facility will extract stormwater from the Sheas Creek Culvert and then treat it before sending back for non-drinking re-use in the Town Centre.

The proposed underground Water Reservoir/Balance tanks have the potential to impact on the Botany Sands Aquifer. In this regard, the design of these facilities will ensure that they are placed above the water table to minimise any associated water quality impacts.

There is potential for decreased runoff as part of the broader redevelopment of the site which due to the proposed increase in pervious surfaces (Matron Ruby Grant Park).

The construction of the project has the potential to generate water quality impacts from sedimentation of waterways, the release of chemicals, oils and toxic substances and increased urban runoff.

Appropriate water quality measures are included Section 8 of this REF to manage water quality impacts during construction.

#### 6.8 Noise

#### 6.8.1 Existing Environment

The site exists in an urban area that is currently experiencing land use change from former hospital uses (Royal South Sydney Hospital) to a mixed-use site containing GIC uses as well as residential, open space and community uses.

Under the Green Square Town Centre DCP 2012, the broader Town Centre area will also experience change over time from industrial uses to a mixed residential and community and open space.

#### 6.8.2 Assessment

The proposed operation of the Water Re-use facility will not generate significant noise impacts as the facility is placed within the Administration Building and the ancillary facilities are placed underground.

The construction of the Water Re-use facility has the potential to generate noise impacts and appropriate mitigation measures are included in Section 8.

#### 6.9 Flora and Fauna

The former hospital site has been extensively disturbed by former hospital uses and does not contain a critical habitat, or threatened species, populations or ecological communities, or their habitats. As such ecological issues have not been assessed in this REF.

#### 6.10 Natural Hazards

The site is affected by flooding as identified in the Cardno report (Refer to Appendix D). As such appropriate mitigation measures have been included to minimise the potential of flooding on the operation of the Water Re-use facility. Erosion and sediment control mitigation measures are also recommended to reduce the potential overflow impacts during periods of high rain.

#### 6.11 Climate Change

Based on the Cardno report (Refer to Appendix D), the following was concluded regarding climate change impacts and sea level rise:

Potential effects of climate change include a rise in sea levels and increased rainfall intensity. Modelling for the Alexandra Culvert Catchment Flood Study identified that sea level rise does not have a major influence on flood levels at this location. Increased rainfall intensity does influence peak flood levels at the site as shown in the elevated results for a 20 per cent increase to the 1 per cent AEP event. From work in similar development areas, it may be applicable to incorporate climate change into the flood planning level. However, it is noted that there is no strict policy on this within the City of Sydney.

#### 6.12 Socio Economic

The proposed Water Re-use facility is unlikely to change the socio-economic context of the surrounding area. The proposed Water Re-use facility forms part of a coordinated plan to provide a viable re-use of the former hospital site (Refer to Appendix B) in accordance with the Green Square Town Centre DCP 2012. The proposed Water Re-use facility will also reduce the cost of non-drinking water supply, which is currently expected to be 80-90 per cent of Sydney Water's potable supply rate.

#### 6.13 Soils

Based on a Phase 2 report prepared by Douglas Partners for the former Royal South Sydney Hospital in 2007<sup>5</sup>, the report concluded:

Laboratory results indicated that potential contaminants at the site were generally present at low levels (or below laboratory practical quantitation limits) within the exception of lead at concentrations above the SAC.

The Review of Contamination Issues report (Refer to Appendix E) provides an updated assessment which identifies that previously has been remediated in accordance with the demolition work (D/2011/1022) or is currently being completed.

Contamination mitigation measures are recommended in Section 8 which include the preparation and finalisation of a Remedial Action Plan and a validation assessment to be undertaken and reported by a suitably qualified consultant, and the report provided to Council following completion of remediation and validation works.

#### 6.14 Spoil and waste management

There is a small potential for waste water to be generated from the facility. This water could be in the form of back-washing or tank flush. Stormwater is only treated on demand and supplied back to the user as required.

In the unlikely event there is unacceptable water quality, a back-flush connection to the sewer line shall be used to discharge waste water in accordance with Sydney Water guidelines.

The proposed Water Re-use facility has the potential to generate waste during the construction and appropriate mitigation measures are provided in Section 8.

#### 6.15 Chemical and hazardous substance management

The City's preferred treatment system for the Water Re-use facility is based on a filtration (e.g. sand filters) as opposed to chemical treatment. In the event a preferred operator nominates a chemical treatment for facility, compliance with Office of
## 6 Environmental Assessment and Mitigation

Environment Heritage Guidelines would be required.

#### 6.16 Future Land Use

The proposed Water Re-use facility is in accordance with the City of Sydney's future plans to transform Development Site 13 into a vibrant mixed-use facility containing GIC uses, mixed residential and community and open space uses in accordance with the Green Square Town Centre DCP 2012. The preparation of a Site 13 Analysis Plan (as contained in the DA for the Modifications to the Administration Building) contains planning and site design principles to achieve greater land use integration between the various uses and reduce potential land use conflict both with uses on-site and elsewhere in the broader area.

### 6.17 Ecologically Sustainable Development and Sustainability

In accordance with Section 6(2) of the Protection of Environment Operations Act 1997, ESD requires the effective integration of economic and environmental considerations in decision-making processes.

ESD can be achieved through the implementation of the following principles and programs which are assessed in Table 6.

#### TABLE 6: ASSESSMENT OF ESD PRINCIPLES

#### **ESD** Principles

(a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by:

- careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
- an assessment of the risk-weighted consequences of various options,
- (b) inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations
- (c) conservation of biological diversity and ecological integrity – namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

### Comment on Proposed Activity

The proposed Water Re-use facility is unlikely to result in serious or irreversible damage on the environment. The proposed facility is placed within an existing building with the ancillary facilities to be placed underground which has been highly disturbed by previous hospital uses.

The REF technical studies have provided a thorough assessment of key engineering, environmental and planning issues.

Proposed mitigation measures will ensure minimal environmental impact from the proposed Water Re-use facility.

The proposed Water Re-use facility will enhance the preservation of water for the future generation through better water management and re-use. Future residents will have an opportunity to substantially reduce domestic water use and water used by Council (cleaning etc.).

The proposed Water Re-use facility and its ancillary facilities are to be provided on and below land that has been highly disturbed by past hospital uses. The site is devoid of significant habitat value and the proposed Water Re-use facility does not impact on the conservation of biological diversity or ecological integrity.

### **6 Environmental Assessment and Mitigation**

- (d) improved valuation, pricing and incentive mechanisms – namely, that environmental factors should be included in the valuation of assets and services, such as:
- polluter pays that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
- the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
- (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Environmental factors have been a driving consideration for the proposed development which aims to reduce water in the Town Centre for domestic and nondomestic uses. The proposed public unlikely generate utility is to environmental impacts however waste water generated from the facility will be sent to the public sewerage system subject to agreement with Sydney Water. The disposal of waste water is unlikely to generate significant upgrade of existing sewerage infrastructure.

The proposed Water Re-use facility will help the City achieve its target of reducing the City's water use by 10 per cent by 2030.

Cost effectiveness is provided through using an existing building to contain the Water Re-use facility and also through water re use for civic purposes (watering of parks, etc.) and also providing water for the proposed trigeneration facility.

#### 6.18 Cumulative impacts

Cumulative impacts may occur where issues of a similar nature arise at each of a number of development sites which together may be considered more significant that at each individual GIC project site is isolation.

The proposed Water Re-use facility forms part of a GIC which includes a trigeneration facility and AWCS; hence there is the potential for cumulative impacts to occur. Cumulative impacts are more likely during the construction stage as the proposed operation of the Water Re-use facility will not generate significant noise, air quality or traffic issues.

Cumulative impacts are more likely to occur during the construction stage must therefore be managed to minimise the simultaneous construction of the Water Re-use facility and also the trigeneration facility and the AWCS. Construction stage cumulative impacts may arise from traffic movements, erosion and sediment control issues and also construction noise issues with each of the proposed GIC uses.

In this regard, the City will ensure an integrated assessment of each of the GIC project's Environmental Management Plans (EMP) are prepared to minimise potential construction stage cumulative impacts. This may include nominating preferred construction routes and access points for construction vehicles and also shared areas for construction parking within the site. Other mitigation measures would include identifying suitable times for each contractor to undertake heavy impact construction work (pile driving, etc.) to minimise potential cumulative noise impacts.

The City will also appoint a Site Construction Manager to ensure better coordination and integrated delivery of each of the GIC projects.

#### 6.19 Other Environmental Impacts

This REF has provided a comprehensive environmental impact assessment of the Water Re-use facility. There are no known potential or adverse environmental impacts that are likely to prevent the approval of the proposed Water Re-use facility at the former hospital site.

# 7 Environmental Factors Considered

### 7.1 Assessment of Clause 228 Factors

Clause 228 of the Regulations provides those factors that must be taken into account concerning the impact of an activity of the environment.

These factors are assessed in Table 7 in relation to the proposed Water Re-use facility (the proposed activity) at the former Royal South Sydney Hospital Administration Building.

### TABLE 7: ASSESSMENT OF CLAUSE 228 FACTORS

CLAUSE 228 FACTORS		IMPACT	and the second second	the farming	19. 19. 19 1 19 19 19 19 19 19 19 19 19 19 19 1	-
		N/A	Negative	Nil	Positive	
(a)	any environmental impact on a community.	ţ.		~		

Comment

The proposed Water Re-use facility will not generate significant environmental impacts. The facility is placed within an existing Administration Building. Key engineering, environmental and planning issues such as flooding, contamination and traffic and access have been assessed in this REF which concluded that provided mitigation measures are implemented the Water Re-use facility will not generate significant environmental impacts.

(b) any transformation of a locality,  $\checkmark$ 

#### **Comment**

The Water Re-use facility will be contained in a former hospital Administration Building which is being reused by Council for GIC uses. The Water Re-use facility is consistent with the City's plans to transform the former hospital site, which essentially has been vacant for 20 years, into a vibrant mixed use premises. The Water Re-use facility will improve water management in the Town Centre and the surrounding area.

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(C) any environmental impact on the ecosystems of the locality,

Comment

The proposed Water Re-use facility is unlikely to generate a significant environmental impact on nearby ecosystems

 (d) any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality,

#### Comment

The proposed Water Re-use facility is unlikely to result in the reduction of the aesthetic recreational scientific or other environmental quality or value of the locality. The Water Re-use facility is consistent with the City's plans to transform the former hospital site, which essentially has been vacant for 20 years, into a vibrant mixed-use site.

(e) any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations,

#### Comment

A Heritage Impact Statement (Refer to Appendix C) has been prepared in support of the proposed Water Re-use facility which concluded that the proposed activity is consistent with the Conservation Management Plan for the former hospital site (City Plan Heritage, 2012). In particular the Administration Building and also key heritage related provisions in relevant environmental planning instruments.

(f) any impact on the habitat of protected fauna (within the meaning of the National Parks and Wildlife Act 1974),

#### Comment

There are no habitats of protected fauna within the meaning of the NPWS Act 1974 in proximity to the Administration Building site.

## 7 Environmental Factors Considered

(g) any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air

#### Comment

There are no endangered species of animal, plant or other form of life whether living on land in water or in the air that occupy or that are proximity to the Administration Building site.

#### (h) any long-term effects on the environment,

#### Comment

The proposed Water Re-use facility will not generate significant long term effects on the environment. The Water Re-use facility will improve water management for the Town Centre and the surrounding area.

 any degradation of the quality of the environment,

#### **Comment**

The proposed Water Re-use facility will not result in any degradation of the environment.

(i) any risk to the safety of the environment,

#### Comment

The proposed Water Re-use facility is unlikely to result in any risk to the safety of the environment. Mitigation measures will be implemented to reduce potential impacts of flooding.

 (k) any reduction in the range of beneficial uses of the environment,

#### Comment

The proposed Water Re-use facility is unlikely to result in any reduction in the range of beneficial uses of the environment.

(I) any pollution of the environment

#### Comment

There is a small amount of energy required to operate the proposed Water Re-use facility which is unlikely to generate significant pollution on the environment.

 (m) any environmental problems associated with the disposal of waste,

#### Comment

The proposed Water Re-use facility is unlikely to generate waste with all water being treated and recycled for use in the Town Centre and broader area. If required, approval would be obtained from Sydney Water to send waste water public back to Sheas Creek Culvert.

 (n) any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply,

#### Comment

The proposed Water Re-use facility will generate demand for stormwater in the Town Centre and surrounding area. However this natural resource is currently not obtainable on a large scale and is therefore not likely to become in short supply. Equipment will be maintained and re-used as required with occasional replacement of machinery over time.

 (o) any cumulative environmental effect with other existing or likely future activities,

#### Comment

The proposed Water Re-use facility is unlikely to generate any cumulative effects with other existing of future activities. The implementation of mitigation measures will reduce the potential environmental impact associated with the construction of the proposed Water Re-use facility (Refer to Section 8) and other GIC uses.

(p) any impact on coastal processes and coastal hazards, including those under projected climate change conditions.

# 7 Environmental Factors Considered

#### Comment

The proposed site is located away from the coastal zone (> 5 kilometres) and is unlikely to generate any significant impacts.

### 7.2 Requirements of the NSW Director-General

There is no relevant Director-General of the DoPI guidelines that need to be taken into account when considering likely impacts of the proposed Water Re-use facility.

### 7.3 Consideration of National Environmental Significance

The site is not classed as "National Environmental Significance" under the Commonwealth EP&BC Act.

This section of the REF describes how the proposal will be management, via environmental management plans and specific safeguards, to reduce potential adverse environmental impacts throughout detailed design, construction and operation. Safeguards and mitigation measures have been developed in accordance with the Clause 228 Guidelines.

Table 8 includes a comprehensive list of safeguards and mitigation measures including general measures from the Clause 228 Guidelines. Section 8.3 identifies any relevant licences and approval required to fulfill the City's legislative responsibilities during the delivery of the proposal.

#### **Construction Environmental Management Plans** 8.1

A Construction Environmental Management Plan (CEMP) would be prepared in accordance with the requirements of the City's Environmental Management System (EMS) for the construction phase of the project. The CEMP provides a mechanism through which all potential environmental impacts relevant to the proposal will be controlled and outlines a framework of procedures and controls for managing environmental impacts during construction.

#### Safeguards and mitigation measures 8.2

Environmental safeguards of the proposal are listed in Table 8. These safeguards would minimise the potential adverse impacts of the proposal described in Section 6.

#### **TABLE 8: ENVIRONMENTAL SAFEGUARDS**

#### General The City will appoint an appropriately qualified and experienced Site Construction Manager to oversee the coordinated and integrated delivery of all Development Site 13 projects. Weekly inspections to monitor environmental compliance and performance will be undertaken by the Site Construction Manager during construction. An appropriately qualified and experienced site-based environmental manager will be appointed prior to the commencement of construction. A project risk assessment including environmental aspects and impacts will be undertaken prior to the commencement of construction. Preparation of CEMP to be prepared prior to construction commences and implemented during construction. A consultation and stakeholder involvement plan will be implemented during construction as part of the CEMP. The plan will include the names and contact details of a nominated person for the receipt of all complaints. Any changes to the design which may result in a material impact on the environment will be assessed through an environmental impact assessment and determined by the City. Traffic Traffic management and traffic control plans will be developed and implemented as necessary. Signage placed at entrances/exits to alert truck drivers to the designated entry and exit points. Notification of surrounding properties of construction activities and the identified . construction routes and site access points throughout construction. All construction vehicles to enter the site via Joynton Avenue and exit via Portman Street with R no vehicles using Portman Street North which has a three-tonne load limit. No idling of trucks to occur prior to 7am (Monday - Friday) and 8am (Saturday) or before site construction commences. Designated construction haulage routes will be determined in advance of construction to minimise impacts on local roads and nearby sensitive receivers e.g. residential areas. Preparation of a Construction Traffic Management Plan to manage potential construction traffic impacts during the construction stage of the project. Contamination

Development will include remediation in accordance with an EPA accredited Auditor approved RAP. A RAP has been prepared, and it is foreseen that it will be amended following supplementary contamination assessment being undertaken (that is, targeting areas not previously accessible - such as under former buildings). The revised RAP would be provided to Council prior to commencement of remediation works.

A validation assessment will be undertaken and reported by a suitably qualified consultant,

and the report provided to the City following completion of remediation and validation works.

#### Heritage archaeological items

- If previously unidentified European heritage archaeological items are uncovered during the works, all works must cease in the vicinity of the material/find and City staff notified immediately.
- If previously unidentified Aboriginal heritage archaeological items are uncovered during the works, all works must cease in the vicinity of the material/find and the Site Construction Manager immediately notified.
- The preparation of a Heritage Management Plan in accordance with the Royal South Sydney Hospital Conservation Management (City Plan Heritage, June 2011).

Based on the City Plan Heritage Report the following is recommended:

- It is anticipated that a schedule of Conservation Works will be prepared for the Administration building and the other retained heritage buildings including the Pathology, Outpatients and Esme Cahill buildings at an appropriate time in accordance with their future adaptive re-uses. Given consideration to the current very poor and long-term vacancy of the site with no public access, the proposed design and its associated adaptive re-use are seen as an opportunity to recover the significance and setting of the site and to allow for public access as well as interpretation of its heritage importance to the local community since 1913. Necessary mitigation measures have been incorporated within the proposed design and ongoing archival recordings as well as interpretive elements embedded into the building's physical fabric. The current proposal incorporates the concept of the interpretive actions and it is anticipated that a detailed Interpretive Strategy will be developed for the whole site to enhance and improve experience of the site's and building's future users.
- Construction fencing to be located immediately adjacent and behind the existing eastern boundary wall of the Administration Building to avoid potential impacts on the following listed heritage items
  - Brick and sandstone boundary fence to Joynton Avenue, 1913; and
    - Landscaped area fronting Joynton Avenue between the Nurses' Home and the Pathology Building, including the significant trees and open landscaped areas around the buildings.

#### Visual

- The placement of road base (crushed granite) around the perimeter of the building.
- Protection of trees on site in accordance with the Earthscape Arboricultural Assessment Plan (2011).
  - Protection of the following landscape heritage items within the site:
    - Brick and sandstone boundary fence to Joynton Avenue, 1913; and
    - Landscaped area fronting Joynton Avenue between the Nurses' Home and the Pathology Building, including the significant trees and open landscaped areas around the buildings.

#### **Tree Protection**

- Prior to commencement of any site works, Tree Protection Fencing shall be erected around all of the existing trees as recommended in Appendix H.
- The fencing shall be erected under the direct supervision of the Site Arborist.
- The fence shall be maintained in good condition for the duration of the construction phase.
- The fence shall consist of temporary chain wire panels 1.8 m in height supported by concrete blocks, fastened together, and supported to prevent sideways movement.
- The Tree Protection Fencing shall not be moved or relocated from the specific alignment without the prior approval of the Site Arborist.

#### Landscape

- The City to prepare a comprehensive Landscape Plan for the site as part of the Development Application for the Community Buildings and Proposed Matron Ruby Grant Park.
- Lighting within the public domain areas adjacent to the Administration Building should be kept as low as necessary to ensure that adequate safety is maintained.
- Feature lighting of the public spaces at ground level should be used to enhance the civic nature of the Administration Building and adjacent areas.

#### Erosion and sediment control

- Erosion and sediment control measures are to be implemented and maintained in accordance with the Landcom/Department of Housing Managing Urban Stormwater, Soils and Construction Guidelines (the Blue Book) to:
  - Prevent sediment moving off site and sediment-laden water entering any water course, drainage lines, or drain inlets;
  - Reduce water velocity and capture sediment on site;

- Minimise the amount of material transported from site to surrounding pavement surfaces; and
- Divert clean water around the site.
- Erosion and sedimentation controls are to be checked and maintained at least on a weekly basis (including clearing of sediment from behind barriers) by the appointed Site Construction Manager.
- Erosion and sediment control measures are not to be removed until the works are complete or areas are stabilised.
- Work areas are to be stabilised progressively during the works.

#### Flooding

- To achieve maximum operation of the Water Re-use facility, machinery for the utilities in the buildings would be constructed on plinths (or flood proofed) to above the 1 per cent AEP plus 0.5m freeboard and PMF peak flood levels.
- Preparation of a flood emergency response plan as part of the CEMP for the site that identifies
  a flood-free area for evacuation of personnel and potentially construction equipment.
- The buildings in the flood affected areas must also be structurally designed to withstand the potential forces of floodwaters and built of flood compatible materials.

#### Water Quality and Quantity

- Water quality control measures are to be used to prevent any materials (e.g. concrete, grout, sediment etc.) entering drain inlets.
- All fuels, chemicals and liquids are to be stored in an impervious bunded area a minimum of 40 metres away from flooded or poorly drained areas.
- Refueling of plant and equipment is to occur in impervious bunded areas located a minimum of 40 m from drainage lines.
- Measures will be implemented to ensure debris is not tracked off site and onto public roads e.g. cattle grids, vehicle wash downs, street sweeping, etc.
- Emergency spill kits are to be kept on site at all times. All staff to be made aware of the location of the spill kit and be trained in its use.

#### Noise and Vibration

- Works are to be carried out during standard work hours (i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays). Other hours may be worked if approved by Council.
- Vibration (other than from blasting) resulting from construction and received at any structure outside of the project must be limited to:
  - For structural damage vibration German Standard DIN 4150: Part 3 1999 "Structural Vibration in Buildings: Effects on Structures"; and
  - For human exposure to vibration the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: A Technical Guideline (DEC 2006).

#### Waste management

- Resource management hierarchy principles will be followed:
  - Avoid unnecessary resource consumption as a priority;
  - Avoidance is followed by resource recovery (including reuse of materials, reprocessing, recycling and energy recovery); and
  - Disposal is undertaken as a last resort.
- Waste material is not to be left on site once the works have been completed.
- Working areas are to be maintained, kept free of rubbish and cleaned up at the end of each working day.
- Waste material taken off site will be appropriately classified and managed in accordance with the Waste Classification Guidelines (DECC, April 2008).
- Biannual waste reports will be undertaken in accordance with requirements of the NSW Government's Waste Reduction and Purchasing Policy (WRAPP).

#### Utilities and Services

- Discussions with utility and service providers will be undertaken prior to commencement of any service adjustments or relocations and all relevant approvals sought prior to the commencement of works where required.
- All permanent lighting for the project must be designed, installed and operated in accordance with the requirements of AS 1158 "Road Lighting" and AS 4282 "Control of the Obtrusive Effects of Outdoor Lighting".
- Road Condition (Dilapidation) Reports must be prepared for Portman Street (Police site to Hansard Street) and also Hansard Street footpaths, drains etc. likely to be used/affected by construction traffic in the vicinity of the project. These reports must be prepared prior to

commencement of construction and after construction is complete. A copy of the relevant report must be forwarded to Council. Any damage resulting from the construction of the project, aside from that resulting from normal wear and tear must be repaired. Alternative arrangements for repair may be negotiated with the relevant authority/utility owner.

### Climate change and sustainability

- Energy efficiency would be considered when selecting equipment.
- Equipment would be regularly maintained to retain fuel efficiency.
- Locally sourced materials would be used where possible, to reduce transport-related emissions.

#### Hazards and risks

Appropriate measures will be undertaken to minimise the impact of flooding at the site.

### 8.3 Licensing and approvals

Provided below are the licenses / approvals required for the delivery of the proposed Water Re-use facility:

- Give written notice to City of Sydney Council of the intention to carry out the development, 21 days prior to determination of the activity; and
- Approval for an off-take structure or "in-channel asset" from Sydney Water Corporation to connect to the Water Re-use facility.
- Licence to extract water from the Sheas Creek Channel from the NSW Office of Water.

## 9 Conclusion and Certification

This REF is prepared to assess the environmental impacts of a proposed Water Re-use facility which forms part of a City of Sydney initiative to provide a Green Infrastructure Centre at the former Royal South Sydney Hospital Site at No.3 Joynton Road, Zetland.

The Water Re-use facility will be housed within the former Administration Building which will be redesigned to accommodate the facility. Ancillary facilities (water reservoirs and balance tanks) will be placed underground immediately next to the Administration Building.

The Water Re-use facility project will provide an opportunity to use non-drinking water in the Town Centre area for watering of parks and gardens, street cleaning and non-drinking water domestic use. It will help manage periods of excessive drought through better management and consumption of water.

Overall the Water Re-use facility project will help reduce the city's water use, which is expected to rise by 10 per cent by 2030. The proposed Water Re-use facility will contribute to the reduction of city water usage through better management and re-use of stormwater in the Green Square Town Centre and broader area.

This REF has been prepared in accordance with Part 5 of the NSW Environmental Planning & Assessment Act 1979 and has assessed those matters listed in Clause 228 of the NSW Environmental Planning & Assessment Regulation 2000. The proposed works will not result in a significant impact on any declared critical habitat, threatened species, populations or ecological communities or their habitats. Therefore a Species Impact Statement is not required.

The REF has been prepared in accordance with State Environmental Planning Policy (Infrastructure) 2007 and the City of Sydney Part 5 Environmental Impact Assessment Procedures Manual.

The REF has assessed key engineering, environmental and planning issues including heritage, contamination and hydrology based on a number of supporting technical studies. The REF includes construction and operational mitigation measures and safeguards to ensure that the proposed Water Re-use facility does not result in a significant adverse effect on the environment. In this regard an Environmental Impact Statement is not required.

### 9.1 Certification

Prepared by:

Name of company:

Company details (if applicable)

Person writing the report (print name)

Position

Signature

The City of Sydney Council 456 Kent Street, Sydney NSW 2000 David White Planner, Green Square

20 June 2012

Date

Determining officer (print name) Position Signature Date



NT APPLICATION			
	BEV	DATE	DESCRIPTION







Royal South Sydney Hospital (former) 3 Joynton Avenue, Zetland Adaptive Reuse of Administration Building

Heritage Impact Statement For City of Sydney

May 2012

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Job No/ Document No	Description of Issue	Prepared By/ Date	Reviewed by Project Manager/Director	Approved by Manager/Director
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12-015	Final	KD/21.05.12	KD/21.05.12	Name: Kerime Danis Date: 21.05.12
Note: This document is preliminary unless it is approved by Manager or Director of City Plan Heritage				

## **1.0** INTRODUCTION

### 1.1 BACKGROUND

City Plan Heritage has been engaged by the City of Sydney Council (Council) to prepare the following Heritage Impact Statement. The proposal is for the adaptive reuse of the Administration Building of the former Royal South Sydney Hospital at No.3 Joynton Avenue, Zetland (the Hospital site). The building is currently subject to partial internal demolition and rectification works as part of the overall clearance of contaminated fabric and soil within the site of the former Royal South Sydney Hospital. The drawings for the proposed adaptive reuse of the Administration Building have been prepared by *Choi Ropiha Fighera* and this report assesses the following drawing numbers all dated 05.2012 and Issue A:

- DA001 Site plan
- DA100 & DA200-205 Existing & Proposed Plans
- DA110 & DA300-302 Existing & Proposed Elevations
- DA400-401 Sections

The former Royal South Sydney Hospital including the buildings on the site known as Administration Building (c1913), Pathology Building (c1913), Outpatients Building (c1935), Esme Cahill Building former Nurses Quarters (eastern section - c1938) and the eastern (Joynton Avenue) boundary fence (c1913) are listed as group Heritage Items on the South Sydney Local Environmental Plan (LEP) 1998. The current proposed works comprises only the Administration Building and its immediate curtilage. In 2009, the Council released the Sustainable Sydney 2030 in response to the community's ideas for creating a better Sydney. As part of the City of Sydney's aim to achieve a substantial reduction in greenhouse gas emissions it identified the Administration Building as having potential as a future Green Transformer, which would accommodate a Trigeneration Facility and a Recycled Stormwater Facility (Green Infrastructure). The current proposal aims for the realisation of the subject Green Infrastructure facility and provides basis to accommodate the future installation of required equipment and plants including gas-fired generators and stormwater recycling plant. The specifications and installation of equipment will be subject to separate planning approvals.

The former Hospital site is Green Square Town Centre development project and is identified as Development Site 13. The proposed design, which is subject of this Heritage Impact Statement, forms part of a broader scheme for the redevelopment of Development Site 13, which will incorporate the first operating Green Transformer in the City of Sydney and also a mixed use with residential, cultural & community, open space and retail uses. All these uses will be subject to separate approvals in a staged form. The buildings on the northern portion of the former Hospital site with the exception of the southern portion where Esme Cahill (former Nurses Quarters) Building is located (refer to Figure 2) are currently under demolition and remediation works as noted earlier. The subject site is currently fenced-off and separated from the southern portion for public safety due to the ongoing demolition works resulted from the significant contamination and existence of exposed asbestos elements as well as subsequent decay/damage to a number of buildings and a number of floors in the main hospital buildings.

A Conservation Management Plan (CMP) was prepared for the whole site in June 2010 by City Plan Heritage and forms part of the documentation that has been consulted in the preparation of this report.

This Heritage Impact Statement considers the impacts of the proposed adaptive reuse and the associated design. This report draws the background information from the Conservation Management Plan of the Site and therefore, for a more detailed information, it should be read in conjunction with the CMP.

### 1.2 SITE LOCATION

The former Royal South Sydney Hospital is located on the western side of Joynton Avenue, Zetland to the north of its junction with Epsom Road. It is bounded by Joynton Avenue to the east, Hansard and Portman Streets to the south and west respectively, and the Ford Benz dealership to the north. The main hospital buildings and car park entrance address Joynton Avenue. The Administration Building sits approximately in the centre of the site fronting Joynton Avenue (see Figure 2). For a more detailed description of the site and its context, see Section 2.0 – Site Description and Context.



Figure 1: Location of the former Royal South Sydney Hospital in Zetland. (Source: Department of Lands Spatial Information eXchange, SIX, street map)



Figure 2: Plan of the subject site showing the two precincts of the former Royal South Sydney Hospital. The area indicated as 'Hospital Precinct' is the subject of the ongoing approved demolition and site rectification works. The Administration Building is circled. Note most of the buildings within site have or will be demolished as part of the remediation works approved under separate application. Refer to site description for the retained buildings map and aerial photographs.

### 1.3 METHODOLOGY

This Heritage Impact Statement has been prepared in accordance with the *NSW Heritage Manual* 'Statements of Heritage Impacts' and 'Assessing Heritage Significance' guidelines. The philosophy and process adopted is that guided by the Australia ICOMOS *Burra Charter 1999*. The subject proposal has been assessed in relation to the relevant controls and provisions contained within the South Sydney Local Environmental Plan 1998 and the City of Sydney Heritage DCP 2006. The proposed works have also been assessed in relation to the relevant to the relevant conservation Policies of the CMP and the relevant 'questions to be answered' in the *NSW Heritage Manual* 'Statements of Heritage Impact' guidelines.

### **1.4** AUTHOR IDENTIFICATION

The following report has been prepared by Kerime Danis (Manager) of City Plan Heritage.

## 2.0 SITE DESCRIPTION AND CONTEXT

In order to avoid repetition only a summary description of the site and its context has been provided for the purpose of this Heritage Impact Statement. For a more detailed description of the site and its context reference should be made to the Conservation Management Plan.

### 2.1 SITE DESCRIPTION

Bounded by Joynton Avenue to the east, Ford Benz dealership to the north, Portman Street to west and the former Nurses Quarter site to the south, the 'Hospital Precinct' consists of buildings which date from the earliest development phase of the site. The buildings within this precinct included the JJ Collins Ward (now demolished), Administration Building, Outpatients Building, Joynton Smith Building (now demolished), Naomi Wing Rehabilitation Centre, Neurological Building (now demolished), Pathology Building, and Morgue, Maintenance Building and Orthotics Building (all now demolished) along with the main car park accessed from Joynton Avenue. The remaining buildings are essentially the significant buildings within the former hospital site, except for JJ Collins Ward, which sustained significant contamination and damage and could not be salvaged.

The Administration building forms the hub of the site with its dominant three to four storey height. It was completed in 1913 and originally constructed in the Queen Anne Style with single storey portion at the front and a two-storey section at the rear. The building has been heavily modified and no longer resembles its original form. It has a gabled roof and face brick exterior. The main east façade of the building has been heavily altered with additional floors and a new main entrance. The additions of floors attempted to retain the character of the building but the changes to the entrance in 1963 are intrusive with the complete eradication of the impressive arched entrance. As part of the current remediation works the wings attached to the building will be demolished and the building will be a freestanding structure with approximately 15 metres curtilage around its rear portion.

Internally, prior to the current remediation works, the building featured a heavily altered layout and was (still is) closed off to public access and out of use. The internal spaces are configured in a T-shape with main hallways running along the north-south and the east-west axis. The east-west hall runs from the original entrance to the rear of the building with various rooms off either side. Some of these rooms are original spaces but many of them have been converted and adapted. The rooms were vandalised by graffiti and fragments of fabric including hazardous building material scattered throughout the floors on all levels along with littered paint cans. In places, the ceiling panels were missing with hanging cables and debris of fabric fallen on the floor. Sections of ceiling were also broken in various rooms, with the pieces lying on the floor. The east west hallway had suffered degradation with missing tiles and removed floorboards leaving the sub-floor crudely exposed with electrical cabling. Fragments of plaster were also fallen off the ceiling. The recent remediation works has removed all contaminated fabric and later partitions and ceilings thus leaving a shell ready to accommodate the changes for the proposed adaptive reuse of the building. Some of the internal walls will also be demolished as part of the current remediation works in accordance with structural engineers' recommendations. In general, the front original portion of the building will be largely retained in its current configuration on both ground and first floors while the top floor will be a shell to accommodate the new Green Transformer use. The rear portion of the building will largely be of three-storey shell to allow for the installation of the future Trigeneration Facility equipment. The following images provide information on the future and current condition of the building.



Figure 3: Site plan showing the future condition of the site with only the works associated with the Administration Building and its immediate public domain curtilage are indicated. Works to the Pathology building are not part of the current proposal. (Source: Choi Ropiha Fighera, dated 05.2012)



Figure 4: Administration building prior to the remediation works showing the contaminated and damage interiors.

CITY PLAN HERITAGE MAY 2012 / CH12-015





Figure 5: Aerial photograph of the site showing the current condition and the progress of the demolition to date. Administration Building is indicated. (Source: Nearmap.com, dated 26 April 2012, accessed on 13 May 2012)



Figure 6: Condition of the Administration Building following remediation works. Note the roof trusses and the parquetry flooring that has been exposed during the remediation works. One of the trusses will be retained adjacent to the gable end while the parquetry flooring will be salvaged and reused within the ground floor corridors of the building.







Figure 7: southern elevation of the Administration Building following the demolition of the JJ Collins Ward. The building on the foreground is the Pathology Building, which will be preserved and adaptively reused as part of future stages of the project for the site

### 2.2 SITE CONTEXT

### WIDER URBAN CONTEXT

The former Royal South Sydney Hospital is located along the western side of Joynton Avenue in Zetland in the local government area of City of Sydney. Zetland lies approximately 6 kilometres to the south of the Sydney CDB and was formerly within the LGA of South Sydney Council.

The general character of the surrounding area is light industrial and commercial consisting of very large flat allotments, Increasingly, residential development in the form of multi storey apartment buildings is beginning to change the long term industrial and commercial nature of the area. The density of the surrounding area is relatively low, warehouse style buildings of one to two storeys on the large allotments. There are public bus stops located on each side of Joynton Avenue outside the subject site. Joynton Avenue is a busy through road within the local area and south to Rosebery.

Located immediately to the north of the subject site is a large flat area currently operating as a Ford car showroom and associated open car parking area. West of the subject site, on the opposite side of Portman Street is another large allotment functioning as the Waverley Council Depot. A long, low, brick complex for the Larke Hoskins group is on the eastern side of Joynton Avenue and just south of the subject site. Adjoining it is a large fenced allotment with entry and exit driveways but currently appearing to be car parking with its use or tenant not apparent.

### IMMEDIATE SITE CONTEXT

The Administration Building, in the site's current configuration, is surrounded by the former hospital buildings known as the Outpatients' Building to the north, the Pathology Building to the southeast and the Naomi Wing Rehabilitation Centre to the further northwest. The Neurological Building adjoins to the north of the Outpatients' Building seen on the 26 April 2012 aerial photograph (Figure 5) and soon will be demolished; therefore, it has not been described here. The following section provides information on the immediate hospital buildings to give an idea of their current condition. These buildings will also be adaptively reused and will be subject to separate approvals in the future.

### The Outpatients' Building

The existing Outpatients' Building was constructed in 1935 in the Georgian Revival style with masonry columns flanking the entrances and gable ends with a pediment over the entrances. The entrance further south features original handrails with a recessed portico entrance articulated with classical detailing. The only visible elevation is the eastern one to Joynton Avenue. It is regularly fenestrated with a row of uniform timber frame double hung sash windows with curved arches. A sandstone string course runs the length of the elevation

below the window sills. This stringcourse is carried through from the Casualty, Administration and Pathology Buildings to match the earlier 1921 facade treatment.

The building externally appears to be in good condition in general, however internally the majority of internal fabric has been removed and many of the rooms have been reconfigured with the removal and addition of walls. The building has suffered from vandalism and dilapidation due to dampness. In the central corridor the floor and ceiling has collapsed, resulting in exposed roof structure. Vandalism is evident in the form of broken fixtures, missing floor boards and broken glass. Loose boards have been laid over the missing floor; however it remains largely unstable in parts. The floor is littered with glass shards and chipped plaster. Internal dampness has resulted in peeling paint and mould on the carpet. The room at the south end of the corridor has been severely damaged with a portion of the ceiling ripped out and a leaking roof causing flaking of paint, in addition to a smashed brick wall and floor structure. All these debris and contaminated fabric have been removed from the building as part of the recent remediation works.



Figure 8: (Above) Joynton Avenue Elevation of Outpatients block looking north from Casualty section under awning. (Right top & right) damage to internal corridor and timber roof structure





### Pathology Building

The former Pathology department is located to the southeast of the Administration Building was originally between the former JJ Collins Ward and the Administration building towards the eastern edge of the site. The building was part of the original stage of development at the hospital and although it is utilitarian in character and form it does demonstrate elements of its late Federation period of construction. It was constructed as the original operating theatre for the hospital in 1913. The exterior of the building is largely intact. It is single storey and rectangular in footprint with a projecting bay to the south. It features a hipped slate roof, which was repaired after the hail storm, with terracotta tile ridge capping.

Internally, the floors are timber and concrete with vinyl/linoleum sheeting and the walls are cement rendered masonry with curved edges. The original ceilings are plastered throughout. The ceiling is broken in several places and floor boards have been removed making the building unsafe. The building has been vandalised with graffiti, broken glass and furniture discarded on the floor.





Figure 9: (Above) East elevation of Pathology building; (Left) internal damage & contamination to the building

### Naomi Wing Rehabilitation Centre

Constructed c1972, the former Rehabilitation Centre, known as Naomi Wing Building after a former director of the Rehabilitation Unit, is a large three-storey building demonstrating stylistic elements of the International style. The building connects to the Outpatients building on the eastern sides through the ground floor lift lobby area. Along the north elevation, a covered concrete walkway forms a link with the Orthotics Building situated north-west of the Rehabilitation Centre. The ground floor level contains the main entrance and lift lobby, the hydrotherapy pool, amenities and treatment and storage rooms. The first floor level is currently used by the City Rangers and the second floor level is vacant. Externally the building is predominantly face brick but is divided into strong horizontal bands with the white cement projecting awnings on each of the levels and the long horizontal rows of continuous windows without mullion separating the individual panes.



Figure 10: North elevation and Hydrotherapy area on ground floor

## 3.0 STATEMENT OF SIGNIFICANCE

The former Royal South Sydney Hospital is of high significance to the local area for the historic, aesthetic and social values of the site and for particular significant elements. It is an example of a late Federation, pavilion style hospital complex, designed between 1909 and 1912 and opened in 1913. The Hospital was then continually adapted to cope with changing populations, changes in medical philosophy, knowledge and practices and the health care needs of the community.

The Administration Building, the JJ Collins Ward, the Pathology Building, the Laundry and the Joynton Avenue fence have historic value and aesthetic value as modified elements of the original scheme prepared by the Government Architect in 1911.

The extensive modifications to the site and the buildings has eroded the aesthetic qualities associated with the original buildings but the Administration Building, the Pathology Building, the Outpatients Building, the Joynton Avenue Fence and the original section of the Esme

Cahill Building demonstrate aesthetic qualities related to the streetscape contribution, their landmark qualities and/or their representative aesthetic character.

For over 90 years the Royal South Sydney Hospital provided health care to many patients and employed a great number staff to do so. It was also a teaching facility for nurses and employed changing technologies in medical care and particularly rehabilitation, which became increasingly important during the 1950s. It therefore demonstrates identified social values for its associations with the local and medical communities. These social values need to be investigated further.

BUILDING / ELEMENT	COMPONENTS OR ELEMENTS OF SIGNIFICANCE	SIGNIFICANCE RANKING		
HOSPITAL PRECINCT				
Overall site complex and setting	Original layout of the hospital has been compromised by the later additions as such diminished the Florence Nightingale scheme with courtyards	<i>High</i> (original layout of the buildings) to <i>Moderate</i> (current layout) / Local Level		
Administration Building	The original 1913 building with 1930s modifications to the front elevation and 1950s additions to the rear and upper levels	High		
Outpatients and Casualty Building	c1935 building with changes and additions	High		
Pathology Building	c1913 building with modifications	High		
Rehabilitation Building – Naomi Wing	C1972 building	Little		
Landscape	Original E-shape hospital layout with courtyard and southern, central and northern wings	High		
	Current hospital layout	Intrusive		
	Trees & shrubs	Moderate		
Sandstone and brick boundary fence to Joynton Avenue	Original 1913 fence with its palisade top been removed	High		
Remaining chain wire fences	Various types and recent period additions	Little		
NURSES QUATERS PRECINCT				
Esme Cahill Building	Original c1938 nurses quarters	High		
Esme Cahill Building –	C1959 addition to the original Nurses	Moderate		
southern wing addition	quarters			
Sandstone and brick	Original 1913 fence with its palisade	High		
boundary fence to Joynton	top been removed			
Avenue				
Timber paling fence & wire and rail gates	Non-original later and recent additions	Little		
Trees	Very few exist including Palm trees	Moderate		

### Significance ranking as identified in the CMP (demolished buildings are not included):

## 4.0 THE PROPOSAL

The proposal is for the provision of a design in preparation of the Administration Building within the "Hospital Precinct" of the former Royal South Sydney Hospital site for its adaptive reuse as a Green Infrastructure Centre incorporating a Trigeneration Facility and Recycled Stormwater Facility. The proposal involves works only to the Administration Building and its immediate public domain within a 15m curtilage to the north and south and extends to the Joynton Avenue and Portman Street boundaries.

The specifications and installation of equipment will be subject to a separate development application. Drawings and the design for the proposed works have been prepared by *Choi Rophia Fighera* and their Architectural Design Statement has been provided as an Attachment to this report. Reference should be made to the Design Statement and the Drawings for a more detailed description of the proposed works; however, in summary, the works comprise the following:

### 4.1 WORKS TO THE ADMINISTRATION BUILDING

The proposed works to the Administration Building include:

- Demolition of identified internal walls, in general to the rear section of the building including the existing gabled roof structure. The existing roof truss adjacent to the Joynton Avenue gable will be retained to allow for interpretation of the current roof structure and form
- Removal of the later staircase on the southern portion of the building and creation of a new staircase at the southwest corner
- A new rooftop addition with a new roof to accommodate the required height of the future Trigeneration plant equipment and associated piping
- Insertion of new steel structural frame, shear walls and floor slabs to support the future Trigeneration plant and restrain existing walls.
- Reorganisation of the room layouts to allow for their use as future Recycled Stormwater facility and associated control, storage, plant and meter rooms.
- Reinstatement of original main arched entrance fronting Joynton Avenue.
- Salvage and reuse of the existing parquetry flooring from the second floor to the ground floor common corridors
- Provision of interpretive panels within the main entrance lobby of the Building that will be retained and enhanced by the new arched portico.
- Replacement of existing lift with a new lift. The existing original staircase within the eastern portion of the building will be retained with the curved later second floor addition being removed and the parapet height being reduced to match existing main walls.
- Treatments to the existing window and door openings in the form of retain as is (the front elevation and original ground floor windows), brick-up some openings, acoustic

glazing from inside, acoustic tinted glazing from outside, and acoustic glazing to both inside and outside in accordance with the location and acoustic requirements of the future plants

### 4.2 WORKS TO THE IMMEDIATE PUBLIC DOMAIN CURTILAGE

The works to the immediate 15 metre curtilage of the Administration Building will involve creation a road base with crushed granite and will incorporate interpretation of the footprint of the former original laundry building along the western end of the site on Portman Street. The footprint of the former laundry will be created by use of the salvaged bricks from the site.

A more detailed landscape treatment will be part of a future adaptive reuse of the other heritage buildings for the overall site and will also incorporate a reservoir in the heritage park to the south. This is subject to a separate development application.

A proposed circular access driveway from Portman Street to provide for future delivery vehicles to access the Trigeneration facility.

## 5.0 HERITAGE IMPACT ASSESSMENT

### 5.1 STATUTORY CONTROLS

The former Royal South Sydney Hospital site is located within the administrative boundaries of City of Sydney Council; however; as part of the former South Sydney Council area, the planning instruments of South Sydney currently apply to the site. As noted earlier, the former hospital site and a number of buildings on it are listed as a group heritage item under the South Sydney Local Environment Plan (LEP) 1998. The eastern side of Joynton Avenue opposite of the Hospital site has been identified as Heritage Streetscape under the South Sydney LEP 1998. Therefore it is subject to the relevant heritage clauses of the former South Sydney statutory and strategic planning instruments and the City of Sydney Heritage DCP 2006.

A Development Application will be made by the applicant, the Council of the City of Sydney, to obtain consent. This Heritage Impact Statement will be part of the Development Application documentation and should be read in conjunction with the Conservation Management Plan (CMP) for the site. The proposed adaptive reuse design works have also been assessed against the Conservation Policies of the CMP.

The former Royal South Sydney Hospital site is located within the boundaries of the Green Square Town Centre LEP. The Town Centre LEP is an amendment (No.17) to the South Sydney LEP 1998. The Town Centre LEP was gazetted on 22 December 2006; however, it does not currently operate in respect of land within the Town Centre. Therefore the proposed works will be considered under the LEP 1998 controls and provisions.

The subject site also falls within the boundaries of the South Sydney LEP 114 (Southern Industrial and Rosebery/Zetland Planning Districts). The former Hospital site has been zoned as 5(a) - Hospital under Special Uses.

### 5.1.1 SOUTH SYDNEY LEP 1998

The proposed works for the adaptive reuse design of the Administration Building have been assessed in relation to the heritage matters contained in Part 4 – Special Provisions including Clauses 22 (Heritage aims), 23 (Protection of heritage items) and 24 (Development in the vicinity of heritage items...).

SOUTH SYDNEY COUNCIL LEP 1998 (AS AMENDED) Part 4 Division 1 Heritage Conservation	THIS PROPOSAL RELATES TO THESE MATTERS AS FOLLOWS:
22 Heritage Aims (1)The consent authority must not grant consent to the carrying out of development on the site of a heritage item, or within a heritage	• This Heritage Impact Statement will form part of a Development Application that will be made by the applicant, City of Sydney, to obtain consent of the

SOUTH SYDNEY COUNCIL LEP 1998 (AS AMENDED) Part 4 Division 1 Heritage Conservation	THIS PROPOSAL RELATES TO THESE MATTERS AS FOLLOWS:	
conservation area or heritage	Council.	
streetscape area, unless it is of the opinion that the proposal is consistent with the following aims and objectives:	<ul> <li>The proposed adaptive reuse design is part of a staged redevelopment process for the former</li> <li>Royal South Sydney Hospital site and is a</li> </ul>	
<ul> <li>(b) to integrate heritage conservation into the planning and development control processes, and</li> <li>(c) to investigate and record sites which have archaeological potential, and</li> </ul>	positive outcome due to the site's long term vacancy and condition. The building has been subject to demolition and rectification works that were necessary for the conservation and maintenance of the heritage buildings within the	
(e) to ensure that any development is undertaken in a manner that is sympathetic to, and does not detract from, the heritage significance of heritage items, of heritage conservation areas and their setting, and of streetscapes within heritage streetscape areas and their setting, and	<ul> <li>site. The buildings suffered from extensive contamination and damage throughout all levels.</li> <li>The recent remediation works removed all contaminated partitions, floors and some internal walls in a controlled and extensively studied form with consideration to the building's future adaptive reuse as a Trigeneration and Recycled Stormwater facility.</li> </ul>	
<ul> <li>(h) to encourage the restoration or reconstruction of buildings or works which are heritage items or buildings and works that contribute to the character of heritage conservation areas or streetscapes within heritage streetscape areas, and</li> <li>(i) to require, when considered necessary, the consideration of a statement of heritage impact or a conservation management plan before consent is granted for development relating to a heritage item, or development within a heritage streetscape area, or development relating to a building older than fifty years, and</li> <li>(j) to ensure the sympathetic use of sites containing buildings or facades of historic or streetscape importance which contribute to the character of the locality.</li> </ul>	The eastern side of Joynton Avenue between 130 Joynton Avenue and Epsom Road corner is part of the Joynton Avenue Heritage Streetscape (HS7). The Streetscape is opposite the former Hospital site and as noted in the inventory form <sup>1</sup> reflects the development of the automotive industry in NSW in the 1950s and the importance of the precinct as an industrial centre in the mid twentieth century. The Streetscape of the 130- 158 Joynton Avenue Group is noted as having the ability to interpret the development of the precinct despite it has lost much of its visual evidence with the redevelopment of the BMC Victoria Park plant. The proposed design of the former Hospital building will have no impact on the identified significance of the Joynton Avenue Heritage Streetscape rather it will complement its industrial warehouse streetscape values noted in its Statement of Significance - "The streetscape	

<sup>&</sup>lt;sup>1</sup> http://www.heritage.nsw.gov.au/07\_subnav\_04\_2.cfm?itemid=2421515

SOUTH SYDNEY COUNCIL LEP 1998 (AS AMENDED) Part 4 Division 1 Heritage Conservation	THIS PROPOSAL RELATES TO THESE MATTERS AS FOLLOWS:	
	<ul> <li>Includes a fine group of post war international style industrial buildings, designed by distinguished industrial architect and engineer Francis E. Feledy in the mid 1950s. Due to their consistent scale, finishes, detailing and form, the buildings and their landscaped settings make a positive contribution to the streetscape". This setting will no not be affected by the proposed development.</li> <li>Extent of fabric removal has been guided by the condition of the fabric and the damage sustained by the contamination or vandalism as well as the significance ranking in association with the CMP. The internal wall removals have been further exhaustively studied by the consultant team including the author who was also the principal author of the CMP, the Council's Strategic Project Manager, the architects, and the structural engineers in order to minimise extent of significant fabric removal. Consultation with Council's Heritage and Urban Design Manager and the area's Heritage Officer has also been made. The current design also considers the recommendations of the City of Sydney Design</li> </ul>	
	<ul> <li>An ongoing archival recording of the building has been carried out by the author during and following removal of contaminated debris from the interiors and prior to the demolition works commenced. After completion of demolition works a final archival recording will also be carried out by the author.</li> <li>The proposed design is the result of extensive consultation between the architects, the Council project team including planning and heritage officers, and the author. It is based firstly on the heritage significance of the Administration</li> </ul>	

SOUTH SYDNEY COUNCIL LEP 1998	THIS PROPOSAL RELATES TO THESE MATTERS
Part 4 Division 1 Heritage	AS FOLLOWS.
Conservation	
	Building, its condition, future development within
	the site and the sequence of development
	phases and forms of the building. A number of
	design options were considered and discounted
	for various reasons due to either awkward
	juxtaposition with the building's form or
	incompatible roof shapes. The current design
	provides a sympathetic and proportioned rooftop
	addition when compared with the gable end and
	its relationship with the overall building floor
	levels. The design respects the building's robust,
	rectilinear and simple fenestration and adds to its
	visual character in a positive manner while
	providing a new use that would allow for
	appreciation of its significant values and role as a
	former hospital facility. in a new . The building
	originally was built in Federation Queen Anne
	style with a high aesthetic quality and was added
	to vertically in a similar way to the current design,
	two additional storey flush over the original
	ground floor level. Therefore, the current form of
	the vertical extension in a flush rooftop separated
	from the original base building by a "shadow gap"
	is considered a continuation of the previous
	1930s-50s layers of additions to the building.
	• The proposed use is consistent with the future
	development scenarios and visions for the Green
	Square Town Centre and in particular the role
	that has been envisaged for the former Royal
	South Sydney Hospital site. The former use of
	the site as a health facility is no longer a feasible
	option and the new use will suit the overall
	dominant character and its original role of the
	Administration Building as a core of the Hospital.
	It will continue to be the core of the new
	operations that would occur within the site and it
	will continue serve the local community in a

SOUTH SYDNEY COUNCIL LEP 1998 (AS AMENDED) Part 4. Division 1 Heritage	THIS PROPOSAL RELATES TO THESE MATTERS AS FOLLOWS:
Conservation	
	different way. In that, the future use of the
	building as a Trigeneration and Recycled
	Stormwater facility could be seen as protection of
	the community's health. The proposed future use
	of the Building will attract significant public and
	stakeholders interest and set an exemplar for
	such Green Infrastructure that has been
	sensitively inserted in a significant heritage
	building in a most contemporary but sympathetic
	manner. The design of the addition together with
	the treatment of the existing openings has the
	potential to create a 'state of art' and a good
	example of modern architecture without
	diminishing the Building's and the site's historical
	and aesthetic values.
	• The proposed design is suitable in terms of its
	form, overall scale and transparent material that
	provides an opportunity to create a sculpture like
	artwork and maintain the dominance of the
	Administration Building within its future urban
	context, in particular, those future mixed use
	residential and commercial developments within
	the former Hospital site. The chosen anodized
	aluminium blade material which matches an
	oxidized copper finish will complement the face
	brick finish of the Administration Building.
	• Treatments of existing openings have been
	sensitively considered in relation to the significant
	aspects of the Building while a balance had to be
	maintained for the acoustic requirements of its
	future use. The windows to the original front
	eastern portion of the Building on the ground floor
	level and on the front facade have been retained
	in their existing condition. As noted previously,
	the remainder of the openings will either be
	bricked-in with the recycled bricks from the site,
	dressed with acoustic glazing from inside or from

SOUTH SYDNEY COUNCIL LEP 1998	THIS PROPOSAL RELATES TO THESE MATTERS	
(AS AMENDED) Part 4 Division 1 Heritage	AS FOLLOWS:	
Conservation	outside. The acoustic glazing that would be	
	installed to the outside of the windows will be	
	tinted to allow a more harmonised colour with the	
	brick finish but also will allow the existing window	
	frames he visible behind	
	In addition the most significant conset of the	
	• In addition, the most significant aspect of the	
	proposal is the reinstatement of the original	
	Administration Duilding This will bring the	
	Administration Building. This will bring the	
	building's original facade somenow into the	
	memories of those local community members	
	knew the Building's configuration in the 1950s.	
	The proposed design provides for the recovery of	
	the original setting of the retained significant	
	hospital buildings by maintaining the original	
	curtilage around the building in reflection its	
	original E-shape layout with former female and	
	male wards that once stood along northern and	
	southern sides. JJ Collins Ward, which had to be	
	demolished as part of the recent remediation	
	works, was one of them.	
	• Necessary conservation works and treatments	
	will be undertaken as part of the current and	
	future approvals to ensure the Administration	
	Building and the remaining buildings are	
	protected and appropriately managed for long	
	term preservation.	
	• This Heritage Impact Statement assesses the	
	proposed works in order to assist the Council in	
	its assessment of the works. The Conservation	
	Management Plan acknowledges the necessity	
	for the retained buildings adaptive reuses for the	
	retention and protection of the heritage	
	significance of the former Royal South Sydney	
	Hospital's site, which would otherwise continue to	
	be comprised.	
	• As noted earlier, the proposed adaptive reuse of	

SOUTH SYDNEY COUNCIL LEP 1998 (AS AMENDED) Part 4 Division 1 Heritage Conservation	THIS PROPOSAL RELATES TO THESE MATTERS AS FOLLOWS:
	the Administration Building will reinstate public access through the proposed "Matron Ruby Grant Park" and allow for the interpretive displays of its heritage significance within the main entrance lobby of the Administration Building. The future detailed design of the building and the site will investigate the possibilities to integrate further interpretive displays of the site's heritage significance.
<ul> <li>23 Protection of heritage items <ol> <li>A person must not, in respect of <ul> <li>a building, work, relic, tree or <ul> <li>place that is a heritage item:</li> </ul> </li> <li>(a) demolish, dismantle, move or <ul> <li>alter the building, work, relic,</li> <li>tree or place, or</li> </ul> </li> <li>(g) make structural changes to <ul> <li>the interior of the building or <ul> <li>work, except with the consent</li> <li>of the consent authority.</li> </ul> </li> </ul> </li> <li>(2) Consent must not be granted to <ul> <li>a development application <ul> <li>required by subclause (1) unless</li> <li>the consent authority has taken <ul> <li>into consideration the extent to</li> <li>which the carrying out of the </li></ul> </li> <li>proposed development would <ul> <li>affect the heritage significance of</li> <li>the item.</li> </ul> </li> <li>(3) The consent authority may <ul> <li>decline to grant a development</li> <li>application required by this</li> <li>clause until it has considered a</li> <li>statement of heritage impact or a</li> <li>conservation management plan,</li> <li>so as to enable it to fully consider</li> <li>the heritage significance of the</li> <li>item and the impact of the</li> <li>proposed development on the</li> <li>significance of the item and its</li> <li>setting.</li> </ul></li></ul></li></ul></li></ul></li></ol></li></ul>	<ul> <li>The proposal is for alterations and a rooftop addition in relation to the future adaptive reuse of a heritage item, listed on the South Sydney LEP 1998 as a group. Therefore, as described earlier the Council's Green Square Project team will submit a Development Application to obtain consent from Council.</li> <li>This report has assessed that the carrying out of the proposed partial demolition and a rooftop addition as well as insertion of a steel structural frame with shear walls within the western portion of the building and treatment of existing openings in varying forms will have no detrimental impact upon the heritage significance of the item. In fact, the proposal will allow for the long time vacant and damaged Administration Building to be used and appreciated again. As noted above, extent of fabric removal was studied by the project team to minimise fabric removal as much as possible and to create a suitable design for the rooftop addition that would balance the protection of the heritage significance of the Administration Building and its importance to the former Hospital site, against the proposed new life for the building as a Green Infrastructure. This Heritage Impact Statement has been prepared by the principal author of the</li> </ul>
SOUTH SYDNEY COUNCIL LEP 1998 (AS AMENDED) Part 4 Division 1 Heritage	THIS PROPOSAL RELATES TO THESE MATTERS AS FOLLOWS:
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Conservation	who has also provided heritage advice throughout
	the design development stage. The Administration
	Building will continue to be a dominant feature
	within the future urban context and developed
	nature of its site, which will incorporate five to
	eight storey mixed use residential and commercial
	buildings along the Portman Street boundary of
	the former Hospital site.
	The proposed design takes into consideration the
	recommendation of the CMP and reinstates the
	original arched entry of the Administration Building
	as well as the recommended heritage curtilage of
	15m north and south of the building to enhance
	the heritage significance of the site
27 Development of a site or place	Aboriginal beritage significance of the site bas
of potential or known	been assessed in the CMP and concluded that it
archaeological significance	is unclear if the site have some potential for any
(1) The consent authority may grant	remains of Aboriginal beritage within the site as
consent to the carrying out of	the site was located close to Waterloo Swamp
development on an archaeological site that has Aboriginal heritage	and Waterloo Dam. Notwithstanding, the site has
significance or a potential	a long history of sequence of development and
likely to have Aboriginal heritage	the sub-floor soil of the Building and its immediate
significance only if:	curtilage had to be cleared due to significant
(2) The consent authority may grant	contamination. No remnants that could be
consent to the carrying out of	considered Aboriginal relics were seen within the
site that has non-Aboriginal heritage	cleared areas of the site.
significance or a potential	The archaeological assessment contained in the
likely to have non-Aboriginal heritage	CMP concluded that the site has some
significance only if:	archaeological potential generally relating to the
	first phase of construction, c.1913. The
	underground archaeology would relate to the
	foundations and possibly demolition debris of
	ancilliary buildings and structures associated with
	the first phase of the construction of the former
	Hospital and with the third phase of expansion.
	These include former laundry, morgue, recreation
	room and laboratory buildings; however, they

SOUTH SYDNEY COUNCIL LEP 1998 (AS AMENDED) Part 4 Division 1 Heritage Conservation	THIS PROPOSAL RELATES TO THESE MATTERS AS FOLLOWS:
	have not been considered to be substantial
	remains or relics that would provide information
	on the construction system of such structures.
	The original laundry was located to the west of the
	Adminstration Building; however, during the
	demolition of the store and maintenance building
	no foundations could be observed. The current
	proposal incorporates interpretation of the
	footprint of the 1913 luandry building within the
	public domain curtilage and landscape for the
	Building.

# 5.1.2 SOUTH SYDNEY LEP 114 (SOUTHERN INDUSTRIAL AND ROSEBERY/ZETLAND PLANNING DISTRICTS)

The subject site also falls within the boundaries of the South Sydney LEP 114 (Southern Industrial and Rosebery/Zetland Planning Districts). The former Hospital site has been zoned as 5(a) - Hospital under Special Uses.

SOUTH SYDNEY LEP 114	THIS PROPOSAL RELATES TO THESE MATTERS
	AS FOLLOWS:
Part 1 - Preliminary Aims, Objectives, etc. (2) The specific aims of this Plan are:  <u>Built Environment</u> (m) to encourage the conservation of identified heritage items including both residential and non-residential buildings; and (n) to protect and enhance the buildings and streetscapes of the districts which are culturally, architecturally, socially, historically and aesthetically important; and (o) to conserve the built form of the existing residential areas and provide planning controls to ensure that development is compatible with the existing scale and density of the established urban environment;	<ul> <li>The subject development is consistent with the objectives and aims of the LEP as it allows for the protection of the heritage item, which has long been vacant and redundant. The proposed design and future adaptive reuse of the former Hospital building will ensure the heritage significance of the Building and the former Hospital site is appreciated and respected.</li> <li>The urban context of the former Hospital site is in the process of significant changes in terms of built fabric as well as type of developments. A number of high-rise residential and commercial developments have been built in the locality and will</li> </ul>

SOUTH SYDNEY LEP 114	THIS PROPOSAL RELATES TO THESE MATTERS
	AS FOLLOWS:
	continue as part of the future redevelopment of the Hospital site for mixed use development. The proposed scale and form of the Building will ensure that its existing dominant presence will remain dominant within the future urban context. This matter has been discussed in detail under the provisions of the LEP 1998 above.
Part 3 - Special Provisions 12. Heritage items (1) A person shall not, in respect of a building, work, relic, place or tree that is a heritage item - 	<ul> <li>As noted in the LEP 1998 table above consent of the Council will be obtained.</li> <li>The Development Application in relation to the proposed works will be accompanied by this Heritage Impact Statement. The provisions of the LEP 114 in relation to the heritage items, Conservation Areas or the Heritage Streetscape are similar to that of LEP 1998. Reference should be made to the previous table in relation to these matters.</li> </ul>

## 5.1.3 CITY OF SYDNEY HERITAGE DCP 2006

The former Royal South Sydney Hospital site and its main original buildings, including the Administration Building, are listed as heritage items under the South Sydney LEP 1998. The site is located within the Green Square Town Centre, which has its own DCP. The Green Square DCP sets out urban design guidelines for future development for the town centre including the former Hospital site. As the Green Square DCP generally deals with the future development parameters, the current proposal for the design and future adaptive reuse of the Administration Building will be assessed against the City of Sydney Heritage DCP only at this stage. The Heritage DCP 2006 provides objectives and provisions for the development of buildings with heritage significance, either individually or as part of their street or area. The proposed works are consistent with the objectives and provisions of the DCP as defined in sections 3.1, 3.2 and 4.0 of the DCP in that it:

- Protects and maintains the setting of the heritage item,
- Is consistent with the Heritage Inventory Assessment Report. A separate discussion has been provided below in Section 6.3,

- Retains all significant external and some internal spaces and elements as much as the future adaptive reuse requirements and the condition of the fabric allow.

CITY OF SYDNEY HERITAGE DCP 2006	THIS PROPOSAL RELATES TO THESE MATTERS
	AS FOLLOWS:
Heritage Items 3.2 Provisions (1) Any development application involving a heritage item is to be accompanied by a Heritage Impact Statement, Conservation Management Plan, or Conservation Management Strategy.	<ul> <li>The Development Application in relation to the proposed works will be accompanied by this Heritage Impact Statement. A Conservation Management Plan was prepared by this office for the entire site and was provided to the City of Sydney for the</li> </ul>
<ul> <li>(2) Development to a heritage item is to: <ul> <li>(a) be consistent with an appropriate</li> <li>Heritage Impact Statement,</li> <li>Conservation Management Plan or</li> <li>Conservation Management Strategy;</li> <li>(b) be consistent with the Heritage</li> <li>Inventory Assessment Report;</li> <li>(c) protect the setting of the heritage</li> <li>item;</li> <li>(d) retain significant internal and</li> <li>external fabric and building elements;</li> <li>(e) retain significant internal and</li> <li>external fabric and building elements;</li> <li>(e) retain significant internal and</li> <li>external spaces;</li> <li>(f) remove unsympathetic alterations</li> <li>and additions;</li> <li>(g) reinstate missing details and</li> <li>building elements;</li> <li>(h) use materials, finishes and colours</li> <li>that are appropriate to the significant</li> <li>periods of development or architectural</li> <li>character of the item; and</li> <li>(i) respect the pattern, style and</li> <li>dimensions of original windows and</li> <li>doors.</li> </ul> </li> <li>(3) Alterations to the room layout of</li> <li>heritage items are to ensure that</li> <li>the original room configuration remains</li> <li>discernable and can be interpreted.</li> </ul>	<ul> <li>satisfaction of this clause as part of the previous application for the current ongoing remediation works within the site.</li> <li>The majority of the partial wall removals will be undertaken as part of the current ongoing remediation works and are further investigated in accordance with the future adaptive reuse of the Building to minimise unnecessary wall removal. Partial wall removals, changes to the internal layout and additions to the building works have been acknowledged in the CMP and provided guidance in the identification of appropriate level of fabric removal as well as the design of the rooftop addition. Assessment of the proposed design has been discussed earlier and further reiterated against the Conservation Policies of the CMP in section 5.2 of this report.</li> <li>The Heritage Inventory Assessment Report for the site contains Council's standard management recommendations and the proposed works appear to be consistent with these recommendations as a CMP and HIS have been prepared to guide and assess the proposed works.</li> <li>The setting of the significant buildings including the Administration Building has</li> </ul>

CITY OF SYDNEY HERITAGE DCP 2006	THIS PROPOSAL RELATES TO THESE MATTERS
	AS FOLLOWS:
	already been enhanced by the removal of
	later intrusive additions and later buildings of
	little significance. The recent remediation
	works were result of extensive contamination,
	existence of hazardous materials and
	damage, and were necessary for the
	provision of safe and healthy environment for
	future occupants of the buildings under their
	future adaptive reuses. The buildings have
	been vacant for a long time with the exception
	of the Rehabilitation Building and the
	Neurological Building. The entire heritage
	listed buildings suffered from extensive
	contamination as well as vandalism causing
	damage to all significant internal fabric (and in
	the case of JJ Collins building to its external
	fabric, which necessitated its complete
	demolition). The recent ongoing remediation
	works allowed for the most important
	elements of the heritage buildings be rescued
	from further deterioration. Unfortunately, there
	were only very few areas within the front
	section of the Administration Building could
	be retained while the interiors of the
	remainder of the Building will need to be
	removed. However, it is considered that the
	rear section of the Administration Building has
	already been significantly modified and does
	not represent its original layout. Therefore,
	removal of the internal walls and preservation
	of its external form and fabric with the
	insertion of a contemporary but sympathetic
	rooftop addition will have no adverse impact
	on its heritage significance. This matter has
	been detailed in the previous section under
	the LEP controls and reiterated under the
	CMP policies below.

#### 5.2 COMPLIANCE WITH THE CMP POLICIES

The following table provides a summary of relevant conservation policies for the purpose of this Heritage Impact Statement. Detailed conservation polices have been provided in the Conservation Management Plan. Policy numbers relate to the numbers in the CMP.

CONSERVATION POLICY	THIS PROPOSAL RELATES TO THESE POLICIES AS FOLLOWS:
<ul> <li>9.3 Head Conservation Policy presents the key principles which form the basis of consideration for all the following conservation policies for the site. These principles arose from the constraints, issues and opportunities presented in the Conservation Policy Development section (Section 7.0) of the CMP.</li> <li>Please note: The entire policy has not been copied here as the specific polices below address the main issues and matters detailed in the Principal Policy.</li> </ul>	FOLLOWS: The proposed design for the adaptive reuse of the Administration Building and associated landscape to the immediate curtilage have adhered to the recommendations of the Head Conservation Policy as much as possible due to the site's and Building's special condition resulted in from the significant contamination and damage to the building fabric. The proposal allows for the future adaptive reuse of the Administration Building and responds to the significant aspects of the building itself, its immediate context and the requirements of its future use as a Green Infrastructure Centre. Removal of later additions and intrusive fabric as part of the current ongoing remediation works allow for reinstatement of original setting of the site. The new rooftop addition as detailed earlier is the result of extensive consultation and studies of the project team and has been favoured by the relevant stakeholders including City of Sydney Design Advisory panel and the Heritage and urban Design team
	The Building will maintain its dominance and role as a core element of the site.
9.3.3 Fabric and Setting 9.3.3.1 Conservation Process Policy 5 The approach to the conservation of individual built elements within the Precincts especially to the significant fabric of the Administration Building, Outpatients and Casualty Building, Pathology Building and Esme Cahill Building should be in accordance with their high level cultural significance, and be one of minimal intervention, with the philosophy of 'do as much as necessary, but as little as possible' being a primary consideration.	Although, the proposed design considers the requirements of the future adaptive reuse of the Building, the extent of fabric removal is the result of fabric condition and every effort had been made to minimise fabric removal as much as possible under the current remediation works. Contamination level was as such some of the fabric needed to be sacrificed to recover and

CONSERVATION POLICY	THIS PROPOSAL RELATES TO THESE POLICIES AS FOLLOWS:
	salvage the overall shell of the building. The
	project team has worked closely to ensure the
	significant fabric and structural integrity of the
	building is not compromised. Recommendations
	of a structural engineer has been sought and a
	steel frame with shear walls will be inserted within
	the rear portion of the Building to reduce any
	impact that could be caused from the vibration of
	the future Trigeneration plant and associated
	equipment.
9.3.3.2 Conservation of Significant Fabric (High Significance)	
Policy 7 Before making any decisions, which may	The Administration Building of the former Hospital
have a material effect, reference should	has been ranked as being of High level of
be made to the individual ranking of	significance in the CMP. The proposed adoptive
element.	significance in the Civir. The proposed adaptive
	and appeals that make the former Administration
	Building as an important element of the site. It
	Building as an important element of the site. It
	respects these values as identified in the CiviP
	and further investigated by the author during
	carrying out ongoing archival recording and the
	design development stage in consultation with the
	Architects. The proposed design allows for
	enhancement of the Building's streetscape
	presentation while balancing the requirements of
	the future adaptive reuse of it.
Policy 9 The Specific Policy Recommendations	
for individual buildings should guide any	The CMP recommendations for individual
work and uses for these buildings.	buildings have been the paramount guiding
	principles during identification of the appropriate
	treatment to the layout of the Building and its
	external elevations as well as form, scale of the
	rooftop addition, the palette of materials and the
	setting. As noted earlier, the author is the
	principal author for the CMP and has been
	working with the project team from the initial
	design stage to ensure retention of significant
	fabric as much the contamination and damage to
	the fabric as allowed as part of the ongoing

CONSERVATION POLICY	THIS PROPOSAL RELATES TO THESE POLICIES AS
	remediation works and the future designated adaptive reuse. The CMP acknowledges the necessity for fabric removal within the buildings and makes recommendations for mitigation measures. The recommendations of the CMP for archival recording of each building is an ongoing process and will further be implemented at the appropriate time accordingly. Refer to specific policies for the Administration Building further below.
<b>Policy 10</b> Where significant fabric has sustained damage or has deteriorated (e.g. asbestos contamination, vandalism, water penetration to roofs, walls, window frames and so forth), conservation works should be undertaken by an appropriately qualified professional to repair that damage in consultation with a suitably qualified heritage consultant.	City Plan Heritage, in particular the author, has been providing advice since the initial stage of the project and will continue to provide advice on the appropriate treatment, repair, conservation and archival recording of the Administration Building to ensure the impact on significant fabric is minimised during carrying out of the works.
<b>Policy 11</b> Repair, reinstatement and restoration of significant elements should be undertaken under the supervision of a suitably qualified conservation architect and should be based on the existing available evidence matching the materials and detailing of the original exactly. Any future restoration works for the reinstatement of the original arched entrance to the Administration Building and other significant buildings should be undertaken by a suitably qualified specialist tradesperson with relevant experience and skills.	As per above statement. The City of Sydney has taken into consideration of the requirement of this Policy and will ensure appropriately skilled professionals involved in this and future projects for the site. The proposed reinstatement of the original arched main entrance to the Building's Joynton Avenue facade is based and will be further detailed in accordance with the historical photographs and the original 1913 drawings of the former Hospital site.
<b>Policy 12</b> Specific proposals, involving physical intervention to the significant buildings and their surrounds should be accompanied by a Heritage Impact Statement (HIS) that assesses the likely impacts of the proposed works.	This Heritage Impact Statement satisfies the requirements of this Policy.
<b>9.3.3.3 Recording Change</b> <b>Policy 13</b> Any change to significant fabric and moderately graded fabric should be documented and recorded prior to	As noted before, the author is undertaking ongoing archival recording of the buildings within the site including the Administration Building and

CONSERVATION POLICY	THIS PROPOSAL RELATES TO THESE POLICIES AS
change through a Photographic Archival	will undertake further recording when the current
Recording. Copies of this documentation should be kept by the City of Council, and at the each Precinct's management office. Recordings before and during	remediation works are completed.
	It is anticipated that further archival recordings will
accordance with the relevant Heritage	be carried out during or after completion of the
Council guidelines on photograph and archival recordings. The recording of	future adaptive reuse works.
change to fabric of lesser significance, or	
minor change, should not be excessively	
the significance of the fabric affected.	
9.3.3.4 Control Physical Intervention	
to Fabric	
Policy 14	The demolition works to the interiors of the
retained and conserved as much as	Building are part of the current ongoing
possible while fabric identified as later addition with little significance should be	remediation works and are under separate
removed to recover original pavilion style	approval obtained from Council. The proposed
design intention of the Hospital. Intervention to significant fabric should	design that is subject of this report is only for the
be minimal and only undertaken where	provision of base building work for the designated
the overall cultural significance of the	future adaptive reuse of the Administration
site. An archival record, and a	Building as a Green Infrastructure Centre for the
of any alteration to fabric graded as High	Green Square Town Centre. The proposed
to Moderate, should be made and stored	design as detailed previously allow for the
on site and with relevant bodies.	conservation of most significant aspects of the
	Admin Building including its all important external
	elements in an appropriate treatment and varying
	forms. The majority of the internal fabric and the
	layout of the front original section of the Building
	will be retained so is the overall form and will
	enhance appreciation of its original setting by
	establishing an appropriate curtilage around it
	similar to that of original design intent. The front
	brick and stone fence along Joynton Avenue will
	not be affected by the current works. Restoration
	and conservation works are proposed to be part
	of the future adaptive reuse of the site's other
	retained buildings in accordance with the CMP
	recommendations.
<b>Policy 15</b> A suitably gualified conservation	It is anticipated that a suitably qualified heritage

professional, as identified in this

CONSERVATION POLICY	THIS PROPOSAL RELATES TO THESE POLICIES AS FOLLOWS:
Conservation Management Plan and the above management policy, must supervise all works to the site except for	consultant will be engaged by the Council as and
	if required in accordance with the
minor day to day maintenance and	recommendations of this Policy.
repairs as detailed in a Maintenance Schedule.	
10.0 Hospital Precinct 10.1 Administration Building	
Policy 16	The proposed design particularly focused on the
from the construction phase (1913) of	retention of the original 1913 fabric and layout of
the Building should be retained and	the Administration Building and maintains the
conserved using appropriate conservation processes. In particular,	majority of the walls within the front section on
the internal layout at front section of the	both ground and first floor levels of the building.
levels should be kept as much as	Wall removals in the original 1913 section of the
possible.	building are made in the form of very large
	openings to allow readability of the original layout
	and are part of the current remediation works
	under separate approval. All external features and
	detailing that have been retained will be made
	good following demolition of the adjoining later
	additions. Openings where the adjoining additions
	are removed have been blocked temporarily for
	security of the building until its future adaptive
	reuse works are implemented. In accordance with
	the proposed design these opening s will either
	be bricked up by reusing recycled bricks from the
	site or glazed with acoustic glazing for viewing
	purposes.
Policy 17	
sustained considerable contamination	As noted above the wall removals are part of a
due to asbestos materials, and remediation of the fabric to acceptable standards will require removal of the	separate approval currently being undertaken and
	are consistent with this policy statement.
floor on the ground level including removal of the walls at the rear section.	Structural engineer's advice has been and will be
	sought prior to the further demolition works
Removal of walls on both ground level rear section and the second level in full	commencing.
is acceptable provided that a structural	
engineer's advice is sought to ensure building's structural integrity is not	I his matter has been discussed above and at
compromised.	previous responses to the LEP and DCP controls.
Removal of walls on the first floor should	i ne proposed design tollows on from the current
be limited to the stud walls and be made	ongoing remediation works and works within the

CONSERVATION POLICY	THIS PROPOSAL RELATES TO THESE POLICIES AS FOLLOWS:
in conjunction with the proposed future layout for the building.	retained layout of the Building.
<b>10.9 Landscape</b> <b>Policy 40</b> Ensure the brick fence with sandstone capping and pillars is preserved and conserved. Undertake conservation works in a near future to prevent further deterioration. No new openings should be made along the fence to avoid loss of fabric. Opportunities should be explored to utilise Portman Street boundary of the site for any new vehicular and pedestrian accesses	Brick and sandstone fence along Joynton Avenue will be maintained and preserved. Conservation works will form part of future broader site landscape and adaptive reuse options for the site. The current proposal includes only road base landscaping around the Administration building and allows for the interpretive footprint of the former laundry building on Portman Street.

### 5.3 'STATEMENTS OF HERITAGE IMPACT' (NSW HERITAGE MANUAL)

The following table addresses the proposal in relation to relevant 'questions to be answered' in the *NSW Heritage Manual* 'Statements of Heritage Impact' guidelines relating to major partial demolition (including internal elements) of a building or structure.

QUESTIONS TO BE ANSWERED	THIS PROPOSAL RELATES TO THESE QUESTIONS AS FOLLOWS:
Is the demolition essential for the	• As discussed above partial removal of internal
heritage item to function?	walls of the Administration Building is part of
	the separate approval and was the result of
	extensive contamination and damage to the
	fabric with the future adaptive reuse of the
	Building as a Green Infrastructure being also
	envisaged. Although most of the rear section
	of the Building will be a shell, the proposed
	design will allow for the Building to be
	adaptively reused in an appropriate manner
	and improve its overall setting and
	appreciation by wider public through public
	access to the future Park and mixed use
	development along Portman Street of the site.
	The Building has been vacant for a long time
	and has been an "eyesore" together with the
	whole former Hospital site.

QUESTIONS TO BE ANSWERED	THIS PROPOSAL RELATES TO THESE QUESTIONS AS FOLLOWS:
Are particular features of the item affected by the demolition (e.g. fireplaces in buildings)?	<ul> <li>No significant aspects of the Administration Building will be affected by the proposed design. The original front section's layout of the Building is maintained discernible.</li> <li>The proposed design, in fact, will reinstate the original main arched entrance of the Building thus it will significantly improve the presentation of the Building from Joynton Avenue.</li> </ul>
Is the detailing of the partial demolition sympathetic to the heritage significance of the item (e.g. creating large square openings in internal walls rather than removing the wall altogether)?	<ul> <li>As noted earlier the proposed design will have minor additional demolition works as most of the demolition works are part of the separate approval currently being implemented. The minor additional demolition is the rear door opening to allow for large maintenance equipment to be brought in and out of the building. It is sympathetic to the heritage significance of the Administration building as this section of the Building has been ranked as Moderate significance and has already been modified. Notwithstanding, the proposed design provides for the interpretation of the existing openings on the rear facade by defining their shadow lines and using the salvaged bricks as a cladding to the new opening doors.</li> </ul>
If the partial demolition is a result of the condition of the fabric, is it certain that the fabric cannot be repaired?	• This matter has been discussed earlier and it essentially does not apply to the current proposal as the demolition works due to the condition of the fabric was part of the previous remediation approval.

# 6.0 CONCLUSION AND RECOMMENDATIONS

In summary, the proposed design is part of a staged redevelopment process for the former Royal South Sydney Hospital site and is a positive outcome due to the site's long term vacancy for more than a decade and hazardous condition. The building has been subject to demolition and rectification works that were necessary for the conservation and maintenance of the heritage buildings within the site. The buildings suffered from extensive contamination and damage throughout all levels. The recent remediation works removed all contaminated partitions, floors and some internal walls in a controlled and extensively studied form with consideration to the building's future adaptive reuse as a Trigeneration and Recycled Stormwater facility.

The proposed design is the result of extensive consultation between the architects, the City of Sydney project team including planning and heritage officers, and the author. It is based firstly on the heritage significance of the Administration Building, its condition, future development within the site and the sequence of development phases and forms of the building. The current design, which extends flush above the building's footprint provides a sympathetic and proportioned rooftop addition. The design respects the building's robust and repetitive fenestration and adds to its visual character in a positive manner while providing a new use that would allow for appreciation of its significant values and role as the core building of the former Hospital. The building originally was built in Federation Queen Anne style with a high aesthetic quality and was added to vertically in a similar way to the current design, two additional storey directly over the original ground floor level. Therefore, the current form of the vertical extension in a flush rooftop separated from the original base building by a "shadow gap" is considered a continuation of the previous 1930s-50s layers of additions to the building.

The adaptive reuse of the Building provides an opportunity for the interpretation of the site's long occupational history as a hospital and its importance for the community. The works will also provide an opportunity for the conservation of the building through maintenance and repair, and through reinstatement of original front arched entry detailing. The proposed design is suitable in terms of its form, overall scale and transparent material that provides an opportunity to create a sculpture like artwork and maintain the dominance of the Administration Building within its future urban context, in particular, those future mixed use residential and commercial developments within the former Hospital site. The design has a sensitive approach to the Building's significant aspects in the treatment of various elements including the window openings to all elevations while balancing the acoustic requirements of its future use.

Necessary conservation works and treatments will be undertaken as part of the current and future approvals to ensure the Administration Building and the remaining buildings are protected and appropriately managed for long term preservation.

The proposed design complies with the recommendations of the CMP and where it is not in compliance it allows for the necessary mitigation measures to be undertaken. The author has been involved in the project from the initial stages including the preparation of the CMP and provided guidance during the identification of the most appropriate way of carrying out the ongoing removal of the contaminated and damaged fabric, and during the development phase of the proposed design while maintaining and preserving the most significant aspects of the former Royal South Sydney Hospital site and the Administration Building.

It is anticipated that a schedule of Conservation Works will be prepared for the Administration building and the other retained heritage buildings including the Pathology, Outpatients and Esme Cahill buildings at an appropriate time in accordance with their future adaptive reuses. Given consideration to the current very poor and long term vacancy of the site with no public access, the proposed design and its associated adaptive reuse are seen as an opportunity to recover the significance and setting of the site and to allow for public access as well as interpretation of its heritage importance to the local community since 1913. Necessary mitigation measures have been incorporated within the proposed design and ongoing archival recordings as well as interpretive elements embedded into the Building's physical fabric. The current proposal incorporates the concept of the interpretive actions and it is anticipated that a detailed Interpretive Strategy will be developed for the whole site to enhance and improve experience of the site's and building's future users.

City Plan Heritage considers that the proposal has a high potential to create a 'state of the art' facility that would enhance the setting of the former hospital site and create an opportunity for appreciation of its heritage significance by wider public through heritage interpretation as part of its future adaptive reuses. The proposal is recommended to the Council of the City of Sydney for approval.

CITY PLAN HERITAGE
MAY 2012

# 7.0 ARCHITECTURAL DESIGN STATEMENT

#### CHOI ROPIHA FIGHERA

#### GREEN INFRASTRUCTURE CENTRE, GREEN SQUARE

(Adaptive Re-use of the former Royal South Sydney Hospital Administration Building)

#### ARCHITECTURAL DESIGN STATEMENT

#### Introduction

The site of the former Royal South Sydney Hospital (RSSH) is located at Joynton Avenue, Zetland, and is owned by the City of Sydney Council. The site falls within the Green Square Town Centre (GSTC) development precinct and has been identified by the City of Sydney as an opportune site to accommodate key public infrastructure projects as well as other development opportunities.

The former Royal South Sydney Hospital Administration Building is located midway along the length of the former RSSH site and forms a key part of a suite of buildings that have been identified as having heritage significance and worthy of retention. Given this, the former RSSH Administration Building has been identified by the City of Sydney Council for adaptive re-use with its new function earmarked as a Green Infrastructure Centre for the Green Square Town Centre.

The Green Infrastructure Centre will be designed to accommodate the installation of a trigeneraton plant capable of generating 12MW of power from renewable resources as well as accommodate a stormwater recycling facility designed to capture and treat the Town Centre stormwater run off for re-use. The adaptive re-use of the former RSSH Administration Building as the Green Infrastructure Centre for Green Square positions it at the heart of the Green Square Town Centre Green Infrastructure Plan and reinforces the City's commitment to the City of Sydney 2030 vision. It will aspire to become a demonstration project for similar installations of this type throughout the City of Sydney in the future.

Choi Ropiha Fighera were appointed in January 2012 by the City of Sydney Council to prepare a concept design and Development Application for the building envelope within which the future trigeneration plant and storwater recycling facility will be housed. The fitting out of this facility with the respective plant will be subject to a separate Development Application.

Choi Ropiha Fighera have prepared the following design statement as part of this Development Application to describe the overall project approach and proposal. It is anticipated that the conversion of the former RSSH Administration Building into the Green Infrastructure Centre for the Green Square Town Centre will help establish GSTC as a benchmark urban renewal project for the City of Sydney with the aspiration of it becoming an exemplar precinct for the City.

#### **Project Approach**

The proposed design emerges from the confluence of four disparate project demands. These include the technical requirements associated with the trigeneration plant, the site, heritage significance, and lastly, the need to establish an appropriate identity for the project which is in alignment the City of Sydney's ambition for it to become a leading example for precinct wide green infrastructure initiatives.

#### TECHNICAL CONSIDERATIONS

The spatial requirements to accommodate a trigeneration plant of the type and scale proposed at the former RSSH site are demanding and have resulted in the need for large volumes. The main engine hall will be in the order of 26 metres in length, 12 metres in width and 6.5 metres in height. Consequently the need to enlarge the existing building envelope in a manner that respected its heritage significance whilst contributing positively to its immediate site and broader context became a main design challenge. Furthermore, technical constraints associated with equipment loads, acoustics, vibration and ventilation requirements have been instrumental in determining the future plant configuration, structural solutions (for both the support of the new plant and the restraint of existing building fabric), as well as the overall architectural concept. Such technical requirements include a minimum open free area requirement of 80% for rooftop cooling units.

#### SITE

The former Royal South Sydney Hospital site when viewed in the broader context of the Green Square Town Centre and future adjacent Epsom Park Precinct, reveals its location relative to two key nodal points; the Epsom Road/Joynton Avenue intersection and the Green Square station. These two key nodal points are linked via a key desire line that extends across the former RSSH site through to the future Green Square Drying Green and main east-west boulevard beyond. This desire line has also been identified in the Draft Green Square DCP (October 2011) as a key view corridor to Green Square.

Upon closer examination of the site master plan, this desire line and view corridor in combination with other recommended through site links and pedestrian networks, establish the southern facade of the former RSSH Administration Building as a key area of public interface. This is further reinforced by its visual presence as a backdrop the future Matron Ruby Grant Park located to the south and the east-west pedestrian connection to the future Epsom Park cafe strip and bio-swale axis extending to Epsom Park beyond.

#### HERITAGE SIGNIFICANCE

The original Royal South Sydney Hospital (1909 - 1940) was inspired by the Queen Anne style of architecture and represented a high aesthetic quality. Its was configured in a pavilion style layout with the administration building at the centre and male and female wings located to the southern and northern sides respectively. Of particular note in the original configuration of the building was a 15 metre curtilage around the administration wing established by the male and female wings. This allowed the form of the Administration building to be experienced in the round and has been identified as an important device to be reclaimed.

The building has undergone various alternations and additions which commenced in the 1940's and continued on to the 1960's (when the main entrance was remodeled), and as a consequence is of local heritage significance only. The proposed adaptive re-use of the former Royal South Sydney Hospital Administration Building is seen as a continuation of this history of alterations and additions and its adaptation considered a positive outcome due to the sites long term vacancy and dilapidated state. Furthermore, it is proposed to reinstate the original arched entrance from Joynton Avenue which was re-constructed in the 1960's.

#### IDENTITY

The proposed adaptive re-use of the former Royal South Sydney Hospital Administration Building as the Green Infrastructure Centre for the Green Square Town Centre is seen as an opportunity to demonstrate and celebrate the City of Sydney's green infrastructure ambition. In doing so it will establish the Green Infrastructure Centre as a precinct level showcase project for future green infrastructure initiatives to be undertaken by the City of Sydney. The buildings architectural expression should thus seek to communicate its unique and exemplary role within the Green Square Town Centre precinct and in doing so, become landmark project for Green Square and the City of Sydney.

#### Proposal

The projects architectural expression is primarily one of a sculptural rooftop addition that has been precisely driven by the project's technical and spatial requirements as well as the aspiration to reclaim the original 15 metre curtilage which originally framed the building. The proposed rooftop structure seeks to reconcile the disparate requirements noted above by providing a solution that addresses the envelope and technical demands of the future trigenartion facility, whilst providing an outcome that supports and responds positively to the future site conditions, heritage requirements and importantly, aspirations for project's identity in the context of the Green Square Town Centre. The rooftop addition has been conceived as an extension of the original building, a new layer of history much like those that can be read in the layers of brickwork that make up the existing facades. In this regard it is an object that grows from the building as opposed to one that simply rests upon it to promote itself.

The proposed sculptured roof-top crowning element is to be formed from bays of interlinked blades of varying depths spaced to meet open area requirements for ventilation. They will be finished in a weathered copper toned metallic finish to compliment the materiality of the original building. The structure uses the technical constraint of 80% free open area to create a screened enclosure that results in an optical visual play through its materiality and form, play of light and shadow, and ever-changing transparency (resulting from the varying blade depths as one circumnavigates the building). The enclosure has a lightness but at the same time a weightiness that compliments and responds to the solidity and mass of the original building. This visual play is further enhanced by a deceptive structural design solution that eliminates secondary sub-framing accentuating the optical play of solidity and lightness. The combination of these techniques allows it to take on an ethereal quality elevating it from a purely pragmatic and technically responsive building to one befitting of civic quality and pride.

The 'up-scaling' the overall building envelope as a consequence of the rooftop addition results in a scale shift that elevates it to a more appropriate scale relationship with that of the future surrounding buildings that will vary in height from 18 storeys to the north to 8 storeys to the south. At the same time, the scale and rectilinear form of the rooftop addition also respects the original building's robust rectilinear geometry, and this is further enhanced by establishing a flush alignment between scalloped rooftop structure and the existing perimeter masonry walls. An expressed shadow gap articulates the junction between the new and the old, and doubles as a concealed perimeter box gutter.

Existing window openings are dealt with in varying ways as determined by either technical (acoustic) requirements, as well as aesthetic and overall compositional requirements. Proposed window treatments consist of either restored original windows, restored windows with new flush-set glazing located externally for acoustic performance requirements, entirely removed and replaced with new acoustic flush-set glazing as a contemporary insertion, or removed entirely and bricked-in with recycled bricks in a stack bond pattern and slight setback as a remnant marking of the original window opening. In some instances, window sills have been slightly lowered to act as viewing windows into the engine rooms of the trigeneration plant, which is response to one of the key project aspirations to become a showcase facility for the public to observe, engage and interact with. The proposed treatment of the exiting windows provides a modulation to the facade that results in a balanced reading of the buildings past use whilst acknowledging it's current state as an adaptive re-use facility.

Our Ref W4956 L01

Contact Andrew Reid

31 May 2012

City of Sydney Council Attention Mr David White GPO Box 1591 SYDNEY NSW 2001

Via email: dwhite@cityofsydney.nsw.gov.au

Dear David,

#### HYDROLOGY AND FLOODING ISSUES FOR PROPOSED GREEN **INFRASTRUCTURE CENTRE**

Following our site meeting of 8<sup>th</sup> May, we have prepared this review of hydrology and flooding issues for the proposed Green Infrastructure Centre at the former South Sydney Hospital site on Joynton Avenue. This letter provides a review of the overall site, but with a focus on the Infrastructure Centre, comprising:

- Modifications to the existing Administration Building.
- Water Re-use Facility,
- Automated Waste Collection System, and
- Trigeneration facility.

The former South Sydney Hospital site is located in the vicinity of a major overland flowpath and ponding area, thus flooding is a constraint to be considered for the redevelopment of the site. Cardno has previously completed modelling of the flood behaviour for the area as part of the Alexandra Canal Catchment Flood Study (2011) and the Green Square Town Centre project (2007-ongoing).

#### **Existing Flood Extent**

During a rainfall event, runoff is conveyed to the lowpoint in Joynton Avenue near the northern boundary of the site. Flows are conveyed in the underground drainage system as well as overland along Joynton Avenue, both from the north (O'Dea Avenue) and south (Epsom Road). The roadway serves as a de-facto detention basin in which water ponds in Joynton Avenue, spilling overland to Portman Street in larger events or draining via the underground drainage network when capacity is available.

Flooding occurs regularly at Joynton Avenue. Recently in February 2012, ninemsn (on 20 February 2012) reported that a storm event on the preceding day resulted in two-metre high floodwaters on Joynton Avenue trapping people in their cars. Previous storm events, such as in February 2010, have also resulted in significant inundation of Joynton Avenue.

Peak flood depths in the vicinity of the site based on the Alexandra Canal Flood Study for the 1% Annual Exceedance Probability (AEP) [alternatively referred to as the 100 year Average Recurrence Interval (ARI)] event are



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31 May 2012



shown in Figure 1. Probable Maximum Flood (PMF) peak depths are shown in Figure 2.

The deepest inundation occurs in Joynton Avenue near the northern boundary of the site, being around 1.7m deep in a 1% AEP event. Flood inundation of Portman Street is less significant. In a PMF event, flood depths of greater than 0.2m occur on the roadways adjacent to the site, with a peak depth of around 2.5m in the Joynton Avenue lowpoint.

Peak flood levels adjacent to the site are listed in Table 1 for the reference locations shown in Figure 3 (with the 1% AEP extent) and in Figure 4 (with the PMF extent).

Location	20% AEP	1% AEP	1% AEP +20% Rain Intensity	PMF
A	18.18	18.71	18.76	19.50
В	18.18	18.71	18.76	19.50
С	18.18	18.71	18.77	19.49
D	18.18	18.71	18.77	19.48
E	18.18	18.71	18.77	19.46
F	18.18	18.71	18.77	19.45
G	18.18	18.71	18.77	19.43
Н	N/A	18.71	18.77	19.41
I	N/A	18.71	18.77	19.39
J	N/A	18.71	18.77	19.33
К	N/A	18.71	18.76	19.23
L	N/A	N/A	18.76	19.20
М	N/A	N/A	18.76	19.18
N	N/A	N/A	18.75	19.18
0	N/A	N/A	18.75	19.11
Р	N/A	N/A	18.75	19.01
Q	N/A	N/A	18.66	18.83
R	N/A	N/A	18.45	18.75
S	N/A	N/A	18.57	18.83
Т	N/A	N/A	18.63	18.93
U	N/A	18.66	18.71	19.25
AA	N/A	18.69	18.74	19.27
AB	N/A	18.70	18.76	19.40
AC	N/A	18.71	18.76	19.48
AD	18.18	18.71	18.76	19.50
AE	18.18	18.71	18.76	19.51

Table 1 – Peak Flood Levels (from Alexandra Canal Catchment Flood Study)

\* N/A - not inundated



#### **Proposed Redevelopment**

A general plan showing the location of the facilities for the Green Infrastructure Centre is included as Figure 5.

#### Green Square Town Centre

Redevelopment of the Green Square Town Centre incorporates proposed raising of the levels of Joynton Avenue and providing alternative stormwater detention facilities. This will reduce the peak depth on the roadway but may not reduce the peak flood level significantly. These changes have not been incorporated in this analysis, and instead the focus is on comparison with existing conditions.

#### Hospital Site

Figure 6 shows a conceptual plan for the Hospital Site which includes:

- Removal of some existing buildings,
- Creation of open access between Joynton Avenue and Portman Street, and
- New multistorey residential and commercial buildings fronting Portman Street (marked as items 5 and 12 in the legend).

The existing buildings fronting Joynton Avenue inhibit the conveyance of overland flow across the site to Portman Street in rare and extreme rainfall events. Flood modelling has not been undertaken to evaluate the change to flood behaviour as a result of removing these buildings.

#### Green Infrastructure Centre

Figure 6 also shows components of the proposed Green Infrastructure Centre which includes:

- Alteration of an existing building to house the Trigeneration facility and the Water Re-use facility, and
- A new building for the Automated Waste Collection System (AWCS).

#### **Development Application**

This assessment considers the flood affectation related to the facilities for the Green Infrastructure Centre. However general information for the whole South Sydney Hospital Site is also provided, which could be utilised as base information for future development.

#### Constraints to development

Council's draft flood planning conditions are attached to this letter and are used as a basis for this assessment.

#### Flood extent

Council's conditions require that developments are not to result in adverse effects of flooding on neighbouring properties. While not specified, typically these impact assessments are evaluated for events up to the 1% AEP.

The existing main hospital building fronting Joynton Avenue acts as a barrier inhibiting flows ponding on the road from being conveyed onto and across the site. Proposed works on the site (separate to this DA) include opening the site with a 6m wide pedestrian zone and other accesses through the centre of the site. Water ponding on Joynton Avenue would therefore be conveyed westward resulting in increased flood inundation of Portman Street.

Table 2 lists the peak flood level and existing ground levels (from Aerial Laser Scanning data) for locations shown on Figure 7. The ALS levels show a high point in the middle of the site (at 18.91 and 18.99m AHD) that is higher than the 1% AEP event in Joynton Avenue (18.71m AHD). To prevent additional flood inundation in the 1% AEP on Portman Street post-development, the proposed accesses across the site would need to incorporate a crest (with the required freeboard).

The creation of the opening at the Joynton Avenue frontage are not part of this particular DA, though they may result in changes to the flood levels associated with the DA in both the 1% AEP and PMF. No modelling has been undertaken. It would be reasonable to assume that the levels would be between those on Joynton Avenue and Portman Street.

Location	Peak 1% AEP Water Level (m AHD)	Peak PMF Water Level (m AHD)	Ground Level on-site (near property boundary) (m AHD)	Roadway Level (m AHD)
С	18.71	19.49	17.4-17.5	17.3
D	18.71	19.48	18.0-18.3	17.6-17.8
E	18.71	19.46	18.3-18.4	17.6-17.8
F	18.71	19.45	18.4-18.6	17.9-18.0
I	18.71	19.39	18.6-18.9	18.3-18.4
0	N/A	19.11	18.5-18.6	18.6
Р	N/A	19.01	18.5-18.6	18.7
Q	N/A	18.83	18.4-18.6	18.6
R	N/A	18.75	18.0-18.2	18.4
AB-AC	18.71	19.44	18.5-18.6	N/A
AD-AE	18.71	19.51	17.6-17.7	N/A

Table 2 – Peak Flood and Ground Levels

The proposed Automated Waste Collection System (AWCS) building and alteration of the existing building for the Green Infrastructure Centre (GIC) are not expected to significantly alter the existing flood extent.

Though not the subject of this DA, the proposed multistorey buildings on the northern side of the site adjacent to the proposed East-West Boulevard (shown on Figure 6) are located on areas that experience some inundation in the 1% AEP event under current conditions. A flood storage area may need to be established to offset the loss of existing storage capacity to mitigate potential flood level increases.



#### Floor levels.

Council's flood planning level requirements apply different conditions for floor levels based on the proposed landuse (eg residential, commercial, child care). Generally it is required for floor levels to be a minimum of the 1% AEP and in some cases applying an additional 0.5m freeboard.

Frontages onto Joynton Avenue, Hansard Street and the proposed East-West Boulevard are inundated by mainstream / overland flooding thus would likely require the 0.5m freeboard. The majority of the Portman Street frontage is less affected, thus the floor level requirement may relate to the 0.3m above surrounding ground condition.

For the Green Infrastructure Centre DA, no residential or commercial buildings are proposed, but the flood information in this assessment may be transferable to other applications for consent on the South Sydney Hospital site. Changes to flood behaviour for the modifications to the existing building layout have not been determined from flood modelling, and therefore it is not possible to directly estimate levels across the site.

Flood planning levels for the DA buildings are defined with respect to utility protection and basement levels described in the following sub-sections.

#### Utilities

Infrastructure and utilities services for the Green Infrastructure Centre are proposed for the site. These include the Water Re-use Facility (the subject of an REF), Trigeneration (the subject of a DA by Cogent), and Automated Waste Collection System (AWCS) (the subject of a DA by Council) which would be approved separately.

The flood planning requirements in Council's draft policy requires that critical facilities, including sewerage and electricity plants and any installations containing infrastructure control equipment, are to have a floor level to the higher of the 1% AEP plus 0.5m freeboard or the PMF level. Facility machinery, such as the absorption chillers and power outlets, could be constructed on plinths to provide the required level. Component systems that are isolated from floodwaters, such as waste transfer pipes, do not necessarily need to be above the FPL. Alternatively, flood exclusion walls could be constructed to the FPL to exclude inundation. These utilities would thus continue to operate in a catchment flood event as they are floodproofed to the required level. The key requirement is therefore that all machinery and equipment be raised above the flood planning level or be floodproofed to this level.

Detailed flood modelling has not been undertaken for the proposed site layout which incorporates the open areas from Joynton Avenue to Portman Street. The peak 1% AEP water level of 18.71m AHD and peak PMF water level of 19.49m AHD from Joynton Avenue (listed in Table 2) are conservative assumptions for the peak levels adjacent to the Automated Waste Collection System (AWCS) building and GIC building. Thus the AWCS facilities could require protection from inundation that is about 1 to 1.5m above the existing adjacent ground level.

The proposed urea storage tank and balance tanks (Items 1 and 2 respectively on Figure 6) are constructed below ground and it is understood they will be sealed, thus would not be affected by flood inundation.

#### Basement levels

Council's draft policy relates flood planning requirements for underground carparks where the floor of the carpark is more than 1m below the surrounding natural ground. In such cases, the requirement is for a floor level (and any other openings or entries) to be the higher of 1% AEP plus 0.5m freeboard and PMF. The required level relates to potential economic losses and hazard to persons located within a below-ground area.

The AWCS building incorporates a basement area with vehicular access. However, it is understood that only up to two people would be permanently based at the AWCS with no permanent employees at



the proposed Trigeneration and Water Reuse Facility. A flood emergency response plan could be developed for the AWCS to manage safety and application of temporary flood barriers could be used to prevent inundation of the basement. The AWCS machinery would be installed on plinths above the flood level as described in the preceding Utilities sub-section. Vehicle access to the building would be restricted during a flood event, which would generally be of short duration (flash flood event).

The Green Infrastructure Centre (GIC) building does not incorporate a basement.

#### Structural design

The buildings in the flood affected areas must also be structurally designed to withstand the potential forces of floodwaters and built of flood compatible materials. It is noted that velocities are generally low across the site, so this is unlikely to be a critical issue. The key constraint is development of the structure to withstand the inundation.

#### On-site detention

On-site detention may be required for stormwater generated on the site which is irrespective of the overland flood volumes. This is generally to offset the additional runoff generated on a site post-development due to increased impervious areas. The existing site has a relatively high impervious proportion due to the extent of buildings and carparking areas.

#### The City of Sydney - Stormwater Drainage Connection Information states:

For all sites generally greater than 250 m<sup>2</sup> OSD is required in accordance with the current Sydney Water guidelines. That is, the 100yr Average Recurrence Interval (ARI) post-development site run-off must be limited to the pre-development 5yr ARI site run-off. All run-off must pass through a silt trap located on the site, before entering the City's drainage system.

It is noted that for this specific DA, there is no proposed modification to the impervious area and therefore OSD should not be required. However, it should be considered for the overall site, for which the proposed open space at Matron Ruby Gray Park could be assessed for this purpose (if required).

#### Climate Change

Potential effects of climate change include a rise in sea levels and increased rainfall intensity. Modelling for the Alexandra Canal Catchment Flood Study identified that sea level rise does not have a major influence on flood levels at this location. Increased rainfall intensity does influence peak flood levels at the site as shown in the elevated results for a 20% increase to the 1% AEP event. From work in similar development areas, it may be applicable to incorporate climate change into the flood planning level. However, it is noted that there is no strict policy on this within Council.

#### **LEP Clauses**

The following section provides an overview of Council's LEP provisions for flooding and the implications for the development.

#### LEP Amendment No. 17

Clause 27KH of the South Sydney Local Environmental Plan 1998 – Amendment No.17 Green Square Town Centre states:

#### 27KH Floodwater management

(1) The Council must not consent to development on land within the Green Square Town Centre unless it is satisfied that the development:

(a) will not adversely affect flood behaviour, including:

*(i) the flood peak at any point upstream or downstream of the proposed development, and (ii) the flow of floodwater on adjoining lands, and* 

(b) will not significantly increase any flood hazard or the likelihood of flood damage to any property, and

(c) will not restrict the capacity of any floodway, and

(d) will not increase the risk to the lives or personal safety of members of the public or emergency services and rescue personnel, and

(e) incorporates any freeboard levels and other flood proofing measures adopted by the Council in any relevant floodplain risk management policy.

(2) Without limiting subclause (1), the Council must not consent to development on land situated on the southern corner of Botany Road and O'Riordan Street, as shown hatched on the map, unless it is satisfied that:

(a) the development is consistent with any relevant floodplain risk management policies and local flood plans that have been adopted by the Council, and

(b) on completion of the development, the land will achieve a low hazard categorisation for a 1% AEP (Annual Exceedance Probability) flood event (as defined in the Floodplain Development Manual), having regard to the design of the development, including flood proofing and flood modification measures, and

(c) the development does not create or materially contribute to a significant risk to the safety of persons in a probable maximum flood (as defined in the Floodplain Development Manual).

- (3) This clause does not limit the operation of clause 38.
- (4) In this clause:

*Floodplain Development Manual* means the NSW Government's Floodplain Development Manual, as published in April 2005.

*floodplain risk management policy* means a floodplain risk management plan or policy that has been prepared in accordance with the Floodplain Development Manual. *local flood plan* includes any plan that sets out evacuation measures in the event of flooding.

Assessment with respect to the Clause 27KH has been reviewed and is listed in the following table for proposed Automated Waste Collection System (AWCS) and GIC facilities:

Clause	Response
Clause (1) The Council must not consent to develop	ment on land within the Green Square Town Centre
unless it is satisfied that the development:	
(a) will not adversely affect flood behaviour,	The proposed works would not be expected to
including:	adversely affect flood behaviour.
(i) the flood peak at any point upstream or	
(ii) the flow of floodwater on adjoining lands, and	
(b) will not significantly increase any flood hazard or	Machinery for the utilities in the buildings would
the likelihood of flood damage to any property, and	be constructed on plinths (or flood proofed) to
	above the 1% AEP plus 0.5m freeboard and PMF
	peak flood levels. The AWCS and GIC facilities
	would thus be able to continue operation during a
	flood event.
(c) will not restrict the capacity of any floodway, and	The proposed works would not be expected to
	restrict the capacity of any floodway.
(d) will not increase the risk to the lives or personal	As described in the Response to (b), the utilities
safety of members of the public or emergency	are designed to continue operation in a flood
services and rescue personnel, and	event. The small number of personnel on-site
	could use these elevated plinths as safe refuge.
(e) incorporates any freeboard levels and other flood	Machinery plinth levels (or floodproofing) in the
proofing measures adopted by the Council in any	proposed buildings are proposed to be above the
relevant hoodplain risk management policy.	1% AEP plus 0.5m freeboard and PMF peak
	flood levels. The buildings would be floodproofed
	Delow Inis level.
Clause 2	Subject site is not situated in the specified
Clause 3	Clause 28 has not been reviewed
	Notod



#### LEP Amendment No. 114

Clause 27 of the South Sydney Local Environmental Plan 1998 – Amendment No.114 states:

#### Flood Liable Lands

(27) Council shall not grant consent to the erection of a building or the carrying out of works on land to which this plan applies if, in the opinion of the council.

(a) the land is within a floodway; and

(b) the carrying out of development is likely -

(i) to adversely impede the flow of flood waters on that land or land in its immediate vicinity (ii) to imperil the safety of persons on that land or land in its immediate vicinity in the event of those lands being inundated with flood waters.

(iii) to aggravate the consequences of floodwaters flowing on that land or land in is immediate vicinity with regard to erosion or siltation.

(iv) to have an adverse effect on the water table of that land or of land in its immediate vicinity.

Responses with respect to Clause 27 follow:

<u>Subclause a.</u> The subject site is located adjacent to Joynton Avenue which is a significant overland flowpath during storm events but determination of the floodway extent has not been determined. The Alexandra Canal Catchment Flood Study identifies high hazard conditions in Joynton Avenue. However, a floodway is not expected to be located on the subject site itself, so this condition is not expected to apply.

<u>Subclause b(i)</u>. The proposed works are not expected to adversely impede flood flows. However, for Case B (in comments for Clause 27KH) flowpaths are opened which may adversely impact downstream.

Subclause b(ii). Refer to previous responses for Clause 27KH, Subclauses 1b and 1d.

<u>Subclause b(iii)</u>. The subject site is located in a highly developed area and would not be expected to have an adverse impact on erosion or siltation. Erosion and sediment control should be implemented adequately during construction in accordance with the Blue Book.

Subclause b(iv). Effects on the water table have not been reviewed as part of this assessment.

#### 31 May 2012



#### Recommendations

The current floor level for the existing building proposed to house the Trigeneration Facility (Green Infrastructure Building) is advised as 19.11m AHD. The flood planning level is conservatively estimated as 19.49m AHD. A raised platform above the PMF level for plant inside the building or internal barriers to exclude flow could be constructed to provide protection from inundation. The structural soundness of the existing building façade to flood inundation should be confirmed.

Machinery in the AWCS building would be constructed on plinths above the required flood level and utilities installed below would be floodproofed. The flood planning level for the AWCS building is conservatively estimated as 19.49m AHD.

The potential changes to flood behaviour in the 1% AEP and PMF events for the opening of Joynton Avenue to Portman Street have not been determined. Additional flood modelling and assessment would be required to define changes to flood extents and resultant water levels. However, the application of flood levels from Joynton Avenue provides a conservative estimate for the purposes of the current DA.

During construction, typical measures will need to be applied to the site for erosion and sediment control. The existing ground levels (from ALS) on the proposed works site are generally above the 10% AEP flood level in Joynton Avenue (being 18.45m AHD), thus the works area may be affected by catchment flood events larger than 10% AEP. Consideration should be given to mitigation measures to manage potential flood inundation of the site during the construction phase. This may involve the preparation of a flood emergency response plan that identifies a flood-free area for evacuation of personnel and potentially construction equipment.

Should you have any questions, please feel free to contact either Rhys Thomson or myself on 9496-7700.

Yours faithfully

Andrew Reid Senior Engineer for Cardno (NSW/ACT) Pty Ltd

Attachments – Figures (seven pages), and FPL Requirements (two pages)







Figure 1 - 1% AEP Peak Depth

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Figure 2 - PMF Peak Depth





Figure 3 - 1% AEP Flood Extents





Figure 4 - PMF Flood Extents

31 May 2012





Figure 5 – DA Plan for Hospital Site (received 30/05/2012)



Figure 6 – Hospital Site Concept (received 30/05/2012)







Figure 7 – Existing Ground Elevations And Peak Flood Levels



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#### FLOOD PLANNING LEVEL REQUIREMENTS

Item	Flood Planning Level	
Residential Properties:		
Habitable Room Floor Level:		
Inundated by mainstream flooding	1% AEP level + 0.5 m	
Inundated by local drainage flooding	1% AEP level + 0.5 m or if the depth of flow in the 1% AEP is $< 0.25$ m then 2 x the depth of flow with a minimum of 0.3 m above the surrounding surface	
All other properties	0.3 m above surrounding ground	
Non-Habitable Floor Level such as a g	arage (excluding underground garages)	
or laundry for which development app	roval is required):	
Inundated by mainstream or local drainage flooding	1% AEP	
Underground car park:		
For this purpose an underground garage is more than 1 m below the surrounding r	or car park is where the floor of the car park natural ground.	
Single property owner with not more th	han 2 car spaces:	
Inundated by mainstream or local overland flooding,	1% AEP level + 0.5 m	
Car park outside floodplain	0.3 m above the surrounding surface	
All others:		
Inundated by mainstream or local overland flooding	1% AEP level + 0.5 m (as a minimum) or a level that is determined based on a review of the PMF, whichever is the higher	
Car park outside floodplain	0.3 m above the surrounding surface	
Industrial/Commercial Properties		
Floer lovel of a husiness	Marite engrands areas and huthe	
	applicant with a minimum of 1% AEP level	
Floor level of schools and child care	Merits approach presented by the	
facilities	applicant with a minimum of 1% AEP level	
Residential floors within tourist establishments	applicant with a minimum of 1% AEP level 1% AEP level + 0.5 m	
Residential floors within tourist establishments Housing for older people or people with disabilities	applicant with a minimum of 1% AEP level 1% AEP level + 0.5 m 1% AEP level + 0.5 m (as a minimum) or a level that is determined based on a review of the PMF, whichever is the higher	



)/R/A//576

These include: hospitals and an and SES stations; major transpo- installations containing infrastru- use in a flood.	cillary service; communication centres; police, fire ort facilities, sewerage and electricity plants; any cture control equipment, any operational centres for
Floor level	1% AEP + 0.5 m (as a minimum) or a level that is determined based on a review of the PMF, whichever is the higher.
Access to and from	1% AEP + 0.5 m (as a minimum) or a level that is determined based on a review of the PMF, whichever is the higher.

underground parking or other forms of underground development, the FPL refers to the minimum level at each access point. The higher of any FPL shall prevail.

W:\City Community & Cultural Services\City Infrastructure\Technical Services\Stormwater\Floodplain managemnt\Flood Planning Level Requirements.doc


Report on Review of Contamination Issues

Design Modifications to the Administration Building Former Royal South Sydney Hospital 3 Joynton Avenue, Zetland

> Prepared for City of Sydney Council

> > Project 44621.03-1 May 2012



# **Douglas Partners** Geotechnics | Environment | Groundwater

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The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

Signature	Date
Author Toutholl	31 May 2012
Reviewer pp / 2	31 May 2012



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Appendix A:	Drawings and Notes About this Report
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#### **Glossary of Terms**

ACM	asbestos cement materials
AHD	Australian height datum
ANZECC	Australian and New Zealand Environmental & Conservation Council
BaP	benzo(a)pyrene (a polycyclic aromatic hydrocarbon compound)
bgl	below ground level
BTEX	benzene, toluene, ethyl benzene, total xylenes (monocyclic aromatic hydrocarbons)
DEC	Department of Environment and Conservation (now superceded)
DP	Douglas Partners Pty Ltd
D.P.	deposited plan
EPA	Environmental Protection Authority
GW	groundwater
GIL	groundwater investigation level
ha	hectares
HIL	NSW DEC Contaminated Sites: <i>Guidelines for the NSW Site Auditors Scheme (2<sup>nd</sup> edition), 2006.</i> Health-based investigation levels (Columns 1 to 4)
km	kilometre
L	litre
LOP	level of protection
m	metre
m <sup>2</sup>	square metre
mg/kg	milligrams per kilogram (or parts per million)
mg/L	milligrams per litre (or parts per million)
NATA	National Association of Testing Authorities
NSW	New South Wales
OCP	organochlorine pesticides
OPP	organophosphate pesticides
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyls
рН	unit measure of acidity/ alkalinity
PID	photoionisation detector
PPIL	NSW DEC Contaminated Sites: <i>Guidelines for the NSW Site Auditors Scheme (2<sup>nd</sup> edition), 2006.</i> Provisional phytotoxicity-based investigation level (Column 5)
PQL	practical quantitation limit
RAP	remediation action plan
SAC	site assessment criteria
TRH	total recoverable hydrocarbons



TPH	total petroleum hydrocarbons (laboratory results quoted for TPH in this report are TRH
	unless specifically stated otherwise)
µg/L	microgram per litre (or parts per billion)
UCL	upper confidence limit of data set
UST	underground storage tank
VOC	volatile organic compound
%	percent
<	less than
≤	equal to or less than
>	greater than
≥	equal to or greater than

Note: All acronyms listed above may not have been used in the report



### Review of Contamination Issues Design Modifications to the Administration Building Former Royal South Sydney Hospital, 3 Joynton Ave, Zetland

#### 1. Introduction

This report has been prepared by Douglas Partners' (DP) on behalf of City of Sydney Council (CoS) to form part of a development application submission for Design Modifications to the Administration Building to accommodate a Trigeneration Facility and a Stormwater Recycling Facility at the former Royal South Sydney Hospital site, located at 3 Joynton Avenue, Zetland. The report has been prepared in accordance with DP's proposal dated 11 April 2012.

For the purposes of this report the land within the Administration Building and surrounding development area as shown on Drawing 1, Appendix A will be referred to as the "Site", whilst the larger former Royal South Sydney Hospital property of which the Site is a part will be referred to as the former hospital site.

A number of previous reports relating to contamination have been prepared for the former hospital site, as discussed below. A NSW Environmental Protection Authority (EPA) accredited Site Auditor, Ms Rebeka Hall of WSP Environmental, has been appointed to audit the contaminated land management works at the former hospital site, including at the Site.

The purpose of this report is to provide details on the contamination status at the Site, implication of the contamination status on the proposed development, and advice on how contamination issues should be managed during the proposed development works.

#### 2. Scope of Works

The scope of the report is to:

- Review available previous reports, including the Phase 2 Contamination Assessment, with specific reference to the Site;
- Preparation of a drawing showing locations relevant to the Site;
- Preparation of tables of results relevant to the Site;
- Discussion of contamination present at the Site, and its implications for the proposed development;
- Recommendations for future works required from a contamination perspective in relation to the Site, and discussion of how these are being addressed as part of proposed contaminated land management for the former hospital site.



#### 3. Site Description

#### 3.1 Site Identification

The Site for the purpose of this report is the Administration Building and surrounding areas as shown on Drawing 1, Appendix A. The Site covers an area of approximately 3,290 m<sup>2</sup> located in the central portion of the former hospital site.

The former hospital site is identified as Lot 1 in Deposited Plan (D.P.) 136025, although the Lot and D.P. identifications are expected to change as part of the redevelopment process.

#### 3.2 Site Condition and Surrounding Land Use

Inspections of the Site and surrounding land were undertaken in 2007 and 2011. The former hospital site was located within a commercial / industrial area of Zetland, on the western side of Joynton Avenue. A Mercedes Benz car dealership was located to the north of the former hospital site. Industrial properties were located beyond Hansard Avenue to the south, while some residential properties were located along Hansard Avenue. Waverly Council depot was located to the west of the site beyond Portman Street. CoS Works Depot was located to the east of the site in 2007, beyond Joynton Avenue. At the time of the inspection in 2007, the former hospital site was occupied by buildings of various ages surrounded by bituminous concrete and concrete pavements mainly associated with car parking. Some landscaped areas were present across the Site.

In 2007 the older section of the Esme Cahill building located at the southern end of the former hospital site (i.e. south of the Site) was occupied by residents and businesses. This included Health at Greensquare, Lady Gowrie Centre, Folbade Pty Ltd and John Cameron Constructions. The buildings at the northern end of the former hospital site (i.e. north of the Site) were also in use. A former day care centre located on Joynton Avenue was used as a community hall. Based on DP's inspection in 2011 the Esme Cahill building and the community hall are still being used.

The central portion of the former hospital site, containing the Site is surrounded by a 3 m high chain link fence, and all buildings within the area were vacant. Access is restricted due to the presence of potential asbestos containing materials (ACM), which it is understood are currently in the process of being removed.

The area of the Site includes the Administration Building, former Laundry Building (also previously used for maintenance and biohazard waste storage) and a small section of the former J.J. Collins Ward. Around the buildings was a mixture of soft landscaping and hardstand.

It is understood that demolition works are currently underway in accordance with a development consent obtained for the works in 2011. The demolition works at the former hospital site are being undertaken by DECC Contractors and are expected to be completed by the end of 2012. Demolition works at the Site comprise demolition of all buildings except for the Administration Building. Hazardous building materials will be removed from the Administration Building as part of the demolition works.



#### 3.3 Geology and Hydrogeology

Reference to the Sydney 1:100 000 Geological Series map indicates that the site is underlain by Quaternary alluvium, comprising fine to medium grained marine sand with podsols. Field observations from previous investigations confirmed the presence of sand and silty sand extended to a depth of at least 3 m below ground level (bgl). A summary of the conditions encountered is provided below:

- FILL Fill was encountered in most of the bores to depths of between 0.2 m and 3 m bgl. However, sampling locations BH2, BH8 and BH15 were discontinued in fill at 3.5 m bgl; BH1 and BH16 were discontinued in fill at 0.5 m bgl, while BH19 was discontinued in fill at 0.2 m bgl.
- SAND Subsurface conditions encountered in the bores comprised largely loosely compacted sands, and some silty sands.
- PEATY LAYERS Sandy peat layers overlying sand were encountered in sampling locations BH4, BH9, BH11, BH17, BH18 and BH24.

The site was observed to be generally flat with a slight westerly down gradient. Groundwater was observed between 3.4 m and 4 m bgl (or 18.5 - 19.8 m above mean sea level, Australian Height Datum). Groundwater flow is inferred to be to the south towards Eastlakes Mill Pond and Botany Bay. Surface water is expected to flow into the local stormwater system.

The nearest surface water feature to the site is Alexandra Canal, located approximately 1.5 km west of the site. Alexandra Canal is a tributary of the Cooks River which is subject to tidal influence from Botany Bay.

It is noted that the northern portion of the former hospital site has historically been subject to significant flooding. The neighbouring site to the north is topographically higher than the site. No records of flooding exist for the southern portion of the former hospital site.

A review of the Botany Bay Groundwater Management Zones map on 3 May 2012 indicated that the site is located in Zone 2 of the management area. Zone 2 indicates that domestic groundwater use is banned. The four management zones are based upon information obtained by the NSW Government in regard to contamination in the Botany area.

#### 4. **Proposed Development**

The proposed development comprises design modifications to the Administration Building, identified as Building 01. The building is to be used as a Green Infrastructure Centre. The proposed land use is commercial/ industrial in nature.

The proposed redevelopment works include:

- Slight increase to the building footprint on the northern side of the building;
- Removal of the current flooring in the building and testing for, and remediation of, contamination in the underlying soils as required. Note asbestos cement contamination from the building has



been identified on damaged flooring in the building, and is expected to be present beneath the current flooring;

- Construction of a new concrete floor slab inside of the building. This slab will be constructed directly onto the ground surface with independent, piered support to rock below;
- Construction of a circular driveway from Portman Street. The driveway will be a concrete slab-onground construction;
- Construction of a services corridor between the Administration Building and Portman Street, including Green Infrastructure services, sewer, water etc.;
- Construction of a services corridor between the Administration Building and Joynton Avenue;
- Installation of five underground storage tanks to the north of the building for storage of Urea by the future Trigeneration operator and incoming Stormwater storage to be treated by the Recycled Stormwater Management System; and
- Landscaping, including a mixture of hard and soft landscaping. Soft landscaping will be undertaken at the Portman Street entrance and a granite road base will be used for temporary landscaping around the building curtilage.

Drawing 1, Appendix A shows the main features of the proposed development.

#### 5. Site Assessment Criteria (SAC)

#### 5.1 Soils

The Site Assessment Criteria (SAC) have been adopted based on the following EPA endorsed guidelines:

- Soil Investigation Levels for Urban Development Sites in NSW as specified in NSW Department
  of Environment and Conservation (DEC) *Contaminated Sites: Guidelines for the NSW Site
  Auditors Scheme 2<sup>nd</sup> edition,* 2006. Appendix II, Soil investigation levels for urban development
  sites in NSW [the health-based investigation levels (HILs) and Provisional phytotoxicity-based
  investigation levels (PPILs)],
- NSW EPA *Contaminated Sites: Guidelines for Assessing Service Station Sites* (1994) [for total petroleum hydrocarbons (TPH) and benzene, toluene, ethyl benzene and total xylenes (BTEX)].

Where no EPA endorsed thresholds are available, reputable national or international guidelines were used as reference levels.

The Site will be redeveloped as a Green Infrastructure Centre, which is considered to be consistent with a commercial/ industrial land use, however, the larger former hospital site will be redeveloped for a mixed use development including medium to high density residential, community facilities and recreational open space.



On this basis contaminant levels across the Site have been assessed with respect to the SAC for commercial/ industrial land use (i.e. SAC 3). However, given contamination at the Site will be managed in conjunction with other areas of the former hospital site which will be developed for more sensitive land uses, reference has also been made to the SAC for these land uses.

In addition, aesthetic issues (e.g. odours, staining, anthropogenic inclusions) will also be taken into account. Any identified aesthetic issue will be individually assessed based on the field observations, depth of the issue of concern and the proposed land use.

A contaminant concentration in soil/fill is considered to be significant if:

- 1. The concentration of the contaminant is more than 2.5 times the SAC. Any location more than 2.5 times the SAC is classified as a 'hotspot', requiring further assessment/management.
- 2. The calculated 95% upper confidence limit (UCL) of the average (excluding any 'hotspot' concentrations) of the data set for the contaminant exceeds the SAC.
- 3. The standard deviation of the results is greater than 50% of the HIL.

For residential developments and parkland it is a requirement that the phytotoxic effects of heavy metals are considered. The DEC (2006) PPIL have been adopted as the screening SAC for potential phytotoxic impacts. It is noted that the PPIL are only considered to apply to soils which are available for plant growth. As such PPIL exceedances will not be considered to be an issue of concern for soil beneath buildings or below the root zone. PPIL apply to single values only and cannot be analysed statistically.

The proposed land use categories and relevant SAC are shown in Table 1 and the SAC are shown in Table 2.

Proposed Land Use	SAC				
	Site				
Green Infrastructure Centre Commercial/ industrial SAC 3					
	Other Areas of Former Hospital Site				
Mixed Residential and Commercial	Residential with minimal access to soil	SAC 1 (+PPILs outside building footprints)			
Parks/Civic Area	Parks and recreational open space	SAC 2 + PPIL			
Community Use Commercial		SAC 3			

Table 1	Pronosed	Landuse	Categories	and SAC
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	SAC				
Contaminant		(m	ng/kg)		Source/ Rationale
	SAC 1	SAC 2	SAC 3	PPIL	
ТРН					
$C_6 - C_9$	65	65	65	-	EPA (1994) <sup>1</sup>
$C_{10} - C_{36}$	1000	1000	1000	-	
TPH (Additional Criteria)					
TPH >C <sub>16</sub> -C <sub>35</sub> (aromatics)	360	180	450	-	DEC $(2006)^2$
TPH >C <sub>16</sub> -C <sub>35</sub> (aliphatics)	22,400	11,200	28,000	-	BE0 (2000)
TPH >C <sub>35</sub> (aliphatics)	224,000	112,000	280,000	-	
BTEX					
Benzene	1	1	1	-	
Toluene	1.4	1.4	130	-	EPA (1994) <sup>1</sup>
Ethylbenzene	3.1	3.1	50	-	
Xylene	14	14	25	-	
Metals					
Arsenic (total)	400	200	500	20	
Cadmium	80	40	100	3	
Chromium	400	200	500	400	
Copper	4,000	2,000	5000	100	
Lead	1,200	600	1500	600	
Mercury	60	30	75	1	
Nickel	2,400	600	3000	60	
Zinc	28,000	14,000	35000	200	
Total Phenols	34,000	17,000	42,500	-	DEC (2006) <sup>2</sup>
PAH					- ( /
Total	80	40	100	-	
Benzo(a)Pyrene	4	2	5	-	
РСВ	40	20	50	-	
OCP					
Aldrin + dieldrin	40	20	50	-	
Chlordane	200	100	250	-	
DDT (including DDD, DDE, DDT)	800	400	1000	-	
Heptachlor	40	20	50	-	
Asbestos	No a	sbestos prese	nt in soil at the	surface	DEC <sup>3</sup>

#### Table 2: Site Assessment Criteria for Soils

Notes to Table 2:

SAC 1 SAC for Residential with minimum access to soil including high-rise apartments and flats [DEC (2006) HIL Appendix II, Column 2]

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- SAC 2 SAC for Parks, recreational open space, playing fields including secondary schools [DEC (2006) HIL Appendix II, Column 3]
- SAC 3 SAC for Commercial/Industrial land use [DEC (2006) HIL Appendix II, Column 4]
- PPIL Provisional phytotoxicity-based investigation levels [DEC (2006) PPIL Column 5]
- 1 NSW EPA Contaminated Sites Guidelines for Assessing Service Station Sites (1994) threshold concentrations for sensitive land use-soils.
- 2 DEC Contaminated Sites Guidelines for the NSW Site Auditor Scheme [2nd Edition (2006)] Health Investigation Levels Columns 2, 3 and 4
- 3 There are no EPA endorsed guidelines for asbestos in soil relating to human health. DEC (2006) states that Auditors must exercise their professional judgement when assessing whether a site is suitable for a specific use. The DEC states that the position of the Health Department is that there should be no asbestos in surface soil
- no threshold specified

#### 5.2 Groundwater

The main receiving body for migrating groundwater from the site is likely to be Alexandra Canal, a tidal/ brackish canal linked to Botany Bay. This marine water canal is located approximately 1.3 km to the west of the site. Any intermediate groundwater environments are likely to be fresh water in nature. The levels of contaminants in groundwater were therefore assessed against Groundwater Investigation Levels (GILs) for both marine and freshwater environments adopted from applicable guidelines, as defined in Table 3. Due to groundwater contamination associated with Orica Botany, the site is located in the Botany Aquifer Management Zone 2 (www.oricabotanygroundwater.com). Ground water use is banned in this zone. The risk of local groundwater being extracted for recreational, irrigation or drinking water purposes is therefore very minimal. Groundwater in the region and water in Alexandra Canal is considered to be disturbed from urban and industrial land use in the area, and as such the 95% Level of Protection (LOP) has been adopted – which is considered to be conservative.



Table 3: Groundwater Investigation Levels (	GIL) and Rationale
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Contaminant	Adopted Criteria - GIL(µg/L)	Rationale
TRH <sup>#</sup>	450	Airport (Environment Protection) Regulations (1997), Schedule 2
$C_6 - C_9$	150	Water Pollution Accepted Limits: Table 1.03 – Accepted limits of
>C9	600	Contamination [adopted due to the absence of high reliability NSW
BTEX Toluene Ethyl benzene	300 140	NSW EPA Contaminated Sites <i>Guidelines for Assessing Service</i> <i>Station Sites</i> (1994) <i>Threshold concentrations – waters, Protection of</i> <i>Aquatic Ecosystem, fresh</i> is adopted in the absence of other comprehensive investigation levels for toluene or ethyl benzene in
xylene	380	groundwater.
BTEX	700 <sup>1</sup> / 050 <sup>2</sup>	
Toluene	180 <sup>4</sup>	ANZECC (2000) Australian Water Quality Guidelines for:
Ethylbenzene	$5^{5}/80^{6}$	
o-xvlene	350 <sup>7</sup>	1. the protection of 95% of marine species;
m-xylene	75 <sup>8</sup>	<ol> <li>the protection of 95% of freshwater species;</li> <li>marine low reliability trigger value;</li> </ol>
Metals		4. low reliability trigger value for fresh and marine species,
Arsenic (V)	2.3 <sup>3</sup> /13 <sup>2</sup>	recommended for slightly-moderately disturbed systems;
Cadmium	5.5 <sup>1</sup> /0.2 <sup>2</sup>	5. Iow reliability ingger value for marine species, recommended for slightly-moderately disturbed systems:
Chromium (III)	27.4 <sup>1</sup> / NS <sup>2</sup>	6. low reliability trigger value for fresh species, recommended
Copper	1.3 <sup>1</sup> /1.4 <sup>2</sup>	for slightly-moderately disturbed systems;
Lead	4.4 <sup>1</sup> /3.4 <sup>2</sup>	<ol> <li>trigger value moderately reliability for fresh and low reliability for marine species, recommended for slightly-</li> </ol>
Mercury	0.4 <sup>1</sup> /0.6 <sup>2</sup>	moderately disturbed systems;
Nickel	70 <sup>1</sup> /11 <sup>2</sup>	8. low reliability trigger value for fresh and marine species,
Zinc	15 <sup>1</sup> / 8.0 <sup>2</sup>	recommended for slightly-moderately disturbed systems;
PAH		and marine species: and
Total	NS	10. low reliability trigger value for the protection of 95% of fresh
Naphthalene	70 <sup>1</sup> / 16 <sup>2</sup>	species.
Benzo(a)pyrene	0.29	
Anthracene	0.4 <sup>10</sup>	According to ANZECC 3.4.2.2, a 95% protection level is appropriate
Phenanthrene	2 <sup>9</sup>	given the region of Zetland is considered to be a moderately
Fluoranthene	1.4 <sup>9</sup>	disturbed urban environment.
VOCs		
Individual	NS	-
Phenols	1 2	
Total	400' / 320 <sup>2</sup>	

Notes:

NS Trigger value not specified.

# The ANZECC & ARMCANZ (2000) 'low reliability' final chronic value of 7 μg/L for petroleum hydrocarbon was not used because the value is applicable to crude oil rather than refined oils. **Douglas Partners** 

#### 6. **Previous Reports and Site History**

#### 6.1 **Previous Reports**

The following documents provide records of assessment at the former hospital site, and are pertinent to the Site:

- DP, Report on Phase 1 Preliminary Contamination Assessment, Royal South Sydney Community Health Complex, Joynton Avenue, Zetland (Ref: 27769, December 1998) [DP (1998)];
- Golder Associates Pty Ltd, Report on Preliminary Assessment Geotechnical Constraints and Potential Site Contamination South Sydney Hospital Site Joynton (Ref: 00623118/007, July 2000) [Golder (2000)];
- DP, Report on Phase 2 Contamination Assessment, 3 Joynton Avenue Zetland (Ref: 44621, November 2007) [DP (2007a)];
- DP, Report on Remediation Action Plan, 3 Joynton Avenue Zetland (Ref: 44621, November 2007) [DP (2007b)];
- R & M Brown Consultancy Hazardous Materials Survey Report Royal South Sydney Hospital 3 Joynton Avenue Zetland NSW (Ref: RMB-2010-0538, February 2010) [RMB (2010)]
- DP, Proposed Demolition and Hazardous Building Materials Removal, former Royal South Sydney Hospital, 3 Joynton Ave Zetland (Ref: 44621.02, June 2011) [DP (2011a)];
- DP, Large Reinforced Gatic Covers near the Former Orthotics Building, Former Royal South Sydney Hospital, 3 Joynton Avenue Zetland (Ref: 44621.02, August 2011) [DP (2011b)]; and
- DP, Report on Remediation Action Plan, Proposed Royal South Sydney Hospital Redevelopment, 3 Joynton Avenue Zetland (Ref: 44621.02, October 2011) [DP (2011c)].

A brief summary of the each of the above reports is provided in the below sections, and a discussion of results relevant to the current subject site is provided in Section 7.

#### 6.1.1 DP (1998): Preliminary Contamination Assessment

The DP (1998) investigation comprised limited near surface soil sampling conducted on three composite sample pairs from six locations across the former hospital site (i.e. including the southern area beyond the current site boundary). These were identified as:

- Composite C1: surficial samples collected from borehole locations one and two;
- Composite C2: surficial samples collected from borehole locations three and four;
- Composite C3: surficial samples collected from borehole locations five and six.

Borehole locations are shown on Drawing 3, Appendix A.

Laboratory analysis indicated that the concentrations of all heavy metals were below the HILs for residential with minimal access to soils (SAC 1, however, it was considered that, due to the limited sampling density, the areas not tested may contain potential contaminants of concern including, but not limited to, heavy metals and polycyclic aromatic hydrocarbons (PAH).



The report made the following conclusions and recommendations:

- the potential for contamination of the land subject to the study was considered to be generally low, however several potential sources of contamination were noted;
- The Underground Storage Tanks (USTs) thought to exist near the Orthotics Building (north western corner of the current site) should be removed and the pit validated following suitable site investigation and assessment;
- If buildings are to be demolished, fibrous materials would require analysis for asbestos and, should asbestos be found, such material should be appropriately disposed of according to WorkCover requirements;
- Site waste management practices appeared to be reasonably good, with Biohazard Waste stored securely and disposed of weekly by a licensed contractor;
- A suspected redundant substation on site is likely to contain transformer oil, and could result in localised contamination if spillage has occurred;
- Sampling and testing undertaken were intended as a general screening of the site only and indicate that the site may contain heavy metal and PAH levels that would require remediation prior to residential development in the southern part of the site;
- Overall, the southern portion and extensions to the northern portion of the site were considered to be generally suitable for the proposed divestment and residential development provided the following was undertaken:
  - A detailed contamination assessment of the site is undertaken to characterise ground conditions, particularly filling and the area around the USTs;
  - The USTs are removed, and the pit is remediated and validated; and
  - All asbestos material found on site is removed and the affected area validated.

#### 6.1.2 Golder (2000): Preliminary Geotechnical & Contamination Assessment

The Golder (2000) contamination assessment included sampling from 13 hand augered boreholes and two shallow test pits over the former hospital site. Soil samples were analysed for a range of contaminants. Borehole and test pit locations are shown on Drawing 3, Appendix A.

Results from the investigation indicated that all soil samples analysed for TPH were within the SACs (TPH threshold is the same for all SACs) with the exception of one sample HA5. HA5 was located in the south western corner of the former hospital site, i.e. outside of the current Site.

Laboratory analysis indicated that the concentrations of heavy metals in all samples analysed were within the SAC 1. Golder (2000) also compared the results to thresholds adopted from PPILs, which can be indicative of potential phytotoxic impacts on plants, and found exceedances of the criteria for cadmium, chromium, lead and zinc.

PAH concentrations exceeded the SAC 1 in two of the fill samples from boreholes HA2 (recycled road material) and HA5 (sand containing slag inclusions). Concentrations of benzo(a)pyrene (BaP - a PAH compound) in the sample from HA2 and HA5 were above the SAC 1. The concentration of total PAH in the sample from HA5 was also above the SAC 1.



#### 6.1.3 DP (2007a): Phase 2 Contamination Assessment

DP (2007a) provided a Phase 2 Contamination Assessment to further assess the potential for contamination in soil and groundwater across the former hospital site. The assessment included a review of readily available site history information and previous investigations. Information on the site history is discussed in Section 6.2, below.

Soil samples were collected from 29 locations across accessible areas of the former hospital site. Analysis of selected soil samples was conducted for a range of contaminants of potential concern including heavy metals, TPH, BTEX, PAH, phenol, polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), volatile organic compounds (VOC) and asbestos. The test locations are shown on Drawing 3, Appendix A.

Appropriate quality assurance/ quality control measures are considered to have been implemented, and as such the data is considered to be suitable for assessment of the Site.

The soil analytical results were compared against the SAC 1 (residential with minimal access to soils) and for soils collected from the heritage garden area (sampling location BH3), the SAC 2. Where relevant, the results were also assessed against the PPIL.

Results of the laboratory analysis indicated that contaminants at the site were generally present at low levels (or below laboratory practical quantitation limits). However, a number of samples were noted to have concentrations above the relevant SAC. These included the following:

- lead in samples BH15/ 3.4-3.5 and BH20/ 0.4-0.5 (maximum concentration 3,800 mg/kg);
- BaP in samples BH9/ 0.1-0.2 and BH17/ 0.1-0.2 (maximum concentration 14 mg/kg);
- total PAH in sample BH17/ 0.1-0.2 (162 mg/kg); and
- TPH C<sub>10</sub> C<sub>36</sub> in sample BH5/ 0.1-0.2 (1,080 mg/kg).

Where contaminants were found to be more than 2.5 times the relevant SAC, the location was classified as a 'hotspot' requiring further assessment/ management. Issues of concern identified during the 2007 assessment were as follows:

- The 'hotspot' of lead relative to SAC 1 in deeper fill of BH15 was considered likely to be from imported fill that had been used to backfill the sand quarry post-1930;
- The 'hotspot' of BaP relative to SAC 1 identified in BH17 in surficial fill was considered likely to have be sourced from building and construction works previously undertaken on site; and
- Ash and slag were identified in boreholes BH9, BH13, BH14, BH15, BH23, BH25, BH26 and BH29 at depths ranging between 0.1-1.0 m. While total PAH and BaP were not found to be elevated above relevant SAC in any of the samples containing ash and slag, it was considered possible that unidentified PAH contamination may have been present in other sections of the ash/slag fill present beneath the site.

Three groundwater monitoring wells were installed as part of the assessment and groundwater samples collected. Details of the construction of the monitoring wells are provided on test bore logs in Appendix B. Groundwater samples were analysed for heavy metals, TPH, BTEX, PAH, VOC, phenols, PCB, OCP, pH and hardness.



Results of the groundwater analysis indicated that all samples analysed from the three monitoring wells recorded contaminant concentrations within the adopted groundwater investigation levels (GIL) with the exception of zinc. Zinc was above the GIL in samples collected from MW1, MW2 and MW3 relative to potential impacts on freshwater ecosystems. The concentrations of heavy metals, including zinc, in the groundwater were considered to be attributed to the overall industrial land use of the surrounding Botany Bay area and were not considered to be an issue of concern.

The report noted that sampling was limited in the areas of the buildings due to access restrictions and, as such, data gaps were present in these areas. Based on the conditions encountered in the other areas of the site, it was considered that any contamination in these areas was considered likely to be of a limited extent. The report recommended further investigation of these areas where possible, once the former building slabs have been removed.

#### 6.1.4 DP (2007b): Remediation Action Plan

DP (2007b) provided a remediation action plan (RAP) covering the works required to remediate the former hospital site to a standard suitable for the proposed mixed use development.

The proposed works included:

- Further testing in previously inaccessible areas (e.g. under buildings);
- Remediation (excavation and off-site disposal) of material with contaminant levels above the site assessment criteria;
- Geophysical investigation for potential USTs;
- Removal of USTs and associated contamination (if presence of USTs confirmed);
- Waste classification of spoil to be disposed off-site;
- Validation of the remediation works to assess their success, and to confirm the suitability of the site for the proposed development.

#### 6.1.5 RMB (2010): Hazardous Building Materials Removal

The RMB (2010) report and register identified the presence of asbestos containing materials (ACM) in poor condition spread over the floor of the ground floor level of the administration building and over the ground in the sub-floor space.

#### 6.1.6 DP (2011a): Proposed Demolition and Hazardous Building Materials Removal

DP prepared a letter to support the development application of the proposed demolition and hazardous buildings material (HBM) removal at the hospital site in June 2011. The area of the HBM removal included in the DA was the northern portion (approximately two thirds) of Lot 1 in Deposited Plan 136025, i.e. including the current subject site.

DP understood the proposed demolition and HBM removal to include the following:

- demolition of 14 non-heritage listed buildings/structures;
- the partial demolition and rectification works to heritage listed buildings;
- the removal of trees;
- removal of hardstand car parks at the northern end of the site;
- the removal of ancillary pathways and in-ground services;
- removal of potentially HBM-impacted surface soils from the subfloor areas of buildings to be retained;
- Removal of underground services/pipes. This will involve excavation of trench lines, estimated to be up to approximately 300 mm deep. These trenches will be backfilled with clean material and shaped to match current site grades;
- The removal of obvious asbestos from the surface of the site.

DP recommended that testing needed to occur beneath the buildings proposed for demolition as part of the remediation/validation, as proposed by CoS under the development application.

It was considered that the proposed removal of HBM from the buildings and subsequent demolition can be effectively conducted independently of the remediation. The letter noted that the removal/disturbance of near surface soil could impact on previously identified contaminated soils. The letter therefore recommended that the previously identified areas of contamination requiring remediation were quarantined from the intrusive soil works, and that a record be kept of the locations where pipes/soil are removed from, including survey data, and of any displacement of soil within the site. If contaminant levels above the site assessment criteria were identified in the near surface soils during waste classification, the location of the contaminated soils would need to be recorded to ensure that any remaining, deeper, contaminated soils could be removed and the area validated.

#### 6.1.7 DP (2011b): Reinforced Gatic Covers Near the Former Orthotics Building

DP inspected structures associated with three large Gatic covers near the former Orthotics Building on the former hospital site, but to the north of the Site (i.e. off-site). The purpose was to determine whether the covers were potentially associated with USTs.

The Gatic covers were lifted to allow inspection of the underground structures. The locations of the structures were recorded with a handheld global positioning system (GPS).

The inspection indicated that all of the locations were associated with underground services and not related to the storage of petroleum product. It was considered that the locations were unlikely to be an issue of concern in relation to contamination.

Also observed during the site inspection was a concrete pad to the south of the former Administration Building (i.e. within the Site). This pad had two cylinders attached to it, one of which was labeled "oil separator", and referenced refrigerant oil. The pad may be associated with a former air conditioning unit. It was recommended that the soil in this area be inspected by an environmental consultant after removal of the pad, and a soil sample collected and analysed for TPH if any signs of concern are observed.



#### 6.1.8 DP (2011c): Remediation Action Plan

This report provided an up-date to the DP (2007b) RAP.

#### 6.2 Site History

Site history information for the former hospital site was obtained from the previous reports, and other sources as quoted, and is briefly summarised below.

A review of the report prepared by City Plan Services in June 2011, entitled *Demolition and Site Rectification Works, Royal South Sydney Hospital, 3 Joynton Avenue Zetland – Statement of Environmental Effects* was conducted by DP. Historical information in the report indicated that buildings associated with the hospital were first constructed between 1909 and 1912. The hospital commenced operation in 1913 and continued to operate until 1998. In September of 1991 the hospital became part of the Prince Henry, Prince of Wales and Prince of Wales Children's Hospital Group. Inpatient services ceased in December 1993 and transferred to Randwick Hospital Campus. The former hospital site was retained by South Eastern Sydney Health Service as a community health centre in 1994. By 2003 the former hospital site was handed over to CoS.

Aerial photographs reveal that in the early 1930s excavation works (possibly sand quarrying) occurred along the northern and western boundaries of the former hospital site, though these are not expected to have extended into the area of the Site.

An investigation conducted by DP in 1998 (Reference: 27769) identified a boiler room in the north of the former hospital site (outside of the Site). During fieldwork, a gasworks facility was observed at the north eastern area of the site. It was likely that the former hospitals boiler and generators were powered by gas.

The former Waterloo Incinerator had been located approximately 250 m west of the former hospital site in the adjacent Waverly Council Depot. The incinerator was operated by Waverly and Woollahra Councils between 1972 and 1997 and was used to incinerate municipal waste. The presence of ash and slag identified in fill material during previous field investigations [DP (1998), Golder (2000)] may have been the result of imported fill during the construction of the car park, or potentially air fall out associated with the neighbouring waste incinerator. Historically, the Bunnerong Power Station, which operated in the 1920s, was located in Matraville (approximately 8 km south east of the site). Waste generated from the coal powered station was used extensively as fill across Sydney development sites at the time. Fill material from power stations is often associated with asbestos, PCB, fly ash and metal contamination. There is the potential that fill sourced from the Bunnerong Power Station or the neighbouring waste incinerator was imported onto the former hospital site.

The RAP (2007) indicated that the 1998 inspection identified three large reinforced concrete Gatic covers in the northern section of the site. At the time these were identified as possible petrol UST, however, the nature of the buried structures was never confirmed. Inspection beneath the lifted covers by DP (2011b) has confirmed that these Gatic covers are associated with service pits. It should be noted, however, that the potential for USTs at the former hospital site cannot be ruled out due to its former use.



### 7. Contamination Issues at the Site

Previous borehole logs are provided in Appendix B and summaries of laboratory results are provided in Appendix C.

The buildings at/ formerly at the Site include the administration building, the old kitchen, offices, part of the J.J. Collins Building, and the former laundry, which has also previously been used as a maintenance building and biohazard waste store. Testing has not been undertaken underneath any of these previous buildings, and it is considered that some of the previous uses present an elevated risk of contamination.

In general the filling at the Site appears to be relatively shallow, as summarised in Table 4.

Consultant	Bore ID	Hardstand	Base course	Fill - silty sand with anthropogenic inclusions	Fill - sandy	Natural sand/ silty sand	Natural peaty sand
Golder	HA 11	-	-	0-0.5	0.5-1.5 (inferred fill)	1.5-3	-
DP	BH 4	-	-	0-0.7	-	0.7-4.5	2.5-2.6
DP	BH 5	0-0.1	0.1-0.3 (refusal at 0.3m)	-	-	-	-
DP	BH 24	0-0.12	0.12-0.3	-	-	0.3-1.6; 2.2-4.3	1.6-2.2
DP	BH 25	0-0.1	0.1-0.3	-	-	0.3-3.5	-
DP	BH 26	-	-	0-0.5	-	0.5-3.5	-
DP	BH 27	0-0.1	0.1-0.4	-	0.4-0.5	0.5-3.5	-

 Table 4: Summary of Subsurface Conditions Encountered at the Site

All chemical contaminants tested at the Site were within the SAC 3 (the relevant thresholds for the commercial/ industrial landuse), taking into account statistical analysis. One TPH  $C_{10}$ - $C_{36}$  result at the site was 1,080 mg/kg compared to the SAC for sensitive sites (applicable to all site uses) of 1,000 mg/kg, however the 95% UCL average for TPH  $C_{10}$ - $C_{36}$  over the former hospital site was however within the SAC 3, indicating that the detected contamination is not statistically significant and does not warrant remediation.

Asbestos contamination has been observed in the sub-floor area of the Administration Building.

Two of the previous three groundwater wells were located at the Site. All groundwater samples from the former hospital site were considered to be within the GILs and/ or expected background levels. Groundwater contamination is therefore not considered to be an issue of concern.

On this basis the known issue of contamination concern at the Site is considered to be asbestos. However, further testing for other potential contaminants of concern, particularly heavy metals, PAH and TPH, is required to confirm that they are not present at unacceptable levels beneath buildings at the Site.



#### 8. **Proposed Works to Address Contamination Issues**

Contamination issues at the Site are proposed to be managed in conjunction with contamination issues at other parts of the former hospital site. An EPA accredited Site Auditor, Ms Rebeka Hall of WSP Environmental, has been appointed to audit the contaminated land management works.

In addition, the ACM are to be removed from the buildings prior to commencement of remediation works. It is understood that near surface soils which are impacted with ACM in the sub floor areas will also be removed as part of the works removing the asbestos form the buildings.

The proposed contaminated land management works include:

- Removal of asbestos from the buildings and surficial soils beneath the buildings (underway);
- Geophysical investigation for unidentified underground structures/ depth of filling (if geophysical distinct from natural soils);
- Removal of any USTs identified by the geophysical investigation;
- Further assessment of soils and groundwater in previously inaccessible areas;
- Remediation of soils in excess of the relevant SAC for the proposed final land use in each area (i.e. within SAC 3 for the Site). It is foreseen that this will be conducted by excavation and off-site disposal of the contaminated spoil. Alternative remediation methods which may be appropriate include on-site treatment or on-site encapsulation.
- Implementation of an unexpected finds protocol throughout earthworks detailing how any unexpected contamination issues such as USTs, asbestos or other indicators of contamination will be managed;
- Validation of the remediation works;
- Preparation of a Site Audit Report and Site Audit Statement by the site auditor stating that the site is suitable for the proposed use from a contamination viewpoint.

#### 9. Conclusions

Based on the available site history, site observations and previous contamination assessment reports it is considered that the proposed contaminated land management methods to be implemented during redevelopment of the Site are suitable.

It is considered that the main contaminant of concern at the Site is asbestos, although based on the site history and contamination results from other areas of the former hospital site, the Site may also be impacted by chemical contaminants including, but not limited to, TPH, PAH and heavy metals.

The scope of the proposed investigation aims to identify whether there is, as yet, unidentified contamination requiring remediation. Any as yet unidentified issues under the buildings at the subject site are expected to be broadly similar to issues in other areas of the former hospital site, and are foreseen to be readily manageable with low-technology remediation methods (e.g. excavation or off-site disposal).



On this basis it is considered that the site can be rendered suitable for the proposed land use subject to appropriate further investigation, provision of a revised RAP and remediation and validation works.

#### 10. Limitations

Douglas Partners (DP) has prepared this report for a project at 3 Joynton Avenue, Zetland, NSW in accordance with DP's proposal SYD120292 dated 29 March 2012, City of Sydney's Letter of Acceptance dated 27 April 2012 and the executed contract. The report is provided for the exclusive use of City of Sydney Council for this project only and for the purpose(s) described in the report. It should not be used for other projects or by a third party. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are sourced from previous reports, and are only indicative of the sub-surface conditions only at the specific sampling or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of anthropogenic influences

The accuracy of the advice provided by DP in this report may be limited by undetected variations in ground conditions between sampling locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached notes and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion given in this report.

#### **Douglas Partners Pty Ltd**

## Appendix A

Drawings

and Notes About this Report



	CLIENT: City of Sydney Cou	ncil	TITLE:	Proposed Development
() Douglas Partners	OFFICE: Sydney	DRAWN BY: PSCH		Design Modifications to the Adminstration Building
Geotechnics   Environment   Groundwater	SCALE: Not to scale	DATE: 30.5.2012		3 Joynton Avenue, ZETLAND







#### Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

#### Copyright

This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

#### **Borehole and Test Pit Logs**

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

#### Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

 In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;

- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

#### Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

## About this Report

#### **Site Anomalies**

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

#### **Information for Contractual Purposes**

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

#### **Site Inspection**

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

## Appendix B

Previous Test Bore Logs

## GRAPHIC SYMBOLS FOR SOIL & ROCK



CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: BH1 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

Γ		Description	<u>i</u>		Sampling & In Situ Testing			w w		1	
R	Uepth (m)	of Strata	Graph Log	Type	Depth	Sample	Results & Comments	Wate	Construction Details	n	
		FILLING - dark brown silty sandy clayey topsoil, with grass roots, humid (grass at surface)	$\bigotimes$	A	0.1 0.2		PID=6ppm		-		
	•	- grading to more sand and gravel content from 0.5m	$\bigotimes$	A	0.5		PID=200m				
	- 0,6 -	Bore discontinued at 0.6m - refusal on concrete			-0.6				-		
	-1								-1		
	•					-					
	-								- · ·		
	-2								-2		
	-										
	-										
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	-3		-						-3	•	
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	-4								-4		
	-										
	•								- - -		
	•										
RI Tì	G: Bobo	at DRILLER: G Trippett 30RING: Solid flight auger		LO	GGE	D: PE	EN	CASING: Uncased			
W RI	ATER OF	BSERVATIONS: No free groundwater observed									
ADBUSC	SAMPLING & IN SITU TESTING LEGEND A Auger sample Disturbed sample Disturbed sample M Water sample C Core drilling D Water seep C Core drilling D Water seep C Core drilling D Water seep C C Core drilling D Water seep C C Core drilling D Water seep C C C C C C C C C C C C C C C C C C C										

City of Sydney Council CLIENT: Phase 2 Contamination Assessment PROJECT: LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH2 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

Π		Description	hic		San	npling (	& In Situ Testing		Well	
RL	Depth (m)	of Strata	Graphi Log	Type	Depth	ample	Results & Comments	Water	Construction Details	
		FILLING - grey black silty clayey filling, with grass roots and gravel (grass at surface)	$\bigotimes$	A	0.1 0.2	<u></u>	PID=4ppm			
	0.3	FILLING - mix of crushed sandstone and clay filling	X	A	0.4 0,5		PID=1ppm			
	0.85	FILLING - dark grey brown silty clayey filling, with gravel up to 1cm diameter		A	0.9 1.0		PID<1ppm		- 1	
	- 1,5 -	FILUNG - grey and brown fine quartz sand filling, with some black peat at 1.8m. Humid (possibly on the edge of a stormwater conduit). Reworked natural material	$\bigotimes$							
	- <b>2</b>			A	1.9 2.0		PID≃2ppm		-2	
	- 2,6 -3 -	FILLING - medium grained quartz sand filling, with minor silt content. Damp. Contains orange sandstone gravel fragments		A	2.9 3.0		PID=3ppm		-3	
	•		$\otimes$							
	· 3,5 ·	Bore discontinued at 3.5m - target depth reached								
	-4								-4	
	-									
	-									
	G: Bot	L Cat DRILLER: G Trippett BORING: Solid flight auger		<u>י</u> נו	DGGE	D: P(	I EN	CA	SING: Uncased	
W.	ATER C	DBSERVATIONS: No free groundwater observed								

SAMPLING & IN SITU TESTING LEGEND pp Pocket penetrometer (kPa) le PiD Photo binisation detector Standard ponetration test mm dia.) PL Point load strength Is(SO) MPa V Shear Vane (kPa) b Water seep \$ Water level CHECKED ADBUWC SAMPI Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling *P* Inilials: Date: 20/4-/07



.



CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH3 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

Π		Description	Sampling & Ir			tin Situ Testing		Well			
RL	Depth (m)	of Strata	Graph Log	Type	Depth	Sample	Results & Comments	Wate	Construction Details		
	-	FILLING - dark brown fine grained, silty sand. Some white sand throughout, dry (grass at surface)	$\bigotimes$	Ā	0.1 0.2		PID<1ppm				
	- - 0,5	SAND - light gray brown fine grained sand Humid	$\bigotimes$	<u>A</u>	0.4 0.5		PID<1ppm				
	-	loose, well sorted			0.9						
	-1	- grading to yellow white fine to medium grained sand. Some black organic specs, damp from 1.0m			1.0		PID=1ppm		-1		
	-2	- dark brown peaty sand layer from 1.8-2.1m		A	1.9 2.0		PID=2ppm		-2		
	- 2.1	SAND - yellow brown fine to medium grained sand, damp, loose, well sorted									
	-3			A	2.9 3.0		₽ID=1ppm		-3		
	- 5.5	Bore discontinued at 3.5m - target depth reached									
	-4								-4		
RI TY W RI	G: Bob (PE OF ATER O EMARKS	cat DRILLER: G Trippett BORING: Solid flight auger BSERVATIONS: No free groundwater observed S:		LC	GGE	D: PE	EN	CA	SING: Uncased		
	SAMPLING & IN SITU TESTING LEGEND         A Auger sample       pp Pocket penetrometer (NPa)         Disturbed sample       PD Phote insistion detector         B Buk sample       S Standard penetration test         U, Tube sample (x mm dia.)       PL Pent toad strength 1s(50) MPa         W Water sample       V Shear Vane (KPa)         C Core drilling       V Water seep * Water level										

City of Sydney Council CLIENT: PROJECT: Phase 2 Contamination Assessment

LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/- BORE No: BH4/MW1 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

Π			Description	. <u>ല</u>	Sampling & In Situ Testir			a In Situ Testing		Weil	
ᆋ	Dep (n	pth 1)	of	Sraph Log	ype	spth	mple	Results &	Wate	Construction	
	-		Strata		<u>۲</u>	å	Sai	Comments	<u> </u>	Details	
			FILLING - dark brown and light brown speckled slity sand filling, with gravel and piece of ceramic tile	$\bigotimes$		0.1 0.2		PID=1ppm			
	-		<ul> <li>More sandy and contains some organic roots from 0.4m. Piece of terracotta and concrete rubble encountered at 0.5m</li> </ul>	$\bigotimes$	A	0.4 0.5		PID=3ppm			
	-1	0.7	SAND - light grey fine to medium grained, quartz sand. Contains some black organic specs. Damp	$\mathbf{x}$	A	0.9 1.0		PID≍1ppm		Bentonile	
	-2	1.9	SILTY SAND - dark brown fine to medium grained, silly sand, damp		A	<b>1.9</b> 2,0		PlD≖2ppm		-2 -2	0.00.00.00.00
		2.5 2,6	PEATY SILTY SAND - dark brown and black peaty silty sand, with some gravel fragments, damp SAND - brown medium grained quartz sand, wet with some patches of grey brown sand		A	2,5 2.6		PiD≍2ppm			
	-3				A	2.9		PID=2ppm	¥	-3 Machine slotted	
	<b>4</b>		- saturated from 3.4m							-4 End cap	
	سمغر والمسترج والمسالين	4.	Bore discontinued at 4.5m - target depth reached	<u></u>							
R	L	Bob	DRILLER: G Trippett		ـــــــــــــــــــــــــــــــــــــ	J DGGE	D: PE	I	CA	SING: Uncased	

TYPE OF BORING: Solid flight auger

LOGGED: PEN

WATER OBSERVATIONS: Free groundwater observed at 3.4m Monitoring well MW1 installed to 4.5m REMARKS:

SAMPLING & IN SITE A Auger sample D Disturbed sample	U TESTING LEGEND pp Packet penatrometer (kPa) PID Photo ionisation detector			Dervele - Devenere
B Bulk sample U, Tube sample (x mm dia.) W Water sample C Core ditling	S Standard penetration test PL Point load strangth 1s(50) MPa V Shear Vane (kPa) D Water scop ¥ Water level	Date: 20/9-/07	N2	<b>Douglas Partners</b> Geotechnics · Environment · Groundwater

CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH5 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

			Description		Sampling & In Site			& In Situ Testing	<u>ب</u>	Well	
R	Dej (n	pth 1)	of	Grapi	ype	epth	mple	Results &	Wate	Construction	
_					-	ã	Sa	Conincina		Details	
	-	0.1	FILLING - dark grey sandy gravel filling with roadbase gravel, damp,	$\bigotimes$	A	0.1 0.2		PID<1ppm			
	-	0,3	Bore discontinued at 0.3m - refusal on concrete (possibly old footpath)			•				-	
	-										
	-1									-1	
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	-2									-2	
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L R <sup>I</sup>	L G: F		DRILLER: G Trippett		L	GGEI	): PF	I		SING: Uncased	
T) W	PE ATE	OF I R O	BSERVATIONS: No free groundwater observed		-*	- <b>-</b>			_, ,		
RI	ema	RKS	::								
A D B	Au Dis Bu	ger sa lurba lk san	SAMPLING & IN SITU TESTING LEGEND pp Pocket penetromater (kPa) d sample PiD Photo hemistation detector plo Standard penotration test		CHE nitials:	CKED				ilae Darfr	1080
	Tu Wa Co	ba sa iter si re dril	mpHe (X mm dia.) PL Pokt load strength (s(50) MPa mple V Shear Vane (KPa) ing D Water seep ₹ Water isvel		)ale: 2	0/4	107	K Z Geoteci	hnic	y a careling and a construction of the second se	n <b>ci 3</b> Indwater

CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

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SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH6 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

Π	Description Sampling & In Situ Testing							ng _ Well			
ಷ	Depth (m)	of	Sraph Log	ype	hlqa	mple	Results &	Wate	Construction		
		Strata		f	ă	Sa	Comments		Details		
	-	FILLING - Sift, sand and clay ming, with some bloken brick at 0.3m, dry, contains gravel (grass at surface)	$\bigotimes$	A*	0,1		PID<1ppm				
	-		$\bigotimes$		U.£						
	• 0.4	SAND - yellow brown fine grained, quartz sand, dry,	Ř	А	0.4		PID<1ppm				
	-	loose			ų,a						
	• •				0.9		DID starses				
	-1			A	1,0		PiD< (ppin		-1		
	-										
	•										
	-										
	-										
				A	1.9		PID<1ppm				
	-2	- light yellow grey, damp from 2.05m			2,0						
	r							1			
	•										
	-								-		
	-3 3.0	CAND willow how mailing emirad available up		A	2.9 3.0		PID<1ppm	Ţ	-3		
		sorted with some dark grey patches, wet					- -				
	r r										
		- grades into white grey sand at 3.5m. Saturated							-		
l	- 3.0	Bore discontinued at 3.5m									
				]							
	F										
	-4								-4		
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R	G: Bon	DRILLER: G Trippett		LC	GGE	D: P8	EN	CA	SING: Uncased		
Т	TYPE OF BORING: Solid flight auger										
W	ATER C	DESERVATIONS: Free groundwater observed at 3.0m S: *Blind field duplicate sample BD1-270207 taken									
٢	**Blind field duplicate sample BD2-270207 collected										
A D B	A Auger sample     pp     Pocket penetrometer (KP3)       D Disturbed sample     PID Photo knisation detector       B Buk sample     S Standard penatration test										
U V C	J. Tube sample (x mm dia.) W Water sample (x mm dia.) C. Core dnilling V Shear Vane (kPa) V Water seep ¥ Water level										
SURFACE LEVEL: --Phase 2 Contamination Assessment EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH7 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

_			·					<b>.</b> –		
		Description	ļ.g _		San	pling 8	k In Situ Testing	2	Well	
님	Depth (m)	of	Log	8	pth	pie	Results &	Mate	Construction	1
	1.44	Strata	Ū	Υ.	Del	San	Comments	[	Details	_
F		FILLING - brown fine silly sand topsoil, dry (grass at surface)	$\boxtimes$	A	0.1		PID<1ppm		-	
	0.2	SAND - yellow brown fine grained sand, with some	$\left[ \begin{array}{c} \mathbf{X} \\ \mathbf{X} \end{array} \right]$		0.2				-	
	İ I	black organic matter, dry							[ ]	
				A	0.5		PiD<1ppm			
			1						-	
	-								-	
				A	0.9		PID<1ppm		•	
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		- grading to grey brown fine to medium grained sand,		А	1.9		PID<1ppm			
	-2	damp from 1.9m			1 <i>2</i> .0				[	
	[				1					
	Ļ		·. · ·					1	l l	
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	-	wat from 2.5m		ĺ	]			Ţ	•	
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	Ĺ,			Α	3.0		PID<1ppm	1	-3	
	ļ	- grading to yellow brown, fine to medium grained sand								
	Ļ	1011 2.511			Į				-	
	ŀ				1					
	ł								-	
	- 3.5	Bore discontinued at 3.5m								
	1	- target depth reached								
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TYPE OF BORING: Solid flight auger WATER OBSERVATIONS: Free groundwater observed at 2.5m **REMARKS:** 

RIG: Bobcat

**DRILLER:** G Trippett

City of Sydney Council

LOCATION: 3 Joynton Avenue, Zetland

CLIENT:

PROJECT:

#### SAMPLING & IN SITU TESTING LEGEND pp Pocket penetremeler (KPa) le PiD Photo ionisation detector Standard penetration tost mm dia.) PL Point toad strength (s(50) MPa V Shear Vane (KPa) P Water seep 7 Water level SAMPL Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling ADBUWC



LOGGED: PEN





CASING: Uncased

CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH8 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

	1		Description	<u>.0</u>		Sam	npling &	a In Situ Testing		Well
RL	De (r	pth n)	of State	Graph	ype	epth	mple	Results &	Wate	Construction
	-		FILLING - dark grey silty sandy gravel filling with gravel roadbase, dry (gravel at surface)		A	0.1 0.2	Se	PID<1ppm		
	•				A•	0.4 0.5		PID<1ppm		
	-1	0.9	FILLING - grey brown fine grained, natural sand filling, reworked (possibly adjacent to a stormwater conduit)		A	0.9 1.0		PłD<1ppm		-1
	-2	1.8	FILLING - brown sand, Ironstone and sandstone filling, containing sections of high plasticity clay		A	1.9 2.0		PID<1ppm		-2
		2.9	FILLING - grey brown sand filling, damp (possibly reworked material) - as above with broken pieces of terracotta piping		A	2.9 3.0		PID<1ppm		-3
		3.5	Bore discontinued at 3.5m - target depth reached						-	
	-4									
RI( TY	G:   'PE	Bobo OF I	cat DRILLER: G Trippett 3ORING: Solid flight auger		LO	GGE	D: PE	N	CA	SING: Uncased
W/ RE	ATE IMA	R O RKS	BSERVATIONS: No free groundwater observed *Bilnd field duplicate sample BD3-270207 collecte	d						





CLIENT: City of Sydney Council PROJECT: Phase 2 Contamination Assessment LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH9 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

	<u> </u>		Description	<u>.</u> 2		Sam	opling 8	k In Silu Testing		Well
R	De (r	n)	of Strata	Graph Log	Type	Depth	Sample	Results & Comments	Wate	Construction Details
			FILLING - dark brown, black silty sand filling with blue metal gravel pieces, and a piece of scrap metal			0.1 0.2		PID<1ppm		· · · · · · · · · · · · · · · · · · ·
		0.4	FILLING - grey brown sand filling, with few gravel fragments (possible reworked material)	$\bigotimes$	A	0.4 0.5		PID<1ppm		
	-1	1.	- with ash and slag from 0.9 to 1.0m	$\bigotimes$	A	0.9 1.0		PID<1ppm		-1
			SAND - grey brown, fine grained quartz sand, well sorted, humid			40				
	-2	1.	PEATY SAND - dark brown to black, moist, fine grained peaty sand. Grades into medium brown		A	2.0		PlD<1ppm		-2
	-3	2.	SAND - mottled yellow brown and dark brown, fine to medium grained sand, moist		A	2,9 3.0		PID<1ppm	Ā	-3
	-		- grev brown at 3.5m							
		3.	5 - grey brown at 3.5m Bore discontinued at 3.5m - target depth reached	<u>1</u>						-4

**RIG:** Bobcat

DRILLER: G Trippett

LOGGED: PEN

CASING: Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 3.0m **REMARKS:** 

SAMPLING & IN SITU TESTING LEGEND       A     Auger sample     pp     Pocket penatromotor (kPa)       D     Disturbed sample     PID     Phote ionisation detector       B     Bulk sample     Standard penetration test       U     Tube sample (x mm dia.)     PL     Point load strangth (s(50) MPa       W     Water sample     V     Shear Vance (kPa)       C     Core drilling     D     Water scop	CHECKED Initials: 1/2 Date: 20 PG7 Douglas Partners Geotechnics · Environment · Groundwater
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CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: BH10 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

	Description			San	npling (	& In Situ Testing		Well
Dept (m)	of Strata	Graph	Type	Depth	Sample	Results & Comments	Wate	Construction Details
-	FILLING - dark grey sandy clayey gravel filling with roadbase gravel (grass at surface)	$\bigotimes$	A	0.1 0.2		PID<1ppm		
	3 SAND - grey fine grained sand with some patches of darker grey sand, damp, well sorted quartz	××	A	0.4 0.5		PID≺1ppm		-
- - - - -	- light grey from 1.0m		A	0.9 1.0		PID<1ppm		- 1
-2	- grading to yellow brown fine grained sand, with some patches of darker brown sand, damp from 1.9m		A	1.9 2.0		PID<1ppm		-2
-3	<ul> <li>grading to yellow/brown fine to medium grained, quartz sand, moist</li> <li>wet from 3.3m</li> <li>grading to white/cream sand from 3.4m</li> </ul>		A	2.9 3.0		PID<1ppm	<b>_</b>	-3
-4	5 Bore discontinued at 3.5m - target depth reached							
RIG: Bo TYPE OI WATER	bcat DRILLER: G Trippett BORING: Solid flight auger DBSERVATIONS: Free groundwater observed at 3.3m		LO	GGED	): PE	N	CAS	SING: Uncased

SAMPLING & IN SITU TESTING LEGEND           A         Auger sample         pp         Pockat panetrameter (kPa)           D         Disturbed sample         PID         Photo ionstain of atector           B         Buik sample         Standard panetrameter (kPa)           U         Tube sample (xmm dia.)         PL         Point load strength is(50) MPa           W         Water sample, V         Shaar Vana (kPa)         C           C         Care drilling         >         Water seep         \$ Water level	CHECKED Initials: PA Date: 20 /4/072 DD Douglas Partners Geotechnics - Environment - Groundwater
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CLIENT: City of Sydney Council PROJECT: Phase 2 Contamination Assessment

LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH11 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

				Description	<u>i</u>		San	npling a	& In Situ Testing		Well	
ā		epli (m)	ו	of Strata	Grapt Log	Type	Depth	Sample	Results & Comments	Wate	Construction Details	
				FILLING - dark brown silty sand filling (topsoil), with grass roots (grass at surface)	$\bigotimes$	A	0.1 0.2		PID<1ppm			
		Q	.5	- as above SAND - light brown fine to medium grained sand, damp	X	A	0.4 0,5		PID<1ppm			
	· · · · · ·					A	0.9 1,0		PID<1ppm		-1	
	<b>1 1</b> - <b>1</b>			- grey brown		A	1.5 1.6		PID<1ppm			
	-2	2 2	.0	PEATY SAND - black peaty sand, damp SAND - coffee brown fine to medium grained sand, moist							-2	
						A	2.4 2,5		PID<1ppm			
	-3			oo ahaya hut yallaw brawa			3,4				-3	
	- 4	3	.5	- as above but yeadw blown Bore discontinued at 3.5m - target depth reached	<u>k</u>		-3.5				-4	
			<b>V</b> = 11.4 Weight a									
L					i					<u> </u>	1	

RIG: Bobcat

DRILLER: G Trippett

LOGGED: PEN

CASING: Uncased

TYPE OF BORING: Solid flight auger WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

	SAMPLING &	<b>KIN SITU</b>	TES	STING	LEGEND
Auger sample			PP	Pocket	Jemorianeq
Disturbed sample	Ċ.		PID	Photo id	inisation de
Duit exmela			c	Clander	d constratio

ADBU, WC Buik sample Tube sample (x mm dia.) Water sample Core drilling

er (kPa) tector S Standard penetration lest PL Point load strength Is(50) MPa V Shear Vane (kPa) > Water scop ¥ Water level







CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: BH12 PROJECT No: 44621 DATE: 27 Feb 07 SHEET 1 OF 1

Γ		Description	в	<b> </b>	San	ipling a	k In Situ Testina		۱۸/۵U
2	Depth	of	og		-	<u>क</u>		ater	Construction
	(m)	Strata	Gra D	Type	Dept	amp	Results & Comments	Š	Details
		FILLING - dark grey brown silty sand filling (topsoil), with grass roots (grass at surface)	$\bigotimes$	A	0.1 0.2	S	PID<1ppm		
	0.3	SAND - grey fine grained quartz sand, damp		A	0.4 0.5		PID<1ppm		
	-1	- grading to fine to medlum grained, grey/while quartz sand, damp from 0.9m		A	0.9 1.0		PID<1ppm		-1
	-2	- grading to dark grey brown fine grained, quariz sand (slightly peaty) from 1.9m		<u>A</u>	1.9 2.0		PID<1ppm		-2
	-3	<ul> <li>grading to yellow brown, fine to medium grained sand, with some patches of darker brown from 3.0m</li> <li>wet from 3.0m</li> <li>as above grading to grey white colour</li> </ul>		A	2.9 3.0		PID<1ppm	¥	-3
	- 3,5	Bore discontinued at 3.5m			•			1	
	-4	- target depth reached							-4
RI TY	G: Bobo PE OF I	DRILLER: G Trippett BORING: Solid flight auger		LO	GGE	); PE	N	CAS	SING: Uncased

WATER OBSERVATIONS: Free groundwater observed at 3.0m REMARKS:

SAMPLING & IN SITU TESTING LEGEND           A Auger sample         pp         Pocket panetromater (kPa)           D Disturbed sample         PID Photo forisation detector           B Buk sample         S Standard penetration test           U, Tube sample (x mm dia.)         PL Point load strength is(50) MPa           W Water sample         V Shear Vane (kPa)           C Core drilling         P Water seep	CHECKED Initiats: PP Date: 20 407
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CLIENT: City of Sydney Council

PROJECT: Phase 2 Contamination Assessment

LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH13 PROJECT No: 44621 DATE: 28 Feb 07 SHEET 1 OF 1

Г	T			Τ.,	F	San	nnine i	& In Situ Testion		W4-11	
	De	pth	Description	ind D		-	1 O		Ē	VVell	
ľ	- (r	n)	ot	L a	2 D	epth	du	Results & Comments	M	Construction	
L			STATA		-		တိ		<u> </u>	Details	
1	ŀ	0.45	CONCRETE							-	
	ŀ	0.15	FILLING - yellow bedding sand	$\mathbb{X}$		0.2		PIDetnom			
	F			$\mathbb{X}$	<u>^</u>	0.3		- inddi safa			
	ł	0.4	FilLING - black, gravely ash, slag and sand filling	<del>IXX</del>						-	
	ł		· / · _ · · · · · · · · · · · · · · · · · · _ · _ · _ · _ · _ · · · _ · · · _ · _ · _ · _ · _ · _ · · _  · _	$\otimes$	A*	0,5		PID<1ppm		-	
1	t			$\mathbb{X}$		0.6					
	T I	0,7	FILLING - mottled grey and yellow crushed sandstone	1XXX						*	
	[		filling, with some clay and some orange sandstone	$\mathbb{X}$					1		
	Ĺ		giurei	$\otimes$	Α	10		PID<1ppm			
	['			$\otimes$							
				$\mathbb{X}$							
	-			$\otimes$							
	ŀ			$\otimes$							
	ł		as shows motified aroom vallow and arow	$\mathbb{X}$							
	ł		- as above, momen cream, yenow and grey	$\otimes$							
	-			$\mathbb{K}$						-	
	ŀ			$\mathbb{X}$						-	
	ł	1.9	FILLING - sand filling with grey brown with orange	W	A	1.9		PID<1ppm			
	-2		sandstone gravel pieces	$\otimes$		2.0			ļ	-2	
	İ.			$\mathbb{K}$							
	[			$\mathbb{X}$							
				$\otimes$		'					
				$\otimes$							
	ŀ			$\otimes$							
	-			$\mathbb{X}$							
	ł	-		$\otimes$							
	ł			$\otimes$					1		
	-3	3.0	SAND - grey fige to medium grained sand moist	XX						-3	
	ŀ			· · · :							
	ł										
	ł		- as above but yellow brown with dark brown peaty sand						ļ	-	
	ſ		layers, wet		A	3.4		PID<1ppm			
l	[	3.0	Bore discontinued at 3.5m			-3.5-					
	ļ		- target depth reached							-	
	Ļ								{		
	Ļ										
	-4						ł			-4	
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**RIG:** Bobcat

DRILLER: G Trippett

LOGGED: PEN

CASING: Uncased

TYPE OF BORING: Solid flight auger WATER OBSERVATIONS: Free groundwater observed at 3.5m REMARKS: \*Blind field duplicate sample BD4-280207 collected

# SAMPLING & IN SITU TESTING LEGEND A Auger sample pp Pocket penetrameter (kPa) D Disturbed sample PID Photo ionisation detector B Buck sample Standard penetration test U, Tube sample (xmm dia.) PL Point load strength is(50) MPa W Water sample V Shard area (kPa) C Core drilling D Water seep ¥





CLIENT: City of Sydney Council PROJECT: Phase 2 Contamination Assessment

LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--- BORE No: BH15 PROJECT No: 44621 DATE: 28 Feb 07 SHEET 1 OF 1

Г	<u></u>		Description			Sarr	ipling 8	& In Situ Testing		Wall
1	De	pth	of	ind Bo	0	£	e l		ater	Construction
ľ	) (n	(נ	Strata	Gra	Typ	Dept	u u	Results & Comments	3	Details
┝			BITUMINOUS CONCRETE				~~			
	ļ	0.1	FILLING - gravel roadbase and brown sand filling	$\bigotimes$	A	0,1 0.2		PID<1ppm		
		0,3	FILLING - orange and brown, crushed sandstone filling, with gravel ash fragments		A	0,4 0.5		PID<1ppm		
	- 1	:			A	0.9 1.0		PID<1ppm		
	•	1.5	FILLING - black gravelly ash		A	1.9		PiD<1ppm		
		2.0	FILLING - grey brown crushed sandstone, sandstone gravel and sand filling, with some ash pieces			2,0				
	-3		<ul> <li>grading to orange red and cream and brown and yellow crushed sandstone filling</li> <li>black ashy layer at 3.4-3.5m. Nail encountered</li> </ul>		A	3.4		PID<1ppm		-3
	,	3.5	Bore discontinued at 3.5m - target depth reached			-3.3-				-4
	· · · · · · · · · · · · · · · · · · ·									
L	<u> </u>				<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>

RIG: Bobcat

DRILLER: G Trippett

LOGGED: PEN

CASING: Uncased

TYPE OF BORING: Solid flight auger WATER OBSERVATIONS: No free groundwater observed

**REMARKS:** 

#### SAMPLING & IN SITU TESTING LEGEND

SAMPI Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling A D B U,₩C

 J LS3 LING LEGEND

 pp
 Pocket penalrometer (kPa)

 PID Photo ionisation detector

 S
 Standard penetration test

 PL
 Point load strength is(50) MPa

 V
 Shear Vane (kPa)

 D
 Water seep

 V
 Water seep







CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination Assessment

LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH14 PROJECT No: 44621 DATE: 28 Feb 07 SHEET 1 OF 1

Г	r				1	San	njina 8	In Situ Testing		10/-11
1	De	pth	Description	e de la composición de la comp			l a l		ater	Construction
ľ	(1	m)	Strata	Ga	Type	Cept	amg	Results & Comments	Š	Details
┝		0.05	BITUMINOUS CONCRETE				<u></u>		+	
	t		FILLING - dark grey gravel and sand roadbase filling	$\otimes$	A	0.1		PID<1ppm		
				$\otimes$	k	0.2				-
	ŀ	0.4	Fil LING - cream and vellow crushed sandstone filling	+		0.4		PID<100m		
	ŀ		Black sandy ash layer at 0.7-0.8m	$\otimes$		0,5		1 io < ippili		
	į			XX	Į	07				
				$\otimes$	<u>^</u>	0.8		PID<1ppm		-
l	ŀ		- grading to grey brown crushed sandstone, sand and	$\otimes$		0,9		PID<100m		
	-1		gravel and some ash from 0.9m	$\otimes$	<u>}</u>	1.0		i is appar		<b>h</b> 1
	Ľ			$\otimes$						
	ļ			$\otimes$	ł.					•
	ŀ									
	ł			$\mathbb{X}$	k					
	t			$\otimes$	k					t l
	[			$\otimes$	1					
	ł			$\otimes$	<u> </u>	1,9		DiDeterm		
İ	-2		- no ash from 2.0m	$\otimes$	]	2.0		-ru~ippii		-2
ļ	İ.			$\otimes$	ķ					
	ļ.			$\mathbb{X}$						
	ŀ			XX						
	ŀ	2.5	SAND - light grey yellow medium grained sand, moist,	- <u>FXX</u>						-
	ŀ		with some black organic matter							
	[				]					
	ŀ					2.9		PIDetaam		-
	-3		- wet at 3.0m		$\vdash$	3,0		Pitty (ppa)	Ľ.	-3
	ł			· · · ·						
	[				1					
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	ł	3.5	Bore discontinued at 3.5m		1					
	ľ		- target depth reached							
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	ŀ									-
	-4									-4
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L			1		I		Į			
RI	G:	Bob	cat DRILLER: G Trippett		LC	GGEI	D: PE	N	CAS	SING: Uncased

TYPE OF BORING: Solid flight auger

WATER OBSERVATIONS: Free groundwater observed at 3.0m REMARKS:

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH16 PROJECT No: 44621 DATE: 28 Feb 07 SHEET 1 OF 1

		Description o Sampling & In Situ Testing						1	\&/- U		
	Depih	Description	о Цар		San 	ipang a	s in Situ Testing	- La	Well		
Ř	(m)	of	Lo	Đ.	뒿	hdh	Results &	Wat	Constructio	n	
		Strata	0	12	ă	Sar	Comments		Details		
		FILLING - brown sandy clay filling (topsoil) with grass			0.1						
		roots (grass at surface)	$\mathbb{W}$	A	0.1		PID<1ppm		[		
	n		$-\infty$		0.2			1			
		FILLING - grey brown sandy gravel filling	$\otimes$		04						
	- 0.		_KXX	A	-0.5-		PID<1ppm	ļ			
		Bore discontinued at 0.5m			0.0			İ			
		- refusal on concrete									
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RIG: Bobcat

CLIENT:

City of Sydney Council

PROJECT: Phase 2 Contamination Assessment

LOCATION: 3 Joynton Avenue, Zetland

**DRILLER: G Trippett** TYPE OF BORING: Solid flight auger

LOGGED: PEN

CASING: Uncased

WATER OBSERVATIONS: No free groundwater observed REMARKS:

## SAMPI Augar samplo Disturbed samplo Buik sample Tubo sample (x mm dia.) Water sample Core drilling

- ADBU.WC
- SAMPLING & IN SITU TESTING LEGEND pp Focket penatromator (kPa) o Pilo Photo ion/sotion detector S standard penetration test mm dia.) PL Point load strength (s(50) MPa V Sheer Vane (RPa) b Water seep ¥ Water level

P Initials; 14 Û Date:

CHECKED





CLIENT: City of Sydney Council

Phase 2 Contamination Assessment PROJECT:

LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH17/MW2 PROJECT No: 44621 DATE: 28 Feb 07 SHEET 1 OF 1

PE     Or     PS     PS     PS     PS     PS     Construction Details       Image: State in the second s		Dopth	Description	ic _		San	ipling (	& In Silu Testing		Well	
FILLING - dark brown sandy filling (topsoft) with grass       0.1       0.2       PID-tippin         - some gravel at 0.5m       - 0.6       PID-tippin       - 0.6         - some gravel at 0.5m       - 0.6       PID-tippin       - 1         - 1       - 1.0       - 1.0       PID-tippin       - 1         - 2       - 1.0       - 1.0       PID-tippin       - 2         - 2       - 2.5       PID-tippin       - 2       - 2         - 2       - 3.5       PID-tippin       - 2       - 2         - 3       - 4       - 3       - 4       - 3       - 4         - 4       - 4       - 4       - 4       - 4       - 4         - 4       - 4       - 4       - 4       - 4       - 4         - 4       - 4       - 4       - 4       - 4       - 4	RL	(m)	of Strata	Grapt Log	Type	Depth	Sample	Results & Comments	Wate	Constructi Details	on
some gravel at 0.5m     A     0.4     PID=tppm     -1      some gravel at 0.5m     A     0.6     PID=tppm     -1      some gravel at 0.5m     A     0.6     PID=tppm     -1      some gravel at 0.5m     A     0.6     PID=tppm     -1      some gravel at 0.5m     A     0.6     PID=tppm     -1      some gravel at 0.5m     A     1.0     PID=tppm     -2      some gravel at 0.5m     A     1.0     PID=tppm     -2      some gravel at 0.5m     A     1.0     PID=tppm     -2      some gravel at 0.5m     A     1.0     PID=tppm     -2      some gravel at 0.5m     A     1.0     PID=tppm     -2      some gravel at 0.5m     A     2.0     PID=tppm     -2      some gravel at 0.5m     A     2.0     PID=tppm     -2      some gravel at 0.5m     A     2.0     PID=tppm     -2      some gravel at 0.5m     A     A     2.0     PID=tppm      some gravel at 0.5m     A     A     A     A      some gravel at 0.5m     A     A     A     A      some gravel at 0.5m     A     A     A     A      some gravel at 0.5			FILLING - dark brown sandy filling (topsoil) with grass roots (grass at surface)		A	0.1 0.2		PID<1ppm			
1     A     0.3     PID <tppm< td="">     1     Bentamile       2     1.0     FILLING - sand, crushed sandstone and gravel     A     1.0     PID<tppm< td="">     2       2     -as above but mostly yellow crushed sandstone     A     2.0     PID<tppm< td="">     2       3     2.9     -PID<tppm< td="">     2.9     PID<tppm< td="">     2       3     SAND - grey brown fine to medium grained sand, wet at 3.2m     A     2.0     PID<tppm< td="">       4     -as above but medium grained, saturated     -as above but medium grained, saturated     A     Bene discontinued at 4.7m</tppm<></tppm<></tppm<></tppm<></tppm<></tppm<>		-	- some gravel at 0.5m		A	0.4 0.5		PID<1ppm			
1.9     FiLLING - sand, crushed sandstone and gravel     A     1.9     PiD <tppn< td="">     -2       2.9     - as above but mosity yellow crushed sandstone     A     2.9     PiD<tppn< td="">     -3       3.0     PiD<tppn< td="">     -3     A     2.9     PiD<tppn< td="">       3.1     PiD<tppn< td="">     -3     -3     A     -3       3.2     SAND - grey brown fine to medium grained sand, wet at 3.2m     A     -4     -4       4     - as above but medium grained, saturated     -4     -4     -4</tppn<></tppn<></tppn<></tppn<></tppn<>		- 1 - 1			A	0,9		PID<1ppm		-1 Bentonile -	
- as above but mostly yellow crushed sandstone     2.9       -3     PEATY SAND - dark brown and black silty peaty sand, moist       3.2     SAND - grey brown fine to medium grained sand, wet at 3.2m       -4     - as above but medium grained, saturated       -4     - as above but medium grained, saturated		-2	FILLING - sand, crushed sandstone and gravel		A	1.9 2.0		PID<1ppm		-2	
3.2       SAND - grey brown fine to medium grained sand, wet at 3.2m       Image: Control of the second sec		2.9 -3	- as above but mostly yellow crushed sandstone PEATY SAND - dark brown and black silty peaty sand, moist		A	2.9 3.0		PID<1ppm		- - -3 - Machine slotted -	10000000000000000000000000000000000000
4.7 Bore discontinued at 4.7m - target depth reached		3.2	SAND - grey brown fine to medium grained sand, wet at 3.2m						<b>Y</b>		20,00,00,00,00,00,00 1111111111111111111
- target depth reached		4.7	- as above but medium grained, saturated							- 4 	0,00,00,00,00,00,00,00,00,00,00,00,00,0
			- target depth reached								

TYPE OF BORING: Solid flight auger WATER OBSERVATIONS: Free groundwater observed at 3.2m

REMARKS: Monitoring well MW2 installed to 4.7m

SAMP Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling ADBU.WC

**RIG:** Bobcat



**DRILLER:** G Trippett

CHECKED Inilials; 2019/07 Date:

LOGGED: PEN





CASING: Uncased

CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: BH17/MW2 PROJECT No: 44621 DATE: 28 Feb 07 SHEET 1 OF 1

Π	Da		Description	& In Situ Testing	<u> </u>	Well					
쩐	(r	n)	of Strata	Grap	Type	Septh	ample	Results & Comments	Wale	Construction	
			FILLING - dark brown sandy filling (topsoil) with grass roots (grass at surface)	$\bigotimes$	A	0.1 0.2	<u></u>	PID<1ppm			
			- some gravel at 0.5m		A	0.4 0,5		PID<1ppm			
	•1				A	0.9 1.0		PID<1ppm		-1 Bentonite	
	2	1.9	FILLING - sand, crushed sandstone and gravel		A	1.9 2.0		PID<1ppm		-2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -2 -	00.00.00.00.00
	3	2,9 3.2	- as above but mostly yellow crushed sandstone PEATY SAND - dark brown and black silty peaty sand, moist SAND - grey brown fine to medium grained sand, wet at 3.2m		A	2.9 3.0		PID<1ppm	¥.	-3 Machine slatted PVC screen	0,00,00,00,00,00,00,00
ـــــــــــــــــــــــــــــــــــــ	4		- as above but medium grained, saturated							-4 -4	0.00.00.00.00.00.00.00.00.00.00.00.00.0
		4.7	Bore discontinued at 4.7m - target depth reached	<u></u>						End cap[0]	£0
LL RIG TYF	i: E PE (	Bobc OF E	at DRILLER: G Trippett 30RING: Solid flight auger	i	LO <sup>,</sup>	GGED	. PE	N	CAS	SING: Uncased	

WATER OBSERVATIONS: Free groundwater observed at 3.2m REMARKS: Monitoring well MW2 installed to 4.7m

SAMPLING & IN SITU TESTING LEGEND       A Auger sample     pp     Pockst penatrometer (kPa)       D Disturbed sample     PID     Photo ionisation detector       B Buik sample     S Standard penatration test       U, Tube sample (x mm dia.)     PL     Point load stangth (550) MPa       W Water sample     V Shear Vane (kPa)       C Core drilling     D Water seep     E Water level	CHECKED Inivials: Date: 20 9/07 Douglas Partners Geotechnics - Environment - Groupdwater
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CLIENT: City of Sydney Council

PROJECT: Phase 2 Contamination Assessment

LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: BH18 PROJECT No: 44621 DATE: 28 Feb 07 SHEET 1 OF 1

Π			Description	. <u>ല</u>		San	npling (	& In Situ Testing		Well	
교	De (r	pih n)	of Strata	Graph Log	Type	Depth	ample	Results & Comments	Wate	Construction	
$\vdash$		0.05			<u> </u>		<u></u>		-		····
			FILLING - dark grey sandy gravel roadbase filling, humid	$\bigotimes$	A	0.1 0.2		PID<1ppm		-	
		0.3	FILLING - dark brown sand filling, with some gravel and crushed sandstone. Piece of ceramic tile at 0.4m		A	0,4 0,5		PID<1ppm			
	-1				A	0.9 1.0		PiD<1ppm		- <b>1</b>	
	-2		- mostly crushed sandstone at 1.5m, orange and cream		A	1.9 2.0		PID<1ppm		-2	
		2,1	SAND - yellow brown, fine to medium grained sand, with some black patches, grades to darker brown sand, moist	× ×							
		2.0	PEATY SAND - dark brown to black peaty, organic sand, wet	*******	Δ	2,9		PID-120m	¥		
	- 3	33		******	<u>^</u>	3.0		PIDA Ippin		-3	
		3.5	SAND - light grey cream medium grained sand, wet								
		-1-	Bore discontinued at 3.5m - target depth reached					2			
	-4									-4	
							· .				

RIG: Bobcat

**DRILLER:** G Trippett TYPE OF BORING: Solid flight auger

LOGGED: PEN

CASING: Uncased

WATER OBSERVATIONS: Free groundwater observed at 2.9m **REMARKS:** 

## SAMPLING & IN SITU TESTING LEGEND pp Pockat penetrometer (kPa) ole PID Photo icn/salion datactor Standard penetrometer (kPa) mm dia.} PL Point load strongth Is(50) MPa V Shear Vano (kPa) V Shear Vano (kPa) V Water seep ¥ Water level

SAMPI Auger sample Disturbed sample Bulk sample Tube sample (x mm dia.) Water sample Core drilling ADBU.WC







CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/---

BORE I	No:	BH	19
PROJE	СТ	No:	44621
DATE:	28	Feb	07
SHEET	1	OF	1

Depth					San	npling	& In Situ Testing	Ϊ.	Well		
<i>a</i>	(m)	of	Log	g	튶	ple	Results &	Vater	Constructio	n	
L		Strata	U	4	ő	San	Comments	~	Details		
	0.05	BITUMINOUS CONCRETE	$\times\!\!\times$		0.1						
	- 0.2	Bore discontinued at 0.2m		<b>_</b>	-0.2		PID<1ppm				
	[	- refusal on concrete									
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П											
RIC	Bobca	at DRILLER: G Trippett		LOG	GED		N C		NG: Lincased		
TY	PE OF B	ORING: Solid flight auger									
RE	WATER OBSERVATIONS: No free groundwater observed										

ſ	SAMPLING 8	IN SITU TESTING LEGEND	CHECKED		
	A Auger sample D Disturbed sample	pp Pocket penetrometer (kPa)			
	8 Bulk sample	S Standard penetration test	Initials:		
	U, Tube sample (x mm dia.) W Water sample	PL Point load strength Is(50) MPa		/	Douglas Partners
	C Core drilling	V Stram varie (kraj ▷ Water seep	Date: 201910-1		Contochulan Environment Oneumeterster

CLIENT: City of Sydney Council PROJECT: Phase 2 Contamination Assessment LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: -EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: BH20 PROJECT No: 44621 DATE: 28 Feb 07 SHEET 1 OF 1

	Donfh		Description	i Li		Sar	gailqn	& In Situ Testing	Τ_	Weil
R	(m)		of Strata	Graph	ype	epth	mple	Results &	Wate	Construction
$\left  \right $		╋	FILLING - dark grey black silty sand filling (topsoil), with	XX			Sa	Continents		Details
			some grass roots and sandstone gravel (grass at surface)		A*	0.1		PID<1ppm		
	0.4	4	FILLING - motiled grey, orange and brown crushed sandstone filling	$\bigotimes$	A	0.4		PID<1ppm		
	-1				A	0.9		PID<1ppm		-1
			SAND - grey brown fine to medium grained sand						-	
	1.6 1.7	3 	PEATY SAND - dark grey peaty sand at 1.6-1.7m							
	2		- as above but light yellow brown sand		A	1.9 2.0		PID<1ppm		-2
			- wel from 2.5m						<b>T</b>	
	3		- grading to grey brown medium grained quartz sand, saturated		A	2.9 3.0		PID<1ppm		-3
	3.5		Bore discontinued at 3.5m - target depth reached	<u>:</u>						
			:							
RIG: TYP WAT REM	E OF E	at 301 851	DRILLER: G Trippett RING: Solid flight auger ERVATIONS: Free groundwater observed at 2.5m *Blind field duplicate sample BD5-280207 collected			GGED	: PEN	1	CAS	ING: Uncased



CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH21 PROJECT No: 44621 DATE: 01 Mar 07 SHEET 1 OF 1

Π	l	Description	. <u>ಲ</u>		Sam	pling 8	In Silu Testing	Well	
Ъ	Depth (m)	of	Log	be	ft	ble	Results &	Wate	Construction
	(,	Strata	Ū	ТУ	Ő	San	Comments		Details
$\Box$	0.05	BITUMINOUS CONCRETE	501		0.1				
		ROADBASE - roadbase gravel filling		A	0.2		PIU<1ppm		
	-	SAND - brown grey fine to medium grained sand							
				Α	0.4		PID<1ppm		
	-				0.0				
	-					1			•
	-								
				A	0,9		PID<1ppm		-1
	-1	- grading to yellow fine grained send, with some black			1.0				
	-	organic specks							
	-								-
	•								
	[								-
Ì	-								
		- grading to light vellow medium grained sand, moist.		A	1.9		PID<1ppm		
	-2	some black organic specks			2.0				
	[		<i>i</i> ,	]					
	-		·· ··						
	-								
	}		····	Ì					f l
	ł			1	1				
	[								- I
	ļ	and the to the project from 2.0m		<u> </u>	2.9		<b>PID</b> <100m		
	-3	- grading to fine gramed from 2.9m		<u> </u>	3.0		PID~ Ippin		-3
	ŀ				1			1	
1	[								[
	ļ								
1	3.	Bore discontinued at 3 5m		<u> </u>	├			<u> </u>	· · · · · · · · · · · · · · · · · · ·
	ł	- larget depth reached				ŧ.			
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	<b>4</b>			1		[			-4
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L	[			1			l		
F	u <b>G:</b> Bot	DRILLER: G Trippett		LC	OGGE	D: PE	EN	CA	SING: Uncased
T	YPE OF	BORING: Solid flight auger							
۷	VATER	OBSERVATIONS: No free groundwater observed							
F	REMARK	(S:							

SAMPLING & IN SITU TESTING LEGEND       A Auger sample     pp     Pocket penetrometer (KPa)       D Disturbed sample     PID Photo ionisation detector       B Buik sample     S     Standard penetration test       U, Tube sample (x mm dia.)     PL Point load strongiti Is[50] MPa       W Water sample     V     Shear Vane (KPa)       C Core drilling     D     Water seep     T Water favel	CHECKED Initials: PF Date: 10 9/07	<b>Douglas Partners</b> Geotechnics · Environment · Groundwater
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CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

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BORE No: BH22 PROJECT No: 44621 DATE: 01 Mar 07 SHEET 1 OF 1

Ē	_		Description	ļ		San	ipling 8	& In Situ Testing	5	Well		
R	De (n	pth 1)	of Strata	Grapi Log	Type	Depth	Sample	Results & Comments	Wate	Construction Details		
		0.05		$\sim$		0.1			-			
	Ĺ	0,1	FILLING - roadbase gravel filling		A	0.2		PID<1ppm		-		
			SAND -grey brown fine grained sand							-		
	-		- grading to light brown, medium brown and dark brown layered/mottled fine grained sand, humid from 0.4m		A	0.4 0.5		PID<1ppm		-		
	-1	1.0	SAND - vellow brown fine grained sand		A	0.9 1.0		PID<1ppm		-1		
	2		SAND - yellow brown inte grained sand		A	1.9 2.0		PID<1ppm		-2		
		2.5	SAND - grey brown fine grained sand, with some darker patches of organic matter			2.9		PID<1ppm				
	- 3 		- moist to wet at 3.0m			3.0			Ţ			
	4	3.5	Bore discontinued at 3.5m - target depth reached	- <b>F</b>						-4		
- D	1G·	Boh	DRILLER: G Trippett		LC	OGGE	D: P	EN	CA	SING: Uncased		
Т	YPE	G: Bobcat DRILLER: G Trippett LOGGED: PEN CASING: Uncased (PE OF BORING: Solid flight auger										

WATER OBSERVATIONS: Free groundwater observed at 3.4m REMARKS:

SAMPLING & IN SITU TESTING LEGEND         A Auger sample       pp       Pocket ponetrometer (PPa)         D Disturbed sample       PID       Photo lonisation detector         B Bulk sample       S Standard panetration loast       In         U, Tobe sample (x mm dia.)       PL       Point load strength 15(50) MPa         W Water sample       V Shear Vano (RPA)       C         C Core drilling       D Water seep ¥ Water level       C	CHECKED Initials: Date: 20 4 07 Douglas Partners Geotechnics • Environment • Groundwater
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City of Sydney Council CLIENT: Phase 2 Contamination Assessment PROJECT: LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/--

BORE No: BH23 PROJECT No: 44621 DATE: 01 Mar 07 SHEET 1 OF 1

			Description	<u>,</u> 2		Sam	pling	& In Situ Testing		Well	
뉟	Dej (n	pih n)	of	Log	å	pth	nple	Results &	Wate	Construction	
	•		Strata	ပ	Ŷ	De	San	Comments		Details	
		0.05	BITUMINOUS CONCRETE	$\mathbb{X}$		0.1		Bloctorm			
		0.2	FILLING - gravel roadbase	₩	<u> </u>	0.2		1 10 ctppin			
			FILLING - light grev sand filling, with black specs of	$\bigotimes$		04			ļ		
	[	0.5	organic matter	XX	A	0.5		PID=2ppm			
	-		FILLING - light grey sand filling, with pieces of ash and gravel	$\otimes$	A*	0.6		PID=1ppm			
	ŀ	0,7	SAND - yellow fine grained sand, humid			0.7					
	ľ.					0.9					
	-1			÷. • •	<u> </u>	1.0		PID=1ppm		-1	
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	t			÷. : .						[	
	ŀ				<u> </u>	1.9		PID-100m	1	-	
	-2		- grading to vellow fine to medium grained, with a few		<u> </u>	20		PiO- ippin		-2	
	ł		black specs of organic matter, moist from 2.0m		1					[ ]	
	[			· · · ·						-	
	ŀ			•							
	ł			÷		ļ					
	Ī				1						
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	ł						1				
	-3		- grading to light grey brown		ł	1				-3	
	t				1						
	ļ			: :	·						
	ł		- moist to wet at 3.5m		A	3.4		PID=2ppm		, -	
	ł	3.	5 Bore discontinued at 3.5m	<u>`</u>		-3.5-			1-2		
	Į.		- target depth reached								
	ł						1			•	
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	<b>F</b> 4									-4	
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	ŀ					<u> </u>		I			
-	21/2+	Bo	hcat DRILLER: G Trippett		1.0	JGGF	D: P	'EN	CA	SING: Uncased	
י ר	TYPE	E OF	BORING: Solid flight auger				•				
۷	VAT	ER	OBSERVATIONS: Free groundwater observed at 3.5m								
F	REM	AR	(S: *Blind field duplicate sample BD6-010307 collected	ed							
ſ	A .	Auces	SAMPLING & IN SITU TESTING LEGEND		СН	ECKED	)				
		Dislur Bulk s	bed sample PiD Photo ionisation detector ample S Standard penatration test		Initials;	_lF		[(/] Do	U	alas Partne	rs
	w v	), Tube sampto (x mm dia.) N Water sampte C core diffing Date: 20/9/0-1 Date: 20/9/0-1 Geotechnics · Environment · Groundwater									

CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH24/MW3 PROJECT No: 44621 DATE: 01 Mar 07 SHEET 1 OF 1

Γ			Description	.9	[	San	npling 8	In Situ Testing		Well	
뇞	D (	epth m)	of	Log	e	40	ala ele	Results &	Vater	Constructio	n
	Ľ		Strata	Q	۲.	å	Sam	Comments		Details	
	-	0.12	CONCRETE FILLING - orange, grey and brown crushed sandstone, sand filling moist	4.4. XX		0.2					
	[	0.3	SAND - grey brown fine grained sand, with some	X	<u> </u>	0.3		PIU<1ppm			
			patches of black (organic) sand		A	0.5 0.6		PID<1ppm			
	-1		- as above but light grey with darker grey patches			0.9		PłD<1ppm		Bentonite —	
		1,6	- grades to yellow brown sand at 1.5m PEATY SAND - dark brown and black fine to medium grained, peaty organic sand								
	-2				A	1.9 2.0		PID<1ppm		-2	0,00,00,00 1111111111111111111111111111
		2.2	SAND - yellow brown, fine to medium grained sand, moist							Machine stollard	
	3				A	2.9 3.0		PID<1ppm	Ţ	-3	
	4		- as above but cream coloured, wet							-4	20,00,00,00,00,00,00,00,00,00,00,00,00,0
		4.3	Bore discontinued at 4.3m - target depth reached	<u> [6]34-5</u>						End cap —	
RI TY W	G: 'PE ATI	Bobo OF I	cat DRILLER: G Trippett BORING: Solid flight auger BSERVATIONS: Free groundwater observed at 3.4m		LC	GGEI	D: PE	N	CAS	SING: Uncased	
RE	EMA	ARKS	S: Monitoring well MW3 installed to 4.3m								

SAMPLING & IN SITU TESTING LEGEND       A     Auger sample     pp     Pocket penetrometer (kPa)       D     Disturbed sample     PID Photo ionisation detector       B     Buik sample     S tandard penetration test       U     Tube sample (km dia.)     PL     Point lead strength 1s(50) MPa       W     Water sampto     V Shear Vane (kPa)       C     Core drilling     D     Water seep 3	CHECKED Initiats: Date: 20/0/07
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CLIENT:City of Sydney CouncilPROJECT:Phase 2 Contamination AssessmentLOCATION:3 Joynton Avenue, Zetland

SURFACE LEVEL: -EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH25 PROJECT No: 44621 DATE: 01 Mar 07 SHEET 1 OF 1

Π		Description	ic		San	apling (	& In Situ Testing		Well	
집	Ueptn (m)	of Strata	Grapt Log	Type	Depth	Sample	Results & Comments	Wate	Construction Details	
H		CONCRETE	4.4			~				
	- 0,1	FILLING - sand and crushed sandstone filling, with some gravel and pieces of ash, moist	$\bigotimes$	A*	0.2		PID<100m			
	- 0.3	SAND - grey brown fine to medium grained sand, with some darker grey patches, damp	.×××		0,3		1 10 11 11			
	-		•. •. • •••	A	0.5 0.6		PID<1ppm			
	- 1	- grading to light grey from 1.0m		A	0.9 1.0		PID<1ppm		-1	
	-2	- grading to yellow fine to medium grained, moist		A	1.9 2.0		PID<1ppm		-2	
	- 3	- as above but yellow/cream		A	2.9 3.0		PID<1ppm		-3	
	3.5	Bore discontinued at 3.5m	<u> </u>			i				
	-4	- target depth reached							-4	
RIC TY W/ RE	G: Bob PE OF ATER O	cat DRILLER: G Trippett BORING: Solid flight auger BSERVATIONS: No free groundwater observed S: *Blind field duplicate sample BD7-010307 collected	l	LO	GGEC	); PE	N	CA:	SING: Uncased	
<dbu WC</dbu 	Auger s Disturbo Buik sau Tube sa Water s Core dri	SAMPLING & IN SITU TESTING LEGEND snple pp Pockel ponetromater (kPa) d sample PID Pholo lonisation detector nple S Standard ponetration tast mple (xmm dia.) PL Point load strength 15(50) MPa ample V Shear Vano (kPa) ling P Water seep ₹ Water level		CHE IUels: alb: 2	скер // 0 / Р	107		<b>19</b> 111	<b>Jlas Partners</b> s · Environment · Groundwater	

City of Sydney Council CLIENT: PROJECT: Phase 2 Contamination Assessment LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH26 PROJECT No: 44621 DATE: 01 Mar 07 SHEET 1 OF 1

Γ		Description	. <u>0</u>	1	San	pling 8	k In Situ Testing	1.	Well
R	Depth (m)	of	Log	þe	bth	npte	Results &	Nater	Construction
		Strata	0	L L	Del	Sarr	Comments		Details
	ŀ	FILLING - sandy gravel filling, with black ash and slag, moist (grass at surface)	$\bigotimes$		0,1		PID<100m		
			$\otimes$		0.2		10 (1)		
	-		$\mathbb{X}$		0.4				[
	- 0.	SAND - grey brown sand with some black organic	$\sim$	1 A	0,5		PID<1ppm	1	
	l	specs, damp							
	-		<i>:</i> .						
				A	0.9		PID<1ppm		
		- grading to light grey from 1.0m			1.0				
									-
	-								
	-								-
				1					[
					1.9		PID<1ppm		
	-2	- grained to yellow brown fine grained sand, moist from			2.0				-2
	-	2.011							-
									t l
	-			<u> </u>	2.9		<b>BID</b> eterm		
	-3	- yellow/cream		Ĥ	3,0		Plosippin	ĺ	- 3
	-								
	•			1					
	- 3.5								
	-	Bore discontinued at 3.5m - target depth reached							
	-								
	-					1			
	- 4								-4
	•								
	-								-
								1	
	-								
	-								} [
Ц		L				.			
RI	G: Bob	cat DRILLER: G Trippett		lo	GGEI	): PE	N	CAS	SING: Uncased
TY W	PE OF	BORING: Solid flight auger BSERVATIONS: No free groundwater observed							
RE	MARK	3:							
		SAMPLING & IN SITU TESTING LEGEND		CHE	CKED		Mandel Providen		
A D B	Auger s Disturb Bulk sa	ample pp Pocket penetrometer (kPa) ed sample PID Photo ionisation detector mple S Stendard genetration test		nilials:	A				JAA Dautaana
	Tube si Water s Core of	mple (x mm dia.) PL Point load strength (s(50) MPa ample V Shear Vane (kPa) Ling D Water seep 8 Water level		Date: 70	, i91	27	NJ Genter	ug hnic	s. Environment, Groundwater





CLIENT: City of Sydney Council Phase 2 Contamination Assessment PROJECT: LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH27 PROJECT No: 44621 DATE: 01 Mar 07 SHEET 1 OF 1

Π			Description	0	T	San	ipling a	& In Situ Testing		Well
님	De	pih n}	of	Log	8	цŅ	ple	Results &	Vater	Construction
		,	Strata	ō	۲ <sup>۲</sup>	Der Der	Sam	Comments	7	Details
	1	0,1	CONCRETE							
			FILLING - sandy gravelly roadbase filling	$\otimes$						
		~		$\boxtimes$		04				
	-	0.4	FILLING - grey sand filling, with some gravel	<u> XX</u>	<u> </u>	0.5		PID<1ppm		
			SAND – light grey sand with some black patches, moist	[]						
	-				·	0.9				
	-1				. -^-	1.0		Pill<1ppm		-1
	-				.]					-
	•			····						
	-			1	·					
	-2	1.9 2.0	SAND - fine grained, dark brown sand, humid	<u> </u>	A	1.9 2.0		PID<1ppm		-2
	-		SAND - grey brown medium grained sand with some black organic specs			_,_				
	-									
	l			<b>.</b>						
	-									
	[								T	
	ļ		- wet at 2.8m	••••		2.9		DIDctorm		
	-3				<u> </u>	3.0				-3
	l			[····						
	ŀ									
	ŀ									
		3.5	Bore discontinued at 3.5m							
	r		- Miger depth reached							
	-									
	4						i			-4
	•									
	ŀ									
	ļ									
	ŀ									
	ŀ									
	[									
	ŀ									
RI TV	G: (PF	BOD OF 1	car DRILLER: G (nppett BORING: Solid flight auger		LO	GGE	J: PE	1N	GA	SING: Uncased
W	ATE	RO	BSERVATIONS: Free groundwater observed at 2.8m							
R	EM/	RK	3:							
	A	ugere	SAMPLING & IN SITU TESTING LEGEND		СНЕ	CKED		<b></b>		
	D B	sturbe ulk sar	d sample PiD Photo ionisation detector mple S Standard penetration test		initials:	K.		III DO	11	ilas Partners
l <sub>v</sub>		ine sa later s ora dri	nano (kruit ola) r⊏ ront todo stengin is(so) mPa ample V Shear Vano (kPa) IEng D Water seep ≩ Water lavel		Date; 2	øfft	17	Geoteci	nic	s · Environment · Groundwater

CLIENT: City of Sydney Council PROJECT: Phase 2 Contamination Assessment

LOCATION: 3 Joynton Avenue, Zetland

.

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH28 PROJECT No: 44621 DATE: 01 Mar 07 SHEET 1 OF 1

Π	_		Description	<u>.</u>		San	npling (	& In Situ Testing	5	Well
R	Ue (r	າ) ກ)	of Strata	Grapi Log	Type	Depth	Sample	Results & Comments	Wate	Construction Details
			FILLING - sand, crushed sandstone and gravel filling, large pieces of sandstone (grass at surface)	$\bigotimes$	A	0.1 0.2		PID<1ppm		
		0,3 0,5	FILLING - grey and dark grey, sand and clay filling, moist	X	A	0.4 0.5		PID<1ppm		
	- <b>1</b>		SAND - light grey and dark grey mottled/layered, line to medium grained sand, moist		<u>A</u>	0.9 1.0		PID≺1ppm		-1
	-2	1.8 2.0	SILTY SAND - brown fine grained, silty sand, moist to wet	• • • •	A	1.9 2.0		PID<1ppm		-2.
	•		SAND - light grey/white medium grained sand, with some black organic specs						×	
	-3	2				2.9 3.0		PID<1ppm		-3
	- 4	3,3	Bore discontinued at 3.5m - target depth reached							-4
RI	G: 1	Bobo	DRILLER: G Trippett		LO	GGE	D: PE	N	CAS	SING: Uncased
11		UP I	sorana, aona mgin sayat							

WATER OBSERVATIONS: Free groundwater observed at 2.5m REMARKS:

SAMPLING & IN SITU TESTING LEGEND           A         Auger sample         pp         Pockel penetrometer (kPa)           D         Disturbed sample         PID         Phole ionisation detector           B         Bulk sample         Standard penetraticentest           U,         Tube sample (k mm dia.)         PL         Point load strength (s(50) MPa           W         Water sample         V         Shanar Vane (kPa)           C         Cora drilling         D         Water seep	CHECKED Initials: P Date: 20 (9/07) Douglas Partners Geotechnics · Environment · Groundwater
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CLIENT: City of Sydney Council

PROJECT: Phase 2 Contamination Assessment

LOCATION: 3 Joynton Avenue, Zetland

SURFACE LEVEL: --EASTING: NORTHING: DIP/AZIMUTH: 90°/-- BORE No: BH29 PROJECT No: 44621 DATE: 01 Mar 07 SHEET 1 OF 1

Π			Description	<u>.</u>	[	Saп	pling a	& In Situ Testing		Well
膨	Der (n	oth 1)	of	raph. Log	R	Ħ	ple	Results &	Nater	Construction
		_	Sirata	Ø	۲.	Del	Sarr	Comments	Ĺ	Details
		0,1	BITUMINOUS CONCRETE FILLING - dark grey/black sandy gravel filling, with slag	$\otimes$	A	0.1		PiD<1ppm		
		0.3	FILLING - grey and dark grey sand and clay filling, with	$\bigotimes$						
		0.5	some brown sand, moist	$\bigotimes$	A	0.4 0.5		PID<1ppm		
			SAND - grey brown and yellow brown fine grained sand, with minor silt content, moist							
	- 1				A	0.9 1.0		PID<1ppm		-1
					A	1.9		PID<1ppm		
	-2		<ul> <li>grading to light grey sand with dark grey and black patches at 2.0m, moist to wet</li> </ul>			2.0				-2
			- grading to light grey						¥	
	-3		-grading to grey/white medium grained sand, wet		A	2.9 3.0		PID<1ppm		-3
		3.5	Bore discontinued at 3.5m							
			- target depth reached							
	-4									-4
				1						
	9: E PE (	Bobc DF E	at DRILLER: G Trippett IORING: Solid flight auger		LO	GGE	): PE	N	CAS	SING: Uncased
W/ RE	NTER Mai	r oi RKS	SSERVATIONS: Free groundwater observed at 2.5m :							

SAMPLING & IN SITU TESTING LEGEND       A     Auger sampla     pp     Pocket penetrometer (kPa)       D     Disturbed sample     PiD     Photo lorisation datactor       B     Buk sampla     S     Standard penetration test       U     Tube sample (x nm dia.)     PL     Point load strength Is(50) MPa       W     Waler sampla     V     Shart Yane (kPa)       C     Core dhiling     D     Water tevel	CHECKED Initials: // Date: 20 4/01 Date: 20
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		Go	<u>Ider</u> ocia	ies				REPORT	. 01	FE	BOREHOLE: HA1
	NT: EC1 TIO NO:	r: N.	Lando Formo Joynto 00623	com c/- Allen Jack er South Sydney on Street, Zetland 3118	( + ( Hos <sub>i</sub> I	Cottle pital	Г 	LOCATION: See Site Plan SURFACE RL: 17.0 m DATUM: AHD INCLINATION: -90*		SH DF LC CH	HEET: 1 OF 1 RILL RIG: Hand Auger & Spade OGGED: AGS DATE: 5/7/04 HECKED: DATE: 31-7.
 	Dri	lling	·····	Sampling			,	Field Material Desc	riptio	n	
PENETRATION RESISTANCE	WATER	DEPTH (metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE AND ADDITIONAL OBSERVATIONS
		- <del>0.0</del> 	17.00 0.50 16.50				SP	Silty SAND - grey SAND - fine grained, yellow, brown white			FILL - sand, rubble NATURAL
		- 1.0 - -	<u>1.00</u> 16.00 <u>1.30</u> 15.70	Sorrele (1 3 1 Fm)			SP SM	SAND - brown, some silt	D-M		
 1	Δ	1.5-	1.60 15.40 1.80 15.20	Sample (1.5-1.7m) Sample (1.5-1.7m)			SP	SAND - Time grained, dark grey and yellow SAND - fine to medium grained, light grey to white	M		
		2.0									
		2.5-									
		3.0-					-				
						-	-				-

And IN Sold of Parameters

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Administration of the South Construction



#### **REPORT OF BOREHOLE: HA2**

DATE: 5/7/00 DATE: 31.7.00

GAP Form No. 9

RL 2

C	Ľ		Gol ISO	lder ocia	tes					REPOI		FE	BOREHOL	E: H/	43
CI Pi LC JC	LIEN ROJE DCAT	T: :CT: 'ION: D:		Lando Forme Joynto 00623	com c/- Allen Jack er South Sydney I on Street, Zetland 118	k + Col Hospita I	ltier al	LOC, SUR INCL	ATION: See Site Plar FACE RL: 17,7 m INATION: -90°	DATUM: AHD		SH DF LC CH	IEET: 1 OF 1 RILL RIG: Hand A GGED: AGS IECKED:	Nuger DATE: DATE:	5/7/00 31.7.sz
		Drilli	ng		Sampling					Field Material [	Descriptio	n			
METHOD	PENETRATION RESISTANCE	WATER	(metres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED GRAPHIC	LOG LISC S-hal	0011/0 220	SOIL / ROCK MATER	IAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCI ADDI OBSER	URE AND TIONAL VATIONS	
			<u>-</u>	17.70 0.40 17.30				SAN P SAN	D - fine grained, dark brow D - fine grained, yellow an	m, with some silt, roots	S WO		TOPSOIL / FILL		
			· 5	<u>0.70</u> 17.00	DS (0.6-0.8m) Duplicate 1		· SI	SANE	O - Tine grained, white crea	ım — — — —	_				
HA		1	.0		DS (1.5-1.7m)						W				
		2.	0	<u>1.90</u> 15.80			SP	SAND	0 - fine grained, grey	<u></u>					
	Δ	> 2.	5	<u>2 40</u> 15.30 2.70				SAND	- fine grained, yellow cre	 im		1	Water table		
		3.	- -	15.00				End of	f Borehole @ 2.70 m				4.400	-	
			· · · · · · · · · · · · · · · · · · ·						-				· . -	•	-
- I	-J-	3::	,	TI Enviro	nis report of borehole nmental purposes of c	must b nly, with encounte	e reac out att ered.	l in conju tempt to As such	unction with accompanyin consider geotechnical pre- it should not be relied up	g notes and abbreviation operties or the geotech on for Geotechnical pu	– – – – – ons. Ithan inical signi rposes.	l s beer ficans	n prepared for se of the materials	GAP F	L

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	LIE RO. OC/ OB	NT: JEC ATIC NO:	T: N:	Lando Forme Joynto 00623	com c/- Allen Ja er South Sydne on Street, Zetla 9118	ack + ( ay Hos and	Cottie pital	r 	LOCATION: See Site Plan SURFACE RL: 18.5 m DATUM: AHD INCLINATION: -90°		SH DF LC CH	HEET: 1 OF 1 RILL RIG: Hand Auge OGGED: AGS D HECKED: D	r ATE: 5/7/ ATE: <b>31/</b>
	T	Dr	illing T		Sampling	3	<u> </u>	<b></b>	Field Material Desc	riptic	on	· · · · · · · · · · · · · · · · · · ·	
	PENETRATION	WATER	DEPTH (matros)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY DENSITY	STRUCTURE ADDITION OBSERVATI	AND AL ONS
			0.0	18.50					SAND - dark brown, with some silt, fine gravel, roots			TOPSOIL / FILL	<u>u</u>
			0.5 —	<u>0.50</u> 18.00				SP	SAND - fine grained, grey and white			NATURAL	
			 1.0 	1.00 17.50	DS (1.0-1.2m)			SP	SAND - fine grained, white	P			
			1.5 —	1.50 17.80 <u>1.70</u> 16,80	DS (1.5-1.7m)			SP SM SP	SAND - fine grained, dark brown with reddish tint, with some silt SAND - fine grained, white	4			
			2.0							and a second second second second second second second second second second second second second second second			
		Δ	2.5 —	1						~			
ļ		_		2.80					End of Borehols @ 2.00 m				
			3.0		-		And and a second second second second second second second second second second second second second second se						
	- 11 -		-		- 								

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IEN OJE CAT B N	T: ECT FIOI O:	: 1:	Lando Forme Joynto 00623	om c/- Allen Jac er South Sydney on Street, Zetland 118	k + ( Hos J	Cottle pital	r	LOCATION: See Site Plan SURFACE RL: 18.8 m DATUM: AHD INCLINATION: -90°		SH DF LC CH	HEET: 1 OF 1 RILL RIG: Hand Auger DGGED: AGS DATE: 5/7/01 HECKED: DATE: 31-7.
NETRATION SISTANCE	rrek	HTT HTT	OFPTH	Sampling SAMPLE OR FIELD TEST	COVERED	MPHIC 6	C Symbol	Field Material Des	ISTURE	NSISTENCY	STRUCTURE AND ADDITIONAL OBSERVATIONS
	Groundwater not encountered	0.5 	<u>1.40</u> 17.40	DS (0.5-0.7m) DS (1 4-1 fim)				SAND - with some silt, fine gravel and cobbles, glass, rubble	2 0		FILL (possibly from on site excavations)
	1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 - 1990 -	2.0	<u>1.80</u> 17.00 <u>1.90</u> 16.90					Clayey SAND and SAND - fine grained, grey, with some silt and clay, gravel and cobbles, slag see HA1 Sample (1.8-2.0m) End of Borehole @ 1.90 m	W		FILL Hand auger refused on large cobble or boulder
		3.0		·				- • • - •			



#### REPORT OF BOREHOLE: HA6

PROJECT: LOCATION: JOB NO:

CLIENT:

Landcom c/- Allen Jack + Cottier Former South Sydney Hospital Joynton Street, Zetland 00623118

LOCATION: See Site Plan SURFACE RL: 18.1 m DATUM: AHD INCLINATION: -90"

SHEET: 1 OF 1 DRILL RIG: Hand Auger LOGGED: AGS DATE: 5/7/00 CHECKED: DATE: 3//7.4



ROJ	NT: IECT	Г:	Lando Formo	com c/- Allen Jack er South Sydney I	( + ( Hosj	Cottie pital	г	LOCATION: See Site Plan SURFACE RL: 18.8 m DATUM: AHD		S D	HEET: 1 OF 1 RILL RIG: Hand	Auger	
		N:	Joynt 00623	on Street, Zetland	ſ			INCLINATION: -90" BOREHOLE DIAMETER: 100 mm		LC		DATE: 20	/7/0 7
	Dri	lling		Sampling		1		Field Material Desc	riptic	<u>л</u>		DATE. OA	<u>/-</u>
PENETRATION RESISTANCE	WATER	DEPTH (malres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY	STRUC ADD OBSER	TURE AND ITIONAL IVATIONS	
	not encountared		18,80 0.20 18.60	DS (0.1-0.3m) PiD= 1A		25.2 <u>15-35</u> 25-2 2-5-2		SAND - fine to medium grained, brown, with some silt, trace fine to medium grave) SAND - fine to medium grained, brown/black, with some ash and silt, trace coal and silt			TOPSOIL FILL		
	Groundwater :	0.5 —	0.50 18.30 0.60	DS (0.5-0.6m) PID=				Trace ash, some fine to medium sandstone grave	W				
		1 1	20	<u></u>				Ena of Borehole @ 0.60 m					
		1.0-											
		- 1.5 -											
		2.0 —							· · · · · · · · · · · · · · · · · · ·				
		2.5											
	3	- - - -											
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#### **REPORT OF BOREHOLE: HA8**

 CLIENT:
 Landcom c/- Allen Jack + Cottier

 PROJECT:
 Former South Sydney Hospital

 LOCATION:
 Joynton Street, Zetland

 JOB NO:
 00623118

10:53.12

JADPROMIDI-150/0623116/141-13.0PJ GLJRAU52.6DT 28/07/2009

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r LOCATION: See Site Plan SURFACE RL: 18.8 m DATUM: AHD INCLINATION: -90° BOREHOLE DIAMETER: 100 mm SHEET: 1 OF 1 DRILL RIG: Hand Auger LOGGED: GPC DATE: 20/7/00 CHECKED: DATE: 37.7.00

Drilling Sampling Field Material Description PENETRATION CONSISTENCY DENSITY RECOVERED Symbol STRUCTURE AND ADDITIONAL OBSERVATIONS MOISTURE SAMPLE OR FIELD TEST GRAPHIC LOG SOIL / ROCK MATERIAL DESCRIPTION METHOD WATER DEPTH (metres) SC DEPTH RL Gravely SAND - fine to medium grained, grey brown, gravel is medium grained 0.0 18.80 FILL (ROAD BASE) 0 20 SAND - tine to medium grained, grey FiLĒ DS (0.3-0.5m) PID= 0A 0,50 0.5 SAND - fine to medium grained, brown, with some clay 1.0 1.25 Encountered sandstone cobbles at 1.25m Groundwater not encountered DS (1.3-1.5m) PID-0A ¥ Σ 1.5 <u>1.60</u> 17.20 SP SAND - fine to medium grained, pale grey NATURAL 1 90 Layers of peaty sand (black) at 1.9m and 2.2m 2.0 DS (2.0-2.2m) PID=0 0A 2.30 SAND - fine to medium grained, dark brown 2.5 3.00 End of Borehole @ 3,00 m 3:5 This report of borehole must be read in conjunction with accompanying notes and abbreviations. It has been prepared for Environmental purposes only, without attempt to consider geotechnical properties or the geotechnical significance of the materials encountered. As such it should not be relied upon for Geotechnical purposes. GAP Form No. 9 RL 2

0			SS(		t <b>es</b>	• • •	Cattin		REPORT	0	FI	BOREHOLE: HA	9
P L( J(	ROJ DCA DB N	ECT: TION	;	Form Joynt 00623	er South Sydney I on Street, Zetland 3118	los	pital	4	SURFACE RL: 18.8 m DATUM: AHD INCLINATION: -90° BOREHOLE DIAMETER: 100 mm		S Di L(	HEET: 1 OF 1 RILL RIG: Hand Auger DGGED: GPC DATE: 2	:0/7
•		Drilli	ng		Sampling		1	_	Field Material Desc	zinti		DATE: 3	<u>"·/</u>
METHOD	PENETRATION RESISTANCE	WATER	DEPTH (metres)	<i>оертн</i> RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY	STRUCTURE AND ADDITIONAL OBSERVATIONS	
			<del></del>	18.80 0.20			<u>16.5</u> 5.55 55.5		Silly SAND - fine to medium grained, brown, with some rootlets, trace of gravel			TOPSOIL	
		c	,5 f	18.60	DS (0.3-0.4m) PID≂ 1A				SAND - fine to medium grained, brown, with trace rootlets, gravel, brick and ash			FILL	
		1	0	0.90 17.00				SP	SAND - fine to medium grained, grey, trace of clay			NATURAL	<del></del> ,
		1.	5		DS (1.3-1.4m) PID= ΩA					W			
		2.0		2.00 16.80		وبرغبة بمستنب المسترين			SAND - Time to medium grained, orange brown, trace of rootlets				
		2.5											
 	-	3.0		1.00 5 80				Ē	ind of Borehole @ 3,00 (7)		8	action of hole was wet. Inferred	
	-								-		g	roundwaler seepage	

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			T: >N:	Lando Forme Joynte 00623	com c/- Allen Jack er South Sydney on Street, Zetland 118	k + ( Hosj J	Cottle pital	er	LOCATION: See Site Plan SURFACE RL: 18.4 m DATUM: AHD INCLINATION: -90° BOREHOLE DIAMETER: 100 mm		SH DF LC CH	HEET: 1 RILL RIG: DGGED: G HECKED:	OF 1 Hand Auger PC DATE: DATE:	20/7 \$1;
	1	Dr	illing I	1	Sampling			1	Field Material Desc	riptic	'n			
MEIHOD	PENETRATION RESISTANCE	WATER	DEPTH (maires)	DEPTH RL	Sample or Field fest	RECOVERED	GRAPHIC LOG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY		STRUCTURE AND ADDITIONAL OBSERVATIONS	
¥L	L	GWNE	- <del>0</del> -0 - - -	18.40	DS (0.1-0.3m) PID= 0A DUPB				Silty SAND - fine to medium grained, grey brown	×		FILL (TOP	SOIL)	
			0.5	18:00					End of Borehole @ 0.40 m			Refusal on boulderc	sandstone cobbles a	nd
			1.5 -											
	1999911444.5		2.0							And And And And And And And And And And				
			2.5											
			3.0	-										
	Ì	3	Go	lder ocia	tes				REPORT	OF	E	BOREHOLE	: HA13	
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	CLIE PRO LOC/ JOB	NT: JEC ATIC NO:	T: )N:	Lando Formo Joynto 00623	com c/- Allen Jack er South Sydney F on Street, Zetland 3118	+ ( los	Cottie pital	r	LOCATION: See Site Plan SURFACE RL: 19.0 m DATUM: AHD INCLINATION: -90° BOREHOLE DIAMETER: 100 mm		5 [ [ [ [	SHEET: 1 OF 1 DRILL RIG: Hand A .OGGED: GPC DHECKED:	Nuger DATE: 20/7/00 DATE: <b>3/.7.~</b>	
L		Dr	illing		Sampling				Field Material De	cripti	on			
METHOD	PENETRATION	WATER	DEPTH (molres)	DEPTH RL	SAMPLE OR FIELD TEST	RECOVERED	GRAPHIC LCG	USC Symbol	SOIL / ROCK MATERIAL DESCRIPTION	MOISTURE	CONSISTENCY		URE AND FIONAL VATIONS	
SH SH		Greundwaiter not encountered W		RL 19.00 19.00 18.70	DS (0.2-0.4m) PID= 0A DS (0.7-0.8m) PID= 0A				SAND - fine to medium grained, brown SAND - fine to medium grained, grey, trace of silt, piece of rock and brick End of Borehole @ 0.80 m			FILL (TOPSOIL)         FILE		
			3.0	Th	- 				• • • • •		•			
				Enviro	nmental purposes on er	icou	ithout intered	atte J. A	a conjunction with accompanying notes and abbreviations inpt to consider geotechnical properties or the geotechnic s such it should not be relied upon for Geotechnical purportion of the state of the second br>second second  It ha al sign ses.	ifica	en prepared for nce of the materials	GAP Form No. 9 RL 2		

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SPT correlations may be subject to corrections for overburden pressure and equipment type.

In the absence of test results, consistency and density may be assessed from correlations with the observed behaviour of the material.



	······································
EXPLANATION OF NOTES, ABBREVIATIONS & TERMS	•
USED ON BOREHOLE AND TEST PIT REPORTS	
DRILLING/EXCAVATION METHOD	
AS Auger Screwing RD Rotary blade or drag bit HQ Diamond Core	e - 63 mm
AV Auger V-Bit RT Rotary Tricone bit NMLC Diamond Core	- 52 mm
ATC Auger TC-Bit RAB Rotary Air Blast NQ Diamond Core	- 47 mm
HA Hand Auger RC Reverse Circulation BH Tractor mounted	ed backhoe
WB Washbore or Bailer PT Push Tube EX Tracked hydra	ulic excavator
JET Jetting CT Cable Tool Rig EE Existing Excav	ation
PENETRATION/EXCAVATION RESISTANCE	
L Low resistance. Rapid penetration possible with little effort from the equipment used.	
M Medium resistance. Excavation/possible at an acceptable rate with moderate effort from the eq	uipment used.
H High resistance to penetration/excavation. Further penetration is possible at a slow rate and rec significant effort from the equipment.	quires
R Refusal or Practical Refusal. No further progress possible without the risk of damage or unaccuted the digging implement or machine.	eptable wear to
These assessments are subjective and are dependent on many factors including the equipment power, we of excavation or drilling tools, and the experience of the operator.	eight, condition
WATER	·····
Water level at date shown Partial water loss	•
Description Water inflow Complete water loss	
GROUNDWATER NOTThe observation of groundwater, whether present or not, was not possibleOBSERVEDwater, surface seepage or cave in of the borehole/test pit.	e due to drilling
GROUNDWATER NOT The borehole/test pit was dry soon after excavation, however groundw ENCOUNTERED present in less permeable strata. Inflow may have been observed had the b been left open for a longer period.	vater could be orehole/test pit
SAMPLING AND TESTING	
SPT Standard Penetration Test to AS1289.6.3.1-1993	
4,7,11 N=18 4,7,11 = Blows per 150mm. N = Blows per 300mm penetration following 19	50mm seating
30/80mm Where practical refusal occurs, the blows and penetration for that interval are	e reported
HW Penetration occurred under the hammer and rod weight only	
HB Hammer double bouncing on anvil	
DS Disturbed sample	
FP Field permeability test over section noted	
PID Photoionisation Detector reading in ppm	
PM Pressuremeter test over section noted	
PP Pocket penetrometer test (expressed as instrument reading in kPa)	
Ranking of Visually Observable Contamination and Odour (for specific soil contamination assessment)	projects)
R = 0 No visible evidence of contamination R = A No non-natural odours identifie	ed d
R = 1 Slight evidence of visible contamination R = B Slight non-natural odours ident	tified
R = 2 Visible contamination $R = 0$ Moderate non-natural boours in $R = 3$ Significant visible contamination $R = 0$ Strong non-natural odours iden	ntified
ROCK CORE RECOVERY	
TCR = Total Core Recovery SCR = Solid Core Recovery RQD = Rock Quality Desi	gnation
$\frac{\text{Length of core recovered}}{\text{Length of core run}} \times 100\% = \frac{\sum \text{Length of cylindrical core recovered}}{\text{Length of core run}} \times 100 = \frac{\sum \text{Axial lengths of core > 100r}}{\text{Length of core run}}$	nm long × 100
ROCK STRENGTH TEST RESULTS	
Point Load Strength Index (Isco) (Avial test - MPa)	
, our mere onongen mere (influ) (router reat - we d)	1
Point Load Strength Index (Isco) (Diametral test - MPa)	.



### TERMS FOR ROCK MATERIAL STRENGTH & WEATHERING AND ABBREVIATIONS FOR DEFECT DESCRIPTIONS

STRENG	ŧΤΗ				
Symbol	I T	erm	Point Los Index -ls	F	ield Guide
εL	Extr	emely	(MPa) < 0.03	Easily remoulded by hand to a n	naterial with soil properties.
VL	V L	ery ow	0.03 to 0.	Material crumbles under firm blo with knife; too hard to cut a triax can be broken by finger pressure	ows with sharp end of pick; can be peeled dal sample by hand. Pieces up to 30 mm
L	Ľ	ow	0.1 to 0.3	Easily scored with a knife; ind specimen with firm blows of pic piece of core 150 mm long by 3 Sharp edges of core may be frial	lentations 1 mm to 3 mm show in the k point; has dull sound under hammer. A 50 mm diameter may be broken by hand. ble and break during handling.
М	Me	dium	0.3 to 1	Readily scored with a knife; a diameter can be broken by hand	piece of core 150 mm long by 50 mm with difficulty.
Н	Н	igh	1 to 3	A piece of core 150 mm long b hand but can be broken with pic hammer.	y 50 mm diameter can not be broken by k with a single firm blow; rock rings under
VH	V H	ery igh	3 to 10	Hand specimen breaks with pic under hammer.	ck after more than one blow; rock rings
EH	Extr H	emely igh	>10	Specimen requires many blows we material; rock rings under hamm	vith geological pick to break through intact er.
ROCK MA	TERIAL W	EATHE	RING		
Syn	nbol		Term	Fi	eld Guide
R	S		Residual Soil	Soil developed on extremely w substance fabric are no longer e but the soil has not been signific	eathered rock; the mass structure and vident; there is a large change in volume antly transported.
E١	N	E	xtremely /eathered	Rock is weathered to such an either disintegrates or can be rem	extent that it has soil properties - i.e. it noulded, in water.
DW	ΗW		Distinctly	Rock strength usually changed discoloured, usually by iron stain	by weathering. The rock may be highly ing. Porosity may be increased by
	MW		reathered	in pores. Subdivisions of this applicable to local conditions.	weathering grade may be used where
SI	N	W	Slightly /eathered	Rock is slightly discoloured bu relative to fresh rock.	t shows little or no change of strength
FI	R		Fresh	Rock shows no sign of decompo	sition or staining.
Note: In	termediate	zones n	nay be identi	ed where heterogeneity exists in the	rock mass.
ABBREVI	ATIONS FO		ECT TYPES	ND DESCRIPTIONS	
Defect Typ	pe		C	ating or Infilling	Roughness
в	Bedding	parting		Cn Clean	SI Slickensided
×	Foliation			Sn Stain	Sm Smooth
L. 1	Cleavage			vi veneer Ct Ceating	KO KOUGN
5 57	Sheared -	zone /Fa	ult)	anarity	Inclination
CS	Crushed	seam (F	ault)	Pl Planar ·	The inclination of defects are
DS	Decompo	sed seal	m -	Un Undulating	measured from perpendicular to the
IS	Infilled se	am		St Stepped	core axis.
s V	Vein	LY		· · ·	



## Appendix C

Summary of Previous Laboratory Results

Test	Sample	Sample	Sample Type	ъH	Ashestos	Arsenic	Cadmium	Chromium	Conner	Lead	TCLP	Nickel	TCT P	Marcura	Zina
Location	Depth	Date		P*** }					004400	1,044	1.0171	MICACI	1 CL-L	Interenty	Zhiu
			ļ	, ,											
HAI	1.3-1.5	5/07/00	Natural	, ,		<0.5	<0.1	0.7	<0.5	<0.5		<0.5		<0.05	2
HA2	0.5-0.7	5/07/00	Fill	1		3.8	0.3	10	31	200	0.16	13	< 0.05	0.29	98
HA3	0.6-0.8	5/07/00	Natural	,	ND	0.9	<0.1	1.4	11	14		1.2		<0.05	31
HA5	0.5-0.7	5/07/00	Fill	,		4.4	0.3	5.4	140	310	0.15	8.2		0.26	270
HA5	1.4-1.6	5/07/00	Fill	,		2.2	<0.1	4.6	4.8	8.4		1.8		<0.05	12
HA6	0.4-0.6	5/07/00	Fill	1	ND	<0.5	<0.1	<0.5	1.2	1.2		<0.5		<0.05	2
HA8	1.3-1.5	20/07/00	Natural	6.7		<5	<0.5	<5	330	54		3		1.26	78
HA10	0.4-0.6	20/07/00	Fill	, 5,5 <sup>1</sup>		<5	<0.5	<5	<5	<5		<2		<0.05	5
HALL	0.0-0.2	20/07/00	Fill	6.2		<5	10	6	170	580		5		0.31	700
HALL	1.7-1.9	20/07/00	Natural	6.6		<5	<0,5	6	<\$	<5		2		<0.05	<5
				í <sup>1</sup>								-		-0104	·
NSW EP	A Provision	al Phytotox	icity-Based	······			-				·····				
	Investiga	tion Levels		- 1		20	3	1	100	600		60		1	200
NSW EPA	Health Base	d Soil Invest	igation Levels		[		<u> </u>			<u> </u>	-	1		1	
	(Reside	ential - D)	° I	- 1		400	80	400	4000	1200		2400		60	28000
Offsite C	riteria: Iner:	t Waste wit	hout TCLP			10	2	10	-	<u> </u>				04	
Offsite C	riteria: Soli	d Waste wit	hout TCLP			100	20	100	-	-		_		4	
Offsite Crit	eria: Indust	rial Waste v	vithout TCLP	- !		400	80	400		-		1 _		16	
Offsite	Criteria: In	ert Waste w	ith TCLP	· - · ·						1500	0.5	1050	07	1.0	
Offsite	Criteria: So	lid Waste w	ith TCLP	- 1		[				1500	5	1050	2		
Offsite Cr	riteria: Indu	strial Waste	with TCLP	-		<u> </u>				6000	20	4200		<u> </u>	· <del>-</del> · · · · · · · · · · · · · · · · · · ·

Notes

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All results are expressed as mg/kg unless otherwise specified

Figures in bold italics exceed the Provisional Phytoxicity-Based Investigation Levels

Figures ir. bold italics and underlined exceed the NSW EPA Soil Investigation Level - Residential D.

Figures shaded in grey exceed the Inert Waste Crieria

Figures shaded in black exceed the Solid Waste Criteria

Figures shaded with horizontal lines exceed the Industrial Waste Criteria

ND - Not Detected

### TABLE 3

# SUMMARY OF ANALYTICAL RESULTS METALS

Landcom Stage 1 Environmental & Geotechnical Assessment Zetland

Test Location	Sample Depth	Sample Date	Sample Type	C <sub>6</sub> -C <sub>9</sub>	C <sub>10</sub> -C <sub>14</sub>	C <sub>15</sub> -C <sub>28</sub>	C <sub>29</sub> -C <sub>36</sub>	Total C <sub>10</sub> -C <sub>36</sub>
HA1	1.3-1.5	5/07/00	Natural	<5	<10	<50	<50	-
HA5	0.5-0.7	5/07/00	Fill	<5	10	1200	460	1670
HA7	0.1-0.3	20/07/00	Fill	<5	<10	<50	<50	-
HA8	0.3-0.5	20/07/00	Fill	<5	<10	<50	<50	-
HA8	1.3-1.5	20/07/00	Natural	<5	<10	<50	<50	-
HA9	0.3-0.4	20/07/00	Fill	<5	<10	<50	<50	-
HA10	0.4-0.6	20/07/00	Fill	<5	<10	<50	<50	-
HA10	1.2-1.4	20/07/00	Natural	<5	<10	<50	<50	-
HA11	0.0-0.2	20/07/00	Fill	<5	<10	<50	<50	-
HA11	1.7-1.9	20/07/00	Natural	<5	<10	<50	<50	-
HA13	0.2-0.4	20/07/00	Fill	<5	<10	<50	<50	-
NSW	/ EPA Servi	e Station C	riteria	65				1000
Offsite Cr	riteria: Inert	Waste (with	nut TCLP)	650				5000
Offsite Cr	iteria: Solid	Waste (with	nout TCLP)	650				10000
Offsite Crite	eria: Industr	ial Waste (w	vithout TCLP)	2600				40000

Notes

All results are expressed as mg/kg (dry weight) unless otherwise specified Figures in **bold** italics exceed the NSW EPA Service Station Guidelines

### TABLE 4 SUMMARY OF ANALYTICAL RESULTS TOTAL RECOVERABLE HYDROCARBONS

Landcom

Stage I Environmental & Geotechnical Assessment Zetland

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Test Location	Sample Depth	Sample Date	Sample Type	Naph thalene	Acenaph thalene	Acenaph thene	Fluorene	Phenan throne	Anthracene	Fluoran thene	Pyrene	Benzo(a) anthracene	Chrysene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Benzo(a) pyrene	TCLP	ldeno (123-cd) pyrene	Dibenzo(ah) anthracene	Benzo(ghi) porylene	Total PAHs
HAla	03-05	12/07/00	Fil	<0.5	<0.5	c0 \$	c0.5	<b>c0 5</b>	~0 S	~0 S	~0.6	-0.5	-0 F								
НАТЬ	02-04	12/07/00	Fill	<0.5	<0.5	-0.5	~0,5	<0.5	-0.5	~0.5	<0.5	<0.5	<0,5	4	0.5 — 🗩	<0.5		<0.5	<0.5	<0.5	<0.5
HAI	13-15	5/07/00	Natural	-05	~0.5	-0.5	~0.5	~0.5 ~0.5	20.5	~0.5	~0.5	~0.3	-0.5		0.5 — 🏊	<0.5		<0.5	<0.5	<0.5	<0.5
HA2	05-07	5/07/00	Fill	<0.5	-0.J A 5	<0.5	~0,5	5.J	16	11	12	×0.3	-0.5		0.5₽	<0.5		<0,5	<0.5	<0.5	<0.5
HAS	0.5-0.7	5/07/00	Fill	0.7	16	<0.5	0.5	10	1.0	57	12	(.2	1,4	P	2	176	<0.001	5,2	0.7	3.6	71
HA7	01-03	20/07/00	640 640	<0.5	c0.5	<0.5	<0.0	-0.5	9.4 20.5	,31 -10 E	-0.5	30 -0 E	22	<b>4</b> — :	×0 •	36	<0.001	23	3.4	18	330
HAR	13.15	20/07/00	Matural	<0.5	~0.5	<0.5	~0.5	~U,J	<0.5	<0.5 10	<0.5	<0.5 N.C	<0.5	<b>4</b> — <	0.5	<0.5		<0.5	<0.5	<0.5	<0.5
HAR	20.22	20/07/00	Matural	-0.5	<0.5	~0,J	<0,5	U.0	-0.3	1.2	1.2	9.5	0.5	<b>4</b> <	9.5₽	<0.5		<0.5	<0.5	<0,5	4
HAQ	03-04	20/07/00	Cill	<0.5	<0.5	<0,5 c0.6	<0.5	<0.5	NU.5	< 0.5	<0.5	<0.5	<0.5	<	0.5₽	<0.5		<0.5	<0,5	<0.5	<0 5
HAIO	04-06	20/07/00	C:II	<0,2	~0.5	<0.5	<0.5	<0.5	40.5	<u, 3<="" td=""><td>&lt;0.5</td><td>&lt;0.5</td><td>&lt;0.5</td><td><b>4</b> &lt;</td><td>0,5₽</td><td>&lt;0.5</td><td></td><td>&lt;0.5</td><td>&lt;0,5</td><td>&lt;0.5</td><td>&lt;05</td></u,>	<0.5	<0.5	<0.5	<b>4</b> <	0,5₽	<0.5		<0.5	<0,5	<0.5	<05
НАТО	12-14	20/07/00	T III Motooral	-0.3	-V.J	-0.5	-0.5	<0.0	50.5	<0.0	<0.5	<0.5	<0.5	4	0.5	<0.5		<05	<0.5	<0,5	<05
HAII	06.03	20107700	FUI	-0.6	<0,0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0,5	<b>4</b> <	0.5 — Þ	<0.5		<0.5	<0.5	<0.5	<0.5
UAL	1710	20/07/00		<0.3	<0,5	<0.5	<0,5	<0.5	<0.5	0.6	0.7	<0,5	<0,5	<b>4</b> <	0.5 — Þ	<0.5		<0.5	<0.5	<0.5	1.4
RAIL	17-1.9	20/07/00	Natural	<0.5	<0,5	<0.5	<0,5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<b>∢</b> — <	0.5 ——	<0.5		<0.5	<0.5	<0 5	<05
BAIZ	01-0_3	20/07/00	Fill	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<b>4</b> <	0.5 —— <b>&gt;</b>	<0.5		<0.5	<0.5	<0.5	<0 5
NSW EPA 1	lealth Base (Reside	l Soil Investiga ntial - D)	tion Levels													4					89
Offsite C	riteria: Inc	'I Waste withou	it TCLP													-			,		700
Offsite C	riteria: Soli	d Waste withou	u TCLP																		200
Offsite Crit	eria: Indust	rial Waste with	iowt TCLP																		- 200
Offite	Criteria: In	ert Waste with	TCLP													ſ	0.004				
Offite	Criteria: Se	lid Waste with	TCLP													10	0.04	<u> </u>			
Offsite Cri	iteria: Iadu	strial Waste wi	th TCLP					-		····· · · · · · · · · · · · · · · · ·			·······			23	0.16				
Hotes										an multiple states and a state of the state						L					-

All retuilts are expressed as mg/lg (dry weight) unless otherwise specified Figures in bold italies exceed the NSW EPA Soil Investigation Level - Residential D Figures in bold italies that are urderlined exceed the faret Waste Criteria Figures shaded is grey exceed the Soid Waste Criteria Figures shaded is black exceed the Industrial Waste Criteria

> TABLE 5 SUMMARY OF ANALYTICAL RESULTS POLYCYCLIC AROMATIC HYDROCARBONS

Landcom Stage I Environmental & Geotechnical Assussment

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118x008r.xis, FAHs

Test Location	Sample Depth	Sample Date	Sample Type	НСВ	a-BHC	Lindane (g BHC)	• Heptachlor	Aldrin	Dieldrin	b-BHC	d-BHC	Heptachlor o epoxide	Endosulfan	trans- chlordane	cis-
HA5 HA6	0.5-0.7 0.4-0.6	5/07/00 5/07/00	Fill Fill	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	<0.1 <0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1
NSW EPA	Levels (Resi	ed Soil Inve dential - D)	stigation					) — Þ					, , , , , , , , , , , , , , , , , , ,	<b>∢</b> 2	00>

}		туре	Date	nonachlor	ne	Endrin	DDE	DDD	DDT	2	sulfate	Methoxych lor	Total PCB
HA5 0.5 HA6 0.4	5-0.7 1-0.6	5/07/00 5/07/00	Fill Fill	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 0.1 < 0.1	< 1 < 1
NSW EPA Heal Levels	ith Base s (Reside	d Soil Inves ential - D)	tigation			<u></u>	<u></u>	<u> </u>	800				40

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All results are expressed as mg/xg (dry weight) unless otherwise specified Figures in bold italizs exceed the NSW EPA Soil Investigation Level - Residential D.

TABLE 6 SUMMARY OF ANALYTICAL RESULTS ORGANOCHLORINE PESTICIDES & PCBs

Landcom

Stage 1 Environmental & Geotechnical Assessment Zetland

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	a					Heavy Metal	S				P/	١H	т	PH		BT	EX		and			
Sample ID	Fill / Natu	AI	As	Cd	Cr <sup>1</sup>	Cu	Pb	Hg	Ni	Zn	total <sup>2</sup>	BaP	C6-C9	C10-C36	Benzene	Toluene	Ethyl- benzene	Total Xylene	Total Phe	РСВ	OCP <sup>2</sup>	VOCs
		1			1			Samp	les from Sul	oject Site / Ir	nmediately /	Adjacent to	Subject Site	е		1	1	1				
BH4/0.1-0.2	F	4,700	7.3	1.7	11	480	370	0.69	9.7	350	18.2	1.8	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH4/0.4-0.5	F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<pql< td=""></pql<>
BH4/2.9-3.0	Ν	1,500	<4	<1	1	<1	1.9	<0.1	<1	26	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH5/0.1-0.2	F	18,000	<4	<1	6.5	130	9.8	0.11	40	67	0.75	0.05	<25	1,080	<1	<1	<1	<3	-	-	-	-
BH24/0.2-0.3	F	2,200	<4	<1	3.1	7.1	12	<0.1	1.8	25	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	<pql< td=""></pql<>
BH24/1.9-2.0	Ν	4,000	<4	<1	2.8	2.3	2.2	<0.1	<1	2	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH25/0.2-0.3	F	4,800	<4	<1	8.7	87	550	0.34	9.7	360	33.4	2.7	<25	<250	<1	<1	<1	<3	-	-	-	<pql< td=""></pql<>
BH26/0.1-0.2	F	3,700	11	1.1	10	95	720	0.3	7.6	1400	8.2	0.7	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td><pql< td=""></pql<></td></pql<>	<pql< td=""></pql<>
BH27/0.4-0.5	F	1,800	<4	<1	1.7	9.9	210	0.11	2.6	63	1.6	0.2	<25	<250	<1	<1	<1	<3	-	-	-	-
BD7-010307 <sup>7</sup>	F	2,300	3	0.4	6	69	180	0.21	9	290	-	-	<10	360	<0.2	<0.5	<0.5	<1.5	-	-	-	-
									Samples f	rom Other P	arts of Form	er Hospital	Site									
BH1/0.1-0.2	F	4,600	7.6	1.1	11	190	220	0.34	10	210	4.7	0.4	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH2/0.1-0.2	F	6,700	5.6	<1	24	140	250	0.45	13	260	31.6	3.2	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH2/2.9-3.0	F	5,300	<4	<1	4	5.4	55	<0.1	1.9	69	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH3/0.1-0.2	F	2,900	4.2	<1	6	110	150	0.22	5.9	110	11.8	1.3	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH3/1.9-2.0	Ν	76	<4	<1	<1	1.6	<1	<0.1	<1	2.8	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH6/0.1-0.2	F	3,800	<4	<1	7.6	99	160	0.22	8.8	260	10.3	1.1	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH/70.1-0.2	F	4,200	7.7	<1	7.3	78	190	0.19	6.2	160	8	0.9	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH8/0.1-0.2	F	34,000	<4	<1	13	82	7.7	0.32	110	55	<0.5	0.05	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH8/0.4-0.5	F	4,900	<4	<1	8.5	63	45	0.47	19	66	12	1	<25	<250	<1	<1	<1	<3	-	-	-	-
BH8/2.9-3.0	F	1,400	<4	<1	1.3	4.5	18	<0.1	<1	69	<0.5	0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH9/0.1-0.2	F	4,900	<4	<1	3.7	87	120	0.18	8.6	650	75.9	8	<25	130	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH9/0.9-1.0	F	3,000	<4	<1	2.9	25	14	<0.1	9	59	1.4	0.1	<25	<250	<1	<1	<1	<3	-	-	-	-
BH10/0.1-0.2	F	4,200	5.7	<1	8.3	57	630	2.2	8.9	310	11.4	1.3	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH11/0.1-0.2	F	4,200	4.7	<1	6.8	120	200	0.26	7.9	230	11.6	1.2	<25	<250	<1	<1	<1	<3	-	-	-	-
BH12/0.1-0.2	F	3,700	5.1	<1	6.6	110	190	0.38	6.2	200	21.7	2.3	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH13/0.2-0.3	F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<pql< td=""></pql<>
BH13/0.5-0.6	F	5,800	<4	<1	8.2	42	23	<0.1	14	41	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH13/1.9-2.0	F	1,900	<4	<1	2	8.1	13	<0.1	3.7	20	<0.5	0.07	<25	<250	<1	<1	<1	<3	-	-	-	-
BH14/0.1-0.2	F	36,000	<4	<1	24	93	4.8	<0.1	99	50	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH14/0.7-0.8	F	1,300	<4	<1	4.6	15	38	0.12	8.9	57	4.4	0.1	<25	<250	<1	<1	<1	<3	-	-	-	-
BH15/0.4-0.5	F	9,000	<4	<1	11	87	98	0.28	51	190	5.7	0.4	<25	<250	<1	<1	<1	<3	-	-	-	-
BH15/3.4-3.5	F	6,400	5.6	1.2	38	420	3800	0.28	13	1000	4.2	0.5	<25	<250	<1	<1	<1	<3	-	-	-	-
BH16/0.1-0.2	F	4,600	<4	<1	6	43	46	0.13	4.8	96	1.6	0.2	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH17/0.1-0.2	F	5,000	<4	<1	5.5	35	62	0.13	4	140	162.6	14	<25	500	<1	<1	<1	<3	-	-	-	-
BH17/1.9-2.0	F	5,300	<4	<1	6.7	48	110	0.16	5.4	69	2.6	0.3	<25	<250	<1	<1	<1	<3	-	-	-	-
BH18/0.1-0.2	F	29,000	<4	<1	75	55	7.1	<0.1	98	54	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH18/0.9-1.0	F	4,200	<4	<1	6	20	41	<0.1	9.7	100	<0.5	0.07	<25	<250	<1	<1	<1	<3	-	-	-	-
BH19/0.1-0.2	F	28,000	16	<1	82	60	12	0.37	99	63	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH20/0.1-0.2	F	11,000	4.8	<1	26	90	130	0.22	36	180	6.3	0.6	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH20/0.4-0.5	F	3,500	<4	<1	6.2	13	1300	<0.1	2.9	140	<0.5	0.1	<25	<250	<1	<1	<1	<3	-	-	-	-
BH20/1.9-2.0	Ν	1,500	<4	<1	<1	<1	1.4	<0.1	<1	<1	<0.5	<0.05	<25	<250	<1	<1	<1	<3	-	-	-	-
BH21/0.1-0.2	F	6,200	5.6	<1	5.5	38	72	0.13	5.4	110	7.6	0.9	<25	<250	<1	<1	<1	<3	-	-	-	-
BH22/0.1-0.2	Ν	1,500	<4	<1	1.7	21	18	<0.1	2.2	24	1.8	0.2	<25	<250	<1	<1	<1	<3	-	-	-	-
BH23/0.1-0.2	F	2,900	5.5	<1	4.6	67	97	0.37	6.3	66	4.9	0.5	<25	<250	<1	<1	<1	<3	-	-	-	-
BH23/0.6-0.7	F	1,500	<4	<1	1.4	23	14	<0.1	3.2	18	<0.5	0.06	<25	<250	<1	<1	<1	<3	-	-	-	-

	ıral					Heavy Metal	s				P/	۹H	TF	РН		B	TEX		enc			
Sample ID	Fill / Natu	AI	As	Cd	Cr <sup>1</sup>	Cu	Pb	Hg	Ni	Zn	total <sup>2</sup>	BaP	C6-C9	C10-C36	Benzene	Toluene	Ethyl- benzene	Total Xylene	Total Ph	PCB	OCP <sup>2</sup>	VOCs
BH28/0.1-0.2	F	4,700	6.3	<1	7.7	110	180	0.41	8.3	430	12.2	1.2	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td><pql< td=""></pql<></td></pql<>	<pql< td=""></pql<>
BH29/0.1-0.2	F	25,000	<4	<1	77	44	7.9	<0.1	95	56	0.5	<0.05	<25	<250	<1	<1	<1	<3	<5	<0.1	<pql< td=""><td>-</td></pql<>	-
BH29/0.4-0.5	F	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<pql< td=""></pql<>
BD1-270207 <sup>2</sup>	F	4,000	<4	<1	6.9	110	180	0.27	7.1	280	-	-	<25	<250	<1	<1	<1	<3	-	-	-	-
BD4-280207 <sup>3</sup>	F	6,100	<4	<1	8.3	38	18	<0.1	13	42	-	-	<25	<250	<1	<1	<1	<3	-	-	-	-
BD6-010307 <sup>4</sup>	F	1,400	<4	<1	1.5	20	12	<0.1	3.2	17	-	-	<25	<250	<1	<1	<1	<3	-	-	-	-
BD3-270207 <sup>5</sup>	F	2,200	3	0.1	6	54	51	0.72	13	74	-	-	<10	100	<0.2	<0.5	<0.5	<1.5	-	-	-	-
BD5-280207 <sup>6</sup>	F	5,400	4	0.4	13	81	140	0.17	23	160	-	-	<10	<250	<0.2	<0.5	<0.5	<1.5	-	-	-	-
										Site Asse	ssment Crite	eria										
SAC 3 <sup>9</sup>	Commercial/ industrial	-	500	100	60%	5,000	1500	75	3000	35,000	100	5	65 <sup>14</sup>	1,000 <sup>14</sup>	1 <sup>14</sup>	130 <sup>14</sup>	50 <sup>14</sup>	25 <sup>14</sup>	42,500	50	50/250/ 1,000/ 50 <sup>13</sup>	-
									Ref	erence Site	Assessmen	t Criteria										
SAC 1 <sup>10</sup>	Residential	-	400	80	400	4,000	1,200	60	2,400	28,000	80	4	65 <sup>14</sup>	1,000 <sup>14</sup>	1 <sup>14</sup>	1.4 <sup>14</sup>	3.1 <sup>14</sup>	14 <sup>14</sup>	34,000	40	40/200/ 800/ 40 <sup>13</sup>	-
SAC 2 11	open space	-	200	40	200	2,000	600	30	600	14,000	40	2	65 <sup>14</sup>	1,000 <sup>14</sup>	1 <sup>14</sup>	1.4 <sup>14</sup>	3.1 <sup>14</sup>	14 <sup>14</sup>	17,000	20	20/100/ 400/ 20 <sup>13</sup>	-
PPIL <sup>12</sup>	PPIL	-	20	3	400	100	600	1	60	200	-	-	-	-	-	-	-	-	-	-	-	-

Notes:

1 All chromium is assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too reactive and unstable under natural conditions

2 Intra-lab blind field duplicate sample of BH6/0.1-0.2

3 Intra-lab blind field duplicate of BH13/0.5-0.6

4 Intra-lab blind field duplicate of BH23/0.6-0.7

5 Inter-lab blind field duplicate of BH8/0.4-0.5

6 Inter-lab blind field duplicate of BH20/0.1-0.2

7 Inter-lab blind field duplicate of BH25/0.2-0.3

8 m+p-Xylene / o-Xylene

9 NSW DEC Health based investigation levels for commercial/ industrial (Guidelines for the NSW Site Auditor Scheme, 2006)

10 NSW DEC Health based levels for residential with minimal access to soil including high-rise apartments and flats (Guidelines for the NSW Site Auditor Scheme, 2006)

11 NSW DEC Health based investigation levels for parks and recreational open space (Guidelines for the NSW Site Auditor Scheme, 2006). Relevant to BH3 only.

12 NSW DEC Health based investigation levels for Provisional phytotoxicity-based investigation levels (Guidelines for the NSW Site Auditor Scheme, 2006).

13 Given in order Aldrin+Dieldrin/Chlordane/DDD+DDE+DDT/Heptachlor

14 NSW EPA Threshold concentrations for sensitive land use - Soils (Guidelines for Assessing Service Stations, 1994)

- Not test/ Guideline not specified

*italic* Values exceeding the PPIL

**bold** Values exceeding the health based levels for residential with minimal access to soil

**bold** Values exceeding the health based levels forcommercial/industrial land use (and more sensitive land

#### Table 10 – Results of Laboratory Analysis for Potential Contaminants in Groundwater (µg/L)

Organics										0.011	otendar oo	i icui i initia i ica		water (µy/	L)				
		ТРН			BTEX	,					PAH		1	VOC's		OCPs			
Sample (D	C6-C9	C10-C36 <sup>4</sup>	Benzene	Toluene	Ethylbenzene	, ,	The Xylene	Total PAH <sup>2</sup>	Benzo(a) pyrene	napthatene	Anthracene	Phenanthrene	-luoroanthene	ndividual VOCs	otal OCPs	chdosulfan	indria	otal PCBs	otal Phenois
MW1	<10	<250	<1.0	<1.0	<1.0	<1.0	<2.0	1	<1	<1	<1	<1	<1	ND	<0.2	<0.2	<0.2		<50
MW2	<10	<250	<1.0	<1.0	<1.0	<1.0	<2.0	<1	<1	<1	<1	<1	<1	ND	< 0.2	<0.2	<0.2	~	<50
MW3	<10	<250	<1.0	<1.0	<1.0	<1.0	<2.0	<1	<1	<1	<1	<1	<1	ND	<0.2	<0.2	<0.2		<50
FD1	<50	<300	<1	<1	<1	<1	<2	•	-	-	-	-	-	· ·	-		-		
								G	roundwater Inv	estigatio	n Levels (GIL) <sup>4</sup>	£				1			<u> </u>
GIL	150 <sup>7</sup>	600 <sup>7</sup>	700 <sup>5</sup> 950 <sup>6</sup>	5 <sup>9</sup> 80 <sup>9</sup>	350'	3509	75 <sup>9</sup>	NŞ	0.2°	70 <sup>5</sup>	0.49	23	1.4 <sup>9</sup>	NS	NS	0.015	0.0085	NS	400'

#### Inorganics

			Hea	vy Metals	s (Filtered	i)			T		Hardness
Sample ID	As	Cd	Cr <sup>s</sup>	Cu	Pb	Ha	Ni	Zn	Ca	Ma	CaCO3 (calculated)
MW1	<1	<0.1	1.1	2	<1	<0.1	<1	15	30	1.6	81 (moderate)
MW2	<1	<0.1	1.6	1.2	<1	<0.1	<1	9.9	19	2.8	59 (soft)
MW3	<1	<0.1	1.4	2	<1	<0.1	5.1	20	15	18	45 (soft)
FD1	<1	<0.1	<1	1	<1	<0.1	<1	<5	-	-	-
				Ground	water Invest	tigation Levels	(G(L) <sup>4</sup>	•	•	••••	
a	2.3 <sup>9</sup>	5.5 <sup>5</sup>	27.45	1.3 <sup>5</sup>	4.45	0.4 <sup>5</sup>	705	155	1		
Ŭ,L	13 <sup>\$</sup>	0.2 <sup>6</sup>	N5 <sup>6</sup>	1.4 <sup>5</sup>	3.4 <sup>6</sup>	0,66	116	86		NS	NS

Notes:

1. All chromium is assumed to exist in the stable Cr(III) oxidation state, as Cr(VI) will be too unstable under the normal environment

2. Results less than the Practical Quantitation Limit (PQL) quoted for the sum of PQLs for individual chain length groups

3. Results less than PQL quoted for individual compounds

4. As per Table 4

5. ANZECC (2000) 95% protection of marine species

6. ANZECC (2000) 95% protection of freshwater species

7. Airport (1997) Regulations

8. NSW EPA (1994) threshold concentrations for fresh water.

9. ANZECC (2000) low or moderately reliable trigger values from Volume 2, Section 8.3 Toxicants.

ND Results less than PQL quoted for individual VOCs (as listed in laboratory reports, Appendix F)

NS Guideline not specified

Bold Values exceeding the GILs









EARTHSCAPE HORTICULTURAL SERVICES Arboricultural, Horticultural and Landscape Consultants ABN 36 082 126 027

29th February 2012

Mr Pieter Coetzee Project Manager, City Projects City of Sydney Council GPO Box 1591 SYDNEY NSW 2001 Your Ref: 2011/015978

Dear Pieter,

### South Sydney Hospital Site - Demolition Works - Tree Protection

In accordance with your directions and notification from Brenton Watson (Project Engineer, DECC) and inspection of the abovementioned site was undertaken on the 28<sup>th</sup> February to inspect tree protection fencing prior to commencement of demolition works.

I wish to confirm that tree protection fencing has been erected in the positions indicated on the Tree Protection Plan (Dwg No. T12\_02201 dated 20/02/12 prepared by Earthscape) in accordance with Council's "Memo – Tree Management Plan" (at the setback distances as specified), with exception of Tree No.s T35-T40 located near the north-western corner of the site (refer Plates 1-6). I am informed by Brenton that the fencing of these trees is unnecessary as there is no demolition work in the vicinity of the trees at this stage and placement of fencing at this point in time would reduce the number of car parking spaces available to Council's Rangers, who are still operating in part of the centre. This is acceptable provided that the area beneath the trees is not used for storage or stockpiling of any type and the asphalt surface and kerb are retained intact. However, the fencing must be erected prior to demolition of the adjacent buildings or pavements.

I have further clarified with Samantha Knight, Council's Tree Management Officer, that T36 in this group is to be retained and T37 (a dead tree) is to be removed, as per the abovementioned plan. This is contrary to Table 1 of the Memo which indicates the reverse and has been accepted as a typographical error.

If you require any further information regarding the above matter, please do not hesitate to contact me on 9456 4787 or 0402 947 296.

Yours sincerely,

Andrew Morton B.App.Sci (Horticulture), A.Dip.App.Sci. (Landscape) Dip. (Arboriculture) [AQF5]



Plate 1 – Fencing around T8



Plate 2 - Fencing around T9



Plate 3 - Fencing around T10 & T11



Plate 4 - Fencing around T13 & T14



Plate 5 – Fencing around T15



Plate 6 – Fencing around T30-T32





## **3.5 OTHER REGULATORY APPROVALS**

- Appendix 3.5.1(d) REF for Water Reuse Facility memo

## MEMO

FILE:	IA/2013/1	DATE:	4 March 2013
TO:	John Dwyer – Senior Program Manager Green Square		
FROM:	Bill Mackay – Manager Planning Assessments		
SUBJECT:	Water Re-Use Facility- 3 Joynton Ave, Zetland		

### Recommendation

It is recommended that the activity as described in the Review of Environmental Factors (REF) undertaken by City of Sydney be granted approval under Part 5 of the Environmental Planning and Assessment Act 1979 and that the following mitigation measures identified in the REF be adhered to throughout construction works:

- Notification of proposed works to surrounding community
- Site notice and operation of complaint management telephone enquiry line
- Standard construction hours of 7am-6pm weekdays and compliance with relevant Australian Standards for construction noise & vibration
- Preparation of Construction Environmental Management Plan (CEMP) including management plan for hazardous materials and contamination
- Environmental controls and preparation of Soil & Water Management Plan (SWMP)
- Preparation and implementation of Traffic Management Plan
- Compliance with requirements of NSW Office of Water and Sydney Water for water extraction

### Background

The proposed development comprises a water treatment plant, underground water reservoir, two (2) balance tanks and an underground pipe connection from the Water Reuse facility to the street to allow connection with the broader Town Centre area. It is to be housed within the ground floor of the former South Sydney Hospital Administration Building, in accordance with alterations to the building approved under D/2012/835. The building will also house a tri-generation power facility which is currently being assessed by Council (D/2012/1909).

The proposed water reuse facility is not exempt development.

The site is currently zoned 5(a) Special Uses – Hospital under the South Sydney Local Environmental Plan 114 (Southern Industrial and Rosebery/Zetland Planning Districts). The LEP 114 states that no development within the 5(a) zone can be undertaken without development consent. Notwithstanding this, Clauses 110-111 and 124-125 of the SEPP (Infrastructure) 2007 takes precedence over the LEP 114 and states that 'stormwater management systems' and 'water supply systems' may be undertaken without development consent.

The proposal falls within the abovementioned scope of works and assessment under Part 4 is not required. However, the proposal remains an 'activity' under Part 5 of the Environmental Planning and Assessment Act 1979 (EP&A Act). A Review of Environmental Factors has been prepared to address Part 5.

The REF concludes the following:

'The proposed activity described in the REF will have some environmental impacts which can be controlled satisfactorily. Having regard to the proposed management and mitigation measures proposed, this assessment has considered that these impacts are unlikely to be significant and therefore an approval for the Project does not need to be sought under Part 3 of the Environmental Assessment and Planning Act, 1979.

It is also considered that the proposed activity does not trigger the approval regime under Part 3 of the Environment Protection and Biodiversity Conservation Act. The Environmental Impact Assessment is recommended to be approved subject to the proposed mitigation and management measures included in the Conditions of Approval contained in this Determination Report'.

Council's Environmental Health Officer has also reviewed the proposal and raised no objection subject to the mitigation measures outlined in the REF.

### Conclusion

The proposal falls within the definition of development that may be carried out without development without consent under the SEPP (Infrastructure) 2007. Approval can therefore be granted under Part 5 of the Environmental Planning & Assessment Act 1979. It is recommended that the findings within the REF for the proposal be supported, which include the following mitigation measures to be adhered to throughout construction works:

- Notification of proposed works to surrounding community
- Site notice and operation of complaint management telephone enquiry line
- Standard construction hours of 7am-6pm weekdays and compliance with relevant Australian Standards for construction noise & vibration
- Preparation of Construction Environmental Management Plan (CEMP) including management plan for hazardous materials and contamination
- Environmental controls and preparation of Soil & Water Management Plan (SWMP)
- Preparation and implementation of Traffic Management Plan
- Compliance with requirements of NSW Office of Water and Sydney Water for water extraction

Having regard to the matters which have been identified as potentially affecting or likely to affect the environment by reason of the proposed activity and the statutory and planning framework, it is concluded that:

 a) the environmental impacts of the proposal are not likely to be significant and therefore the activity may be approved under Part 5 of the Environmental Planning and Assessment Act 1979;

- b) it is not necessary for approval to be sought for the proposal under Part 4 of the Environmental Planning & Assessment Act 1979;
- c) the proposal will not impact on any matters of national environmental significance; and
- d) having regard to the above, it is concluded that the proposal is not likely to significantly affect the environment within the meaning of Section 112 of the Environmental Planning & Assessment Act 1979.

Prepared by:

Calvin Houlison – Specialist Planner

TRIM Document Number: 2013/060743

Approved

**Bill Mackay** – Manager Planning Assessments





### **3.5 OTHER REGULATORY APPROVALS**

- Appendix 3.5.1(e) City of Sydney correspondence clarifying scope of planning approvals

Telephone +61 2 9265 9333 Fax +61 2 9265 9222 council@cityofsydney.nsw.gov.au GPO Box 1591 Sydney NSW 2001

GPO Box 1591 Sydney NSW 200 cityofsydney.nsw.gov.au



2 April 2014

Darren Wharton Project Manager Flow Systems Level 2, 1 Alfred Street Sydney NSW 2000 Australia

Dear Mr Wharton

# Planning Approval for the Water Re-use facility and the non-potable water network

The purpose of this letter is to confirm the planning approval for the Water Re-use facility including its primary infrastructure components which to be provided at the Green Square Town Centre (Refer to Attachment A).

## Consent Under Part 4 of the NSW Environmental Planning and Assessment Act 1979

In 2012, the Council granted consent under Part 4 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) for the redesign of the former Royal South Sydney Hospital Administration Building (D/2012/875). This consent provided the internal space requirements for the Water Re-use facility at the Administration Building site.

In early 2013, the Central Sydney Planning Committee granted consent under Part 4 of the EP&A Act for the Green Square Town Centre Essential Infrastructure project (D/2012/1175) which covers the following works:

Provision of essential infrastructure for the Green Square Town Centre, including demolition of minor structures and tree removal, construction of new roads and associated infrastructure, concept landscaping and streetscape design, provision above and below ground services (including stormwater, sewer, water, electrical and telecommunications) and staged construction

When the consent was issued, the non-potable recycled water network was at a concept stage and the full component of ancillary infrastructure was not known. The design development of the non-potable recycled water network is now complete and it is considered that the consent issued for the GSTC Essential Infrastructure DA would also cover the following components:

- The offtake pit
- Gross pollutant trap
- Source water pump station
- Rising main

## Approval under Part 5 of the NSW Environmental Planning and Assessment Act 1979

In early 2013, the City granted project approval under Part 5 of the EP& A Act for the Water Re-use facility project at the former Royal South Sydney Hospital at No.3 Joynton Avenue, Zetland (Refer to Attachment C).

The project approval covers the following works:

The proposed development comprises a water treatment plant, underground water reservoir, two (2) balance tanks and an underground pipe connection from the Water Reuse facility to the street to allow connection with the broader Town Centre area. It is to be housed within the ground floor of the former South Sydney Hospital Administration Building, in accordance with alterations to the building approved under D/2012/835. The building will also house a trigeneration power facility which is currently being assessed by Council (D/2012/1909).

The City considers that the development consent for the Redesign of the Administration Building and the GSTC Essential Infrastructure project and also the project approval for the Water Re-use facility, adequately cover the entire building and infrastructure works needed to implement a non-potable recycled water network in the Town Centre.

The project is now being implemented by the City, who will continue to review compliance with the overall consent conditions and mitigation measures governing the project.

If you have any further enquiries please contact David White, Senior Development Planner on (02) 9288 5960 or email <u>dwhite@cityofsydney.nsw.gov.au</u>

Yours faithfully

2-14

David White Senior Development Planner