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ENGINEERING REPORT

COSTCO WHOLESALE

17-21 PARRAMATTA ROAD LIDCOMBE

JANUARY 2010

Hughes Trueman

REVISION 6

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JOB NO: 09S603C

Q.A. CHECK	APPROVED FOR ISSUE:	DATE:
PMcB	PMcB	25 January, 2010

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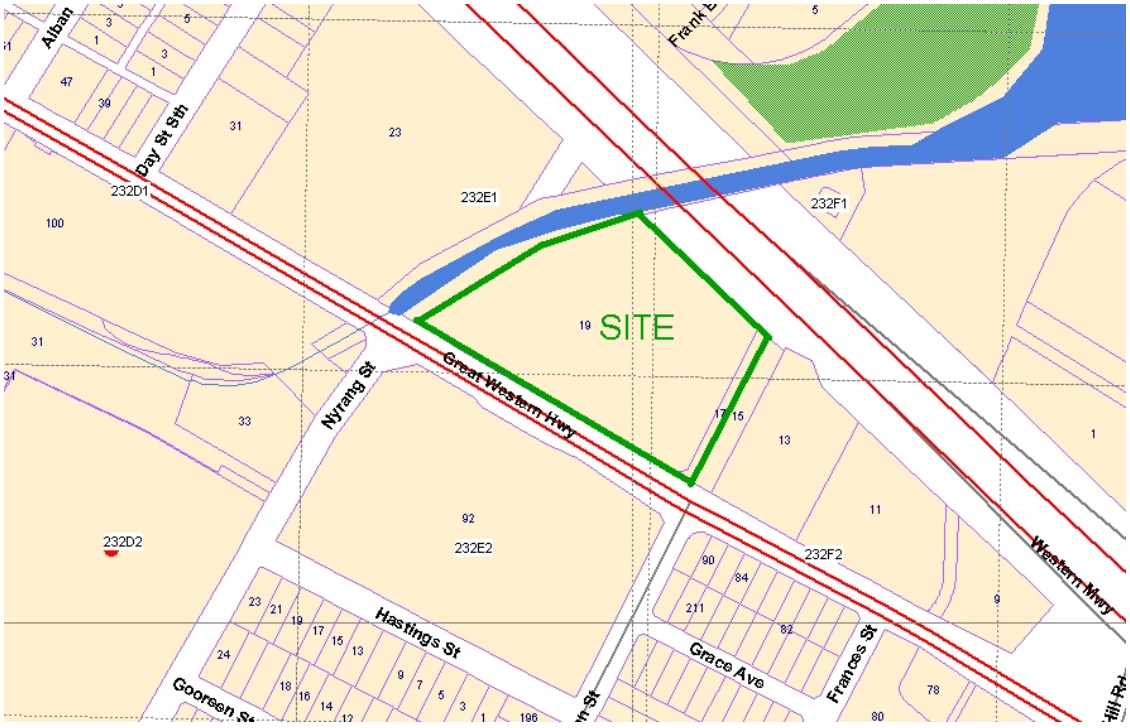
1 INTRODUCTION

This Engineering Report has been prepared by Hughes Trueman to accompany the Costco Wholesale's planning submission under the Part 3A approval process with the State Government. The site is located at 17-21 Parramatta Road, Lidcombe. It is within the local government area of Auburn City Council.



The proposed site development is described as:

- Lot 1 DP 214452
- Lot 1 DP 52225

The neighbouring Lot to the east is Lot 26 DP 586063

The Lot on the opposite side of Parramatta Road is Lot 11 DP1102278

This engineering report on the subject site is based on: -

- Proposed site layout by Mulvanny G2 & Group GSA Architects
- Director General Requirements dated 21/06/09
- Dial Before You Dig desktop service searches with relevant authority stakeholders
- Discussions with Auburn City Council, Sydney Water & the Department of Water & Energy
- Detail survey completed by Stutchbury Jaques dated 24/07/09
- Site Visit by Hughes Trueman staff

- The following letters received upon review of the original submission documents:
  - Roads and Traffic Authority Letter dated 11/11/09
  - NSW Office of Water Letter dated 17/11/09
  - Sydney Water Letter dated 17/11/09
  - Auburn City Council Letter dated 20/11/09
  - Ingham Planning Letter dated 20/11/09
  - NSW Department of Planning Letter dated 27/11/09

2 SITE DESCRIPTION

2.1 *EXISTING SITE IMPROVEMENTS*

The proposed store is located at 17-21 Parramatta Road, Lidcombe. The site is bounded by Parramatta Road to the south, Haslams Creek to the west, the M4 Motorway to the north, and a commercial development to the east.

The existing improvements to the site comprise:

- Lot 1 DP 52225 (17 Parramatta Road) – an asphalt parking area currently used for parking of rental trucks. This site is currently being used in conjunction with 15 Parramatta Road. At the rear of the site appears to be an above ground on-site detention tank which is common with 15 Parramatta Road. A large signage structure is located at the rear of the property
- Lot 1 DP 214452 (19-21 Parramatta Road) – a single storey steel framed structure, currently used for warehousing purposes. The surrounding area is sealed with concrete or asphalt and used for truck hardstand areas.

The neighbouring property to the east of the site (15 Parramatta Road) is a single storey structure used as an office for truck rental purposes.

On the opposite side of Parramatta Road to the south (92 Parramatta Road) is a 3 storey building used for retail purposes.

3 CIVIL DESIGN

The site survey indicates that the site generally falls from the south-east corner of the site towards the north-western corner and Haslams Creek.

It is proposed to construct two levels of carparking with the retail floor and offices of the Costco building, over the parking areas. Carparking would also be provided at ground level around the outside of the building. A loading dock is proposed along the eastern side of the building.

A new signalised access is proposed opposite the existing Nyrang Street intersection with Parramatta Road. A left-in slip lane is proposed along the frontage of the site. A left-out exit for service vehicles only is proposed at the eastern end of the site.

3.1 ON-SITE WORKS

Based on the proposed layout, the proposed mid-frontage slip lane into the carpark determines the floor level of the upper carpark. Head height constraints determine the floor levels of the lower carpark and the retail levels. The level of the loading dock hardstand area is determined from the loading area operational requirements in relation to the retail floor level.

The proposed level of the upper carpark is slightly higher than the floor level of the existing building.

The proposed levels of the open carpark and circulation driveway areas surrounding the building are similar to the levels of the existing external hardstand area.

The circulation driveway along the eastern boundary is higher than the existing level to suit the proposed loading dock level.

Given the above constraints, retaining walls will be required along the eastern boundary to the site, the eastern side of the upper level parking floor and the full perimeter of the lower level parking floor.

The existing retaining wall along the western, Haslams Creek boundary is proposed to be maintained and repaired to prevent further erosion from stormwater flow.

The proposed site grading is shown on drawing 09s603c-DAC02-5.

3.1.1 Vehicle Manoeuvring

A 19m articulated truck is the maximum sized vehicle proposed to access the site. Trucks access the site from the proposed Nyrang Street intersection from both directions. Trucks exit the site from the eastern driveway towards the east.

Truck swept paths are shown on drawing 09s603c-DAC07 and are to AS2890.2-Commercial Vehicle Facilities.

3.2 OFF-SITE WORKS

There is a local crest in Parramatta Road approximately opposite the John Street intersection. The road falls towards Haslmas Creek with a change in level of approximately 3.5m across the frontage of the subject site

Parramatta Road is under the Authority of the Roads and Traffic Authority (RTA), the verge area behind the kerb is under the Authority of Auburn City Council (Council).

The design of the proposed mid-frontage slip lane is determined from the RTA Road Design Guide. A 3.6m wide verge area has been provided (as requested in Auburn City Council letter dated 20/11/09) adjacent to the new slip lane. This land will be dedicated as road reserve.

The height of the existing verge along the frontage of the site is higher than the desired Council standards. In design of the slip lane, the verge levels will be redesigned to a more standard level and cross-fall.

RTA documents indicate that B-Double trucks are permitted to use both Parramatta Road and Nyrang Street.

The proposed intersection geometry caters for B-Double truck turns from both directions of Parramatta Road. The design of the intersection is determined from the RTA Road Design Guide, with pedestrian crossings provided on all legs (except the western leg) of the intersection. The existing road reserve area at the south-eastern corner of the intersection will need to be utilised. The proposed intersection design minimises any impact on the existing bridge over Haslams Creek. As requested in Auburn City Council letter dated 20/11/09, a minimum verge width of 3.6m has been provided along the intersection frontage to 92 Parramatta Road, and no extra land dedication will be required.

The intersection geometry and truck swept paths are shown on drawing 09s603c-DAC04&7.

4 STORMWATER DESIGN

The existing site currently drains to the north-western corner. There are two existing stormwater outlets into Haslams Creek at the north-western corner, and a single outlet further upstream toward Parramatta Road.

The proposed stormwater design will gravitate to the existing connections at the north-western corner. The access to the basement carpark has been graded to prevent stormwater from the open carpark areas draining into the basement. Therefore, the basement carpark stormwater pumps will only cater for water brought in from vehicles.

4.1 FLOODING

The subject site is adjacent to Haslams Creek. The report 'Haslams Creek Floodplain Risk Management Study and Plan', dated January 2003, has previously been prepared for Council by Bewsher Consulting Pty Ltd.

Table 1.1 of this report indicates that Haslams Creek along the frontage of the site has a concrete lined bank, with an unlined invert, under the authority of Sydney Water. Table 4.2 in the report identifies the flood levels to be considered for design and suggested planning levels for future developments between Parramatta Road and the M4 Motorway as follows:

Water Level		**Planning Level (including freeboard)**	
1:100 year event	Peak Maximum Flood	1:100 year event	Peak Maximum Flood
RL2.7-3.0	RL7.7-8.2	RL3.4-3.7	RL8.2-8.7

Since the release of the report the following requirements have been introduced and are required to be addressed by the Director General as part of this submission:

- Assessment of flood risk on site and relevant provisions of the NSW Floodplain Development Manual (2005)
- Comment on the potential effects of sea level rise climate change with respect to flooding

Haslem's Creek is tidal and will be impacted on by sea level and climate change. Latest data on sea level change and climate change suggest that these may increase 1 in 100 year flood levels by 0.7m to 1.0 metres in the next fifty (50) years. This would lift the minimum planning floor level to approximately **RL 4.7 metres** in a 100 year storm event.

The impacts of these rises on the proposed planning levels and comments on the acceptance of the levels are provided in the following table:

Item	Description	Proposed Floor Level	Comment
1.0	Proposed Carpark Level 1 (upper level)	RL 6.64m	This is well above the assessed minimum level of RL4.7m
2.0	Proposed Carpark Level 2 (lower level)	RL 3.34m	This carpark is lower than the assessed minimum level of RL 4.7m but this carpark level is accessed only from a ramp from the upper carpark level. The controlling level for flooding are the openings along the northern and southern walls which are greater than RL4.7m. Water must rise to this level before entering the lower carpark level.
3.0	Proposed Building Floor Level	RL 9.84m	This is well above the assessed minimum level of RL4.7m. This level is also above the PMF level identified in the 2003 report

Given the above, the proposed development floor levels are well above the expected level 1 in 100 year flood level rises due to climate change and sea level rise.

Perimeter Access Road and at Grade Carparking external to the building

The building is accessed from Parramatta Road. This road rises from a level of RL3.6m at the western limit of the development site at the Nyrang Street intersection, to RL5.0m at the slip lane access to the carpark, and to approximately RL 7.2m at the eastern John Street end.

The internal access road and carpark rises from RL3.6m at the Nyrang Street intersection to RL 4.3m along the Haslams Creek frontage, from RL4.3m to RL 5.6m along the northern frontage (at the rear) and then from RL5.6m to RL 7.2m along the eastern frontage to the access back onto Parramatta Road. This provides for a continual rise around the perimeter of the building from west to east.

Only a small section of the perimeter road near the Nyrang Street intersection can be expected to be vulnerable to flooding in the 100 year storm event – expected to be RL3.0m (Q100 from 2003 report) plus 0.7m (expected rise due to climate change and sea level rise) = RL3.7m. The remainder of the perimeter internal road rises continually from RL 3.6m to 7.2m at the east end and is above the expected critical 1 in 100 year flood level.

The main vehicular egress from the site is from the Nyrang Street intersection. During a 1 in 100 year event (including a climate change increase), the existing bridge crossing Haslams Creek will be affected by flooding. The grading of the intersection allows vehicles to exit in an easterly direction without being affected by a 1 in 100 year flood event.

Under a Peak Maximum Flood (PMF) condition, water will cover the entire site and parking areas, including Parramatta Road and the M4 Motorway but not reach the main trading floor of the building.

Table 4.2 in the 2003 flood study report also indicates that the water levels upstream of Parramatta Road are significantly higher (approximately 1.5m) that the water levels along the frontage of the site. Whereas

the downstream water levels of the M4 Motorway are similar to that along the frontage of the site (approximately 0.1m).

Section 8 of the 2003 flood report indicates potential options to upgrade channels / culverts / bridge crossings of Haslams Creek to reduce the flooding levels. There appears to be no recommendations to modify the Parramatta Road, or M4 Motorway bridges to reduce flood levels.

A Flood Management Plan can be prepared to enable the staff of the building to direct orderly egress from the site in both a 1 in 100 year and PMF storm events away from the lower western end of the site toward the higher eastern end.

4.2 HASLAMS CREEK RIPARIAN ZONE

The Department of Water and Energy (DWE) has provided advice on rehabilitation of the 'riparian zone'. They indicate that the width of the 'riparian zone' for this area is 10m from the top of the concrete channel, and that it is not essential that the existing concrete retaining wall along the site boundary needs to be removed.

Refer email dated 18/08/09 from DWE, and standard requirements for the riparian zone.

Sydney Water are the authority responsible for the maintenance of Haslams Creek for the section adjacent to the subject site. Sydney Water indicate that the primary aim is to maintain hydraulic capacity of the channel, and that it is not essential that the existing concrete retaining wall along the site boundary needs to be removed.

Refer email dated 17/08/09 from Sydney Water.

Details of the landscaping treatment of the riparian zone are shown on the landscape drawings. As requested in Auburn City Council's Letter dated 20/11/09, the car parking within the 10m setback has been removed.

4.3 SITE STORMWATER DRAINAGE

The subject site appears to drain to existing stormwater outlets in Haslams Creek. There may be some minor drainage out to Parramatta Road near the existing driveways.

There appears to be only one existing stormwater pit along the frontage of the site, immediately adjacent to Haslams Creek, which it appears to be connected into.

Stormwater from the building is to be collected using a syphonic drainage system directed to the corners of the building. A portion of this water will be directed to a rainwater reuse system. Refer below.

The remainder of the roof stormwater will be directed through underground stormwater pipes and connect into the existing pipe connection to Haslams Creek at the north-western corner of the site (as preferred by Sydney Water, refer email).

Stormwater from the loading dock area will be directed through a water quality device (refer below) before draining to Haslams Creek.

Stormwater from the open carpark and driveway areas will drain to the landscaped area along the boundary of the site for water quality treatment before further treatment through a proprietary water quality device (refer below).

Stormwater from the covered basement areas, will drain to a stormwater pump pit in the lower carpark level and be pumped into the loading dock stormwater system.

Due to the site grades and design of the intersection with Nyrang Street, some of the stormwater from the intersection will drain directly to Parramatta Road and into Haslams Creek.

Stormwater pits and pipes are to be designed to Council standards, with overland flow in a 1 in 100 year storm event directed toward the north-western corner of the site, and away from the undercover carparking areas.

Refer attached drawing 09s603c-DAC01 for the proposed stormwater drainage layout.

Discussion with Council indicates that they recall that the site stormwater from the neighbouring property, 15 Parramatta Road, drains into the M4 Motorway site.

4.4 STORMWATER RETENTION

It is proposed to connect the north-eastern corner of the roof of the building into above-ground rainwater reuse tanks with a total volume of 100kL. This water will be filtered prior to storage within the tank. Stored water will be used for landscaping irrigation, toilet flushing, and wash down of pavement areas. Any stormwater overflow will be directed into the site's underground stormwater drainage network.

4.5 STORMWATER DETENTION

No on-site detention structures were observed on 19 Parramatta Road. At the rear of 15 -17 Parramatta Road is a lower section, enclosed by block walls, which appears to be a form of stormwater detention system.

Based on Council's Part J Stormwater Drainage DCP, the site is located in Area 4, which allows a Permissible Site Discharge (PSD) of 150L/s/ha. The site storage requirement (SSR) is 325m^3/ha.

With a total site area of 25220m^2 this equates to a SSR of 819m^3 and PSD of 378L/s.

The primary reason for on-site detention is to 'hold back' stormwater such that there is no increase in stormwater flows to downstream properties. However, the subject site is at the downstream end of the Haslams Creek catchment, and it is also downstream of the Parramatta Road bridge, which from the Haslams Creek flood study is the last constriction point in Haslams Creek.

It would be preferable to have the stormwater from the subject site drain away early and leave capacity in the trunk stormwater system before the upstream stormwater reaches this location in the catchment.

The proposed development includes a greater landscaped area than the existing site, and the addition of the rainwater reuse tank will reduce the total quantity of stormwater leaving the site compared to the existing condition.

Therefore, in our opinion the installation of on-site detention is not necessary.

In addition Sydney Water have authority over Haslams Creek and any direct connection into the Creek. They have indicated (refer attached email) that in their opinion on-site detention is not required.

The existing stormwater detention constructed for both 15 and 17 Parramatta Road will be modified to service 15 Parramatta Road only.

4.6 STORMWATER QUALITY

No existing water quality treatment devices were observed on-site.

Stormwater from the loading dock area, and the covered basement carpark (pumped from the lowest level) is proposed to be collected and directed to the north-western corner of the site through a gross pollutant trap and oil and silt arrestor, before discharge into Haslams Creek. (As requested in Sydney Water Letter dated 17/11/09)

Stormwater from the open carparking areas, and the driveway areas along the northern and western boundaries will be directed into each adjacent landscaped area alongside the boundary. The landscaped area will act as a bioswale filter before entering the underground stormwater system and treated again through a gross pollutant trap and oil and silt arrestor and discharging to Haslams Creek.

As indicated in Sydney Water Letter dated 17/11/09, a model was undertaken of the proposed scheme using the MUSIC software package in order to achieve the following criteria as defined by the NSW EPA – Managing Urban Stormwater – Council Handbook 1997:

Pollutant	Requirement
Suspended Solids	80% reduction of the average annual load
Total Phosphorous	45% reduction of the average annual load
Total Nitrogen	45% reduction of the average annual load
Litter	Retention of litter greater than 50mm for flows up to 25% of the 1 year ARI peak flow
Coarse Sediment	Retention of sediment coarser than 0.125mm for flows up to 25% of the 1 year ARI peak flows
Oils and Grease	In areas with concentrated hydrocarbon deposition, no visible oils for flows up to 25% of the 1 year ARI peak flow

4.6.1 Pre-Developed Model

The existing conditions have been modelled assuming the proposed Costco development without any water quality treatment. The site has been modelled as a single urban catchment with an area of 2.5 ha and an impervious area of 91%.

The following mean annual loads were determined for the pre developed model as shown in Table 4.6.1.

Table 4.6.1 – MUSIC Output – Pre Developed Mean Annual Loads

Parameter	Load
Flow (ML/yr)	24.2
Total Suspended Solids (kg/yr)	4820
Total Phosphorus (kg/yr)	10.2
Total Nitrogen (kg/yr)	70.6
Gross Pollutants (kg/yr)	626

4.6.2 Post-Developed Model

The post developed site was modelled as urban roof and hardstanding nodes. Bioretention facilities were located at the west and north boundaries of the development taking drainage from carparking and hardstanding areas only. Hardstanding areas and roof areas are directed towards to a gross pollutant trap (Humegard or equivalent) then to an oil and silt arrestor (Humeceptor or equivalent) located in the north western corner of the site.

A cross section of a typical bioretention facility are shown on drawing DAC01. It is estimated that 258m^2 of active bioretention is required.

The treatment properties for each device were obtained from Humes Water Solutions and are summarised below in Tables 4.6.2 and 4.6.3.

Table 4.6.2 – Properties of Humegard from Manufacturers Specifications

Parameter	In	Out
Total Suspended Solids (mg/L)	500.2	250.7
Total Nitrogen (mg/L)	5.0	4.0
Total Phosphorus (mg/L)	4.978	4.006
Gross Pollutants (kg/ML)	15.0	2.2

Table 4.6.3 – Properties of Humeceptor from Manufacturers Specifications

Parameter	In	Out
Total Suspended Solids (mg/L)	500.3	100.3
Total Nitrogen (mg/L)	5.0	3.5
Total Phosphorus (mg/L)	4.998	3.519
Gross Pollutants (kg/ML)	15.1	14.9

The model was run to compare the pre development pollutant loads compared with the post development pollutant loads to determine the reduction in the mean annual loads. The results are shown in Table 4.6.4.

Table 4.6.4 – MUSIC Output – Post Developed Mean Annual Loads

Parameter	Load	% Removal Required	% Removal Achieved
Flow (ML/yr)	23.5	-	
Total Suspended Solids (kg/yr)	911	80%	81%
Total Phosphorus (kg/yr)	5.27	45%	48.3%
Total Nitrogen (kg/yr)	38	45%	46.2%
Litter (kg/yr)	129	-	79.4%
Coarse Sediment		-	Refer Humes Brochure
Oils and Grease		-	Refer Humes Brochure

As can be seen in Table 4.6.4 the Suspended Solids, Nitrogen and Phosphorus are all significantly reduced by the treatment train proposed for this development. Targets set by Sydney Water are met for Total Suspended Solids, Total Phosphorus and Total Nitrogen. In regards to Coarse Sediment and Oils and Grease, the attached Humeceptor Product Brochure indicates that based on field data, capture rates of 90-95% of material finer than 100um has been achieved. In regards to hydrocarbons, removal rates of greater than 89% have been achieved for inlet concentrations >10ppm.

4.7 GROUNDWATER

As indicated in NSW Office of Water letter dated 17/11/09, no permanent pumping of groundwater is permitted.

The carparking levels have been raised sufficiently such that they are higher than the measured groundwater levels as indicated in the URS geotechnical investigation. Therefore, it is not proposed to intercept or use the groundwater. Any fluctuations in the water table will be accommodated by utilising a tanked basement structure.

5 SITE SERVICES

5.1 WATER SUPPLY

This site is under the authority of Sydney Water. The Sydney Water services plan indicates that there are existing water mains along Parramatta Road. The existing site appears to be connected to the water main at the eastern end of the site.

A feasibility assessment and pressure inquiry by Sydney Water (refer Appendix) indicates that the site can be connected to this water main.

Therefore, it is proposed to utilise the existing water main connection at the eastern end of the site.

5.1.1 Fire Protection

A fire control centre, fire hydrant booster valve assembly, and sprinkler valve room is proposed in the south-eastern corner of the building with direct access from Parramatta Road. Hydrants are to be located throughout the building as required by Australian Standards.

Fire hydrant and fire sprinkler pumps are to be located in a room below the loading dock carparking area with access along the eastern boundary..

Fire sprinklers would be installed in the covered carparking areas.

5.2 SEWER DRAINAGE

This site is under the authority of Sydney Water. The Sydney Water services plan indicates that the site is serviced by a sewer main which starts from the north-western corner of the site and drains to the north beneath the M4 Motorway.

A feasibility assessment by Sydney Water (refer Appendix) indicates that the site can be connected to this sewer main.

Therefore, it is proposed to utilise this existing sewer connection to drain the proposed building.

Given the proposed location of the food preparation areas within the building, three grease traps are proposed for the site, two servicing the eastern end of the building, and the other servicing the western end of the building.

5.3 ELECTRICITY SUPPLY

This site is under the authority of Energy Australia. The Energy Australia services plan indicates that there are above ground and underground electrical cables along the frontage of the site.

Due to the proposed electrical equipment within the building, it is proposed to install two electrical substations, located in the south-eastern corner of the site.

Due to construction of a new slip lane and Nyrang Street intersection, the existing electrical services will need to be relocated. It is proposed to underground these services at the same time as relocating the services. New street lighting will be installed to suit the new slip lane and intersection.

5.4 TELECOMMUNICATIONS SUPPLY

Telstra have services in the region. The relevant service plans indicate that there are underground telecommunication services along both sides of Parramatta Road.

Due to the proposed slip lane and modifications to the Nyrang Street intersection, the existing telecommunications conduits will need to be relocated to suit.

5.5 GAS SUPPLY

The site is under the authority of Agility. The Agility services plan indicates that there are gas supply services along part of the frontage of the site.

It is proposed to extend the existing gas main near the western end of the site to service the proposed development.

6 CONSTRUCTION ISSUES

6.1 SOIL AND WATER MANAGEMENT

Soil and water management controls are proposed to be installed for the duration of construction works. The concept design shown on 09s603c-DAC06 (attached) follows guidelines as indicated in the 'Managing Urban Stormwater: Soils & Construction' – NSW Department of Housing.

6.2 SITE DEMOLITION / WASTE MANAGEMENT

The existing structure at 19 Parramatta Road is primarily a large warehouse building, steel framed, concrete slabs and masonry walls. Small portions of the building are two storey areas used for offices / amenities. The surrounding hardstand area is primarily concrete hardstand. The existing structure at 17 Parramatta Road is primarily an open asphalt parking area.

It is proposed to demolish and remove all existing structures and vegetation within the site boundaries exception of the existing retaining wall along the Haslams Creek boundary, which will be rehabilitated, and the tree in the south-eastern corner which is to be retained.

The existing stormwater, water and sewer connections beyond the site boundaries are proposed to be retained. Refer drawing 09s603c-DAC08 attached.

All demolition materials will be recycled where possible. The following table indicates proposed recycling / disposal methodology.

Existing Material On-Site	**Destination**
Excavation Material	Fill material disposed to a licensed waste facility Virgin Excavated Natural Material (VENM) to be reused as fill for another development site
Green Waste	Disposed to a landscaping recycling facility
Masonry	Disposed off-site to a recycling facility
Concrete	Disposed off-site to a recycling facility
Timber	Disposed off-site to a recycling facility
Plasterboard	Disposed off-site to a recycling facility
Metals	Disposed off-site to a recycling facility
Asbestos	Disposed to a licensed waste facility
Other Materials (Plastics)	Disposed off-site to a recycling facility

APPENDIX

09s603cDAC01 – General Arrangement Siteworks Plan

09s603cDAC02 – Siteworks Plan Part 1

09s603cDAC03 – Siteworks Plan Part 2

09s603cDAC04 – Siteworks Plan Part 3

09s603cDAC05 – Siteworks Plan Part 4

09s603cDAC06 – Soil and Water Management Concept Plan, Notes & Details

09s603cDAC07 – Vehicle Manoeuvring Plan

09s603cDAC08 – Demolition Plan

Haslams Creek Flood Study - Extract

Department of Water and Energy – Comment on Riparian Zone dated 18/08/09

Sydney Water - Comment on stormwater drainage dated 17/08/09

- Feasibility Investigation dated 21/08/09

- Pressure Inquiry dated 29/07/08

MUSIC Model Schematic and Calculations

Humeceptor Product Brochure