Oakdale - Estate Road Extension

INFRASTRUCTURE STAGES 3&4 including

Stage 2 Estate Rd Extension (Ch 260-730), associated WSUD biodiversity basin, bulk earthworks and earth retaining walls

MP 08_66-s75W - Mod 5 - Civil Design Report

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Report no: 12-79-R001 Revision: 05 Date: 11 October 2012

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EXECUTIVE SUMMARY

On 2 January 2009, the Minister for Planning approved a Concept Plan and concurrent Stage 1 Project Approval Application from Goodman Limited (Goodman) to establish the Oakdale Industrial Estate. The Estate is located on a 61 hectare site, adjacent to the Sydney Water Pipeline in the Western Sydney Employment Area (WSEA) and would be developed for warehouse, distribution and freight logistics purposes.

The 61 hectare industrial estate forms part of the Erskine Park Employment Area, which was created in 1993 as a key employment area for Western Sydney. The Erskine Park Employment Area now forms part of the Western Sydney Employment Hub, which is identified in the Metropolitan Plan for Sydney 2036 ("the Metropolitan Plan") as a key centre for employment growth over the next 25 years.

Existing Concept Approval MP08_065

The initial Concept Approval (MP 08_065) was subsequently modified and included the following:-

- Overall the subdivision, as modified, created:
  - 8 development lots;
  - 3 environmental/recreation lots (total area ~10.5ha);
  - 3 road corridor lots; and
  - 1 services lot.
- 8 industrial buildings with a combined gross floor area of 150,000m², and associated infrastructure;
  - Upgrade of a 0.5km section of Old Wallgrove Road from the Sydney Catchment Authority (SCA) crossing to the estate entry road to facilitate access to the revised estate entry location
  - Bulk earthworks
  - The construction of the required Oakdale Central Estate Road in 3 Stages (refer Goodman dwg OAK S75w Sk02(b))

Existing Project Approval MP08_66

The DHL Logistics Hub (Buildings 1A & 2A) Major Project (MP 08_0066) was also approved on 2 January 2009. The DHL Logistics Hub Project Approval has been modified 3 times and the current modified approval includes the following:

- Subdivision of the site ;
- Upgrade of Old Wallgrove Road;
- Construction of a 260m long portion of the new estate road to facilitate access to Lot 1A and 2A; (aka Estate Road Stage 1, CH 0-Ch 260) Erection of Warehouses 1 (Lot 1A), 2 and 3 (Site 2A);
- Construction of the required Estate Road Ropes Creek Crossing
- Bulk Earthworks across the whole of Oakdale Central;
- Provision of infrastructure and services for Oakdale Central; and
- Construction of two warehouses and associated infrastructure.

The purpose of this s75W Mod 5 report

This s75W mod 5 Civil design report is intended to be read in conjunction with AT&L S75W dwg series 12-79 dwgs C000-C003, C005-C007, C010-C015, C020, C040-C042, C060, C078, C080-82, C100-C104. A copy of these drawings are provided in Appendix C)

These s75W Mod 5 drawings, and this S75W-Mod 5 report encompasses the next planned phase of civil works on the Oakdale Central site known as INFRASTRUCTURE STAGES 3 & 4 which includes:

- the proposed stage 2 extension of the Estate Road from Ch 260 to approx Ch 730) aka Estate Road Stage 2)
- the proposed construction of a new stormwater biodiversity basin immediately west of building lot 1c
- proposed associated cut to fill and imported filling bulk earthworks to construct the estate road extension road and basin and to raise lot 1c to marry to the same earthworks pad level as lot 1b
- proposed new keystone earth retaining walls to the perimeter of building lot 1c.
- the widening of lot 1c by approx 20m further west

INTRODUCTION

AT&L have been engaged by Goodman Property Services (Aust) P/L to undertake the Civil Design for the subject estate road extension, associated stormwater and services, WSUD basin adjacent lot 1c and earthworks/retaining wall within building lot 1C.

This report should be read in conjunction with the following AT&L S75W Mod 5 series 12-79 drawings dated 11/10/2012:

C000-C003, Rev B

C005-C007, Rev C

C010-C011, Rev C

C012-C015, Rev B

C020, Rev B

C040-C042, Rev B

C060,Rev B

C078, Rev B

C080-C082,Rev B

C100-C104, Rev C

SkC112, Rev P3

A copy of these drawings is provided in Appendix C.

Additionally, the following associated reports should also be read in conjunction with this report:

- Oakdale Concept Plan – Water Sensitive Urban Design Strategy Dated September 2010 Prepared by GHD;
- 21/16225/135599 Central Project Application No.1 – Estate Works & DHL Stormwater Management Strategy Dated 18 March 2008 2010 Prepared by GHD.

Summary

This s75W Mod 5 report encompasses the next planned phase of civil works on the Oakdale Central site known as INFRASTRUCTURE STAGES 3 & 4 which includes:

- the proposed extension of the Estate Road from Ch 260 to approx Ch 730) (aka Estate Road Stage 2)
- the proposed construction of a new stormwater biodiversity basin immediately west of building lot 1c
- proposed associated cut to fill and imported filling bulk earthworks to construct the estate road extension road and basin and to raise lot 1c to marry to the same earthworks pad level as lot 1b
- proposed new keystone earth retaining walls to the perimeter of building lot 1c.
- the widening of lot 1c by approx 20m further west

This report generally discusses the design philosophy behind the following components of the given S75W design:

- Civil design
- Stormwater Management
  - On Site Detention (OSD)
  - Piped and Overland Flows
  - Water Sensitive Urban Design (WSUD)
- Sedimentation and Erosion Control
- Road geometry and pavement
- Bulk earthworks to the road extension, biodiversity basin and lot 1c
- Retaining walls to lot 1c

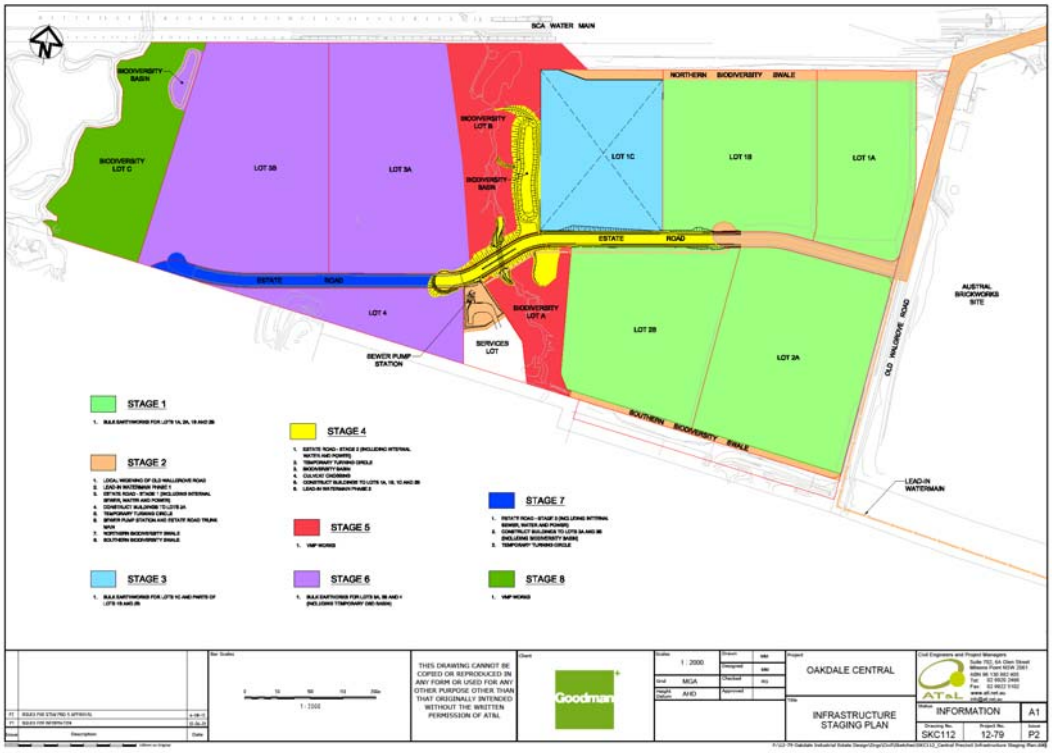


Figure 1 –**Infrastructure** Staging Plan

1. STORMWATER MANAGEMENT

1.1 The Site (Infrastructure Stages 3 & 4: inc Estate Road Extension Stage 2- Ch 260-730, associated culvert, WSUD biodiversity basin, bulk earthworks and earth retaining walls)

The stormwater catchment associated with the works proposed in the subject site (Referred to hereafter as "*The Site*") is approximately 26.7ha in area (excluding the easement for the swale, Lot 1A and Lot 1B).

The site is located in the Fairfield City Council Local Government area and is bound by the future Chandos Parkway Road Corridor to the south, Northern Bio-Swale to the north and Ropes Creek to the east. The Site forms part of the Oakdale Central Precinct Concept Plan Approval (08_0065).

Infrastructure stages 1 and 2 are now built and the Site is now proposed to collect the stormwater from the now constructed Stage 1 (Estate Rd -Ch 0- Ch 260 & the associated constructed DHL buildings on lot 2a) & divert this storm water along the proposed road extension prior to discharging into the proposed WSUD basin adjacent lot 1c.

1.2 Council & Precinct Requirements & Recommendations

As part of the MoP Concept and Project Approvals obtained for the site to date, GHD prepared a precinct wide stormwater management strategy which forms the basis of the stormwater management design proposed for the site. Refer *Oakdale Concept Plan – Water Sensitive Urban Design Strategy Dated September 2010*.

A summary of Council and GHD requirements and recommendations adopted is listed below:

- OSD of 250 m^3/ha of developable site area. OSD will have restricted outlet sizes based on a permissible site discharge of 140L/s/ha.
- OSD to mitigate post development flows to pre-developed flows for peak Average Reoccurrence Interval (ARI) events.
- WSUD to achieve target reductions:
    - 85% Total Suspended Solids (TSS)
    - 65% Total Phosphorus (TP)
    - 45% Total Nitrogen (TN)
    - 90% Gross Pollutants (GP)
- Finished Floor Levels (FFL) to have minimum 300mm freeboard to 100 year overland flows.

- Rainwater tanks are desirable for reuse for irrigation, toilet and other non-potable water uses. No set guidelines are provided and are subject to separate on lot DA's.

1.3 Stormwater Management

DRAINs modelling software has been used to calculate the Hydraulic Grade Line (HGL) of the stormwater pipes and the On-Site Detention (OSD) Volume. DRAINs data files and output results are attached in Appendix A.

MUSIC modelling software has been used to evaluate pollutant loads from the developed site. MUSIC data files and output results are attached in Appendix B.

1.3.1 Hydrology

- Pipe drainage shall be designed to accommodate the 5-year ARI storm event.
- The combined piped and overland flow paths shall be designed to accommodate the 100-year ARI storm event.
- Where trapped low points are unavoidable and potential for flooding private property is a concern, an overland flowpath capable of carrying the total 100-year ARI storm event shall be provided. Alternatively the pipe and inlet system may be upgrade to accommodate the 100 year ARI storm event.
- Rainfall intensities shall be as per the Intensity-Frequency-Duration table in accordance with the Australian Rainfall and Runoff volume 2.
- Times of concentration for each subcatchment shall be determined using the kinematic wave equation.
- Runoff coefficients shall be calculated in accordance with AR&R. The fraction impervious shall be determined from analysis of the subcatchments.
- Flow width in gutter shall not exceed 2.5m for the minor design storm event.
- Velocity depth ratios shall not exceed 0.4 for all storms up to and including the 100 year ARI event.
- Blockage factors of 20% and 50% shall be adopted for pits on grade and at sags respectively.

1.3.2 Hydraulics

- A hydraulic grade line HGL design method shall be adopted for all road pipe drainage design. The HGL shall be shown on all drainage long sections.

- The minimum pipe size shall be 375 diameter RCP.
- The minimum pipe grade shall be 1.0%.
- All pipes shall be Rubber Ring Jointed uno.
- The minimum cover over pipes shall be 450mm in grassed areas and 600mm within carriageways.
- Where minimum cover cannot be achieved due to physical constraints the pipe class shall be suitably increased.
- All trafficable shall be Reinforced Concrete Pipes or Fibre Reinforced Cement equivalent.
- The pipe friction coefficients to adopted shall be:

Materials	Mannings – n	Colebrook-White – k	Min. Pipe Class
RCP	0.012	0.3	3
FRC	0.01	0.15	3

Table 1 – Pipe Details

- All pipes classes shall be designed for the ultimate service loads and where applicable, constructions loads will be designed for.
- Pipes discharging to the overland flow path shall adopt a minimum tailwater level equivalent to respective overland flow level.
- Pit Loss coefficients shall be calculated in accordance with Missouri Charts.
- A minimum 150mm freeboard shall be maintained between pit HGL and pit surface levels.
- Overland flowpaths shall maintain a minimum of 300mm freeboard to all habitable floor levels.
- Pits deeper than 1.2m shall contain step irons at 300 mm centres.

1.3.3 On-Site Detention (OSD)

The total catchment area draining towards the new proposed WSUD biodiversity basin adjacent lot 1c equates to 26.7Ha.

This new biodiversity basin is intended to capture and meet the WSUD water quality needs of the following sub-catchments:

- the existing and proposed Estate Road from Ch 0 to approx Ch850,
- the existing DHL buildings, hardstand and landscape areas as currently developed on lot 2a

- the proposed future industrial developments to lots 1C, 2B and 4.

The basin is primarily not intended to capture OSD however it has been designed to accommodate OSD from the Estate Road sub catchment (i.e. Ch 0 to approx Ch 850)

Building lots 1a,1b,1c, 2a, 2b and 4 are modelled with individual OSD to capture and treat stormwater within the bounds of each lot, prior to discharging into the road network and ultimately towards the northern swale or new WSUD biodiversity basin.

Underground OSD tanks have already been built on the DHL site (lot 2a) and OSD is also already Project Approved on Lot 1a.

The construction of OSD on lots 1b, 1c, 2b and 4 will be subject to future DAs for any proposed development of these lots.

The individual Lots have been modelled with a base flow equal to the PSD of 140 L/s/Ha. This is considered conservative as the shorter duration minor storms will likely have significantly lower discharge.

OSD has been designed to generally achieve the following outcomes:

- PSD = 140 L/s/Ha equating to maximum allowable combined discharge of 3,738 L/s
- OSD = 250 m^3/Ha equating to minimum combined OSD volume of 3,608 m^3 (excluding Lots 1C, 2B and Lot 4)
- Post developed peak flows to be mitigated to pre-developed peak flows for 5 year and 100 year.

Results

The results of the drains model indicate the following targets are achieved:

- Actual Maximum combined discharge = 3,720 L/s
- Actual Minimum combined OSD volume = 3,624 m^3 (Capacity of the Basin from Extended Detention RL 59.8 to Top of Basin RL 61.0 AHD)

The OSD achieves mitigation of peak flows for 5 year and 100 year ARI. (*See table 2*)

	5 YR ARI		100 YR ARI	
	(m^3/s)		(m^3/s)	
Duration	Existing	Developed	Existing	Developed
Peak	3.08	3.08	6.50	3.72

Table 2 - Pre-Post Developed Flows (With OSD)

1.3.4 Overland Flows

Overland flows within the road have been designed to be safely conveyed within the road carriageway.

GHD carried out a flood study as part of the *Oakdale Concept Plan – Water Sensitive Urban Design Strategy Dated September 2010.* This report and the associated design drawings were used to determine the upstream catchments and flows entering into "the site".

1.3.5 Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design encompasses all aspects of urban water cycle management, including water supply, wastewater and stormwater management. WSUD is intended to minimise the impacts of development upon the water cycle and achieve more sustainable forms of urban development.

The WSUD strategy, MUSIC Model and subsequent WSUD designs prepared by AT & L are based upon the GHD Project Approval WSUD Strategy Report found in Appendix D.

WSUD Modelling – MUSIC Model

The MUSIC Model for Urban Stormwater Improvement Conceptualisation (MUSIC, Version 5.00.10) was used to evaluate pollutant loads from the developed site for Post-development (treated) conditions based on the proposed site development.

A conceptual view of the MUSIC model used in this report can be found in Appendix B.

Base MUSIC Model

GHD provided a base MUSIC model, which was inclusive of an additional catchment and water quality treatment device for the adjacent property of Austral Brickworks. The information provided and details of the Austral Brickworks catchment and sediment basin were retained for use in the preparation of the MUSIC model provided in this report.

Climate Data

Pluviograph data (6 minute rainfall intensity and evopotranspiration) for Horsley Park (Station 067119) was use in the MUSIC model.

Catchment Areas and MUSIC Parameters

All building lot catchment areas were assumed to be between 70% and 80% roofed. Of the non-roofed areas, 80% of this area was assumed to be impervious. To provide a more accurate model, separate catchment nodes were created to simulate the roofed area and non-roofed areas for each lot.

MUSIC model input parameters for these catchments including rainfall-runoff, base flow concentration and stormflow concentration parameters were selected as per the Draft MUSIC Modelling Guidelines for New South Wales. The parameters used for the various catchment areas can be seen in tables 3, 4, 5 and 6.

Rainfall-Runoff Parameters

Parameter	Unit	Figure
Rainfall Threshold	mm/day	1.40
Soil Storage Capacity	Mm	170
Initial Storage	% of Capacity	30
Field Capacity	Mm	70
Infiltration Capacity Coefficient	a	210.0
Infiltration Capacity Coefficient	b	4.7
Initial Depth (Ground Water)	mm	10
Daily Recharge Rate	%	50.00
Daily Baseflow Rate	%	5.00
Daily Seepage Rate	%	0.00

Table 3 – Rainfall-Runoff Parameters – All Catchment Areas

Base Flow/Stormflow Concentration Parameters – Impervious (Roofed) Areas

Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	0.000	0.000	1.300	0.320
Phosphorus	0.000	0.000	-0.890	0.250
Nitrogen	0.000	0.000	0.300	0.190

Table 4 – Base Flow/Stormflow Concentration Parameters – Impervious (Roofed) Areas

Base Flow/Stormflow Concentration Parameters – Pervious Areas

Pollutant	Baseflow Concentration Parameter – Mean (log	Baseflow Concentration Parameter – Std Dev (log	Stormflow Concentration Parameters – Mean (log	Stormflow Concentration Parameters – Std Dev (log

	mg/L)	mg/L)	mg/L)	mg/L)
TSS	1.200	0.170	2.150	0.320
Phosphorus	-0.850	0.190	-0.600	0.250
Nitrogen	0.110	0.120	0.300	0.190

Table 5 – Base Flow/Stormflow Concentration Parameters – Pervious Areas

Base Flow/Stormflow Concentration Parameters – Road

Pollutant	Baseflow Concentration Parameter – Mean (log mg/L)	Baseflow Concentration Parameter – Std Dev (log mg/L)	Stormflow Concentration Parameters – Mean (log mg/L)	Stormflow Concentration Parameters – Std Dev (log mg/L)
TSS	1.200	0.170	2.430	0.320
Phosphorus	-0.850	0.190	-0.300	0.250
Nitrogen	0.110	0.120	0.340	0.190

Table 6 – Base Flow/Stormflow Concentration Parameters – Road

Parameters used for the Bio-rentionbasin were based off guidelines provided by FAWB – Stormwater Biofiltration Systems – Version 1, 2009, and were modified accordingly. Parameters used to model the bioretention basin are shown in the table 7 below.

Parameter	Unit	Figure
Extended Detention Depth	m	0.30
Surface Area	m^2	2000
Filter Area	m^2	1900
Unlined Filter Media Perimeter	M	0.01
Saturated Hydraulic Conductivity	mm/hour	180
Filter Depth	m	0.50
TN Content of Filter	mg/kg	900

Media		
Orthophosphate Content of Filter Media	mg/kg	30.0
Exfiltration Rate	mm/hour	0.00
Base Lined	-	Yes
Vegetation Properties	-	Effective Nutrient Removal Plants
Overflow Weir Width	m	10.00
Underdrain Present	-	Yes
Submerged Zone	-	No

Table 7 – Biorention Basin Parameters

Results

Stormwater quality treatment for "the site" will ultimately be provided by the proposed WSUD biodiversity basin within Biodiversity Lot B.

MUSIC modellings results presented as mean annual loads at the receiving node indicate that adopted target reductions are achieved, as shown in Table 8.

Pollutant	Sources (Kg/yr)	Residual Load (Kg/yr)	Reduction (%)	Target Reduction (%)
Total Suspended Solids	24,600	3,390	86.2	85
Total Phosphorus	56.5	14.9	73.6	65
Total Nitrogen	562	271	51.9	45
Gross Pollutants	7,980	37.6	99.5	90

Table 8 – Pollutant Loads – Combined

2 SEDIMENT AND EROSION CONTROL

2.1 Current Project Approval Sedimentation Plans

The Current Project Approved Sediment and Erosion and Control plans prepared by GHD is appended to this report in Appendix G.The earthworks shown on these plans are now built and for this reason these plans are now effectively obsolete.

New sediment and erosion control measures are proposed for the subject s75W Mod 5 proposal as is outlined in clause 2.2 below

2.2 New S75w Sedimentation and Erosion Control (Construction)

A conceptual Soil and Water Management Plan (SWMP) has been prepared in accordance with the NSW Department of Housing Publication titled: Managing Urban Stormwater- Soils and Construction (2004). Detail designs and calculations will be presented in a Report as part of detail design documentation.

Refer to AT&L Drawings C100, C101, C102, C103 and C104 for the proposed conceptual SWMP. Copies of these plans are contained in Appendix C.

The SWMP attempts to minimise the impact of sedimentation due to construction works by the following methods:

- Diversion of “clean” water away from the disturbed areas and discharge via suitable scour protection.
- Provision of hay bale type flow diverters to catch drainage and divert to “clean” water drains.
- Diversion of sediment-laden water into temporary sediment control basins to capture the design storm volume and undertake flocculation (if required).
- Provision of construction traffic shaker grids and wash-down to prevent vehicles carrying soils beyond the site.
- Provision of catch drains to carry sediment-laden water to sediment basins.
- Provision of silt fences to filter and retain sediments at source.
- Provision of a strategy to preserve the existing alignment of the Ropes Creek Tributary whilst constructing the required adjacent new estate road creek crossing culverts (including the construction of a temporary earthen flood levy around the culvert construction area).
- Where future construction and building works are not proposed, the rapid stabilisation of disturbed and exposed ground surfaces with hydro-seeding.

2.2.1 Technical Requirements

The following general technical requirements will apply in the design of SWMP.

- Temporary Sediment Basins will be designed to be stable in the 10 year ARI storm.
- Temporary Sediment Basin volumes will be determined using the 3 month storm.
- All catch drains and clean water drains will be designed for the 2 year ARI storm.
- Creek preservation levy works (during culvert construction) will be sized for the 10 year ARI storm.
- All erosion control measures to be located above the 2 ARI flood boundary.

2.2.2 Site Investigation

A Geotechnical Investigation of the site will form the basis for establishing soil properties and identifying contaminants at site. The investigation will identify:

- Particle size distribution.
- Occurrence of Acid Sulphate soils.
- Occurrence of Reactive soils.
- Occurrence of site contamination.
- Soil classification and suitability for embankment construction.
- Slope stability of natural terrain.
- Depth of water table.
- Other requirements and tests as will be required.

2.2.3 Phased Implementation

The appointed construction contractor will be required by the principal to take ownership of the final adopted Sedimentation and Control plan. Their final Soil and Water Management Plans will be prepared to suit the critical Phases of the Project and the Construction Program. The key phases of construction works are currently envisaged to be undertaken in chronological order as listed below:

1. Construction of truck site entry and exit sediment controls.
2. Construction of site perimeter silt fences
3. Construction of temporary Bio- Retention basins (including fill importation for main basin)
4. Construction of catch drains feeding temp basins
5. Construction of temp creek levy and silt fences around the proposed new culvert construction area
6. Construction of new Creek culverts
7. Divert creek into new culvert and decommission adjacent creek

8. Importation of fill to lot 1c and road extension
9. Construction of road stormwater drainage and verge services
10. Construction of road pavements
11. Construction of retaining walls on the west side of lot 1C.

2.2.4 Key Risks and Constraints

Overtopping of Sediment Basins – The loss of sediments from the temporary basins will result in sedimentation in the Ropes Creek Tributary. This risk will be minimised by sizing basins to be in accordance with Industry Standards.

Damage to Habitat in the Riparian Zone – The natural habitat can be damaged due to construction activities. This risk will be managed by demarcating "No-Go" areas for construction traffic and workers.

Spillage due to construction traffic – Accidental spillage of fuels, oils and chemicals has the potential to contaminate the stream flows in Ropes Creek. This risk will be managed by undertaking all refuelling offsite or in designated areas with suitable controls such as spill bunds for containment.

Washout of Creek Works – The occurrence of a major storm event has the potential to cause severe erosion associated with the construction of the culvert crossings. This risk will be managed by

- building a temporary earthen levy around the culvert construction area which can accommodate a 1:10 year flood event and
- minimising the duration of construction works in the creek and
- undertaking rapid landscape stabilisation of disturbed areas once works are completed.

2.2.5 Site Management

The SWMP will identify critical management practices such as:

- maintenance routines/frequency
- Sediment removal from basins
- Inspection for blockage and potential loss of sediment.
- Maintenance of sediment control measures.
- Assessing effectiveness of control measures.

2.2.6 Conclusion

The erosion control measures proposed for the site will comply with the requirements of Fairfield City Council and The Department of Environment, Climate Change and Water (DECC).

The proposed SWMP will ensure that the best management practice is applied to the development site in controlling and minimising the negative impacts of soil erosion.

3 SERVICES

Services including sewer, water, power, telecommunication and gas can be made available to “the site”.

Internal reticulation will be coordinated at the Construction Certificate (CC) stage of works.

4 BULK EARTHWORKS / RETAINING WALLS & ROPES CREEK TRIBUTARY CROSSING

4.1 Bulk Earthworks (BE)

A summary of the proposed s75W mod 5 bulk earthwork volumes is

	From Current Existing Surface levels			From GHD Mod 1 Project Approval Dwg levels		
	Cut (m3)	Fill (m3)	Import Fill Balance (m3)	Cut (m3)	Fill (m3)	Import Fill Balance (m3)
i) Road Extension Ch 240 to Ch720 (to Rd subgrade levels, includes associated road edge batters)	-3,700	12,100	8,400			
ii) Biodiversity Basin adjacent lot 1c	-1,500	6,400	4,900			
iii) Raise level of Lot 1c	0	130,100	130,100	0	109,400	109,400
Totals	-5,200	148,600	143,400			

i) BE to Estate Road extension (Ch 260-730) and associated biodiversity basin

Cut to fill and imported fill bulk earthworks are proposed as required to achieve the given design plan finish levels to the stage 2 estate road extension.

ii) BE to Biodiveristy Basin adjacent lot 1c

Cut to fill and imported fill bulk earthworks are proposed as required to achieve the given design plan finish levels to the new biodiversity basin.

iii) Raising of BE Levels to Lot 1c

Imported fill is proposed to raise the current approved bulk earthworks level of Lot 1c by an average of one and a half a metres (1.5m) from a current MOP Project Approved pad RL of 65.0 to proposed new RLs ranging between RL 66.26 and RL 67.0. This increase in filling is desired in order to marry the pad level of 1c to that of the Project Approved pad level of lot 1b (average RL 66.50):

PSM have been engaged to produce a specific Bulk Earthworks specification for the subject works including for the required Importation of fill. A copy of this specification is attached in Appendix E

4.2 Retaining Walls

Boral “Keystone” or other similar mock stone face look retaining walls are proposed to the perimeter of the earthworks on lot 1c at the locations as detailed on the s75W drawings. Similar such walls have already been built on lot 2a.

The proposed retaining walls will be built to the manufacturers (i.e. Boral or other) design guideline requirements or a Structural Engineers design requirements

4.3 Rope Creek Tributary Crossing Culvert

Minister of Planning (MoP) Approval has previously been gained to build this proposed creek crossing structure as per *Project Approval MP08_66.*

It is confirmed that the current creek crossing culvert design, as is presented on AT&L drawings C080, C081 and C082 (All Rev A, 25-6-12), have been formulated having had previous verbal and written consultation with:

- Greg Brady of the DPI (now Department of Water) and
- Carla Ganassin of the Department of Primary Industries-Fisheries NSW

All conditions of *MP08_66* are intended to be followed. It should be clarified upfront that what is proposed is a series of culverts which in our opinion is an adequate form of "bridge" for the given situation and circumstance.

5 ROAD DESIGN

5.1 Horizontal and Vertical Geometry

The Stage 2 Estate Road extension and temporary cul-de-sac (Ch 260 –Ch 730) has generally been designed to meet the requirements of Fairfield City Councils Engineering Specifications and Australian Standards to accommodate B-Double truck movements.

5.2 Estate Road Extension Pavement Design

An estate road pavement design for Ch 260-730 has been undertaken by PSM a copy of which is provided in Appendix F. The proposed pavement is the same as that constructed within Estate Road Stage 1 (Ch 0- Ch 260)

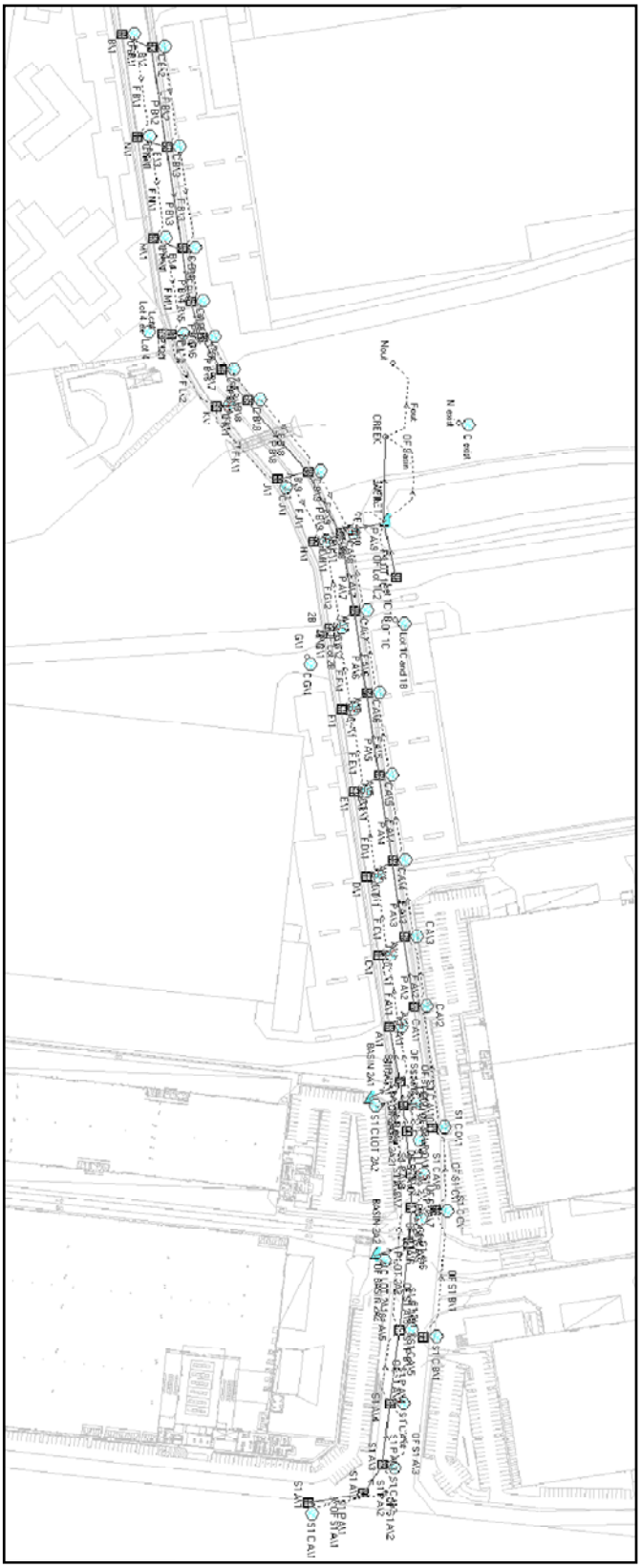
6 CONCLUSION / RECOMMENDATIONS

The relevant requirements as set out in the MOP approvals, Councils Guidelines and GHD's Precinct wide Water Sensitive Urban Design Strategy are demonstrated to be generally achieved in the subject S75W Mod 5 AT&L Civil engineering design drawings and supporting reports.

Appendix A

Proposed *MP08_66* -S75W-Mod 5

DRAINS Model

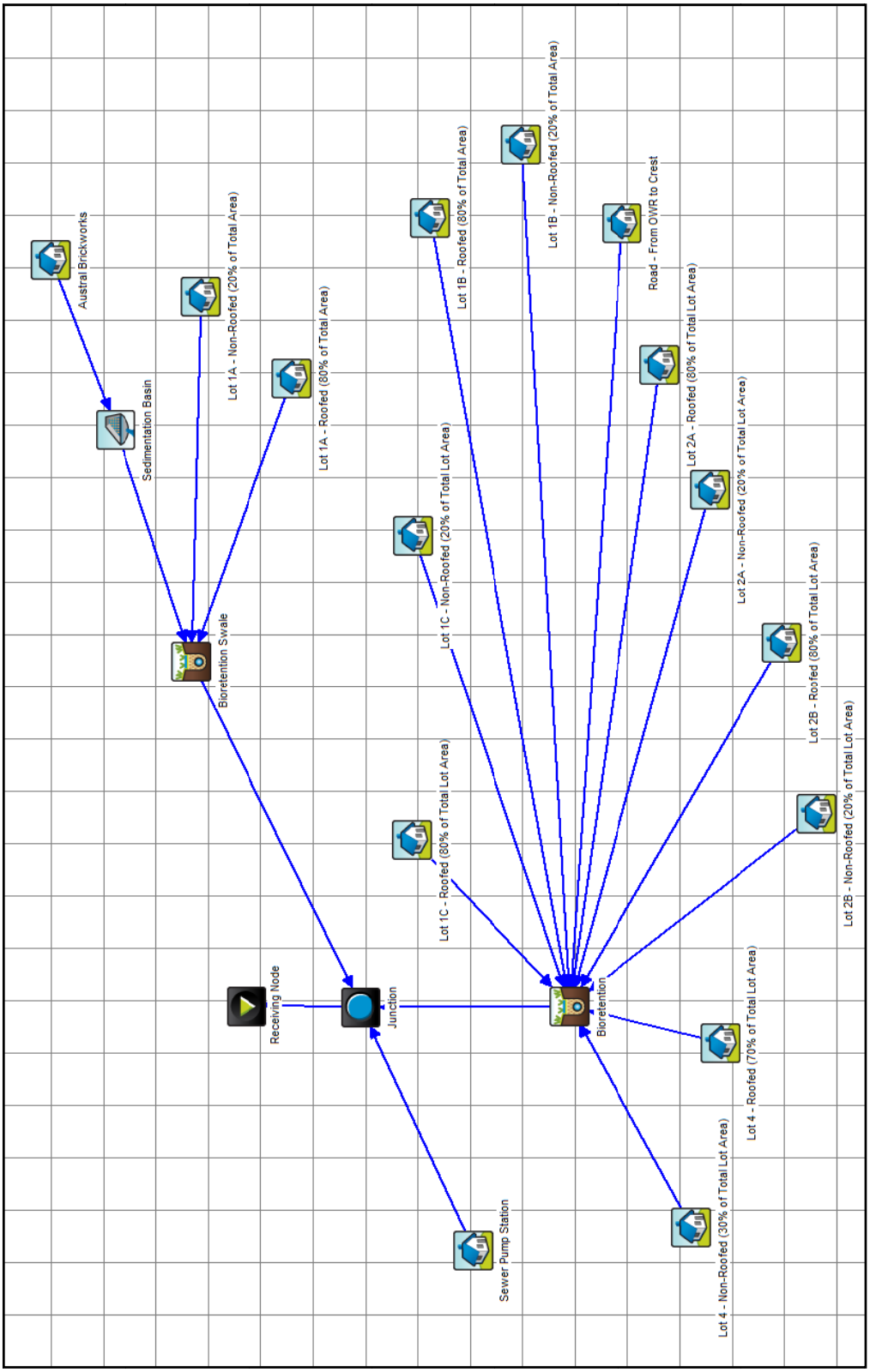


DRAINS MODEL

Appendix B

Proposed *MP08_66* -S75W-Mod 5

MUSIC Model


Austral Brickworks
Sedimentation Basin
Lot 1A - Non-Roofed (20% of Total Area)
Lot 1A - Roofed (80% of Total Area)
Bioretention Swale
Lot 1B - Roofed (80% of Total Area)
Lot 1B - Non-Roofed (20% of Total Area)
Road - From OWR to Crest
Lot 1C - Non-Roofed (20% of Total Lot Area)
Lot 2A - Roofed (80% of Total Lot Area)
Lot 2A - Non-Roofed (20% of Total Lot Area)
Lot 2B - Roofed (80% of Total Lot Area)
Lot 2B - Non-Roofed (20% of Total Lot Area)
Lot 1C - Roofed (80% of Total Lot Area)
Receiving Node
Junction
Bioretention
Lot 4 - Roofed (70% of Total Lot Area)
Lot 4 - Non-Roofed (30% of Total Lot Area)
Sewer Pump Station

MUSIC MODEL

Appendix C

Proposed *MP08_66* -S75W-Mod 5
AT&L -Civil Works &
Erosion and Sediment Control Drawings

Appendix D

Existing Project Approval *MP08_66* -s75W-Mod 1
GHD- WSUD Strategy Report

Appendix E

Proposed *MP08_66* -S75W-Mod 5
PSM Earthworks Specification

Appendix F

Proposed *MP08_66* -S75W-Mod 5 PSM Road Pavement Design

Appendix G

Existing Project Approval *MP08_66* -s75W-Mod 1
GHD - Soil and Water Management Plan

Appendix H

Existing Project Approval *MP08_66* -s75W-Mod 1

GHD - Stormwater Management Plan