28 Yarrunga Street, Prestons
Civil Stormwater Management Report

CLIENT/ Favelle Favco Cranes Pty Ltd

DATE/ DECEMBER 2019

CODE/ 19-648-FAVCO PRESTONS

Commercial in Confidence

Document Registration

Document Title	28 YARRUNGA STREET, PRESTONS
Document File Name	REP001-01-19-648-Civil Stormwater Management Report
Section	AT&L PTY LTD – ENGINEERING DIVISION
Document Author	GLEN JAMES

Issue	Description	Date	Author	Checked	Approved
A	FOR COMMENT	05-09-19	Glen James	☒	☒
B	FOR APPROVAL	24-09-19	Glen James	☒	☒
C	FOR APPROVAL	21-11-19	Glen James	☒	☒
D	FOR APPROVAL	04-12-19	Glen James	☒	☒
				☐	☐

Contents

Appendices

Figures

Tables

1. Introduction

This Civil Stormwater Management Report supports the proposed development of 28 Yarrunga Street in Prestons. Refer to Figure 1 for location of the proposed development.

AT&L have been engaged by Favelle Favco Cranes Pty Ltd to prepare a Development Application (DA) Civil Stormwater Management Report on the civil and stormwater management requirements for the proposed development.

This report is written to comply with Liverpool Development Control Plan 2008 (DCP), Liverpool City Council's Development Design Specification: Stormwater Drainage Design (2003) and Liverpool City Council's On-Site Stormwater Detention Technical Specification.

Figure 1 – Site Location (Courtesy of Nearmap)

The site is approximately 4.68 Ha in area and is in The Liverpool City Council (LCC) Local Government Area (LGA). The existing site consists of warehouse buildings and unpaved area for crane bases and parking. Access to the site is provided by a driveway entrance from Yarrunga Street to the south. The site generally falls from the south-eastern corner at RL 42.20 to the north-western corner at RL 34.51. Refer to the survey drawings within Appendix A for all features on the site along with existing contour levels.

2. Project Description

The proposed development involves the construction of two warehouse buildings over two stages with a maximum height of 2 storeys. Refer to Figure 2 & 3 for architectural site layout for the proposed Stage 1 and Stage 2 layouts.

The proposed Stage 1 development involves the demolition of the small existing buildings, crane bases and car park within the Stage 1 footprint and construction of a 2-storey building with offices, warehouses and perimeter driveways. The existing warehouse is to remain in operation during Stage 1.

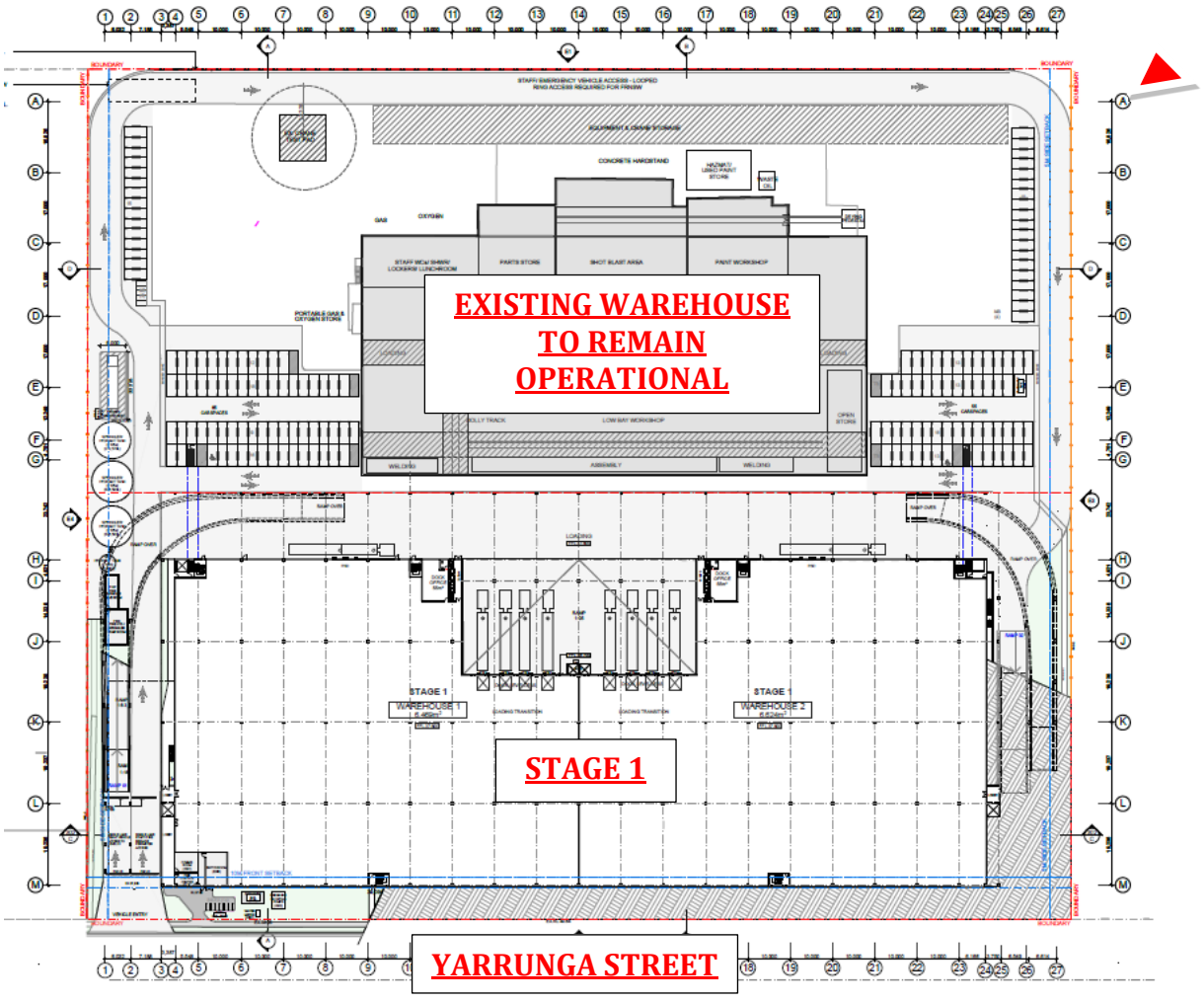

Figure 2 - Proposed Stage 1 Layout

The proposed Stage 2 development involves the demolition of the existing main warehouse building, other small buildings and car park within the Stage 2 footprint and construction of a 2-storey building (with basement) with offices and perimeter driveways .

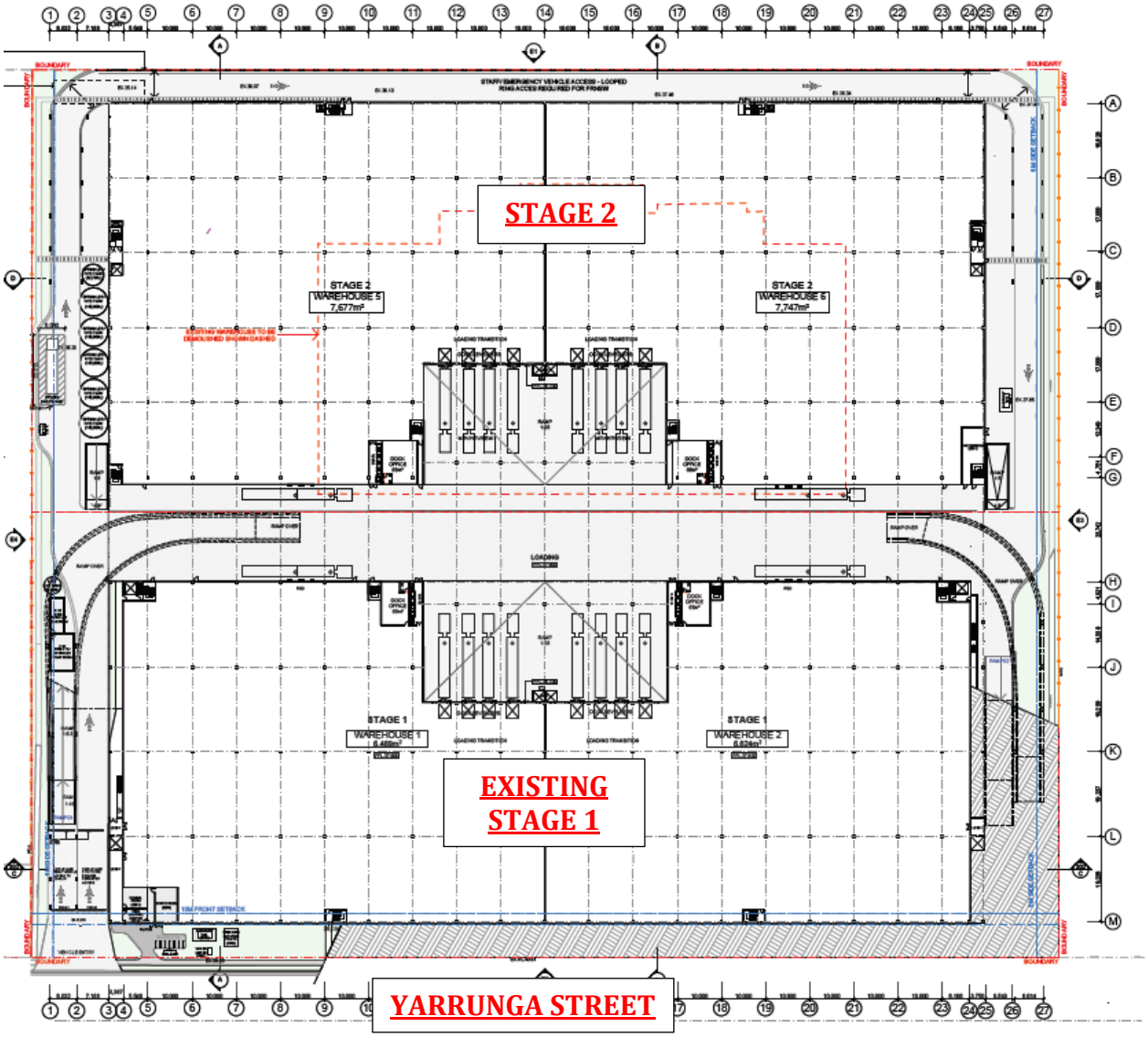

Figure 3 - Proposed Stage 2 Layout

2.1. Scope of Report

This report outlines the design criteria for:

- Stormwater infrastructure;
- How stormwater is managed across the site;
- Identification of existing utility infrastructure; and
- How the future development will be serviced.

Refer to Appendix B for the Civil Development Application Civil Works Package Drawings.

This report has been prepared to satisfy the requirements and conditions of the following documents:

- Liverpool Development Control Plan 2008 (DCP);
- Liverpool City Council's Development Design Specification: Stormwater Drainage Design (2003);
- Liverpool City Council's On-Site Stormwater Detention Technical Specification
- OEH's Managing Urban Stormwater: Soils and Construction Guideline.

This civil infrastructure report includes:

- Stormwater Management:
- Piped and Overland Flows;
- Water Sensitive Urban Design (WSUD);
- Dial Before you Dig (DBYD) information (Appendix D); and
- Infrastructure Services, including:
    - Sewer;
    - Water Supply (Potable);
    - Electricity
    - Gas and
    - Telecommunications.

3. Stormwater Management

3.1. Existing Stormwater Drainage

There is an existing pit and pipe network located within the site along the northern boundary with all runoff directed to this and then ultimately discharging into the existing 3m wide stormwater easement running through 90 Yarrawa Street, to ultimately discharging to Cabramatta Creek to the west.

When this network is at capacity the overland flow path within the site directs overflow toward the north-western corner of the site and spills onto the easement., to ultimately discharging to Cabramatta Creek to the west.

3.2. Proposed Site Stormwater Drainage

All proposed stormwater drainage from the development will be designed in accordance with Liverpool City Council's requirements.

All stormwater is proposed to connect into the existing stormwater infrastructure (675 diameter pipe within our site is to remain) located within the 3m wide easement at the north western corner of the site draining through 90 Yarrawa Street. The rate of stormwater runoff from the post-developed site is not to exceed the rate of runoff from the pre-developed site up to and including 100-year ARI.

Refer to the Civil Drawings in Appendix B for layout and details for the proposed stormwater network across the site.

Stormwater generated within the proposed site will be treated to the LCC's stormwater quality treatment requirements using proprietary treatment devices and a filtration swale system located along the eastern, western and southern boundaries.

3.3. Hydrology

- Pipe drainage shall be designed to accommodate the 10-year ARI storm event (10% AEP) in accordance with Liverpool City Council's requirements;
- 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 upgraded to accommodate the 100 year ARI storm event;
- Rainfall intensities shall be as per the Intensity-Frequency-Duration table in accordance with Liverpool City Council rainfall data;
- Times of concentration for each sub catchment shall be determined using the kinematic wave equation. Minimum time of concentration is 5 mins and the maximum are 20 mins. Runoff coefficients shall be calculated in accordance with AR&R. The fraction impervious shall be determined from analysis of the sub catchments;
- Runoff coefficients shall be calculated in accordance with the ARR&R. The fraction impervious shall be determined from analysis of the sub-catchments;

- Flow width in gutter shall not exceed 2.5m for the 5 year ARI storm event.
- Velocity depth ratios shall not exceed 0.4 for all storms up to and including the 100-year ARI event.
- Bypass from any pit on grade shall not exceed 10 l/s;
- Blockage factors of 10% and 30% shall be adopted for kerb inlet and grated pits respectively; and
- All pits deeper than 1.8m to be reinforced.

3.4. 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 375mm diameter RCP (external) and 150mm uPVC (internal);
- Maximum spacing between pits shall not exceed 75m;
- The minimum pipe grade shall be 1% (external) and 0.5% (internal);
- All pipes shall be Rubber Ring Jointed unless noted otherwise;
- 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 pipes shall be a minimum Class 3 Reinforced Concrete Pipes or Fibre Reinforced Cement equivalent;
- The pipe friction coefficients to be adopted shall be:

Materials	Mannings – n	Colebrook-White – k	Min. Pipe Class
RCP	0.012	0.3	3
FRC	0.011	0.15	3

Table 1 - Pipe Details

- All pipes classes shall be designed for the ultimate service loads and where applicable, construction 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; and
- Pits deeper than 1.2m shall contain step irons at 300 mm centres.

3.5. Modelling Software

DRAINS modelling software has been utilised for stormwater quantity (OSD) design.

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

4. Stormwater Management

4.1. OSD Requirement

As discussed within Section 3.2, The rate of stormwater runoff from the post-developed site is to not exceed the rate of runoff from the pre-developed site up to and including 100-year ARI as per Liverpool City Council's On-Site Stormwater Detention Technical Specification. A On Site Detention Basin (OSD) is proposed within the development footprint to ensure that post-development flows does not exceed pre-development flows.

ARI (Year)	Pre-Development Flow (m^3/s)	Post-Development Flow (m^3/s)
5	1.50	1.48
20	1.85	1.75
100	2.22	1.96

Table 2 – Development Flows

Table 2 demonstrates that the post development flow does not exceed the pre-developed flow, which has been modelled utilising DRAINS software and the LCC stormwater requirements.

4.2. Water Sensitive Urban Design (WSUD)

Water Sensitive Urban Design (WSUD) 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 to achieve more sustainable forms of urban development.

The water quality targets were extracted from 6.4 Stormwater Quality Management policy received from Bernard Jeffery (Liverpool City Council, Senior Land Development Engineer) on 3rd September 2019.

As discussed within section 3.2 all stormwater runoff from the buildings and hardstand areas will be directed into treatment tanks.

Proprietary treatment devices will treat the water to satisfy Council's water quality requirements. These devices have been modelled as an Ocean Protect Oceanguard, Ocean Protect Stormfilters and overland flow swales. By utilising these treatment devices, stormwater draining from each stage of the development will meet the required Liverpool City Council's water quality treatment rates before discharge into the existing stormwater network easement.

A summary of the required number and position of the treatment devices is indicated within the stormwater drainage plans within Appendix B. Refer also to Appendix C for a summary of the MUSIC model undertaken for each stage to meet to the LCC treatment rates.

4.3. WSUD Modelling - Music Model

The MUSIC Model for Urban Stormwater Improvement Conceptualisation (MUSIC, Version 6.3.0) was used to evaluate pollutants loads from the site. Liverpool Council MUSIC Link was used.

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

4.3.1. Catchment Areas and Music Parameters

MUSIC model input parameters for this site included rainfall-runoff, base-flow concentration and storm-flow concentration parameters. The parameters used for the catchment area(s) can be seen in Table 2,3 & 4.

Parameter	Unit	Figure
Rainfall Threshold	mm/day	0.30
Soil Storage Capacity	mm	187.00
Initial Storage	% of Capacity	30.00
Field Capacity	mm	127.00
Infiltration Capacity Coefficient	a	135.00
Infiltration Capacity Coefficient	b	4.00
Initial Depth (Ground Water)	mm	10.00
Daily Recharge Rate	%	10.00
Daily Baseflow Rate	%	10.00
Daily Seepage Rate	%	0.00

Table 3 - Rainfall-Runoff Parameters - Roof Catchment Areas

Parameter	Unit	Figure
Rainfall Threshold	mm/day	1.50
Soil Storage Capacity	mm	187.00
Initial Storage	% of Capacity	30.00
Field Capacity	mm	127.00
Infiltration Capacity Coefficient	a	135.00
Infiltration Capacity Coefficient	b	4.0
Initial Depth (Ground Water)	mm	10.00
Daily Recharge Rate	%	10.00
Daily Baseflow Rate	%	10.00
Daily Seepage Rate	%	0.00

Table 4 - Rainfall-Runoff Parameters – Non-Roof Catchment Areas

Parameter	Unit	Figure
Rainfall Threshold	mm/day	1.50
Soil Storage Capacity	mm	187.00
Initial Storage	% of Capacity	30.00
Field Capacity	mm	127.00
Infiltration Capacity Coefficient	a	135.00
Infiltration Capacity Coefficient	b	4.0
Initial Depth (Ground Water)	mm	10.00
Daily Recharge Rate	%	10.00
Daily Baseflow Rate	%	10.00
Daily Seepage Rate	%	0.00

Table 5 - Rainfall-Runoff Parameters – Landscape Catchment Areas

4.3.2. Results

MUSIC modelling results for each stage are presented as mean annual loads at the receiving node indicate that adopted target reductions (as per the Carter Street DCP) are achieved, as shown in Table 5 & 6.

Pollutant	Sources (Kg/yr)	Residual Load (Kg/yr)	Reduction (%)	Target Reduction (%)
Total Suspended Solids	742	111	85.1	85
Total Phosphorus	2.89	0.996	65.6	65
Total Nitrogen	37.8	20.1	46.8	45
Gross Pollutants	459	0	100.0	90

Table 6 – Stage 1: Pollutant Loads

Pollutant	Sources (Kg/yr)	Residual Load (Kg/yr)	Reduction (%)	Target Reduction (%)
Total Suspended Solids	943	113	88	85
Total Phosphorus	3.20	1.05	67.3	65
Total Nitrogen	40.1	20.6	48.4	45
Gross Pollutants	492	0	100.0	90

Table 7 – Stage 2: Pollutant Loads

Pollutant	Sources (Kg/yr)	Residual Load (Kg/yr)	Reduction (%)	Target Reduction (%)
Total Suspended Solids	1680	224	86.7	85
Total Phosphorus	6.10	2.04	66.5	65
Total Nitrogen	77.9	40.8	47.6	45
Gross Pollutants	952	0	100.0	90

Table 8 – Overall Site Pollutant Loads

5. Sedimentation and Erosion Control

5.1. Sedimentation and Erosion Control (Construction)

Soil and Water Management Plans (SWMP) has been prepared in accordance with the NSW Department of Housing Publication titled: Managing Urban Stormwater- Soils and Construction (2004) and the relevant LCC guidelines for the whole site.

5.2. Sources of Pollution

The activities and aspects of the works that have potential to lead to erosion, sediment transport, siltation and contamination of natural waters include:

- Earthworks undertaken immediately prior to rainfall periods;
- Work areas that have not been stabilised;
- Extraction of construction water from waterways during low rainfall periods;
- Clearing of vegetation and the methods adopted, particularly in advance of construction works;
- Stripping of topsoil, particularly in advance of construction works;
- Bulk earthworks and construction of pavements;
- Works within drainage paths, including depressions and waterways;
- Stockpiling of excavated materials;
- Storage and transfer of oils, fuels, fertilisers and chemicals;
- Maintenance of plant and equipment;
- Ineffective implementation of erosion and sediment control measures;
- Inadequate maintenance of environmental control measures; and
- Time taken for the rehabilitation / revegetation of disturbed areas.

5.3. Potential Impacts

The major potential impacts on the riparian environment relate to erosion of distributed areas or stockpiles and sediment transportation. Potential adverse impacts from erosion and sediment transportation can include:

- Loss of topsoil;
- Increased water turbidity;
- Decreased levels of dissolved oxygen;
- Changed salinity levels;
- Changed pH levels;
- Smothering of stream beds and aquatic vegetation;

- Reduction in aquatic habitat diversity;
- Increased maintenance costs; and
- Decrease in waterway capacity leading to increased flood levels and durations.

5.4. Construction Methodology

The following construction methodology will be followed to minimise the impact of sedimentation due to construction works:

- Diversion of “clean” water away from the disturbed areas and discharge via suitable scour protection;
- 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; and
- Where future construction and building works are not proposed, the rapid stabilisation of disturbed and exposed ground surfaces with hydro-seeding.

5.5. Site Inspection and Maintenance

The inspection and maintenance requirements outlined in this section must be carried out while either earthworks or quarrying is being conducted, and all areas re-established.
The Contractor will be required to inspect the site after every rainfall event and at least weekly, and will:

- Inspect and assess the effectiveness of the SWMP and identify any inadequacies that may arise during normal work activities or from a revised construction methodology. Construct additional erosion and sediment control works as necessary to ensure the desired protection is given to downstream lands and waterways;
- Ensure that drains operate properly and to effect any repairs;
- Remove spilled sand or other materials from hazard areas, including lands closer than 5 metres from areas of likely concentrated or high velocity flows especially waterways and paved areas;
- Remove trapped sediment whenever less than design capacity remains within the structure;
- Ensure rehabilitated lands have affectively reduced the erosion hazard and to initiate upgrading or repair as appropriate;
- Maintain erosion and sediment control measures in a fully functioning condition until all construction activity is completed and the site has been rehabilitated; and
- Remove temporary soil conservation structures as the last activity in the rehabilitation.

5.6. Conclusion

The erosion control measures proposed for the site will comply with the requirements of Liverpool 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.

6. Services

This development will incorporate full servicing for stage 1 and stage 2.

6.1. Sydney Water

6.1.1. Water Supply

From Dial Before You Dig (DBYD) information obtained there is an existing 150mm PVC-O (Polyvinyl Chloride, Oriented) recycled potable water main and an existing 150mm DICL (Ductile Iron Cement Lined) potable water main owned and operated by Sydney Water along Yarrunga Street.

Advice will need to be sought with a Water Services Coordinator (WSC) on connection into the water main or any others within the vicinity of the site. Refer to DBYD records within Appendix D.

Approval will need to be sought with Sydney Water prior to connecting into this main.

6.1.2. Sewerage

From DBYD information there is an existing 225mm diameter PP (Polypropylene) sewer pipe owned and operated by Sydney Water running through 30-50 Yarrawa Street. The Sewer pipe is approximately 70m from the north eastern corner of the site. Refer to DBYD records within Appendix D.

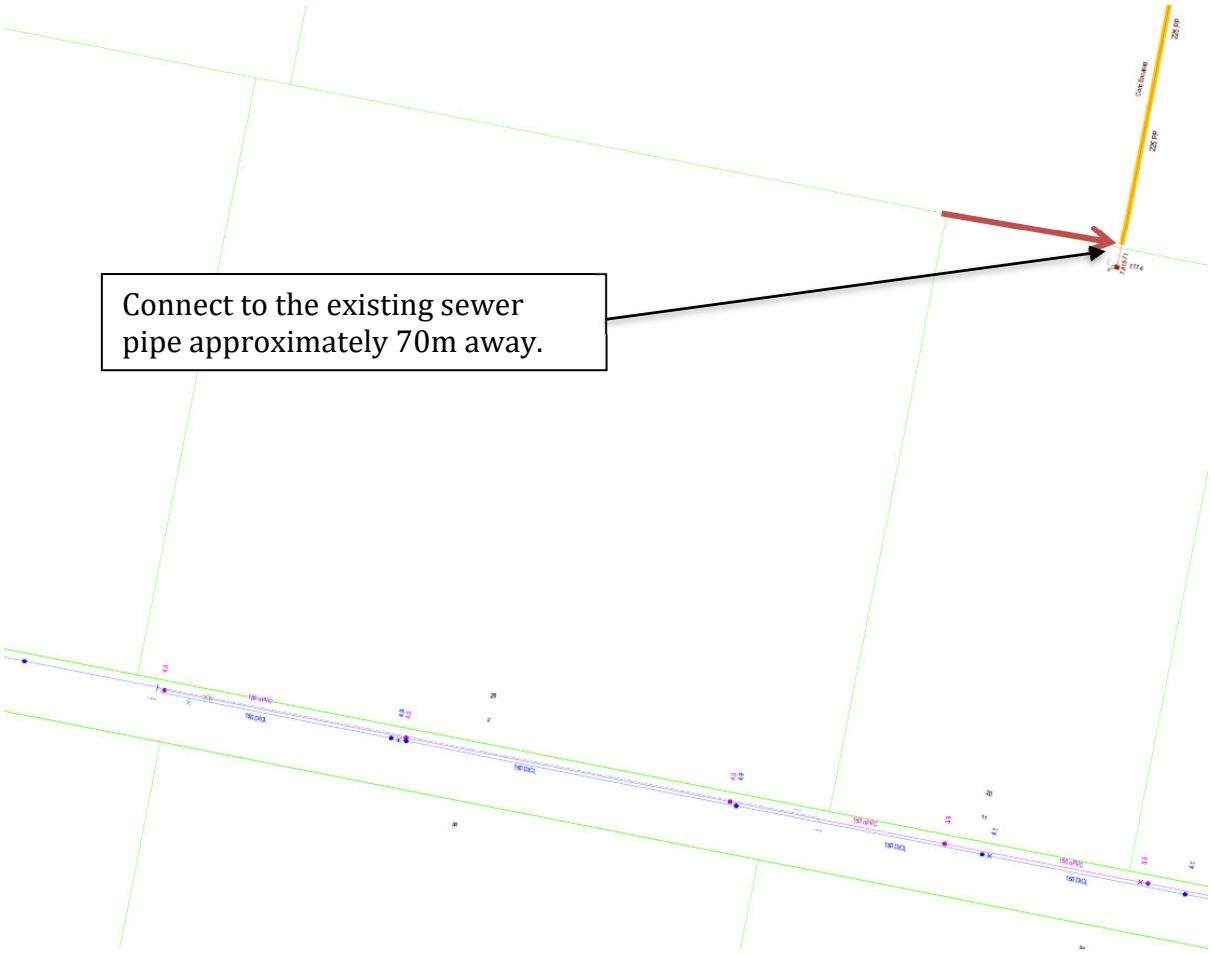

Figure 4 - Proposed Stage 2 Layout

AT&L being accredited Water Services Coordinators (WSC's) consider:

- The existing sewer should have capacity to cater for the proposed development;
- There is no technical or engineering impediment to connection with the sewer, this will be confirmed during detailed design and in consultation with neighbouring property; and
- No easements are required based upon Sydney Water Guidelines, due to the sewer being less than 600mm in diameter.

Approval and confirmation will need to be sought with Sydney Water prior to connecting into any sewer main, as part of the standard application process.

6.2. Communications

DBYD records indicate that there is an existing NBN and Telstra telecommunications and fibre optic cables within the site and along Yarrunga Street.

Refer to DBYD records within Appendix D for details.

Confirmation will need to be sought with the telecommunications authorities for all connections.

6.3. Gas

DBYD records indicate that there is an existing distribution 110mm gas mains along Yarrunga Street. Refer to DBYD records within Appendix D for details.

Approval will need to be sought from Jemena as owners of these gas mains for all connections into their network.

6.4. Electrical

From DBYD records there are existing electrical ducts owned by Ausgrid within the site and along Yarrunga Street. Refer to DBYD records within Appendix D for details.

Advice will need to be sought by a Level 3 accredited service provider on servicing during detailed design.

6.5. Conclusion

This section demonstrates that services including sewer, water, power, telecommunications and gas can be made available to the site.

Internal reticulation will be coordinated at the Construction Certificate (CC) stage of works and applications to the relevant authorities made.

Appendix A

Detailed Site Survey

Appendix B

Civil Development Application Drawings

Appendix C

MUSIC Model and Report

Appendix D

Dial Before you Dig (DBYD)

SYDNEY
LEVEL 7 153 WALKER STREET
NORTH SYDNEY NSW 2060
02 9439 1777
INFO@ATL.NET.AU

BRISBANE
SUITE A LEVEL 11
127 CREEK STREET
BRISBANE QLD 4000
07 3211 9581
INFO-QLD@ATL.NET.AU

atl.net.au