

Erskine Park Industrial Site Development Application

Engineering Assessment DA No.1

Prepared for Fitzpatrick Investments
Pty Ltd

22 October 2021

Document Information

Prepared by
Ensfire Solutions Pty Ltd
1302/83 Mount Street
North Sydney NSW 2060
ABN 71 624 801 690

© Enspire 2021. Copyright in the whole and every part of this document belongs to Enspire and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person other than by agreement with Enspire.

This document is produced by Enspire solely for the benefit and use by the client in accordance with the terms of the engagement. Enspire does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by any third party on the content of this document.

Document Title	Erskine Park Industrial Site Development Application
Document Subject	Engineering Assessment DA No.1
Prepared For	Fitzpatrick Investments Pty Ltd
Project Name	Erskine Park Industrial Site Development
Project Number	190050
File Name	rept002-190050-01-enspire-r01-211021-da1erskinparkindustrialdevelopmentlockwoodroad

Transmittal

[illegible]



Contents

1	Introduction	5
2	Related Reports and Documents	2
3	The Development	4
3.1	Proposed Development Works	4
3.2	Existing Site Conditions	4
4	Erosion and Sediment Control	6
4.1	Sediment Basin	6
4.2	Sediment and Erosion Control Measures	6
5	Bulk Earthworks	7
5.1	Cut and Fill Operations	7
6	Stormwater Management Strategy	7
6.1	Objectives and Controls	7
6.2	Proposed Stormwater Management Strategy	8
6.3	Existing Catchments and External Conveyance	8
6.4	Post Development Catchments	9
6.5	Stormwater Connection	10
6.6	Stormwater Quantity	10
6.6.1	Stormwater Quantity Objectives	10
6.6.2	Stormwater Quantity Management Strategy	11
6.7	Stormwater Quality	11
6.7.1	Water Quality Objectives (Water Sensitive Urban Design)	11
6.7.2	Stormwater Quality Management Strategy	11
7	Flooding	12
8	Siteworks	12
8.1	General	12
8.2	Road Pavements	13
8.3	Design and Posted Speed	13
8.4	Parking and Signage	13
8.5	Vertical and Horizontal Geometry	13
8.6	Design Vehicles	13
8.7	Retaining Walls	14
9	Utilities	15
10	Conclusion	16

List of Tables

Table 1 – Enspire Drawing Reference	2
Table 2 - Approximate Cut and Fill Volumes	7
Table 3 – Typical Roads and Pavements	13



List of Figures

Figure 1 – Site Locality Plan	2
Figure 2 – Existing Site	5
Figure 3 – Existing Catchment	9
Figure 4 – Overall Post Developed Catchment	10
Figure 5 – Flood Extents	12
Figure 6 – Proposed Retaining Walls	15



1 Introduction

Enspire Solutions (**Enspire**) has been engaged by Fitzpatrick Investments Pty Ltd to prepare the Civil Engineering and stormwater management design and documentation in support of a Development Application (**DA**) submission to Penrith City Council for the proposed construction of sitewide bulk earthworks and retaining walls, private road and carparking, loading dock aprons and stormwater drainage infrastructure associated with Lot 1 within the Erskine Park Industrial Estate, Lockwood Road, Erskine Park (**the subject site**) as shown in **Figure 1** – Site Locality Plan.

Works associated with this application (Development Application No.1) include:

1. Implementation of erosion and sediment controls;
2. Bulk earthworks;
3. Trunk stormwater drainage pit and pipe system;
4. Local stormwater drainage to service Lot 1;
5. Gross pollutant traps;
6. Retaining walls;
7. Internal private road construction; and
8. Utilities servicing, internal circulation roads and parking associated with Lot 1.

This report intends to inform Council of the parameters and assumptions adopted in the design and documentation of the following civil engineering elements:

- Sediment and Erosion Control;
- Bulk Earthworks;
- Stormwater Quantity;
- Stormwater Quality;
- Road geometry;
- Pavements;
- Retaining walls; and
- Utilities.

It should be noted that the Pelikan Artline building shown in **Figure 1** was constructed under a separate approval, however it is located within the same property boundary as the subject site.

It should also be noted that the construction of utilities servicing, internal circulation roads and car parking associated with future Lots 2, 3, 4 and 5 will be constructed under separate approval known as Development Application No.2.

Development of future Lots 2, 3, 4 and 5 is thus excluded from this approval.

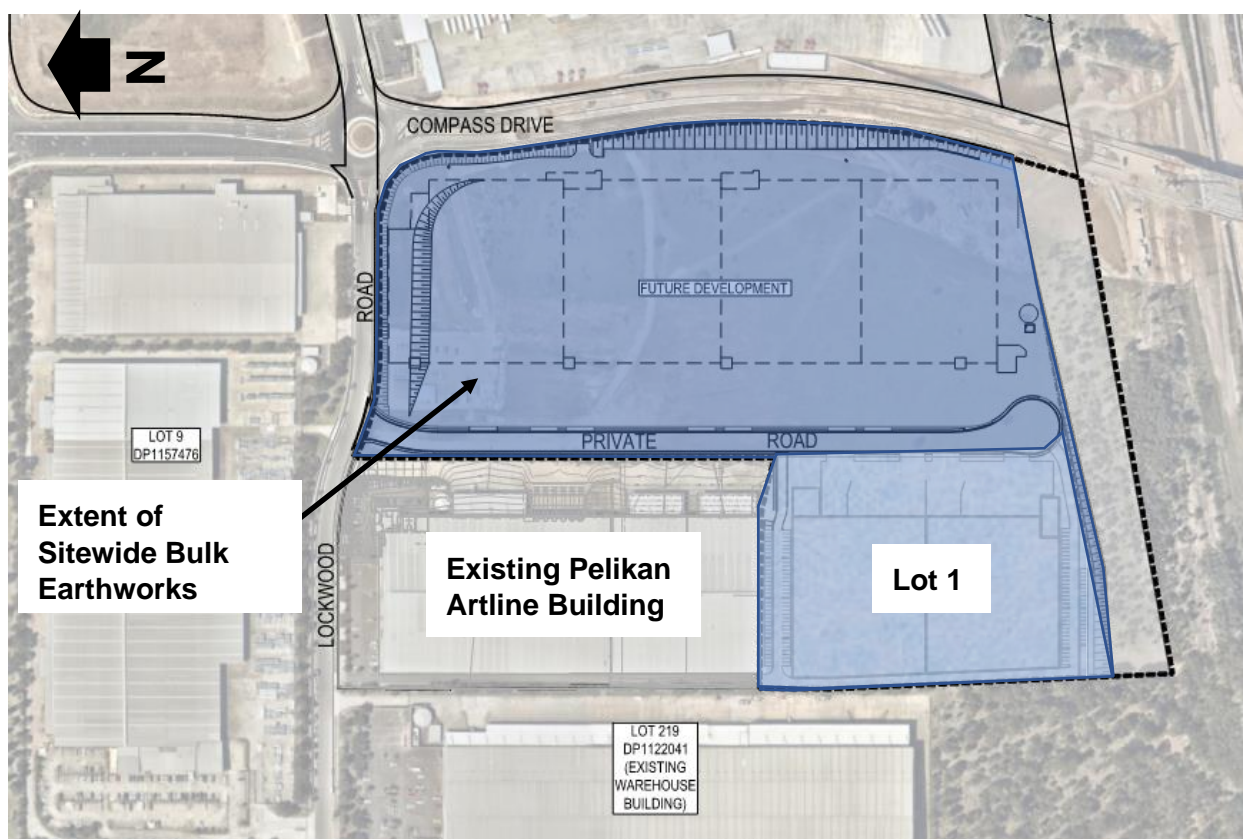


Figure 1 – Site Locality Plan

Extract from Nearmaps.

2 Related Reports and Documents

This report is to be read in conjunction with the following reports and documents:

- 1) Development Application Documentation prepared by Enspire:

Table 1 – Enspire Drawing Reference

Drawing Number	Drawing Title
190050-05-DA1-C01.01	COVER SHEET AND DRAWING SCHEDULE
190050-05-DA1-C01.21	GENERAL NOTES
190050-05-DA1-C01.41	GENERAL ARRANGEMENT PLAN
190050-05-DA1-C03.01	EROSION AND SEDIMENTATION CONTROL PLAN - SHEET 01
190050-05-DA1-C03.02	EROSION AND SEDIMENTATION CONTROL PLAN - SHEET 02
190050-05-DA1-C03.03	EROSION AND SEDIMENTATION CONTROL PLAN - SHEET 03
190050-05-DA1-C03.21	EROSION AND SEDIMENTATION CONTROL DETAILS
190050-05-DA1-C03.31	SEDIMENT BASIN PLAN AND SECTION
190050-05-DA1-C04.01	BULK EARTHWORKS - CUT AND FILL PLAN
190050-05-DA1-C05.01	SITWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 01
190050-05-DA1-C05.02	SITWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 02
190050-05-DA1-C05.03	SITWORKS AND STORMWATER MANAGEMENT PLAN - SHEET 03



190050-05-DA1-C07.01	TYPICAL ROAD CROSS SECTIONS AND ROAD LONGITUDINAL SECTIONS
190050-05-DA1-C11.01	PAVEMENT, SIGNAGE AND LINE MARKING PLAN - SHEET 01
190050-05-DA1-C11.02	PAVEMENT, SIGNAGE AND LINE MARKING PLAN - SHEET 02
190050-05-DA1-C11.03	PAVEMENT, SIGNAGE AND LINE MARKING PLAN - SHEET 03
190050-05-DA1-C14.01	SITWORKS DETAILS
190050-05-DA1-C20.01	PRE-DEVELOPMENT STORMWATER CATCHMENT PLAN
190050-05-DA1-C20.21	POST-DEVELOPMENT STORMWATER CATCHMENT PLAN
190050-05-DA1-C22.01	TURNING PATH PLAN - SHEET 01
190050-05-DA1-C22.02	TURNING PATH PLAN - SHEET 02
190050-05-DA1-C23.01	SAFETY IN DESIGN

- 2) Stormwater Management Report – Stage C Bioretention/Detention Basin, prepared by Cardno, July 2017;
- 3) Stormwater Management Report, prepared by Cardno, May 2009;
- 4) Penrith City Council Stormwater Drainage Specification for Building Developments 2018;
- 5) Penrith City Council Design Guidelines for Engineering Works for Subdivisions and Developments 2013;
- 6) Penrith City Council Engineering Construction Specification for Civil Works 2017; and
- 7) Penrith City Council Development Control Plan 2014.



3 The Development

3.1 Proposed Development Works

The development site is located within the Penrith City Council Local Government Area (LGA) and occupies a total area of approximately 11.9ha.

The development is generally bounded by the following;

- Industrial sites to the west;
- Lockwood Road to the north;
- Compass Drive to the east; and
- Conservation area and above-ground trunk watermain to the south.

The development, subject to this development application involves construction of:

- A private road connecting to Lockwood Road;
- Bulk Earthworks, private access road, internal roads, carparking, hardstand apron areas and stormwater drainage associated with one (1) industrial site, and
- Connection to essential utilities.

3.2 Existing Site Conditions

The land to which this application applies has generally been cleared and stabilised. It includes an existing sediment basin in the north-east corner of the site, immediately upstream of the site drainage outlet pit (Refer **Figure 2**).

The site generally grades from the southeast and southwest (approx. RL66m AHD) to the north (approx. RL61m AHD) at a grade of around 1%. There is a natural valley orientated north-south through the centre of the site. The valley is located immediately to the east of the existing Pelikan Artline building.

There is an existing retaining wall along a portion of the western site boundary up to 4.4m high, with the subject site situated on the high side of the wall.



Figure 2 – Existing Site

Extract from Nearmaps.



4 Erosion and Sediment Control

The objectives of the erosion and sediment control for the development site are to ensure:

- Adequate erosion and sediment control measures are applied prior to the commencement of construction and are maintained throughout construction; and
- Construction site runoff is appropriately treated in accordance with Penrith City Council requirements.

As part of the works, the erosion and sedimentation control will be constructed in accordance with Council requirements and the NSW Landcom Manual, "Managing Urban Stormwater Soil & Construction" 2004 (Blue Book) prior to any earthworks commencing on site.

4.1 Sediment Basin

A single sediment basin is proposed during construction until the development site is stabilised. The sediment basin will be located at the lowpoint in the site, near the proposed private road intersection with Lockwood Road. The sediment basin will be constructed as part of these works and will be maintained and modified as required during construction activities.

As per Appendix C of the Blue Book, the expected soil texture group for the proposed development is Type D. The proposed sediment basin has been designed and sized to represent this soil texture classification.

To ensure the sediment basin is working effectively it will be maintained throughout the construction works. Maintenance includes ensuring adequate settlement times or flocculation and pumping of clean water to reach the minimum storage volume at the lower level of the settling zone. The settling zone will be identified by pegs to clearly show the level at which design storage capacity is available.

The pumped water from the sediment basin can be reused for dust control during construction.

An overflow weir is provided to control overflows for rainfall events in excess of the design criteria.

4.2 Sediment and Erosion Control Measures

Prior to any earthworks commencing on site, sediment and erosion control measures will be implemented generally in accordance with the Construction Certificate drawings and the "Blue Book". The measures shown on the drawings are intended to be a minimum treatment only as the contractor will be required to modify and stage the erosion and sedimentation control measures to suit the construction programme, sequencing and techniques, as well as the weather conditions at the time. These measures will include:

- A temporary site security/safety fence constructed around the site;
- Sediment fencing provided downstream of disturbed areas, including any topsoil stockpiles;
- Dust control measures including covering stockpiles, installing fence hessian and watering exposed areas;
- Placement of hay bales or mesh and gravel inlet filters around and along the proposed catch drains and around stormwater inlet pits;
- The construction of a temporary sediment basin; and
- Stabilised site access at the construction vehicle entry/exits.



Any stockpiled material, including topsoil, will be located as far away as possible from any associated natural watercourses or temporary overland flow paths. Sediment fences shall be installed to the downstream side of stockpiles and any embankment formation. All stockpiles and embankment formations will be stabilised by hydroseeding or hydro mulching on formation.

5 Bulk Earthworks

5.1 Cut and Fill Operations

As part of development works, bulk earthworks on the site will generally consist of cut and fill operations to establish proposed road formations and site levels. The levels have been designed to maintain a consistent warehouse floor level across all lots and provide an optimal interface with the northern and southern properties.

Approximate cut to fill earthworks operations for the works subject to this development application are summarised in **Table 2**.

Table 2 - Approximate Cut and Fill Volumes

Earthworks	Volume (m ³)
Cut	32,700
Fill	101,250
Balance	68,550 (Import)

The cut and fill earthworks volumes provided are concept only and are subject to change pending final coordination and detailed civil design. It should be noted that the cut and fill operations have been calculated based on the following assumptions:

- No allowance for earthworks bulking factors;
- No allowance for spoil generated from utility service and stormwater drainage trenching;
- Allowance for pavement depth of local roads; and
- Allowance for 150mm topsoil replacement across landscape areas in road verges and lots.

6 Stormwater Management Strategy

6.1 Objectives and Controls

The stormwater strategy has been developed in accordance with the Penrith City Council Development Control Plan 2014 (DCP) and Design Guidelines for Engineering Works for Subdivisions and Developments (2013) guidelines.

The proposed strategy seeks to:

- Prevent damage by stormwater to the built and natural environment;
- Ensure that post development flows from the total site do not generate stormwater discharges that exceed the existing pre-development flows;
- Ensure that an adequate and environmentally acceptable method of removing surface water and stormwater is implemented;
- Minimise nuisance flows of stormwater from one property to adjoining properties;
- Provide a stormwater system which can be maintained economically;



- Provide a stormwater system which utilises open space in a manner compatible with other uses;
- Control flooding and enable access to allotments, stabilise the landform and control erosion; and
- Minimise urban runoff pollutants to watercourses.

6.2 Proposed Stormwater Management Strategy

The stormwater management strategy has been designed to ensure site stormwater runoff is managed in the following key areas:

- Site catchments (internal and external);
- Stormwater Quantity; and
- Stormwater Quality.

The proposed civil engineering development package documents site levels, grading, minor and major stormwater drainage components and catchments for the site. The stormwater management strategy considers external upstream catchments as well as downstream external conditions.

6.3 Existing Catchments and External Conveyance

As part of the proposed stormwater management strategy the following items were assessed:

- Pre-developed catchments extents;
- External catchments upstream of the site; and
- Existing overland flow routes.

Under existing conditions, the catchments and impervious areas have been determined based on aerial photography, aerial laser and ground survey of the site. Refer to Figure 3 – Existing Catchment for the existing catchment plan.

The site is subject to negligible external catchments, given the topographical ridgeline that is located within the conservation area immediately to the south of the development.

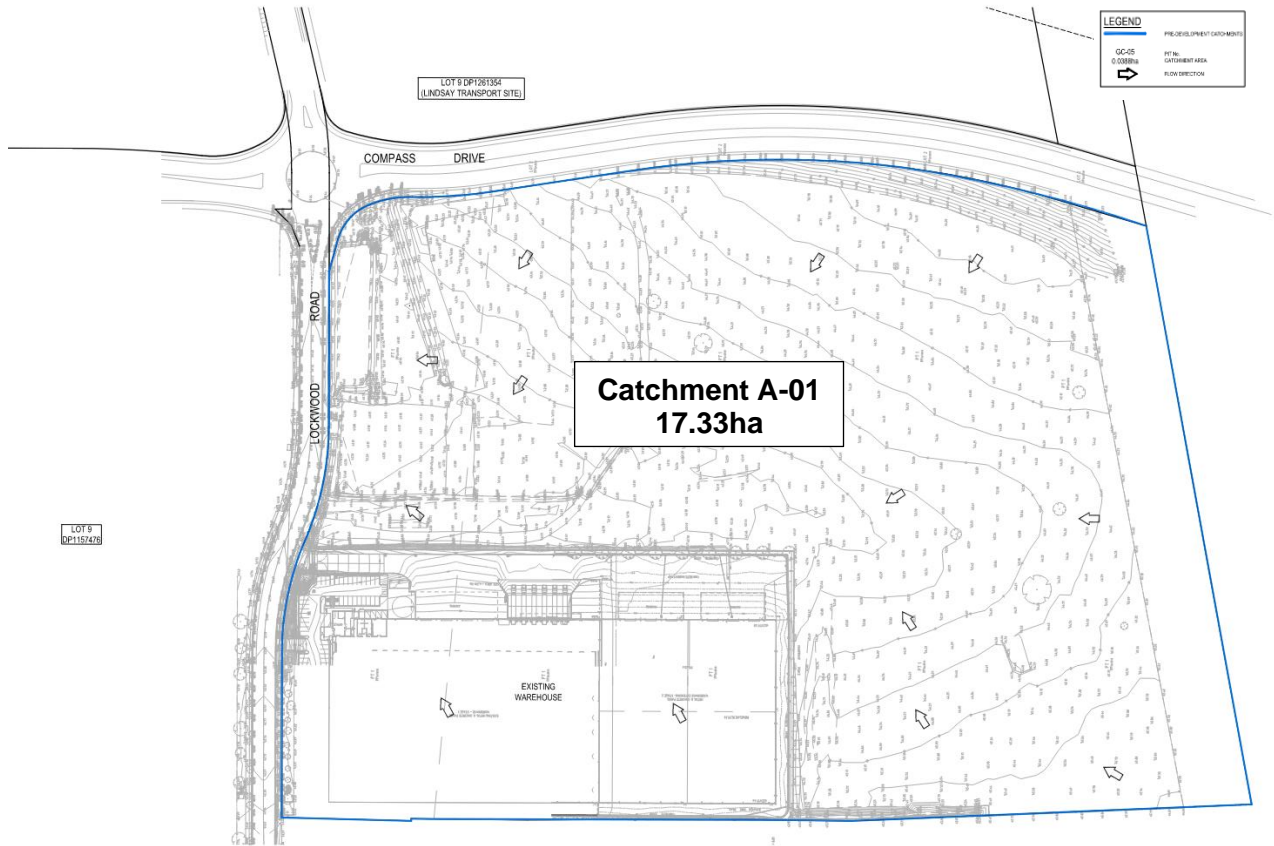


Figure 3 – Existing Catchment

Extract from Enspire Drawing 190050-05-DA-C20.01.

Prior to development, the Erskine Park Industrial Estate was divided into two sub-catchments separated by a ridgeline orientated north-south and roughly parallel to Ropes Creek. The subject site is located within the catchment that drains northwards towards the electrical easement (along the northern boundary of the Industrial Estate), and then eastwards towards Ropes Creek.

6.4 Post Development Catchments

The proposed post-development catchments are generally consistent with the pre-developed catchments as discussed in **Section 6.3**.

Figure 4 shows the subject site within the context of the overall Industrial Park stormwater drainage catchments.

The subject site is thus consistent with the Industrial Estate stormwater management strategy established by Cardno (2009 and 2017).

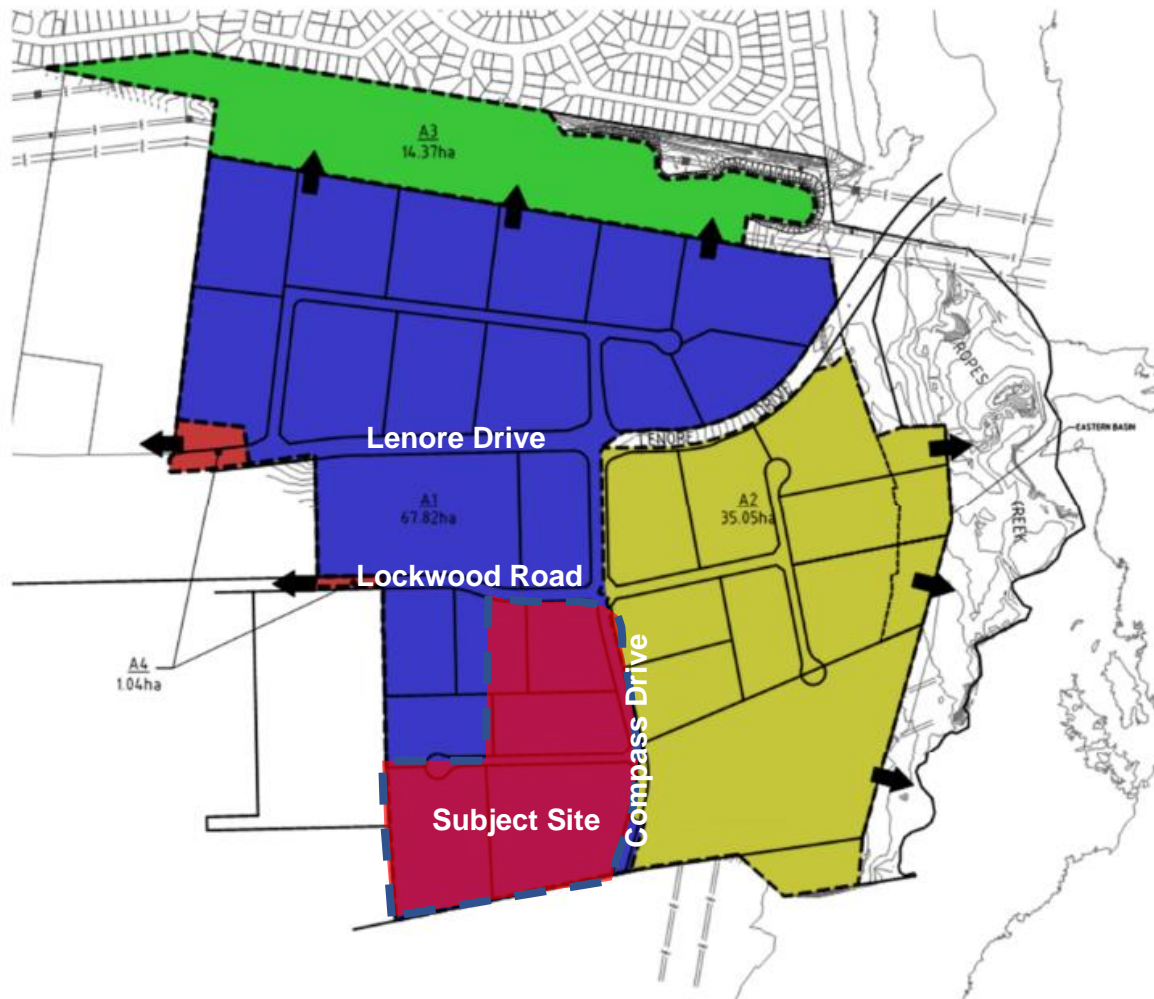


Figure 4 – Overall Post Developed Catchment

Quote for Figure or table comment/reference.

6.5 Stormwater Connection

The subject site is serviced by an existing 1500mm diameter pipe in Compass Drive. The site will connect to an existing pit in the northeast corner of the site.

This connection also caters for the runoff from the existing Pelikan Artline building. The existing Pelikan Artline outlet, which drains to the existing sediment basin on the subject site, will be piped directly to the site connection point.

6.6 Stormwater Quantity

6.6.1 Stormwater Quantity Objectives

Penrith City Council requires that there will be no increase in runoff from the site as a result of the development under all durations for all the storms up to and including the 1% AEP event.



6.6.2 Stormwater Quantity Management Strategy

On-site Stormwater Detention (OSD) for the subject site has been allowed for in the existing regional on-site detention basin constructed within the electrical easement along the northern boundary of the Industrial Estate (Cardno, 2009 and 2017).

6.7 Stormwater Quality

6.7.1 Water Quality Objectives (Water Sensitive Urban Design)

The main objective of the Penrith DCP 2014 is to safeguard the environment by improving the quality of stormwater run-off entering receiving waters. The following performance criteria are used as a basis:

Performance Criteria

- Pollution load reductions:
 - 90% reduction in the post development mean annual load total gross pollutant (greater than 5mm);
 - 85% reduction in the post development mean annual load of Total Suspended Solids (TSS);
 - 60% reduction in the post development mean annual load of Total Phosphorus (TP);
 - 45% reduction in the post development mean annual load of Total Nitrogen (TN);
 - 90% Free Oils and Grease with no visible discharge.
- Modelling for the determination of the mean annual loads of land uses must be undertaken in MUSIC in the detailed design stage and in accordance with the associated WSUD Technical Guidelines.
- Any changes to the flow rate and flow duration within the receiving watercourses as a result of the development shall be limited as far as practicable. Natural flow paths, discharge point and runoff volumes from the site should also be retained and maintained as far as practicable.
- Impervious areas directly connected to the stormwater system shall be minimised. Runoff from impervious areas such as roofs, driveways and rainwater tank overflows shall be directed onto grass and other landscaped areas designed to accept such flows.

6.7.2 Stormwater Quality Management Strategy

Gross Pollutant Trap

Gross pollutant traps (GPTs) are primary stormwater treatment measures, typically applied as the first measure in a stormwater treatment train. GPTs come in varying forms from simple trash racks through to more complex devices with continuous deflection screens and hydrodynamic separation.

GPTs will be installed immediately upstream of the site stormwater outlet connection point.

The performance of GPTs varies according to the type of device selected. In this case, a Humes Humeguard device (or an approved equivalent) is envisaged and will be finalised at the Detailed Design stage. Typically the GPTs will have continuous deflection screens and hydrodynamic separation to target the removal of a significant proportion of the Total Suspended Solid (TSS) load. Removal of TSS is important for protecting and minimising maintenance of downstream treatment devices such as raingardens which are sensitive to high TSS loads.



Bio-retention Areas

Water Sensitive Urban Design (WSUD) for the subject site has been allowed for in the existing regional bioretention basin constructed within the electrical easement along the northern boundary of the Industrial Estate (Cardno, 2009 and 2017).

7 Flooding

The subject site is not flood affected.

Figure 5 show the subject site location relative to the Ropes Creek predicted flood levels at the peak of the PMF event for the proposed works layout (Worley Parsons, 2013).

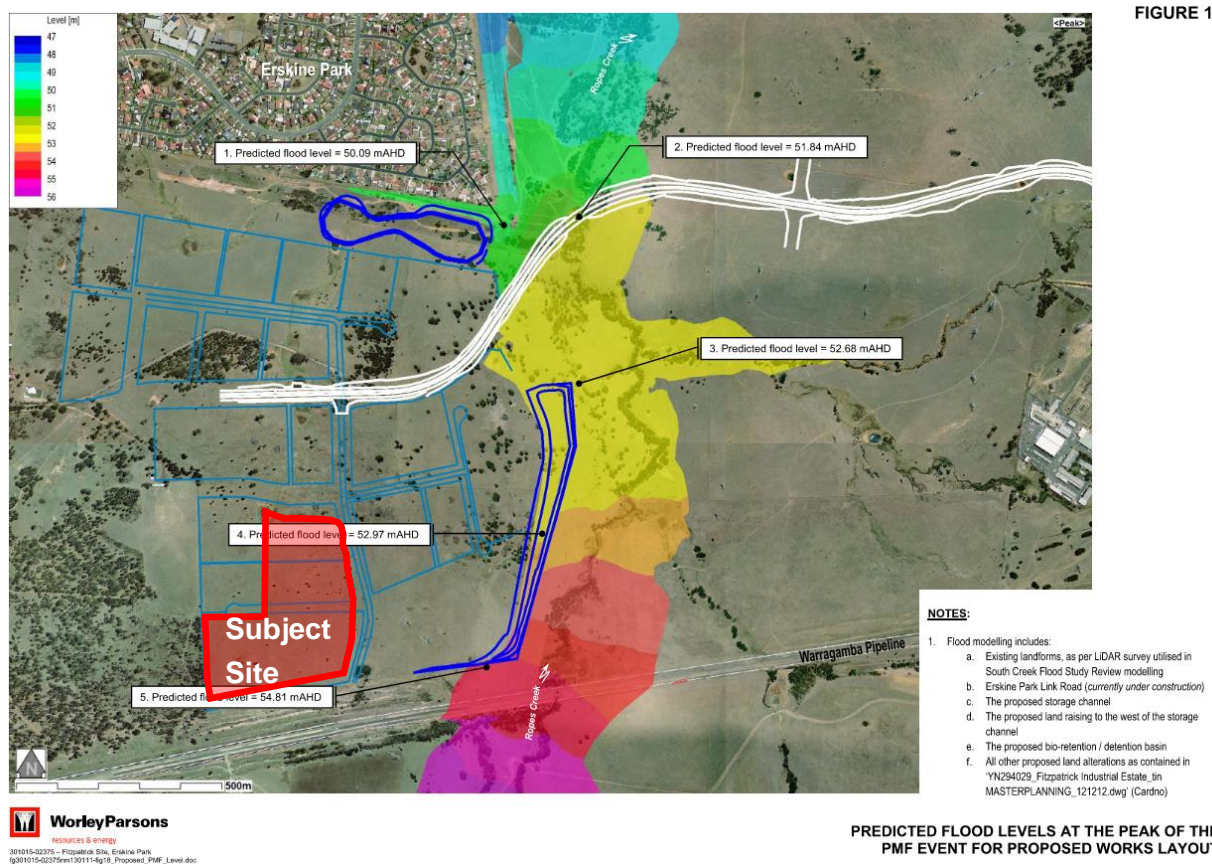


Figure 5 – Flood Extents

Extract from Worley parsons Flood Impact Assessment.

8 Siteworks

8.1 General

The proposed development will include a new private road to provide access from Lockwood Road to the individual buildings within the subject site. The internal carpark network will consist of a series of a circulation roadways to connect service areas and carparks.

No work is proposed on existing public roads, except localised adjustments to facilitate vehicular access into the subject site.



8.2 Road Pavements

It is proposed that internal roads and hardstands will be designed as follows:

Table 3 – Typical Roads and Pavements

Road Type	Road Profile	Comments
Private Road Heavy Industry	19.60m road reserve Single lane, two way 13.0m wide carriageway (two 6.50m lanes) 3.30m wide footways either side (1.5m footpaths both sides)	Flexible Pavement 1x10 ⁷ ESA
Carparks and circulation roads	Varies according to AS2890.1	Flexible Pavement 5x10 ⁵ ESA
Hardstands	Varies according to AS2890.2	Rigid Pavement 1x10 ⁷ ESA

Please refer to the Enspire drawing package for details of proposed pavements.

8.3 Design and Posted Speed

The proposed private road will have a speed limit of 50km/h.

8.4 Parking and Signage

Signage and line marking will be designed to provide appropriate warning and guidance to drivers.

Please refer to the Enspire drawing package for details of proposed signage and linemarking.

8.5 Vertical and Horizontal Geometry

The road geometry will be designed in accordance with Penrith City Council Design Guidelines and generally in accordance with AUSTROADS Guide to Road Design Part 3. The vertical and horizontal geometry has considered sight distance in accordance with AUSTROADS Guide to Road Design Part 3.

Carpark and hardstand geometry will be designed in accordance with AS2890.1 and AS2890.2.

8.6 Design Vehicles

Design vehicles for the development include a 5.2m passenger car and the 26m B-Double articulated vehicle. The 35.4m B-Triple articulated vehicle has been assessed as the check vehicle. Swept path analysis has been completed using AutoTURN software and in accordance with AUSTROADS and Council's Guidelines.

Please refer to the Enspire drawing package for swept paths at critical locations.



8.7 Retaining Walls

An overview of proposed retaining wall locations is presented in **Figure 6**.

Eastern Retaining Wall

A retaining wall is proposed along the eastern boundary of the site to replace an existing earth batter. The wall height will generally vary between 0.4m and 7.6m high.

The retaining wall will be designed and constructed to ensure the stability of Compass Drive and associated buried utility services (along the high side of the wall) is protected at all times.

It is expected the retaining wall will consist of a contiguous piled wall with blockwork facing in areas where a stable construction batter cannot be provided. The retaining wall system will be finalised at the Detailed Design stage.

Western Retaining Wall

There is an existing retaining wall approximately 4.4m high along a portion of the western site boundary. The subject site is located at the high side of the retaining wall. The proposed surface levels along this existing wall are, on average, 850mm lower than the existing top of wall, which means the wall will be trimmed in areas to suit.

The extension of the existing retaining wall will be carried out using a similar retaining wall system to the existing.

Northern Retaining Wall

A smaller retaining wall up to a maximum of 2.6m high will be located along the site frontage at the intersection of Compass Drive and Lockwood Road. A masonry blockwork wall is proposed at this location

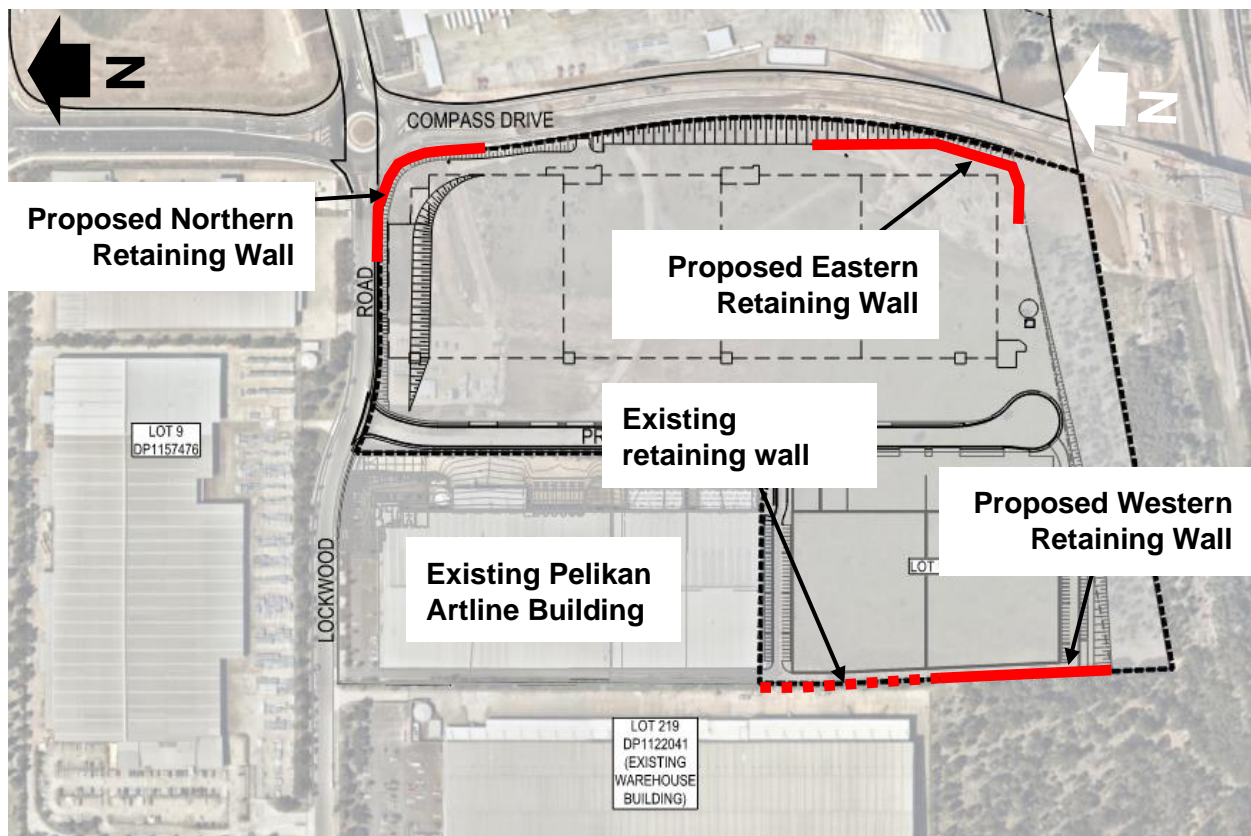


Figure 6 – Proposed Retaining Walls

9 Utilities

Extensive existing utility infrastructure has been provided in the adjacent streets as part of the previous development.

The following services are available to the subject site;

1. Potable Water;
2. Sewer;
3. Telecommunications;
4. High and low voltage electrical services, including street lighting; and
5. Natural Gas.



10 Conclusion

This Civil Engineering and Stormwater Management Report has been prepared to provide an understanding of the design assumptions, inputs and guide to the stormwater quantity and quality management techniques for the proposed development, Erskine Park.

This report demonstrates that the stormwater drainage objectives as outlined in the Penrith City Council Stormwater Drainage Specification for Building Developments and DCP 2014 are met.

The included stormwater drainage, quantity (OSD) and quality (WSUD) provided by the existing trunk drainage system with site connection point discharging to an existing detention/bioretention basin within the electrical easement to the north have been designed to accommodate for the stormwater flows of proposed development.