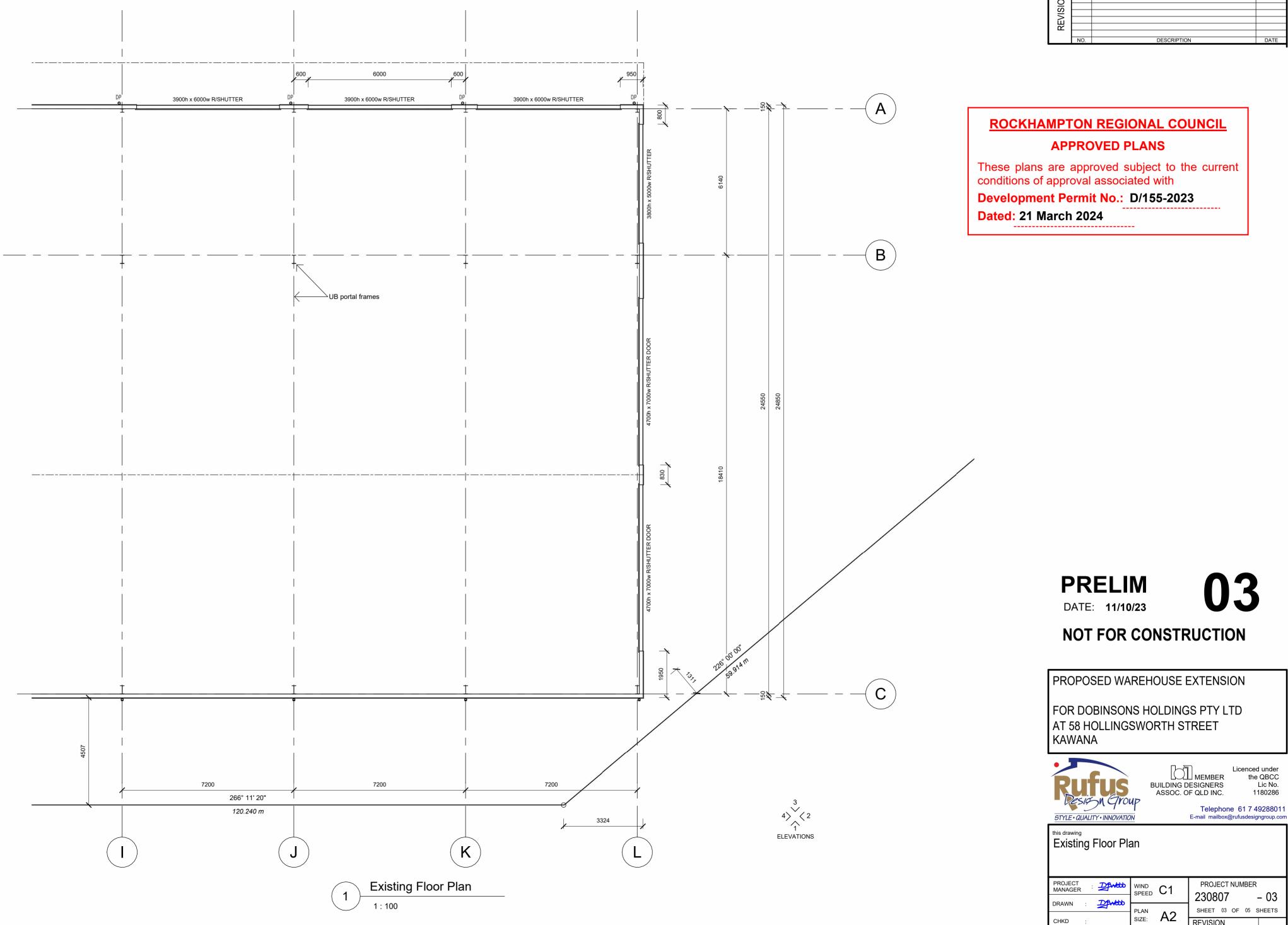


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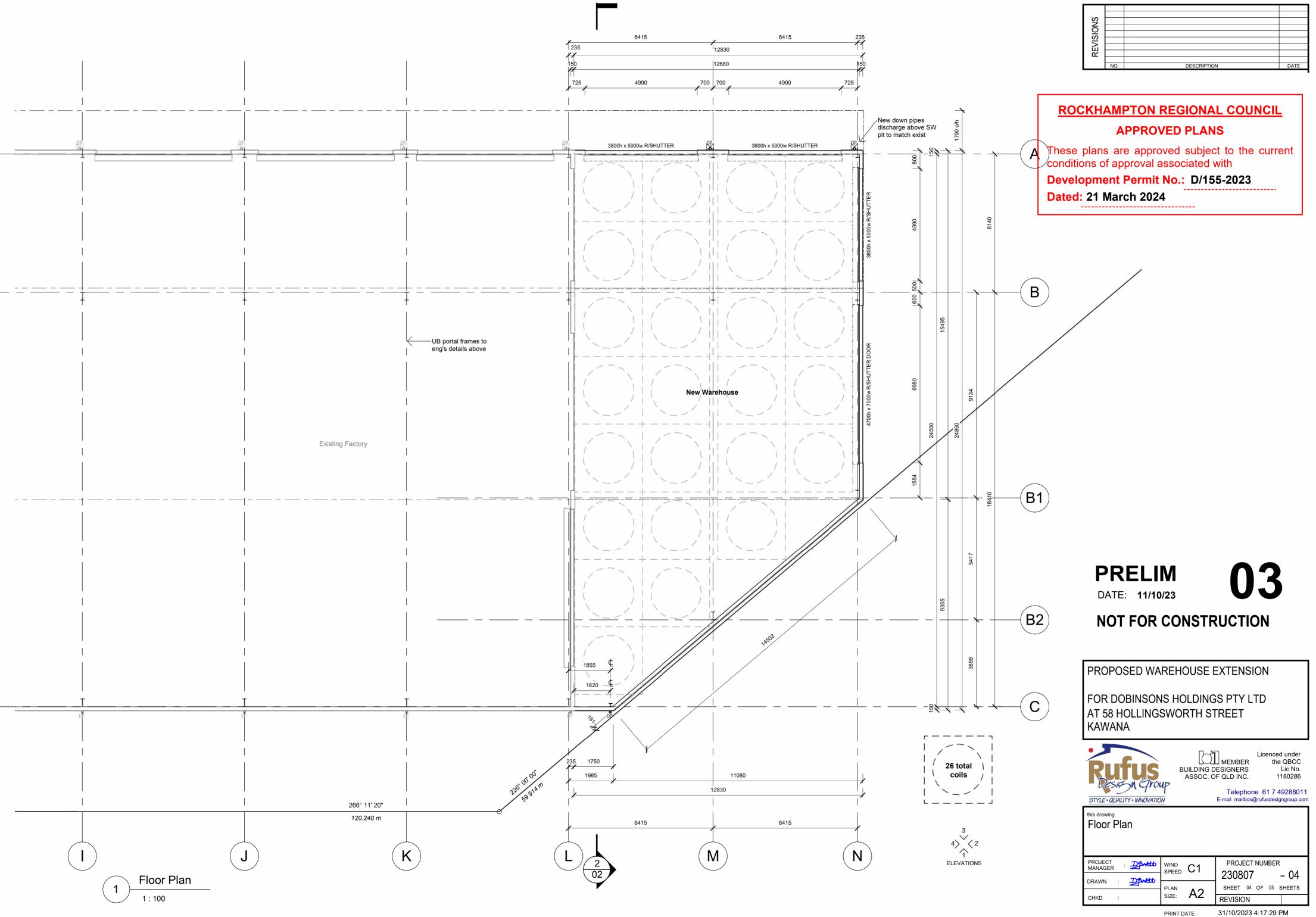




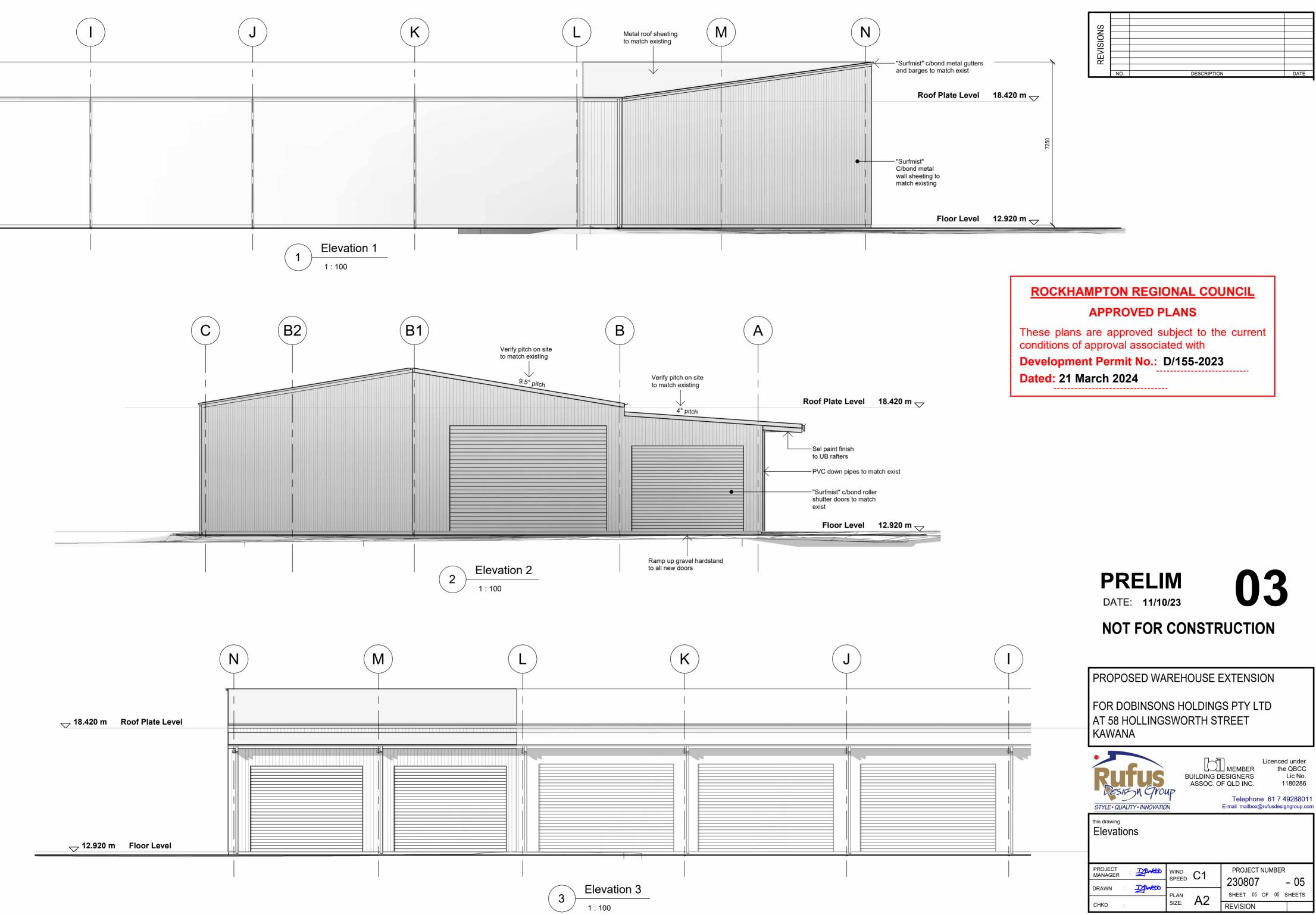
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Dated: 21 March 2024

SITE BASED STORMWATER MANAGEMENT PLAN

58 Hollingsworth Street, Kawana, QLD 4677 Dobinsons Holdings PTY LTD

31 January 2024

CE24014.1 – SBSWMP Rev A Contract No. CE24014.1

A/ PO BOX 3203 RED HILL ROCKHAMPTON Q 4701 MOLONEY & SONS ABN: 39 133 970 689





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1. INTRODUCTION

1.1. PROJECT COMMISSION

Moloney & Sons Engineering (MSE) have been engaged by Dobinsons Holdings PTY LTD to undertake a Site Based Stormwater Management Plan (SBSWMP) for the project at 58 Hollingsworth Street, Kawana, QLD.

The proposed development includes a minor 267m² extension to the main existing workshop/warehouse only. This Site Based Stormwater Management Plan (SBSMP) was undertaken in order to provide supporting documentation on behalf of the Development Application for the subject site.

1.2. PROJECT BACKGROUND

1.2.1. PROJECT LOCATION

The subject site is located at 58 Hollingsworth Street, Kawana, QLD as a part of Lot 1 on SP130691 and is zoned industrial in the suburb of Kawana, QLD and has an area of approximately 0.925 hectares.

The site fronts Hollingsworth Street to the west, Power Street to the south, and is surrounded by properties to the east. Figure 1 shows the approximate site location.

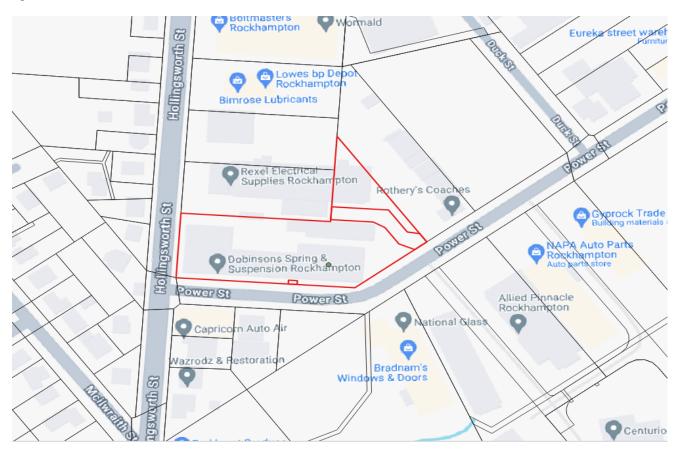


Figure 1 Locality Plan (Source: Googe Maps)



1.2.2. Existing Site and Land Use

At the time of writing this report, the subject site includes a number of existing workshops/warehouses, whilst the balance of the remaining ground area is covered primarily with a mixture of gravel & sealed hardstand areas. Access to the site can be gained through a bitumen driveway connecting to Hollingsworth Street to the west, Power Street to the south.

The site is relatively flat with spot heights ranging from over RL 13.6m AHD at the northern part to approximately RL 12.4 m AHD at the southern boundary. Generally, the subject site has a slope of 1%, and grades towards southern site boundary.

An aerial photograph of the site is illustrated in Figure 2.



Figure 2 Aerial Image of the Site (Google Earth)

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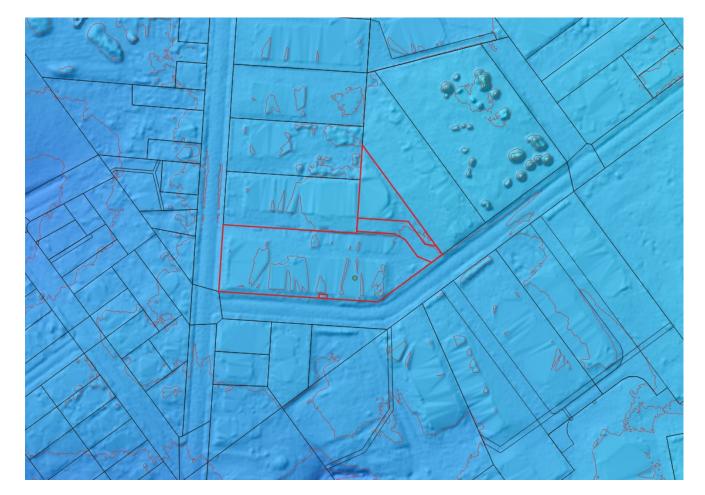


Figure 3 Site Elevation

1.3. Description of Proposed Project

The majority of the site will remain as per the pre-developed condition with the only proposed development pertaining to the minor extension of the existing workshop/warehouse, converting some existing hardstand area to roofed area. Please refer to Appendix A for the proposed development.

Please refer to Moloney & Sons Engineering, Post Development Catchment Plan (Ref: CE24014-SK200) included as Appendix B for further details of the proposed layout.

1.4. PROPOSED CONCEPTUAL DRAINAGE

It is proposed that stormwater flows generated from proposed roof area will be captured and discharged the site's southern boundary as the Legal Point(s) of Discharge (LPoD). The proposed drainage regime for the development is to be facilitated by a Building Hydraulics consultant at the detailed design phase.



2. SITE HYDROLOGY

2.1. BACKGROUND

This section of the SBSWMP defines the method and parameters applied in the hydrological assessment of the location to simulate the expected flow pattern and maximum discharge at the Lawful Point of Discharge (LPoD).

For evaluating the peak flow rates before and after development, a Rational Method computation is presented as a reference.

The Rational Method, as discussed in *Section 4.3 of the Queensland Urban Drainage Manual 2017 (i.e. QUDM)*, is a feasible and reliable method for approximation, owing to its adaptability to the available data and its ability to generate suitable approximations of the maximum site discharge based on the data inputs mentioned below:

- specific intensity frequency duration (IFD) data;
- length/type of flow path;
- contributing catchment areas; and
- coefficient of discharge.

Intensity Frequency Duration (IFD) data for the hydrologic modelling was obtained from the Bureau of Meteorology website. The IFD data is summarised in **Table 1**.

Duration (min)	1 Year ARI	2 Year ARI	5 Year ARI	10 Year ARI	20 Year ARI	50 Year ARI	100 Year ARI
5	86.10	111.00	147.00	172.00	199.00	234.00	259.00
10	64.00	91.40	120.00	127.00	147.00	173.00	192.00
15	60.10	77.60	102.00	119.00	138.00	162.00	181.00
20	52.40	67.60	88.80	104.00	121.00	142.00	158.00
25	46.60	60.10	79.10	93.00	108.00	127.00	141.00
30	42.00	54.30	71.50	84.10	97.50	115.00	128.00
45	32.80	42.40	56.00	66.00	76.60	90.20	100.00
60	27.10	35.20	46.50	54.90	63.70	75.10	83.50
90	20.60	26.60	35.30	41.70	48.50	57.20	63.60
120	16.80	21.70	28.80	34.00	39.60	46.80	52.10
180	12.50	16.20	21.50	25.40	29.60	35.00	39.10

Table 1 Intensity Frequency Duration Data

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2.2. Pre-Development SCENARIO

2.2.1. CATCHMENT DEFINITION

The pre-development catchment has been analysed as a catchment with a contributing area of 0.925 hectares.

Any stormwater runoff from roof areas, road and ground surfaces are conveyed as sheet flow to the south site boundary as Lawful Point of Discharge (LPoD).

The catchment boundary and LPoD for the pre-development plan will be shown in Moloney & Sons Engineering Drawing CE24014-SK100 in Appendix B.

2.2.2. RATIONAL METHOD

The pre-development coefficient of runoff (C year) was determined on the fraction impervious method specified in *QUDM*. Based on the detailed survey information provided, the pre-development catchment has an impervious areas of 0.879 ha, which equates to a fraction impervious of approximately 95%.

Using the Rational Method, the corresponding 60-minute ten-year rainfall intensity (I_{10}) was calculated to be 54.9mm/hr and a C_{10} values of 0.88 has been adopted for catchment A.

The Time of Concentration for the post developed catchments has been calculated in accordance with QUDM Table 4.6.3 – Recommended roof drainage system travel times.

In accordance with Table 4.6.3 of QUDM, the post-development catchment will have a time of concentration that will incorporate 2 minutes of the roof to downpipe time. This equates to a total travel time of seven (7) minutes.

The pre-development peak flow rates have been calculated for the selected storms, by utilizing the Bureau of Meteorology IFD Data's design rainfall intensities.

To determine the design peak flow rates for the site, the Rational Method (I.e. $Q = 2.78 \times 10-3$ CIA) has been applied.

The coefficient of runoff, time of concentration and peak flow rate are presented in **Table 2** for the standard Annual Exceedance Probability (AEP) design storms of 39%, 10%, 5% and 1% (corresponding to the 2, 10, 20 and 100 year Average Recurrence Interval (ARI) storms).

Catchment A								
Annual Exceedance Probability	AEP	39%	10%	5%	1%			
Coefficient of Runoff	С	0.75	0.88	0.92	1.00			
Area of Catchment (ha)	А	0.925	0.925	0.925	0.925			
Average Rainfall Intensity (mm/h)	I	102	158	114	238			
Peak Flow Rate (m3/s)	Q	0.196	0.357	0.432	0.612			

Table 2 Pre-Development Peak Flow Estimation – Rational Method

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2.3. POST-DEVELOPMENT SCENARIO

2.3.1. CATCHMENT DEFINITION

The post-development catchment will remain as per the pre-development condition, having a contributing area of 0.925 hectares.

Any stormwater runoff from roof, road and ground surfaces are conveyed as sheet flow to the south site boundary as Lawful Point of Discharge (LPoD).

The catchment boundary and LPoD for the post-development plan will be shown in CE24014-SK200 in Appendix B.

2.3.2. RATIONAL METHOD

The post-development coefficient of runoff (C year) was determined based on the fraction impervious method specified in *QUDM*.

Based on the provided layout, the post-development catchment A has impervious areas of 0.893hectares, which equate to a fraction impervious of 97%.

Using the Rational Method, the corresponding 60-minute ten-year rainfall intensity (I_{10}) was calculated to be 54.9mm/hr and a C_{10} values of 0.89 has been adopted for catchment A.

The Time of Concentration for the post developed catchments has been calculated in accordance with QUDM Table 4.6.3 – Recommended roof drainage system travel times.

In accordance with Table 4.6.3 of QUDM, the post-development catchment will have a time of concentration that will incorporate 2 minutes of the roof to downpipe time. This equates to a total travel time of seven (7) minutes.

The peak flow rates for the post development scenario have been calculated for the selected storms by utilizing the Bureau of Meteorology IFD Data's design rainfall intensities. Similar to post-development peak flow calculations, the Rational Method (i.e. $Q = 2.78 \times 10-3$ CIA) has been applied for the post-development scenario.

The coefficient of runoff, time of concentration and peak flow rate are presented in **Table 3** for the standard Annual Exceedance Probability (AEP) design storms of 39%, 10%, 5% and 1% (corresponding to the 2, 10, 20 and 100 year Average Recurrence Interval (ARI) storms).

Catchment A								
Annual Exceedance Probability	AEP	39%	10%	5%	1%			
Coefficient of Runoff	С	0.75	0.89	0.9324	1.00			
Area of Catchment (ha)	А	0.925	0.925	0.925	0.925			
Average Rainfall Intensity (mm/h)	I	102	158	182	238			
Peak Flow Rate (m3/s)	Q	0.198	0.361	0.436	0.612			

Table 3 Post Development Peak Flow Estimation – Rational Method

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2.4. CHANGE IN FLOW RATES

Rational Method assessment aims to evaluate the change in flow rate calculated from the pre and post development catchment. From **Table 2** and **Table 3** above, the peak flow rate for AEP design storms of 39%, 10%, 5% and 1% are compared in **Table 4**.

LPOD A							
Annual Exceedance Probability	AEP	39%	10%	5%	1%		
Pre-Developed Peak Flow Rate (m3/s)	Q	0.196	0.357	0.432	0.612		
Post-Developed Peak Flow Rate (m3/s)	Q	0.198	0.361	0.436	0.612		
Change in Peak Flow Rates (m3/s)	Q	+0.002	+0.004	+0.004	0.000		

Table 4 Change in Peak Flow Rate

As demonstrated in **Table 4** above, the subject development looks to result in a considerably minor increase in discharged peak flow rates of approx. 1%. As the development is limited to the proposed warehouse extension only and proposes to be replacing with the existing hardstand with a proposed roofed area. Such increases are considered negligible and present no nuisance to nearby properties or undue burden on existing stormwater infrastructure. Therefore, on-site detention is not required to mitigate flows to pre-development conditions.

2.5. EXTERNAL CATCHMENT

An assessment was conducted on the subject site and its vicinity to identify if there were any external contributing catchments that could potentially impact the site. Based on the contours sourced from ELVIS data, there are no contributing external catchments having potential to discharge stormwater flows to the subject site.

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3. CONCLUSION

This Site Based Stormwater Management Plan has been prepared for Dobinsons Holdings PTY LTD to assist with the development of 58 Hollingsworth Street, Kawana.

A hydrological analysis demonstrated that the anticipated post-development peak flow rates discharging from the site are negligible net increases compared to the pre-development flow rates.

Therefore, on-site detention is not required to mitigate flows to pre-development conditions.

After reviewing these calculateions, MSE are of the opinion that no actionable damage would be created externally, from a direct result of this development being approved, and no additional or actionable nuisance associated with the increased runoff rate on downstream properties and/or infrastructure would be created

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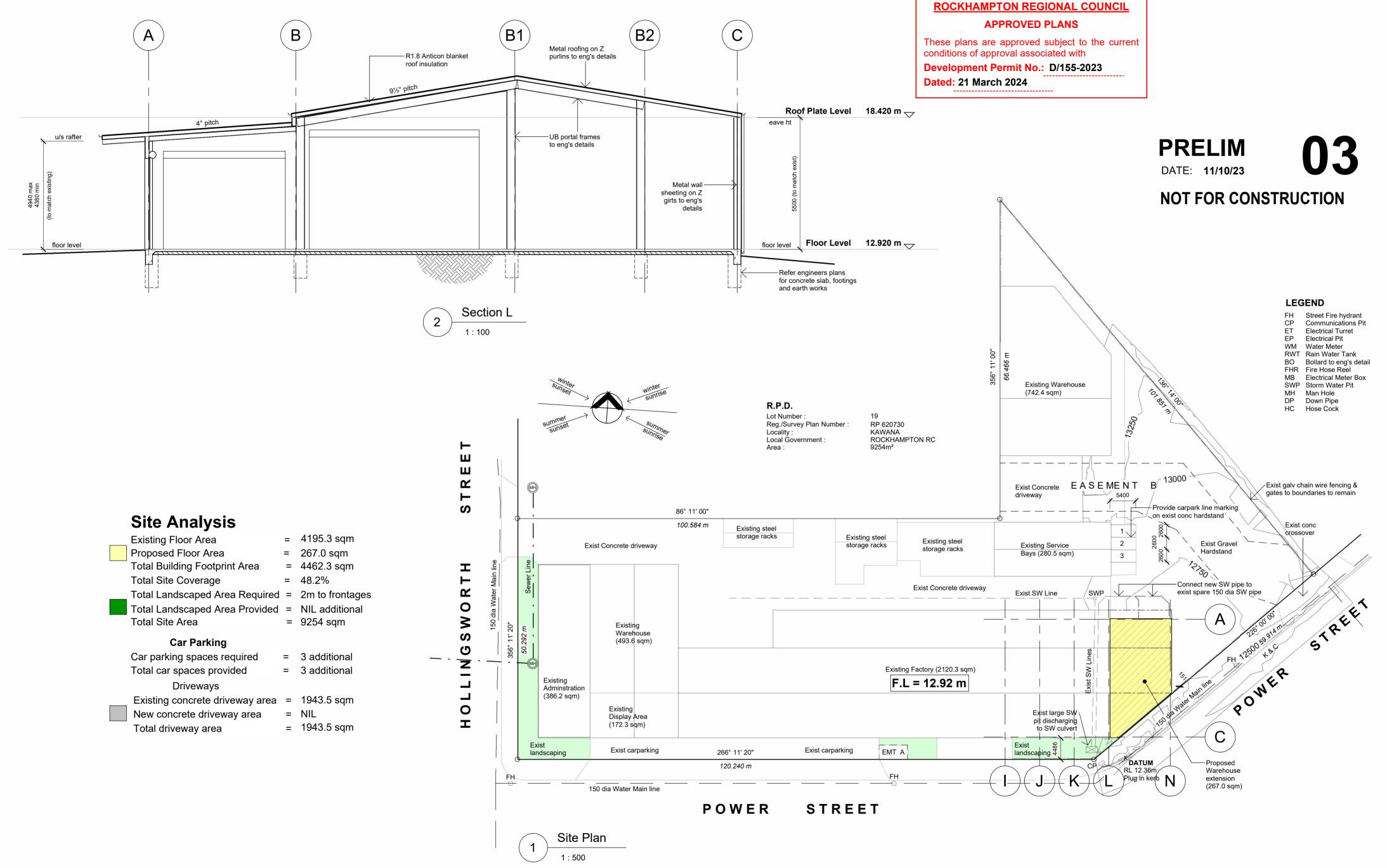
APPENDIX A – PROPOSED LAYOUT

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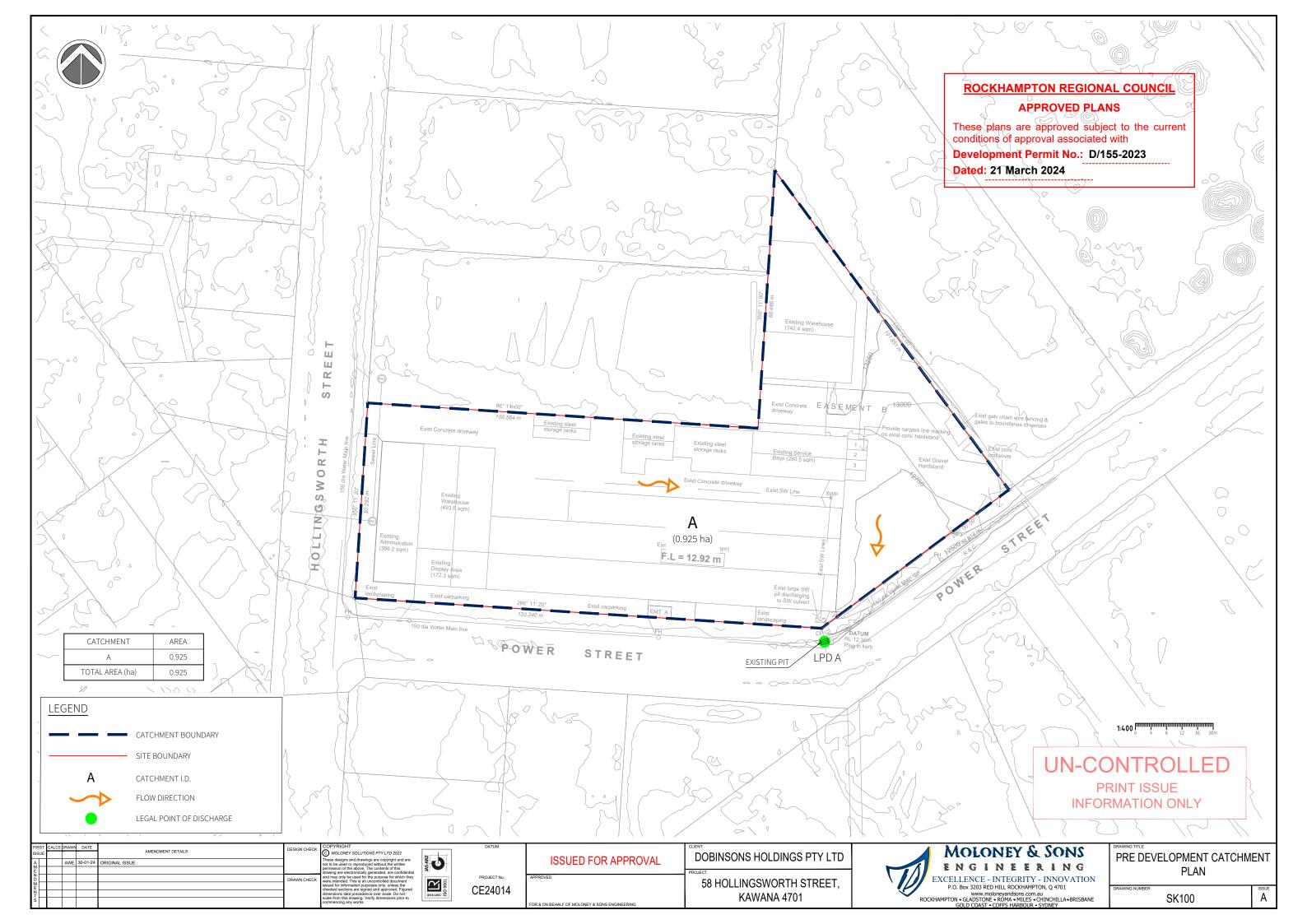
APPENDIX B – STORMWATER MANAGEMENT PLAN DRAWINGS

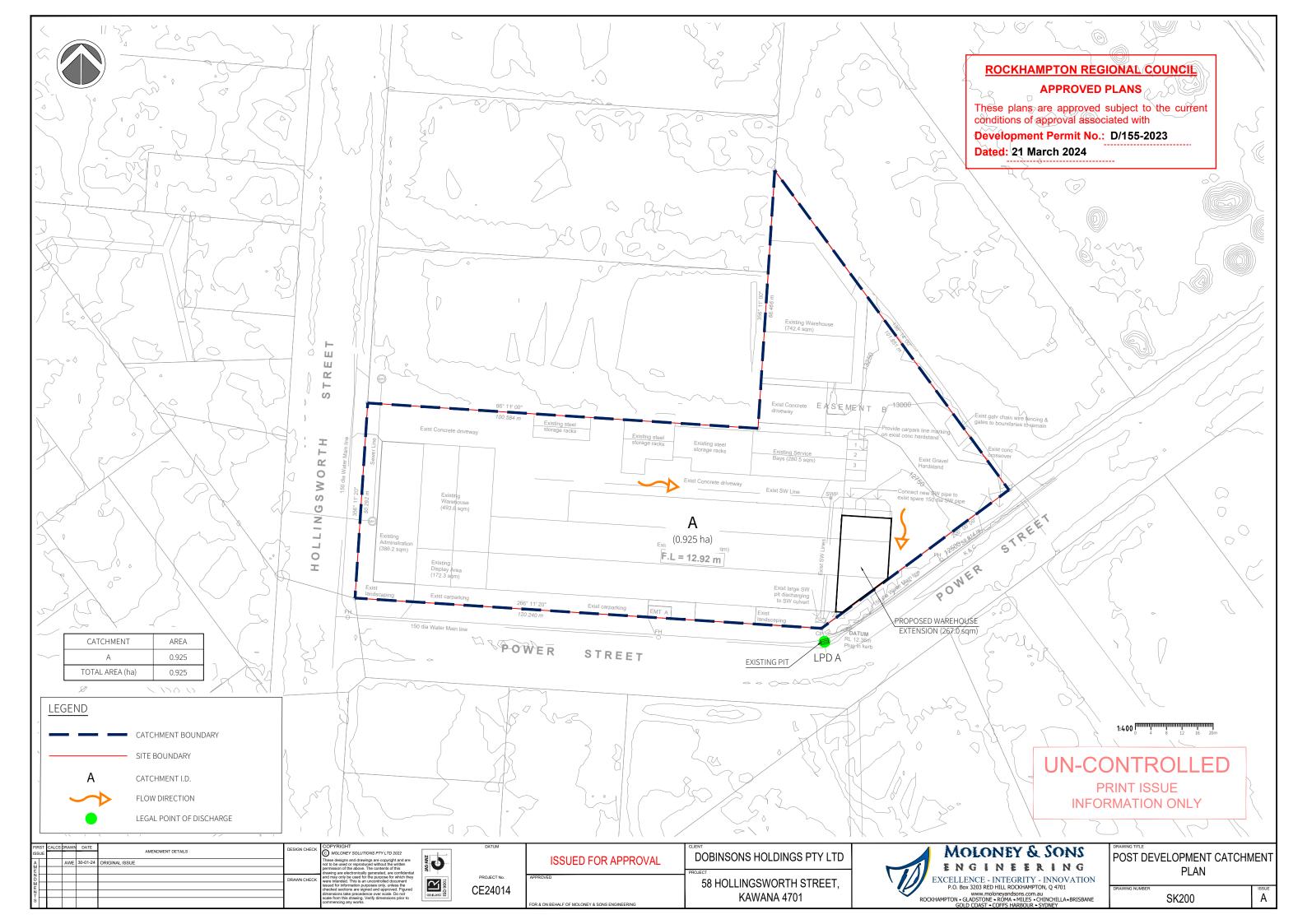
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