

**PRELIMINARY**  
NOT FOR CONSTRUCTION

REV	REVISION DESCRIPTION	DATE
1	FOR MCU APPLICATION	09/12/21
2	ACCESS/EGRESS AMENDMENT	20/07/22

**DILEIGH**  
CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

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Yeppoon, Queensland 4703

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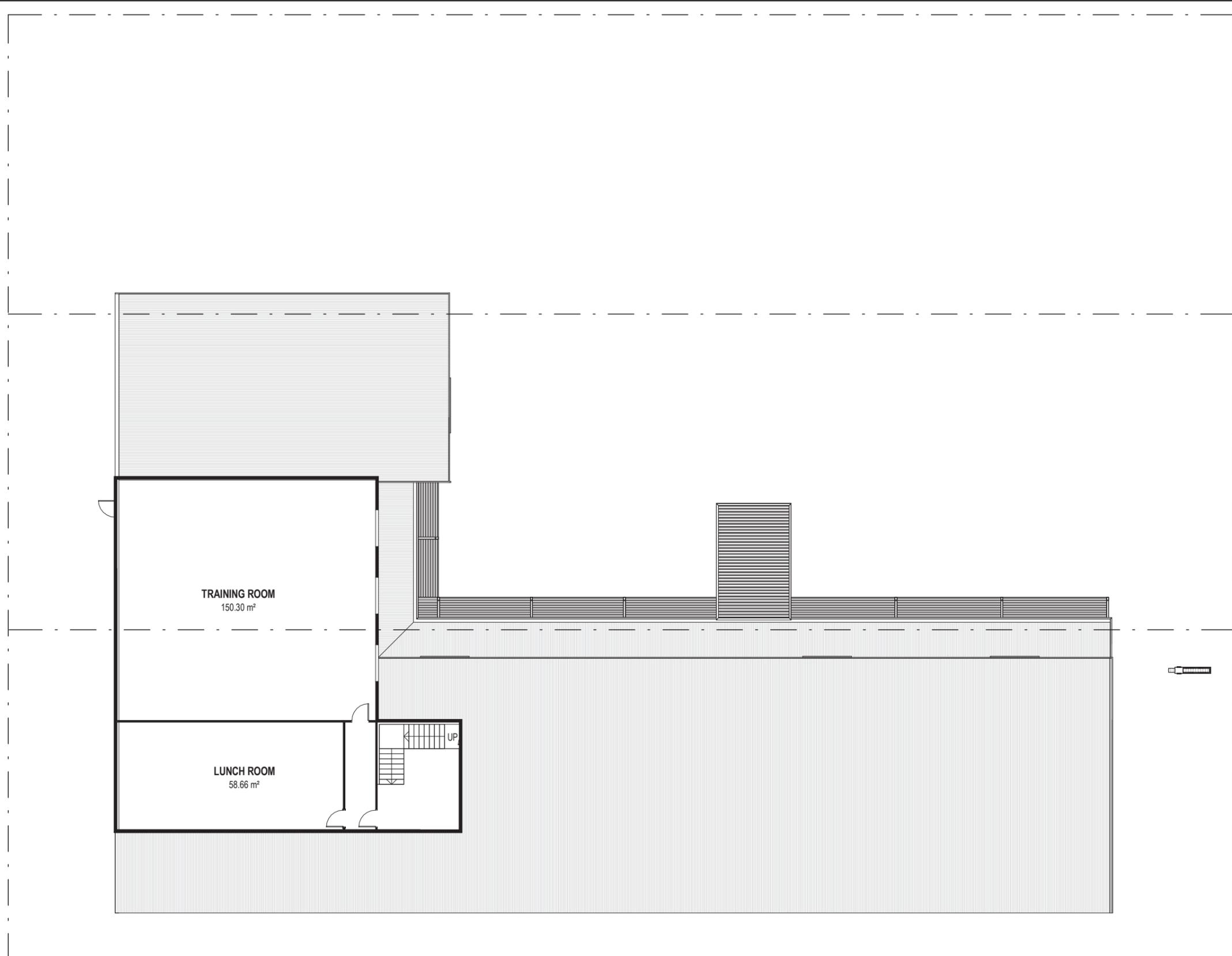
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22.07.2022	

**S.PRASAD**  
CONCEPT PROPOSED MEDICAL AND PHARMACY  
90-94 HIGH STREET, ROCKHAMPTON 4700  
SITE AND GROUND FLOOR PLAN

Dwg No.  
**D21.546- SK01**

**BUILDING DESIGN**

Revision  
**2**



**ROCKHAMPTON REGIONAL COUNCIL**  
**APPROVED PLANS**  
 These plans are approved subject to the current conditions of approval associated with  
**Development Permit No.: D/171-2021**  
**Dated: 30 August 2022**



**PROPOSED LEVEL 1 FLOOR PLAN**  
 SCALE 1 : 200

**CONCEPTUAL ONLY**  
 WINDOWS, ROOM AND FACADE LAYOUT AND DOORS TO BE CONFIRMED  
 SEWER MANHOLE LOCATION TO BE CONFIRMED

0 1 2 3 4 1:200  
 SCALES mm FULL SIZE A3

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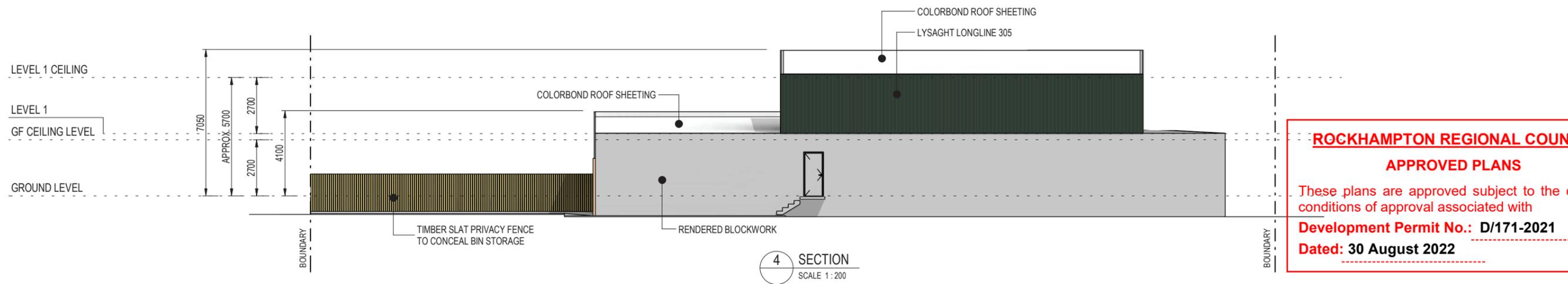
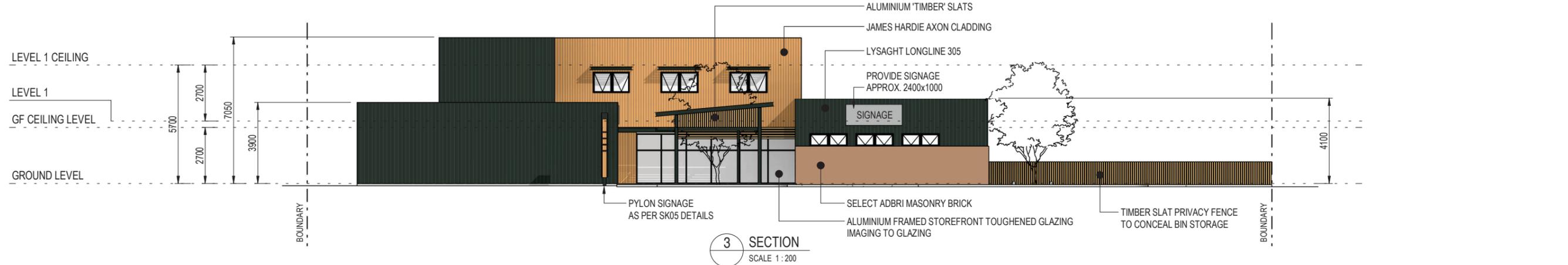
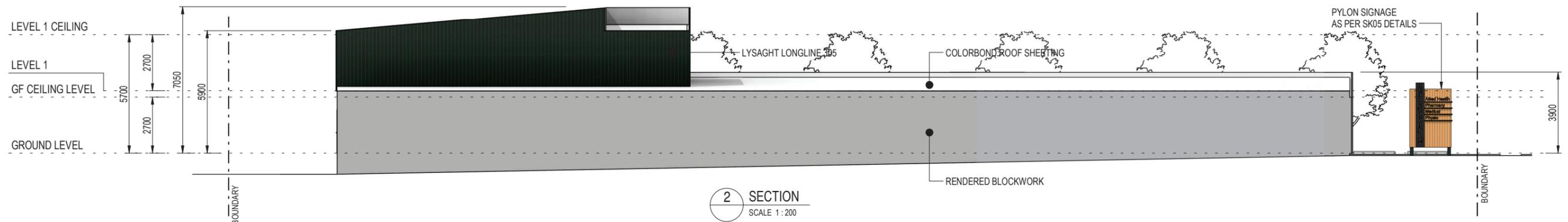
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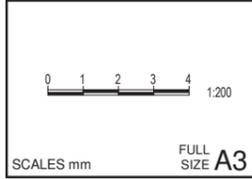
S.PRASAD  
 CONCEPT PROPOSED MEDICAL AND PHARMACY  
 90-94 HIGH STREET, ROCKHAMPTON 4700  
 CONCEPT LEVEL 1 PLAN

Dwg No.	D21.546- SK02
BUILDING DESIGN	
Revision	1

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**Dated: 30 August 2022**



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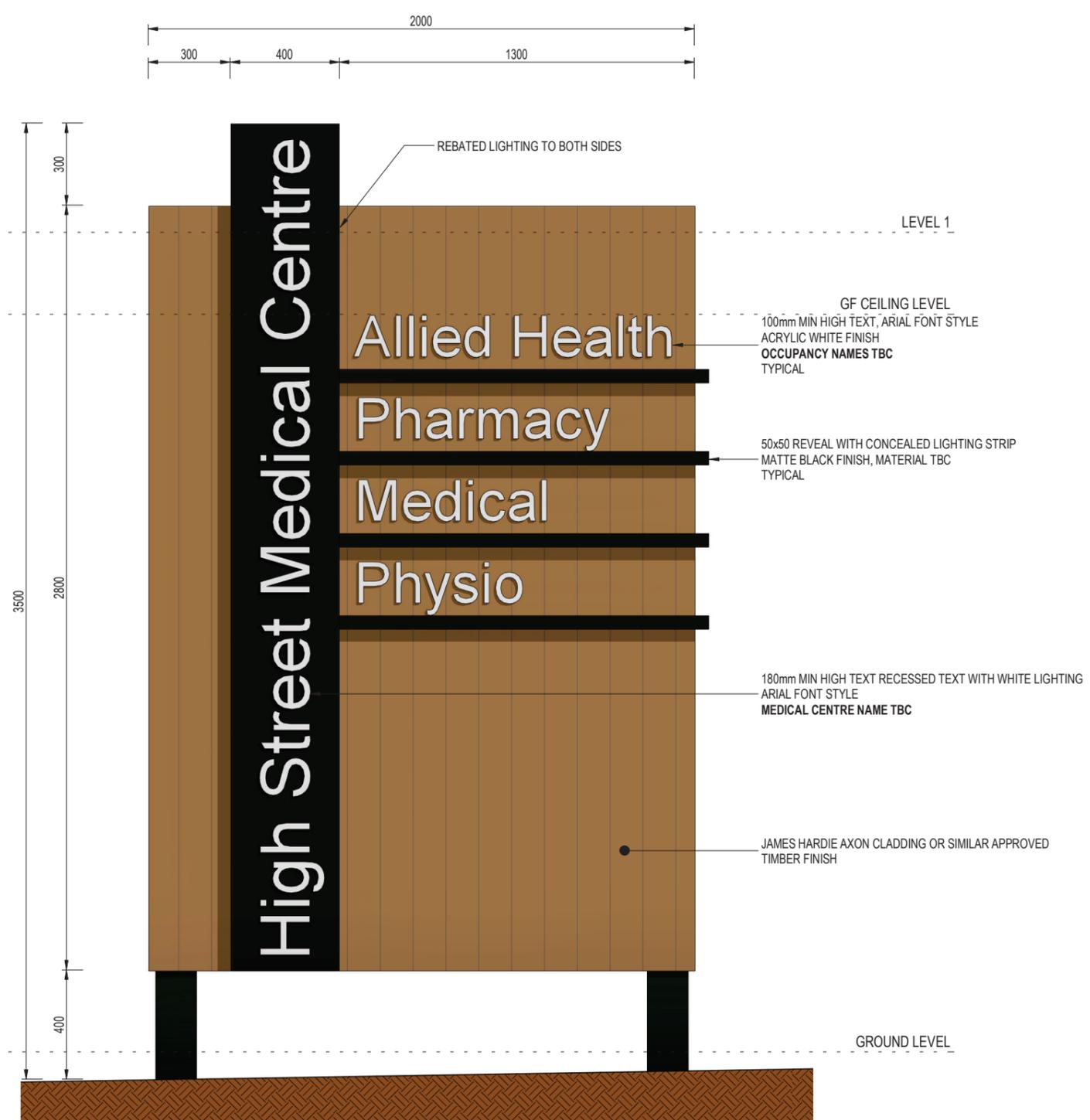
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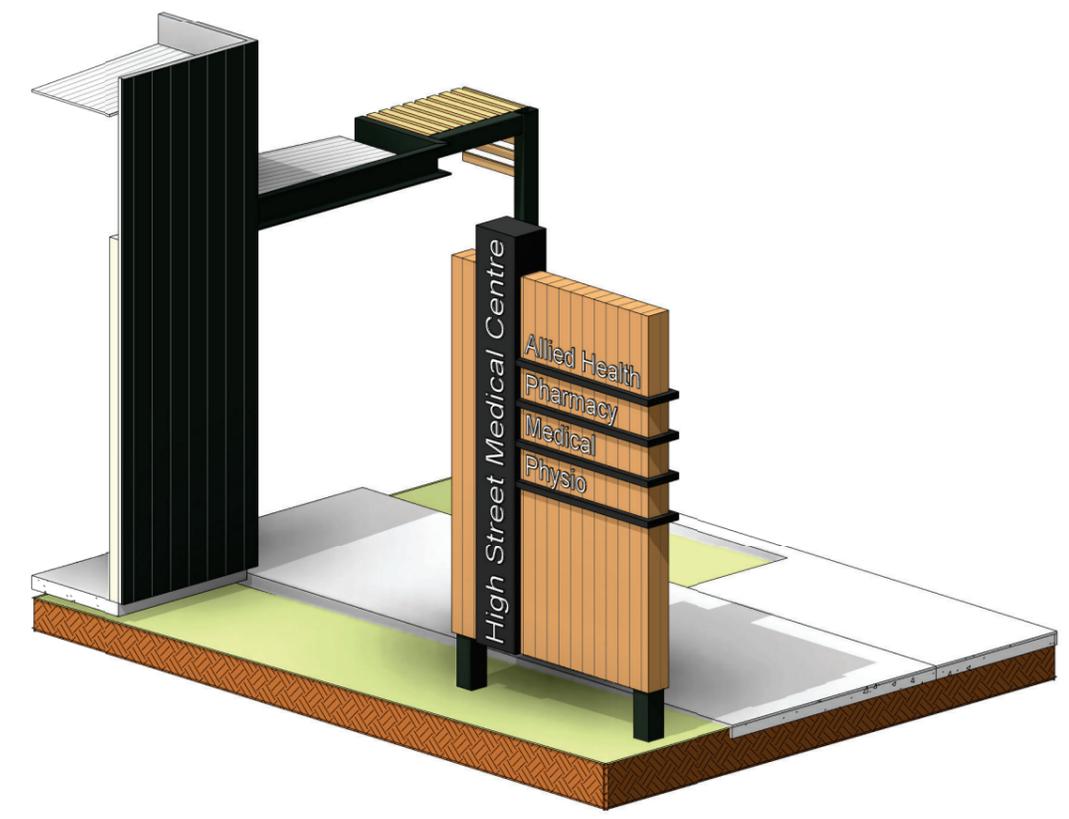
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CONCEPT PROPOSED MEDICAL AND PHARMACY  
90-94 HIGH STREET, ROCKHAMPTON 4700  
CONCEPT ELEVATIONS

Dwg No.  
**D21.546- SK03**  
BUILDING DESIGN  
Revision

**ROCKHAMPTON REGIONAL COUNCIL**  
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**Dated: 30 August 2022**



**CONCEPT PYLON SIGNAGE ELEVATION**  
 SCALE 1:20



**CONCEPT PYLON SIGNAGE 3D VIEW**

**CONCEPTUAL ONLY**  
 PYLON SIGNAGE DESIGN CONCEPTUAL ONLY, TO BE CONFIRMED



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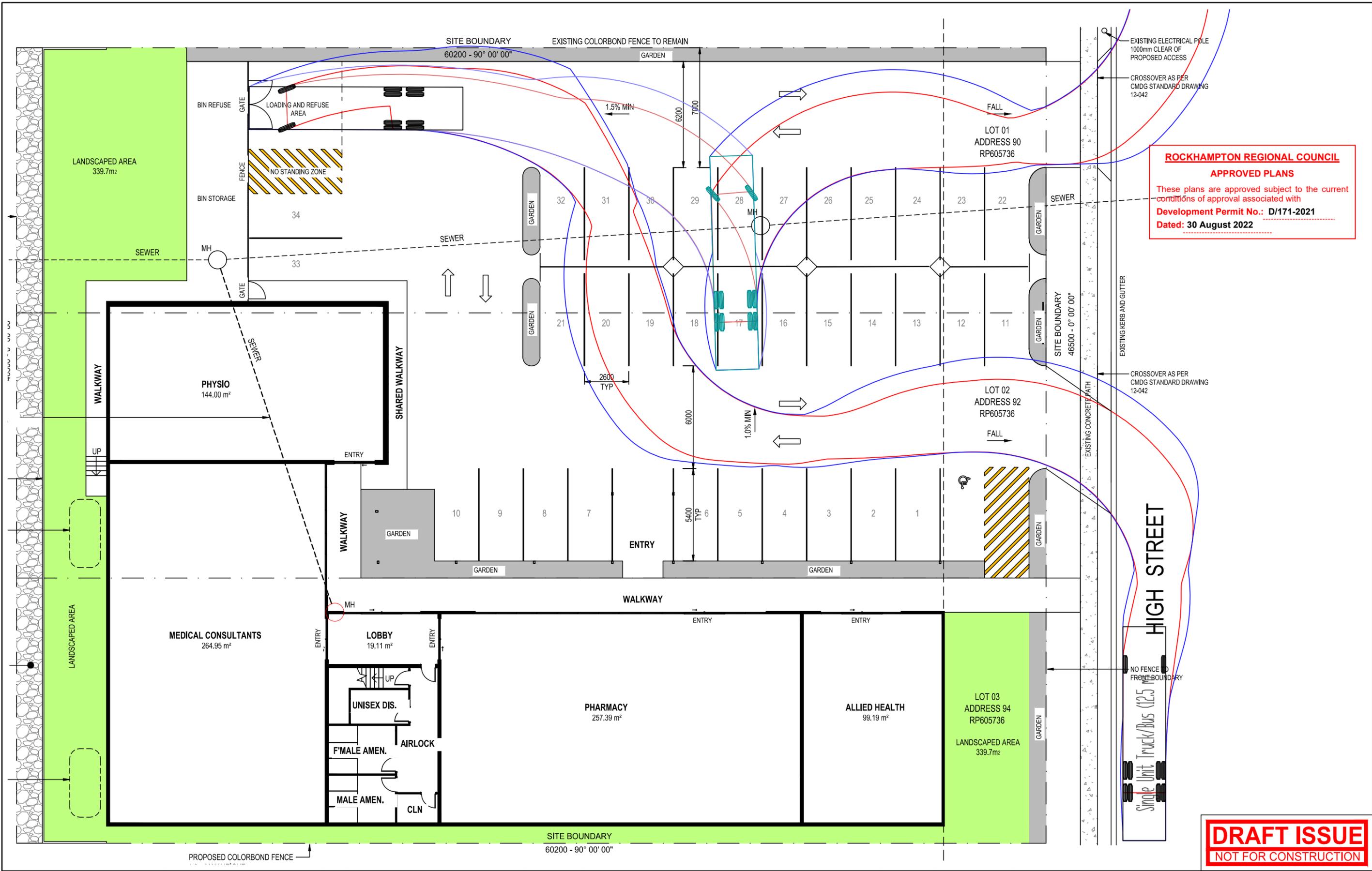
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S.PRASAD  
 CONCEPT PROPOSED MEDICAL AND PHARMACY  
 90-94 HIGH STREET, ROCKHAMPTON 4700  
 CONCEPT PYLON SIGNAGE

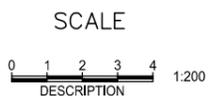
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**ROCKHAMPTON REGIONAL COUNCIL**  
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**Development Permit No.: D/171-2021**  
**Dated: 30 August 2022**

**DRAFT ISSUE**  
**NOT FOR CONSTRUCTION**



REV	REVISION	DATE
A	FOR INFORMATION ONLY	15/12/2021
B	FOR INFORMATION ONLY - AMENDED CROSSOVER LAYOUTS	20/07/2022

**DILEIGH**  
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Checked by	GJB
Approved	Sign
RPEQ	
7682	

**S PRASAD**  
 CONCEPT PROPOSED MEDICAL AND PHARMACY  
 90-94 HIGH STREET, ROCKHAMPTON, 4700  
**VEHICLE SWEEP PATH**  
**REFUSE TRUCK**

D21.546-01
SHEET 1 OF 01
A B

2021



**PROPOSED MEDICAL SUITES & PHARMACY  
90 – 94 HIGH STREET  
BERSERKER**

## **STORMWATER MANAGEMENT REPORT**

**FOR DR. S. PRASAD**

**ROCKHAMPTON REGIONAL COUNCIL**

**APPROVED PLANS**

These plans are approved subject to the current conditions of approval associated with

**Development Permit No.: D/171-2021**

**Dated: 30 August 2022**

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Document Status					
Rev No.	Author	Reviewer	Approved For Issue		
			Name	Signature	Date
A	G Brown	A Doherty	Glenn Brown RPEQ 7682		06.12.2021
B	G Brown	A Doherty	Glenn Brown RPEQ 7682		13.05.2022

## 1. Introduction

This report was prepared for Dr. Prasad in support of their material change of use application for the site located at 90 – 94 High Street Berserker. This report should be read in conjunction with the overall application relating to this project. The proponent is seeking approval to develop the sites with a proposed pharmacy, medical suites, and other similar type offices with associated, landscaping, access and parking.

The land subject to this application is described as Lots 1, 2 & 3 on RP605736 which has a total area of 2,799.3m<sup>2</sup>.

## 2. Existing Stormwater Conditions

The following existing conditions were reviewed and assessed to ensure the post development conditions do not exceed or are mitigated back to those currently generated by the sites.

### 2.1 Internal Catchments

The natural surface levels on the site fall from the front property boundary towards the rear property boundary. Arbitrary spot levels taken on Lot 2 indicate the fall to be in the vicinity of 670mm to 850mm, refer attached site plan.

Lots 1 & 3 are currently occupied by residential dwellings while Lot 2 is currently vacant but had in the past been occupied with a residential style dwelling. Based on the existing residence and others in the area we have allowed approximately 180m<sup>2</sup> for the residence and driveways (impervious areas) for each of the three allotments under consideration.

From QUDM Figure 4.4 a time of concentration of 16 minutes was adopted for the site being 60m of sheet flow across average grass at approximately 1.3% fall

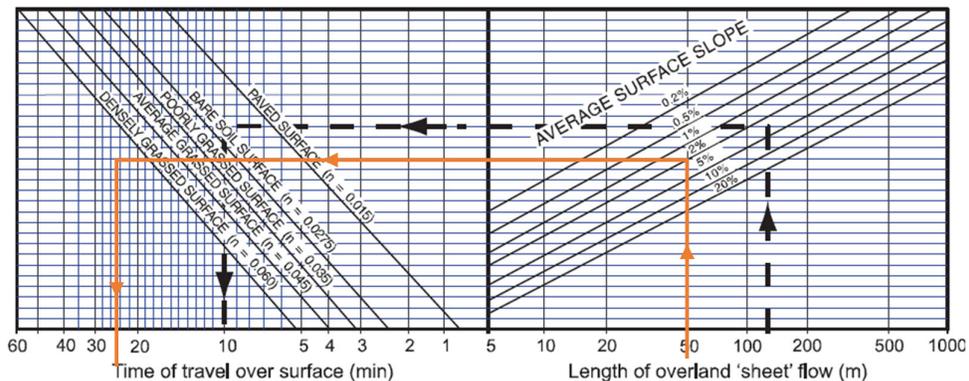


Figure 4.4 – Overland sheet flow times (shallow sheet flow only) (source: ARR, 1977)

The pre-developed site discharge was then calculated using the modified rational method and the results tabulated below.

PRE DEVELOPED					TC= 16 min	
Development Area	0.27993 ha					
F	C	I	A	Q		
sq kms	co eff	mm/hr	sq kms	m3/sec	Fi	0.193
Q2	0.278	0.603198478	89.1	0.00280	0.0418	<sup>1</sup> I <sub>10</sub> 65.60 mm/hr
Q5	0.278	0.674163005	118.0	0.00280	0.0619	C <sub>10</sub> 0.710
Q10	0.278	0.709645268	139.0	0.00280	0.0768	From QUDM T4.5.4
Q20	0.278	0.745127532	160.0	0.00280	0.0928	
Q50	0.278	0.816092059	189.0	0.00280	0.1200	
Q100	0.278	0.851574322	212.0	0.00280	0.1405	

Table 2.1: Pre-Developed Site Discharge

## 2.2 External catchments

The site has no external catchments for events below the 1% AEP with natural falls from the front property boundary to the kerb and channel in High Street with the road reserve expected to contain storm events up to and including the 1% AEP.

The adjoining allotment to the west currently occupied by Relationships Australia directs site runoff to High Street or the detention basin in the rear southwest corner of the allotment with all site flows up to and including the 1% AEP contained within the site.

The adjoining allotments to the east and south fall away from the proposed development site.

## 2.3 Lawful Point of Discharge

Existing conditions show that the site discharges lawfully to the southern boundary, generally as sheet flow. The proposed design will aim to mitigate flows and replicate existing flow conditions as near as possible to ensure no actionable nuisance is caused to the downstream properties. As per QUDM 2016 no easement is proposed downstream as no change in flow regime is expected.

## 3. Post Developed Site Flows and Management

### 3.1 Post Developed Flows

The proposed development of the site increases the fraction impervious to a value of 0.781 as per the table below. Based on this value, a  $C_{10}$  value of 0.845 (From QUDM Table 4.5.3) was adopted.

Total site area	2,799.3 m <sup>2</sup>
Proposed concrete parking, access and paths	1,395.0 m <sup>2</sup>
Proposed roof area	790.0 m <sup>2</sup>
<b>Total Impervious Area</b>	<b>2,185.0 m<sup>2</sup></b>
<b>Fraction Impervious (Total Impervious/Site Area)</b>	<b>0.781</b>

Table 3.1: Total Site Impervious Area

From QUDM Figure 4.4 a time of concentration of 13 minutes was adopted for the site being

Medium	Length (m)	Grade (%)	T <sub>c</sub> (min)
Concrete Carpark	40	1.5	5
Grass Buffer	15	2	9
<b>Total</b>			<b>14</b>

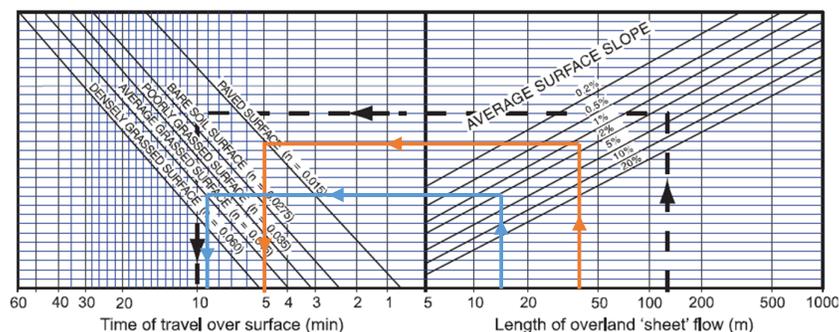


Figure 4.4 – Overland sheet flow times (shallow sheet flow only) (source: ARR, 1977)

Based on these revised figures, the following discharges from site were calculated:

POST DEVELOPED						TC= 13 min	
Development Area						0.27993 ha	
AreaA	F	C	I	A	Q	Fi	
sq kms	co eff	mm/hr	sq kms	m3/sec			
Q2	0.278	0.71836736	97.4	0.00280	0.0545	1 <sub>h0</sub>	65.60 mm/hr
Q5	0.278	0.802881167	129.0	0.00280	0.0806	C <sub>10</sub>	0.845
Q10	0.278	0.84513807	152.0	0.00280	0.1000	From QUDM T4.5.3	
Q20	0.278	0.887394974	175.0	0.00280	0.1209		
Q50	0.278	0.971908781	206.0	0.00280	0.1558		
Q100	0.278	1	231.0	0.00280	0.1798		

Table 3.2: Post-Developed Full Site Discharge

When compared with the pre-developed total site flows, we note an increase in flow for all recurrence intervals. Refer table below:

COMPARING PRE-TREATMENT FLOWS			
EVENT ARI	PRE-DEV	POST -DEV	CHANGE
Q2	0.0418	0.0545	30.19%
Q5	0.0619	0.0806	30.19%
Q10	0.0768	0.1000	30.23%
Q20	0.0928	0.1209	30.26%
Q50	0.1200	0.1558	29.81%
Q100	0.1405	0.1798	27.95%

Table 3.3: Site Discharge Comparison

### 3.2 Discharge Flow Management

Based on the increase of pervious areas and resulting increase in site runoff, stormwater detention is required.

The following strategies are proposed for the minor (20% AEP) and major (1% AEP) storm events.

#### 3.2.1 Minor (20% AEP) Storm Management

Flows from the carpark and landscaped areas will travel overland as sheet flow to the rear of the site. At this point it is proposed to mitigate the increase in discharge utilising a portion of the lower landscaped area to the rear of the proposed development. A 150mm high kerb to the perimeter of the landscaping will act as a high flow discharge weir with 9 x 100 diameter outlets evenly spaced as low flow discharge. The low flow discharge outlets have been designed to have the same IL to replicate the existing flow conditions, spreading the discharge across a greater length. Flows will then travel across 1.5m of embedded gravel which will act to spread the flows further and dissipate the energy prior to crossing the boundary into the neighbouring land at pre-development rates.

We note at this level of event we do not expect the weir to overtop with all flows through the low flow outlet pipes.

Roof water will be captured in a number of rainwater tanks at the rear of the building. These tanks with a combined total volume of 20,000L will collect all roof water runoff before discharging to ground surface and into the overland flow and detention system along the rear boundary as described above.

### 3.2.2 Major (1% AEP) Storm Management

Flow management will be similar to that of the minor storm event however in this event the weir will overtop after the required detention is provided to reduce flows back to pre-development levels. As with the minor event the weir will overtop onto a gravel buffer prior to discharge to the neighbouring properties.

As with the minor storm event roof water will be captured in a number of rainwater tanks at the rear of the building. These tanks with a combined total volume of 20,000L will collect all roof water runoff before discharging to ground surface and into the overland flow and detention system along the rear boundary as described above.

Refer to plan D21546-SW-01 in Appendix A for preliminary layout.

### 3.2.3 Flow Management Outcomes

With the above flow management strategies in place the following outcomes are expected.

COMPARING Q5 FLOWS POST TREATMENT			
PRE DEV.	0.0806	m3/sec	
POST DEV	0.0415	m3/sec	
EQUALS	48.54 % DECREASE IN MINOR FLOWS		

Table 3.4: Q5 Flow Comparison

From the above we note that the provision of roof water tanks is sufficient to achieve a reduction in flows from site. In addition to this, flows will be further reduced through the kerb and overland detention area.

In the major storm event, we are unable to capture sufficient roof water runoff to fully mitigate the flows back to pre-development level and will need rely on the proposed overland detention system to provide the remainder of the required reduction. From the following outputs we note that the roofwater tanks will reduce the post development outflow to 157L/s which represents a 12% increase on pre-development levels.

COMPARING Q100 FLOWS POST TREATMENT			
PRE DEV.	0.1405	m3/sec	
POST DEV	0.1578	m3/sec	
EQUALS	12.33 % INCREASE IN MAJOR FLOWS		

With the post development inflows from the above equating to the required flows to be mitigated additional detention through the overland area reduces the outflow from site to 139L/s which is less than pre-development levels.

COMPARING Q100 FLOWS POST TREATMENT			
PRE DEV.	0.140	m3/sec	
POST DEV	0.139	m3/sec	
EQUALS	0.71 % DECREASE IN MAJOR FLOWS		

### 3.2.4 Stormwater Discharge Characteristics

In developing the stormwater management strategies for both minor and major storm events consideration was given to the effects the development would have on the characteristics of the predevelopment flows or the current flows in to neighbouring properties.

Section 3.6 of Queensland Urban Drainage Manual (QUDM) indicates four issues to be considered to reduce the likelihood of the resultant flows causing an actionable nuisance or becoming unlawful.

**Diversion of Stormwater:** Currently the site discharges as sheet flow across the rear boundary with flows in a south westerly to southerly direction. We note an existing retaining wall along the western boundary will intercept flows and concentrate them through the property to the rear at this point.

The proposed development site will partially restrict flows through the top of the catchment however once clear of the building flows will be captured by a small kerb as the lower boundary of the detention area. As noted in the above flow management strategies the kerb will be slotted and discharge to a rubble infiltration trench along the full length of the boundary ensuring flows are able to remain as sheet type flows prior to crossing the property boundaries as they currently do.

**Concentration of Stormwater Flows:** The proposed strategies will not result in any concentration of flows across the rear boundaries and will improve the current situation where flows are concentrated at the end of the existing retaining wall by allowing the flows to integrate with the flows through the rubble infiltration trench.

#### Other Flow Characteristics

Peak discharges have been treated through detention to ensure they are no greater than the existing and will provide a significant improvement to the rear property owners in a minor storm event with less peak flow.

Flow velocities will be tempered by the kerbing and rubble trench ensuring flows velocities are no greater than the current.

Treatment through grass buffers and detention and the infiltration trench will ensure water quality is reduced to required levels under the SPP ensuring downstream recipients are not required to deal with or treat water of an unacceptable quality.

#### Adverse Impacts

The proposed treatment described previously will ensure there are no adverse impacts to the receiving lands ensuring they are suitable for future use as deemed suitable and acceptable by Council.

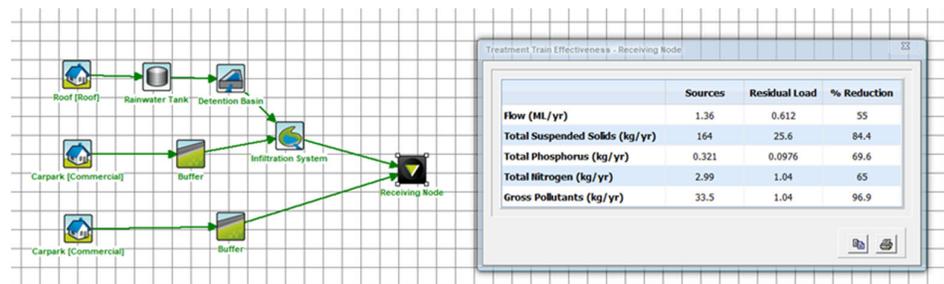
### 3.3 Stormwater Quality Management

The size of the combined development area being greater than 2500m<sup>2</sup> (2,799m<sup>2</sup>), triggers the State Planning Policy Healthy Water however given the location of the development and distance from any receiving water ways, stormwater drainage systems or other systems that would transport contaminants to receiving waters we ask that Council relax this requirement in this instance.

While relaxation of the requirements is requested we note that some quality improvement is proposed for the site as follows:

- All paved and roof areas will flow across grass buffer strips prior to exiting the development site
- Detention along the southern boundary will allow some contaminants to settle
- Following the detention, flows will traverse a rubble strip and infiltration trench which will accept the 3-month flows allowing further contaminants to be removed.
- Prior to reaching any pervious material, roadway or drainage infrastructure runoff is required to traverse another grass buffer area being the rear yards to the residential premises of the adjoining allotments.

The system was modelled using Music X to provide an indication of the provided reductions, refer below output.



The SPP 2017 notes the following design objectives in relation to water quality reductions for Central Queensland (South)

- Total Suspended Solids (TSS) 85%
- Total Phosphorous (TP) 60%
- Total Nitrogen (TN) 45%
- Gross Pollutants >5mm 90%

Based on the above all objectives except the total suspended solids have been met. Although we note that the difference between the achieved and required is very minor at 0.6% and could be considered as being compliant.

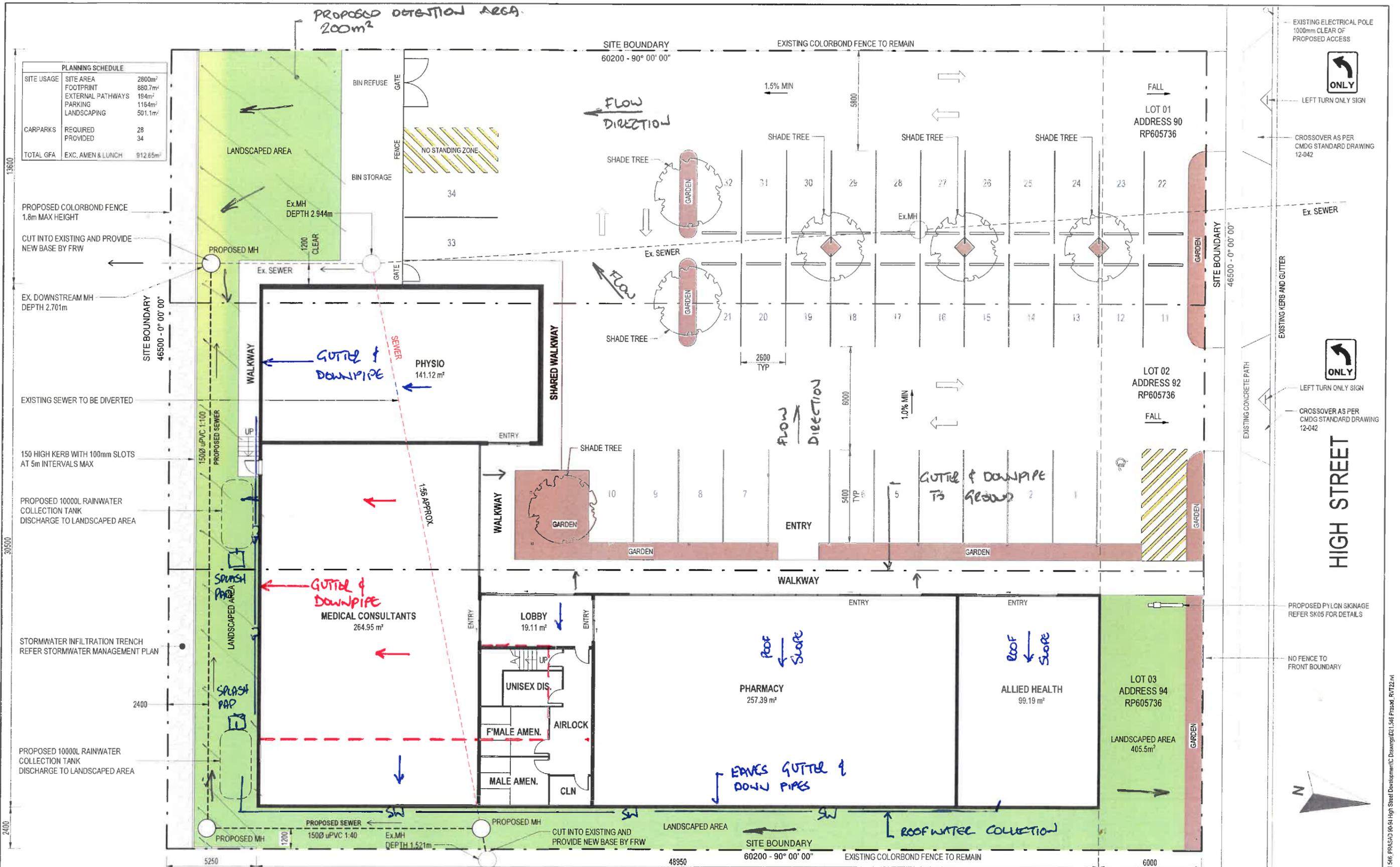
#### 4. Conclusion

The proposed development will increase the impervious area of the site and requires quantity management of the stormwater discharge which will be achieved by installing a detention system along the southern boundary. The detention area will then discharge to via a weir type system to a rubble / infiltration drain prior to leaving site.

Quality objectives will not be fully met but given the location of the development it is unlikely that the partially treated runoff will impact on the surrounding environment or any receiving waters.

Based on the above the proposed stormwater management plan demonstrates that predeveloped flows can be maintained with some onsite detention and does not adversely affect the surrounding allotments which should allow Council to approve this plan.

## Appendix A – Stormwater Management Strategy Drawing



PLANNING SCHEDULE		
SITE USAGE	SITE AREA	2800m <sup>2</sup>
	FOOTPRINT	880.7m <sup>2</sup>
	EXTERNAL PATHWAYS	194m <sup>2</sup>
	PARKING	1164m <sup>2</sup>
	LANDSCAPING	501.1m <sup>2</sup>
CARPARKS	REQUIRED	28
	PROVIDED	34
TOTAL GFA	EXC. AMEN & LUNCH	912.65m <sup>2</sup>

PROPOSED COLORBOND FENCE 1.8m MAX HEIGHT  
 CUT INTO EXISTING AND PROVIDE NEW BASE BY FRW

EX. DOWNSTREAM MH DEPTH 2.701m

EXISTING SEWER TO BE DIVERTED

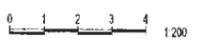
150 HIGH KERB WITH 100mm SLOTS AT 5m INTERVALS MAX

PROPOSED 10000L RAINWATER COLLECTION TANK DISCHARGE TO LANDSCAPED AREA

STORMWATER INFILTRATION TRENCH REFER STORMWATER MANAGEMENT PLAN

PROPOSED 10000L RAINWATER COLLECTION TANK DISCHARGE TO LANDSCAPED AREA

PROPOSED MH 1500 uPVC 1:40 Ex.MH DEPTH 1.521m



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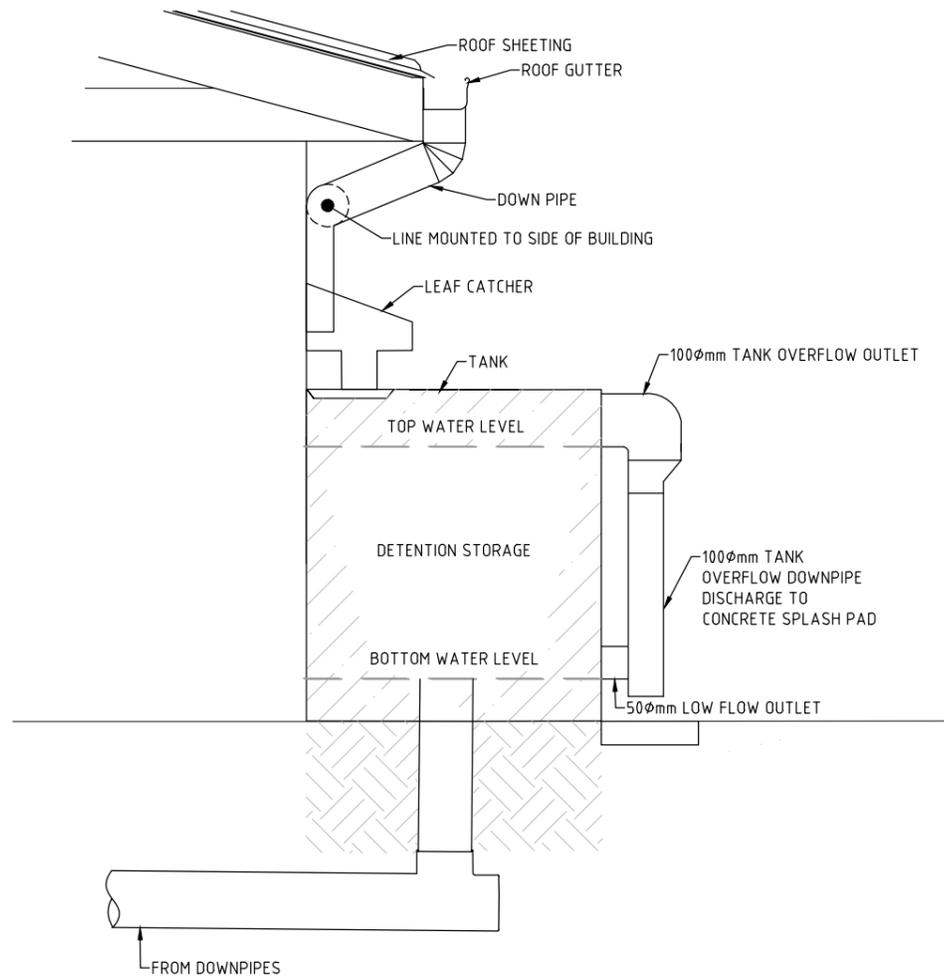
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OBCC	15269972
Sign	

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 90-94 HIGH STREET, ROCKHAMPTON 4700  
 SITE AND GROUND FLOOR PLAN -  
**STORMWATER MANAGEMENT**

Dwg No.	D21.546- SK01
Revision	1



SCALE

REV	REVISION	DATE
A	FOR APPROVAL	11/03/2021

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RPEQ	7682
Date	12.05.2022

**S. PRASAD**  
 STORMWATER MANAGEMENT PLAN ASSOC WITH AN MCU  
 90 & 94 HIGH STREET, BERSERKER  
**PROPOSED DETENTION TANK**  
 DETAILS

D21.057-03
SHEET 02 OF 02
A