GENERAL NOTES

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ROCKHAMPTON REGIONAL COUNCIL

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Dated: 17 August 2021

scale @A1 1 : 200 scale @A3 1:400

0 10m 1:200

PRELIMINARY

REV.	DESCRIPTION	ISSUED BY	DATE
P1	PRELIMINARY ISSUE		05-03-2021
P2	PRELIM UPDATES		10-03-2021

TONY MADDEN ARCHITECTS
(07) 4927 9700
www.tmarchitects.com.au

client:
FITZROY COMMUNITY HOSPICE

location:
38 AGNES STREET, ROCKHAMPTON

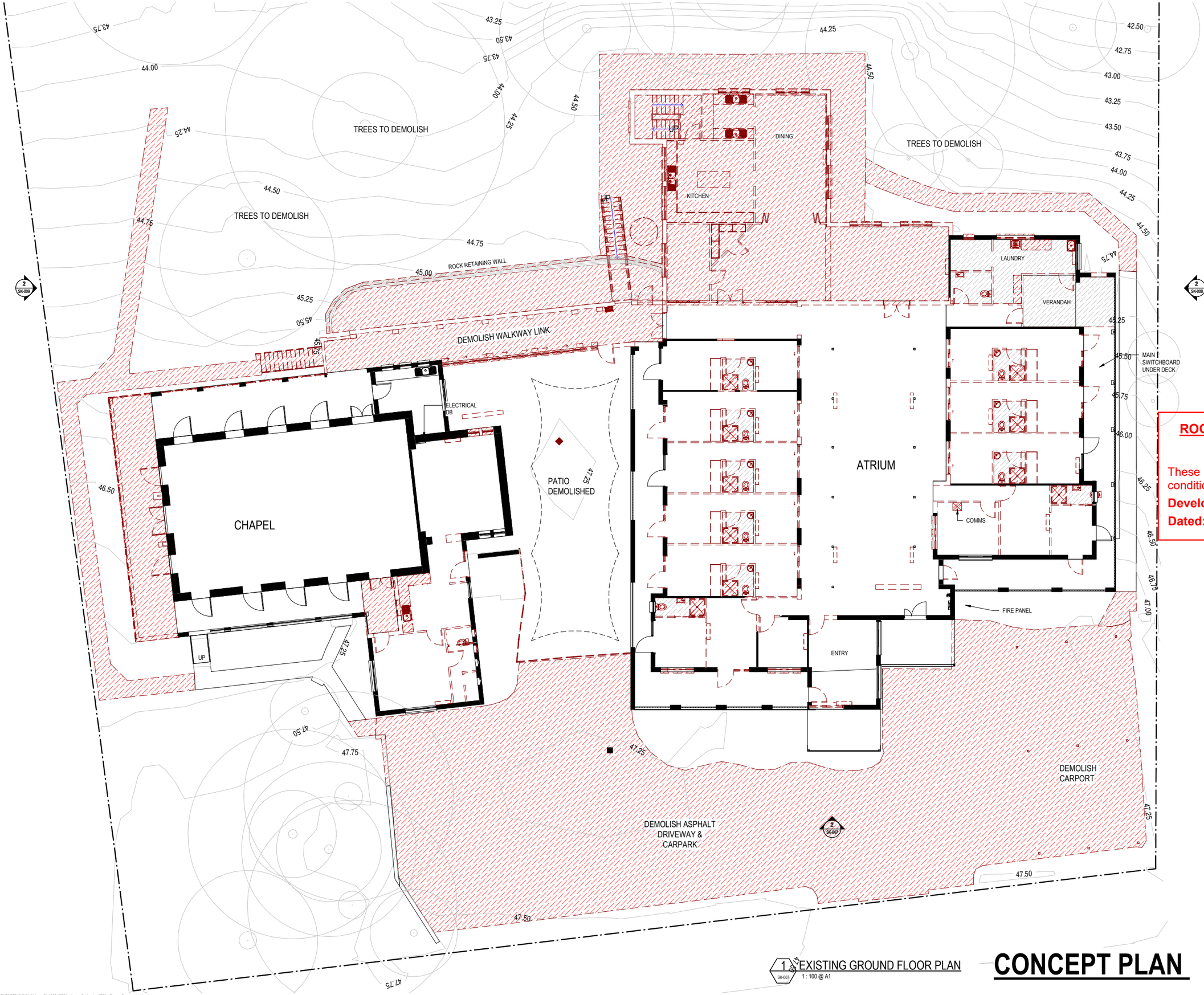
project:
FITZROY COMMUNITY HOSPICE
CONCEPT PROPOSAL

drawing title:
OVERALL EXISTING SITE PLAN

job no:	drawing no:	rev:
2221	SK-001	P2

1 SK-007 OVERALL EXISTING SITE PLAN
1 : 200 @ A1

CONCEPT PLAN



1 SK-007 EXISTING GROUND FLOOR PLAN
1 : 100 @ A1

CONCEPT PLAN

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0 5m 1:100

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project:
FITZROY COMMUNITY HOSPICE
CONCEPT PROPOSAL

drawing title:
EXISTING GROUND FLOOR PLAN

job no:	drawing no:	rev:
2221	SK-002	P1

GENERAL NOTES

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EXISTING RETAINING STONE WALL TO DEMOLISH

PORTION OF EXISTING BUILDING SHOWN HATCHED TO DEMOLISH

EXISTING STORE

SK-010 2

2 SK-009

2 SK-008

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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1 SK-008 EXISTING LOWER LEVEL PLAN
1 : 100 @ A1

CONCEPT PLAN

scale @A1 1 : 100 scale @A3 1:200

0 5m 1:100

PRELIMINARY

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P1	PRELIMINARY ISSUE		05-03-2021

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client: FITZROY COMMUNITY HOSPICE

location: 38 AGNES STREET, ROCKHAMPTON

project: FITZROY COMMUNITY HOSPICE CONCEPT PROPOSAL

drawing title: EXISTING LOWER FLOOR PLAN

job no:	drawing no:	rev:
2221	SK-003	P1

GENERAL NOTES

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1 SK-007 — SK-004 - OVERALL PROPOSED SITE PLAN
1 : 200 @ A1

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CONCEPT PLAN

scale @A1: 1 : 200 — scale @A3: 1:400

0 10m 1:200

PRELIMINARY

REV.	DESCRIPTION	ISSUED BY	DATE
P2	PRELIM UPDATES		10-03-2021
P3	PRELIM UPDATES		11-03-2021
P4	Additional Info		22-04-2021

TONY MADDEN ARCHITECTS
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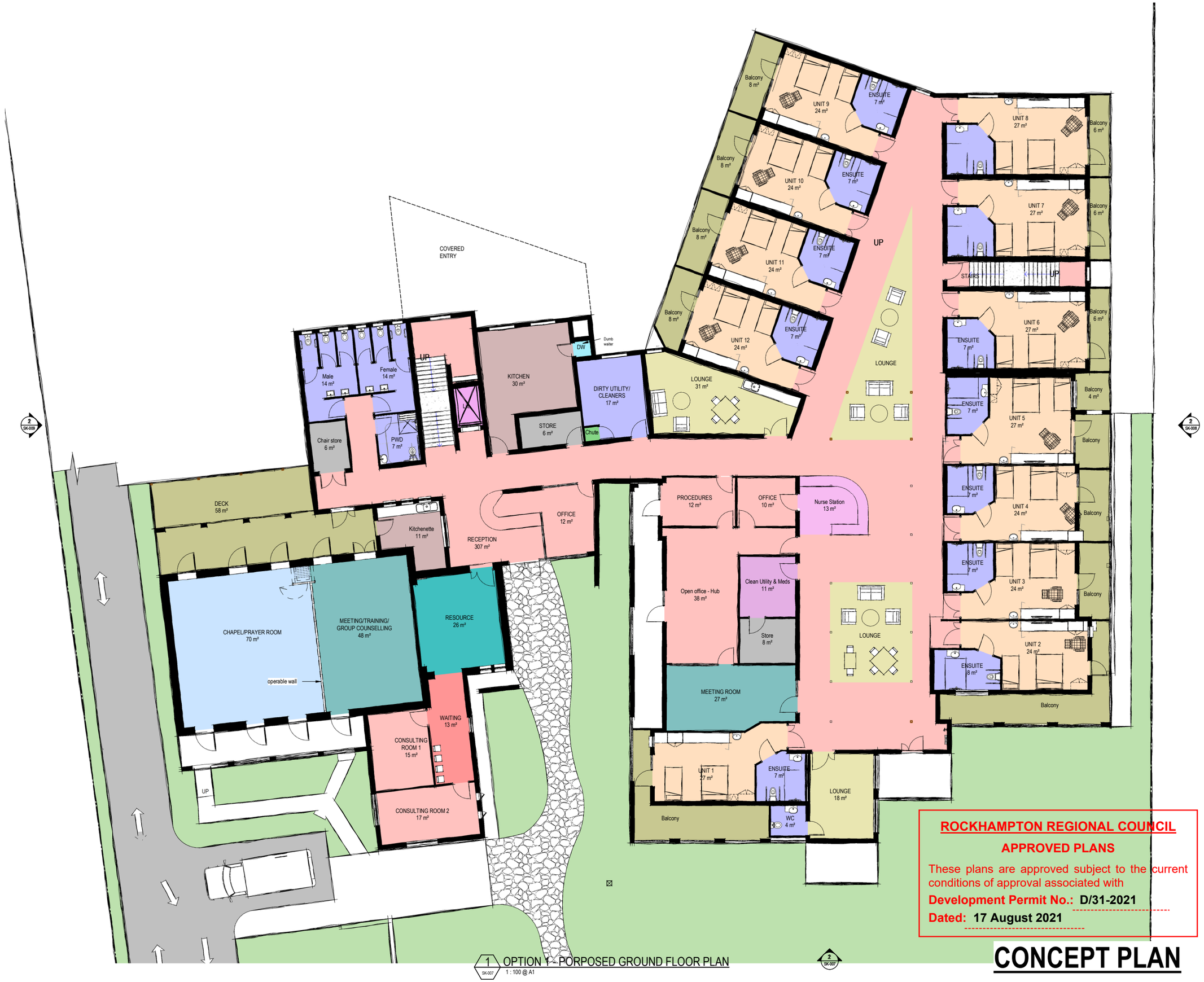
client: FITZROY COMMUNITY HOSPICE

location: 38 AGNES STREET, ROCKHAMPTON

project: FITZROY COMMUNITY HOSPICE CONCEPT PROPOSAL

drawing title: OVERALL PROPOSED PLAN

job no:	drawing no:	rev:
2221	SK-004	P4



1 SK-007 OPTION 1 - PORPOSED GROUND FLOOR PLAN
1 : 100 @ A1

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CONCEPT PLAN

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scale @A1: 1 : 100
scale @A3: 1:200
0 5m
1:100

PRELIMINARY

REV.	DESCRIPTION	ISSUED BY	DATE
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P2	PRELIM UPDATES		10-03-2021
P3	PRELIM UPDATES		11-03-2021

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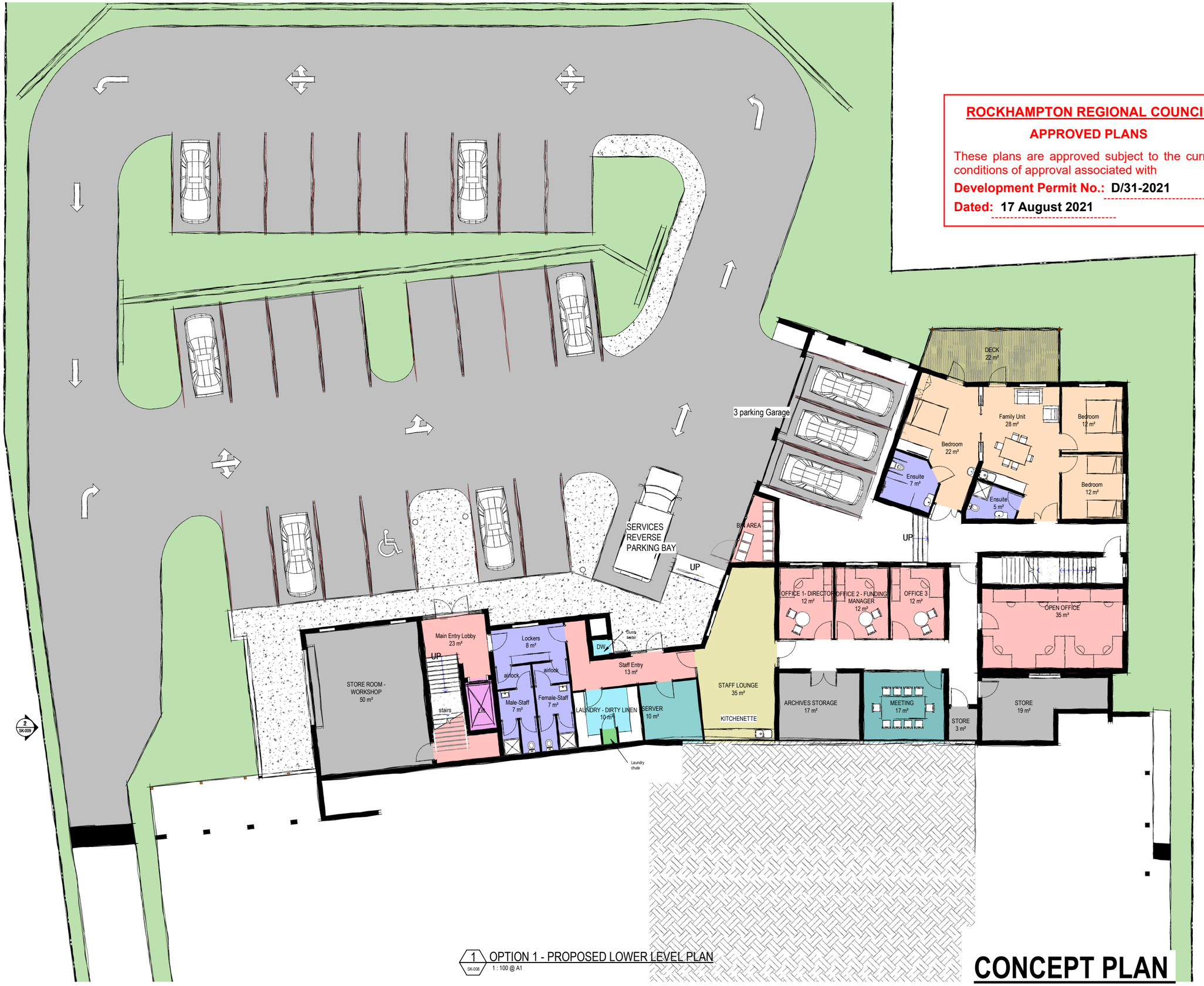
client: FITZROY COMMUNITY HOSPICE

location: 38 AGNES STREET, ROCKHAMPTON

project: FITZROY COMMUNITY HOSPICE CONCEPT PROPOSAL

drawing title: PROPOSED GROUND FLOOR CONCEPT PLAN

job no:	drawing no:	rev:
2221	SK-005	P3



1 SK-008 OPTION 1 - PROPOSED LOWER LEVEL PLAN
1 : 100 @ A1

CONCEPT PLAN

ROCKHAMPTON REGIONAL COUNCIL

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0 5m 1:100

PRELIMINARY

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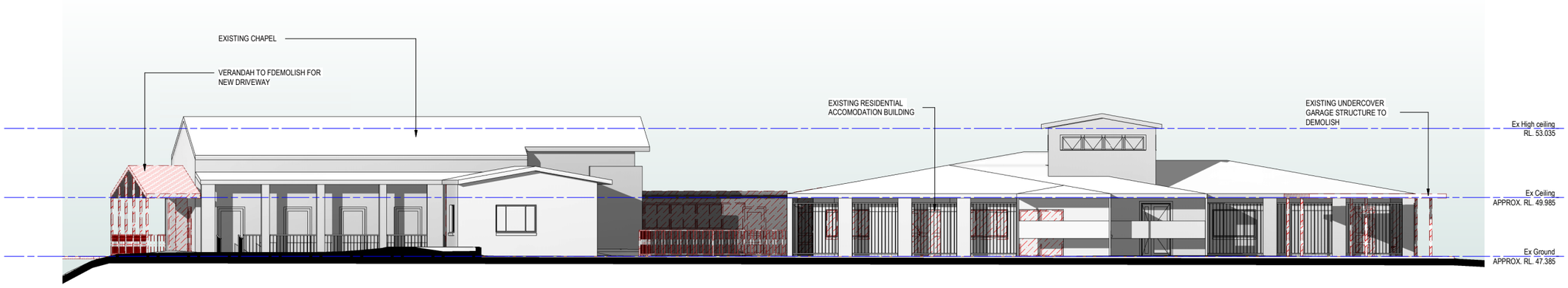
client: FITZROY COMMUNITY HOSPICE

location: 38 AGNES STREET, ROCKHAMPTON

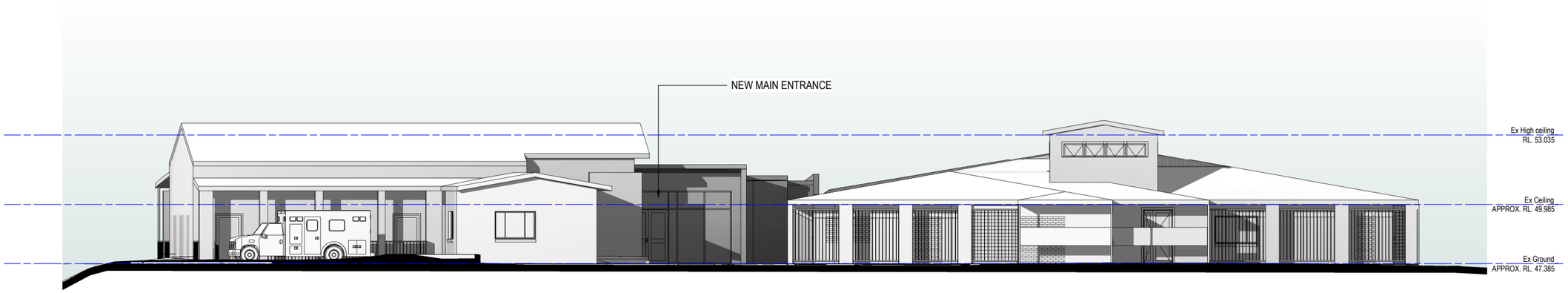
project: FITZROY COMMUNITY HOSPICE CONCEPT PROPOSAL

drawing title: PROPOSED LOWER FLOOR CONCEPT PLAN

job no:	drawing no:	rev:
2221	SK-006	P3



1 SK-002 EXISTING EAST ELEVATION - AGNES STREET
1 : 100 @ A1



2 SK-002 PROPOSED EAST ELEVATION - AGNES STREET
1 : 100 @ A1

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scale @A1	scale @A3
1 : 100	1:200

0 5m 1:100

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38 AGNES STREET, ROCKHAMPTON

project:
FITZROY COMMUNITY HOSPICE CONCEPT PROPOSAL

drawing title:
ELEVATIONS

job no:	drawing no:	rev:
2221	SK-007	P1

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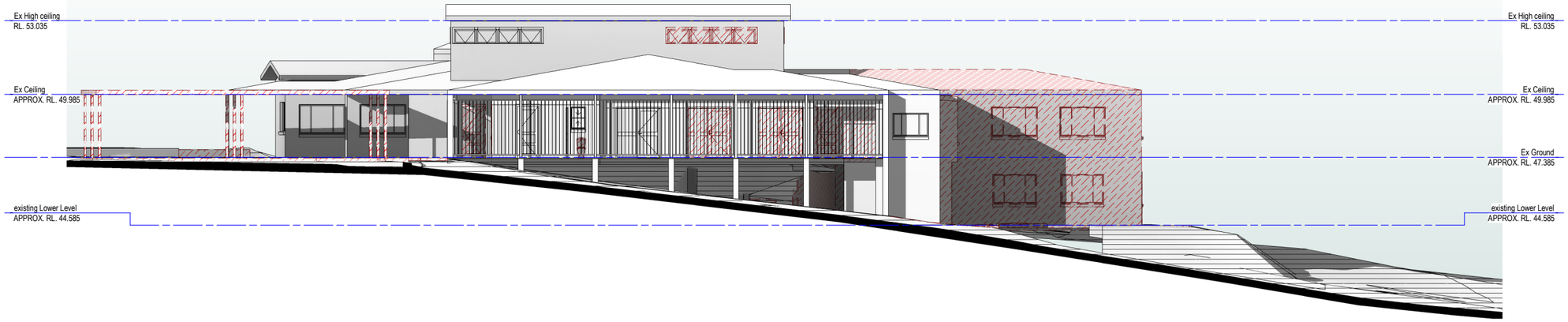
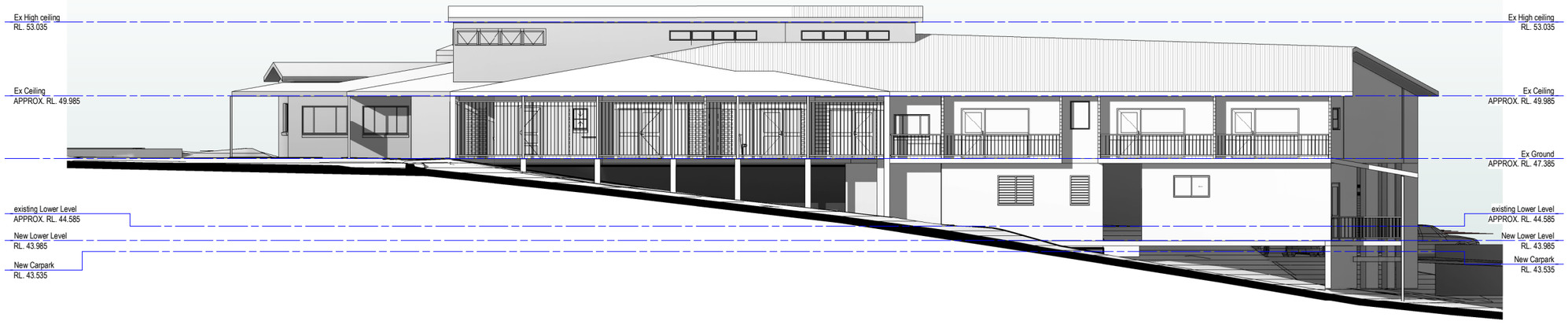


1 SK-002 EXISTING NORTH ELEVATION

1 : 100 @ A1



2 SK-002 PROPOSED NORTH ELEVATION

1 : 100 @ A1

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scale @A1	scale @A3
1 : 100	1:200

0 5m 1:100

PRELIMINARY

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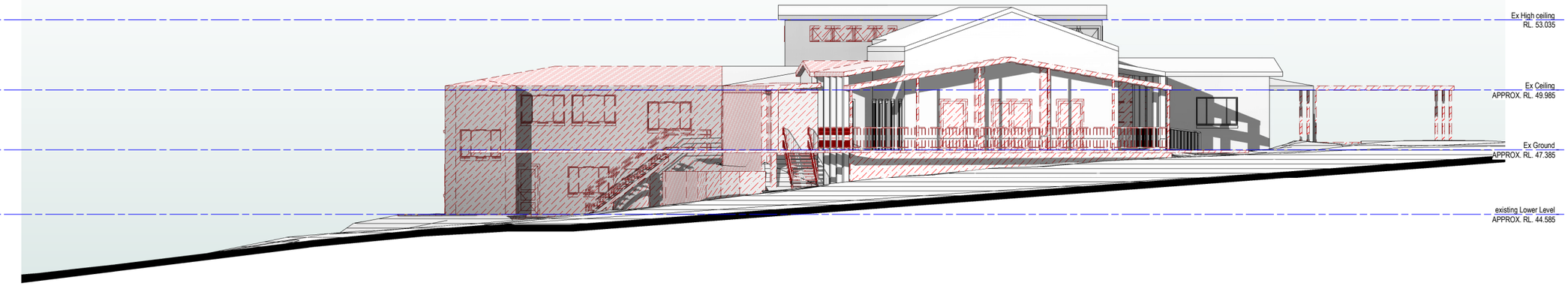
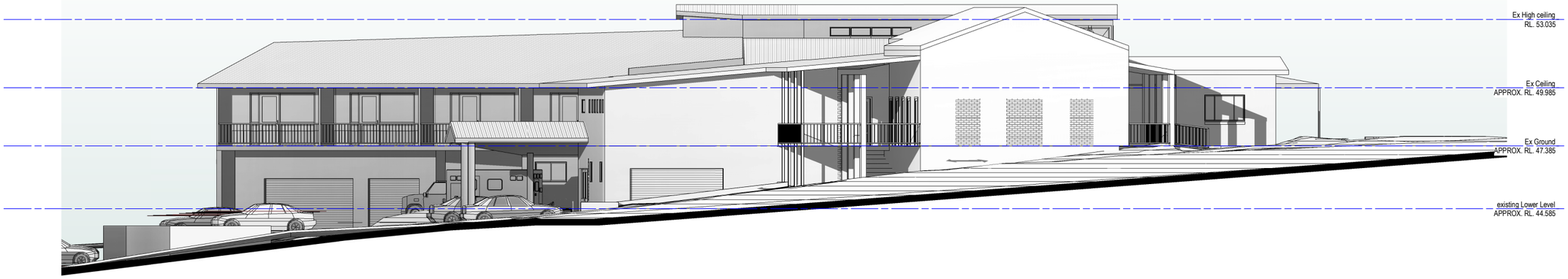
project:
FITZROY COMMUNITY HOSPICE
CONCEPT PROPOSAL

drawing title:
ELEVATIONS

job no:	drawing no:	rev:
2221	SK-008	P3



1 SK-002 EXISTING SOUTH ELEVATION
1 : 100 @ A1



2 SK-002 PROPOSED SOUTH ELEVATION
1 : 100 @ A1

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scale @A1: 1 : 100
scale @A3: 1:200
0 5m 1:100

PRELIMINARY

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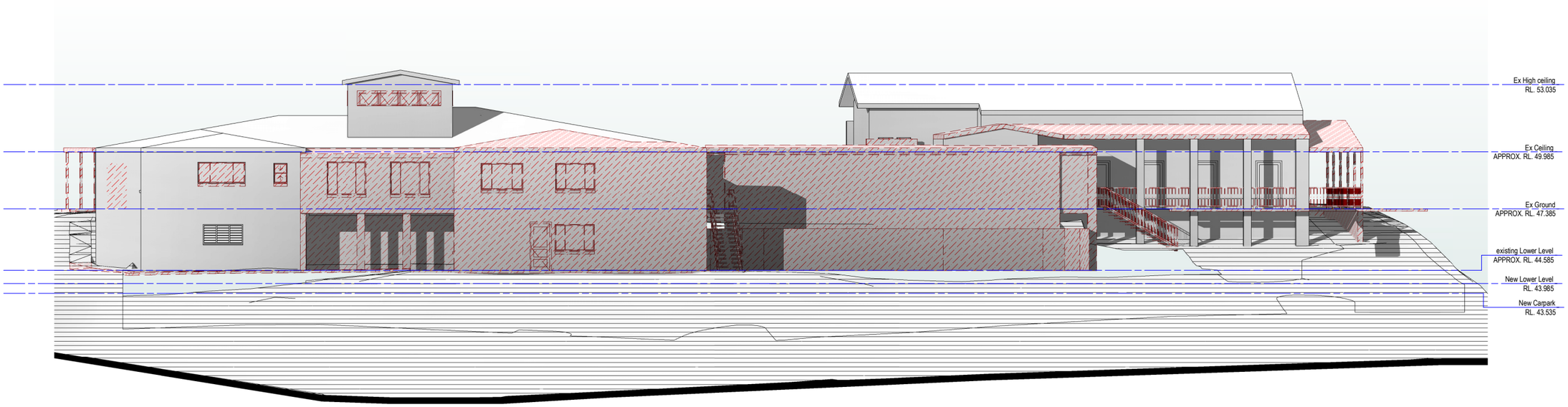
38 AGNES STREET, ROCKHAMPTON

project:
FITZROY COMMUNITY HOSPICE
CONCEPT PROPOSAL

drawing title:
ELEVATIONS

job no:	drawing no:	rev:
2221	SK-009	P1



1 SK-003 EXISTING WEST ELEVATION
1 : 100 @ A1

2 SK-003 PROPOSED WEST ELEVATION
1 : 100 @ A1

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0 5m 1:100

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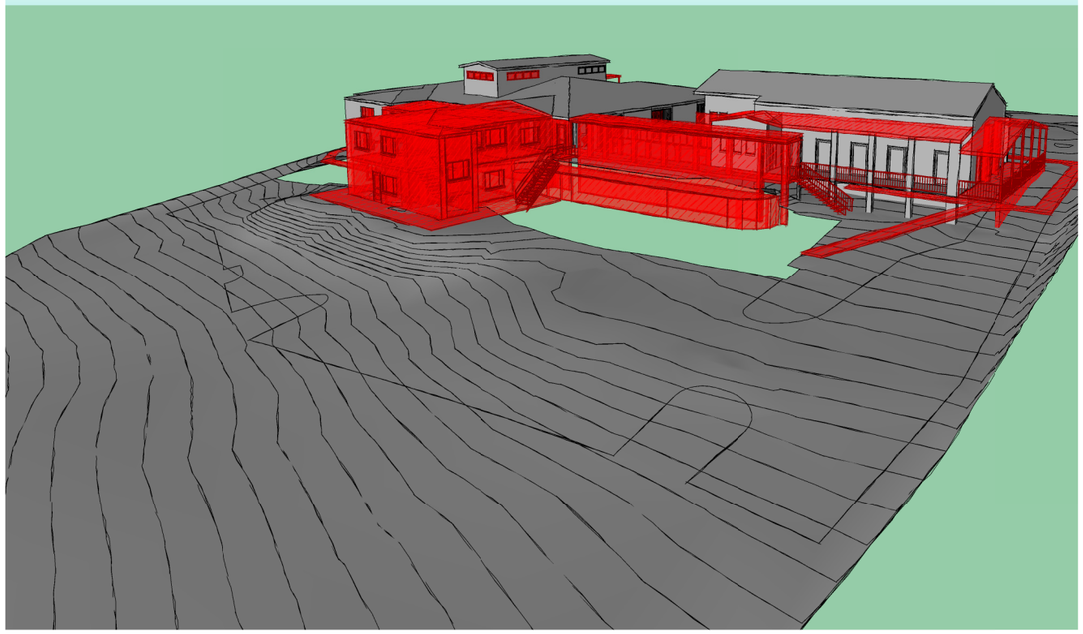
CONCEPT PROPOSAL

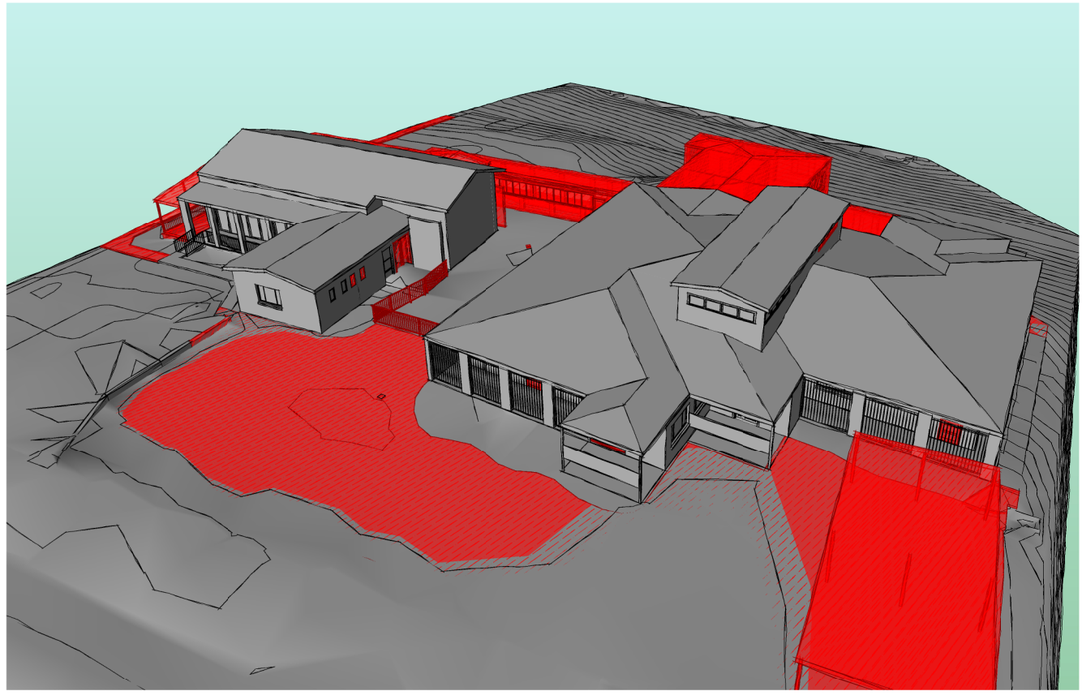
drawing title:
ELEVATIONS

job no:	drawing no:	rev:
2221	SK-010	P2

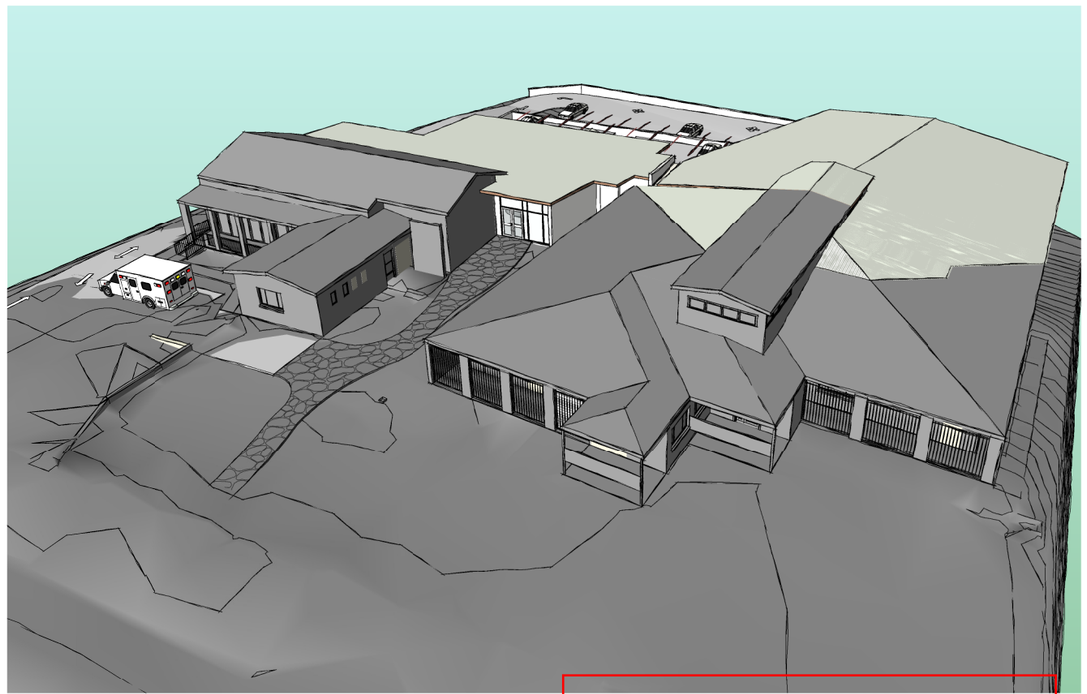


1 EXISTING -3D VIEW 1
@ A1

2 PROPOSED -3D VIEW 1
@ A1



3 EXISTING -3D VIEW 2
@ A1



4 PROPOSED -3D VIEW 2
@ A1

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1:200
0 5m
1:100

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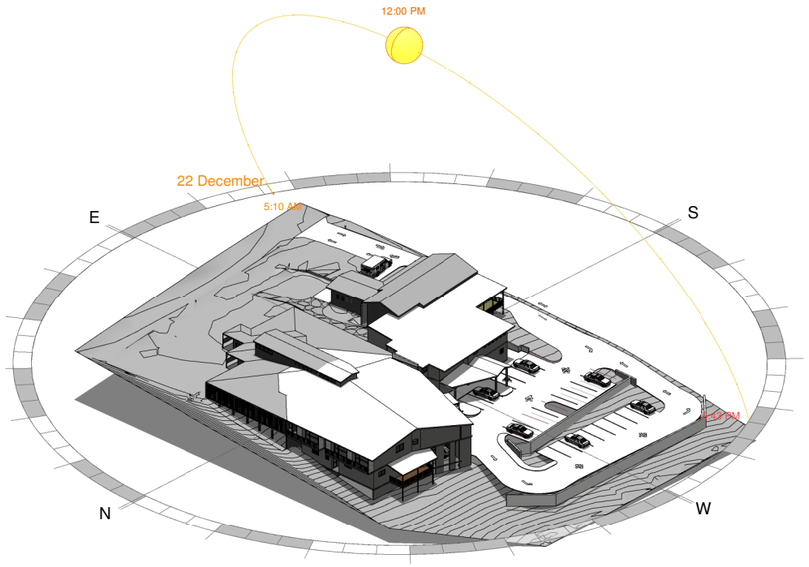
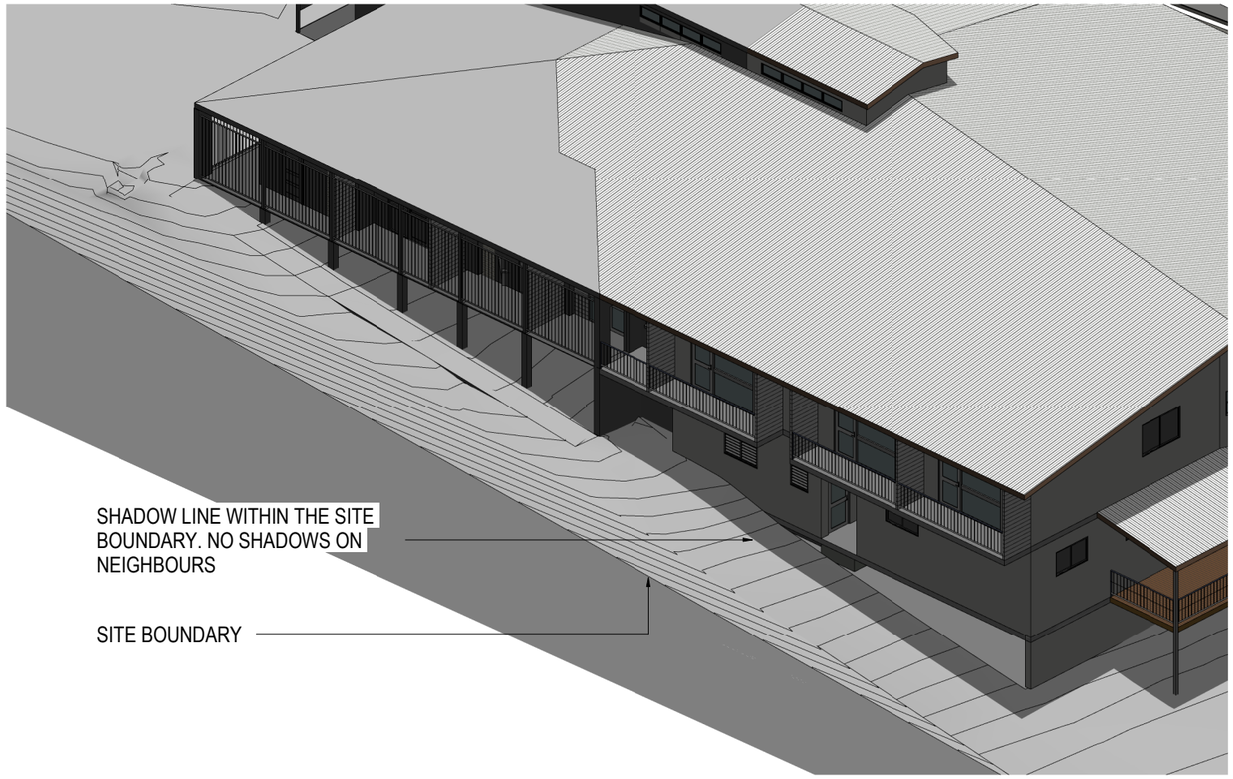
FITZROY COMMUNITY HOSPICE
CONCEPT PROPOSAL

drawing title:
3D VIEWS

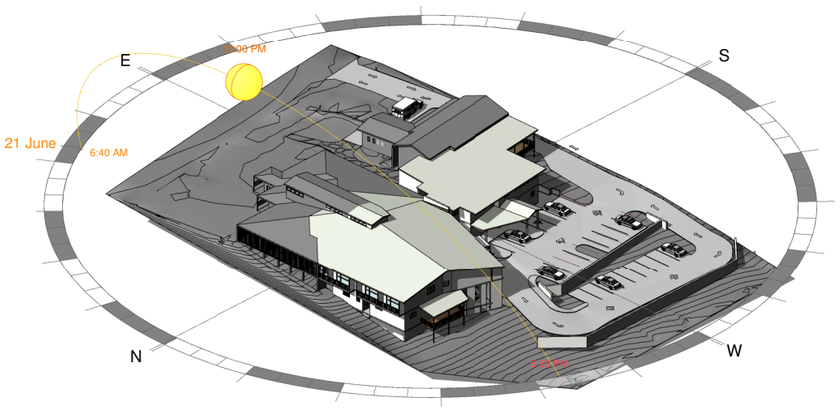
job no:	drawing no:	rev:
2221	SK-011	P2



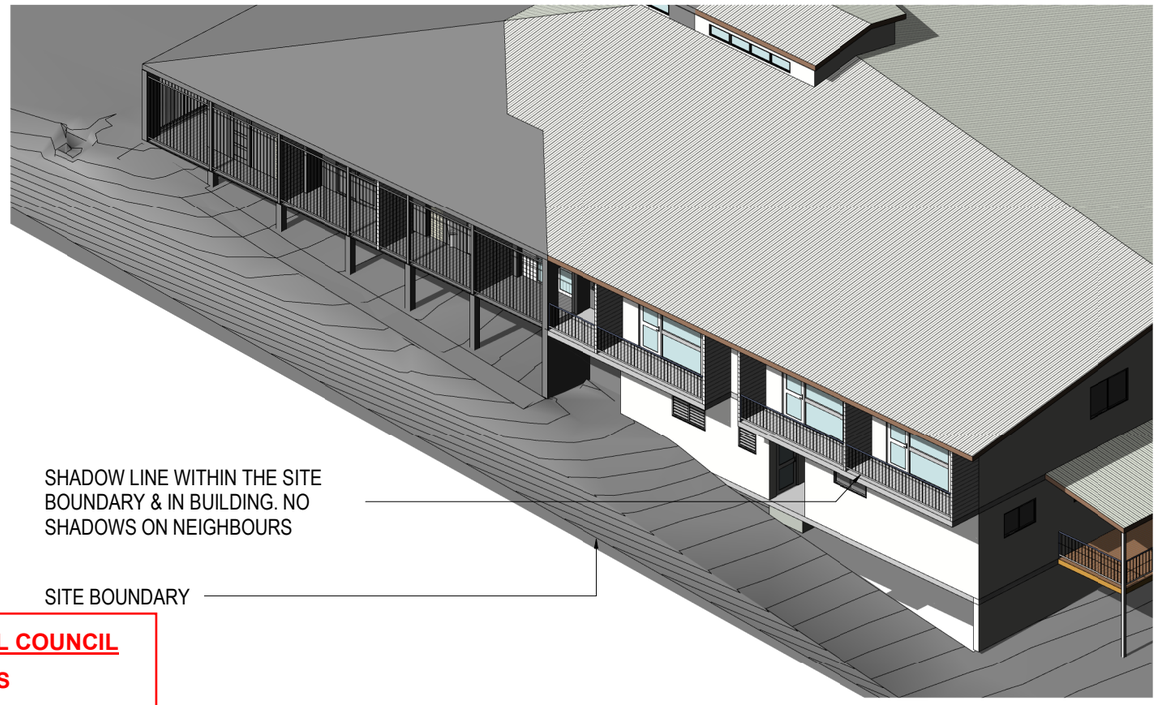
1 PROPOSED SUN STUDY - 22nd Dec 12pm
@ A1



2 PROPOSED SUN STUDY - 22nd Dec 12pm - VIEW
@ A1



3 PROPOSED SUN STUDY - 21st June 12pm
@ A1



4 PROPOSED SUN STUDY - 21st June 12pm - VIEW
@ A1

ROCKHAMPTON REGIONAL COUNCIL

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scale @A1 scale @A3
1:200
0 5m
1:100

PRELIMINARY

REV.	DESCRIPTION	ISSUED BY	DATE
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FITZROY COMMUNITY HOSPICE

location:
38 AGNES STREET, ROCKHAMPTON

project:
FITZROY COMMUNITY HOSPICE
CONCEPT PROPOSAL

drawing title:
SUN STUDY

job no:	drawing no:	rev:
2221	SK-012	P1

1 SK-007 OVERALL EXISTING SITE PLAN - impervious area
1 : 200 @ A1

IMPERVIOUS AREA CALCULATION

EXISTING TOTAL SITE AREA (survey info)-	4947m2
EXISTING CARPARK & BITUMEN AREA -	575m2
EXISTING CONCRETE PATHS	189m2
EXISTING BRICK PAVERS	208m2
EXISTING BUILDING ROOF AREA	1258m2
TOTAL EXISTING IMPERVIOUS AREA	2230m2

CAR PARKING NUMBERS

EXISTING STREET PARKING -	7 BAYS
EXISTING SITE PARKING -	8 BAYS

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0 5m 1:100

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38 AGNES STREET, ROCKHAMPTON

project:
FITZROY COMMUNITY HOSPICE
CONCEPT PROPOSAL

drawing title:
EXISTING IMPERVIOUS AREAS

job no:	drawing no:	rev:
2221	SK-200	P2

1 SK-007 OVERALL PROPOSED SITE PLAN - impervious area
1 : 200 @ A1

IMPERVIOUS AREA CALCULATION

EXISTING TOTAL SITE AREA (survey info)-	4947m2
NEW CARPARK & BITUMEN AREA -	1398m2
NEW & EXISTING CONCRETE PATHS	213m2
NEW STONE PATHS	75m2
EXISTING & NEW BUILDING ROOF AREA	1726m2
TOTAL EXISTING & NEW IMPERVIOUS AREA	3412m2
TOTAL EXISTING IMPERVIOUS AREA	2230m2
TOTAL ADDITIONAL IMPERVIOUS AREA	1182m2

CAR PARKING NUMBERS

EXISTING STREET PARKING -	7 BAYS
NEW STREET PARKING -	1 ADDITIONAL BAY
NEW SITE PARKING BAYS -	24 BAYS
NEW PARKING UNDERCOVER -	3 BAYS

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scale @A1 1 : 200 scale @A3 1:200
0 5m 1:100

PRELIMINARY

REV.	DESCRIPTION	ISSUED BY	DATE
P1	PRELIMINARY ISSUE		05-03-2021
P2	PRELIM UPDATES		10-03-2021

TONY MADDEN ARCHITECTS
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client: FITZROY COMMUNITY HOSPICE

location: 38 AGNES STREET, ROCKHAMPTON

project: FITZROY COMMUNITY HOSPICE CONCEPT PROPOSAL

drawing title: PROPOSED IMPERVIOUS AREA

job no:	drawing no:	rev:
2221	SK-201	P2

mcmurtrie CONSULTING ENGINEERS
REGIONAL LEADERS | NATIONAL EXPERTISE

TECHNICAL MEMORANDUM

Project No. 083-20-21

Date: 09-Jun-21

ROCKHAMPTON REGIONAL COUNCIL
APPROVED PLANS
These plans are approved subject to the current conditions of approval associated with
Development Permit No.: D/31-2021
Dated: 17 August 2021

To:
Luke Madden
Architect
Tony Madden Architects
luke@tmarchitects.com.au

From:
Lachlan McMurtrie
Director
McMurtrie Consulting Engineers
lachaln@mcmengineers.com

FITZROY COMMUNITY HOSPICE – STORMWATER MANAGEMENT PLAN STATEMENT

INTRODUCTION

McMurtrie Consulting Engineers (MCE) has been engaged by Tony Madden Architects to prepare a Stormwater Management Plan Statement for the proposed Fitzroy Community Hospice situated at 38 Agnes Street, Rockhampton on Lot 2 on SP125014. The subject site is located within the Wandal and West Rockhampton Local Catchment and is not affected by local or riverine (Fitzroy River) flooding.

Figure 1 – Site Location (*Source: Queensland Globe*)

HYDROLOGIC ASSESSMENT

The hydrologic assessment flows are derived using the Rational Method and considered the following scenarios:

- Existing: The site in its current condition as shown in *Attachment A*.
- Developed: Proposed development, as shown in *Attachment B*.

Existing

The site has an area of 4,947m^2 with elevations ranging between 47.50m on the eastern boundary and 39.50m on the western boundary. Currently the site is occupied by buildings, carpark and pathways to a total impervious area of 2,230m^2. The rest of the area is covered in grass and a few scattered trees. The site stormwater runoff currently flows across the site from an east to westerly direction and discharges on to the stormwater easement that runs along the western boundary which is the Lawful Point of Discharge (LPOD). This stormwater easement then continues to run through the adjacent lot fronting Pennycuick Street (Lot 4 on RP618105) and ultimately discharges into Pennycuick Street (refer *Figure 1*). The site itself is its own catchment and is not influenced by external catchments. Rational Method has been adopted to calculate the pre-development and post-development discharge generated from the site.

Table 1 details the Rational Method parameters used for 1% AEP for the existing scenario. Refer *Attachment C* for detailed calculations.

Table 1: Rational Method Parameters - Existing

Parameter	Existing Catchment
Area (ha)	0.49
Fraction Impervious (%)	45
Runoff Coefficient C_{10}	0.74
Time of Concentration (min)	10
1% AEP Peak Flow Rate (m^3/sec)	0.305

Developed

The developed condition will consist number of buildings with increased areas for carpark and pathways, adding the total impervious area to 3,412m^2. The rest of the area will be landscaped. The stormwater runoff from the site will be directed to the stormwater easement located along the western boundary of the site.

Table 2 details the Rational Method parameters used for 1% AEP for the developed scenario. Refer *Attachment C* for detailed calculations.

Table 2: Rational Method Parameters - Developed

Parameter	Developed Catchment
Area (ha)	0.49
Fraction Impervious (%)	70
Runoff Coefficient C_{10}	0.81
Time of Concentration (min)	8
1% AEP Peak Flow Rate (m^3/sec)	0.361

DETENTION

Initial sizing of the detention basin has been undertaken by a comparison of *Culp (1948), Boyd (1989), Carroll (1990)* and *Basha (1994)* equations to determine the order of magnitude of the storage required for the major storm. Boyd equation produced the largest detention volume for 1% AEP and then followed by Basha. Therefore conservatively adopting Boyd's equation, the proposed development would require approximately 36m^3 of detention volume to ensure no worsening to downstream catchments and infrastructure. Refer *Attachment C* for calculations. It is proposed that the required detention volume will be provided by detaining the runoff captured in the carpark bounded by kerb. There is ample carpark area to provide the above detention volume. Kerb breaks will be provided in the carpark to throttle the runoff prior to discharging onto the drainage easement at pre-development discharge rate. Rock pads will be installed at kerb breaks to prevent any scouring. Details of the kerb breaks and rock pads will be provided at detailed design stage when runoff routing calculations are undertaken to optimise the detention basin size utlising a computer model. It is acknowledged that during a storm event, detained stormwater will not be evenly distributed across the proposed carpark area and that water will start to backup from the throat of the kerb breaks. Depth of detention within car park will be designed not to exceed 150mm.

QUALITY ASSESSMENT

The proposed development will result in an impervious area greater than 25 per cent of the net developable area and therefore will be required to satisfy the water quality benchmarks setout in State Planning Policy (2017).

During the construction phase of the development, disturbances to the existing ground have the potential to significantly increase sediment loads entering downstream drainage systems and watercourses. The operational phase of the development will potentially increase the amount of sediments and nutrients washing from the site.

The following section describes construction phase controls in compliance with Council guidelines.

Construction Phase

Key Pollutants

During the construction phase a number of key pollutants have been identified for this development. Table 3 illustrates the key pollutants that have been identified.

Table 3: Key Pollutants

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, material off cuts.
Sediment	Exposed soils and stockpiles during earthworks and building works.
Hydrocarbons	Fuel and oil spills, leaks from construction equipment and temporary car park areas.

Erosion and Sediment Control (ESC) devices employed on the site shall be designed and constructed in accordance with CMDG.

Pre Construction

- Stabilised site access/exit onto Agnes Street.
- Sediment fences to be located along the contour lines downstream of disturbed areas.
- Diversion drains to divert clean runoff around the construction site.
- Educate site personnel to the requirements of the Sediment and Erosion Control Plan.

Construction

- Maintain construction access/exit, sediment fencing, catch drains and all other existing controls as required.

- Progressively surface and revegetate finished areas as appropriate.

During construction, all areas of exposed soils allowing dust generation are to be suitably treated. Treatments will include mulching the soil and watering. Road access is to be regularly cleaned to prevent the transmission of soil on vehicle wheels and eliminate any build-up of typical road dirt and tyre dusts from delivery vehicles.

Adequate waste disposal facilities are to be provided and maintained on the site to cater for all waste materials such as litter hydrocarbons, toxic materials, acids or alkaline substances.

Operational Phase

Approximately 75 square metresof bioretention treatment area would be required to satisfy compliance with the State Planning Policy (SPP) water quality benchmarks considering the area of the contributing catchment. Modelling has not been used to demonstrate compliance, however a conservative estimate is the default bioretention treatment area required to comply with water quality objectives being 1.5 per cent of the contributing catchment (SPP). Note that use of this default area may result in a larger footprint than if modelling is undertaken. A detailed water quality assessment will be conducted during detailed design stage using the industry standard MUSIC software. It is proposed that the bioretention area can be incorporated in the garden bed located in the centre area of the carpark at the rear of the property.

CONCLUSION AND QUALIFICATIONS

This SMP statement has been prepared for the proposed Fitzroy Community Hospice. The development is subject to detailed design, and further supporting analysis may be required as part of future applications.

The above analysis indicates the proposed development will not result in adverse stormwater quantity runoff external to the site and the stormwater quality benchmark can be satisfied by introducing a treatment device such as a bio-retention basin.

Lachlan McMurtrie
Director
RPEQ 15243

Attachment A: Existing Scenario

1 OVERALL EXISTING SITE PLAN
SK-007
1 : 200 @ A1

CONCEPT PLAN

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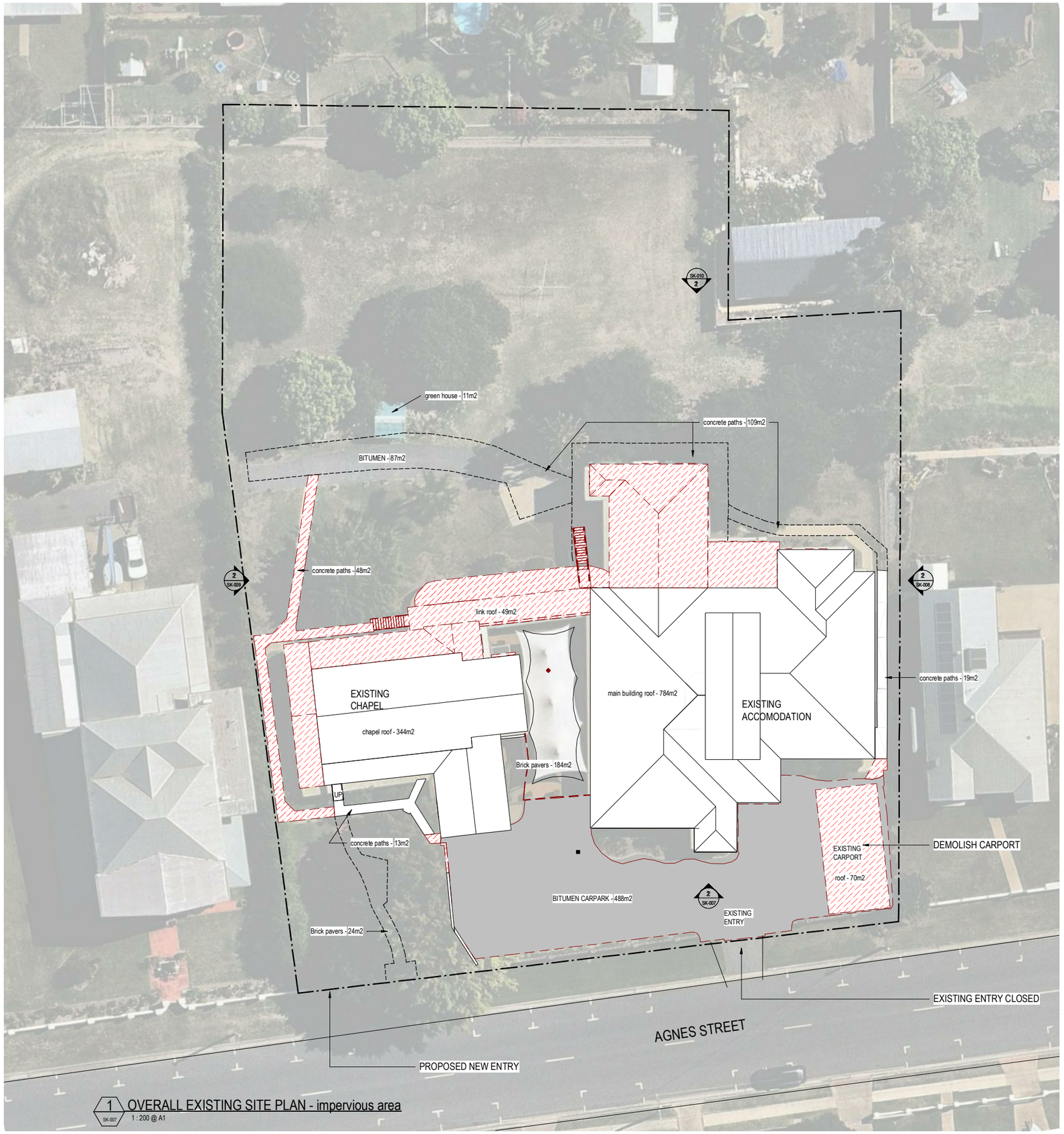
38 AGNES STREET, ROCKHAMPTON

project:
FITZROY COMMUNITY HOSPICE
CONCEPT PROPOSAL

drawing title:
OVERALL EXISTING SITE PLAN

job no:	drawing no:	rev:
2221	SK-001	P1



1 OVERALL EXISTING SITE PLAN - impervious area
SK-007 1 : 200 @ A1

IMPERVIOUS AREA CALCULATION

EXISTING TOTAL SITE AREA (survey info)-	4947m2
EXISTING CARPARK & BITUMEN AREA -	575m2
EXISTING CONCRETE PATHS	189m2
EXISTING BRICK PAVERS	208m2
EXISTING BUILDING ROOF AREA	1258m2
TOTAL EXISTING IMPERVIOUS AREA	2230m2

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drawing title:
EXISTING IMPERVIOUS AREAS

job no:	drawing no:	rev:
2221	SK-200	P1

Attachment B: Developed Scenario

1 SK-007 OVERALL PROPOSED SITE PLAN - impervious area
1 : 200 @ A1

IMPERVIOUS AREA CALCULATION

EXISTING TOTAL SITE AREA (survey info)-	4947m2
NEW CARPARK & BITUMEN AREA -	1398m2
NEW & EXISTING CONCRETE PATHS	213m2
NEW STONE PATHS	75m2
EXISTING & NEW BUILDING ROOF AREA	1726m2
TOTAL EXISTING & NEW IMPERVIOUS AREA	3412m2
TOTAL EXISTING IMPERVIOUS AREA	2230m2
TOTAL ADDITIONAL IMPERVIOUS AREA	1182m2

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job no:	drawing no:	rev:
2221	SK-201	P1

Attachment C: Rational Method Calculations and Detention Basin Sizing

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Stormwater Design
Rational Method

Project No: **083-20-21**
Project Descrption: **38 Agnes Street, Rockhampton**
Design Details: **1% AEP - Pre Development**

Coefficient of Discharge Section

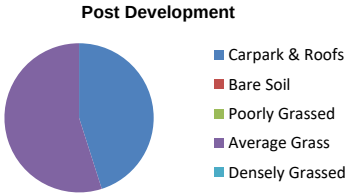
Description	*Symbol*	*Unit*	*Value*	*Reference*	*Comments*
Fractions Impervious	f_i		0.450		***Carpark + Roof + Pathways***
1 hour ARI 10 rainfall intensity	${}^{1hr}i_{10}$	mm/hr	64.9	2016 IFD	
Frequency Factor	F_y		1.20	QUDM 2016, Table 4.5.2	***1% AEP***
10yr Coefficient of Discharge	C_{10}		0.74	QUDM 2016, Table 4.5.3	
'y' yr Coefficient of Discharge	C_y		0.89	QUDM 2016, Equ 4.3 $= F_y \times C_{10}$	
Adopted Coefficient of Discharge is:	C_y		**0.89**	***Where a coefficient of discharge calculated from Equation 4.3 for an urban catchment exceeds 1.00, it should be arbitrarily set to 1.0 in accordance with 'the recommendations of Australian Rainfall and Runoff (2016).***	

Time of Sheet Flow

Description	*Symbol*	*Unit*	*Value*	*Reference*	*Comments*
Flow path Length	*L*	m	90	QUDM 2016, Table 4.6.4	

Breakdown of Horton's Surface Areas

	n	*m2*	*%*	
Carpark & Roofs	0.018	2230	45%	0.008
Bare Soil	0.0275		0%	0.000
Poorly Grassed	0.035		0%	0.000
Average Grass	0.045	2717	55%	0.025
Densely Grassed	0.060		0%	0.000
Total		**4947**		**0.033**



Horton's surface roughness factor	*n*		0.033		***Refer above for breakdown of areas***
Slope of surface	*S*	%	9.0		
Overland sheet flow travel time	*t*	min	10.13	QUDM 2016, Equ 4.5 $= (107\ n\ L^{0.333}) / S^{0.2}$	*Friend's Equation (QUDM 2016, 4.5)*
Adopted Time of Concentration		**min**	**10.00**		

Peak Flow Rate Calculation

Description	*Symbol*	*Unit*	*Value*	*Reference*	*Comments*
'y' yr Coefficient of Discharge	C_y		0.89	As above	
Catchment Area	*A*	ha	0.4947		
Average rainfall intensity for a design duration of '*t*' hours (calculated abvoe) and an ARI of 'y' years	${}^{t}I_y$	mm/hr	250	2016 IFD	
Peak Flow Rate for an ARI of 'y' years	Q_y	m^3/sec	**0.305**		

Stormwater Design
Rational Method

Project No: **083-20-21**
Project Descrption: **38 Agnes Street, Rockhampton**
Design Details: **1% AEP - Post Development**

Coefficient of Discharge Section

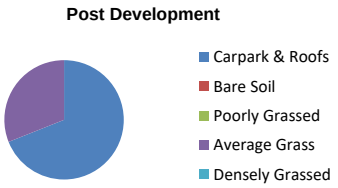
Description	*Symbol*	*Unit*	*Value*	*Reference*	*Comments*
Fractions Impervious	f_i		0.700		***Carpark + Roof + Pathways***
1 hour ARI 10 rainfall intensity	$^{1hr}i_{10}$	mm/hr	64.9	2016 IFD	
Frequency Factor	F_y		1.20	QUDM 2016, Table 4.5.2	***1% AEP***
10yr Coefficient of Discharge	C_{10}		0.81	QUDM 2016, Table 4.5.3	
'y' yr Coefficient of Discharge	C_y		0.97	QUDM 2016, Equ 4.3 $= F_y \times C_{10}$	
Adopted Coefficient of Discharge is:	C_y		**0.97**	***Where a coefficient of discharge calculated from Equation 4.3 for an urban catchment exceeds 1.00, it should be arbitrarily set to 1.0 in accordance with 'the recommendations of Australian Rainfall and Runoff (2016).***	

Time of Sheet Flow

Description	*Symbol*	*Unit*	*Value*	*Reference*	*Comments*
Flow path Length	*L*	m	90	QUDM 2016, Table 4.6.4	

Breakdown of Horton's Surface Areas

	n	*m2*	*%*	
Carpark & Roofs	0.018	3412	69%	0.012
Bare Soil	0.0275		0%	0.000
Poorly Grassed	0.035		0%	0.000
Average Grass	0.045	1535	31%	0.014
Densely Grassed	0.060		0%	0.000
Total		**4947**		**0.026**



Horton's surface roughness factor	*n*		0.026		***Refer above for breakdown of areas***
Slope of surface	*S*	%	9.0		
Overland sheet flow travel time	*t*	min	8.14	QUDM 2016, Equ 4.5 $= (107\ n\ L^{0.333}) / S^{0.2}$	*Friend's Equation (QUDM 2016, 4.5)*
Adopted Time of Concentration		**min**	**8.00**		

Peak Flow Rate Calculation

Description	*Symbol*	*Unit*	*Value*	*Reference*	*Comments*
'y' yr Coefficient of Discharge	C_y		0.97	As above	
Catchment Area	*A*	ha	0.4947		
Average rainfall intensity for a design duration of '*t*' hours (calculated abvoe) and an ARI of 'y' years	$^{t}I_y$	mm/hr	270	2016 IFD	
Peak Flow Rate for an ARI of 'y' years	Q_y	m^3/sec	**0.361**		

Detention Basin Sizing Check (To limit the Peak

Peak Flow Rate Pre Development	Qo	0.305	m^3/s	Previous Calculated
Peak Flow Rate Post Development	Qi	0.361	m^3/s	Previously Calculated
Reduction Ratio	r	0.155125		(Qi-Qo)/Qi
Total Time of Concentration	tc	480	s	Previously Calculated
Inflow Volume	Vi	231.04	m^3	4tcQi/3
Initial Sizing (Culp 1948)	*Vs*	15.65311	m^3	QUDM Eq 5.01
Initial Sizing (Boyd 1989)	*Vs*	35.84	m^3	QUDM Eq 5.02
Initial Sizing (Carroll 1990)	*Vs*	16.91479	m^3	QUDM Eq 5.03
Initial Sizing (Basha 1994)	*Vs*	25.74656	m^3	QUDM Eq 5.04
Initial Sizing Volume	**V**	35.84	**m^3**	Maximum of all metho