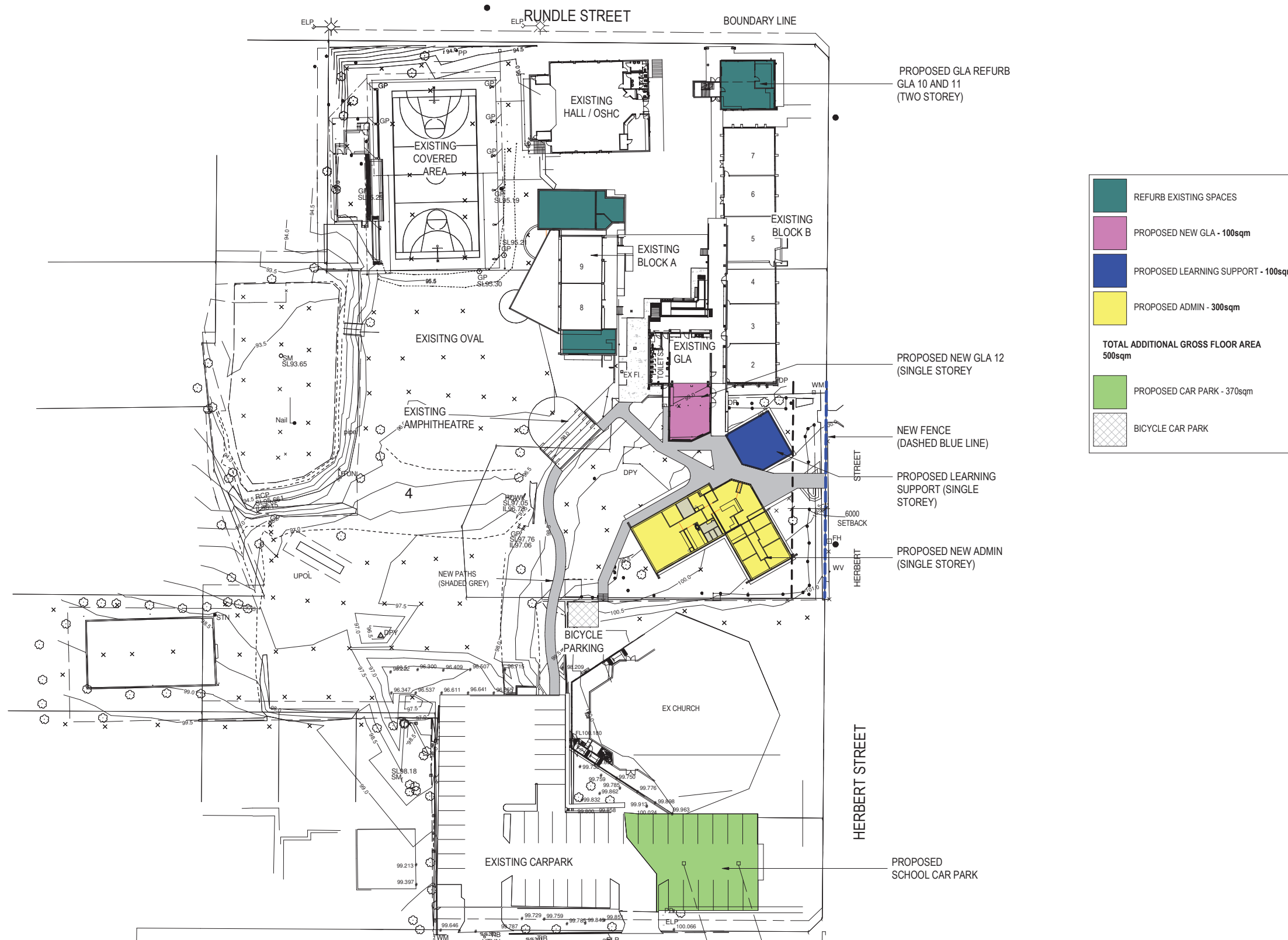


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**LANDSCAPING LEGEND**

- EXISTING GRASS (TO REMAIN)
- EXISTING TREES (TO REMAIN)
- PROPOSED NEW TREES / SHRUBS

PROPOSED SHRUBS / TREES TO BE SELECTED TO COMPLY WITH ROCKHAMPTON REGIONAL COUNCIL REQUIREMENTS



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**REVISIONS**

REVISION	DESCRIPTION	DATE

project:  
MCU APPLICATION

client:  
ROMAN CATHOLIC TRUST CORP.  
DIOCESE OF ROCKHAMPTON FOR  
CATHOLIC EDUCATION -  
DIOCESE OF ROCKHAMPTON

drawing title:  
LANDSCAPE PLAN

location:  
ST. JOSEPH'S WANDAL

job no:  
2096

drawing no:  
SK-03

drawn  
Author  
date  
JAN 17

scale  
As  
indicated

rev

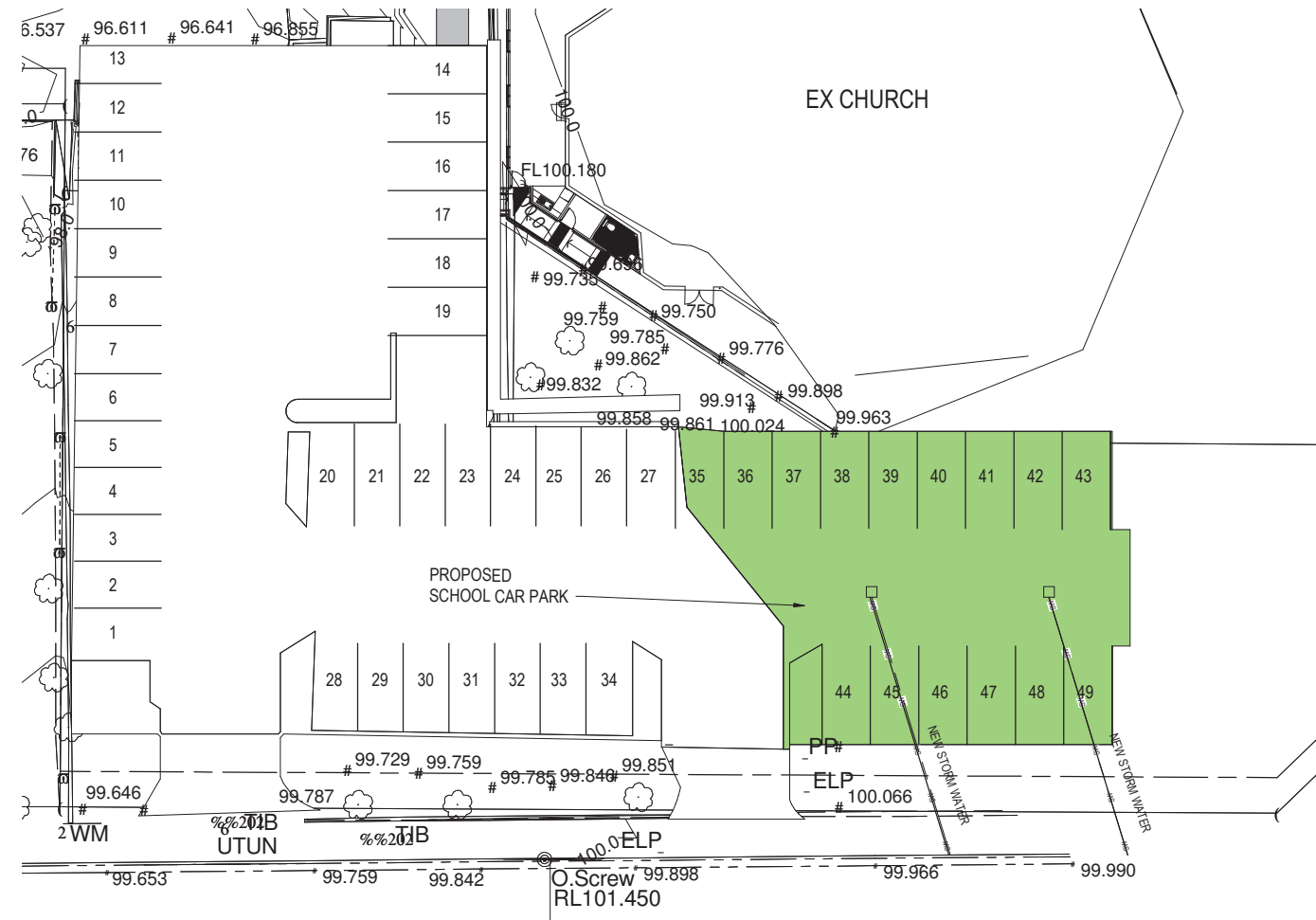
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**Dated: 27 February 2018**

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CP PROPOSED CAR PARK  
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CATHOLIC EDUCATION -  
DIOCESE OF ROCKHAMPTON

drawing title:  
PROPOSED CAR PARK  
EXTENSION

location:  
ST. JOSEPH'S WANDAL

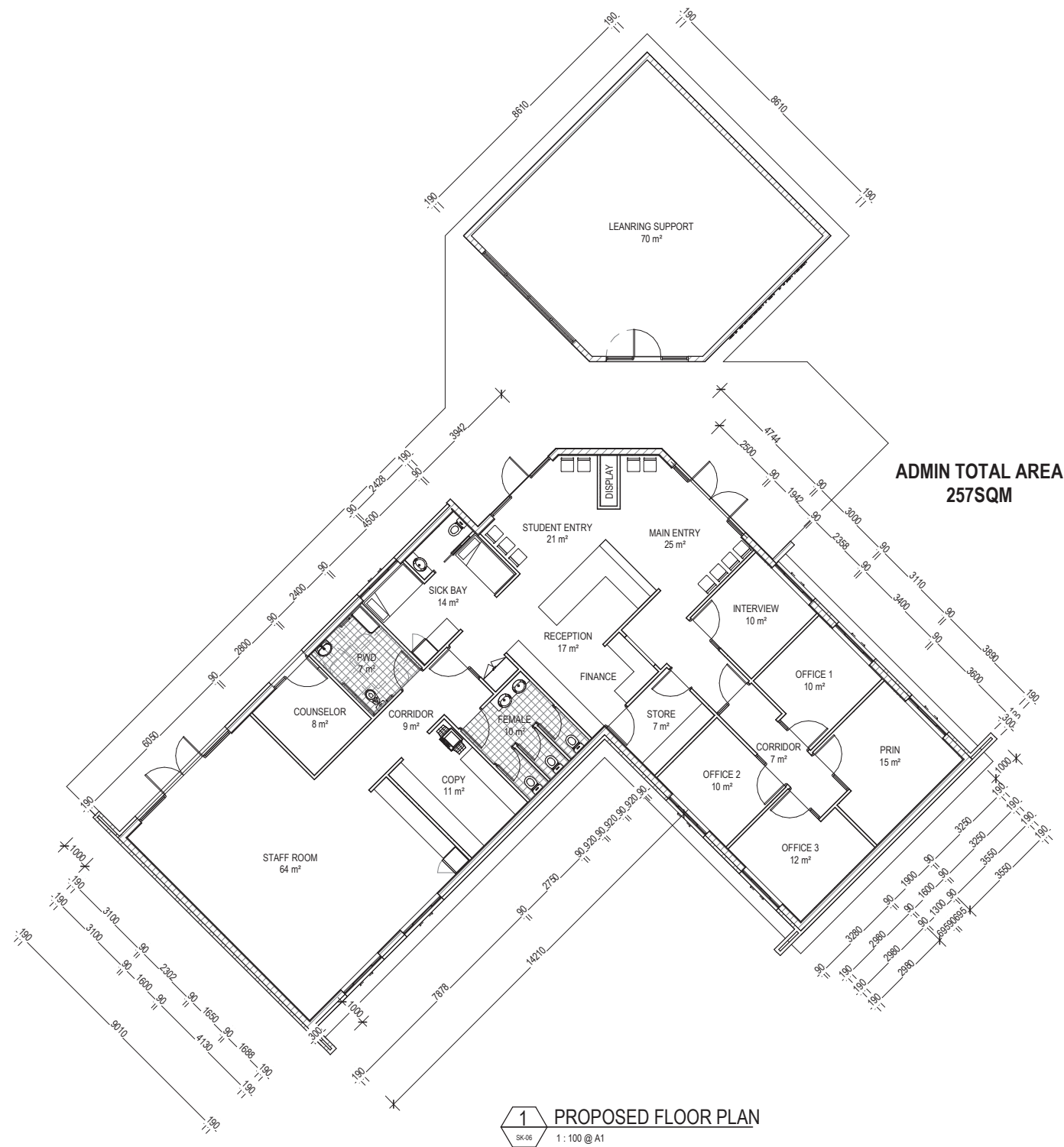
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drawn Author date JAN 17	scale 1 : 200
TONY MADDEN ARCHITECTS & INTERIORS 171-175 BOLSOVER ST ROCKHAMPTON Phone (07)4927 9700 Fax (07)4927 8815	

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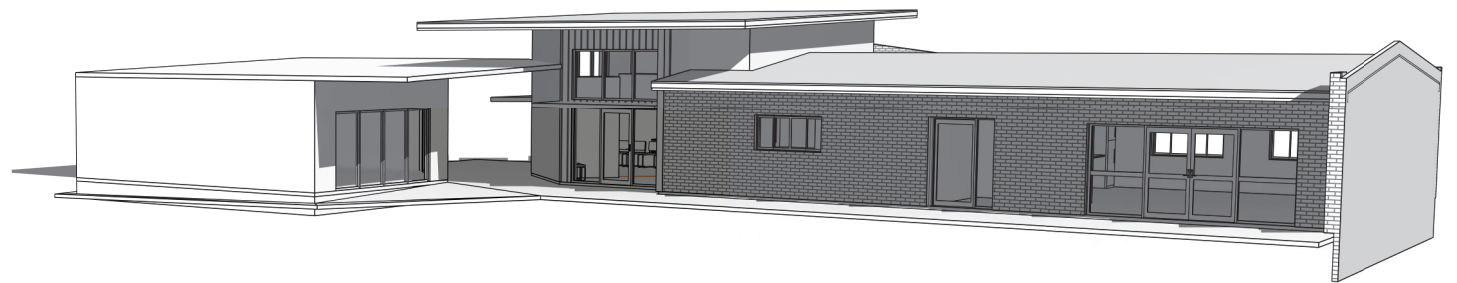
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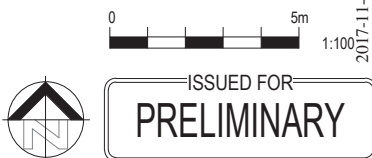


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CATHOLIC EDUCATION -  
DIOCESE OF ROCKHAMPTON

drawing title:  
PROPOSED ADMIN &  
LEARNING SUPPORT

location:  
ST JOSEPH'S WANDAL

job no:  
2096

drawing no:  
SK-05

drawn  
NJB  
date  
JAN 17

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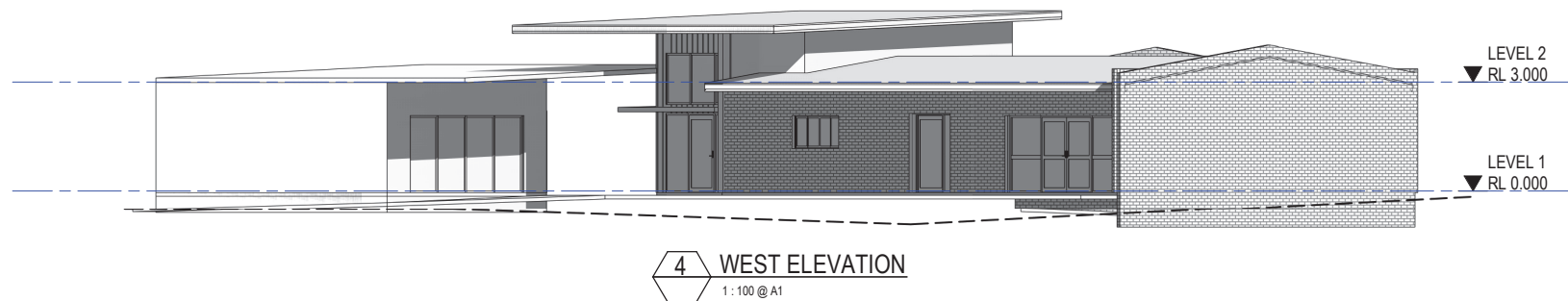
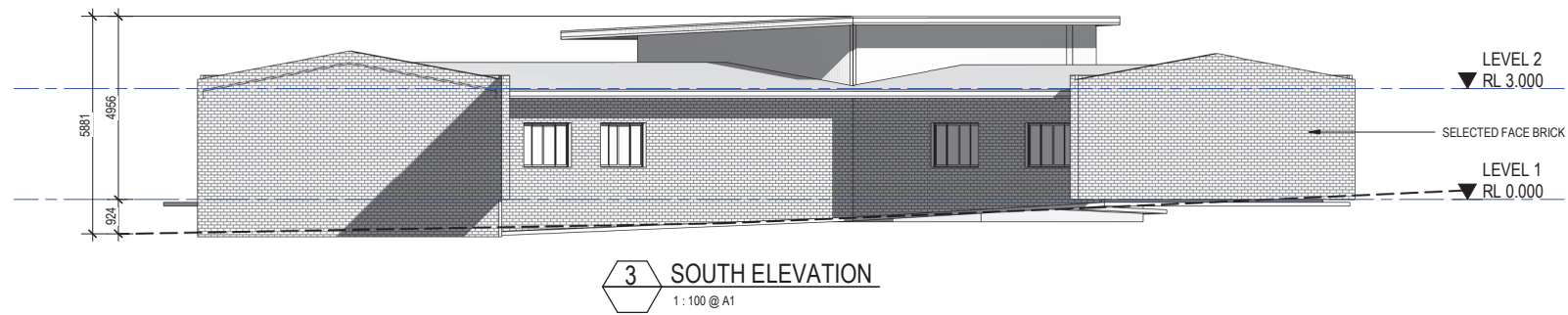
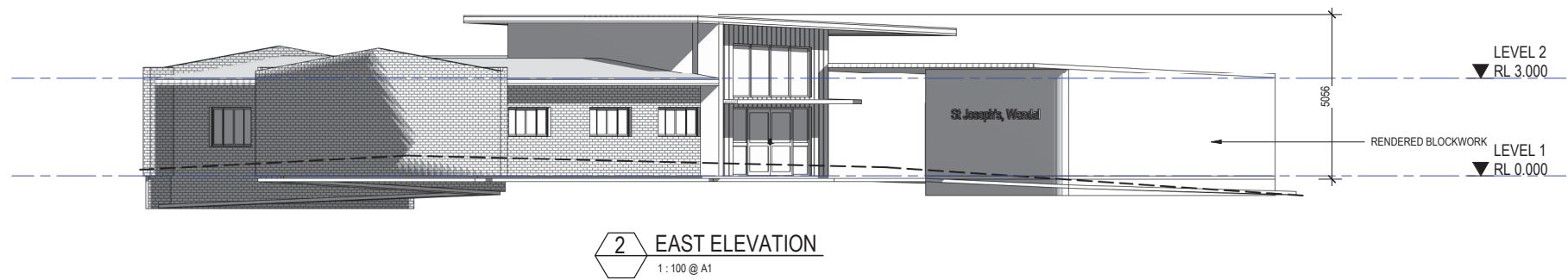
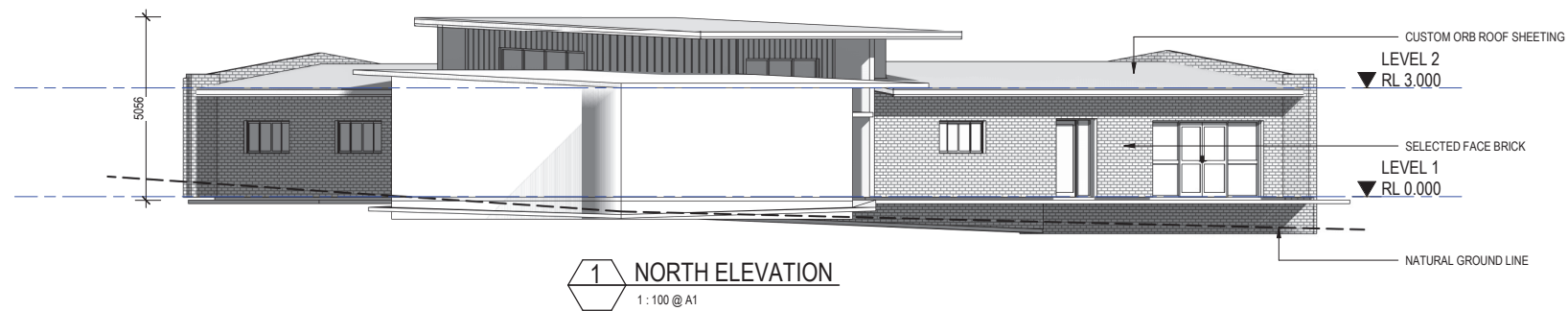
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DIOCESE OF ROCKHAMPTON

drawing title:  
ELEVATIONS

location:  
ST JOSEPH'S WANDAL

job no:  
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drawing no:  
SK-06

drawn  
Author  
date  
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FOR CATHOLIC EDUCATION -  
DIOCESAN OF ROCKHAMPTON

drawing title:  
PROPOSED GLA

location:  
RUNDAL STREET &  
HERBERT STREET, SOUTH  
ROCKHAMPTON

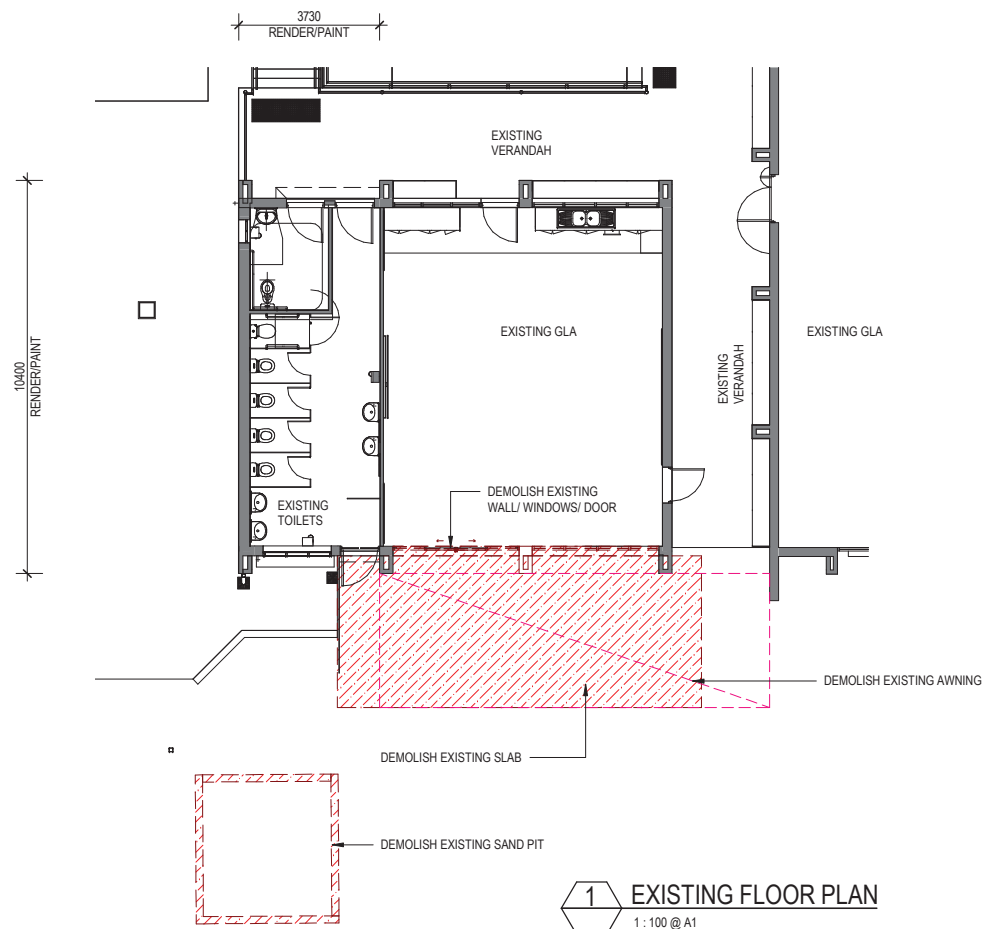
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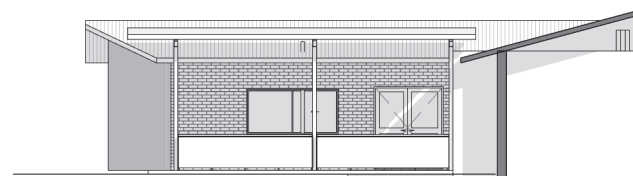
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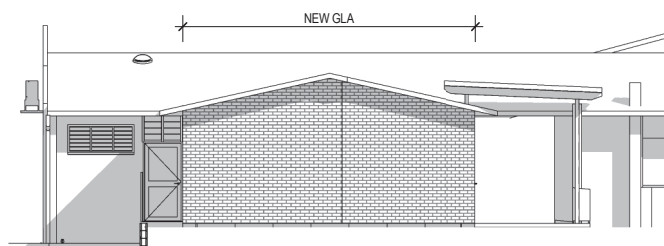
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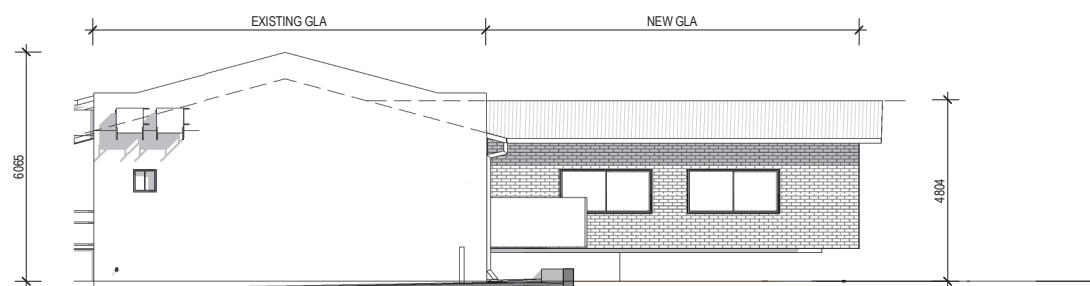
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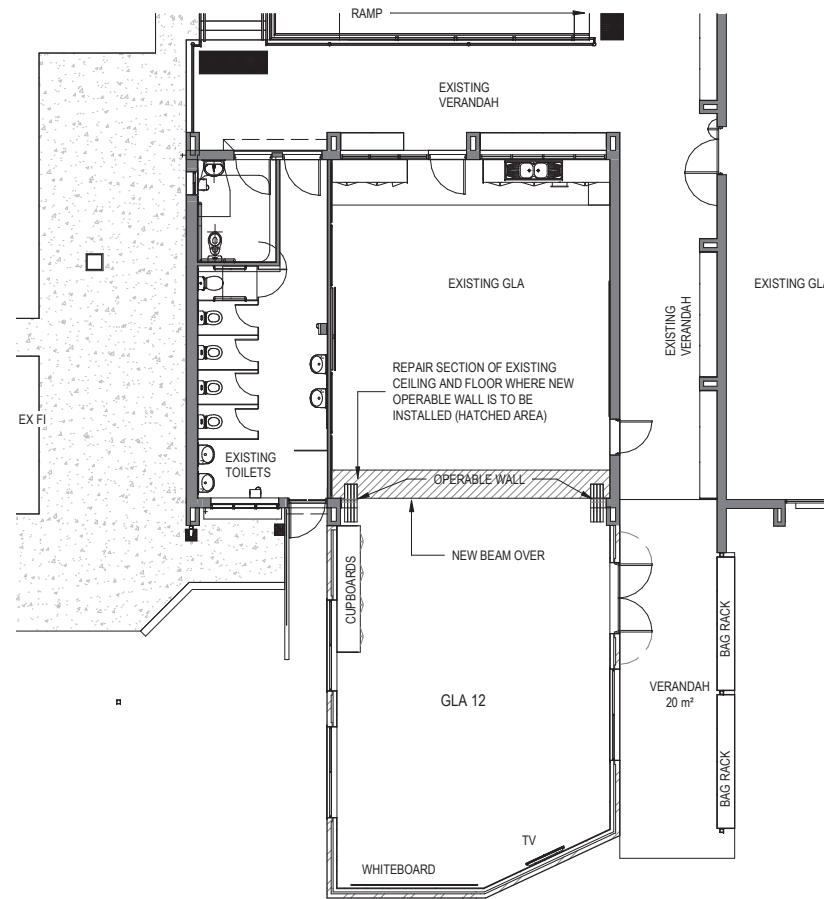
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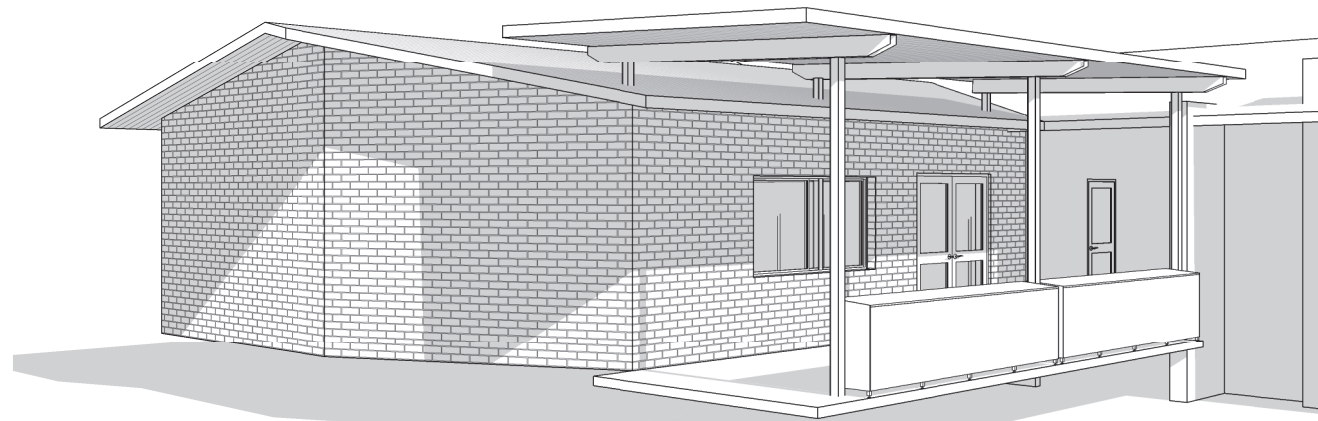
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**6 WEST ELEVATION**  
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**2 PROPOSED FLOOR PLAN**  
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**3 3D View 6**  
@ A1

# Engineering Infrastructure Report

## St Joseph's Catholic Primary School, Wandal



PREPARED FOR ROMAN CATHOLIC TRUST CORPORATION  
DIOCESE OF ROCKHAMPTON


**ROCKHAMPTON REGIONAL COUNCIL**  
**APPROVED PLANS**

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**Dated: 27 February 2018**

#### DOCUMENT CONTROL

ISSUE	DATE	ISSUE DETAILS	AUTHOR	CHECKED	APPROVED
1	December 2017	Draft	MD		
A	January 2018	For Approval	MD	CS	 Chris Shields RPEQ 9347

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# 1 Introduction

Calibre Consulting (QLD) Pty Ltd has prepared this Engineering Infrastructure Report in support of the Material Change of Use Application on behalf of our client, the Roman Catholic Trust Corporation for Catholic Education – Diocese of Rockhampton. This report relates to works associated with the proposed refurbishments and extensions to St Joseph's Catholic Primary School located at 67 Rundle Street, Wandal. The school is currently situated on lot 1 and lot 3 on RP607524, lot 4 on RP610138, lot 1 on RP605091, lot 2 on RP612165, and bounded by the council controlled road corridors of Rundle Street, Herbert Street and Meade Street.

The suburb of Wandal is located on the southside of the city of Rockhampton and existing residential properties are located in vicinity of the school campus. St Joseph's Catholic Primary School has been located in its current location since 1916 and the school shares the site with St Vincent's Catholic Church.

The development proposal includes the installation of a new administration building, learning support building and a new general learning area (GLA). Refurbishment of existing buildings is also proposed as well as extending the existing sealed car park which accesses off Meade Street. The proposed works will involve removal of existing pathways, shade structures and playground equipment to allow for development.

This report intends to address the Civil Engineering Infrastructure for the proposed development including sewer reticulation, water reticulation, stormwater management and address access and parking for the project. The report will demonstrate that the development will not negatively impact on existing services, buildings and infrastructure surrounding the subject site through engineered solutions.

The locality of the subject site can be seen in the following illustration and Appendix A details the existing site and Appendix B details the proposed development plan.



Figure 1 Locality Image

## 2 Site Works/Erosion Control

Site works for the development will consist of the following stages:

- Demolition of pathways, shade structures and playground equipment;
- Clearing and grubbing;
- Earthworks;
- Underground services installation;
- Construction of new Administration building, Learning Support building and General Learning Area (GLA) building;
- Refurbishment of existing buildings;
- Construction of car park extension;
- Final detailed works; and
- Vegetation establishment, landscaping, and erosion and sediment control measures.

All stockpiles are to be segregated and protected with appropriate silt traps and fences. Access to stockpiles are to be from the upstream side to reduce erosion and maintain consistency throughout the project construction phase. Erosion control measures are to be implemented during construction in accordance with Rockhampton Regional Council requirements. All erosion control measures are to be closely monitored by the Principal Contractor and re-established after all rain events or vandalism.

## 3 School Growth Assumptions

St Joseph's Catholic Primary School currently has a student enrolment of 277 in 2017 and is a one (1) to one and a half (1.5) stream school. Staff numbers for 2017 total 22 staff members for the school.

As part of this proposed development work, a new administration building will be constructed along with a learning support building and extension of a building to create one (1) new general learning area. This will result in the refurbishment of the existing administration building into two (2) general learning areas. Overall, a total of three (3) new general learning areas are proposed as part of this development.

It is intended that the school enrolments will be increased to 352 by the end of year 2020, with a total of 23 staff by the same year. This will make the school a two (2) stream school at the year 2020. Therefore, the growth of student enrolments is intended to increase by 9% between 2017 and 2020, and the school growth rate including staff and students equates to 8.47% between 2017 and 2020.

## 4 Sewer Reticulation

The existing school site currently has access to Rockhampton Regional Council's sewage infrastructure which will be maintained as part of this expansion of St Joseph's Primary School, Wandal.

An existing gravity system currently services the site and traverses from the Meade Street end of the site to the south and falls towards the north-west end of the site crossing Rundle Street. According to Rockhampton Regional Council's Geographical Information System (GIS), this gravity sewer main is a 150mm diameter comprising of an Earthenware material type. Existing access chambers are located over the school footprint, however no building works are proposed in the near vicinity of the existing council sewer infrastructure.

To analyse the potential impact of sewer infrastructure as part of this development, the 2017 staff and students numbers of the school have been used as a benchmark as this current loading is currently catered for by the existing sewer system. It is noted that as part of the development, toilet amenities will be provided in the new administration building with four (4) new toilets proposed. However, no additional toilet facilities are proposed on the school site.

The sewerage loads for the current 2017 scenario and the projected 2020 school expansion have been calculated in the accordance with the Capricorn Municipal Development Guidelines (CMDG) – Design Specifications – D12 Sewerage Reticulation. As per table D12.C.01 – (*Design EP's per development type*) from the aforementioned design specification, the equivalent persons (EP's) were calculated based on the rates within this table and the staff and student numbers both in 2017 and projected to 2020. The design Average Dry Weather Flow (ADWF) of 540L/ET/d from the CMDG design specification D12 has been utilised based on an EP per ET of 2.7. This means that the ADWF also equates to 200L/EP/d.

In accordance with CMDG specification D12, the Peak Dry Weather Flow (PDWF) is 2.5 times the ADWF. Using a density of 0.26 EP/student and staff from table D12.C.01, the data in the following table has been calculated to determine the sewer loadings from the development:

Table 1 Sewer Demands

Scenario	Enrolled Students and Employed Staff	ADWF – Litres per day (Students & Staff x 200L/EP/d x 0.26 EP/Student)	PDWF (2.5 X ADWF)	Increase from 2017
2017	299	15,548 L/d (0.180 L/s)	38,870 L/d (0.450 L/s)	
2020	375	19,500 L/d (0.226 L/s)	48,750 L/d (0.564 L/s)	25.3%

Investigation into the existing sewer infrastructure servicing the site has identified that the grade of the sewer main downstream of the site is approximately 5.8% based off council’s GIS information. Based on a maximum 60% depth of flow of the 150mm diameter main, the partial maximum (PWDF) pipe flow at capacity for this Earthenware main is approximately 25L/s. Given the 2020 projections for sewer loadings, the 2020 sewer demand has been calculated to be 0.46% of the existing pipes available capacity. This percentage is expected to have a negligible effect upon the Council’s existing infrastructure sewer network, and therefore no upgrades will be required.

All proposed internal sanitary drainage (if required) will be documented during the detailed design phase by a suitably qualified person (Hydraulic Engineer), and all appropriate approvals sought from Rockhampton Regional Council (RRC).

The existing sewer infrastructure services plan obtained from RRC can be found in Appendix C of this report.

5 Water Reticulation

Existing council water infrastructure is located in the vicinity of the subject site, with the school currently being connected to the council’s water supply network. Rockhampton Regional Council’s Geographical Information System (GIS) has identified that a 150mm diameter water main is located on the school frontage of Herbert Street, whilst a 100mm diameter main tees from the Herbert Street main along the school side of Meade Street. The following screenshot shows the existing water infrastructure around the St Joseph’s School Wandal site:

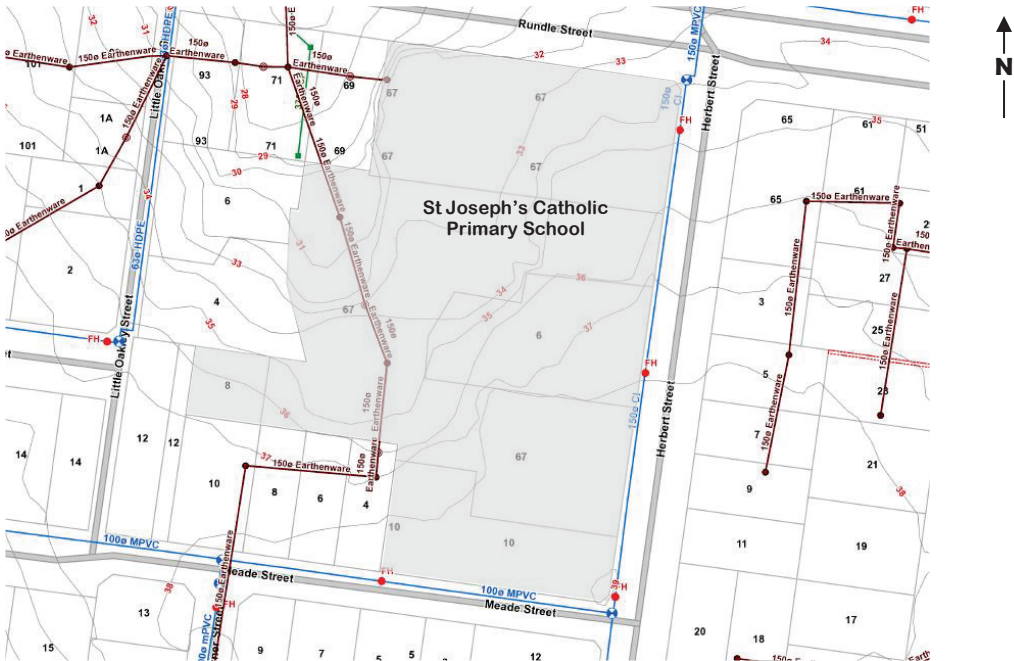


Figure 2 Existing Water Infrastructure (from RRC GIS)

Existing main spring fire hydrants are currently located in three places along the Herbert Street frontage of the school and a fire hydrant is along located near the existing school car park in the road reserve of Meade Street. Therefore, we believe adequate fire hydrant coverage is provided to the site in the existing scenario with no upgrades required for fire hydrant accessibility as part of the proposed works.

Water service connections are currently in place to the site from the Herbert Street reticulation main. It is intended that these connections will remain in place as part of the proposed expansion to the school facilities.

Given the existing infrastructure in place is servicing the demands of the school at present, an assessment has been undertaken to assess the ability of the existing system to cater for the increase in demand from the 2020 school projections. The water supply loads have been calculated in accordance with the Capricorn Municipal Development Guidelines (CMDG) – Design Specifications – D11 Water Reticulation. Using a design Average Daily Consumption of 500 L/EP/d from the CMDG specification D11 and a design demand rate of 0.2 EP per student from Table D11.C.01 of the CMDG, the following table shows the Average Daily Consumption for 2017 and the projected 2020 demand from the school:

Table 2 Water Demands

Scenario	Enrolled Students and Employed Staff	Average Daily Consumption (Students & Staff x 500 L/EP/d x 0.2 EP/Student)	Mean Day Max Month (1.4 x AD)	Max Day (1.89 x AD)	Increase from 2017
2017	299	29,900 L/d (0.346 L/s)	41,860 L/d (0.484 L/s)	56,511 L/d (0.654 L/s)	
2020	375	37,500 L/d (0.434 L/s)	52,500 L/d (0.608 L/s)	70,875 L/d (0.820 L/s)	25.4%

Therefore as evident in the table above, due to the 2020 projection of the student and staff numbers for the school, a 25.4% increase in demand is apparent. The increase in staff and student numbers from 2017 through to 2020 is 76 persons, which equates to 15.2 equivalent persons total. Adopting a further assumption of 3 EP/ET for a standard residential dwelling, the increase in staff and students would be equivalent to an additional 5.06 Residential Dwellings or approximately an increase of 0.088 L/s.

Given the existing water infrastructure currently in the road reserves around the school campus and the minimal increase in demand from the school expansion projected to 2020, it is proposed that no upgrades will be required to the existing water infrastructure. The increase in demand is expected to have a negligible impact to the existing council network.

The internal water reticulation (if required) will be detailed by a suitably qualified person (Hydraulic Engineer) during the detailed design phase, and all appropriate approvals sought from Rockhampton Regional Council (RRC). It is expected the location of the existing metered connection will be maintained for the proposed development.

## 6 Access and Parking

An existing off-street car parking facility is located on the southern side of the site next to the existing St Vincent's Catholic Church. Access to this car parking facility is currently gained from Meade Street through two (2) existing vehicular crossovers. As part of the school expansion, the existing car park is proposed to be extended within the subject site to include an additional fifteen (15) off-street car parking spaces. Please refer to the town planning report completed by Scot Stewart – Town Planning Consultant which address planning performance outcomes in relation to car parking numbers.

It is intended that the existing concrete crossovers to Meade Street will be maintained with no additional vehicle crossovers to council road corridors proposed as part of the school expansion. These existing crossovers to Meade Street are currently two-way entry-exit driveways and are compliant width consisting of 6.7m and 5.9m respectively. Both of the crossovers appear to have acceptable sight distance along Meade Street. Given the current accesses in place, we believe that no upgrades will be required to council's road network as a result of this expansion of the school.

Existing school drop-off and pick-up facilities are currently in place in Herbert Street on the eastern side of the school site. No new drop off zone facilities are proposed as part of this Meade Street Car Park extension. The new car park extension will be designed in accordance with Australian Standard 2890 considering car park space width, length, aisle widths and grades.

The off-street car parking preliminary layout is included in Appendix D of this report.

## 7 Stormwater Management

### 7.1 Stormwater Quantity

An analysis has been undertaken for the stormwater management of the development to ensure that no adverse impacts occur to adjacent and downstream properties and infrastructure from the proposed expansions and the overall stormwater strategy for the school.

The Queensland Urban Drainage Manual 2017 (QUDM) has been utilised in order to determine the hydrology changes from the development. The Rational Method has been adopted to calculate stormwater runoff for each catchment and an analysis of the pre-development and post-development flow rates has been undertaken.

#### 7.1.1 Existing System

The subject site has been divided into two (2) distinct catchments representing the overall site falls. St Vincent's Catholic Church and nearby car park in the south-eastern corner of the site are situated at the crest of the land with the majority of the school campus falling towards the northern corner of the site whilst the remainder falls to north-east.

#### Catchment Details

The fraction impervious values have been determined based on the existing site details for the catchment and the following table details the catchment area with the fraction impervious value assigned respectively. Refer to Appendix E for the Existing Catchment Plan.

Table 3 Existing Catchment Details

Catchment ID	Catchment Area		Fraction Impervious (%)
	(m <sup>2</sup> )	ha	
1	10218	1.0218	55.00
2	10344	1.0344	36.00

#### Time of Concentration

For the existing site, the time of concentration (tc) value for the catchment has been determined considering the characteristics of the particular catchment. The use of standard time for roof to main connection from buildings has been utilised in accordance with section 4.6.5 of QUDM (2017), along with using Friend's Equation as per section 4.6.6 of QUDM (2017) for overland sheet flow time. Stream velocities to calculate stream flow time have been used in accordance with Table 4.6.6 of QUDM (2017). Table 4 below shows the time of concentration determined for each catchment and detailed calculations can be found in Appendix H of this report.

Table 4 Existing Time of Concentration Values

Main Catchment	Time of Concentration (tc) mins			
	Roof to Main Connection	Friend's	Stream Flow	Total
1	5.0		2.9	7.9 (8.0)
2	-	6.3	2.3	8.6 (9.0)

## Rainfall Intensity and Coefficient of Discharge

The rainfall intensity for the existing site has been determined based off Intensity, Frequency and Duration data available for the Rockhampton Area from Australian Rainfall and Runoff IFD tables (AUS-IFD). From this data, the 1 hour duration, 10 year design storm for Rockhampton was determined to be 64mm/hr. The rainfall intensities for each design storm from the 2 year average recurrence interval up to and including a 100 year average recurrence interval were determined using the data from the IFD tables for the particular time of concentration for each catchment.

The C10 coefficient of discharge for a 1 in 10 year design storm was determined for each catchment using values from Table 4.5.3 of QUDM (2017) with use of the fraction impervious values obtained and the aforementioned rainfall intensity.

Using the coefficient of discharge determined, the coefficient of discharge for the other various design storms including the 2, 5, 20, 50 and 100 average recurrence intervals were calculated using the frequency factors (Fy) for each year provided in Table 4.5.2 of QUDM (2017).

## Peak Flow Calculations

Using the existing catchment area, the rainfall intensity for the assigned time of concentration values and the runoff coefficients, the existing peak flows for each respective catchment were determined for the various average recurrence intervals (ARI).

As stated in Table D5.04.2 of the Capricorn Municipal Development Guidelines (CMDG) for Stormwater Drainage Design, the design average recurrence interval for Urban Residential is a 1 in 5 year ARI for the minor system whilst the major system is a 1 in 100 year ARI.

The existing peak flow for each catchment are shown in the following Table 5. Detailed stormwater calculations are included in Appendix H.

Table 5 Existing Peak Flow Rates

Catchment ID	Minor Q5 Peak Flow (m <sup>3</sup> /s)	Major Q100 Peak Flow (m <sup>3</sup> /s)
1	0.307	0.704
2	0.276	0.628

## 7.1.2 Proposed System

The overall site catchments and drainage strategy will not alter significantly from that of the respective corresponding existing catchments. With the expansion of the school proposed through the construction of a new building and car park extension, minor increases in impervious area will be apparent for some catchments as identified, however with no significant impact to existing infrastructure or neighbouring properties.

## Catchment Details

For analysis of the proposed stormwater scenario, the school site has been broken into two (2) distinct catchments, where one catchment includes a portion of external area adjacent to the school comprising of the neighbouring residential allotment. The fraction impervious values have been determined based on the proposed case and the following table details the catchment area with the fraction impervious value assigned respectively. Refer to Appendix F for the Proposed Catchment Plan.

Table 6 Proposed Catchment Details

Catchment ID	Catchment Area		Fraction Impervious (%)
	(m <sup>2</sup> )	ha	
A	10071	1.0071	59.00
B	10491	1.0491	39.00

## Time of Concentration

For the proposed site, the time of concentration (tc) value for the catchment has been determined considering the characteristics of the particular catchment. The use of standard time for roof to main connection from buildings has been utilised in accordance with section 4.6.5 of QUDM (2017), along with using Friend's Equation as per section 4.6.6 of QUDM (2017) for overland sheet flow time. Stream velocities to calculate stream flow time have been used in accordance with Table 4.6.6 of QUDM (2017). Table 7 below shows the time of concentration determined for each catchment and detailed calculations can be found in Appendix H of this report. Due to the minimal change in catchment characteristics between the existing and proposed cases, the proposed time of concentration values have remained similar compared to the corresponding existing catchments.

Table 7 Proposed Time of Concentration Values

Time of Concentration (tc) mins				
Main Catchment	Roof to Main Connection	Friend's	Stream Flow	Total
A	5.0		2.9	<b>7.9 (8.0)</b>
B	-	6.3	2.3	<b>8.6 (9.0)</b>

## Rainfall Intensity and Coefficient of Discharge

The rainfall intensity for the proposed site has been determined based off Intensity, Frequency and Duration data available for the Rockhampton Area from Australian Rainfall and Runoff IFD tables (AUS-IFD). From this data, the 1 hour duration, 10 year design storm for Rockhampton was determined to be 64mm/hr. The rainfall intensities for each design storm from the 2 year average recurrence interval up to and including a 100 year average recurrence interval were determined using the data from the IFD tables for the particular time of concentration for each catchment.

The C10 coefficient of discharge for a 1 in 10 year design storm was determined for each catchment using values from Table 4.5.3 of QUDM (2017) with use of the fraction impervious values obtained and the aforementioned rainfall intensity.

Using the coefficient of discharge determined, the coefficient of discharge for the other various design storms including the 2, 5, 20, 50 and 100 average recurrence intervals were calculated using the frequency factors (Fy) for each year provided in Table 4.5.2 of QUDM (2017).

## Peak Flow Calculations

Using the proposed catchment area, the rainfall intensity for the assigned time of concentration values and the runoff coefficients, the proposed peak flows for each respective catchment were determined for the various average recurrence intervals (ARI).

As stated in Table D5.04.2 of the Capricorn Municipal Development Guidelines (CMDG) for Stormwater Drainage Design, the design average recurrence interval for Urban Residential is a 1 in 5 year ARI for the minor system whilst the major system is a 1 in 100 year ARI.

The proposed peak flow for each catchment are shown in the following Table 8. Detailed stormwater calculations are included in Appendix H.

Table 8 Proposed Peak Flow Rates

Catchment ID	Minor Q5 Peak Flow (m <sup>3</sup> /s)	Major Q100 Peak Flow (m <sup>3</sup> /s)
1	0.308	0.704
2	0.284	0.647

### 7.1.3 Summary of Existing and Proposed Peak Flow Rates

The Peak Flow Rates determined for the existing system and proposed system have been summarised in the following table for the minor 1 in 5 year ARI design storm and major 1 in 100 year ARI design storm.

Table 9 Summary of Existing and Proposed Peak Flow Rates

Existing Contributing Catchments	Existing Minor Q5 Peak Flow (m <sup>3</sup> /s)	Existing Major Q100 Peak Flow (m <sup>3</sup> /s)	Proposed Contributing Catchments	Proposed Minor Q5 Peak Flow (m <sup>3</sup> /s)	Proposed Major Q100 Peak Flow (m <sup>3</sup> /s)	% Increase Minor Q5	% Increase Major Q100
1	0.307	0.704	A	0.308	0.704	0.32%	0%
2	0.276	0.628	B	0.284	0.647	2.89%	3.03%

Based on the differences between the existing and peak flow rates, it is evident that due to the works within catchment A on the St Joseph's Catholic Primary School site, a minimal increase in runoff has resulted in a minor event, with no increase in runoff determined in a major event. Therefore, with only a 0.32% increase in runoff in the minor 1 in 5 year event, we believe that no stormwater mitigation measures will be required for this catchment.

The intended works within proposed catchment B consists of the extension to the existing school car park adjacent to St Vincent's Catholic Church. The car park extension comprises of a small increase in impervious area over the entire catchment B from 36% to 39% over the total area. This small increase has resulted a small increase in runoff in both a minor 1 in 5 year ARI event and a 1 in 100 year ARI event. However, the increase in runoff in both of these minor and major events is equal to and less than 3.0% of the runoff for the entire proposed catchment B area. In a major 1 in 100 year event, this results in an increase of 19L/s (0.019m<sup>3</sup>/s). Therefore, we believe this increase is insignificant considering the size and characteristics of the proposed catchment B and therefore no stormwater mitigation measures are proposed.

In the existing scenario, existing catchment 2 (proposed catchment B) has a well-defined stormwater flow path which caters for runoff from a portion of the school site and neighbouring residential properties. The school have existing concrete lined channels at the bottom of existing catchment 2 which convey runoff to a council pit and pipe system to ultimately direct stormwater to Jardine Park, located approximately 590m north, north-east of the school site. This pit and pipe system comprises of a grated inlet structure at the top of the line at the school site with a 375mm dia. RCP pipe (according to council records) conveying runoff further downstream. The grated inlet structure has a blockwork wall on the downstream side allowing for increased headwater pressure to convey stormwater into the pit and pipe drainage system. The following image for Rockhampton Regional Council's Geographical Information System (GIS) shows the existing council pit and pipe system in place with a photo showing the inlet structure at the school:



Figure 3 Existing Council Stormwater Infrastructure (from council's GIS service)

Therefore, given the existing stormwater system currently in place as described, we believe no upgrades are required to the existing system to accommodate the proposed administration building and car park extension works. Appendix G details the Stormwater Management Plan for the St Joseph's Catholic Primary School site.

## 7.2 Stormwater Quality

The stormwater quality assessment for the development has been based on the requirements listed in the State Planning Policy – July 2017 under the Water Quality section. With the proposed expansion of St Joseph's Catholic Primary School, we believe no Stormwater Quality Improvement Devices (SQID's) will be required with these works.

The site is over 2500m<sup>2</sup> of area as per the land area threshold requirements for Stormwater Quality. However, the increase in impervious area on the school site as part of this development will not exceed 25% of the site area to trigger Stormwater Quality analysis as per the State Planning Policy – July 2017. The additional impervious area as part of this expansion will increase over the net development area by under 6%.

Therefore, we believe that no Stormwater Quality measures or improvement devised are required to be implemented as part of this development on the St Joseph's Catholic Primary School, Wandal campus.

## 8 Electricity and Telecommunications

Existing Electrical and Telecommunications infrastructure is located within the vicinity of the subject site in the road reserves of Herbert Street, Rundle Street and Meade Street. The school is currently connected to this supply and any electrical reticulation design for the proposed internal works will be completed by a qualified Electrical Engineer.

According to Dial Before you Dig information obtained, the school currently has access to telecommunications services through infrastructure installed from the Rundle Street road corridor. It is intended that the existing telecommunications connection to the school site will be maintained and utilised as part of the expansions to the schools facilities.

All proposed works will be designed and constructed in accordance with the RRC requirements and the specification of the relevant authorities, and all connections to live electrical & telecommunications systems will be carried out at the Developer's expense.

## 9 Conclusion

There appears to be no insurmountable engineering infrastructure difficulties with the proposed expansion of St Joseph's Catholic Primary School located at 67 Rundle Street, Wandal. A review of the services proposed for this development and their impact on surrounding services, indicates that there is no impediment to development.

The existing site accesses to the Meade Street car park will be maintained and the car park extended internally. As well as this, the proposed new buildings and existing building extensions can adequately be serviced by the existing council sewer and water infrastructure within the area and electrical and telecommunication services are available within the vicinity of the site.

Stormwater Management for the proposed development has been considered and included in this report addressing the Stormwater Quantity and Quality for the site.

Minor alterations in the design may eventuate from future applications, however the fundamentals of the design strategy ensure that service provisions will not pose a serious constraint to development.

If you should have any questions regarding this report, please do not hesitate to contact the Calibre Consulting Office in Rockhampton on (07) 4961 4200.

ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL

## Appendix A Existing Site Plan

ROMAN CATHOLIC TRUST CORPORATION DIOCESE OF  
ROCKHAMPTON



**LEGEND**

- OH ——— EXISTING OVERHEAD ELECTRICAL
- D ——— EXISTING STORMWATER DRAINAGE
- // ——— EXISTING FENCELINE
- S —●— EXISTING GRAVITY SEWER MAIN AND MANHOLE
- 32.0 ——— EXISTING CONTOURS

**17-003063 ST JOSEPH'S CATHOLIC PRIMARY SCHOOL,  
WANDAL - NEW ADMINISTRATION BUILDING  
EXISTING SITE PLAN**



0 1.25 5.0m  
0 2.5 10.0m  
1:250 (A1)  
1:500 (A3)

ROCKHAMPTON BRANCH  
REFERENCE: 17-003063  
DATE: 20-01-18 REV: A  
DRAWN: MJD

ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL

## Appendix B Proposed Site Plan

ROMAN CATHOLIC TRUST CORPORATION DIOCESE OF  
ROCKHAMPTON

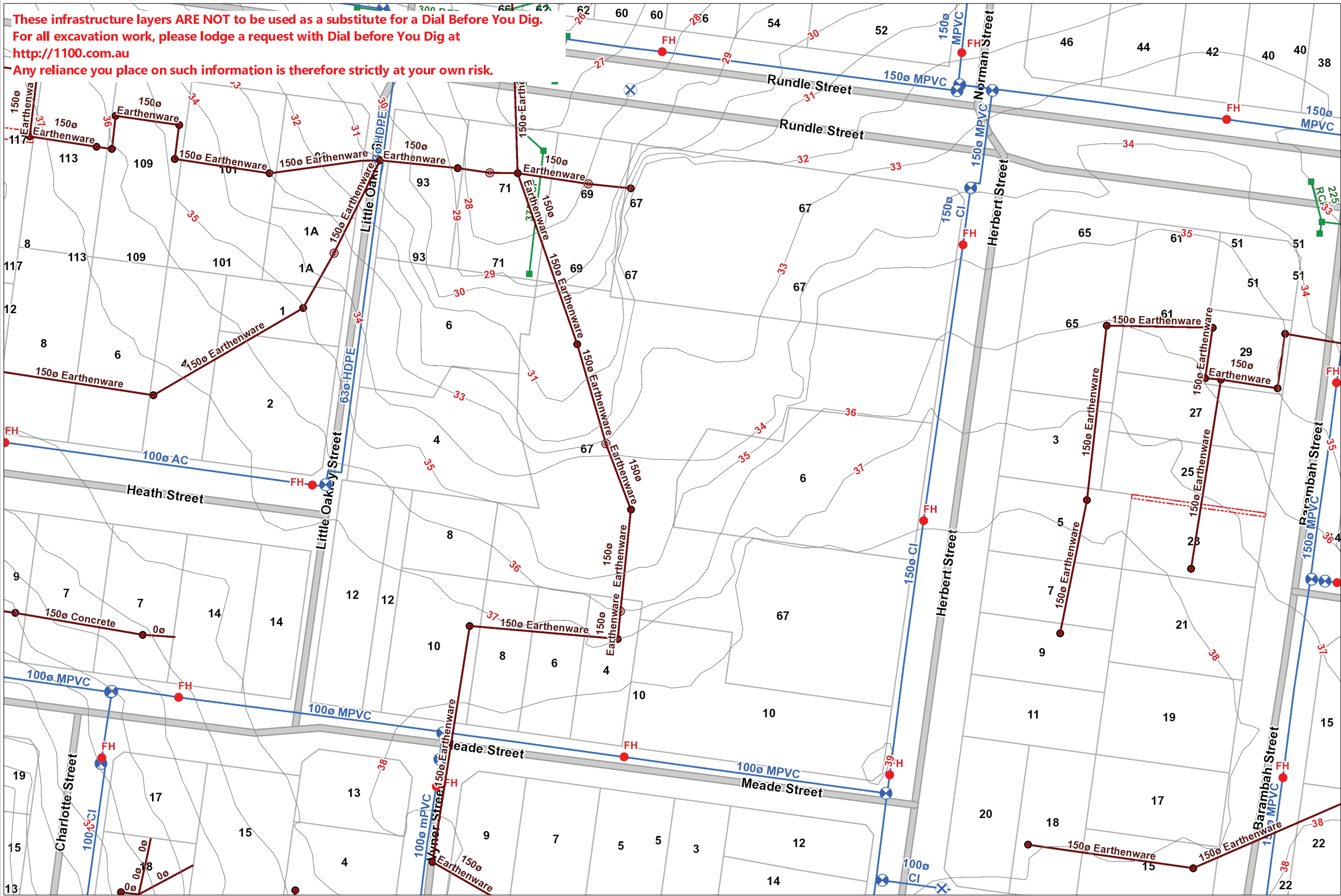


ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL

## Appendix C RRC GIS Services Plan

ROMAN CATHOLIC TRUST CORPORATION DIOCESE OF  
ROCKHAMPTON

These infrastructure layers ARE NOT to be used as a substitute for a Dial Before You Dig.  
For all excavation work, please lodge a request with Dial before You Dig at <http://1100.com.au>  
Any reliance you place on such information is therefore strictly at your own risk.



- Legend**
- Sewer Gravity Mains
  - Sewer Rising Mains
  - Sewer Access Chambers
    - Access Chambers
    - Roll Over
    - Lamp Hole | Inspection Opening
    - Overflow Chambers
  - Hydrants
  - Water Valves
    - Other Valve Type
    - Gate, Sluice, Butterfly
    - Air Valve
    - Ball Cock, Stop Cock
    - Ball Valve
    - Motor Sluice Valve
    - Non Return Valve
    - Pressure Reducing Valve
    - RPZ Valve
    - Reflux Valve
    - Scour Valve
    - Sluice Bypass Valve
    - Tap
  - Water Mains
    - Other Main Type
    - Trunk Main
    - Reticulation Main
    - Raw Water Main
    - Scour Line
  - Culverts
  - Headwalls
  - Stormwater Junctions
  - Stormwater Main
  - Roads 1
    - Main Roads (TMR)
    - Major Council Roads
    - Council Roads
    - Access / Service Roads
    - Private Roads
    - Unconstructed Roads
  - Easements
  - Parcel Boundaries
  - Parks and Forests
    - National Park
    - Reserves
    - State Forest
  - Council Boundary
  - Rivers
  - Ocean

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ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL

## Appendix D Car Park Layout Plan

ROMAN CATHOLIC TRUST CORPORATION DIOCESE OF  
ROCKHAMPTON



ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL

## Appendix E Existing Catchment Plan

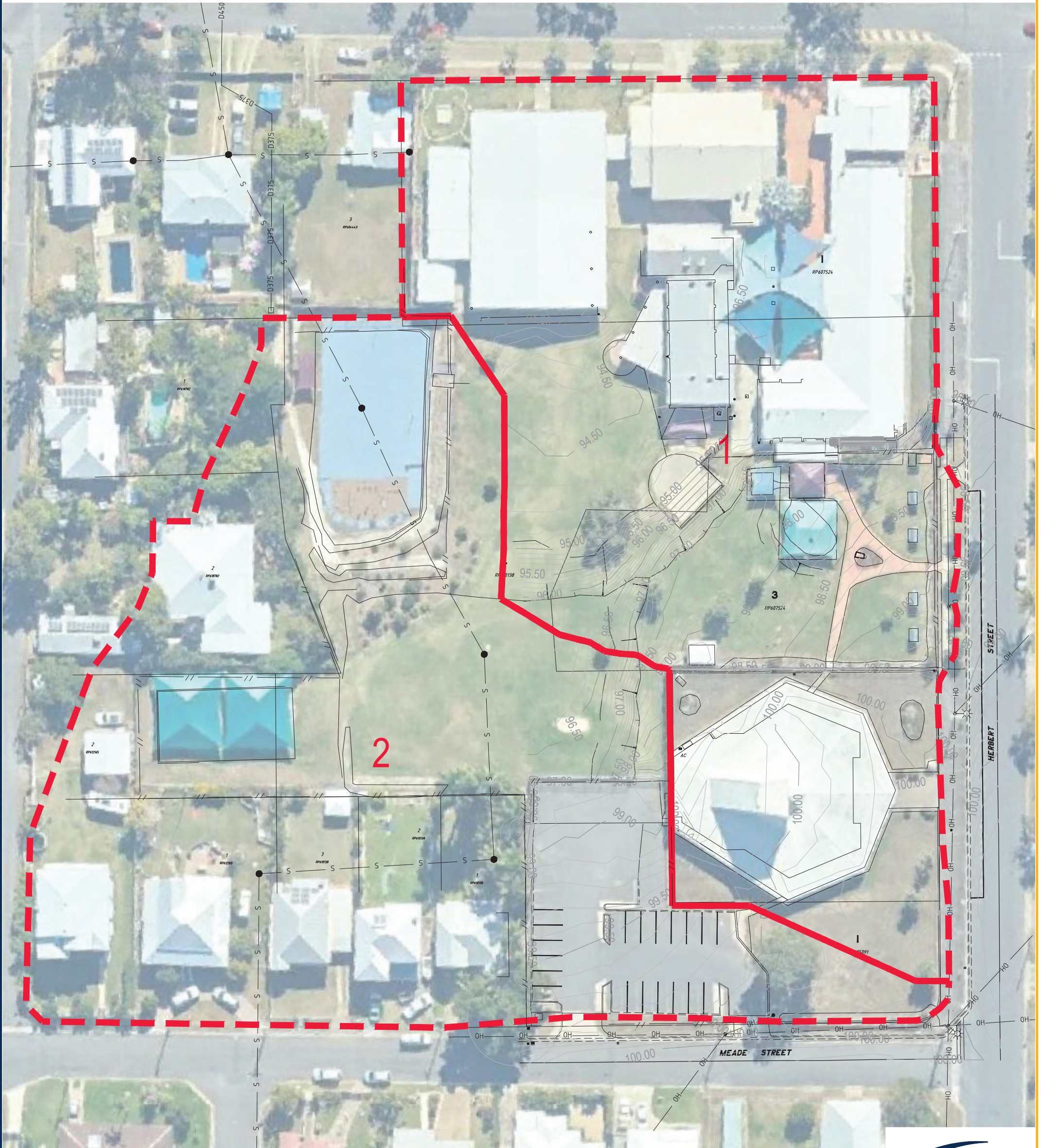
ROMAN CATHOLIC TRUST CORPORATION DIOCESE OF  
ROCKHAMPTON



## LEGEND

— OH —	EXISTING OVERHEAD ELECTRICAL
— D —	EXISTING STORMWATER DRAINAGE
— // —	EXISTING FENCELINE
— S — ● —	EXISTING GRAVITY SEWER MAIN AND MANHOLE
— ■ — ■ —	EXISTING CATCHMENT BOUNDARY
— 32.0 —	EXISTING CONTOURS

CATCHMENT DETAILS		
ID	AREA	UNIT
1	1.022	ha
2	1.034	ha



# 17-003063 ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL - NEW ADMINISTRATION BUILDING EXISTING CATCHMENT PLAN



SCALE 1:625 (A3)

ROCKHAMPTON BRANCH  
REFERENCE: 17-003063  
DATE: 20-01-18 REV: A  
DRAWN: MJD

ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL

## Appendix F Proposed Catchment Plan

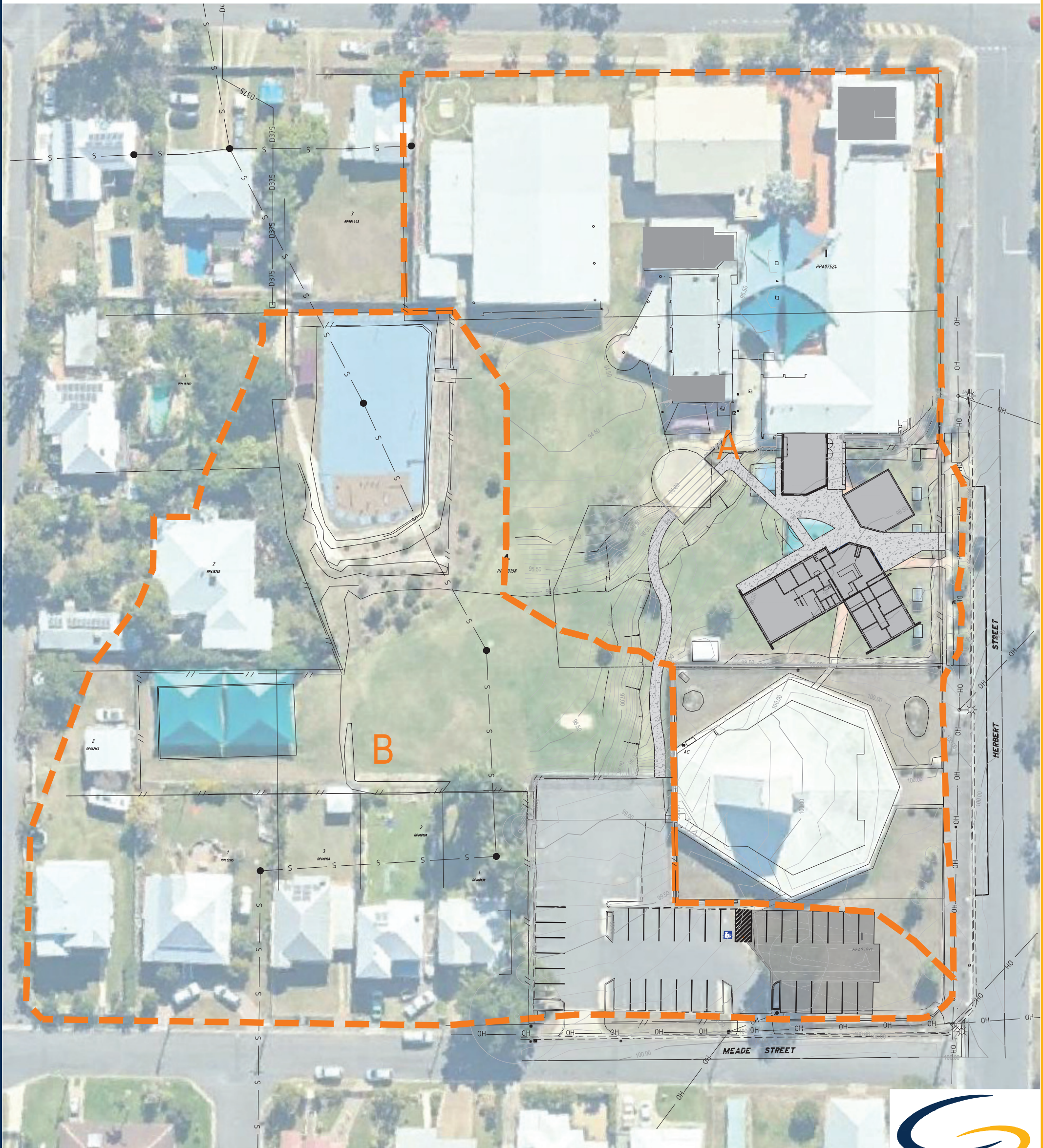
ROMAN CATHOLIC TRUST CORPORATION DIOCESE OF  
ROCKHAMPTON



# LEGEND

- OH ——— EXISTING OVERHEAD ELECTRICAL
- D ——— EXISTING STORMWATER DRAINAGE
- // ——— EXISTING FENCELINE
- S —●— EXISTING GRAVITY SEWER MAIN AND MANHOLE
- - - - - PROPOSED CATCHMENT BOUNDARY
- [Pattern: Solid Grey] PROPOSED CAR PARK SURFACE
- [Pattern: Dotted Grey] PROPOSED CONCRETE SURFACE
- [Pattern: Solid Dark Grey] PROPOSED BUILDING FOOTPRINT
- 32.0 ——— EXISTING CONTOURS

CATCHMENT DETAILS		
ID	AREA	UNIT
A	1.007	ha
B	1.049	ha



17-003063 ST JOSEPH'S CATHOLIC PRIMARY SCHOOL,  
WANDAL - NEW ADMINISTRATION BUILDING  
PROPOSED CATCHMENT PLAN



SCALE 1:625 (A3)  
ROCKHAMPTON BRANCH  
REFERENCE: 17-003063  
DATE: 20-01-18 REV: A  
DRAWN: MJD

ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL

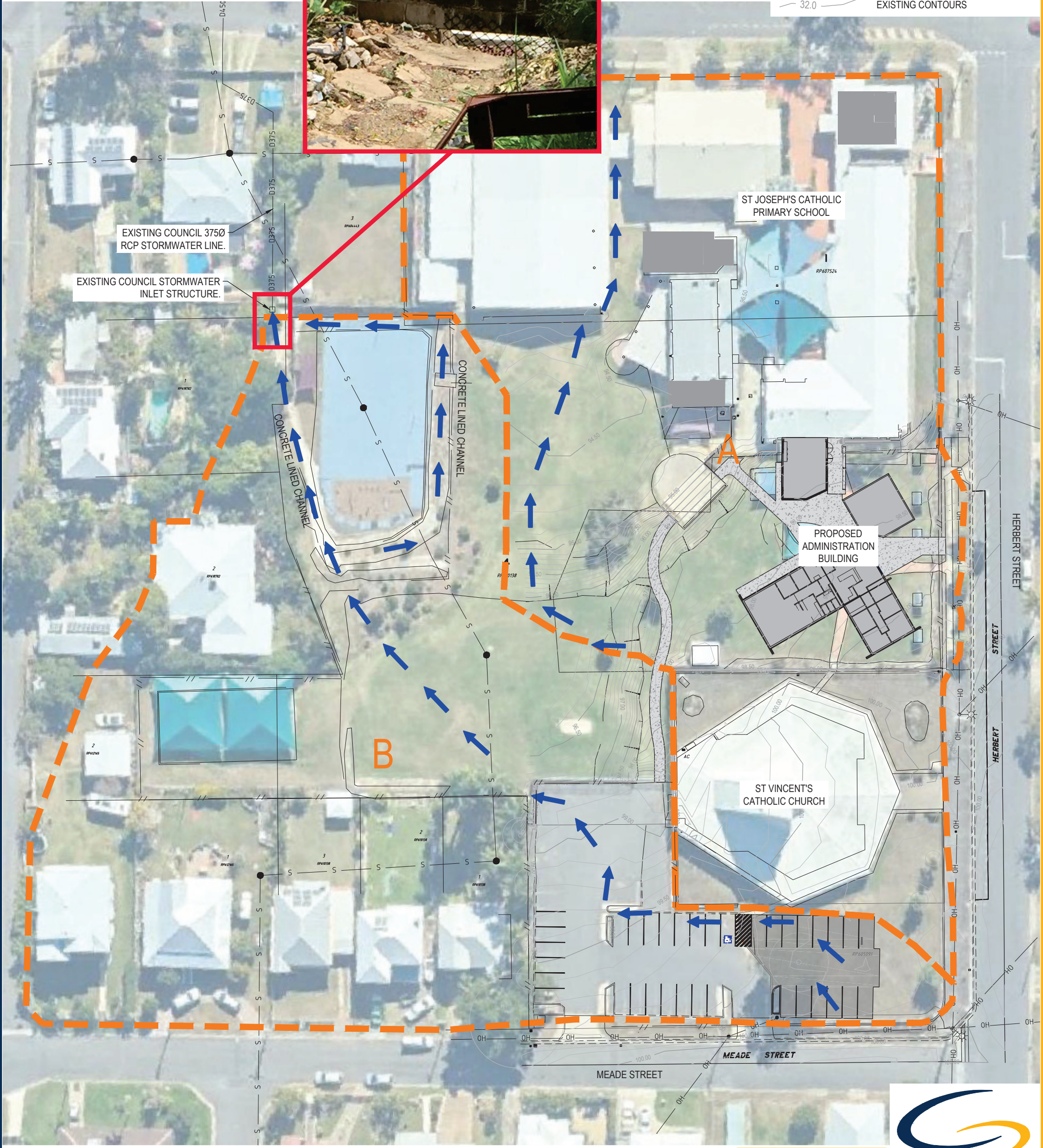
## Appendix G Stormwater Management Plan

ROMAN CATHOLIC TRUST CORPORATION DIOCESE OF  
ROCKHAMPTON



# LEGEND

- OH— EXISTING OVERHEAD ELECTRICAL
- D— EXISTING STORMWATER DRAINAGE
- // EXISTING FENCELINE
- S— EXISTING GRAVITY SEWER MAIN AND MANHOLE
- PROPOSED CATCHMENT BOUNDARY
- FLOW PATH ARROW
- PROPOSED CAR PARK SURFACE
- PROPOSED CONCRETE SURFACE
- PROPOSED BUILDING FOOTPRINT
- 32.0 EXISTING CONTOURS



## 17-003063 ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL - NEW ADMINISTRATION BUILDING STORMWATER MANAGEMENT PLAN



SCALE 1:625 (A3)

ROCKHAMPTON BRANCH  
REFERENCE: 17-003063  
DATE: 20-01-18 REV: A  
DRAWN: MJD

ST JOSEPH'S CATHOLIC PRIMARY SCHOOL, WANDAL

## Appendix H Stormwater Calculations

ROMAN CATHOLIC TRUST CORPORATION DIOCESE OF  
ROCKHAMPTON

## Existing Runoff

### Time of Concentration



#### Catchment 1

##### Roof to Main Connection (QUDM 2017)

Time of Concentration (t) 5.0 mins \*4.6.5 Church

##### Stream Velocity (QUDM 2017)

Description	Value	Unit	
Stream Velocity	0.7	m/s	*Table 4.6.6
Length of Overland Stream Flow	120.0	m	
Time of Concentration (t)	2.9	mins	

Total Time of Concentration (t) 7.9 mins

#### Catchment 2

##### Friend's Equation (QUDM 2017)

\*4.6.6

Description	Value	Unit	
Overland Sheet Flow Path Length (L)	85	m	
Horton's Surface Roughness Factor (n)	0.015		
Upstream RL	100.300	m	
Downstream RL	98.800	m	
Slope of Surface (S)	1.8	%	
Time of Concentration (t)	6.3	mins	

$$t = (107n L^{0.333})/S^{0.2}$$

##### Stream Velocity (QUDM 2017)

Description	Value	Unit	
Stream Velocity	0.7	m/s	*Table 4.6.6
Length of Overland Stream Flow	96.0	m	
Time of Concentration (t)	2.3	mins	

Total Time of Concentration (t) 8.6 mins

Developed Runoff  
Time of Concentration



Catchment A				
Roof to Main Connection (QUDM 2017)				
Time of Concentration (t)	5.0	mins	*4.6.5	Church
Stream Velocity (QUDM 2017)				
Description	Value	Unit		
Stream Velocity	0.7	m/s	*Table 4.6.6	
Length of Overland Stream Flow	120.0	m		
Time of Concentration (t)	2.9	mins		
Total Time of Concentration (t)	7.9	mins		

Catchment B

Friend's Equation (QUDM 2017)

Description	Value	Unit
Overland Sheet Flow Path Length (L)	85	m
Horton's Surface Roughness Factor (n)	0.015	
Upstream RL	100.300	m
Downstream RL	98.800	m
Slope of Surface (S)	1.8	%
Time of Concentration (t)	6.3	mins

\*4.6.6

$$t = (107n L^{0.333})/S^{0.2}$$

Stream Velocity (QUDM 2017)

Description	Value	Unit
Stream Velocity	0.7	m/s
Length of Overland Stream Flow	96.0	m
Time of Concentration (t)	2.3	mins
Total Time of Concentration (t)	8.6	mins

\*Table 4.6.6

## Existing Runoff

### Rational Method



#### EX Catchment 1

TOC **8** mins

Area = **1.0218** Ha

#### Rainfall Intensity Table

Return period	1	2	5	10	20	50	100
<b>8</b>	<b>89</b>	<b>115</b>	<b>149</b>	<b>171</b>	<b>200</b>	<b>239</b>	<b>270</b>

Total Catchment Area **10218** m<sup>2</sup>

$$Q = F * C * I * A$$

	F	C	I	A	Q	Fy
	factor	co eff	mm/hr	ha	m <sup>3</sup> /sec	factor
<b>Q2</b>	0.00278	0.650	115.00	1.0218	<b>0.212</b>	0.85
<b>Q5 - Minor</b>	0.00278	0.727	149.00	1.0218	<b>0.307</b>	0.95
<b>Q10</b>	0.00278	0.765	171.00	1.0218	<b>0.371</b>	1.00
<b>Q20</b>	0.00278	0.803	200.00	1.0218	<b>0.456</b>	1.05
<b>Q50</b>	0.00278	0.880	239.00	1.0218	<b>0.597</b>	1.15
<b>Q100 - Major</b>	0.00278	0.918	270.00	1.0218	<b>0.704</b>	1.20

C10 value

**0.765**

fi value

**55.00** %

=

0.55 fi

#### EX Catchment 2

TOC **9** mins

Area = **1.0344** Ha

#### Rainfall Intensity Table

Return period	1	2	5	10	20	50	100
<b>9</b>	<b>85</b>	<b>110</b>	<b>143</b>	<b>163</b>	<b>190</b>	<b>228</b>	<b>258</b>

Total Catchment Area **10344** m<sup>2</sup>

$$Q = F * C * I * A$$

	F	C	I	A	Q	Fy
	factor	co eff	mm/hr	ha	m <sup>3</sup> /sec	factor
<b>Q2</b>	0.00278	0.600	110.00	1.0344	<b>0.190</b>	0.85
<b>Q5 - Minor</b>	0.00278	0.671	143.00	1.0344	<b>0.276</b>	0.95
<b>Q10</b>	0.00278	0.706	163.00	1.0344	<b>0.331</b>	1.00
<b>Q20</b>	0.00278	0.741	190.00	1.0344	<b>0.405</b>	1.05
<b>Q50</b>	0.00278	0.812	228.00	1.0344	<b>0.532</b>	1.15
<b>Q100 - Major</b>	0.00278	0.847	258.00	1.0344	<b>0.628</b>	1.20

C10 value

**0.706**

fi value

**36.00** %

=

0.36 fi

## Developed Runoff

### Rational Method



#### Catchment A

TOC **8** mins

Area = **1.0071** Ha

#### Rainfall Intensity Table

Return period	1	2	5	10	20	50	100
<b>8</b>	<b>89</b>	<b>115</b>	<b>149</b>	<b>171</b>	<b>200</b>	<b>239</b>	<b>270</b>

Total Catchment Area **10071** m<sup>2</sup>

$$Q = F * C * I * A$$

	F	C	I	A	Q	Fy
	factor	co eff	mm/hr	ha	m <sup>3</sup> /sec	factor
<b>Q2</b>	0.00278	0.660	115.00	1.0071	<b>0.212</b>	0.85
<b>Q5 - Minor</b>	0.00278	0.738	149.00	1.0071	<b>0.308</b>	0.95
<b>Q10</b>	0.00278	0.777	171.00	1.0071	<b>0.372</b>	1.00
<b>Q20</b>	0.00278	0.816	200.00	1.0071	<b>0.456</b>	1.05
<b>Q50</b>	0.00278	0.894	239.00	1.0071	<b>0.597</b>	1.15
<b>Q100 - Major</b>	0.00278	0.932	270.00	1.0071	<b>0.704</b>	1.20

C10 value

**0.777**

fi value

**59.00** %

=

0.59 fi

#### Catchment B

TOC **9** mins

Area = **1.0491** Ha

#### Rainfall Intensity Table

Return period	1	2	5	10	20	50	100
<b>9</b>	<b>85</b>	<b>110</b>	<b>143</b>	<b>163</b>	<b>190</b>	<b>228</b>	<b>258</b>

Total Catchment Area **10491** m<sup>2</sup>

$$Q = F * C * I * A$$

	F	C	I	A	Q	Fy
	factor	co eff	mm/hr	ha	m <sup>3</sup> /sec	factor
<b>Q2</b>	0.00278	0.609	110.00	1.0491	<b>0.195</b>	0.85
<b>Q5 - Minor</b>	0.00278	0.681	143.00	1.0491	<b>0.284</b>	0.95
<b>Q10</b>	0.00278	0.717	163.00	1.0491	<b>0.341</b>	1.00
<b>Q20</b>	0.00278	0.753	190.00	1.0491	<b>0.417</b>	1.05
<b>Q50</b>	0.00278	0.825	228.00	1.0491	<b>0.548</b>	1.15
<b>Q100 - Major</b>	0.00278	0.860	258.00	1.0491	<b>0.647</b>	1.20

C10 value

**0.717**

fi value

**39.00** %

=

0.39 fi



# CONTACT US

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[WWW.CALIBREGROUP.COM](http://WWW.CALIBREGROUP.COM)