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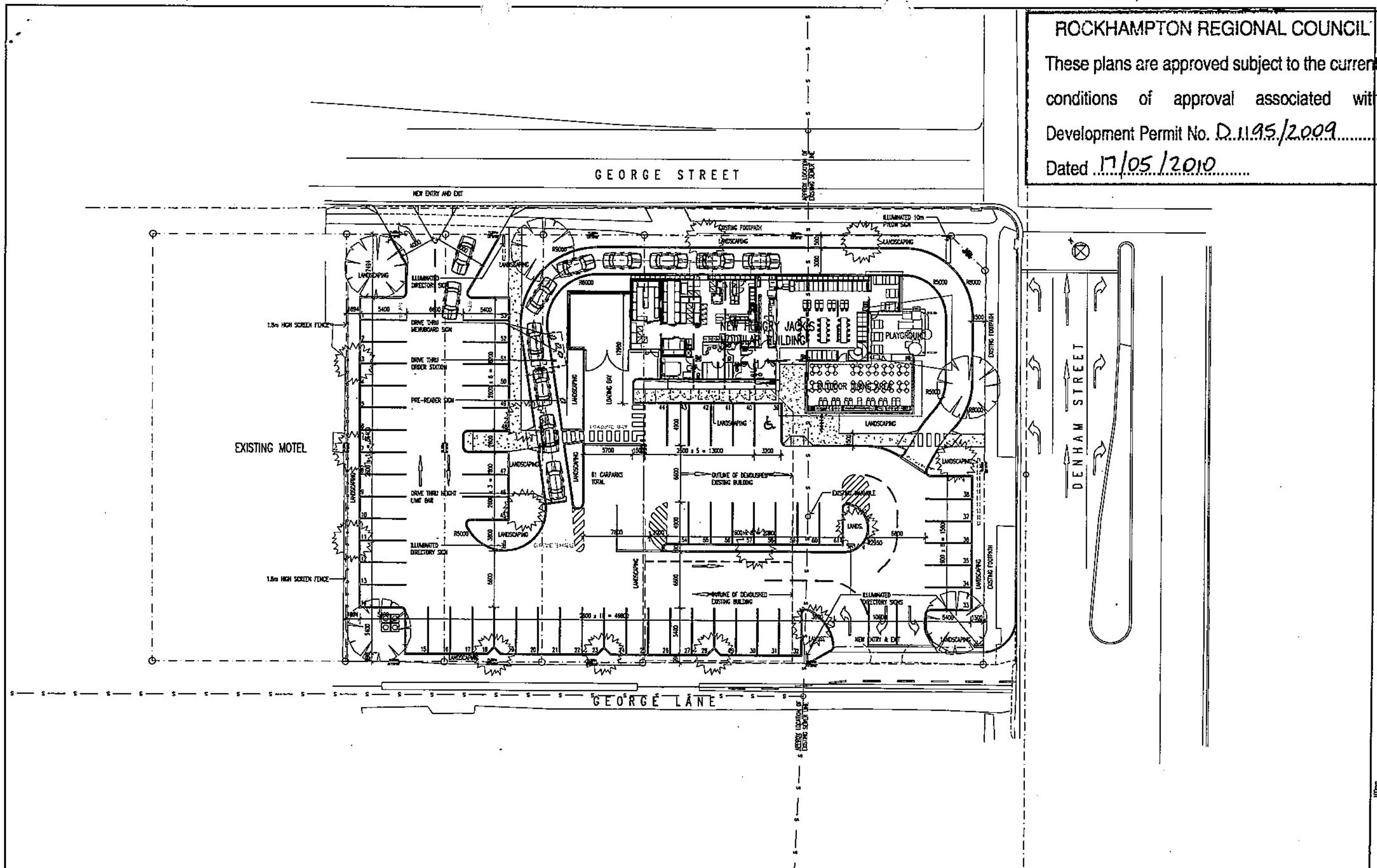
Dated 17/05/2010



6	MODIFIED GEORGE ST CROSSOVER, NEW FOOTPATH	PL	25.06.09	JV
5	UPDATED TITLE	PL	29.05.09	JV
4	UPDATED D/T LANE, LOADING BAY, SCREEN, SIGNAGE	PL	13.05.09	JV
3	UPDATED SIGNAGE, BUILDING LAYOUT, LOADING BAY	PL	30.04.09	JV
2	UPDATED ENTRY/EXITS	PL	23.03.09	JV
1	COORDINATION ZONE	PL	17.03.09	JV
No	AMENDMENT	DWN	DATE	CHKD

HUNGRY JACK'S

FOR INFORMATION

PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)

140 GEORGE STREET, ROCKHAMPTON SOUTH, QLD

DRAWING TITLE: SITE PLAN FINAL

DATE: FEBRUARY 2009

PROJECT NO: 2020-705

SCALE: 1:200 AT A1 SIZE

DRAWN: PL

CHECKED: JV

DRAWING NO. SK15

OPT: - REV: 6

wbp

ROCKHAMPTON REGIONAL COUNCIL

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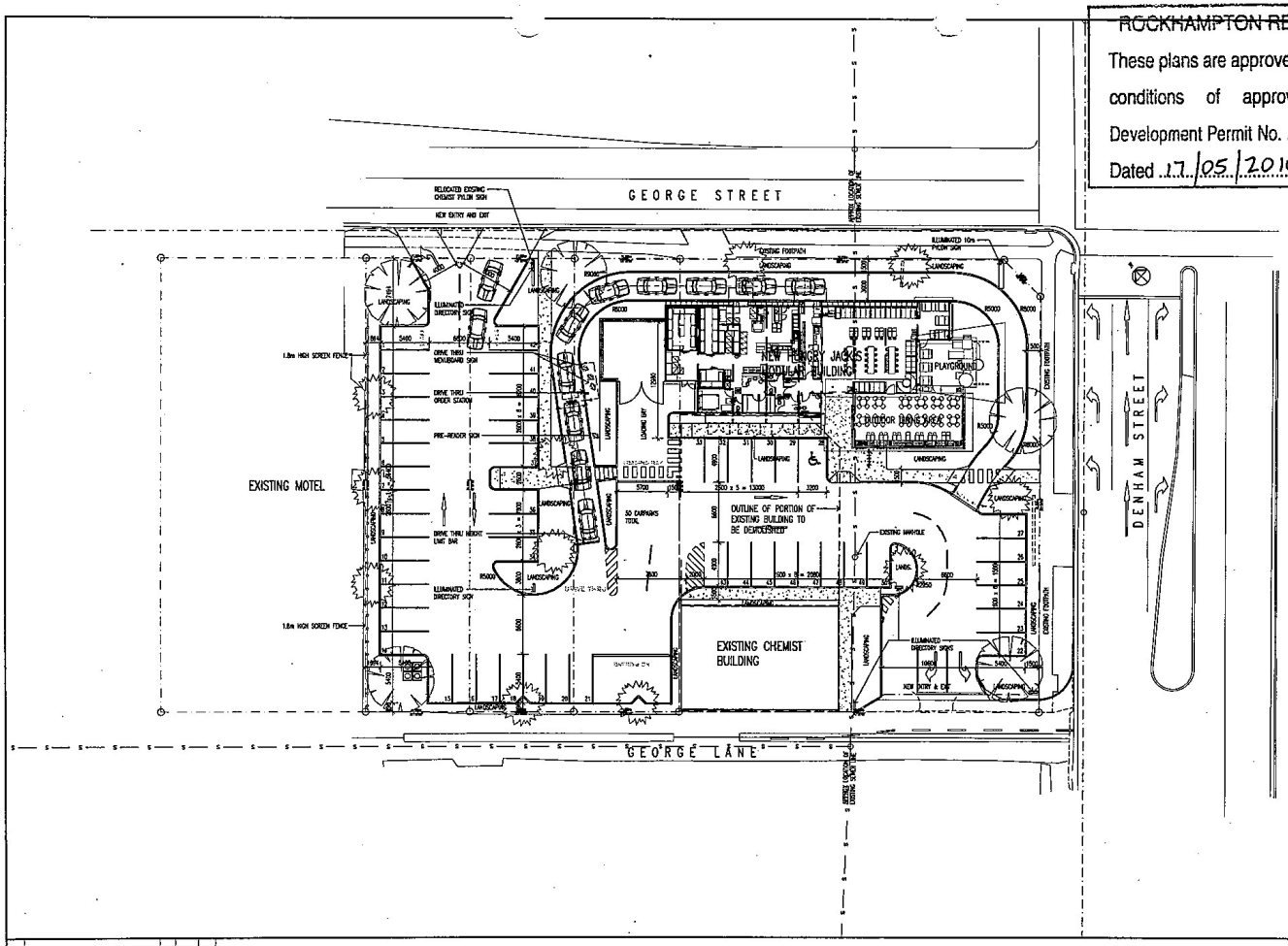


No	AMENDMENT	DWN	DATE	CHKD
3	UPDATED CROSSOVER & NEW FOOTPATH	PL	26.06.09	JV
2	UPDATED TITLE	PL	29.05.09	JV
1	DOOR/AWNING ISSUE	PL	13.05.09	JV

HUNGRY JACK'S

FOR INFORMATION

PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)

LOT 2 GEORGE STREET, ROCKHAMPTON SOUTH, QLD

DRAWING TITLE: SITE PLAN INTERIM

DATE: FEBRUARY 2009

PROJECT NO: 2020-705 DRAWN: PL

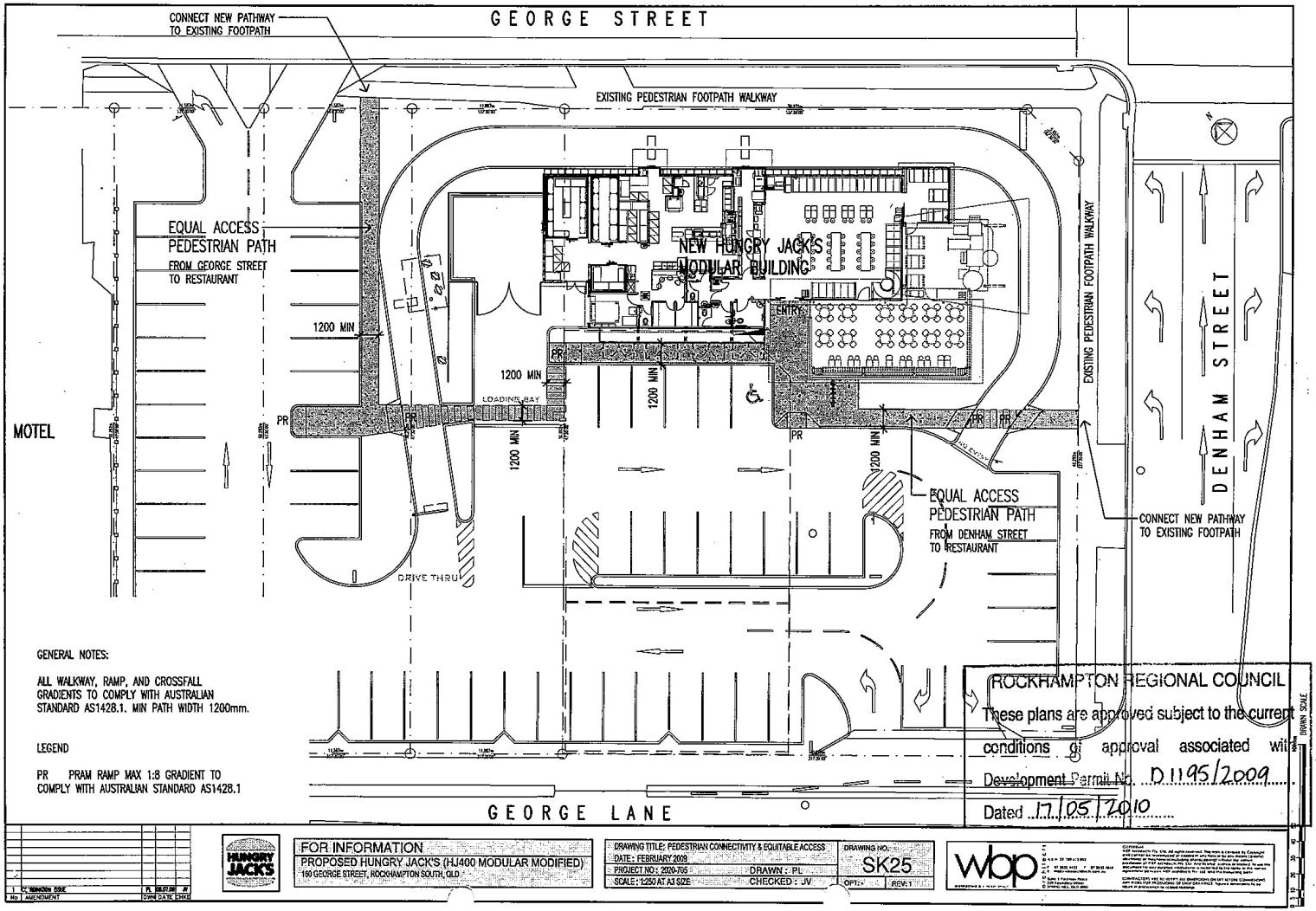
SCALE: 1:200 AT A1 SIZE CHECKED: JV

DRAWING NO. SK20

OPT:- REV:3

wbp

DRAWN SCALE



GENERAL NOTES:

ALL WALKWAY, RAMP, AND CROSSFALL GRADIENTS TO COMPLY WITH AUSTRALIAN STANDARD AS1428.1. MIN PATH WIDTH 1200mm.

LEGEND

PR PRAM RAMP MAX 1:8 GRADIENT TO COMPLY WITH AUSTRALIAN STANDARD AS1428.1

ROCKHAMPTON REGIONAL COUNCIL
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1	"C" VARIATION ISSUE	PL	06.07.09	JV
No	AMENDMENT	DWN	DATE	CHKD

FOR INFORMATION
PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)
169 GEORGE STREET, ROCKHAMPTON SOUTH, QLD

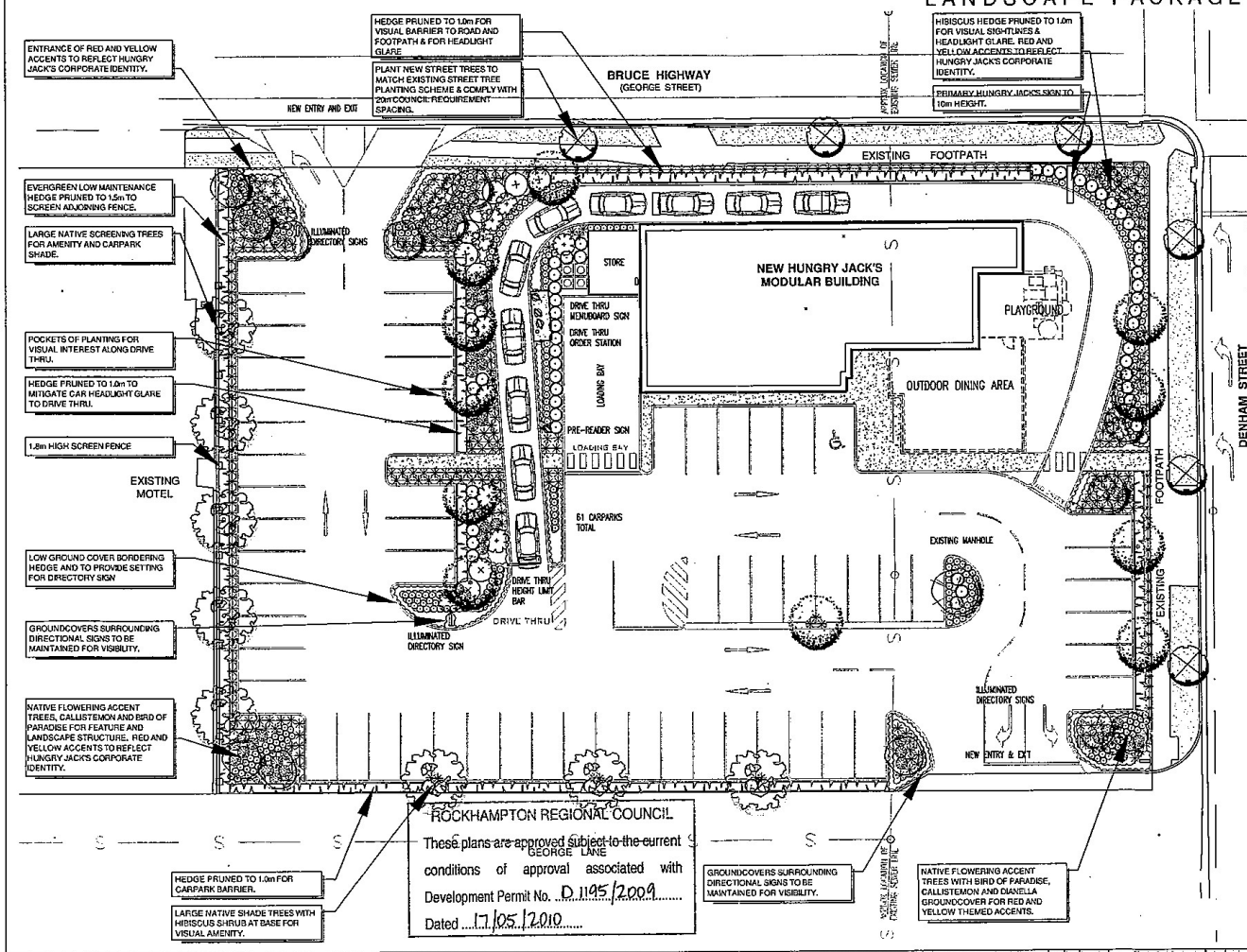
DRAWING TITLE: PEDESTRIAN CONNECTIVITY & EQUITABLE ACCESS
DATE: FEBRUARY 2009
PROJECT NO: 2020-705
SCALE: 1:250 AT A3 SIZE
DRAWN: PL
CHECKED: JV
DRAWING NO: SK25
OPT: -
REV: 1

wbp

DRAWN SCALE

HUNGRY JACK'S RESTAURANT

LANDSCAPE PACKAGE



NOTES

THIS PLAN HAS BEEN DEVELOPED TO COMPLY WITH THE ROCKHAMPTON REGIONAL COUNCIL - (PREVIOUSLY ROCKHAMPTON CITY COUNCIL) PLANNING SCHEME AND SOUTH ROCKHAMPTON HIGHWAY COMMERCIAL AREA PRECINCT SCHEME.

DESIGN PHILOSOPHY

WHEN WE DESIGNED THIS PROPOSED LANDSCAPE CONCEPT PLAN WE SET OUT TO CREATE AN ORIGINAL DESIGN WHICH NOT ONLY COMPLIMENTS THE BUILDINGS ARCHITECTURE BUT ESTABLISHES ITS OWN CHARACTER. THE LANDSCAPE HAS BEEN DESIGNED AS A FORMAL SETTING WITH FOCAL POINTS OF COLOURFUL VISUAL INTEREST.

ENTRANCES OF NATIVE FLOWERING FEATURE TREES SET IN BEDS OF HIBISCUS, CALLISTEMONS AND BIRD OF PARADISE PROVIDES STRIKING FEATURES ADDING CHARACTER TO THE RESTAURANT CARPARK.

SHRUBS AND GROUNDCOVERS ARE LAYERED TO CREATE DEPTH AND INTEREST TOWARDS THE BUILDING ALSO CONTRIBUTING POSITIVELY TO THE GEORGE AND DENHAM STREETSCAPES.

95% OF PLANT SPECIES HAVE BEEN CHOSEN FROM THE ROCKHAMPTON CITY PLAN PLANTING PALETTE.

MICROCLIMATE DESIGN FEATURES

CANOPY SHADE TREE PLANTINGS HAVE BEEN ALLOCATED TO THE CARPARK, WHERE POSSIBLE, TO DECREASE TEMPERATURES WHILST CREATING COOLER MICROCLIMATES.

FEATURE ACCENT AND SHADE TREES AROUND THE BUILDING PERIMETER PROVIDE SHADE TO THE RESTAURANT AND DRIVE-THRU.

BUFFERS

THE SIDE BOUNDARY OF THE SITE FEATURES DENSE HEDGE PLANTING TO PROVIDE A VISUAL BUFFER TO THE EXISTING MOTEL.

STREET BOUNDARIES OF GEORGE & DENHAM STREETS AND GEORGE LANE FEATURE A LAYERING OF HEDGED SHRUBS AND GROUNDCOVER FRAMING THE CARPARK CREATING VISUAL INTEREST AND CHARACTER.

A LANDSCAPE MAINTENANCE PROGRAM FOR THE SITE WILL INCLUDE PROVISIONS TO MAINTAIN THE QUALITY OF THE BOUNDARY SCREENING GARDENS.

LEGEND

- SHADE TREE PLANTING — Refer to Suggested Species List for more information.
- THEME TREE PLANTING — Refer to Suggested Species List for more information.
- FEATURE PALM PLANTING — Refer to Suggested Species List for more information.
- NEW STREET TREE PLANTING — Refer to Suggested Species List for more information.
- HEDGE PLANTING — Refer to 'Shrubs' in the Suggested Species List for more information.
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- TURFGRASS PLANTINGS — Refer to 'Shrubs' in the Suggested Species List for more information.
- CONCRETE PAVEMENT — Colours, types, and styles to match existing footpaths.

SUGGESTED SPECIES LIST

TREES

BACKHOUSIA citriodora	- Lemon Scented Myrtle
EUCALYPTUS 'Summer Red'	
SYZYGIUM australe	- South Cherry
TIBOUCHINA elicanville	
XANTHOSTEMON chrysanthes	- Golden Penda
WATERHOUSIA floribunda	- Weeping Lilly Pilly

PALMS

CYCAS REVOLUTA - Japanese Sago Palm

SHRUBS

CALLISTEMON 'Little John'	
HIBISCUS heterophyllus	- Native Hibiscus
LYDRA 'Prince of Orange'	
METROSIDEROS 'Fiji Fire'	
NANDINA domestica	- Sacred bamboo
STRELITZIA reginae	- Bird of Paradise
SYZYGIUM 'Cascade'	
SYZYGIUM 'Weeping Gem'	
WESTRINGEA fruticosa	- Native Rosemary

GROUNDCOVERS

ALTERNANTHERA 'Yellow'	
DIANELLA caerulea	- Blue flax lily
DIANELLA 'Tasred'	
TRACHELOSPERMUM jasminoides	- Star Jasmine

NORTH

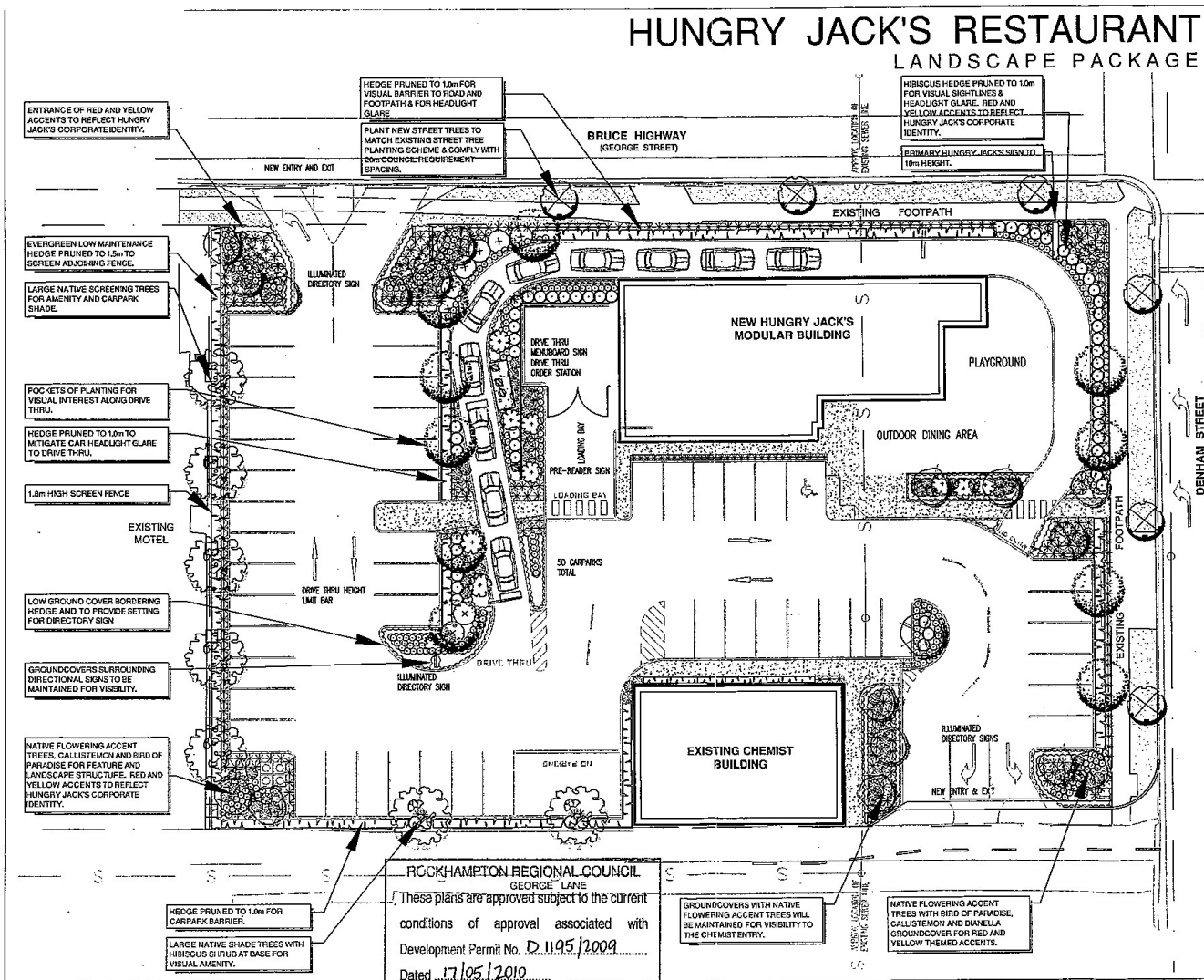
Client: HUNGRY JACK'S AUSTRALIA Pty Ltd.

HUNGRY JACK'S RESTAURANT
LANDSCAPE CONCEPT PLAN

anembo consultants

HUNGRY JACK'S RESTAURANT

LANDSCAPE PACKAGE



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Client:
HUNGRY JACK'S AUSTRALIA Pty Ltd

HUNGRY JACK'S RESTAURANT
LANDSCAPE CONCEPT PLAN

anembo consultants

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Dated 17/05/2010

LAMBERT & REHBEIN

DATE 10 June, 2009

CONTACT CAMERON MESSER

Proposed "Hungry Jacks" Development - Rockhampton South

Traffic Impact Assessment

For Hungry Jacks Pty Ltd

TABLE OF CONTENTS

APPENDIX A

PROPOSED SITE LAYOUT

APPENDIX B

TRAFFIC FLOW DIAGRAMS

APPENDIX C

GEORGE STREET / DENHAM STREET INTERSECTION – SIDRA RESULTS

APPENDIX D

RCV SWEPT PATH ASSESSMENT

APPENDIX E

GEORGE LANE / DENHAM STREET INTERSECTION - SIDRA RESULTS

Document Control Page

Revision	Date	Description	Author	Signature	Verifier	Signature	Approver	Signature
A	30/03/2009	DRAFT	AH		CM		CM	
B	06/05/2009	FINAL	AH		CM		CM	
C	09/06/2009	REVISED FINAL	AH		CM		CM	

1.0 INTRODUCTION

Lambert & Rehbein was commissioned by Hungry Jacks Pty Ltd to undertake a traffic impact assessment of the proposed "Hungry Jacks" development, located at 160 George Street, Rockhampton South, positioned the north-western corner of the George Street / Denham Street intersection.

The proposed Hungry Jacks development includes a Hungry Jacks restaurant with drive through facilities. The proposed site layout of the proposed "Hungry Jacks" development has been included in **Appendix A**.

This document has been structured to provide information in a clear and concise manner, including:

Section 2 reviews the existing situation of the road network surrounding the proposed development, including analysis of existing conditions of the adjacent Main Roads' controlled signalised intersection and a summary of the surrounding land uses.

Section 3 details the proposed development, including an assessment of the site layout.

Section 4 investigates the forecast ultimate development generated traffic volume and evaluates the impact of the development generated traffic volumes on the adjacent signalised intersection of George Street and Denham Street.

Section 5 summarises the key outcomes of the traffic investigations.

Lambert & Rehbein derived the data in this report primarily from the data provided by the Client, a traffic movement survey provided by the Department of Main Roads for the 4th October 2007, a site investigation conducted on 14th January 2009, and discussions with Main Roads' officers in January and March of 2009. The passage of time, manifestation of latent conditions or impacts of future events may require further exploration at the site and subsequent data analysis, and re-evaluation of the findings, observations and conclusions expressed in this report.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between Lambert & Rehbein and the Client. Lambert & Rehbein accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

2.0 CONTEXT OF THE PROPOSED DEVELOPMENT

This section of the report describes the context of the proposed development and includes a description of the existing road network, adjacent land uses, and existing traffic volumes.

2.1 DEVELOPMENT SITE

The proposed development site is located on the north western corner of the George Street / Denham Street signalised intersection. The subject site is bound by Denham Street; the Bruce Highway, otherwise known as George Street; and George Lane. It is understood that the previous land uses on the site included a combination of small retail tenancies including a chemist that is proposed to be retained for a maximum period of three years. The site currently gains access to the external road network via George Street, Denham Street and George Lane.

The site location, in relation to the surrounding road network, is displayed in **Figure 2-1**.

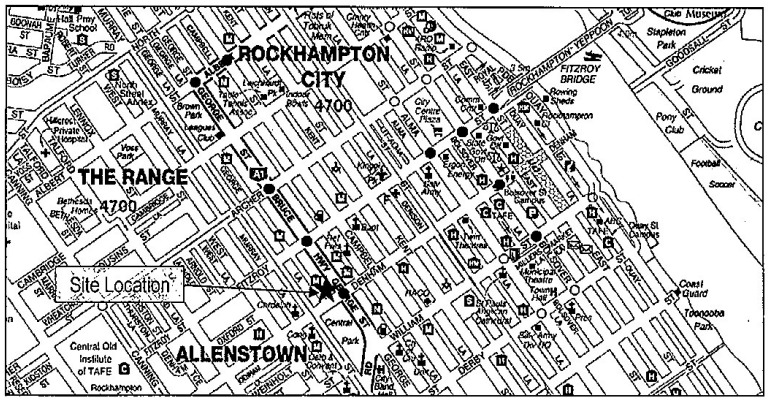


Figure 2-1 Site Location

The surrounding properties include a combination of retail/commercial developments and motels along George Street, whilst residential dwellings are predominantly located along Denham Street to the west of the development site.

2.2 SURROUNDING ROAD NETWORK

A site inspection of the land use, road condition, and intersection characteristics within the study area was undertaken in January 2009. The aim of this field review was to collect information about the road network, intersection operation, safety characteristics and specific network / land-use factors potentially of influence to the proposed Hungry Jacks development. The information gathered throughout this field review / visit has been used in the formulation of this assessment.

The subject site is located on the corner of George Street and Denham Street, which is situated south west of the Rockhampton CBD.

Adjacent to the north-eastern boundary of the development site is George Street, which forms part of the Bruce Highway and is under the jurisdiction of the Department of Main Roads. Adjacent to the development site, George Street has been constructed in the form or a four lane, two way, median divided road, which is consistent with the road classification of an urban arterial route within Rockhampton Regional Council's *Road Hierarchy Plan.*

Figures 2-2 and **2-3** show George Street north and south of the subject development site.

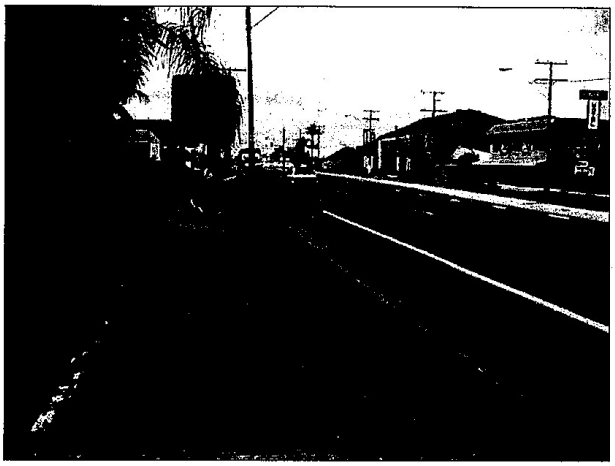


Figure 2-2 George Street, north of the development site

Figure 2-3 George Street, south of the development site

Adjacent to the southern boundary of the subject site is Denham Street, which is classified as a major urban collector in Rockhampton Regional Council's *Road Hierarchy Plan*. Denham Street has been constructed as a four lane, two way road and provides direct property access to residential dwellings further west of the development site.

Figures 2-4 and **2-5** show Denham Street west and east of the subject development site.

Figure 2-4 Denham Street, west of the development site

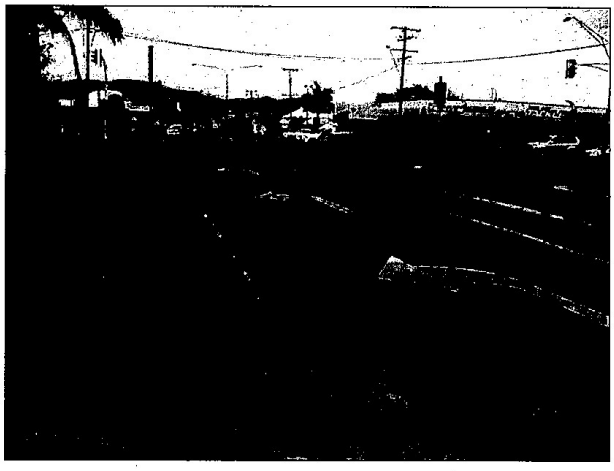


Figure 2-5 Denham Street, east of the development site

Adjacent to the western boundary of the subject site is George Lane, which acts as a minor access road to residential properties located north-west of the subject site and also connects to a commercial development located adjacent to the subject development's northern boundary. The southern end of George Lane connects to Denham Street at a priority controlled intersection with all movements accepted. The northern end of George Lane terminates at Fitzroy Street in a similar configuration.

Figure 2-6 shows George Lane adjacent to the subject development site.

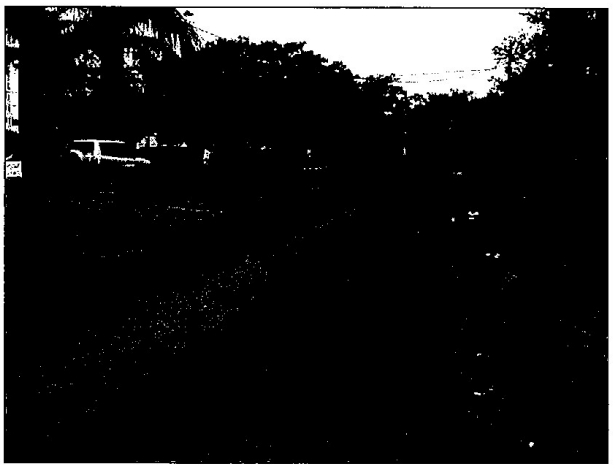


Figure 2-6 George Lane, adjacent to the development site

2.3 EXISTING INTERSECTION ASSESSMENT

Vehicle movement data was provided by the Department of Main Roads for the intersection of the George Street and Denham Street. The traffic surveys were undertaken on Thursday 4th October 2007, between 6am and 6pm. The data supplied included volumes of light and heavy vehicles that travelled through the intersection.

The AM peak hour for the George Street / Denham Street signalised intersection was recorded to be 8:15 - 9:15 pm, whilst the PM peak hour was recorded to be 4:15 - 5:15 pm. It is understood that the trading peak for a Hungry Jack's food outlet historically falls outside of the standard business hours in the evening. Therefore, the Hungry Jacks peak traffic generation period is not anticipated to coincide with the AM peak of the external road network.

Within the peak periods, the average heavy vehicle percentage (HV %) was surveyed to be approximately 10% along George Street and approximately 5% along Denham Street.

A summary of the 2007 PM surveyed peak hour volumes are displayed in **Appendix B.**

In order to gain an understanding of the existing (2009 PM peak) performance of the George Street / Denham Street signalised intersection, a compound growth rate of 2% p.a. was applied to the surveyed traffic volumes collected in 2007.

The George Street / Denham Street signalised intersection has been analysed in SIDRA INTERSECTION for the 2009 peak periods, adopting the following assumptions:

- A Saturation Flow of 1,950 through car units per hour;
- Heavy Vehicle percentage of 10% for George Street and 5% for Denham Street;
- A signal cycle time of 100 seconds; and
- Gap Acceptance values are those as specified by *Austroads / Main Roads Standards.*

A summary of the results is provided in **Table 2-1** for the peak periods, whilst the SIDRA INTERSECTION Summary Output Tables have been included in **Appendix C** of this report.

Intersection - George Street / Denham Street	Degree of Saturation (%)	95% Back of Queue (m)	Average Delay (secs)	Level of Service
AM Peak Period				
George Street (South)	0.373	87	8.7	A
Denham Street (East)	0.233	26	38.2	D
George Street (North)	0.278	65	8.5	A
Denham Street (West)	0.366	59	38.0	D
PM Peak Period				
George Street (South)	0.365	83	7.3	A
Denham Street (East)	0.281	41	41.6	D
George Street (North)	0.321	73	7.4	A
Denham Street (West)	0.369	54	41.3	D

Table 2-1 2009 Peak Hour Background Traffic

On the basis of the analysis results above it appears that the George Street / Denham Street intersection currently operates with a degree of saturation below the maximum desirable

threshold (x=0.900) for the peak periods. The modelled results correlate well to the on site observed operation of the intersection during the peak period.

Main Roads officers expressed particular concern regarding the existing and future performance of the right turn pocket at the northern approach to the George Street / Denham Street intersection. The model results included in **Appendix C** show a 95% Back of Queue Length of 9m during the AM peak and 12m during the PM peak. As the subject right turn pocket currently has a storage length of approximately 45m, it is considered that the current facility has capacity for future growth.

No changes to the layout of George Street / Denham Street intersection are considered necessary on the basis of the SIDRA INTERSECTION assessment of the 2009 peak hour volumes and the on site observations.

3.0 DETAILS OF THE PROPOSED DEVELOPMENT

This section of the report provides details of the proposed development, including access arrangements, car park provision and layout, and service vehicle requirements.

3.1 PROPOSED DEVELOPMENT

The proposed development site is located on the north-western corner of the George Street / Denham Street signalised intersection, Rockhampton South.

It is proposed to develop a Hungry Jacks fast food store to include drive through facilities. The proposed site layout plan, included in **Appendix A** of this report, proposes to consolidate the existing three access points, into two accesses that allow convenient access to customers travelling from all directions in Rockhampton South.

At the time of opening for the proposed Hungry Jacks development, it is anticipated that the existing chemist development will continue to operate for a maximum period of three years. For the purposes of future traffic generation into and out of the site, it has been assumed that the chemist will no longer be operational ten years after the opening of the proposed development (2019).

3.2 ACCESS ARRANGEMENTS

As previously mentioned in **Section 2**, the site currently has three accesses that link to all of its abounding roads. The Hungry Jacks development proposes to consolidate the access points to two driveways:

- A left in / left out driveway located on the eastern frontage of the site via George Street; and
- The secondary access is located on George Lane at the approximate location of the existing driveway. This access is intended to cater predominantly for right in / left out access into and out of the subject site via George Lane. The site layout plan in **Appendix A** shows the proposed widening of George Lane between the George Lane / Denham Street intersection and the Hungry Jacks driveway, to allow for two vehicles to pass each other without causing queuing along Denham Street. The George Lane entrance enables vehicles travelling to and from the south, from the north, and to and from the east.

It has been noted that without the proposed access via George Lane, vehicles travelling from the north may be encouraged to conduct an illegal u-turn manoeuvre at the northern George Street approach to the George Street / Denham Street signalised intersection.

In addition, the proposed access via George Lane will reduce the volume of vehicles entering the State Controlled Road Network (George Street), as vehicles travelling to and from the south and east will be able to enter and exit the site without travelling along George Street.

3.3 SERVICING ARRANGEMENTS

It is anticipated that the subject Hungry Jacks development will be serviced by two types of vehicles:

- A standard refuse collection vehicle (RCV) as part the development waste management system; and
- An 8.8m MRV for deliveries.

A swept path assessment for the largest vehicle, 10m RCV, has been included in **Appendix D**, which shows the vehicle manoeuvrability within the site.

It is anticipated that the RCV will service the site once a day, whilst deliveries are anticipated to occur a maximum of three times per day. As such, it is considered that the low frequency of servicing required for the proposed Hungry Jacks Development will have a minimal impact on the performance of the internal circulation of the site and is not anticipated to impact on the performance of the external road network.

3.4 CAR PARKING DEMAND AND PROVISION

The *Rockhampton City Plan, currently adopted by Rockhampton Regional Council* stipulates that vehicle parking bays for a Take-away Food Store development are to be provided at a rate of 1 space per 12.5m^2 of GFA, whilst a shop development (chemist) is required to have a car parking supply of 1 space per 25m^2 of GFA.

The proposed Hungry Jacks development currently has a total GFA of 402m^2, whilst the chemist has an approximate GFA of 200m^2. Therefore, to meet the planning scheme car parking requirements, the proposed Hungry Jacks development is required to provide a minimum of 33 car parking spaces, whilst the chemist is required to provide 8 car parking spaces.

The site layout plan by WBP Architects, included in **Appendix A**, indicates a total provision of 42 car parking spaces, including one spaces located close to the store entrance for people with disabilities. As a result, it is considered that the proposed development provides sufficient car parking facilities to Rockhampton Regional Council's minimum requirements, and is considered to be sufficient for both the proposed Hungry Jacks and the chemist developments.

In addition, the proposed development layout includes 10 bicycle parking racks located within close proximity to the store entrance.

3.5 TRIP GENERATION AND DISTRIBUTION

Appendix 3A of the Main Roads *Road Planning and Design Manual* recommends a nominal 180 trips per Hungry Jacks store that includes drive-through facilities.

The traffic generation rates and directionality of movements adopted for the analysis of the proposed development site use is shown in **Table 3-1.**

Land Use	Generation Rate (trips / store)		Directionality (% In / out)	
	AM Peak	PM Peak	AM	PM
Drive-in Takeaway food outlets	180	180	50 / 50	50 / 50

Table 3-1 Proposed Development Generation Rates

Based on the above guidelines and assumptions, the estimated traffic generated by the proposed development is shown in **Table 3-2.**

Land Use	AM (In)	AM (Out)	PM (In)	PM (Out)
Drive-in Takeaway food outlets	90	90	90	90

Table 3-2 Proposed Development Traffic Generation

As previously mentioned, the existing land uses on the subject site includes a combination of retail tenancies with an approximate GFA of 500m², including the existing chemist, which has an approximate GFA of 200m².

The Road Transport Authority *Guide to Traffic Generating Developments* suggests that retail type developments with a GFA less than 10,000m² would generate approximately 12.3 vehicles per 100m² during a PM peak period.

Based on the above guidelines, the estimated traffic currently generated by the existing land use scenario is shown in **Table 3-3**.

Land Use	AM (In)	AM (Out)	PM (In)	PM (Out)
Chemist - Retail (200m² GFA)	-	-	13	13
Balance - Retail (300m² GFA)	-	-	18	18
Total	-	-	*31*	*31*

Table 3-3 Existing Development Traffic Generation

In order to determine the net increase in development generated traffic of the subject site for the 2009 opening year scenario, the estimated trips for the 'balance – retail' land use scenario, shown in **Table 3-3**, are removed from the forecasted trips summarised in **Table 3-2**.

To determine the net increase in development generated traffic of the subject site for the 2019 ten year design scenario, the 'total' estimated trips for the existing land use scenario, shown in **Table 3-3**, are removed from the forecasted trips summarised in **Table 3-2**.

Therefore, the net increase in development generated trips for the proposed Hungry Jack development are as shown in **Table 3-4**.

Year	AM (In)	AM (Out)	PM (In)	PM (Out)
2009 (net increase)	90	90	72	72
2019 (net increase)	90	90	59	59

Table 3-4 Net Increase in Development Generated Traffic

The volumes summarised in **Table 3-4** are considered conservative as no reductions have been adopted relating to drop in trips often encountered with the proposed land use.

Given the location of the proposed Hungry Jacks development and the existing road network, it is expected that the traffic generated by the development will distribute as follows:

- 20% of the development generated traffic would travel to / from the north via George Street;
- 30% of the development generated traffic would travel to / from the south via George Street;

- 40% of the development generated traffic would travel to / from the west via Denham Street;
- 10% of the development generated traffic would travel to / from the east via Denham Street;
- 40% of the development generated traffic travelling from the east would turn right at the George Street / Denham Street signalised intersection to then turn left into the development site via the George Street entrance; and
- 60% of the development generated traffic travelling from the east would continue through the George Street / Denham Street signalised intersection to then turn right onto George Lane and then right into the development site via the George Lane entrance.

The distributed net increase in development generated traffic is summarised in **Appendix B** of this report.

4.0 IMPACT ASSESSMENT

This section of the report describes the analysis scenarios and presents summaries of the potential impact that the development generated traffic volumes could have on the operation of the adjacent road network including the signalised intersection of George Street and Denham Street during the peak periods and the priority controlled intersection of Denham Street and George Lane.

4.1 GEORGE STREET / DENHAM STREET INTERSECTION

4.1.1 2009 OPENING YEAR SCENARIO

The predicted future operation of George Street / Denham Street intersection was assessed using the intersection modelling program SIDRA INTERSECTION, adopting the assumptions stated in **Section 2.3**. A summary of the SIDRA INTERSECTION output tables for the 2009 Opening Year scenarios, are included in **Appendix C**.

Opening Year 2009 – Background Traffic

George Street / Denham Street intersection was analysed for the opening year (2009) peak periods. The results of the 2009 Background traffic have been summarised and assessed in **Section 2.3** of this report.

Opening Year 2009 – Design Traffic

The analysis of George Street / Denham Street intersection was undertaken for the 2009 design traffic scenario to assess whether the intersection would operate at a satisfactory level from the opening of the development. In calculating the traffic for this scenario the additional development generated traffic (net increase) was simply added to the total background traffic flows. The traffic flow diagram for this scenario is shown in **Appendix C**. The results of the intersection analysis are shown in **Table 4-1**.

Intersection - George Street / Denham Street	Degree of Saturation (%)	95% Back of Queue (m)	Average Delay (secs)	Level of Service
AM Peak Period				
George Street (South)	0.384	90	8.8	A
Denham Street (East)	0.275	27	38.6	D
George Street (North)	0.278	65	8.8	A
Denham Street (West)	0.387	62	38.7	D
PM Peak Period				
George Street (South)	0.453	112	13.8	B
Denham Street (East)	0.264	36	30.5	C
George Street (North)	0.388	95	14.1	B
Denham Street (West)	0.450	48	31.0	C

Table 4-1 Opening Year 2009 – Design Traffic

The above table indicates that the addition of development traffic to George Street / Denham Street intersection is forecast to have an insignificant impact on the operation of the intersection, with minimal increases in degree of saturation, queuing and delays expected. It is clear, from the results of the analysis, that theoretically the intersection would continue to operate well below the desirable degree of saturation, even with the proposed development traffic added to the background traffic.

As previously mentioned in **Section 2.3**, Main Roads officers have expressed particular concern regarding the existing and future performance of the right turn pocket at the northern approach to the George Street / Denham Street intersection. The model results included in **Appendix C** show a 95% Back of Queue Length of only 14m during the AM peak and 23m during the PM Peak. As the subject right turn pocket currently has a storage length of approximately 45m, it is considered that the current facility has sufficient capacity for the additional traffic generated by the subject development.

Given the above information, it is considered that the development does not warrant any physical upgrading works at George Street / Denham Street intersection during the opening year of the proposed Hungry Jacks development.

4.1.2 2019 TEN YEAR DESIGN HORIZON

The predicted future operation of George Street / Denham Street intersection was assessed using the intersection modelling program SIDRA INTERSECTION, adopting the assumptions stated in **Section 2.3**. A summary of the SIDRA INTERSECTION output tables for the 2019 Ten Year Design Horizon scenarios, are included in **Appendix C**.

2019 Ten Year Design Horizon – Background Traffic

A summary of the SIDRA INTERSECTION output tables for the 2019 Ten Year Design Horizon scenarios, are included in **Appendix C**.

George Street / Denham Street intersection was analysed for the ten year design horizon (2019) peak periods assuming a background growth rate of 2% pa for all movements. The results of the SIDRA INTERSECTION assessment are provided in **Table 4-2** for the 2019 peak periods.

Intersection – George Street / Denham Street	Degree of Saturation (%)	95% Back of Queue (m)	Average Delay (secs)	Level of Service
AM Peak Period				
George Street (South)	0.454	109	9.4	A
Denham Street (East)	0.290	32	38.8	D
George Street (North)	0.339	80	9.0	A
Denham Street (West)	0.447	70	38.6	D
PM Peak Period				
George Street (South)	0.445	104	7.9	A
Denham Street (East)	0.338	49	42.2	D
George Street (North)	0.391	90	8.1	A
Denham Street (West)	0.446	64	42.0	D

Table 4-2 Ten Year Design Horizon 2019 – Background Traffic

The results of the ten year design horizon (2019) background traffic volume intersection analysis indicate that the operation of George Street / Denham Street intersection is theoretically well below the available capacity. The results indicate that the intersection is forecast to operate with relatively low degrees of saturation, which are well below the desirable maximum for a signalised intersection (x=0.900) on all approaches. No changes to this intersection are considered warranted as a result of an increase of background traffic volumes.

2019 Ten Year Design Horizon – Design Traffic

The analysis of George Street / Denham Street intersection was undertaken for the 2019 design traffic scenario to assess whether the intersection would operate at a satisfactory level ten years from the opening of the development. In calculating the traffic for this scenario the additional development generated traffic was simply added to the total background traffic flows. The traffic flow diagram for this scenario is shown in **Appendix C**. The results of the intersection analysis are shown in **Table 4-3**.

Intersection – George Street / Denham Street	Degree of Saturation (%)	95% Back of Queue (m)	Average Delay (secs)	Level of Service
AM Peak Period				
George Street (South)	0.465	112	9.5	A
Denham Street (East)	0.332	33	39.1	D
George Street (North)	0.339	80	9.4	A
Denham Street (West)	0.470	74	39.3	D
PM Peak Period				
George Street (South)	0.504	126	11.7	B
Denham Street (East)	0.328	46	35.4	D
George Street (North)	0.435	107	12.1	B
Denham Street (West)	0.503	60	35.9	D

Table 4-3 Ten Year Design Horizon 2019 – Design Traffic

The above table indicates that the addition of development traffic to George Street / Denham Street intersection is not forecast to have a significant impact on the operation of the intersection, with insignificant increases in degree of saturation, queuing and delays expected. It is clear, from the results of the analysis, that theoretically the intersection would continue to operate below the desirable degree of saturation, even with the proposed development traffic added to the background traffic.

As previously mentioned in **Section 2.3**, Main Roads officers have expressed particular concern regarding the existing and future performance of the right turn pocket at the northern approach to the George Street / Denham Street intersection. The model results included in **Appendix C** show a 95% Back of Queue Length of only 18m during the AM peak and 27m during the PM peak. As the subject right turn pocket currently has a storage length of approximately 45m, it is considered that the current facility has sufficient capacity for the additional traffic generated by the subject development.

Given the above information it is considered that the development does not warrant any physical upgrading works at George Street / Denham Street intersection during the ten year design horizon of the proposed Hungry Jacks development.

4.2 GEORGE LANE / DENHAM STREET INTERSECTION

4.2.1 2009 OPENING YEAR SCENARIO

The predicted future operation of George Lane / Denham Street priority controlled intersection was assessed using the intersection modelling program SIDRA INTERSECTION, adopting the assumptions stated in **Section 2.3**. A summary of the SIDRA INTERSECTION output tables for the 2009 Opening Year scenarios, are included in **Appendix E**.

Opening Year 2009 – Design Traffic

The analysis of George Lane / Denham Street intersection was undertaken for the 2009 design traffic scenario to assess whether the intersection would operate at a satisfactory level from the opening of the development. In calculating the traffic for this scenario the additional development generated traffic was simply added to the total background traffic flows. The traffic flow diagram for this scenario is shown in **Appendix E**. The results of the intersection analysis are shown in **Table 4-4**.

Intersection – George Lane / Denham Street	Degree of Saturation (%)	95% Back of Queue (m)	Average Delay (secs)	Level of Service
PM Peak Period				
Denham Street (East)	0.064	3	1.4	A
George Lane (North)	0.093	3	11.5	B
Denham Street (West)	0.058	0	1.1	A

Table 4-4 Opening Year 2009 – Design Traffic

The above table indicates that the addition of development traffic to George Lane / Denham Street intersection is forecast to operate well below the desirable degree of saturation, even with the proposed development traffic added to the background traffic.

Given the above information, it is considered that the development does not warrant any physical upgrading works at George Lane / Denham Street intersection during the opening year of the proposed Hungry Jacks development.

4.2.2 2019 TEN YEAR DESIGN HORIZON

The predicted future operation of George Lane / Denham Street intersection was assessed using the intersection modelling program SIDRA INTERSECTION, adopting the assumptions stated in **Section 2.3**. A summary of the SIDRA INTERSECTION output tables for the 2019 Ten Year Design Horizon scenarios, are included in **Appendix E**.

2019 Ten Year Design Horizon – Design Traffic

The analysis of George Lane / Denham Street intersection was undertaken for the 2019 design traffic scenario to assess whether the intersection would operate at a satisfactory level ten years from the opening of the development. In calculating the traffic for this scenario the additional development generated traffic was simply added to the total background traffic flows. The traffic flow diagram for this scenario is shown in **Appendix E**. The results of the intersection analysis are shown in **Table 4-5**.

Intersection – George Lane / Denham Street	Degree of Saturation (%)	95% Back of Queue (m)	Average Delay (secs)	Level of Service
PM Peak Period				
Denham Street (East)	0.073	4	1.3	A
George Lane (North)	0.129	4	12.5	B
Denham Street (West)	0.071	0	1.1	A

Table 4-5 Ten Year Design Horizon 2019 – Design Traffic

The above table indicates that the addition of development traffic to George Lane / Denham Street intersection is forecast to operate below the desirable degree of saturation, even with the proposed development traffic added to the background traffic.

Given the above information it is considered that the development does not warrant any physical upgrading works at George Lane / Denham Street intersection during the ten year design horizon of the proposed Hungry Jacks development.

5.0 SUMMARY AND CONCLUSIONS

Lambert & Rehbein was commissioned by Hungry Jacks Pty Ltd to undertake a traffic impact assessment of the proposed "Hungry Jacks" development, located at 160 George Street, Rockhampton South, positioned the north-western corner of the George Street / Denham Street intersection.

The key conclusions drawn from this traffic report include the following –

- It is proposed to develop a Hungry Jacks fast food store to include driveway through facilities and an alfresco dining area. The total proposed GFA is 402m².
- Vehicle movement surveys were provided by the Department of Main Roads for the intersection of the George Street and Denham Street that were collected on Thursday 4th October 2007, between 6am and 6pm.
- Nominal trip generation rates of 180 trips per hour per fast food development were obtained from Appendix 3A of the Main Roads *Road Planning and Design Manual*. The net increase in development traffic was calculated taking into account the staged removal of the existing retail developments.
- SIDRA INTERSECTION analysis was conducted for the George Street / Denham Street signalised intersection for both the opening year (2009) and the ten year design horizon (2019). Results of the SIDRA model indicated that theoretically the intersection would continue to operate below the desirable degree of saturation, even with the proposed development traffic added to the background traffic.
- Main Roads officers expressed particular concern regarding the existing and future performance of the right turn pocket at the northern approach to the George Street / Denham Street intersection. For the 2019 design traffic scenario, the modelled 95% Back of Queue Length was shown to be 29m. As the subject right turn pocket currently has a storage length of approximately 45m, it is considered that the current facility has sufficient capacity for future growth, over and above the proposed development.
- As a result of the intersection analysis, it is considered that the development does not warrant any physical upgrading works at George Street / Denham Street intersection during the ten year design horizon of the proposed Hungry Jacks development.
- SIDRA INTERSECTION analysis was conducted for the George Lane / Denham Street priority controlled intersection for both the opening year (2009) and the ten year design horizon (2019). Results of the SIDRA model indicated that theoretically the intersection

would continue to operate well below the desirable degree of saturation, even with the proposed development traffic added to the background traffic.

- As a result of the intersection analysis, it is considered that the development does not warrant any physical upgrading works at George Lane / Denham Street intersection, other than appropriate widening of George Lane as shown in the site layout plans shown in **Appendix A**.
- The subject development is required to have vehicle parking bays provided at the rate of 1 space per 12.3m^2 of GFA for fast food developments, and 1 space per 25m^2 of GFA for shop developments. As the proposed Hungry Jacks development has a GFA of 402 m^2 and the existing chemist has an approximate GFA 402 m^2, the proposed car parking supply of 42 vehicle spaces satisfies Council's minimum requirements.
- No traffic and transport engineering matters have been identified that should preclude approval of the proposed Hungry Jacks development at this location.

LAMBERT & REHBEIN
ENGINEERS • MANAGERS • SCIENTISTS

17 September, 2009
Our File Ref: B08628TL003
Contact: Cameron Messer

ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D/195/2009
Dated 17/05/2010

CONICS - Sunshine Coast Office
PO Box 149
WURTULLA QLD 4575

Attention: Madeline Dye

RE: PROPOSED "HUNGRY JACK'S" DEVELOPMENT
160 GEORGE STREET, SOUTH ROCKHAMPTON
RESPONSE TO ROCKHAMPTON R.C.'S REQUEST FOR INFORMATION

Lambert & Rehbein was commissioned by Hungry Jack's Pty Ltd to conduct a traffic engineering assessment of the proposed "Hungry Jack's" development, located at 160 George Street, Rockhampton South, positioned on the north-western corner of the George Street / Denham Street intersection.

This advice has been compiled in response to the traffic and transport related issues raised within the Rockhampton Regional Council Information Request letter, dated 22nd July 2009. The following response has been formulated based on the revised site layout plans provided by WBP Achitects. The relevant plans have been attached to this technical note, for further reference.

ITEM 2.3 TRAFFIC GENERATION AND IMPACT

The Traffic Impact Assessment Report prepared by Lambert & Rehbein has been reviewed / the storage length of the right turn pocket in Denham St is considered to be no more than 18m when measured in accordance with DMT Road Design Manual Chapter 13 Figure 13.42. Please provide justification for the use of a 45m storage length or adjust the report and conclusions as required to suit the shorter storage length.

It is recognised that according to Figure 13.42 in Chapter 13 of the *Road Planning and Design Manual (RPDM)*, the available storage length for the right turn pocket at the western Denham Street approach is approximately 18m. However, in congested environments, it is considered appropriate to assume that the practical storage length of a turning pocket to include the deceleration length and taper until a vehicle (2m wide) is no longer able to physically fit in the pocket. When applying this methodology to the subject turn slot, the practical queuing storage is closer to 25m.

Please note that revised intersection analysis has been conducted for this intersection to include 2009 count data, and an increased growth rate of 3% p.a. (compound). As such, the revised intersection outputs can be found in the electronic SIDRA files enclosed with this letter.

The results of the analysis undertaken indicate that during the 2020 ten year design horizon, the maximum theoretical queue length forecast for the right turn pocket from Denham Street (W) into George Street (S) is only 27m. As such, it is considered that the current right turn lane arrangements are appropriate for the forecast development and background traffic. It is considered that the proposed development should not have a significant impact on the operation of the Denham Street / George Street signalised intersection.

ITEM 2.4 WASTE

Please provide details (including type, dimensions and turn radius) of the waste collection vehicles expected to collect waste and demonstrate via swept paths on a fully dimensioned and properly scaled plan, how this vehicle is able to enter the site in a forward direction. In performing these manoeuvres, the waste collection/s shall not interfere with or in any way impede designated vehicle parking spaces or pedestrian and bicycle movements within or adjacent to the site. Compliance with all aspects AS/NZS2890.2:2002 will be required to be demonstrated for all waste collection vehicles.

A waste management report has been prepared for the proposed development by WBP Architects. This report identifies three major waste types that require regular collection. This includes the following:

- Bulk Refuse – collected by Council's bulk waste collection contractor up to 7 times a week;
- Recyclable Waste – collected by a private contractor on a weekly basis; and
- Waste Oil - collected by a private contractor on a monthly basis.

As a result, it is anticipated the subject site will be serviced by various RCV type vehicles. A swept path assessment of a 10m RCV entering the site via the George Street driveway entering the service bay in a forward direction, conducting a single reverse manoeuvre and the exiting the site in a forward gear. The swept path assessment confirms that an RCV can manoeuvre within the site whilst having a minimal effect on the circulation of customer vehicles. The vehicle is not anticipated to traverse into any car park.

The service vehicle paths cross the designated pedestrian crossing, however given the relative infrequency in which the site will be serviced, no considerable safety issues to pedestrians and cyclists were identified.

ITEM 3.1 VEHICULAR ACCESS

Please provide suitably scaled and adequately dimensioned drawings for each of the proposed vehicular accesses demonstrating how they comply with the relevant Australian Standards, and how they are integrated with adjoining infrastructure within the road reserve. The plans must show all existing and proposed road line-markings, pavement markings, parking bays and associated signage. Any changes to on-street parking in the vicinity of the proposed accesses must be shown.

Please find attached the site layout plans that show that the proposed car parking layout and access arrangements have been designed in accordance with the Australian Standard for parking facilities (AS 2890). On street car parking is not currently permitted along either George Street or Denham Street adjacent to the development site and as such the proposed development is not anticipated to have a significant impact on the current operation of George Street and Denham Street.

ITEM 3.2 VEHICULAR MANOEUVRING

Please provide details (including type, dimensions and turn radius) of the waste collection vehicles. In addition, please demonstrate, via swept vehicle paths on a fully dimensioned and properly scaled plan, how this vehicle enters the site in a forward direction (commencing with the direction of travel in the adjoining street), manoeuvres into the proposed collection areas and exits the site in a forward direction. In performing these manoeuvres, the waste collection vehicle(s) must not interfere with or in any way impede designated vehicle parking spaces or pedestrian and bicycle movements within or adjacent to the site. Compliance with all aspects of AS/NZS2890.2:2002 must be demonstrated for all waste collection vehicles. All swept path turning movement diagrams must consider parking areas to be fully occupied.

Please provide details of the maximum vehicle class (the design vehicle) that will use each entry to and exit from the development site. For vehicle class definitions please refer to AS/NZS 2890.1-2004 and AS 2890.2-2002.

If the design vehicle for any access is larger than the waste collection vehicle referred to in the above item please provide suitably scaled swept path turning movement diagrams for the design vehicle showing how it enters the site in a forward gear, manoeuvres within the site, (including into and out of loading bays, docks or other service areas), and exits the site in a forward gear. All swept path turning movement diagrams must consider parking areas to be fully occupied.

It is anticipated that the subject Hungry Jacks development will be serviced by two types of vehicles:

- A standard refuse collection vehicle (RCV) as part the development waste management system; and
- An 8.8m medium rigid vehicle (MRV) for deliveries.

The largest vehicle classified in AS 2890 to enter and exit the site via the George Street driveway is an 8.8m MRV; however the driveway crossover has been designed to accommodate the manoeuvring of a 10m RCV.

As previously mentioned, enclosed with this letter are swept path assessments showing an RCV servicing the site for both the interim (with chemist) and future (without chemist) internal car park arrangements. All requested vehicle specifications have been included in these sketches.

The largest vehicle classified in AS2890 to enter and exit the site via the Denham Street driveway is a B99 vehicle, and as such the crossover has been designed to accommodate as a minimum a B99 vehicle.

On the basis of this assessment, it is our opinion that the proposed layout should be able to adequately cater for the largest anticipated vehicle to service the site without having any adverse impact on the external road network.

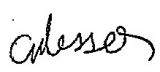
ITEM 3.4 OTHER ITEMS

Please provide electronic copies of the aaSIDRA files used in the analyses of key intersections. The intersection analyses must use a design horizon of ten years after the opening of the development.

A full digital copy of the SIDRA Intersection model is enclosed with this response.

We trust the above information is satisfactory. Should you have any further queries, please do not hesitate to contact the undersigned at your earliest convenience.

Yours faithfully
For and on behalf of
LAMBERT & REHBEIN (SEQ) PTY LTD



C.J. MESSER BE(Env), MIEAust
SENIOR TRAFFIC ENGINEER

Enc: Site Layout Plan
RCV Swept Path Assessment
SIDRA Intersection model (CD)

ask
CONSULTING ENGINEERS

Rockhampton Hungry Jacks

160 & 166 George Street, Rockhampton

4998R01V02.doc
09/06/2009

Prepared for
Conics

ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D1195/2009
Dated 17/05/2010

ASK Consulting Engineers Pty Ltd
ATF ASK Consulting Engineers Trust
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CONTENTS

1 Introduction

ASK Consulting Engineers was commissioned by Conics on behalf of Hungry Jack's Australia Pty Ltd to undertake a noise and lighting impact assessment for the proposed Hungry Jack store to be located at 160 & 166 George Street, Rockhampton.

The noise issues associated with this report include noise from mechanical plant, medium rigid vehicle (MRV) deliveries and car parking. Lighting issues to be addressed will include car park lighting.

2 Subject Site Description

The subject site is located at 160 & 166 George Street, Rockhampton.

To the north of the site is the Home Motel which is a two storey building with windows facing the subject site. To the west the of the subject site on the opposite side of a laneway/road are residential dwellings. To the east of the subject site is George Street which is a part of the Bruce Highway, and to the south is Denham Street. The subject site and nearby residents are shown in Figure 2.1.

The subject site site approximately 300mm below the car park height of the hotel.

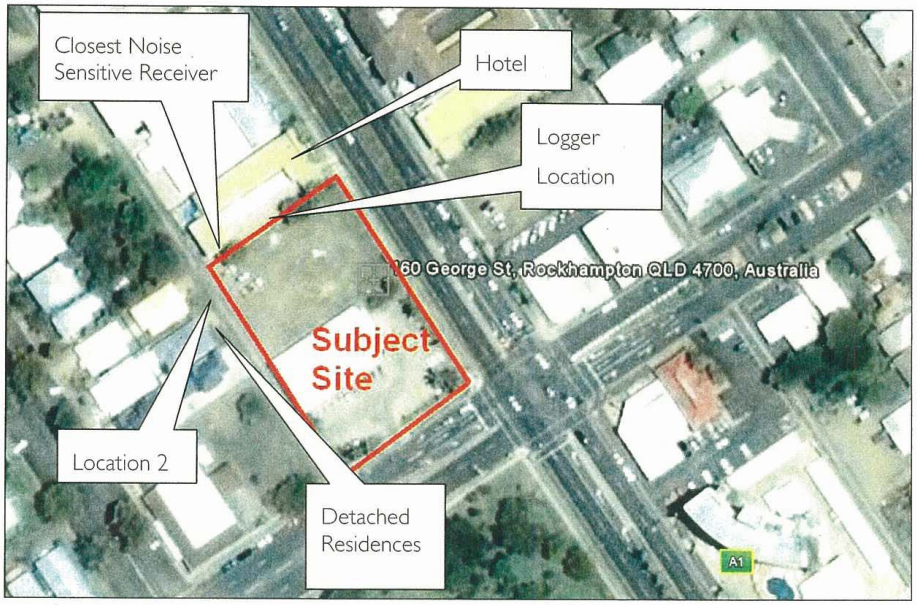


Figure 2.1 Subject Site and Noise Logging Location

3 Proposed Development

The proposed development is to consist of a Hungry Jacks restaurant and car parking. The proposed site design is shown in **Figure 3.1**.

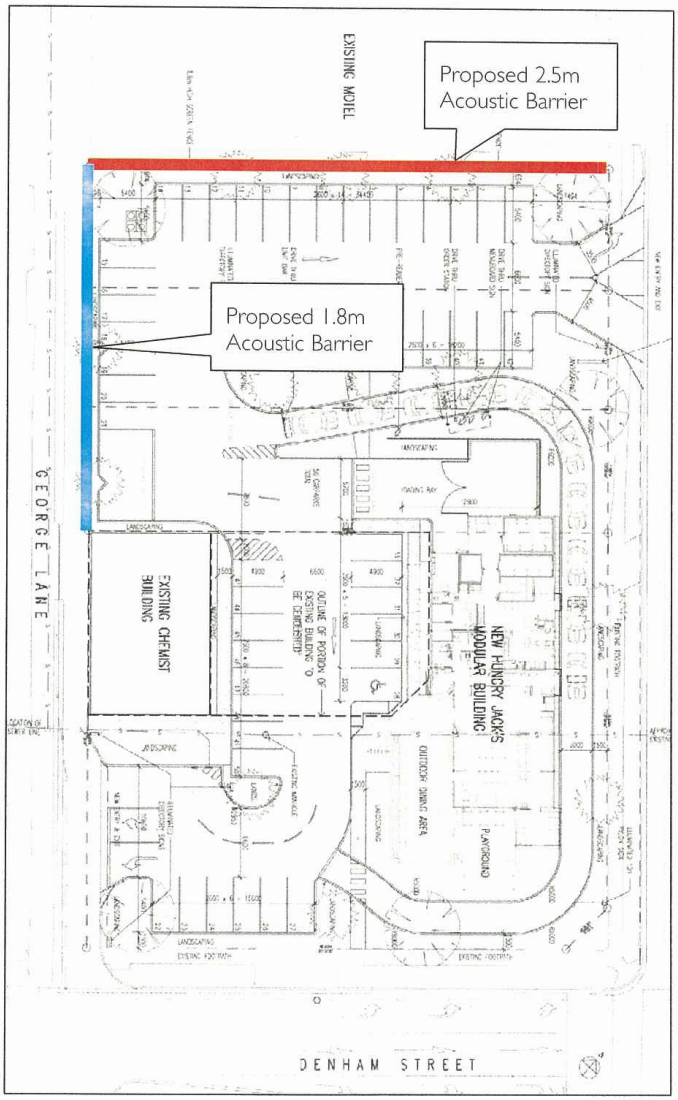


Figure 3.1 Site Layout and Acoustic Barrier Locations

4 Existing Environment

4.1 Existing Noise Environment

A calibrated Larson Davis 831 Type 1 noise logger was placed onsite between the 21/04/2009 and 27/04/2009. The logger was setup to record continuous 15 minute measurements to establish the existing noise environment currently experienced at the hotel. The weather during the monitoring period was fine with no rain.

The recorded noise levels are shown in **Figure 4.1** with a 24 hour time scale.

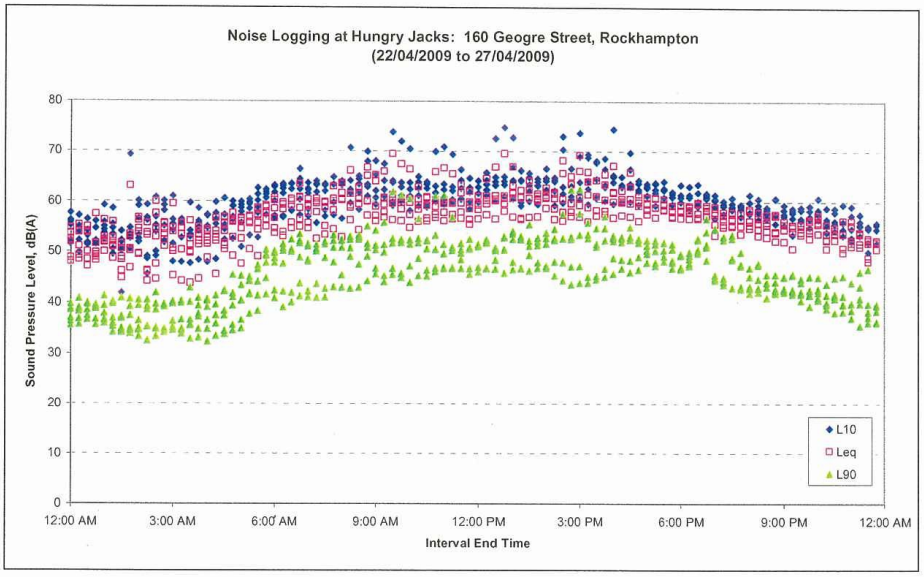


Figure 4.1 Graph of Noise Levels

The noise levels have been averaged over the working days and weekend and are shown in **Table 4.1.**

The background noise levels, calculated using lowest 10% method, are as follows:

- Day – 50 dB(A)
- Evening – 42 dB(A)
- Night – 35 dB(A)

Table 4.1 Unattended Measured Noise Levels

Parameter	Statistic	Noise Levels, dB(A)		
		Day	Evening	Night
Lmax	Maximum	99	83	86
	Minimum	69	67	60
	Average	77	72	71
L1	Maximum	78	72	73
	Minimum	61	61	54
	Average	69	66	65
L10	Maximum	75	64	69
	Minimum	56	54	42
	Average	63	59	56
L90	Maximum	63	57	54
	Minimum	41	39	32
	Average	50	46	40
Leq	Maximum	70	60	64
	Minimum	53	51	44
	Average	60	56	53

Attended noise measurements were also conducted onsite to observe and establish existing noise sources. Measurements were conducted using a calibrated Rion NL22 Sound Level Meter. Noise sources observed during the attended measurements were:

- Birds
- Insects
- Traffic from George Street/Bruce Highway
- Local traffic travelling on laneway
- Motel car park traffic

The results from these 15 minute attended measurements are shown in Table 4.2. The weather during the measurements was fine, cool and no clouds were present.

Table 4.2 Attended Measured Noise Levels

Date	Start Time	Location (refer Figure 2.1)	Measured Noise Levels, dB(A)			
			Lmax	L_{eq}	L10	L_{90}
21/04/2009	5:23:31 PM	Logging Location	78	54	55	47
21/04/2009	5:43:59 PM	Location 2	72	54	56	47
21/04/2009	6:08:00 PM	Logging Location	82	59	62	49
21/04/2009	6:23:51 PM	Location 2	75	57	60	50
21/04/2009	9:00:50 PM	Logging Location	77	58	62	48
21/04/2009	9:24:56 PM	Location 2	82	56	59	48
21/04/2009	9:57:21 PM	Logging Location	69	54	58	42
21/04/2009	11:32:52 PM	Logging Location	75	53	54	43
22/04/2009	5:44:38 AM	Location 2	71	56	60	49

4.2 Existing Light Environment

Ambient lighting measurements were conducted around the subject site to establish existing lighting conditions. Measurements were conducted using a Lutron LX-105 Digital Light Meter. The results of the lighting measurements are shown in **Figure 4.2**.

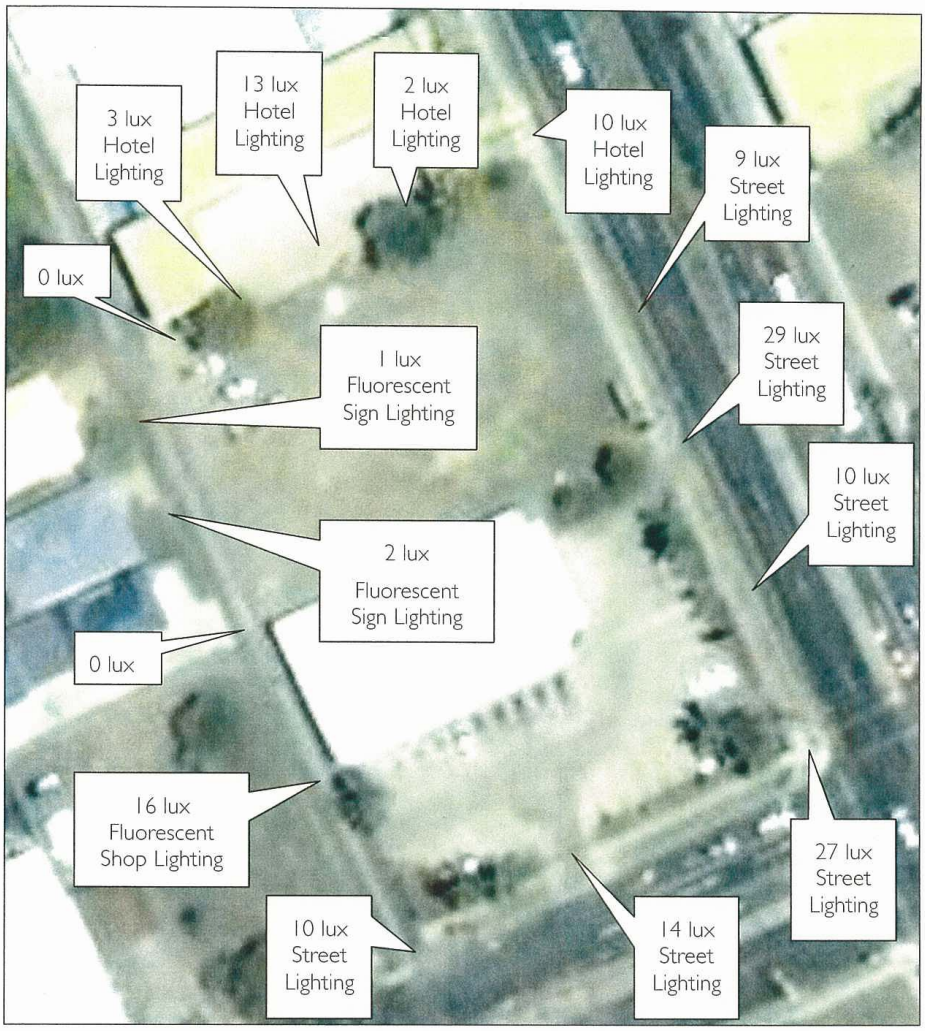


Figure 4.2 Measured Existing Light Levels (Measured in Lux)

5 Criteria

As Rockhampton City Council does not have its own noise criteria, other than specifying the use of the EPR 1998, it is proposed to use criteria utilised by Brisbane City Council for similar developments. Rockhampton City Council does have lighting criteria and these are outlined in Section 5.4.

5.1 Noise - Comparison of Like Parameters (Brisbane City Council)

To assess short term car park noise such as vehicle drive bys, car door slams, medium rigid vehicle (MRV) engine starts and reversing beepers, 'Comparison of Like Parameters' will be applied using the L_1 parameter.

The 'Comparison of Like Parameters' criterion from NIAPSP (Brisbane City Council's Noise Impact Assessment Planning Scheme Policy) is typically used to evaluate noise from non-steady noise sources. Firstly, noise measurements are conducted on the receiving environment in the absence of the noise source. Secondly, the measurements are repeated (or predictions calculated) inclusive of the noise source. The maximum allowable difference between the two data sets is 3dB(A) for the relevant parameter.

The relevant parameters may include:

- L_{max} – for short duration events, such as car doors closing, hammering.
- L_{Aeq} – for steady state and variable noise, such as industrial and commercial activities with a range of noise sources, air-conditioning and plant noise
- L_1 – for short duration events, such as hammering, items being dropped, shooting
- L_{10} – for relatively short duration events, such as industrial and commercial activities
- L_{90} – for steady state or quasi-steady state noise levels, and describing the existing environment.

Any chosen parameter/s must be justified based on the character of the ambient noise and the character of noise emitted from the development.

5.2 Noise - Sleep Disturbance (Brisbane City Council)

This methodology applies to noise sources operational during the night period (10pm – 7am) that are neither steady nor quasi-steady.

Research adopted by the World Health Organisation (WHO), concludes that for short duration variable noise sources the onset of sleep disturbance commences at internal L_{max} noise levels of between 45 dB(A) and 50 dB(A).

Accordingly, for these noise sources measured internal maximum noise levels in area categories:

- Quiet Areas (i.e. R1 – R3 in AS1055) must not regularly exceed 45 dB(A); and
- Noisier Areas (i.e. R4 – R6 in AS1055) must not regularly exceed 50 dB(A).

Here, "regularly" refers to the likelihood the noise levels could be exceeded by certain events (e.g. passing trucks) throughout the night.

The existing background noise level best matches the noise levels displayed in a R3 category, therefore, the internal noise limit of 45 dB(A) L_{max} is applied. The noise level reduction from outside a open window to inside is typically 10 dB(A), and therefore the corresponding external noise level which must be achieved is 55 dB(A) L_{max} during the night time period of 10pm to 7am.

5.3 Noise - Background Plus (General)

When assessing the mechanical plant proposed on the site, 'Background Plus' criteria are applied to ensure minimal nuisance is experienced by adjacent detached residences and the motel.

The 'background plus' noise limits in Table 5.1, although not contained as part of state and local legislation, are still regularly used by the state government and local councils when specifying noise criteria or assessing noise complaints. They are widely accepted as being appropriate noise limits for non-time-varying noises, such as mechanical plant, and for minimising the risk of noise complaints.

Table 5.1 Environmental Noise Limits

Noise Limits at a Noise Sensitive Place Measured as the Adjusted Maximum Sound Pressure Level $L_{max,adj,T}$	Period
Background noise level plus 5 dB(A)	7am - 6pm
Background noise level plus 5 dB(A)	6pm - 10pm
Background noise level plus 3 dB(A)	10pm - 7am

After applying the 'Background Plus' criteria to the measured noise levels, the mechanical plant noise limits are shown in Table 5.2.

Table 5.2 Mechanical Plant Design Limits

Period	Background Plus Noise Level Criteria, $L_{max, adj,T}$, dB(A)	
	Measured Limit	Design Component Limit
Daytime (7am - 6pm)	55	53
Evening (6pm - 10pm)	47	45
Nighttime (10pm - 7am)	38	35

5.4 Lighting - Criteria (Rockhampton City Council)

Rockhampton City Council applies the following acceptable solutions with respects to lighting pollution (reference: Rockhampton City Council City Plan Reprint 1 - May 8, 2009, Chapter 5, Environmental Nuisance by Noise and Light Code):

A2.1 The light from premises must not exceed 8 lux at a distance of 1.5 metres outside boundary of the site; or

A2.2 A Light Report, prepared by a suitably qualified person, is required to ensure that the proposed measures to abate the environmental nuisance by light are effective.

Although not specifically mentioned in the Code, the lighting criteria is taken to apply at boundaries shared with sensitive receivers (i.e. hotel and residences), and does not necessarily apply at boundaries shared with road corridors or other non-sensitive receiving areas.

6 Noise Impact Assessment

6.1 Car Park Noise

It is proposed to assess car park noise using the Sleep Disturbance criteria. It is considered that compliance with the stricter night time limit would result in acceptable daytime noise levels.

The noise from car parking has been calculated to the nearest noise sensitive receivers. The closest noise sensitive receiver is the room at the rear of the hotel which overlooks the subject site (refer to Figure 2.1).

Table 6.1 shows the calculated noise impact from a car door slam from the closest parking lot.

Table 6.1 Calculated Noise Levels from Car Parking to Nearest Noise Sensitive Receivers

Item	Noise Analysis at Each Receptor	
	Hotel	Detached Residents
Door Slam, Lw dB(A)	92.5	92.5
Distance (m)	9	11
Screening dB(A)	nil	nil
Directivity dB(A)	0	0
Calculated Noise Level dB(A)	65	64
Night Limit dB(A) (Sleep disturbance)	55	55
Acceptable without Barrier?	No	No
Proposed Barrier Height (m)	2.5	1.8
Calculated Noise Level with Barrier dB(A)	55	52
Acceptable with Barrier?	Yes	Yes

From Table 6.1 it can be seen that acoustic barriers will be required to mitigate the noise from car park to the detached residences and the motel rooms. The barrier heights are 1.8m and 2.5m, and the locations of these barriers are shown on Figure 3.1.

The barriers are to be solid and continuous, have a minimum density of 12.5kg/m^2, and have negligible air gaps.

6.2 Driveway Car Noise

Noise from cars driving through the car park has also been assessed.

Calculated noise levels from a vehicle movement are 55 dB(A) and 45 dB(A) at the hotel and detached residences respectively, with the proposed noise barriers. These noise levels would comply with sleep disturbance criteria and are therefore acceptable.

6.3 Loading Dock Noise

Typical store delivery and service vehicle schedules for the store (assuming reasonably busy operation, as expected) are:

- Bulk Refuse collection / up to seven times a week (i.e. maximum once daily);
- Bulk recyclable collection / 1-2 times a month;
- Refrigerated bulk deliveries of Frozen Goods & paper stock / 2-3 times a week;
- Perishable Foods (not necessarily all refrigerated delivery vehicles) / 3-5 times a week;
- Dairy Product deliveries in refrigerated delivery vehicles / 2-3 times a week; and
- Buns / Daily.

The predicted noise from the loading dock includes engine starts and reverse beepers.

During the daytime and evening the 'Comparison of Like Parameters' criteria will be used by comparing the predicted noise produced by the engine starts and reverse beepers against the existing L_{max} measured onsite. The predicted noise level is compared with the levels measured during the attended measurements at **Location 2** for the receivers at the detached residences, and the **Logging Location** for the hotel receivers (refer **Figure 2.1**).

During the night, the predicted noise levels will be compared with the Sleep Disturbance limit of 55 dB(A) L_{max}.

The average L_{max} measured by the attended noise measurements at **Location 2** is 75 dB(A) L_{max} at 1.5m and was caused by passing cars in the laneway. The calculated noise level at the façade of the detached residences for a passing car is 63 dB(A) L_{max}. As cars were seen using this lane in each measurement, this level will be used to determine the 'Like Parameter' limit for the short tem noise event such as truck engine starts and reverse beepers. The limit is calculated as 66 dB(A) L_{max} (i.e. 63 + 3).

For the receivers at the hotel, the L_{max} measured during the attended measurement will be used as the 'Like Parameter' for a short term noise event. As the L_{max} at this location was affected by trucks engine braking and accelerating on George Street, which is at the same distance from the road as the hotel receivers, this level will be used as a representative level experienced at the hotel façade. The average measured L_{max} noise level from the attended measurements is 76 dB(A) at the **Logging Location**. Thus the limit is calculated as 79 dB(A) L_{max} (i.e. 76 + 3).

The calculated noise impacts from the loading docks are indicated in **Table 6.2**.

Table 6.2 Calculated Noise Impact from Loading Dock

Item	Detached Residences		Closest Window of Upper Floor of Hotel	
	MRV Engine	MRV Reversing Beeper	MRV Engine	MRV Reversing Beeper
L_W dB(A)	107	110	107	110
Distance (m)	39	39	40	40
Directivity dB(A)	0	10	0	5
Calculated Noise Level dB(A)	66	59	66	64
Existing Noise Level dB(A)	63	63	76	76
Day Limit dB(A)*	66	66	79	79
Evening Limit dB(A)*	66	66	79	79
Night Limit dB(A)#	55	55	55	55
Daytime Use Acceptable?	Yes	Yes	Yes	Yes
Evening Use Acceptable?	Yes	Yes	Yes	Yes
Nighttime Use Acceptable?	No	No	No	No

Note: * day & evening limits determined using 'Comparison of Like Parameters' criteria.

night limits determined using Sleep Disturbance criteria.

From **Table 6.2**, it is shown that the loading dock deliveries would not comply during the night time period of 10pm to 7am. Therefore it is proposed that a time restriction apply to MRV deliver vehicles of 7am to 10pm.

Refrigerated vehicles would normally be assessed separately from non-refrigerated vehicles. In this case there is predicted to be, on average, only 1 refrigerated vehicle per day, and therefore a detailed assessment is not considered warranted.

Were it proposed to attenuate noise from refrigerated vehicles, the required noise barriers would be of the order of 3.5m to 4.5m high. The required barrier may be considered aesthetically unacceptable and unwarranted as there will only be on average 1 delivery per day.

It is recommended that all refrigerated MRV deliveries are restricted to daytime hours of 7am to 6pm. This will ensure minimal impact on nearby residents.

6.4 Mechanical Plant

The noise limits for permanent mechanical plant are shown in Table 5.2. The mechanical plant for this proposed development includes:

- Fijitsu AUT 54UUAS (Sound Power: 68 dB(A)) (Amount: 6);
- Temperzone ISD 270K (Sound Power: 74 dB(A)) (Amount: 2);
- Kirby PP100HM-3 (Sound Power: 64 dB(A) however its stated as being tentative, hence 66 dB(A) will be used to ensure compliance) (Amount: 1); and
- Kirby PPH350CX091 (Sound Power: 72 dB(A)) (Amount: 1).

The calculated noise impacts from the above mechanical plant onto the nearest noise sensitive receivers are shown in Table 6.4.

Table 6.4 Calculated Noise Impact from Mechanical Plant

Item	Noise Analysis at Each Receptor	
	Detached Residences	Hotel
Lw dB(A)	80*	80*
Distance (m)	41	49
Directivity dB(A)	0	0
Calculated Noise Level dB(A)	40	39
Day Limit dB(A)	53	53
Evening Limit dB(A)	49	49
Night Limit dB(A)	40	40
Acceptable?	Yes, 24 hours/day	Yes, 24 hours/day

Note*: All plant is located in same area hence sound power data has been summed and calculated to the nearest noise sensitive receivers.

Table 6.4 shows that all mechanical plant will meet 'background plus' criteria during all periods of the day at the nearest noise sensitive receivers. Therefore no further assessment is required.

7 Lighting Impact Assessment

Lighting emissions from the site will include lighting from overhead lights and vehicle lights. The proposed limit for lighting (refer Section 5.4) is 8 lux at 1.5m outside the boundary of the site.

To mitigate the lighting pollution from vehicle headlights, the proposed 1.8m and 2.5m high acoustic barrier should provide sufficient light attenuation to protect the motel to the north and the houses to the west.

The proposed lighting plan provided to ASK is shown in **Figure A.1** (note: this plan is superseded but the lighting positions are still indicative of proposed locations).

ASK has been advised that it is proposed to use 400w Metal Halide (4000K) forward throw light fittings mounted on 9m high poles to illuminate the carpark. Typical light spread data for such a luminaire is shown in **Figure 7.1** (Note: this data is for a Cercio brand light with reasonable shrouding, which may not be the actual lighting brand selected, but is representative of the typical lighting spread of this type of light). **Figure 7.1** indicates that the 8 lux level will be achieved at approximately 20m in front of the light, and 6m behind the luminaire (note: the Y-axis on the graph appears to incorrectly note the distance scale as 14m behind the light, instead of 7m).

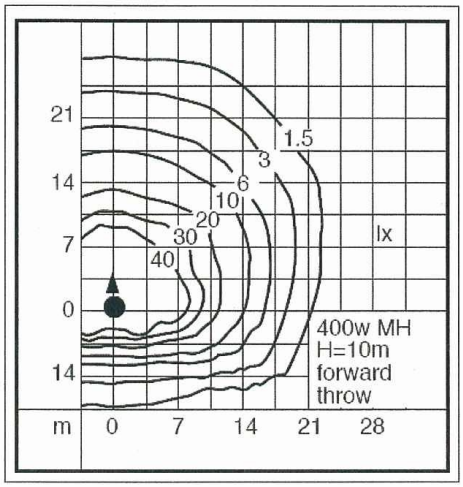


Figure 7.1 Typical Light Spread for Carpark Lighting (400w MH, Forward Through)

The preliminary lighting positions shown in **Figure A.1** may result in excessive lighting levels (lux) at the adjoining hotel, as the rear 6m separation distance indicates that a 4.5m buffer is required between the lights and the hotel boundary. Based on site measurements, the existing lighting levels may already exceed 8 lux in this area, in which case the new lighting may not be an issue.

The light levels should be measured and certified once the lighting is installed and operational. If the new lighting levels are excessive then additional shrouding and/or shielding may be required to these luminaires.

8 Conclusion

ASK Consulting Engineers has assessed the noise and lighting emissions for the proposed Hungry Jacks at 160 and 166 George Street, Rockhampton. From this assessment, the following measures are recommended:

- A 1.8m acoustic barrier is to be constructed on the western boundary and a 2.5m barrier along the northern boundary as indicted on Figure 3.1;
- The barriers are to be solid and continuous, have a density of 12.5 kg/m^2, and have negligible air gaps (less than 1% of the total barrier);
- Non-refrigerated MRV deliveries are restricted to the hours of 7am to 10pm;
- Refrigerated MRV deliveries are restricted to the daytime hours of 7am to 6pm, and an average of 1 vehicle per day; and
- Based on typical light data and the preliminary lighting plan, additional shrouding and/or shielding is likely to be required to any carpark lights within 4.5m of the hotel boundary. The light levels should be measured and certified against the 8 lux limit once the lighting is installed and operational. The light levels should be measured at 1.5m outside the boundary to the hotel, in the absence of other lighting, where possible.

Please contact the undersigned on 07 3831 7511 with any queries regarding this report.

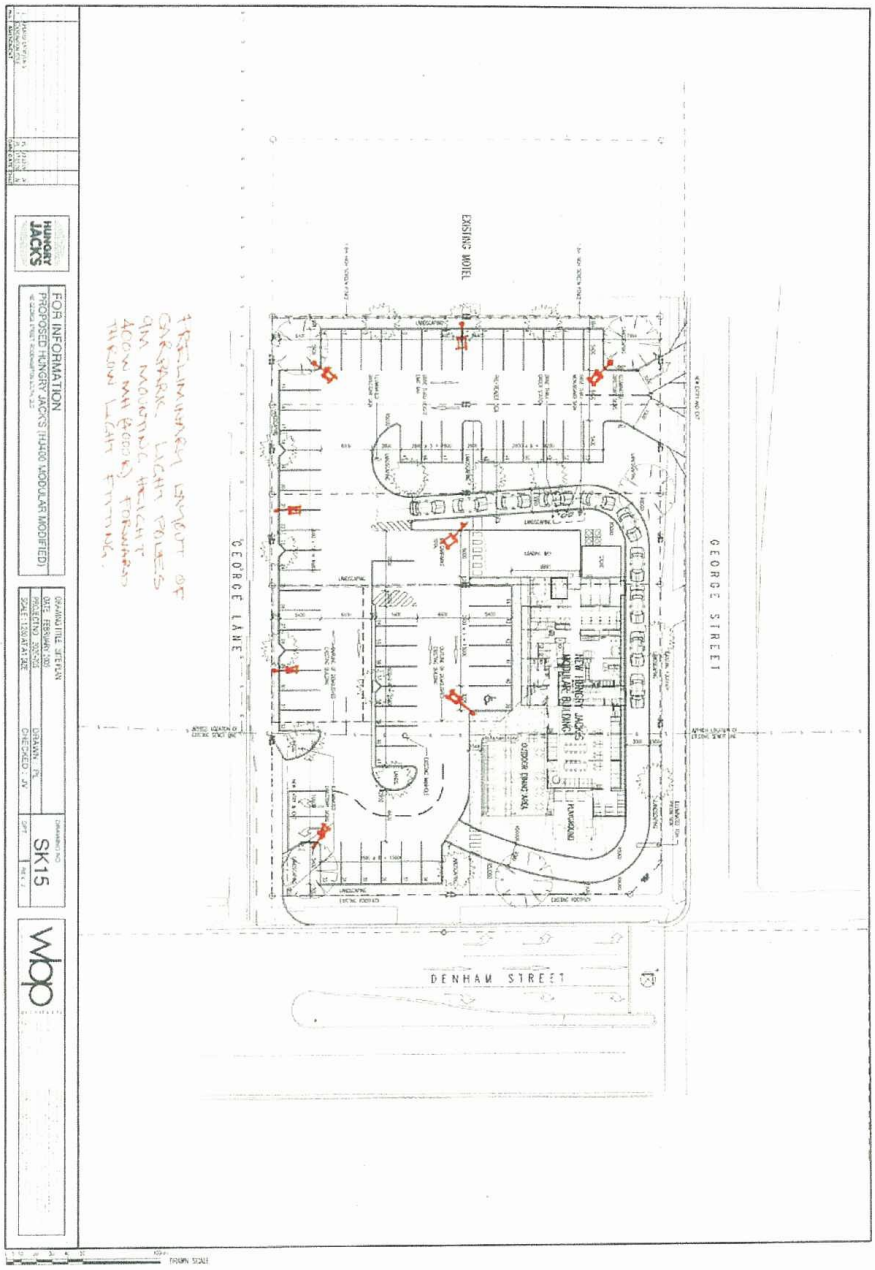
Yours faithfully,

ASK Consulting Engineers

Kult Heaton
Mechanical Engineer

Stephen Pugh
Associate

Appendix A: Proposed Lighting Locations (Indicated on Superseded Site Plan)



ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D1195/2009
Dated 17/05/2010

WASTE MANAGEMENT REPORT

PROPOSED '"HUNGRY JACK'S" DEVELOPMENT
160- 166 GEORGE STREET (CNR. DENHAM STREET)
ROCKHAMPTOM SOUTH

Report prepared by
WBP Architects
3/220 Boundary Street
SPRING HILL QLD 4000

Date: 7th July 2009

2020-705-003

The proposed "Hungry Jack's" development will be a company owned and operated store managed in a similar manner to the other existing company owned and operated "Hungry Jack's" store at North Rockhampton.

The store will generate the following types of waste.

- Bulk refuse
- Recyclable refuse
- Waste oil
- Trade waste (drainage)

All incoming goods pallets and bun crates are returned to the respective suppliers for reuse.

Bulk Refuse

Bulk refuse (ie. food scraps, general refuse etc.) is deposited in a 3cu.m. mobile lidded industrial waste bin which is stored in a dedicated air conditioned and mechanically ventilated Bin Room located within the building. The bulk refuse is collected by Council's bulk waste collection contractor anywhere up to seven times a week (ie. daily) dependent on the store's seasonal needs.

The bulk refuse storage bin is cleaned and sanitized on a regular basis to prevent the build up of putrifiable waste.

Recyclable Waste

Recyclable waste (ie. clean cardboard food and dry goods storage boxes etc.) are deposited in a suspended bale bag which is located in the external screened storage enclosure.

The recyclable waste is collected by a private contractor on a weekly basis or more frequently dependent on the store demands.

Waste Oil

Waste oil recovered from the various pieces of cooking equipment is deposited in 150 litre nominal capacity bulk storage vessels with hinged access lids which are located in the external screened storage enclosure.

The waste oil is collected by a private contractor for recycling on a monthly basis or more frequently dependent on the store demands.

Trade Waste (drainage)

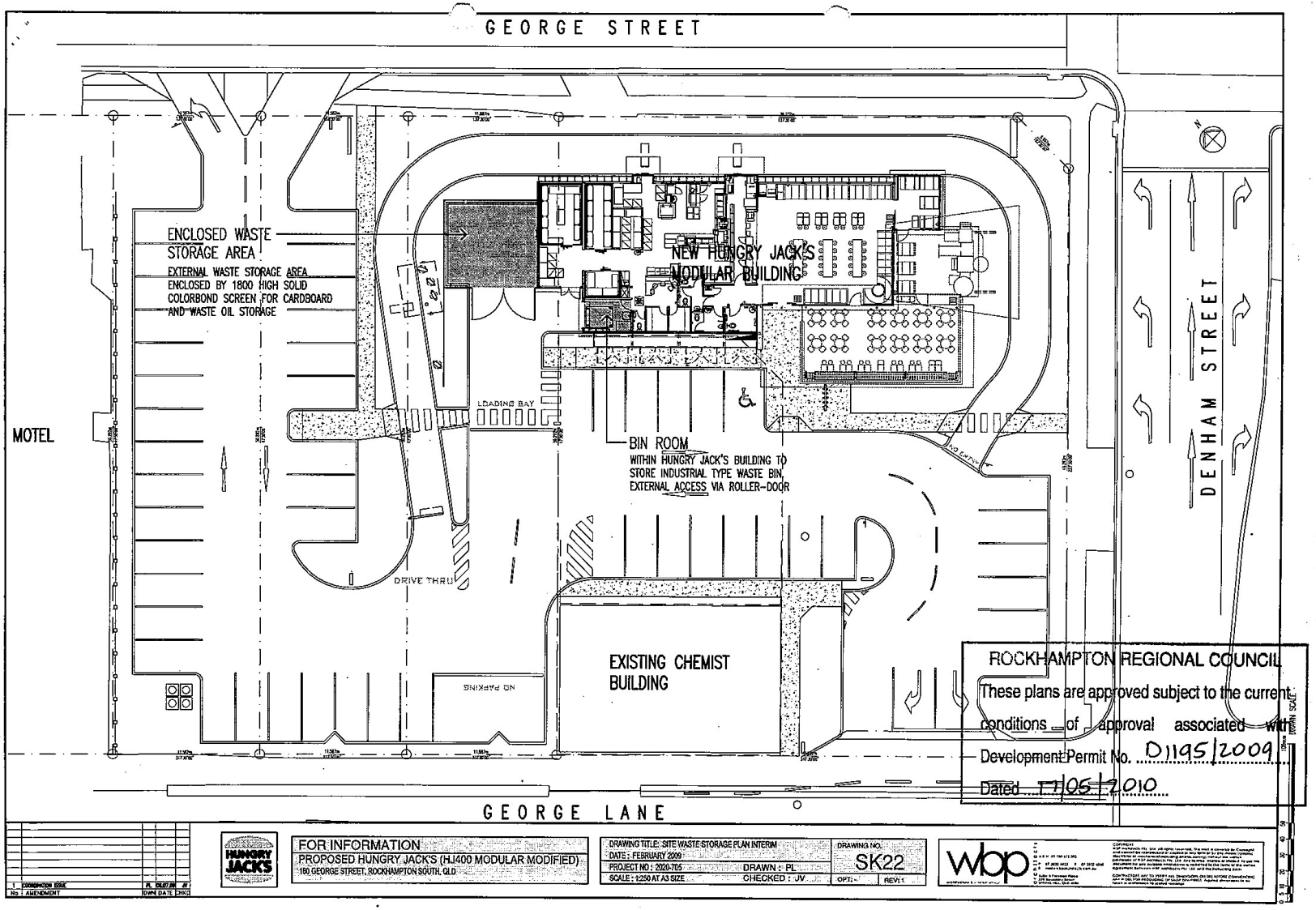
Trade waste from the food preparation sink, washing up sinks, kitchen floor wastes and bucket trap wastes, tundishes etc., is drained to a 2000 litre capacity Grease Interceptor Trap (GIT) which then discharges into the Council sanitary sewer.

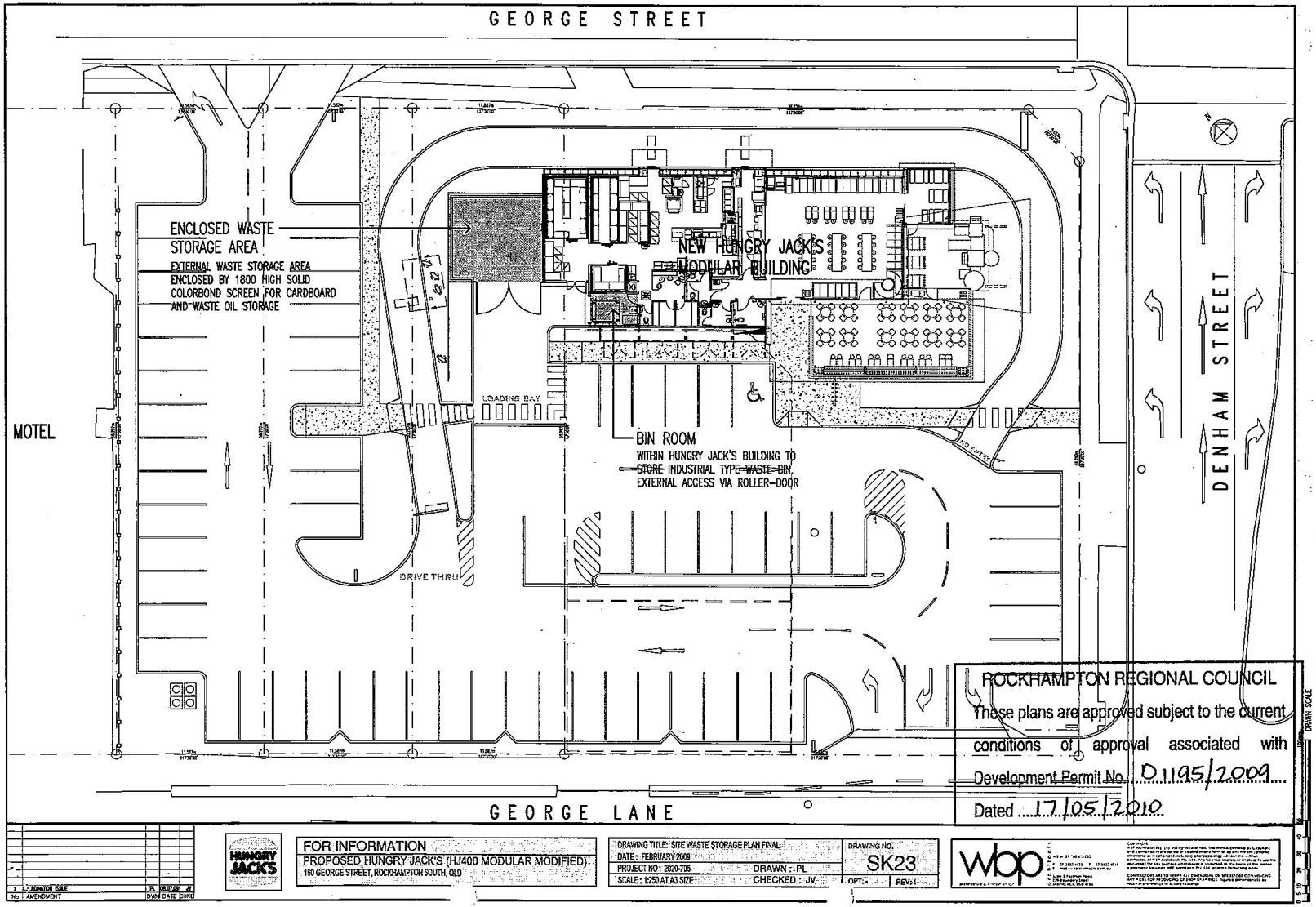
The Grease Interceptor Trap is emptied on a regular basis dependent on the store demand by a private contractor to remove all of the solid and solidified trade waste which is then disposed of at a Council approved trade waste depository.

Refer to the attached 'Site Waste Storage Plan' and the 'Equipment Plan' for the locations of the Bin Room (Bulk Refuse Waste Storage), Recyclable Waste and Waste Oil depositories.

The Grease Interceptor Trap location is yet to be determined as it is subject to further investigation of the development trade waste and sanitary waste drainage requirements however it is likely to be located in the Loading Bay area or in close proximity.

This report has been prepared by Jack Van De Ven of WBP Architects who has had extensive experience with "Hungry Jack's" project requirements since 1985.


GEORGE STREET
ENCLOSED WASTE STORAGE AREA
EXTERNAL WASTE STORAGE AREA ENCLOSED BY 1800 HIGH SOLID COLORBOND SCREEN FOR CARDBOARD AND WASTE OIL STORAGE
NEW HUNGRY JACK'S MODULAR BUILDING
LOADING BAY
BIN ROOM
WITHIN HUNGRY JACK'S BUILDING TO STORE INDUSTRIAL TYPE WASTE BIN, EXTERNAL ACCESS VIA ROLLER-DOOR
MOTEL
DRIVE THRU
NO PARKING
EXISTING CHEMIST BUILDING
DENHAM STREET
GEORGE LANE
ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D1195/2009
Dated 7/05/2010
FOR INFORMATION
PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)
160 GEORGE STREET, ROCKHAMPTON SOUTH, QLD
DRAWING TITLE: SITE WASTE STORAGE PLAN INTERIM
DATE : FEBRUARY 2009
PROJECT NO : 2020-705
SCALE : 1:250 AT A3 SIZE
DRAWN : PL
CHECKED : JV
DRAWING NO. SK22
OPT: -
REV: 1
wbp



ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D1195/2009
Dated 17/05/2010

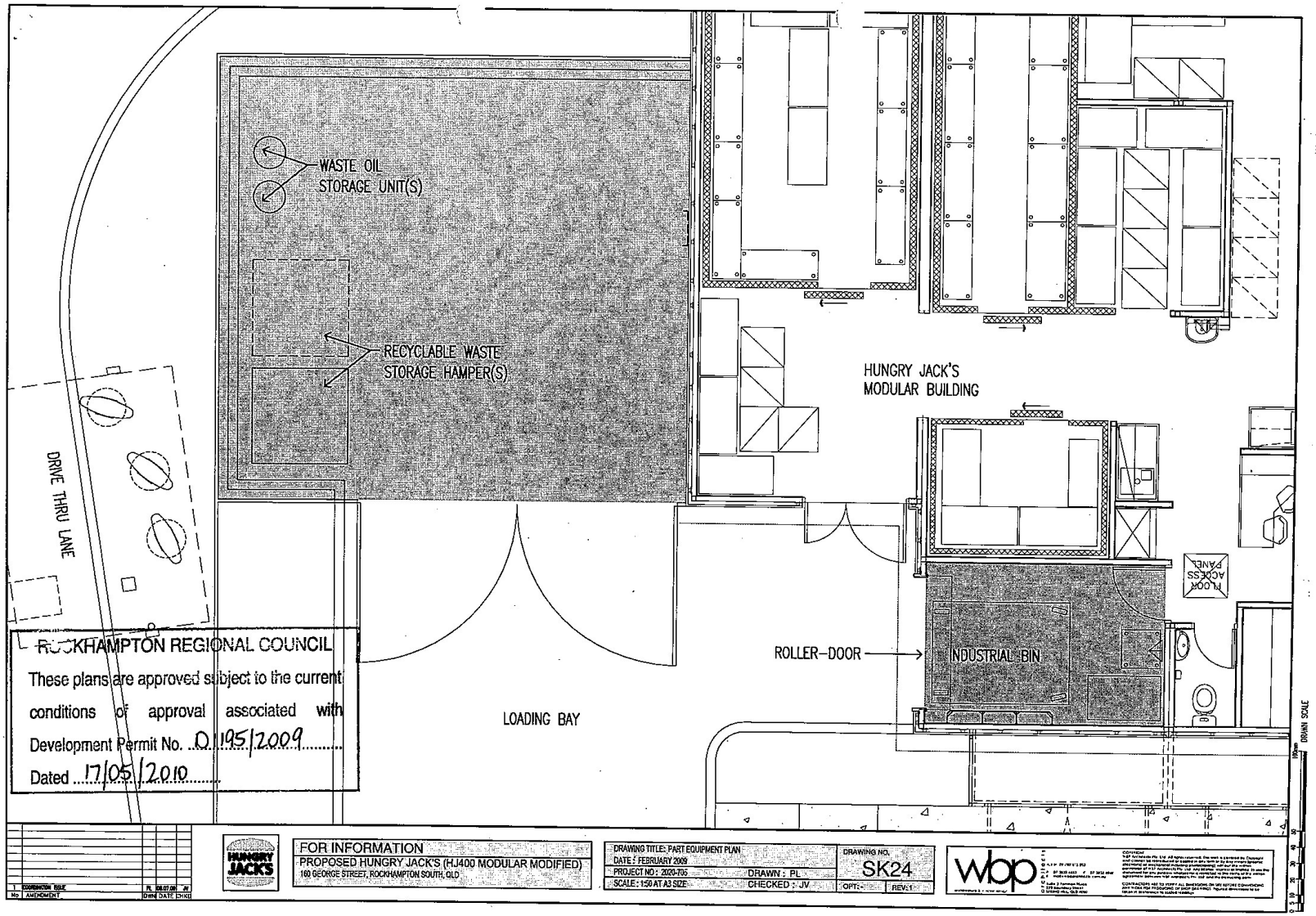
1	17 JOHNSTON ISSUE	PL	08.07.09
No	AMENDMENT	DWN	DATE

FOR INFORMATION
PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)
160 GEORGE STREET, ROCKHAMPTON SOUTH, QLD

DRAWING TITLE: SITE WASTE STORAGE PLAN FINAL
DATE: FEBRUARY 2009
PROJECT NO: 2020-705
SCALE: 1:250 AT A3 SIZE
DRAWN: PL
CHECKED: JV
DRAWING NO. SK23
OPT:-
REV:1

wbp

DRAWN SCALE


WASTE OIL
STORAGE UNIT(S)
RECYCLABLE WASTE
STORAGE HAMPER(S)
HUNGRY JACK'S
MODULAR BUILDING
DRIVE THRU LANE
ROLLER-DOOR
INDUSTRIAL BIN
FLOOR ACCESS PANEL
LOADING BAY
ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D/195/2009
Dated 17/05/2010
FOR INFORMATION
PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)
160 GEORGE STREET, ROCKHAMPTON SOUTH, QLD
DRAWING TITLE: PART EQUIPMENT PLAN
DATE : FEBRUARY 2009
PROJECT NO : 2020-705
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DRAWING NO.
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OPT:
REV:1
wbp
DRAWN SCALE

ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D/195/2009
Dated 17/05/2010

MRG
WATER CONSULTING PTY LTD

SEPTEMBER 2009

MRG
WATER CONSULTING PTY LTD

specialist civil engineers

Report Name	Date	Revision No.
Stormwater Quantity Management Report for Hungry Jacks, 160 George St, Rockhampton South	17th September 2009	1319/Rev 1

Project Engineer: Mark Gibson
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Director
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M 0418 569 362

Technical Assistant: James Parker
Undergraduate Engineer
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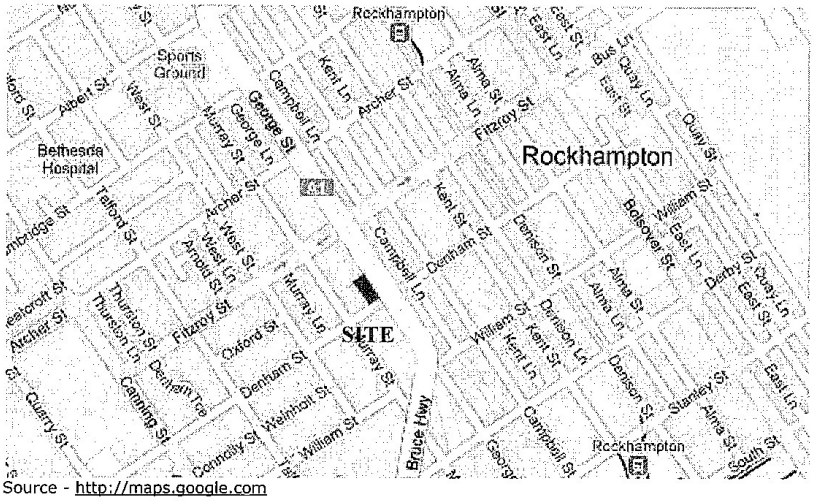
1.0 INTRODUCTION

MRG Water Consulting Pty Ltd was commissioned by Hungry Jacks Pty Ltd to prepare a Stormwater Quantity Management Report for the proposed Hungry Jacks at 160 George St, Rockhampton South. The location of the proposed development is shown on Figure 1 below.



Source - http://maps.google.com

Figure 1 – Locality Plan

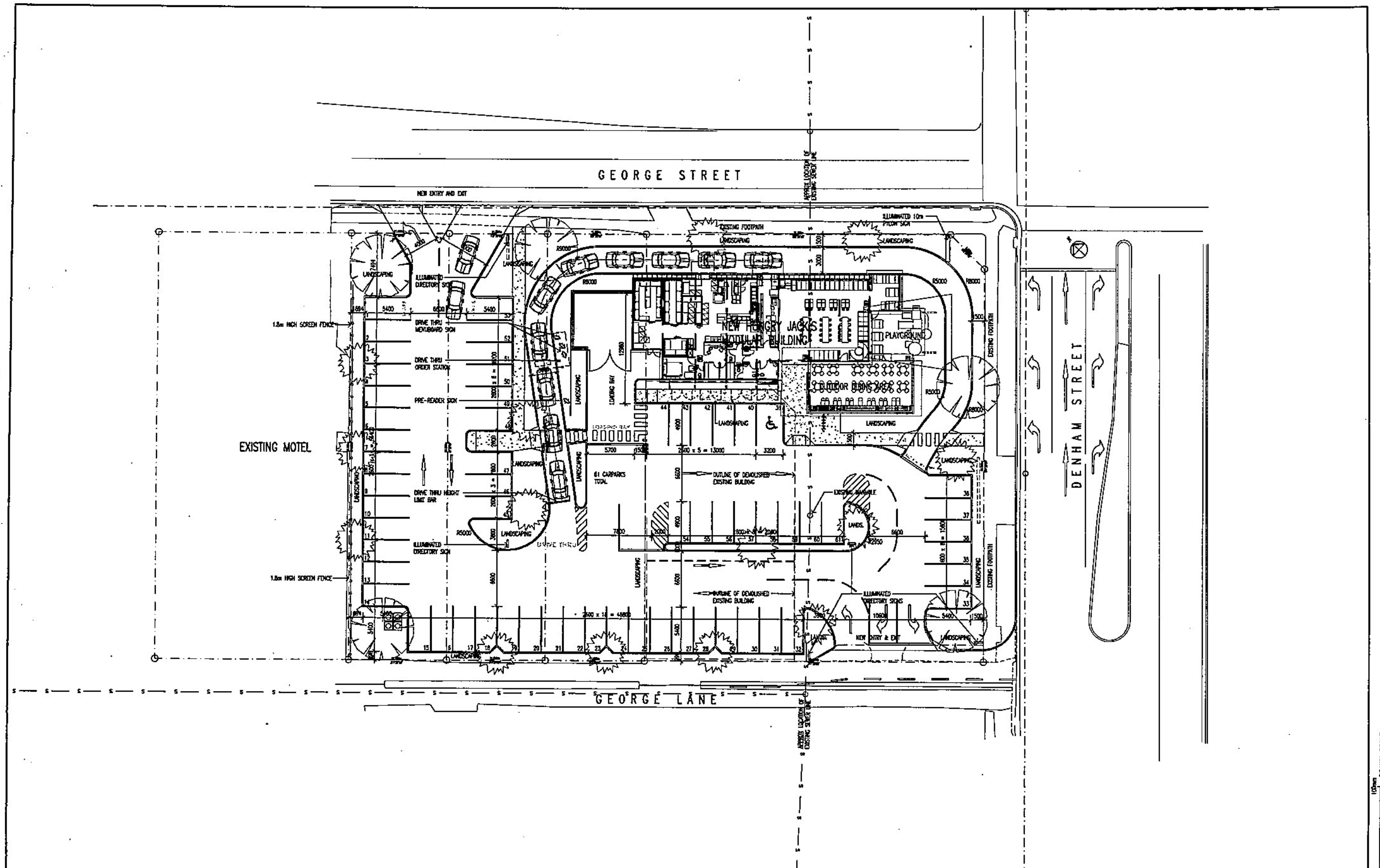
The site is located approximately 1.1km west of the Fitzroy River. The site is bound by George St (Bruce Hwy) on the north east, Denham St on the south east and George Lane on the south west. Stormwater is directed towards to the eastern corner of the site, where it enters the underground stormwater pipes.

It is proposed to develop the site into a Hungry Jacks restaurant. This involves the consolidation of 4 lots fronting George St, and the staged demolition of an existing building on the site. Figures 2 and 3, (Drawings Sk20 - 3 and SK15 – 6 by WBP Architects), show the two stages of demolition and construction for the site. This involves the initial demolition of the northern portion of the existing building. At this time the Hungry Jacks restaurant building, and a significant portion of the carpark will be constructed. Following completion, the remainder of the existing building will be demolished, and the carpark finished.

The purpose of this report is to:

1) Calculate the peak discharges from the existing and developed site;

2) Design the proposed stormwater infrastructure so that peak stormwater discharges leaving the site do not exceed those for predeveloped site conditions.



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5	UPDATED TITLE	PL	29.05.09	JV
4	UPDATED D/T LANE, LOADING BAY, SCREEN, SIGNAGE	PL	13.05.09	JV
3	UPDATED SIGNAGE, BUILDING LAYOUT, LOADING BAY	PL	30.04.09	JV
2	UPDATED ENTRY/EXITS	PL	23.03.09	JV
1	COORDINATION ISSUE	PL	17.03.09	JV

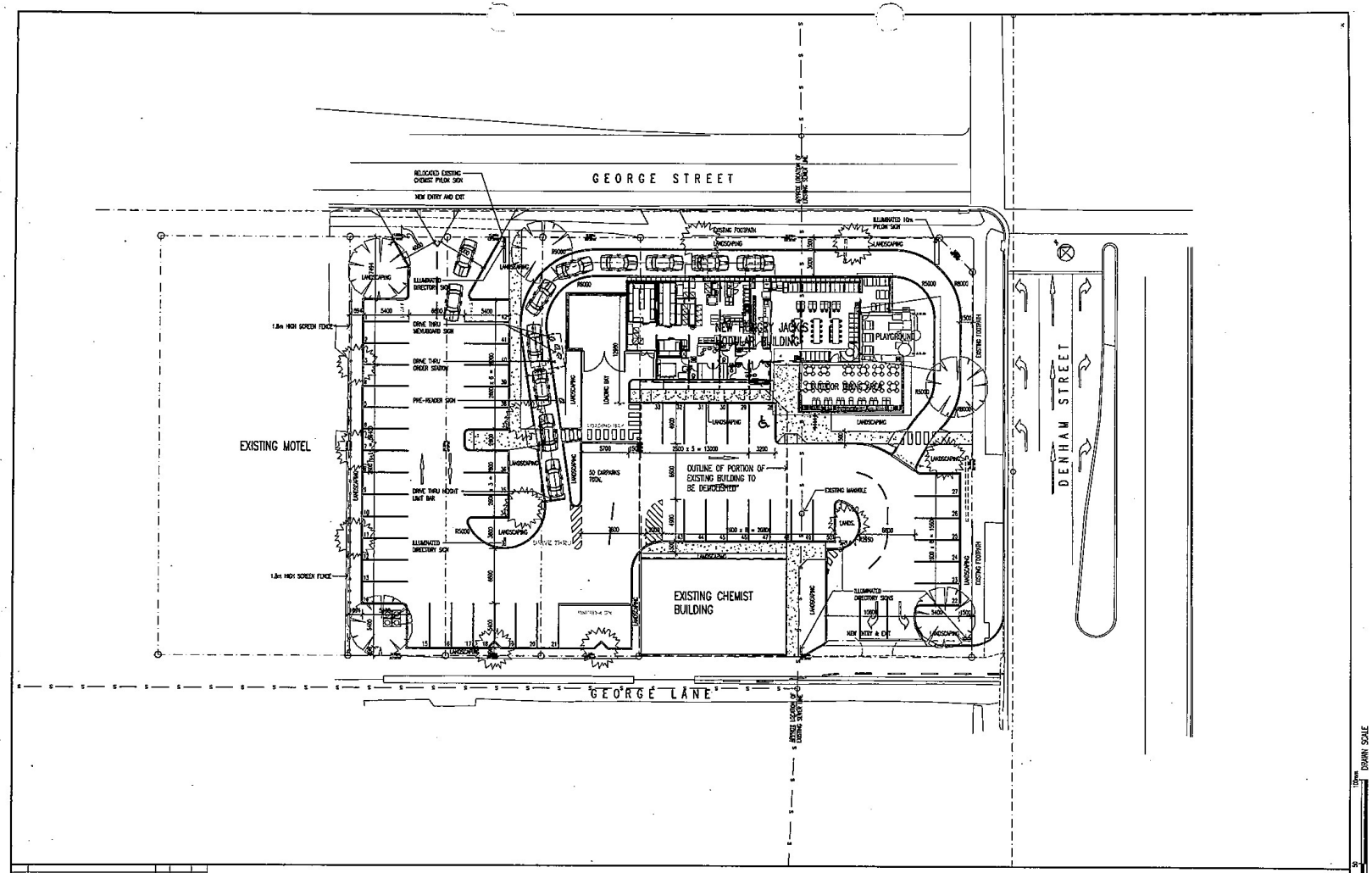
HUNGRY JACKS

FOR INFORMATION
PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)
180 GEORGE STREET, ROCKHAMPTON SOUTH, QLD

DRAWING TITLE: SITE PLAN FINAL
DATE: FEBRUARY 2009
PROJECT NO: 2020-705 DRAWN: PL
SCALE: 1:200 AT A1 SIZE CHECKED: JV

DRAWING NO. SK15
OPT: REV: 6

wbp architects



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2	UPDATED TITLE	PL	20.05.09	JV
1	ROCKHAMPTON ISSUE	PL	13.05.09	JV

HUNGRY JACK'S

FOR INFORMATION

PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)

169 GEORGE STREET, ROCKHAMPTON SOUTH, QLD

DRAWING TITLE: SITE PLAN INTERIM

DATE : FEBRUARY 2009

PROJECT NO : 2020-705

SCALE : 1:200 AT A1 SIZE

DRAWN : PL

CHECKED : JV

DRAWING NO: SK20

OPT:- REV: 3

wbp

DRAWN SCALE

2.0 RATIONAL METHOD CALCULATIONS

2.1 GENERAL

The peak stormwater discharges from the 3378 m^2 site been calculated using the Rational Method, as shown on Figures 4 and 5. The Rational Method calculations have been completed in accordance with the parameters recommended in the Queensland Urban Drainage Manual (QUDM, 2007). Rational Method Calculations have been undertaken for existing and developed site conditions, for the 1, 2, 5, 10, 20, 50 and 100 year ARI storm events.

Rainfall intensities have been calculated in accordance with the guidelines contained in Australian Rainfall and Runoff (2005).

2.2 EXISTING SITE CONDITIONS

Figure 4 shows the existing flow paths that were used in the existing site Rational Method calculations. Due to the flat nature of the site, and the current landuse on the western portion of the site, it was determined that using a 'Standard Inlet Time' was not appropriate. Instead, overland flow, and channel flow times were calculated separately for more accuracy.

As shown on Figure 4, there are two existing site flowpaths. In undertaking Rational Method Calculations, it was found that either flowpath could be used, as they are the same length. Overland flow (43m) was assumed for the currently undeveloped western portion of the site. After water has flowed off the undeveloped western portion, it turns to kerb flow (39m) along George St or George Lane and flows to Denham St. The existing site Time of Concentration (t_c) was found to be 10.6 minutes.

In determining C10 coefficients, current landuse was assumed. For Gardens/Landscaping, it was assumed as 0% impervious. Table 4.05.3 (b) of QUDM (Medium Density Bushland, Medium Soil Permeability) gave a C10 value of 0.59. For Paved/Roofed, it was assumed 100% impervious. Table 4.05.3 (a) gave a C10 value 0f 0.90. For the western portion of the site, currently covered in gravel and reasonably compacted, it was assumed to be 20% impervious. Table 4.05.3 (a) gave a C10 value 0f 0.65.

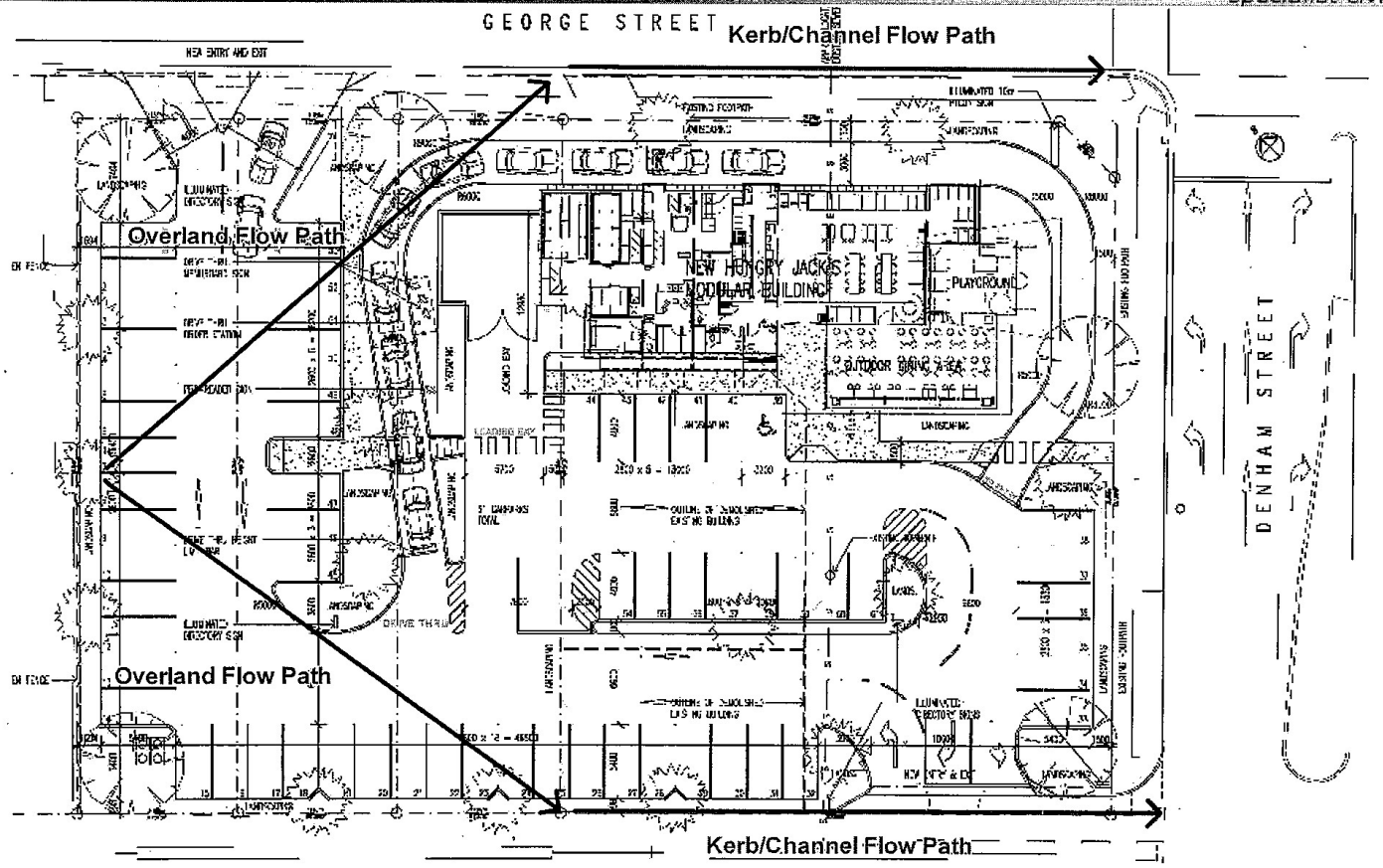


Figure 4 – Rational Method – Existing Site Conditions, Scale 1:5000 @ A4

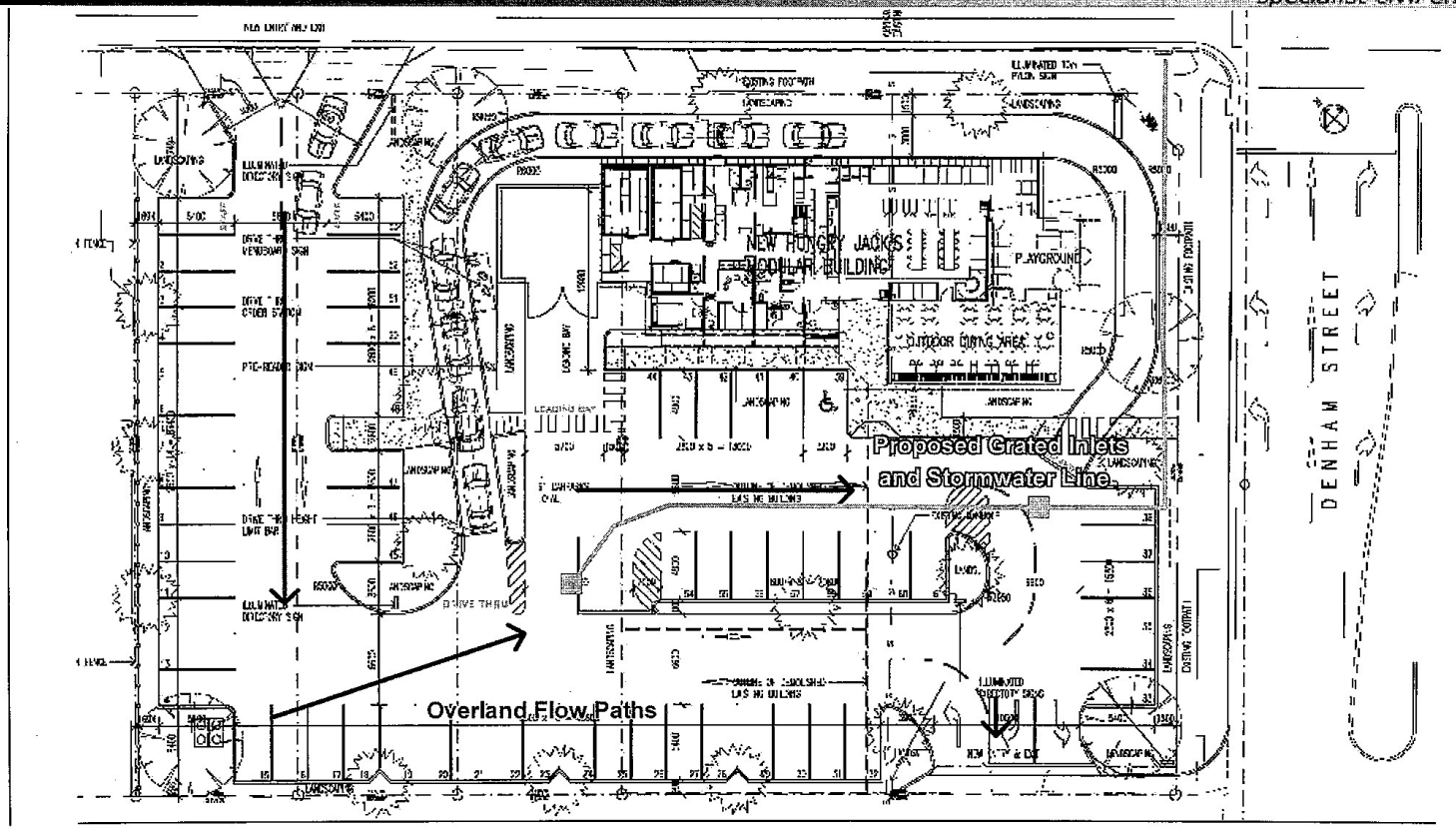


Figure 5 – Rational Method - Developed Site Conditions, Scale 1:5000 @ A4

2.3 DEVELOPED SITE CONDTITIONS

Figure 5 shows the assumed flowpath used in developed site Rational Method calculations. In determining this flowpath, it was determined that a flowpath longer that that under existing site conditions would result in a higher travel time, and a subsequent reduction in peak rainfall intensities and peak discharges. Under developed site conditions it is proposed to use the topography to extend the t_c of the site by grading the carpark from its highest point in the northern corner, to a low point at the southern edge of the site.

Under developed conditions it is proposed to increase the length water has to travel to offset the increase in impervious area. The length of the overland flow path was determined to be 100m, with a slope of approx 0.4%. The Mannings 'n' value was assumed to be 0.025. The t_c under developed site conditions was found to be 14.0 minutes. Table 2.1 compares the existing and developed site peak discharges.

In determining C10 coefficients, the proposed developed landuse was assumed. For Gardens/Landscaping, it was assumed as 0% impervious. Table 4.05.3 (b) of QUDM (Medium Density Bushland, Medium Soil Permeability) gave a C10 value of 0.59. For Paved/Roofed, it was assumed 100% impervious. Table 4.05.3 (a) gave a C10 value 0f 0.90.

Table 2.1 - Rational Method Peak Discharges

ARI (years)	Peak Discharge (m^3/s)		% Increase due to development
	Existing	Developed (Unmitigated)	
1	0.045	0.045	0.000 (0.0%)
2	0.062	0.062	0.000 (0.0%)
5	0.090	0.090	0.000 (0.0%)
10	0.108	0.107	-0.001 (-0.7%)
20	0.132	0.131	-0.001 (-0.8%)
50	0.170	0.166	-0.004 (-2.1%)
100	0.196	0.189	-0.07 (-3.6%)

Table 2.1 shows that development of the site will decrease peak discharges by $0.007m^3/s$ or 3.6%. Further details of Rational Method Calculations can be found in Appendix A of this report.

3.0 FLOWPATHS AND WATER DEPTHS

To ensure that the carpark would have sufficient capacity to convey stormwater through it without causing flooding issues, capacity calculations for the carpark have been undertaken. This involved a partial Rational Method Calculation for a portion of the car park only (approx. 0.802 m^2). This discharge was cross checked against the capacity of a channel of dimensions shown in Figure 6.

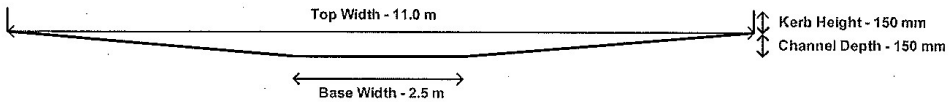


Figure 6 – Proposed Channel Dimensions - NTS

The slope of the carpark was assumed as 0.3%, and the Mannings 'n' value used was 0.025. The calculated capacity of the channel is 0.46m^3/s. The Q100 flow at this location was 0.047m^3/s. Thus the carpark will have sufficient capacity to convey stormwater through it.

This conceptual design shows that the site has sufficient capacity to convey stormwater to the points where it enters stormwater system. Further detailed design and assessment will be undertaken to ensure sizing requirements, dimensions and grades are suitable and achievable.

4.0 CONCLUSION

This report demonstrates that development of the site will not increase peak discharges entering the Council's stormwater system. This is due to the length stormwater must travel being increased. This increase in length results in a lower rainfall depth, which offsets the increase in impervious area.

Mark Gibson
BE Civil, MIE Aust, RPEQ 6722

LIST OF APPENDICES

APPENDIX A

Rational Method Calculations

RATIONAL METHOD CALCULATIONS

Project: Hungry Jacks - Rockhampton
Location of Discharge:
Catchment Condition: Current Site Conditions
Other Comments:

MRG

Time of Concentration	10.6 minutes				
	Landscape	Carpark & Roof	Gravel	Total	
Sub-Catchment Areas	0.030	0.150	0.158	0.338	ha
C10 Runoff Coefficients	0.59	0.90	0.65		
10yr 1hr Intensity (mm/hr)	64.37				

ARI (years)	Rainfall Intensity (mm/hr)	Depth (mm)	Fy	Runoff Coefficients Landscape	Carpark & Roof	Gravel	Discharges (cumecs) Landscape	Carpark & Roo	Gravel	TOTAL
1	79.5	14	0.80	0.47	0.72	0.52	0.003	0.024	0.018	**0.045**
2	103.1	18	0.85	0.50	0.77	0.55	0.004	0.033	0.025	**0.062**
5	133.6	24	0.95	0.56	0.86	0.62	0.006	0.048	0.036	**0.090**
10	152.5	27	1.00	0.59	0.90	0.65	0.008	0.057	0.043	**0.108**
20	177.8	32	1.05	0.62	0.95	0.68	0.009	0.070	0.053	**0.132**
50	212.2	38	1.15	0.68	1.00	0.75	0.012	0.088	0.069	**0.170**
100	239.4	42	1.20	0.71	1.00	0.78	0.014	0.100	0.082	**0.196**

Upper Catchment Slope	1.0%
Overland Flow Time	10 min
Channel Travel Length	36 metres
Channel Fall	0.25 metres
Travel Time	1 min
Delta for	1.0
Time of Concentration @ u/s bdy	10.6

Equiv Travel Velocity
0.60 m/s

Table A1

RATIONAL METHOD CALCULATIONS

Project: Hungry Jacks - Rockhampton
Location of Discharge:
Catchment Condition: Fully Developed Site
Other Comments:

MRG

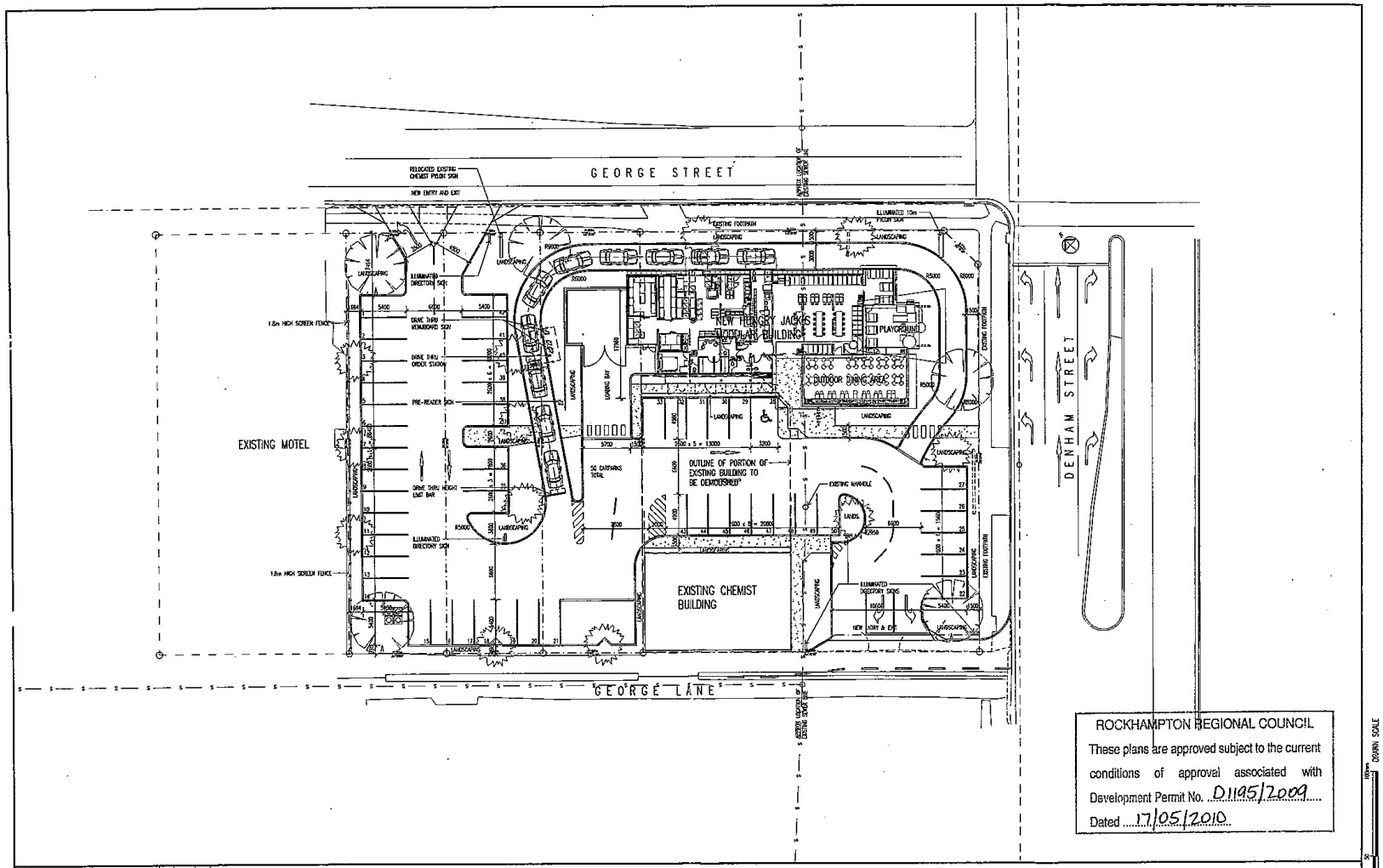
Time of Concentration	14.0 minutes				
	Landscape	Car Park & Roof		Total	
Sub-Catchment Areas	0.059	0.278		0.338	ha
C10 Runoff Coefficients	0.59	0.90			
10yr 1hr Intensity (mm/hr)	0.00				

ARI (years)	Rainfall Intensity (mm/hr)	Depth (mm)	Fy	Runoff Coefficients Landscape	Car Park & Roof	0	Discharges (cumecs) Landscape	Car Park & Roo	0	TOTAL
1	70.9	17	0.80	0.47	0.72	0.00	0.006	0.039	0.000	**0.045**
2	91.9	21	0.85	0.50	0.77	0.00	0.008	0.054	0.000	**0.062**
5	118.8	28	0.95	0.56	0.86	0.00	0.011	0.079	0.000	**0.090**
10	135.4	32	1.00	0.59	0.90	0.00	0.013	0.094	0.000	**0.107**
20	157.8	37	1.05	0.62	0.95	0.00	0.016	0.115	0.000	**0.131**
50	188.1	44	1.15	0.68	1.00	0.00	0.021	0.145	0.000	**0.166**
100	212.1	49	1.20	0.71	1.00	0.00	0.025	0.164	0.000	**0.189**

Upper Catchment Slope	1.0%
Overlnad Flow Time	14 min
Channel Travel Length	0 metres
Channel Fall	0 metres
Travel Time	0 min
Delta for	3.0
Time of Concentration @ u/s bdy	14.0

Equiv Travel Velocity
0.00 m/s

Table A2



ROCKHAMPTON REGIONAL COUNCIL

These plans are approved subject to the current conditions of approval associated with Development Permit No. D1195/2009

Dated 17/05/2010

No	AMENDMENT	DWN	DATE	CHKD
2	UPDATED TITLE	PL	29.05.09	JV
1	COORDINATION ISSUE	PL	13.05.09	JV

HUNGRY JACK'S

FOR INFORMATION

PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)

169 GEORGE STREET, ROCKHAMPTON SOUTH, QLD

DRAWING TITLE: SITE PLAN INTERIM

DATE: FERRUARY 2009

PROJECT NO: 2020-705

SCALE: 1:200 AT A1 SIZE

DRAWN: PL

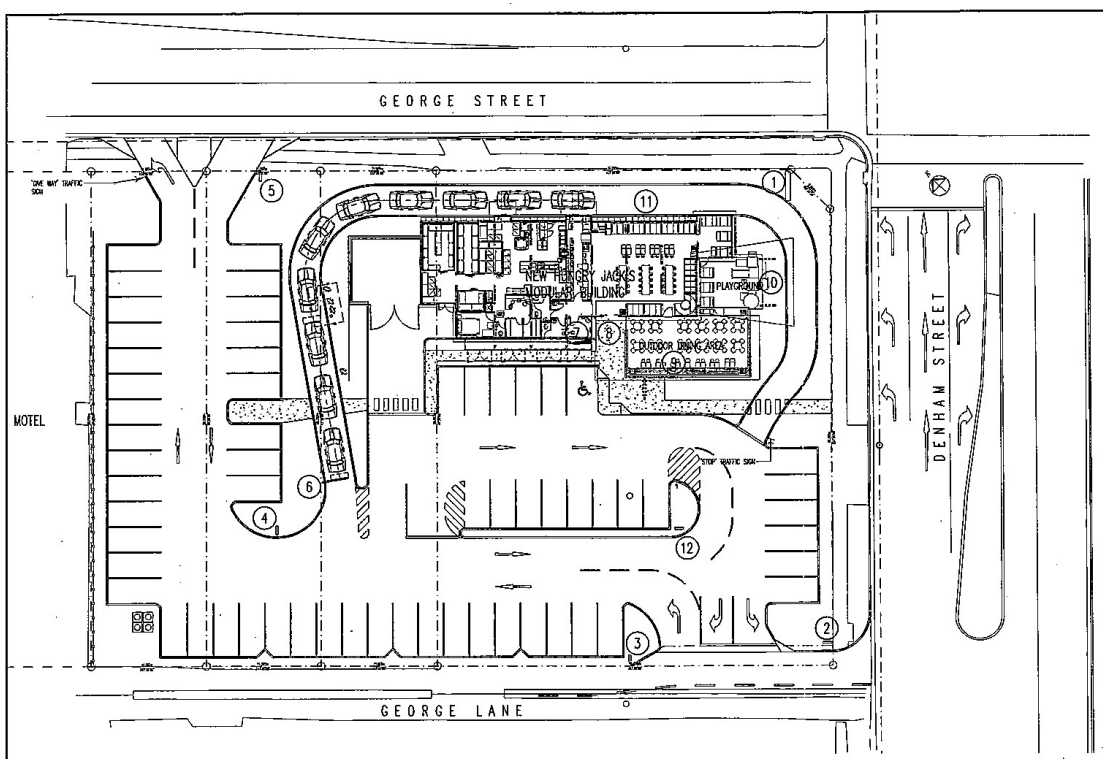
CHECKED: JV

DRAWING NO. SK20

OPT:- REV: 2

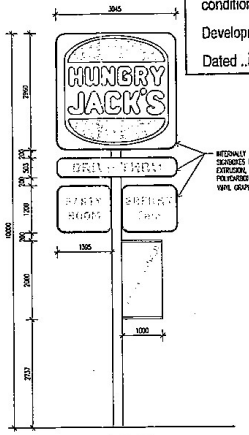
wbp

DRAWN SCALE



SIGN NUMBER	HUNGRY JACK'S NAME	COUNCIL SPECIFIC SIGN TYPE	COUNCIL SPECIFIC SIGN CATEGORY	ASSESSABLE
1	PYLON SIGN	PYLON SIGN	FREESTANDING, ILLUMINATED	CODE
2	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
3	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
4	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
5	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
6	HEIGHT LIMIT BAR	PYLON SIGN	FREESTANDING, ILLUMINATED	CODE
7	BUN LOGO	WALL FLUSH SIGN	ILLUMINATED	CODE
8	BUN LOGO	WALL FLUSH SIGN	ILLUMINATED	CODE
9	LETTER SIGN	ROOF SIGN	ILLUMINATED	CODE
10	LETTER SIGN	UNDER AWNING SIGN	ILLUMINATED	SELF
11	LETTER SIGN	AWNING (FETHER) FASCIA SIGN	ILLUMINATED	SELF
12	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
13	- deleted -	-	-	-

ROCKHAMPTON REGIONAL COUNCIL
These plans are approved subject to the current conditions of approval associated with Development Permit No. D/1145/2009
Dated 17/05/2010



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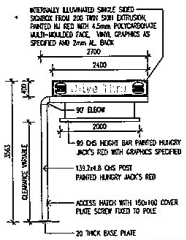

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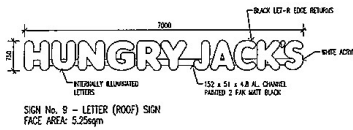

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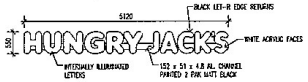
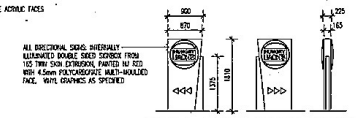


SIGN No. 10 – LETTER (UNDER AWNING) SIGN
SIGN No. 11 – LETTER (FASCIA) SIGN
FACE AREA: 2.82sqm



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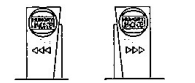

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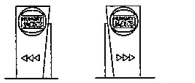

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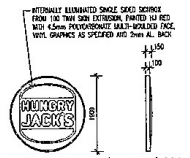
SIGN No. 12 – DIRECTIONAL (INFORMATION BOARD) SIGN



SIGN No. 7 – BUN LOGO (FLUSH WALL) SIGN
SIGN No. 8 – BUN LOGO (FLUSH WALL) SIGN
FACE AREA: 2.84sqm

NO	AMENDMENT	DRWN	DATE	CHKD
5	APPROVED TITLE	PL	29.05.09	JV
4	APPROVED SIGNAGE	PL	13.05.09	JV
3	CONFIRMATION ISSUE	PL	11.05.09	JV
2	CONFIRMATION ISSUE	PL	07.05.09	JV
1	CONFIRMATION ISSUE	PL	30.04.09	JV

HUNGRY JACK'S

FOR INFORMATION
PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)
160 GEORGE STREET, ROCKHAMPTON SOUTH, QLD

DRAWING TITLE: SITE SIGNAGE PLAN & SIGNAGE ELVATIONS FINAL		DRAWING NO.	
DATE: FEBRUARY 2009		SK18	
PROJECT NO: 2020-705	DRAWN: PL		
SCALE: 1:200 & 1:50 AT A1 SIZE	CHECKED: JV	OPT:-	REV: 5

wbp

DRAWN SCALE

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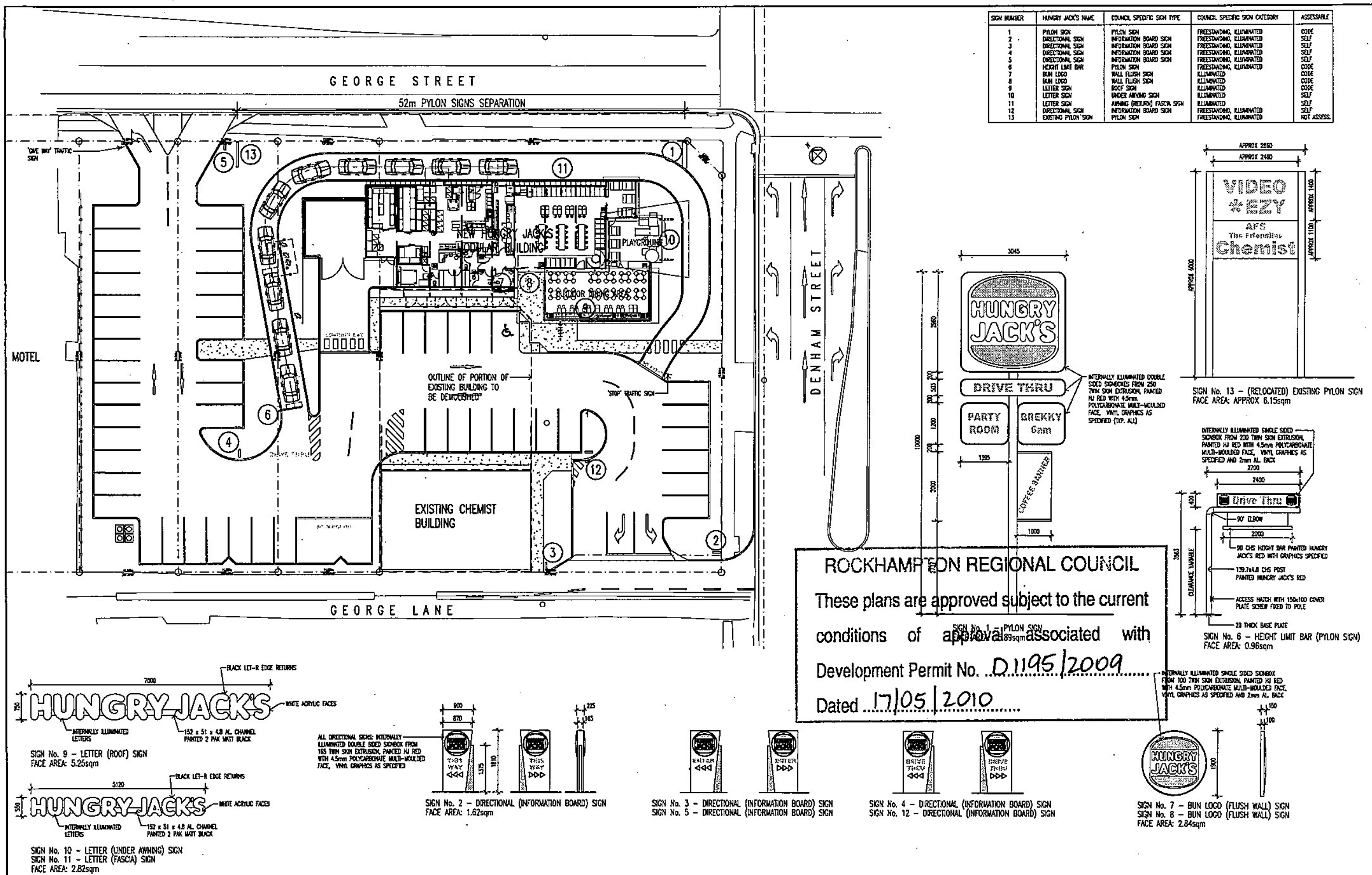
1	PYLON SIGN	PYLON SIGN	FREESTANDING, ILLUMINATED	CODE
2	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
3	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
4	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
5	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
6	HEIGHT LIMIT BAR	PYLON SIGN	FREESTANDING, ILLUMINATED	CODE
7	BUN LOGO	WALL FLUSH SIGN	ILLUMINATED	CODE
8	BUN LOGO	WALL FLUSH SIGN	ILLUMINATED	CODE
9	LETTER SIGN	ROOF SIGN	ILLUMINATED	CODE
10	LETTER SIGN	UNDER AWNING SIGN	ILLUMINATED	SELF
11	LETTER SIGN	AWNING (RETURN) FASCIA SIGN	ILLUMINATED	SELF
12	DIRECTIONAL SIGN	INFORMATION BOARD SIGN	FREESTANDING, ILLUMINATED	SELF
13	EXISTING PYLON SIGN	PYLON SIGN	FREESTANDING, ILLUMINATED	NOT ASSESS.



GEORGE STREET
52m PYLON SIGNS SEPARATION
DENHAM STREET
GEORGE LANE
MOTEL
NEW HUNGRY JACK'S MODULAR BUILDING
PLAYGROUND
OUTLINE OF PORTION OF EXISTING BUILDING TO BE DEMOLISHED
EXISTING CHEMIST BUILDING
"STOP" TRAFFIC SIGN
HUNGRY JACK'S
DRIVE THRU
PARTY ROOM
BREKKY 6am
COFFEE BANNER
SIGN No. 1 - PYLON SIGN
VIDEO EZY
AFS The Friendly Chemist
SIGN No. 13 - (RELOCATED) EXISTING PYLON SIGN FACE AREA: APPROX 6.15sqm
Drive Thru
SIGN No. 6 - HEIGHT LIMIT BAR (PYLON SIGN) FACE AREA: 0.96sqm
SIGN No. 9 - LETTER (ROOF) SIGN FACE AREA: 5.25sqm
SIGN No. 10 - LETTER (UNDER AWNING) SIGN
SIGN No. 11 - LETTER (FASCIA) SIGN
FACE AREA: 2.82sqm
SIGN No. 2 - DIRECTIONAL (INFORMATION BOARD) SIGN FACE AREA: 1.62sqm
SIGN No. 3 - DIRECTIONAL (INFORMATION BOARD) SIGN
SIGN No. 5 - DIRECTIONAL (INFORMATION BOARD) SIGN
SIGN No. 4 - DIRECTIONAL (INFORMATION BOARD) SIGN
SIGN No. 12 - DIRECTIONAL (INFORMATION BOARD) SIGN
SIGN No. 7 - BUN LOGO (FLUSH WALL) SIGN
SIGN No. 8 - BUN LOGO (FLUSH WALL) SIGN
FACE AREA: 2.84sqm
DRAWN SCALE

ROCKHAMPTON REGIONAL COUNCIL

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

Development Permit No. D1195/2009

Dated 17/05/2010

No	AMENDMENT	DWN	DATE	CHKD
3	DIMENSION ADDED	PL	27.07.09	JV
2	UPDATED TITLE	PL	25.05.09	JV
1	COORDINATION ISSUE	PL	13.05.09	JV

HUNGRY JACKS

FOR INFORMATION

PROPOSED HUNGRY JACK'S (HJ400 MODULAR MODIFIED)

100 GEORGE STREET, ROCKHAMPTON SOUTH, QLD

DRAWING TITLE: SITE SIGNAGE PLAN & SIGNAGE ELEVATIONS INTERIM

DATE: FEBRUARY 2009

PROJECT NO: 2020-705 DRAWN: PL

SCALE: 1:200 & 1:50 AT A1 SIZE CHECKED: JV

DRAWING NO. SK21

OPT: - REV: 3

wbp