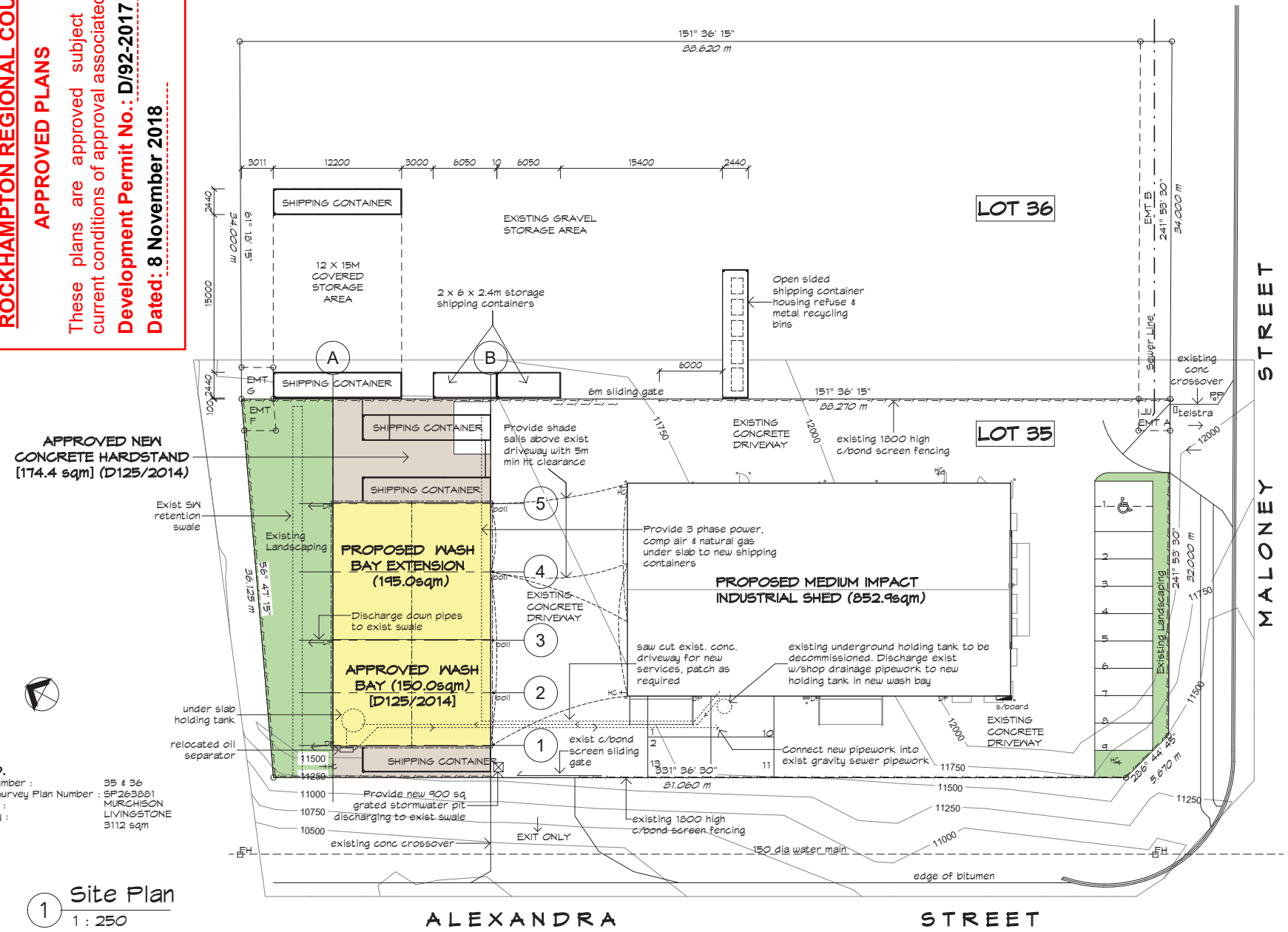
ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with **Development Permit No.: D/92-2017**

Dated: 8 November 2018



R.P.D.

Lot Number :	35 & 36
Reg./Survey Plan Number :	SP263881
Parish :	MURCHISON
County :	LIVINGSTONE
Area :	3112 sqm

1 Site Plan
1 : 250

REVISIONS	No.	DESCRIPTION	DATE
	E	ADJOINING BLOCK ADDED	17/11/17
	D	WASHBAY EXTENSION ADDED	03/11/17
	C	CHANGED TO MEDIUM IMPACT INDUST.	26/07/17
	B	EXIST SW SWALE ADDED	21/12/16
	A	DEVELOPMENT APPLICATION	01/12/16

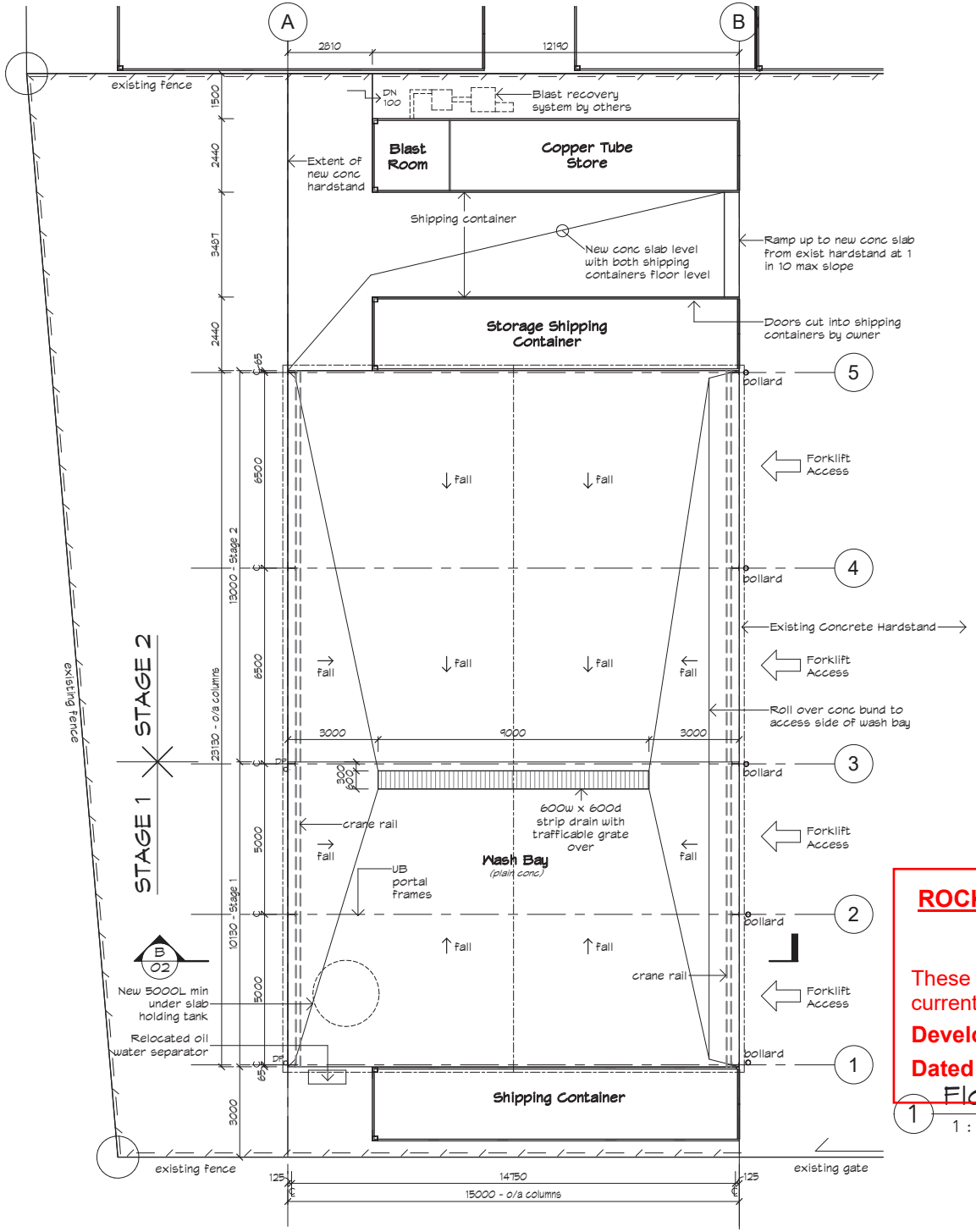
PROPOSED WASH BAY
FOR G & J HEAZLEWOOD
AT 151 MALONEY STREET
KAWANA

this drawing: Site Plan

Rufus Design Group
STYLE • QUALITY • INNOVATION
MEMBER BUILDING DESIGNERS ASSOC. OF QLD INC.
Licenced under the QBSA Act Lic No. 1180286
Telephone 61 7 49288011
Facsimile 61 7 49266579
E-mail mailbox@rufusdesigngroup.com

PROJECT MANAGER : DAW
DRAWN : DAW
CHKD : T.J.R.
WIND SPEED C2
PLAN SIZE: A2
PROJECT NUMBER 160820-01
SHEET 01 OF 05 SHEETS
REV. A B C D E

PRINT DATE : 17/11/2017 10:31:49 AM



REVISIONS			
	D	WASH BAY EXTENSION ADDED	03/11/17
	C	CRANE RAILS & ROOF ROTATED 90 DEG	18/10/17
	B	BUNDING ADDED	09/12/16
	A	DEVELOPMENT APPLICATION	01/12/16
	No.	DESCRIPTION	DATE

General Notes

CONST. TO BE IN ACCORD. WITH THE QLD. BUILDING ACT 1975-1998 & THE STANDARD BUILDING REGULATION 1998 AND SHALL COMPLY WITH ALL LOCAL AUTHORITY REGULATIONS AND REQUIREMENTS.

DO NOT SCALE

ALL WALL DIMENSIONS ARE TO STRUCTURAL COMPONENTS - NOT TO THE FACE OF LININGS/FINISHES

VERIFY ALL DIMENSIONS AND LEVELS ON SITE BEFORE STARTING WORK.

Site Details

REFER TO CIVIL ENGINEER'S PLANS FOR ALL LEVELS & CIVIL WORKS.
SITE LEVELS AND FINISHED FLOOR LEVELS ARE TO BE VERIFIED BY THE BUILDER BEFORE STARTING WORK.

Stormwater Drainage

ALL STORM WATER DRAINAGE WORK TO BE IN ACCORDANCE WITH AS 3500.

Sewer Drainage

ALL PLUMBING & DRAINAGE WORK TO BE IN ACCORDANCE WITH WATER & SEWERAGE SUPPLY ACT AND AS 3500.

Slab & Footings

CONCRETE WORK TO BE IN ACCORDANCE WITH AS 3600.

Roofing

METAL ROOFING TO BE IN ACCORDANCE WITH AS 1562.1 AND FIXED TO MANUFACTURERS SPECIFICATIONS.

Wall Cladding

WALL CLADDING TO BE FIXED TO MANUFACTURERS SPECIFICATIONS.

Structural Steel

RHS & SHS STEEL SECTIONS TO BE FIRST GRADE STEEL COMPLYING WITH AS 1163 AND HOT ROLLED SECTIONS TO COMPLY WITH AS 3679.

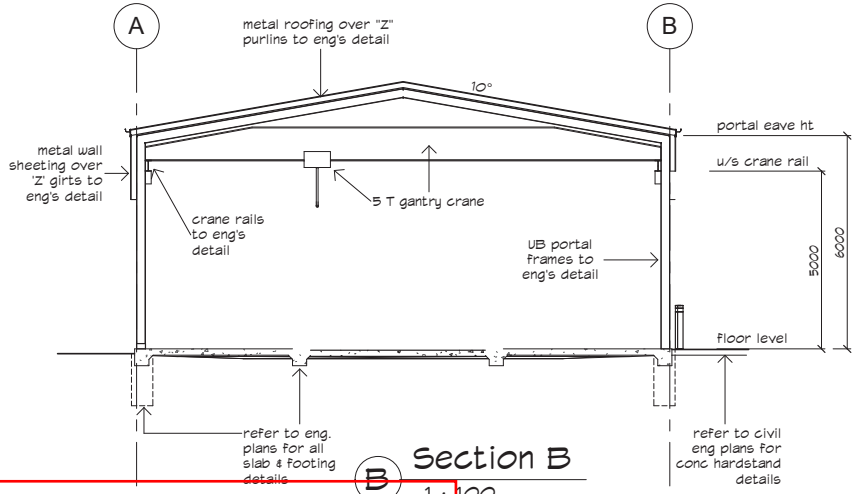
ALL STRUCTURAL STEEL MATERIALS, WORKMANSHIP, FABRICATION & ERECTION SHALL COMPLY WITH THE REQUIREMENTS OF AS 4100, AS 1538, AS 1554 AND ANY OTHER RELEVANT SPECIFICATIONS.

Working At Heights

FOR CONSTRUCTION, CLEANING AND MAINTENANCE PROCEDURES WHERE THERE IS A RISK OF FALLING, COMPLY WITH THE FOLLOWING CLAUSE FROM DIV. 4 OF PART 1B OF THE "WORKPLACE HEALTH AND SAFETY REGULATION". (CLASS 1B8 - FALL ARREST HARNESS SYSTEM)

Other Consultants

REFER TO DETAILS BY OTHER CONSULTANTS FOR:
- SLAB & FOOTING DESIGN
- SOIL TEST
- SITE CONTOURS
- CONCRETE DRIVEWAY INCLUDING FALLS
- ALL STRUCTURAL DETAILS
- ROOF & SITE DRAINAGE DESIGN
- WATER RETICULATION & SEWER DRAINAGE DESIGN
- FIRE SAFETY EQUIPMENT



B Section B
1 : 100

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/92-2017

Dated: 8 November 2018

1 Floor Plan
1 : 100

ELEVATIONS

PROPOSED WASH BAY

FOR G & J HEAZLEWOOD
AT 151 MALONEY STREET
KAWANA

Rufus Design Group
STYLE • QUALITY • INNOVATION
MEMBER BUILDING DESIGNERS ASSOC. OF QLD INC.
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this drawing
Floor Plan & Section B

PROJECT MANAGER : DAW	WIND SPEED C2	PROJECT NUMBER 160820 - 02	
DRAWN : DAW	PLAN SIZE: A2	SHEET 02 OF 05 SHEETS	
CHKD :		REVISION D	

PRINT DATE : 17/11/2017 10:31:49 AM

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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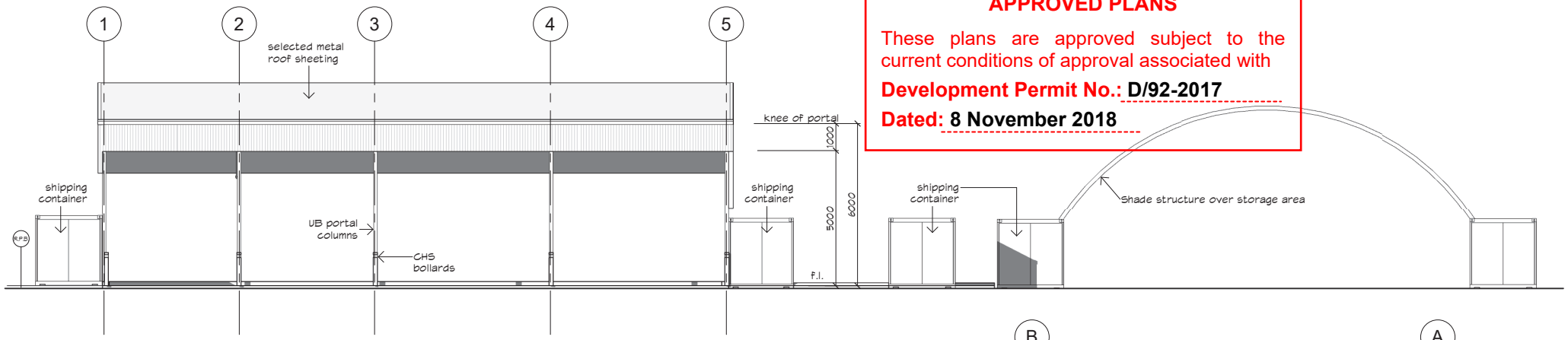
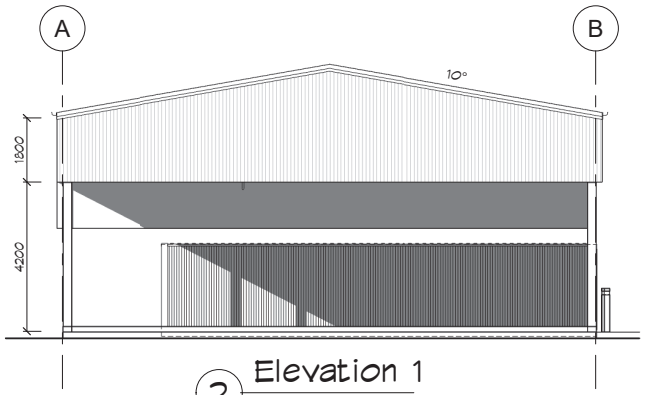
Dated: 8 November 2018

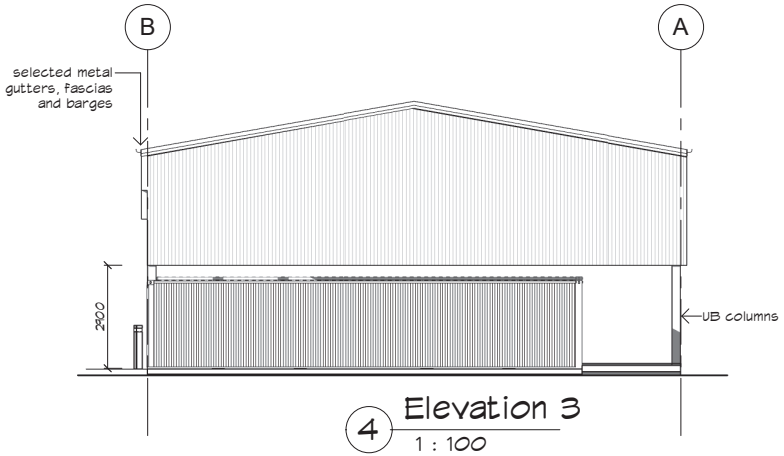


3 Elevation 2
1 : 100

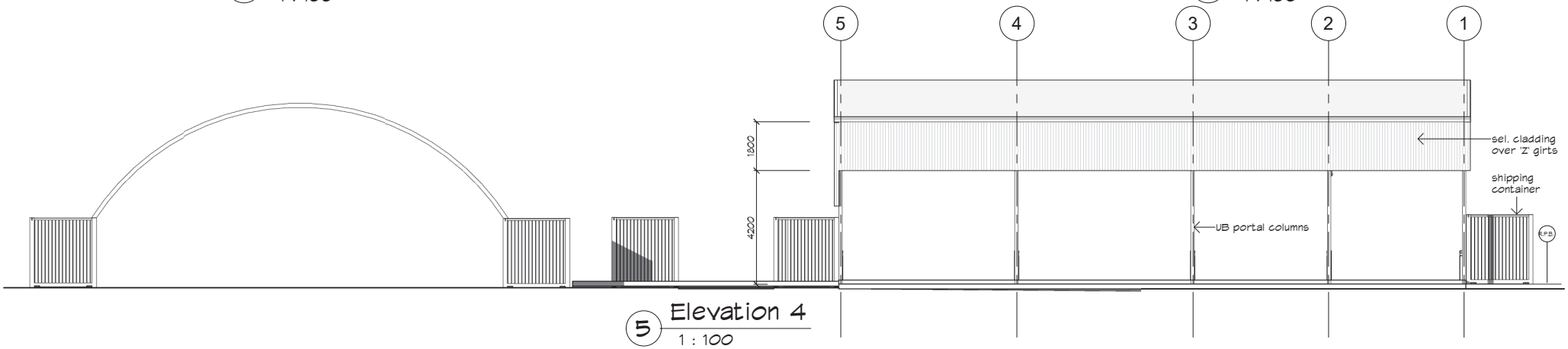


2 Elevation 1
1 : 100

PAINT COLOURS
EXTERNAL
(Dulux Weathershield Exterior Gloss Acrylic)
Blue - 'Royal Blue B12'
Light Grey - 'Lightbox Gray N33'
Red - 'Red 485C'
Dark Grey - 'Domino PG1A8'



4 Elevation 3
1 : 100



5 Elevation 4
1 : 100

REVISIONS			
	E	WASH BAY EXTENSION ADDED	03/11/17
	D	CRANE RAILS ROTATED 90 DEGREES	18/10/17
	C	NOTES CHANGED OR ALTERED	21/12/16
	B	WASH BAY SKIRT INCREASED	09/12/16
	A	DEVELOPMENT APPLICATION	01/12/16
	No.	DESCRIPTION	DATE

PROPOSED WASH BAY
FOR G & J HEAZLEWOOD
AT 151 MALONEY STREET
KAWANA

this drawing
Elevations

Rufus Design Group
STYLE • QUALITY • INNOVATION
MEMBER BUILDING DESIGNERS ASSOC. OF QLD INC.
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Telephone 61 7 49288011
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PROJECT MANAGER : DAW
DRAWN : DAW
CHKD : T.J.R.
WIND SPEED C2
PLAN SIZE: A2
PROJECT NUMBER 160820 - 03
SHEET 03 OF 05 SHEETS
REV. A B C D E

PRINT DATE : 17/11/2017 10:31:51 AM

2018

DILEIGH

CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

Rob Jones

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/92-2017

Dated: 8 November 2018

PROPOSED MEDIUM IMPACT INDUSTRY – 151-153 MALONEY STREET, KAWANA

TRAFFIC IMPACT ASSESSMENT

FOR G & J HEAZLEWOOD

D18126-RP02

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2.2 Proposed Development Profile 1

3. Alexandra Street Details 2

3.1 Existing Traffic Data 2

3.2 Traffic Generation 2

3.3 Traffic Comparison 2

4. Conclusion 3

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Document Status					
Rev No.	Author	Reviewer	Approved For Issue		
			Name	Signature	Date
A	R. Jones	G. Brown	Glenn Brown RPEQ 7682		04.09.2018

1. Introduction

This report was prepared for G & J Heazlewood as supporting documentation for the Material Change of Use application for Medium Impact Industry located on 151-153 Maloney St, Kawana.

Locality Plan

The subject land is described as Lots 35 and 36 on SP263881 which has a total area of 6,119m^2. There is an existing 852m^2 Industrial Shed on Lot 35 which has been operating as a radiator repair and servicing workshop as an approved Low Impact Industry (with associated carparking, drainage etc). There is also approval on the site for a 150m^2 washbay (development approval D/125-2014).

It is proposed to carry on operation as a radiator workshop, with some additional activities that warrant development approval for Medium Impact Industry. It is proposed that the approved washbay will be extended by 195m^2 to 345m^2. Lot 36 will be used for storage, with no permanent structures proposed. Refer Appendix A for proposed site plan.

The site is located on Industrial zoned land under the current Rockhampton Regional Council Planning Scheme.

2. Site Profile

2.1 Existing Site Usage

The site currently has access from Maloney St, with egress available to Alexandra St. It currently houses an 852m^2 workshop, and has current approval for a 150m^2 washbay, giving a total gross floor area of 1,002m^2.

2.2 Proposed Development Profile

The proposed development will utilise Lot 36 for storage, and increase the size of the washbay by 195m^2. This will bring the total gross floor area of the development up to 1,197m^2, but only increasing the current approved development by 195m^2.

It is proposed that the site access and egress arrangements will remain unchanged.

3. Alexandra Street Details

As indicated previously, the site has egress to Alexandra Street, and it is expected that most of the traffic generated by the development will use Alexandra Street. At the development site location, Alexandra St is a two lane Urban Arterial Road.

3.1 Existing Traffic Data

Rockhampton Regional Council was approached to ascertain if there was any relevant traffic data available for Alexandra St close to the proposed development. 2017 Traffic Counts for Alexandra St (from Farm St to Maloney St) are provided as follows:-

AADT - 6022 vehicles per day

AM Peak - 534.5 vehicles per hour (0800-0900)

PM Peak - 534.4 vehicles per hour (1500-1600)

Commercial - 18.3% Commercial Vehicles

A growth rate of 1.7% was adopted to determine background traffic rates in the proposed opening year of 2019 and the ten year design horizon of 2029.

3.2 Traffic Generation

The development traffic generation rates were adopted from the NSW RTA Guide to Traffic Generating Developments (2002). The proposed use of the site did not align well with the industrial purposes listed in the guide, and so the commercial traffic development rate was adopted as a worst case scenario, being higher than all industrial rates:-

Daily Trips - 10/100m^2 Gross Floor Area

Peak Hour - 2/100m^2 Gross Floor Area

As the development would be receiving parts deliveries and servicing heavy vehicles, a commercial vehicle rate of 50% was adopted. For the proposed increase in gross floor area of 195m^2, the following traffic generation has been adopted:-

Daily Trips - 20 (10 commercial vehicles)

Peak Hour - 4 (2 commercial vehicles

It is assumed that in the worst case scenario, all of these trips will utilise Alexandra Street.

3.3 Traffic Comparison

Comparing the base case (without development) against the proposed development gives at worst a 1.98% increase in peak hour commercial vehicles on Alexandra Street in the development's opening year, with a total increase of only 0.72%:-

Traffic Comparison

Case	Without Development	With Development	Impact
AADT 2019	6228.5 (1139.8)	6328.5 (1189.8)	+0.32% (+0.88%)
AADT 2029	7372.1 (1349.1)	7392.1 (1359.1)	+0.27% (+0.75%)
AM Peak 2019	552.8 (101.2)	556.8 (103.2)	+0.72% (+1.98%)
AM Peak 2029	654.3 (119.7)	658.3 (121.7)	+0.61% (+1.67%)

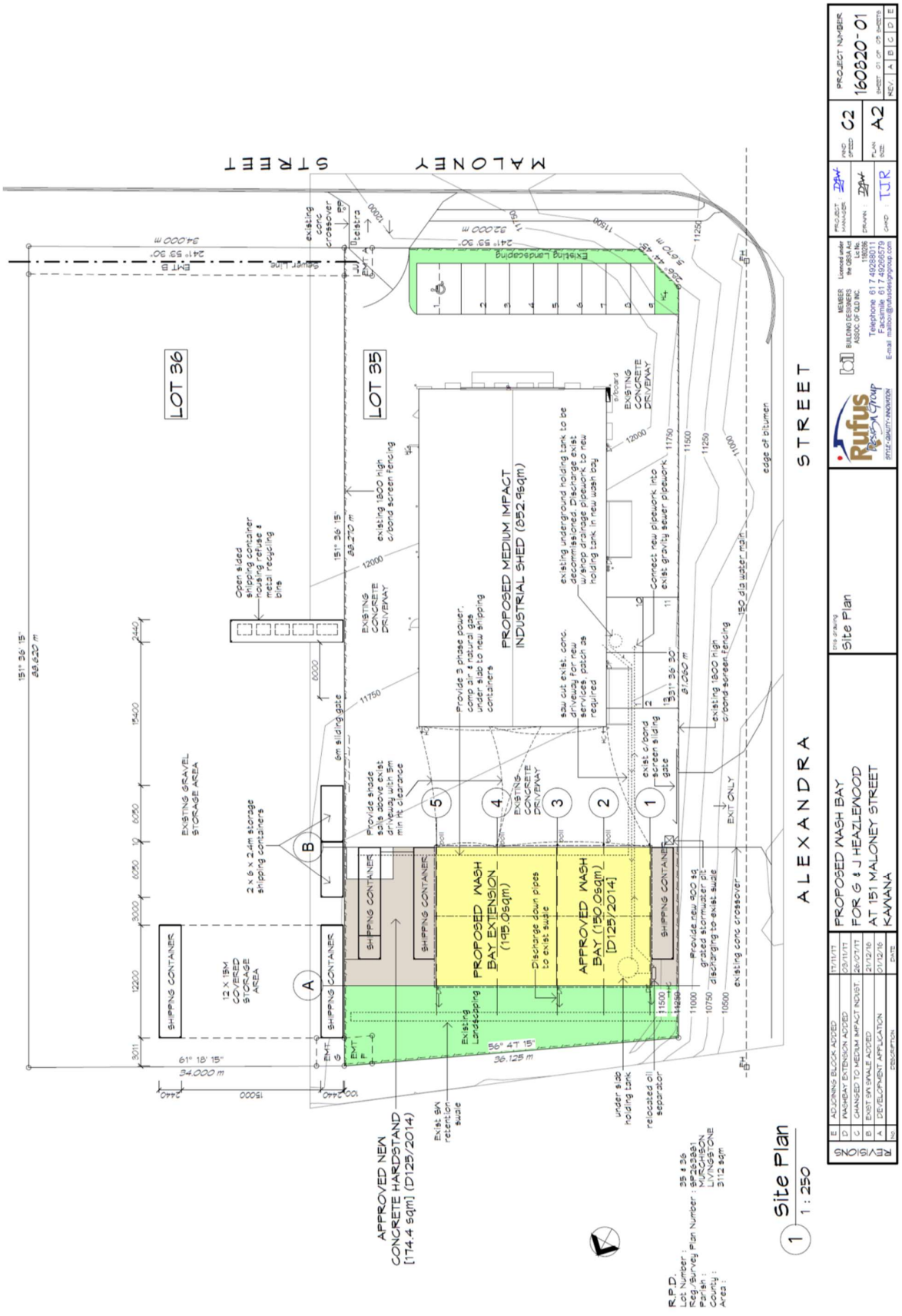
Traffic Comparison cont.			
PM Peak 2019	552.7 (101.1)	556.7 (103.1)	+0.72% (+1.98%)
PM Peak 2029	654.2 (119.7)	658.2 (121.7)	+0.61% (+1.67%)

Note – Commercial Vehicle Traffic Shown in Parentheses

4. Conclusion

In the worst case scenario, the development is expected to increase commercial vehicle traffic by less than 2% and total traffic by less than 1% during the peak hour on Alexandra St. The Department of Transport and Main Roads superseded Guidelines of Road Impacts of Development and the current Guide to Traffic Impact Assessment specify that an increase of less than 5% is not significant enough to warrant a detailed impact assessment as the increase will not have a noticeable effect on traffic operations of level of service of the road network. As a result, the development does not necessitate any mitigation to the surrounding road network.

Appendix A: Proposed Site Plan



2018

DILEIGH

CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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Development Permit No.: D/92-2017

Dated: 8 November 2018

STORMWATER MANAGEMENT REPORT FOR MATERIAL CHANGE OF USE – PROPOSED MEDIUM IMPACT INDUSTRY, LOT 35 & LOT 36 ON SP263881 ON MALONEY ST, KAWANA

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3. Post Developed Site Flows and Management 4
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     - 3.1.1 Lot 35 4
     - 3.1.2 Lot 36 4
   - 3.2 Discharge Flow Management 4
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     - 3.2.1 Lot 36 5
   - 3.3 Stormwater Quality Management 6
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     - 3.3.2 Lot 36 6
4. Conclusion 6

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Document Status					
Rev No.	Author	Reviewer	Approved For Issue		
			Name	Signature	Date
01	A Doherty	G Brown	G Brown RPEQ 07682		31.8.18

1. Introduction

This report was prepared for G & J Heazlewood in support of a Material Change of Use that is to be submitted to Rockhampton Regional Council. This report should be read in conjunction with the overall application relating to this project. The proponent is seeking approval to develop the site for a Medium impact industry application.

The land subject to this application is described as Lot 35 and 36 on SP263881, Lot 35 has an area of 3118m^2, with frontage to Alexandra St and Maloney St. Lot 36 has an area of 3007 m^2 with frontage to Maloney Street.

2. Existing Stormwater Conditions

Lot 35 is developed with a combination of structures and hard stand resulting in an impervious site coverage of 89%. Lot 35 also has existing stormwater management infrastructure in place from the initial development on the site. Water is detained on site on the hard stand area toward the northern boundary, prior to discharging to the bio-retention swale adjacent the northern boundary.

Prior to the hard stand being installed Lot 36 was vegetated with short grass and has an almost constant 1% slope from south to north, discharging at the northern boundary to the drainage reserve at the rear of the property.

Due to the homogenous nature of lot 36 site coverage and slope, the Kinematic Wave Equation was used to calculate the pre-developed Time of Concentration in accordance with QUDM section 4.6.6(d). A retardance factor (n*) value of 0.091 was selected as the mean for sparse vegetation from QUDM table 4.6.5. A maximum sheet flow length of 50m was adopted from QUDM section 4.6.6(a) for an urban area. The rainfall intensity, *I,* was adopted by iteration for each calculated Annual Recurrence Interval.

$$Q100\ Tc = \frac{6.94(L.n*)^{0.6}}{I^{0.4}.S^{0.3}} = \frac{6.94(50 \times 0.091)^{0.6}}{277^{0.4} \times 0.01^{0.3}} = 7.23\ minutes$$

$$Q5\ Tc = \frac{6.94(L.n*)^{0.6}}{I^{0.4}.S^{0.3}} = \frac{6.94(50 \times 0.091)^{0.6}}{137^{0.4} \times 0.01^{0.3}} = 10.14\ minutes$$

These were rounded up to 7.5 minutes for the Q100 event and down to 10 minutes for the Q5 event. From these times of concentration, the following Major and Minor discharges were calculated using a C10 value of 0.7 for a fully pervious catchment where Qy=F*Cy*Iy*A

Q100 = 0.198m^3/s

Q5 = 0.076m^3/s

See Sheet D18.034-02 for calculations (Appendix A).

3. Post Developed Site Flows and Management

3.1 Post Developed Flows

3.1.1 Lot 35

The material change of use application and subsequent additional buildings on the site will not increase the sites overall fraction impervious and subsequently will not increase peak discharge. However, the proposed structures will obstruct the existing pavement detention area at the rear of the site, creating a requirement to provide an alternative solution for site detention. Refer previous stormwater management report for the site (Appendix B).

3.1.2 Lot 36

It is not intended to significantly alter the stormwater flow paths within the development – it is intended to drain from South to North across the site at a 1.0 to 0.5% grade. It is intended to provide a bio-retention swale along the northern boundary and on the edge of the hardstand area to treat and direct flows to the existing inter-allotment system.

The proposed development will have a fraction impervious of 0.89, which gives a C10 value of 0.867 (From QUDM table 4.5.3). Using the Kinematic Wave Equation over the impervious portion of the site gives a Time of Concentration of under 5 minutes, and so 5 minutes was adopted in accordance with the QUDM section 4.6.2 Minimum Time of Concentration.

This gives the following discharges from the site:-

Q100 = 0.268m^3/s

Q5 = 0.122m^3/s

This is an increase in flow of:

COMPARING Q100 FLOWS LOT 36 PRE-TREATMENT			
PRE DEV.	0.198	m3/sec	
POST DEV	0.268	m3/sec	
EQUALS	35.24	% INCREASE IN MAJOR FLOWS	
COMPARING Q5 FLOWS lot 36 PRE-TREATMENT			
PRE DEV.	0.076	m3/sec	
POST DEV	0.122	m3/sec	
EQUALS	60.02	% INCREASE IN MINOR FLOWS	

Refer to drawing D18.034-02 for calculations (Appendix A).

3.2 Discharge Flow Management

3.2.1 Lot 35

The material change of use to Medium Impact Industry does not result in any increase in flows from the site as developed, however the additional structures will be constructed over the existing pavement detention area. To mitigate the loss of the existing pavement area a detention tank is proposed to be installed. From the existing storm water management plan (refer appendix A) the pre and post developed flows are;

COMPARING Q100 FLOWS LOT 36 PRE-TREATMENT			
PRE DEV.	0.206	m3/sec	
POST DEV	0.278	m3/sec	
EQUALS	34.95	% INCREASE IN MAJOR FLOWS	

COMPARING Q5 FLOWS lot 36 PRE-TREATMENT			
PRE DEV.	0.079	m3/sec	
POST DEV	0.126	m3/sec	
EQUALS	59.49	% INCREASE IN MINOR FLOWS	

Refer attached storm water management plan (Appendix B).

This proposed tank detention will be provided under the slab in the proposed wash down bay. The proposed tank size is 45 kL with a dual staged outlet. The tank detention will reduce the post developed Q100 discharge to 205l/s (a 1l/s decrease on pre-developed flows) and post developed Q5 discharge to 74l/s (a 5l/s decrease on pre-developed flows) – See sheets D18.034-02 for calculations (Appendix A).

This detention strategy will result in the following post-developed discharges for Lot 35:-

COMPARING Q5 FLOWS POST TREATMENT'			
PRE DEV.	0.0790	m3/sec	
POST DEV	0.0750	m3/sec	
EQUALS	5.06	% DECREASE IN MINOR FLOWS	

COMPARING Q100 FLOWS POST TREATMENT'			
PRE DEV.	0.2060	m3/sec	
POST DEV	0.2050	m3/sec	
EQUALS	0.49	% DECREASE IN MAJOR FLOWS	

3.2.1 Lot 36

To mitigate the increase in post developed flows, onsite detention will be required. It is proposed to provide an underground tank detention tank in the northern rear corner of the allotment.

This proposed tank detention will be provided in the Northern rear corner of lot 36. The proposed tank size is 45 kL with a dual staged outlet. The tank detention will reduce the post developed Q100 discharge to 193l/s (a 5l/s decrease on pre-developed flows) and post developed Q5 discharge to 74l/s (a 2l/s decrease on pre-developed flows) – See sheet D18.034-02 for calculations (Appendix A).

This detention strategy will result in the following post-developed discharges for Lot 36:-

COMPARING Q100 FLOWS POST TREATMENT'			
PRE DEV.	0.198	m3/sec	
POST DEV	0.193	m3/sec	
EQUALS	2.53	% DECREASE IN MAJOR FLOWS	

COMPARING Q5 FLOWS POST TREATMENT'			
PRE DEV.	0.076	m3/sec	
POST DEV	0.074	m3/sec	
EQUALS	2.63	% DECREASE IN MAJOR FLOWS	

3.3 Stormwater Quality Management

3.3.1 Lot 35

Lot 35 has an existing bio retention swale at the rear of the allotment of 1.5% of the total site area (47m$^{2)}$ in accordance with the State Planning Policy (July 2017) Appendix 2 – Water Quality, Table B to comply with load reduction targets for all Queensland regions in lieu of modelling. It is intended to provide a bio-retention swale along the edge of the hardstand areas to treat runoff from all of the impervious site areas. Refer proposed Stormwater management plan D18.126-01 (Appendix A).

3.3.2 Lot 36

It is proposed to install a bio retention swale at the rear of lot 36 of 1.5% of the total site area (45m^2) in accordance with the State Planning Policy (July 2017) Appendix 2 – Water Quality, Table B to comply with load reduction targets for all Queensland regions in lieu of modelling. It is intended to provide a bio-retention swale along the edge of the hardstand areas to treat runoff from all of the impervious site areas.

Refer drawing D18.126-01 for layout plan (Appendix A).

4. Conclusion

The proposed development will increase the impervious area of the site and will require both quantity and quality management of the stormwater discharge. It is proposed to manage this through pavement detention to the proposed hardstand storage area, and to provide bio-retention swale to treat the runoff from the impervious areas.

Adam Doherty

For and On Behalf of

Dileigh Consulting Engineers Pty Ltd

Appendix – A

N

LOT 37
SP263881

45m³ DETENTION AREA

45sq.m. BIO-RETENTION BASIN

LOT 36
SP263881

SHIPPING CONTAINER

EXISTING GRAVEL
STORAGE AREA

LOT 42
SP263881

COVERED
STORAGE AREA
(12 X 15m)

SHIPPING CONTAINER

45m³ DETENTION AREA

EXISTING BIO-RETENTION SWALE

LOT 35
SP263881

PROPOSED WASH
BAY EXTENSION
(195.0sqm)

EXISTING MEDIUM IMPACT
INDUSTRIAL SHED
(852.9sqm)

APPROVED WASH BAY
(150.0sqm)
(D125/2014)

SHIPPING CONTAINER

11500
11250
11000
10750
10500

11750
12000
12000
11750
11500
12000
11750
11500
11250
11000

FH
FH

LOT 106
SP152741

MALONEY STREET

LOT 104
RP603516

ALEXANDRA STREET

LOT 3
RP892674

LOT 4
RP612772

LEGEND

- EXISTING UNDERGROUND ELECTRICITY
- TELSTRA (CABLE & PIT)
- EXISTING 150ø WATER
- EXISTING SEWER MAIN & ACCESS CHAMBER
- EXISTING STORMWATER MAIN
- EXISTING FENCELINE
- EXISTING KERB AND CHANNEL
- FH EXISTING FIRE HYDRANT
- EXISTING LANDSCAPED AREAS
- EXISTING CONCRETE CARPARK/DRIVEWAY
- PROPOSED BIO-RETENTION SWALE
- PROPOSED DETENTION TANK
- PROPOSED STORMWATER LINE WITH 600sq PIT & SILT BASKET
- 43.5 EXISTING CONTOUR
- PROPOSED STORMWATER FLOW PATH
- INDICATIVE ROOFWATER AND DOWN PIPE

STORMWATER MANAGEMENT NOTES:

1. ALL CALCULATIONS CARRIED OUT IN ACCORDANCE WITH THE QUEENSLAND URBAN DRAINAGE MANUAL
2. SITE PRE DEVELOPED CATCHMENT TAKEN FROM ACTUAL SITE AREAS USING ACTUAL FRACTION IMPERVIOUS

DRAFT ISSUE
NOT FOR CONSTRUCTION

SCALE
0 2.5 5 7.5 10
DESCRIPTION
1:500

REV	REVISION	DATE
A	STORMWATER MANAGEMENT PLAN	08/2018

DILEIGH
CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT
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Drawn by	CER
Checked by	ACD
Approved GLENN J BROWN	
RPEQ 7682	Sign

G AND J HEAZLEWOOD
Material Change of Use - Medium Impact Industy
151 MALONEY STREET, KAWANA
PROPOSED STORM WATER MANAGEMENT PLAN

D18.126-01

SHEET 01 OF 02

A

Hydrograph Report

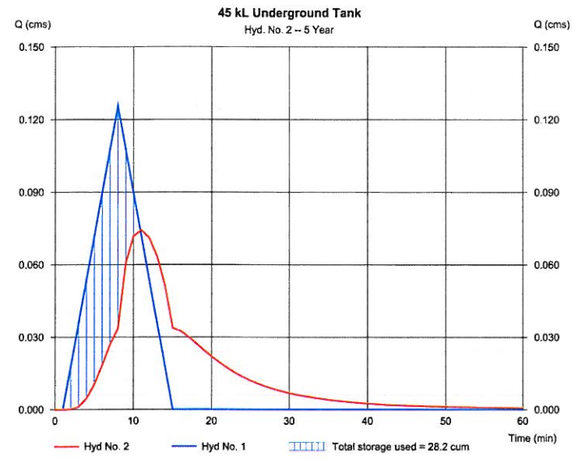
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Friday, 08 / 24 / 2018

Hyd. No. 2

45 kL Underground Tank

Hydrograph type	= Reservoir	Peak discharge	= 0.074 cms
Storm frequency	= 5 yrs	Time to peak	= 11 min
Time interval	= 1 min	Hyd. volume	= 52.7 cum
Inflow hyd. No.	= 1 - Q5 - Lot 35	Max. Elevation	= 1.38 m
Reservoir name	= 25kL Tank	Max. Storage	= 28.2 cum

Storage Indication method used



Hydrograph Report

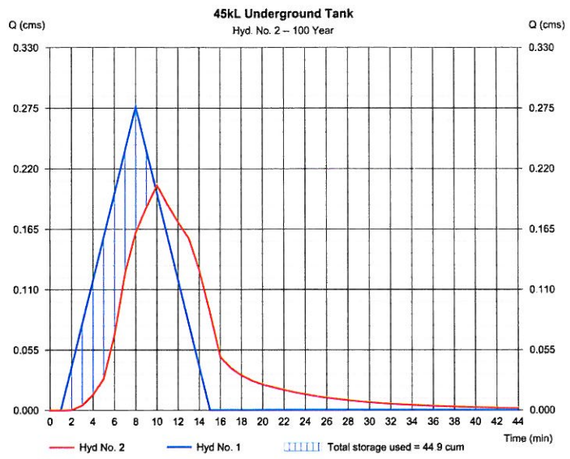
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Friday, 08 / 24 / 2018

Hyd. No. 2

45kL Underground Tank

Hydrograph type	= Reservoir	Peak discharge	= 0.205 cms
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 115.9 cum
Inflow hyd. No.	= 1 - Q100 Lot 35	Max. Elevation	= 1.60 m
Reservoir name	= 25kL Tank	Max. Storage	= 44.9 cum

Storage Indication method used



Hydrograph Report

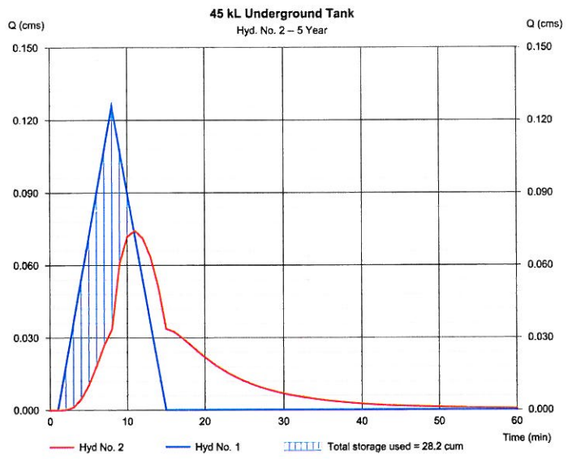
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Friday, 08 / 24 / 2018

Hyd. No. 2

45 kL Underground Tank

Hydrograph type	= Reservoir	Peak discharge	= 0.074 cms
Storm frequency	= 5 yrs	Time to peak	= 11 min
Time interval	= 1 min	Hyd. volume	= 52.7 cum
Inflow hyd. No.	= 1 - Q5 Lot 36	Max. Elevation	= 1.38 m
Reservoir name	= 25kL Tank	Max. Storage	= 28.2 cum

Storage Indication method used.



Hydrograph Report

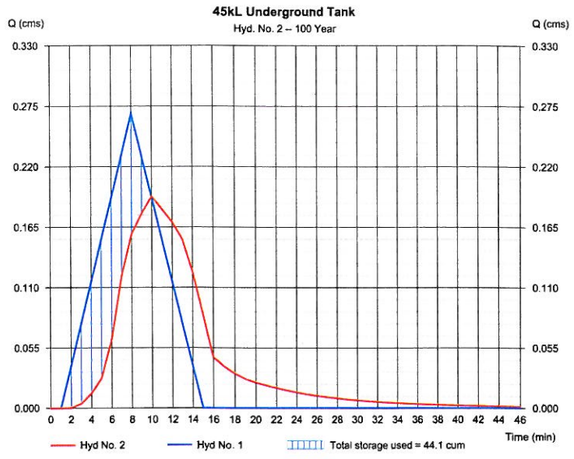
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 — Friday, 08 / 24 / 2018

Hyd. No. 2

45kL Underground Tank

Hydrograph type	= Reservoir	Peak discharge	= 0.193 cms
Storm frequency	= 100 yrs	Time to peak	= 10 min
Time interval	= 1 min	Hyd. volume	= 112.5 cum
Inflow hyd. No.	= 1 - Q100 Lot 36	Max. Elevation	= 1.59 m
Reservoir name	= 25kL Tank	Max. Storage	= 44.1 cum

Storage Indication method used.



LOT 35 DETENTION HYDROGRPAHS

Lot 35

Q= F*C*I*A

PRE DEVELOPED TC= 7.5-11 min

0.311802 ha

AreaA	F sq kms	C co eff	I mm/hr	A sq kms	Q m3/sec
Q2	0.278	0.595	105	0.00312	0.054
Q5	0.278	0.665	137	0.00312	0.079
Q10	0.278	0.7	163	0.00312	0.099
Q50	0.278	0.805	245	0.00312	0.171
Q100	0.278	0.84	284	0.00312	**0.206**

Fi	0.000	
$^1I_{10}$	64	mm/hr
C_{10}	0.7	

Lot 35

POST DEVELOPED TC= 5 min

0.311802 ha

AreaA	F sq kms	C co eff	I mm/hr	A sq kms	Q m3/sec
Q2	0.278	0.73695	136	0.00312	0.087
Q5	0.278	0.82365	177	0.00312	0.126
Q10	0.278	0.867	203	0.00312	0.153
Q50	0.278	0.99705	284	0.00312	0.245
Q100	0.278	1	321	0.00312	**0.278**

Fi	0.890	
$^1I_{10}$	64	mm/hr
C_{10}	0.867	

LOT 36 DETENTION HYDROGRPAHS

Lot 36

Q= F*C*I*A

PRE DEVELOPED TC= 7.5-11 min

0.3007 ha

AreaA	F sq kms	C co eff	I mm/hr	A sq kms	Q m3/sec
Q2	0.278	0.595	105	0.00301	0.052
Q5	0.278	0.665	137	0.00301	0.076
Q10	0.278	0.7	163	0.00301	0.095
Q50	0.278	0.805	245	0.00301	0.165
Q100	0.278	0.84	284	0.00301	**0.198**

Fi	0.000	
$^1I_{10}$	64	mm/hr
C_{10}	0.7	

Lot 36

POST DEVELOPED TC= 5 min

0.3007 ha

AreaA	F sq kms	C co eff	I mm/hr	A sq kms	Q m3/sec
Q2	0.278	0.73695	136	0.00301	0.084
Q5	0.278	0.82365	177	0.00301	0.122
Q10	0.278	0.867	203	0.00301	0.147
Q50	0.278	0.99705	284	0.00301	0.237
Q100	0.278	1	321	0.00301	**0.268**

Fi	0.890		
$^1I_{10}$	64	mm/hr	
C_{10}	0.867		

COMPARING Q100 FLOWS LOT 36 PRE-TREATMENT			
PRE DEV.	0.198	m3/sec	
POST DEV	0.268	m3/sec	
EQUALS	35.24 % INCREASE IN MAJOR FLOWS		

COMPARING Q5 FLOWS lot 36 PRE-TREATMENT			
PRE DEV.	0.076	m3/sec	
POST DEV	0.122	m3/sec	
EQUALS	60.02 % INCREASE IN MINOR FLOWS		

STORMWATER MANAGEMENT NOTES:

1. ALL CALCULATIONS CARRIED OUT IN ACCORDANCE WITH THE QUEENSLAND URBAN DRAINAGE MANUAL
2. SITE PRE DEVELOPED CATCHMENT TAKEN FROM ACTUAL SITE AREAS USING ACTUAL FRACTION IMPERVIOUS

DRAFT ISSUE
NOT FOR CONSTRUCTION

SCALE

REV	REVISION	DATE
A	STORMWATER MANAGEMENT PLAN	08/2018

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Checked by	ACD
Approved	GLENN J BROWN
RPEQ	7682
Sign	

G AND J HEAZLEWOOD
Material Change of Use - Mediium Impact Industy
151 MALONEY STREET, KAWANA
STORMWATER MANAGEMENT CALCULATIONS

D18.126-02

SHEET 02 OF 02

A

Appendix - B

2014

DILEIGH

CIVIL / STRUCTURAL DESIGN & PROJECT MANAGEMENT

STORMWATER MANAGEMENT REPORT FOR MATERIAL CHANGE OF USE – PROPOSED LOW IMPACT INDUSTRY, LOT 35 ON SP263881 ON MALONEY ST, KAWANA

This report was prepared for G & J Heazlewood in support of a Material Change of Use that is to be submitted to Rockhampton Regional Council. This report should be read in conjunction with the overall application relating to this project. The proponent is seeking approval to develop the site for a low impact industrial application.

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2. Existing Stormwater Conditions 3
3. Post Developed Site Flows and Management 3
   3.1 Post Developed Flows 3
   3.2 Discharge Flow Management 4
   3.3 Stormwater Quality Management 5
4. Conclusion 5

Document Status					
Rev No.	Author	Reviewer	Approved For Issue		
			Name	Signature	Date
01	R Jones	G Simmers	GBA Simmers RPEQ 4585		9/5/14

1. Introduction

This report has been prepared as a supporting document to the submission being made by G & J Heazlewood for a Material Change of Use for Low Impact Industry.

The land subject to this application is described as Lot 35 on SP263881, which has an area of 3118m^2. The site has frontage to Alexandra St and Maloney St.

2. Existing Stormwater Conditions

The development site is an undeveloped single lot with a total area of 3118m^2. It is vegetated and has an almost constant 1% slope from south to north and discharges at the northern boundary to an adjacent property – from there the discharges enter an existing natural channel and which transports it to a culvert under Alexandra St.

Due to the homogenous nature of the site coverage and slope, the Kinematic Wave Equation was used to calculate the pre-developed Time of Concentration in accordance with QUDM section 4.6.6(d). A retardance factor (n*) value of 0.091 was selected as the mean for sparse vegetation from QUDM table 4.6.5. A maximum sheet flow length of 50m was adopted from QUDM section 4.6.6(a) for an urban area. The rainfall intensity, *I*, was adopted by iteration for each calculated Annual Recurrence Interval.

$$Q100\ Tc = \frac{6.94(L.n*)^{0.6}}{I^{0.4}.S^{0.3}} = \frac{6.94(50 \times 0.091)^{0.6}}{277^{0.4} \times 0.01^{0.3}} = 7.23\ minutes$$

$$Q5\ Tc = \frac{6.94(L.n*)^{0.6}}{I^{0.4}.S^{0.3}} = \frac{6.94(50 \times 0.091)^{0.6}}{137^{0.4} \times 0.01^{0.3}} = 10.14\ minutes$$

These were rounded up to 7.5 minutes for the Q100 event and down to 10 minutes for the Q5 event. From these times of concentration the following Major and Minor discharges were calculated using a C10 value of 0.7 for a fully pervious catchment.

Q100 = 0.206m^3/s

Q5 = 0.079m^3/s

See Sheet D14.034-03 for calculations.

3. Post Developed Site Flows and Management

3.1 Post Developed Flows

It is not intended to significantly alter the stormwater flow paths within the development – it is intended to drain from South to North across the site at a 0.5% grade, however it is intended to provide a small bunded swale along the northern edge of the hardstand area to direct flows to the road reserve where they will enter the same culvert as the pre-development flows (See sheet D14.034-02 for site stormwater management plan). The proposed development will have a fraction impervious of 0.89, which gives a C10 value of 0.867 (From QUDM table 4.5.3). Using the Kinematic Wave Equation over the impervious portion of the site gives a Time of Concentration of under 5 minutes, and so 5 minutes was adopted in accordance with the QUDM section 4.6.2 Minimum Time of Concentration.

This gives the following discharges from the site:-

Q100 = 0.278m^3/s

Q5 = 0.126m^3/s

This is an increase in flow of:

COMPARING Q100 FLOWS PRE-TREATMENT		
PRE DEV.	0.206	m3/sec
POST DEV	0.278	m3/sec
EQUALS	35.21	% INCREASE IN MAJOR FLOWS

COMPARING Q5 FLOWS PRE-TREATMENT		
PRE DEV.	0.079	m3/sec
POST DEV	0.126	m3/sec
EQUALS	60.02	% INCREASE IN MINOR FLOWS

Refer to drawing D14.034-03 for calculations.

3.2 Discharge Flow Management

To mitigate the increase in post developed flows, onsite detention will be required. It is proposed to provide pavement detention in the hardstand storage area at the northern extent of the site to detain site discharges.

This proposed pavement detention will be provided by the 150mm barrier kerb – a water depth of 150mm will provide 40.5m^3 storage over 540m^2 of area (the Q100 event will require 36m^3 of storage see drawing D14.034-02 for inundation details). Stormwater will discharge through, and be restricted by, a series of breaks in the kerb (7 x 200mm wide evenly spaced along the kerb to limit concentration of discharge). The carpark detention will reduce the post developed Q100 discharge to 155l/s (a 51l/s decrease on pre-developed flows) and post developed Q5 discharge to 74l/s (a 5l/s decrease on pre-developed flows) – See sheets D14.034-03 for calculation details).

This detention strategy will result in the following post-developed discharges for the site:-

COMPARING Q100 FLOWS POST-TREATMENT		
PRE DEV.	0.206	m3/sec
POST DEV	0.155	m3/sec
EQUALS	24.47	% DECREASE IN MAJOR FLOWS

COMPARING Q5 FLOWS POST-TREATMENT		
PRE DEV.	0.079	m3/sec
POST DEV	0.074	m3/sec
EQUALS	6.88	% DECREASE IN MINOR FLOWS

3.3 Stormwater Quality Management

It is proposed to provide 1.5% of the total site area (47m$^{2)}$ of bio-retention in accordance with the State Planning Policy (December 2013) Appendix 2 – Water Quality, Table B to comply with load reduction targets for all Queensland regions in lieu of modelling. It is intended to provide a bio-retention swale along the edge of the hardstand areas to treat runoff from all of the impervious site areas (See Sheet D14.034-02 for details).

4. Conclusion

The proposed development will increase the impervious area of the site and will require both quantity and quality management of the stormwater discharge. It is proposed to manage this through pavement detention to the proposed hardstand storage area, and to provide bio-retention swale to treat the runoff from the impervious areas.

Rob Jones

For and On Behalf of

Dileigh Pty Ltd

STORM WATER MANAGEMENT PLAN
LOT 35 MALONEY ST KAWANA
G & J HEAZLEWOOD

LOT 35 ON SP263881
PARISH OF MURCHISON
D14.034

SITE PLAN
(Not To Scale)

EXISTING LEVELS AND SERVICES

1. THE CONTRACTOR SHALL VERIFY THE LOCATIONS AND LEVELS OF ALL EXISTING SERVICES WITH THE RELEVANT AUTHORITIES INCLUDING "DIAL BEFORE YOU DIG" PRIOR TO COMMENCING CONSTRUCTION. ANY COSTS ASSOCIATED WITH REPAIRING DAMAGE TO EXISTING SERVICES SHALL BE PAID FOR BY THE CONTRACTOR.
2. THE CONTRACTOR SHALL VERIFY THAT THE EXISTING LEVELS ARE AS PER THIS DESIGN WHERE CONNECTIONS TO EXISTING INFRASTRUCTURE ARE REQUIRED. ANY DIFFERENCES TO BE NOTIFIED TO THE ENGINEER PRIOR TO ORDERING MATERIALS OR COMMENCING ANY WORKS.
3. PRIOR TO COMMENCING WORKS THE CONTRACTOR SHALL VERIFY THAT THERE ARE NO CLASHES BETWEEN ANY CROSSING SERVICE OR PIPELINE. ANY CLASHES TO BE NOTIFIED TO THE ENGINEER PRIOR TO WORKS COMMENCING.
4. PRIOR TO COMMENCING WORKS THE CONTRACTOR SHALL VERIFY LOCATION AND DETAILS OF ALL EXISTING SERVICE CONNECTIONS TO NEW ALLOTMENTS PREVIOUSLY INSTALLED

CIVIL WORKS DRAWING INDEX

SH.	DWG. No.	DRAWING TITLE
1	D14.034-00	COVER SHEET & SITE PLAN
2	D14.034-01	PROPOSED SITE PLAN
3	D14.034-02	STORMWATER MANAGEMENT PLAN
4	D14.034-03	STORMWATER CALCULATIONS

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LEGEND

- PROPOSED COMPACTED GRAVEL ROADBASE
- PROPOSED CONCRETE DRIVEWAY
- PROPOSED LANDSCAPING
- PROPOSED FENCE

N

LOT 36 SP263881

150mm HIGH BARRIER KERB

PP

telstra

EMT F

MALONEY STREET

LOT 35 SP263881

PROPOSED LOW IMPACT INDUSTRIAL SHED

BINS

BINS

BINS

1 2 3 4 5 6 7 8 9 10 11 12 13

12.0

12.0

11.5

11.5

11.5

11.5

LOT 42 SP263881

A

150mm HIGH BARRIER KERB

11.0

11.0

10.5

10.5

10.0

9.5

ALEXANDRA STREET

ALEXANDRA ST EDGE OF BITUMEN

EXISTING SURFACE

10.500

1 in 8 MAX

PROPERTY BOUNDARY

1.3m

11.500

8.0m

SECTION A

SCALE

0 1.25 2.5 3.75 5

DESCRIPTION

1:250

REV	REVISION	DATE
A	MCU APPLICATION	05/2014

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Checked by	RAJ
Approved	GEOFF SIMMERS
RPEQ	4585
Sign	9/5/14

G&J HEAZLEWOOD

STORM WATER MANAGEMENT PLAN

LOT 35 MALONEY ST KAWANA

PROPOSED SITE PLAN

D14.034-01

SHEET 1 OF 3

A

LEGEND

- Proposed Stormwater Flow Path
- Bio-Retention Swale
- 100mm Ø Socked Slotted Pipe
- 0.5% Proposed Pavement Grade

N

LOT 36 SP263881

Q100 AREA OF INUNDATION
510m²
36.2m³
MAXIMUM DEPTH OF 142mm

PP

telstra

MALONEY STREET

EMT F

TOP OF BUND

100mmØ uPVC SUBSOIL DRAINAGE LINE @ 1.0% TO ROAD RESERVE

STORMWATER DISCHARGE CONTROLLED BY 7 x 200 WIDE BREAKS IN KERB. REFER TO DWG D14.034-03 FOR CALCULATIONS

BINS

LOT 35 SP263881

PROPOSED LOW IMPACT INDUSTRIAL SHED

LOT 42 SP263881

1.5m WIDE BIO-RETENTION SWALE (PROVIDING 50m² BIO-RETENTION AREA = 1.5% OF TOTAL DEVELOPMENT IN ACCORDANCE WITH THE STATE PLANNING POLICY).

PROVIDE FROG-FLAP AND GROUTED ROCK PROTECTION TO BIO RETENTION SUBSOIL PIPE OUTLET

0.5% 1.0% 11.5 12.0 10.5 10.0 9.5 50

Q= F*C*I*A

PRE DEVELOPED TC= 7.5-11 min

0.311802 ha

AreaA	F sq kms	C co eff	I mm/hr	A sq kms	Q m3/sec
Q2	0.278	0.595	105	0.00312	0.054
Q5	0.278	0.665	137	0.00312	0.079
Q10	0.278	0.7	163	0.00312	0.099
Q50	0.278	0.805	245	0.00312	0.171
Q100	0.278	0.84	284	0.00312	**0.206**

Fi	0.000	
$^1I_{10}$	64	mm/hr
C_{10}	0.7	

POST DEVELOPED TC= 5 min

0.311802 ha

AreaA	F sq kms	C co eff	I mm/hr	A sq kms	Q m3/sec
Q2	0.278	0.73695	136	0.00312	0.087
Q5	0.278	0.82365	177	0.00312	0.126
Q10	0.278	0.867	203	0.00312	0.153
Q50	0.278	0.99705	284	0.00312	0.245
Q100	0.278	1	321	0.00312	**0.278**

Fi	0.890	
$^1I_{10}$	64	mm/hr
C_{10}	0.867	

COMPARING Q100 FLOWS PRE-TREATMENT		
PRE DEV.	0.206	m3/sec
POST DEV	0.278	m3/sec
EQUALS	35.21 % INCREASE IN MAJOR FLOWS	

COMPARING Q5 FLOWS PRE-TREATMENT		
PRE DEV.	0.079	m3/sec
POST DEV	0.126	m3/sec
EQUALS	60.02 % INCREASE IN MINOR FLOWS	

COMPARING Q100 FLOWS POST TREATMENT		
PRE DEV.	0.206	m3/sec
POST DEV	0.155	m3/sec
EQUALS	24.47 % DECREASE IN MAJOR FLOWS	

COMPARING Q5 FLOWS POST TREATMENT		
PRE DEV.	0.079	m3/sec
POST DEV	0.076	m3/sec
EQUALS	4.30 % DECREASE IN MAJOR FLOWS	

SCALE

0 1.25 2.5 3.75 5 1:250

DESCRIPTION

REV	REVISION	DATE
A	MCU APPLICATION	05/2014

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Drawn by	CET
Checked by	RAJ
Approved	GEOFF SIMMERS
RPEQ 4585	Sign 9/5/14

G&J HEAZLEWOOD
STORM WATER MANAGEMENT PLAN
LOT 35 MALONEY STREET, KAWANA
STORM WATER MANAGEMENT PLAN

D14.034-02

SHEET 2 OF 3

A

Q100 Pre-Developed Kinematic Wave Equation

L			S	tc	$tc = \frac{6.94(L.n)^{0.6}}{I^{0.4}.S^{0.3}}$
m	n	I	m/m	minutes	
50	0.091	277	0.01	7.23	

Adopt 7.5 minutes

Q100 Post-Developed Kinematic Wave Equation Concrete

L			S	tc	$tc = \frac{6.94(L.n)^{0.6}}{I^{0.4}.S^{0.3}}$
m	n	I	m/m	minutes	
35	0.013	321	0.005	2.11	

Q100 Post-Developed Kinematic Wave Equation Gravel

L			S	tc	$tc = \frac{6.94(L.n)^{0.6}}{I^{0.4}.S^{0.3}}$
m	n	I	m/m	minutes	
15	0.03	321	0.005	2.09	

Q5 Pre-Developed Kinematic Wave Equation

L			S	tc	$tc = \frac{6.94(L.n)^{0.6}}{I^{0.4}.S^{0.3}}$
m	n	I	m/m	minutes	
50	0.1	137	0.01	10.14	

Adopt 10 minutes

Q5 Post-Developed Kinematic Wave Equation Concrete

L			S	tc	$tc = \frac{6.94(L.n)^{0.6}}{I^{0.4}.S^{0.3}}$
m	n	I	m/m	minutes	
35	0.013	177	0.005	2.67	

Q5 Post-Developed Kinematic Wave Equation Gravel

L			S	tc	$tc = \frac{6.94(L.n)^{0.6}}{I^{0.4}.S^{0.3}}$
m	n	I	m/m	minutes	
15	0.03	177	0.01	2.16	

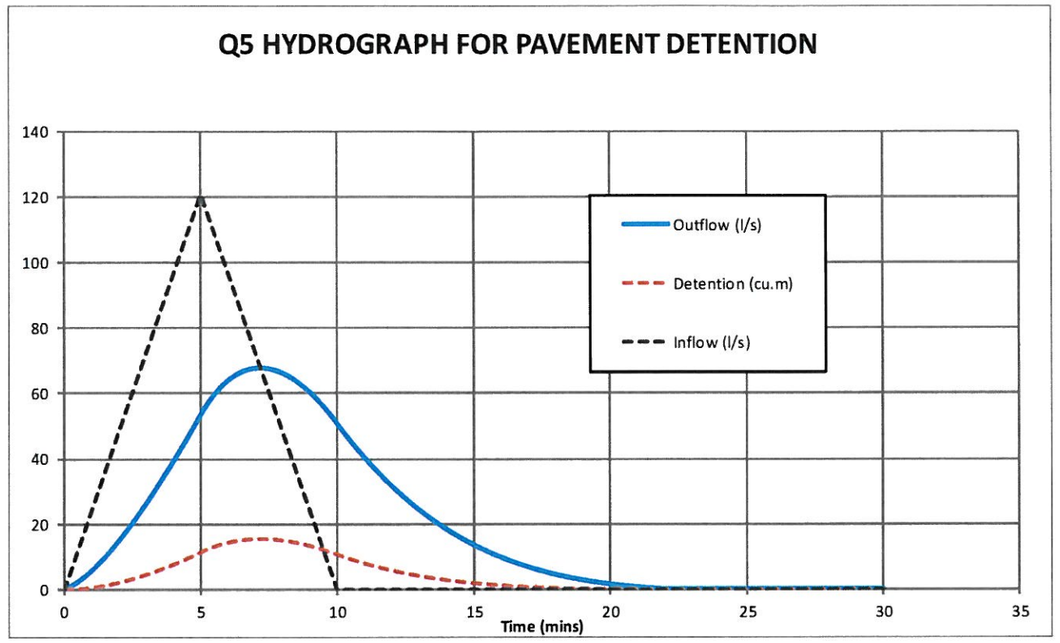
Adopt 5 minutes

Detained Catchment - ENTIRE SITE EXCEPT LANDSCAPING TC= 5 min

0.2868 ha

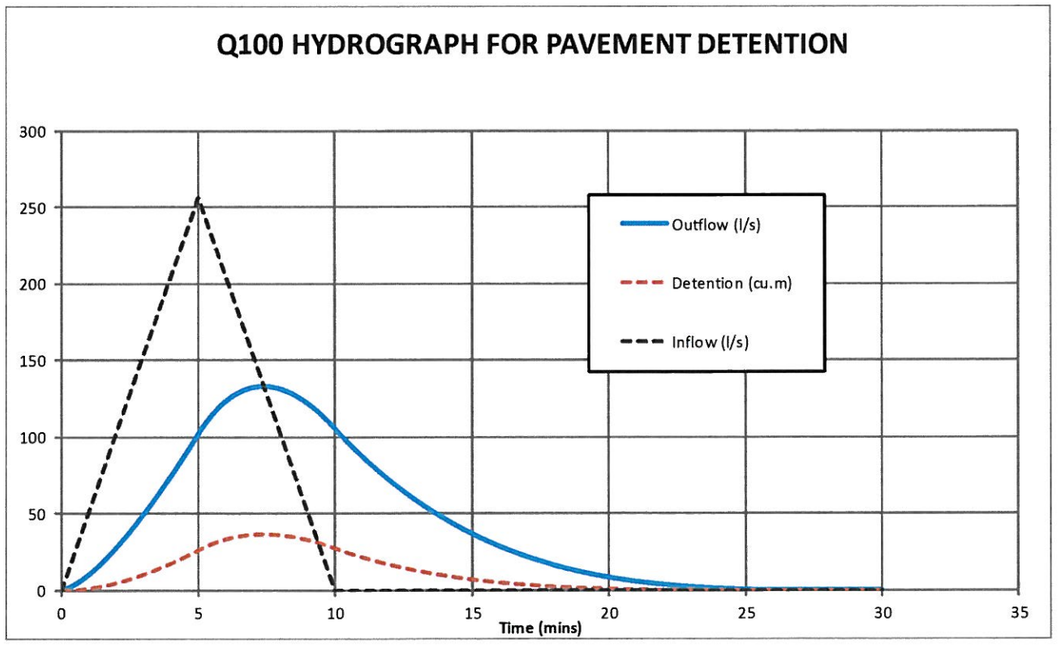
C1	F sq kms	C co eff	I mm/hr	A sq kms	Q m3/sec
Q2	0.278	0.765	136	0.00287	0.083
Q5	0.278	0.855	177	0.00287	0.121
Q10	0.278	0.9	203	0.00287	0.146
Q20	0.278	0.945	237	0.00287	0.179
Q50	0.278	1	284	0.00287	0.226
Q100	0.278	1	321	0.00287	**0.256**

Fi	1.000	
$^1I_{10}$	71	mm/hr
C_{10}	0.9	



Q5 HYDROGRAPH FOR PAVEMENT DETENTION

TIME (sec)	INFLOW (Cu.mecs)	OUTFLOW (Cu.Mecs)	Detention (l)
60	0.024	0.006	592.2
120	0.048	0.015	2185.0
180	0.072	0.026	4604.0
240	0.097	0.039	7732.6
300	0.121	0.054	11487.6
360	0.097	0.064	14429.4
420	0.072	**0.068**	**15504.4**
480	0.048	0.066	15068.3
540	0.024	0.060	13404.8
600	0.000	0.051	10754.9
660	0.000	0.040	8020.0
720	0.000	0.032	5861.8
780	0.000	0.024	4186.2
840	0.000	0.018	2908.8
900	0.000	0.014	1955.2
960	0.000	0.010	1260.2
1020	0.000	0.007	768.4
1080	0.000	0.004	433.3
1140	0.000	0.003	216.6
1200	0.000	0.002	87.5
1260	0.000	0.001	21.6
1320	0.000	0.000	0.3
1380	0.000	0.000	0.0
1440	0.000	0.000	0.0
1500	0.000	0.000	0.0
1560	0.000	0.000	0.0
1620	0.000	0.000	0.0
1680	0.000	0.000	0.0
1740	0.000	0.000	0.0
1800	0.000	0.000	0.0



Q100 HYDROGRAPH FOR PAVEMENT DETENTION

TIME (sec)	INFLOW (Cu.mecs)	OUTFLOW (Cu.Mecs)	Detention (l)
60	0.051	0.010	1311.9
120	0.102	0.027	4860.3
180	0.154	0.049	10298.4
240	0.205	0.074	17399.9
300	0.256	0.102	25992.1
360	0.205	0.123	32972.8
420	0.154	**0.132**	**35974.7**
480	0.102	0.131	35665.4
540	0.051	0.122	32594.8
600	0.000	0.106	27227.1
660	0.000	0.087	21438.2
720	0.000	0.072	16668.2
780	0.000	0.058	12774.6
840	0.000	0.047	9632.5
900	0.000	0.037	7130.3
960	0.000	0.029	5167.6
1020	0.000	0.022	3654.0
1080	0.000	0.016	2509.0
1140	0.000	0.012	1661.5
1200	0.000	0.008	1050.5
1260	0.000	0.006	623.7
1320	0.000	0.004	338.1
1380	0.000	0.002	158.2
1440	0.000	0.001	55.9
1500	0.000	0.000	9.0
1560	0.000	0.000	0.0
1620	0.000	0.000	0.0
1680	0.000	0.000	0.0
1740	0.000	0.000	0.0
1800	0.000	0.000	0.0

SCALE

0 1.25 2.5 3.75 5 1:250

DESCRIPTION

REV	REVISION	DATE
A	MCU APPLICATION	05/2014

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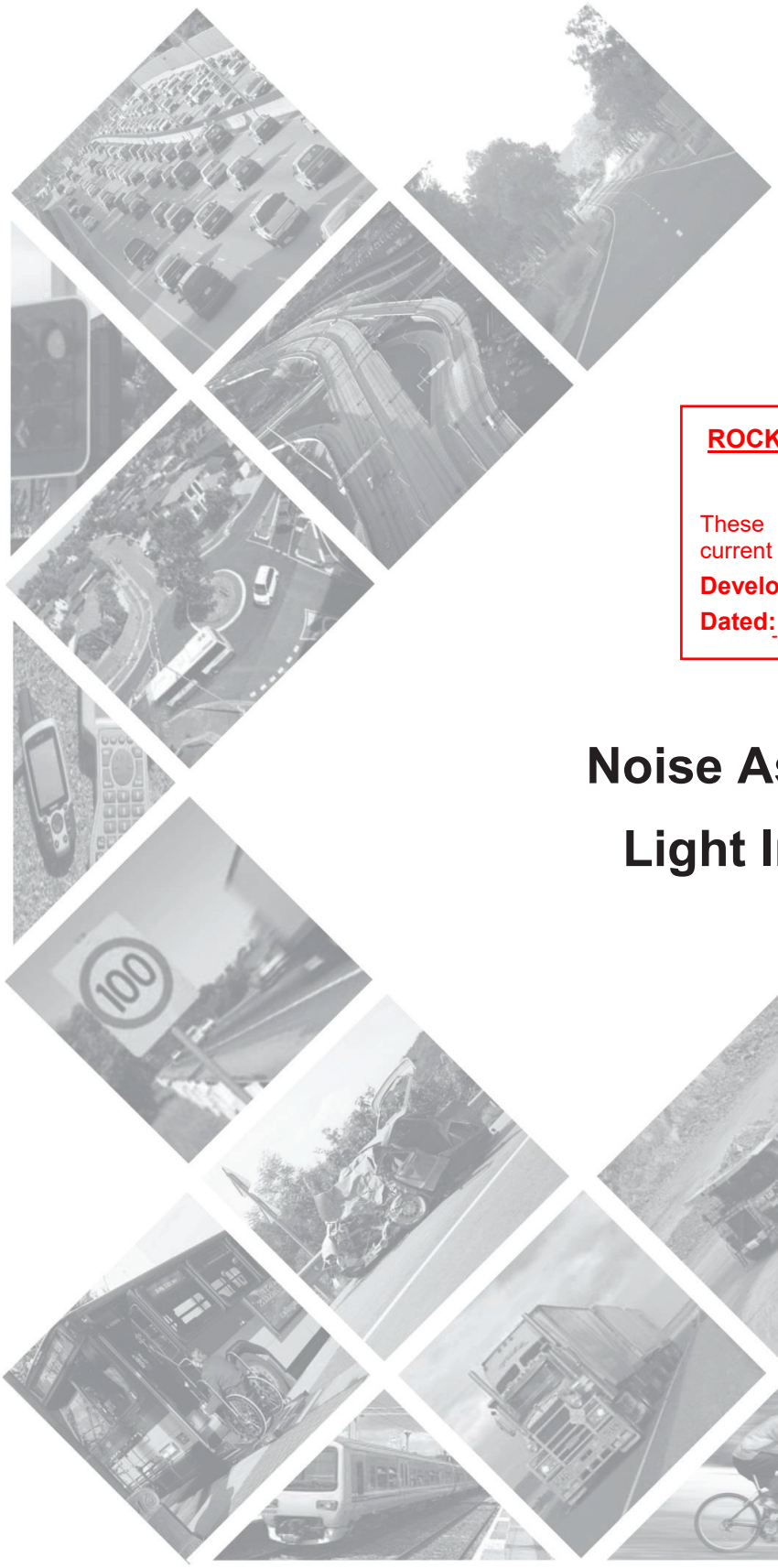
STORMWATER MANAGEMENT PLAN
LOT 35 MALONEY ST, KAWANA
STORM WATER CALCULATIONS

D14.034-03

SHEET 3 OF 3

A



RoadPro ACOUSTICS

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Development Permit No.: D/92-2017

Dated: 8 November 2018

Noise Assessment Report

Light Industry Operation

151 Maloney St

Kawana

Report 1109R1-D1

24 November 2017

Document control

Report 1109R1-D1

Version history:

Version no.	Date	Changed by	Nature of amendment
Draft 1	6-Sep-17	JC	Initial draft
Revision 0	24-Nov-17	JC	Final report

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Appendix A – Logger Measured Noise Levels

1 Introduction

RoadPro Acoustics was engaged by GM & JA Heazlewood Pty Ltd to assess the noise emissions from a radiator repair and reconditioning workshop (Light Industry) at 151 Maloney St, Kawana (the Site).

The Site location is shown in **Figure 1**.

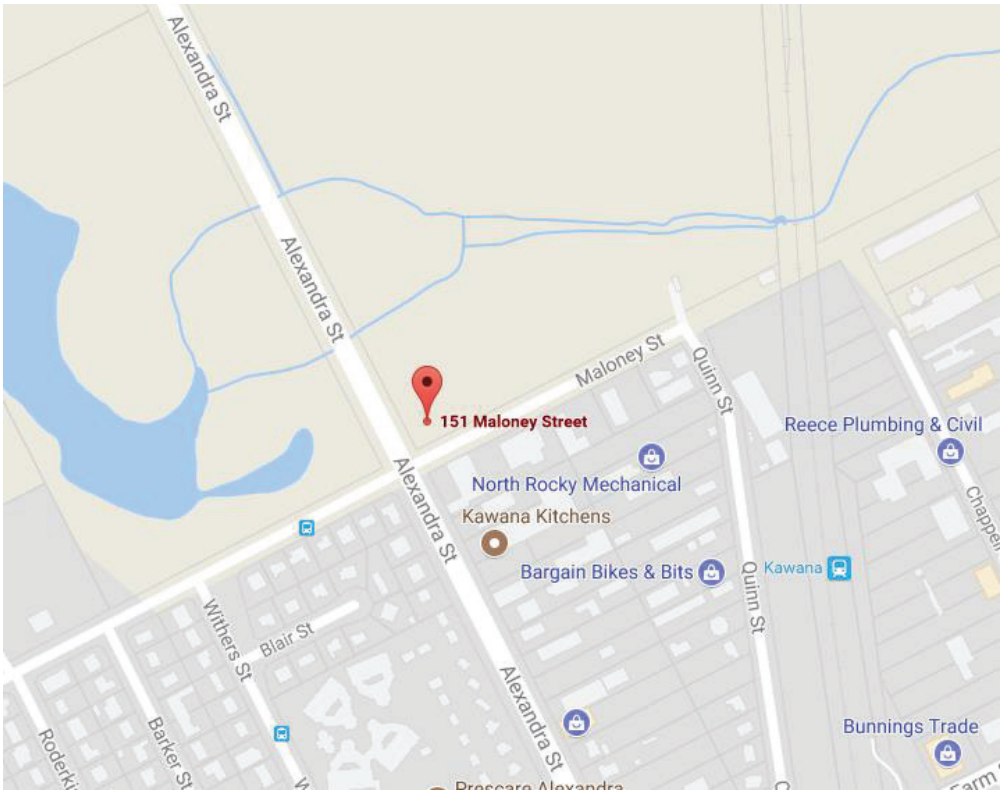

Figure 1: Site Location – 151 Maloney St, Kawana

The site is located at an interface between commercial/light industrial to the north and south, and residential uses approximately 50 m to the south-west. The location of surrounding land uses is shown in **Figure 2**.

The Site is approved to operate from 6am – 7pm Monday to Friday, with some minor activities sometimes occurring on Saturday morning.

It is proposed to extend the operating hours of the Site until midnight. Noise emissions during the extended operating hours are the focus of this Noise Assessment.

Figure 2: Site and Surrounding Land Uses – 48 McBean St, Yeppoon

2 Noise Criteria

2.1 Environmental Protection Act 1994

The *Environmental Protection Act 1994* specifies criteria for *regulated devices*, pumps and air conditioning plant as follows:

440S Regulated Devices

(1) This section applies to—

(a) a person carrying out an activity other than building work; and

(b) a person carrying out building work, at premises used by the person only for residential purposes, other than under an owner-builder permit.

(2) A person must not operate a regulated device in a way that makes an audible noise—

(a) on a business day or Saturday, before 7.00a.m. or after 7.00p.m; or

(b) on any other day, before 8.00a.m. or after 7.00p.m.

…

***regulated device** means any of the following—*

(a) a compressor;

(b) a ducted vacuuming system;

(c) a generator;

(d) a grass-cutter;

(e) an impacting tool;

(f) a leaf-blower;

(g) a mulcher;

(h) an oxyacetylene burner;

(i) an electrical, mechanical or pneumatic power tool.

Examples of a power tool—chainsaw, drill, electric grinder or sander, electric welder, nail gun

440T Pumps

(1) This section applies to premises at or for which there is a pump.

(2) An occupier of the premises must not use, or permit the use of, the pump on any day—

(a) before 7a.m, if it makes an audible noise; or

(b) from 7a.m. to 7p.m, if it makes a noise of more than 5dB(A) above the background level; or

(c) from 7p.m. to 10p.m, if it makes a noise of more than 3dB(A) above the background level; or

(d) after 10p.m, if it makes an audible noise.

(3) Subsection (2)(a), (c) and (d) do not apply to a noise made at an educational institution, that is not more than 5dB(A) above the background level.

(4) In this section— Pump —

(a) means an electrical, mechanical or pneumatic pump; and

Examples — liquid pump, air pump, heat pump

(b) includes a swimming pool pump and a spa blower.

440U Air-conditioning equipment

(1) This section applies to premises at or for which there is air-conditioning equipment.

(2) An occupier of the premises must not use, or permit the use of, the equipment on any day—

(a) before 7a.m, if it makes a noise of more than 3dB(A) above the background level; or

(b) from 7a.m. to 10p.m, if it makes a noise of more than 5dB(A) above the background level; or

(c) after 10p.m, if it makes a noise of more than 3dB(A) above the background level.

2.2 Environmental Protection (Noise) Policy 2008

The *Environmental Protection (Noise) Policy 2008* (EPP(Noise)) provides guidance for controlling noise in Queensland. The EPP(Noise) lists the hierarchy of preferred noise control as follows:

1. Avoid producing the noise,
2. Minimise the noise, and
3. Manage the noise.

The control of background creep (the incremental increase in noise levels over time as development intensity increases) is achieved by:

1. Limiting continuous noise (measured as the $L_{A90,T}$[1]) from new developments to a level that does not exceed the pre-existing $L_{A90,T}$, and
2. Limiting time-varying noise (measured as the $L_{Aeq,adj,T}$[2]) to a level that does not exceed the pre-existing $L_{A90,T}$ by more than 5 dB(A)[3].

2.3 Summary of Criteria

The applicable noise criteria from Queensland environmental legislation for the site can be summarised as follows:

1. Before 7am and after 7pm on business days and Saturday:
    a. No audible noise from cleaning, repair or fabricating works (including compressors)
    b. No audible noise from pumps
    c. Air conditioning plant ≤ 3 dB(A) above background noise level
2. 7am to 7pm on business days and Saturday:
    a. Overall noise from fabricating works ≤ 5 dB(A) above background noise level

3 Measurements

3.1 Background Noise

Background noise measurements were carried out near the site from 9 August 2017 to 15 August 2017 at the location shown in **Figure 3**. The measurement location is considered to be representative of background noise levels surrounding the site, but was not affected by noise from the site itself.

The measurements were carried out using a Rion NL-21 (serial no. 718) recording "fast" response A-weighted sound levels at 15-minute intervals, with the microphone at a height of approximately 1.2 m. Weather data for the duration of the survey was obtained from the Bureau of Meteorology automatic weather station at Yeppoon, and conditions were generally fine and suitable for noise monitoring. The noise monitoring was extended to 10 days after a few days of elevated wind speeds during the week were noted.

The instrument was checked for calibration prior to and post-measurement using a 94 dB acoustic signal at 1000 Hz, and drift in calibration remained within ±0.5 dB.

Site notes are provided in **Table 1**, and a summary of the logged data over the week is provided in **Table 2**. The measurement data is provided in **Appendix B**.

[1] $L_{A90,T}$ means the A-weighted sound pressure level, obtained using time-weighting 'F', that is exceeded for 90% of the measuring period (T).
[2] $L_{Aeq,adj,1hr}$ means an A-weighted sound pressure level of a continuous steady sound, adjusted for tonal character, that within a 1 hour period has the same mean square sound pressure of a sound that varies with time.
[3] dB(A) means decibels measured on the 'A' frequency weighting network.

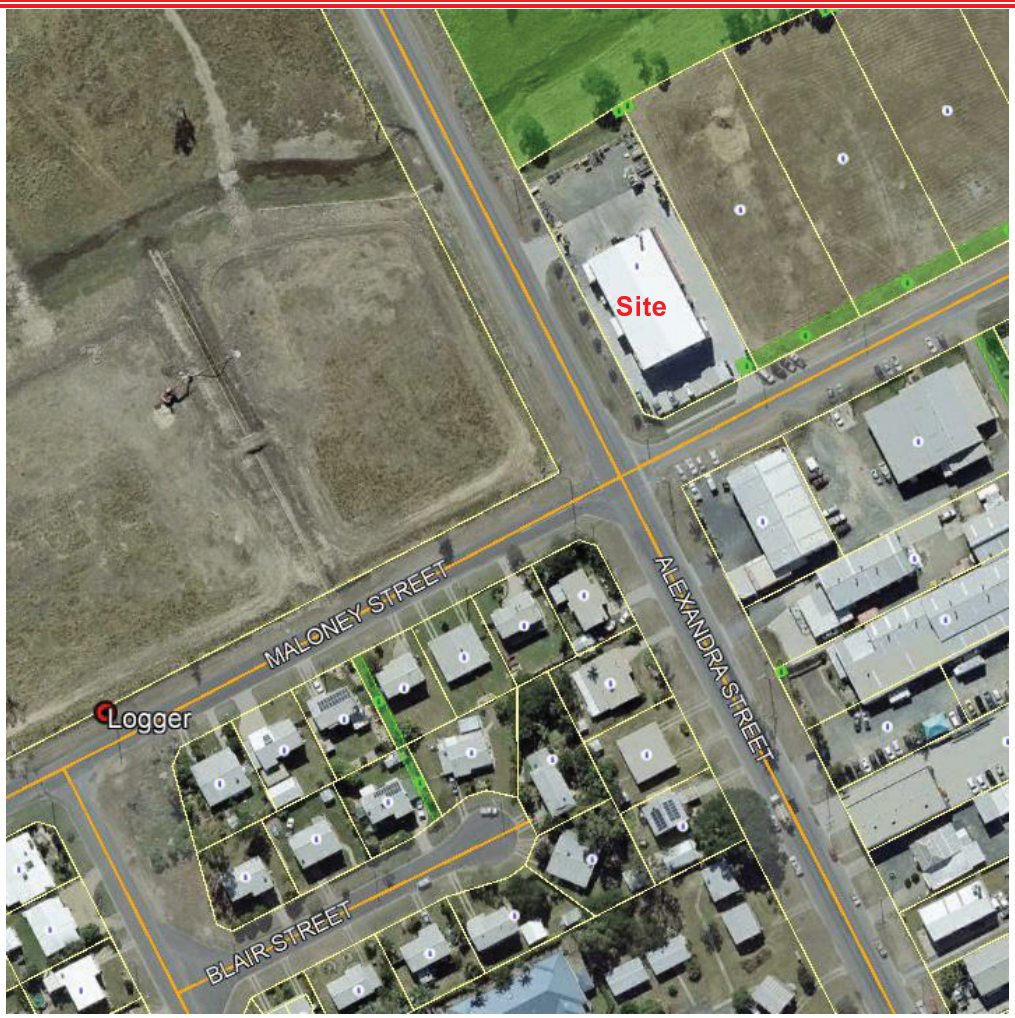

Figure 3: Noise Logger Location

Table 1 Background Noise Notes

Road traffic on Alexandra St dominant
Some traffic on Maloney St
Occasional pedestrian

Table 2 Logger Noise Measurement Results

		Measured Sound Level, dBA					
Day	**Period**	**L_{Aeq}**	**L_{Amax}**	**L_{Amin}**	**L_{A1}**	**L_{A10}**	**L_{A90}**
9-Aug-17	Evening	48.0	68.6	33.0	58.4	47.6	33.0
	Night	47.3	62.5	34.3	54.2	45.7	32.4
10-Aug-17	Day	54.8	74.5	39.3	65.8	54.5	39.3
	Evening	50.8	67.9	41.2	57.1	50.0	35.7
	Night	47.5	62.5	33.3	53.1	44.2	31.0
11-Aug-17	Day	54.3	75.0	36.0	65.8	53.3	35.9
	Evening	51.7	68.8	41.6	59.2	50.7	38.0
	Night	44.6	62.3	31.8	53.1	43.7	31.1
12-Aug-17	Day	51.8	70.9	33.4	63.1	51.7	34.2
	Evening	51.3	65.8	43.1	57.0	50.6	38.9
	Night	44.2	60.4	30.8	50.7	42.0	30.1
13-Aug-17	Day	49.7	70.4	29.6	61.3	47.9	30.6
	Evening	52.5	69.4	42.4	58.6	50.6	39.2
	Night	46.3	62.2	32.2	52.1	42.9	29.8
14-Aug-17	Day	53.4	74.1	35.0	65.1	51.7	34.4
	Evening	54.1	68.0	46.5	59.7	55.2	45.3
	Night	48.4	62.4	34.7	54.9	46.9	32.0
15-Aug-17	Day	53.7	74.3	35.3	65.0	51.9	33.7
	Overall						
	Day	53	73	35	64	52	35
	Evening	52	68	43	58	51	39
	Night	46	62	33	53	44	31

Notes: The L_{A90} is the lowest 10th percentile of the $L_{A90(15\text{-}minute)}$ measurements for the respective time period. The Rating Background Noise Level is the lowest 10th percentile of the background noise levels measured for each time period.
The L_{Aeq} is the logarithmic average of the $L_{Aeq(15\text{-}minute)}$ measurements for the respective time period.
Other parameters are simple arithmetic averages of the measured noise levels for the respective time periods.

The daytime L_{A90} at the residences nearest to the site is expected to be dominated by road traffic noise from Alexandra Street, and will be much greater than the background noise level measured. However, this assessment is focussed on the evening and night-time periods for which Site operations are proposed, and there is no requirement to comment on daytime noise levels.

The $L_{A90(evening)}$ is erroneous, and likely due to insects the grass near the logger. Based on the daytime and night-time noise levels, a reasonable assumed L_{A90} for the **evening** period is **33 dB(A)**.

4 Site-Specific Noise Criteria

4.1 General Noise

The general criteria in **Section 2.3** and the measured ambient noise levels in **Section 3** provide site-specific criteria for noise from the site as shown in **Table 3**.

Table 3 Site-Specific Criteria for Commercial Use

	General Criterion	Measured LA90	Site-Specific Criterion
Evening (6 pm – 10 pm)	$L_{Aeq,\ adj}$ ≤ *background level LA90 + 10dB(A)*	36 dB	33 + 5 = 38 dB(A)
Night (10 pm – 6 am)	$L_{Aeq,\ adj}$ ≤ *background level LA90 + 5dB(A)*	31 dB	31 + 5 = 36 dB(A)

4.2 Mechanical Plant Noise

4.2.1 Air Conditioners

The general criteria in **Section 2.3** and the measured ambient noise levels in **Section 3** provide site-specific criteria for noise from air conditioners as shown in **Table 4**.

Table 4 Site-Specific Criteria for Air Conditioning Plant

	General Criterion	Measured LA90	Site-Specific Criterion
Evening (6 pm-10 pm)	≤ *background level LA90 + 5dB(A)*	36 dB	33 + 5 = 38 dB(A)
Night (10 pm-6 am)	≤ *background level LA90 + 3dB(A)*	31 dB	31 + 3 = 34 dB(A)

4.2.2 Pumps

The general criteria in **Section 2.3** and the measured ambient noise levels in **Section 3** provide site-specific criteria for noise from pumps as shown in **Table 5**.

Table 5 Site-Specific Criteria for Pumps

	General Criterion	Measured LA90	Site-Specific Criterion
7 am-7 pm	≤ *background level LA90 + 5dB(A)*	35 dB	35 + 5 = 40 dB(A)
7 pm-10 pm	≤ *background level LA90 + 3dB(A)*	33 dB	33 + 3 = 36 dB(A)
10 pm-7 am	*inaudible*	31 dB	31 – 10 = 21 dB(A)

5 Measured Noise Emissions, and Recommendations for Attenuation

5.1 Observations of Noise Emissions

A site visit was carried out on Thursday 31st August 2017 to gain an appreciation for the work carried out at the Site, and specifically identify noise-producing activities.

Workshop operations that produce noise to varying degrees include:

- High-pressure water cleaning of incoming radiators and parts
- Compressed air cleaning
- Sanding (with hand power and pneumatic tools)
- Painting
- Assembly
- Forklift movement of radiators and parts around the site and to different workshop areas

Observations of noise from the Site were carried out on 2 occasions – the evenings of Wednesday 23rd August and Thursday 31st August 2017 at the location shown in **Figure 4**.

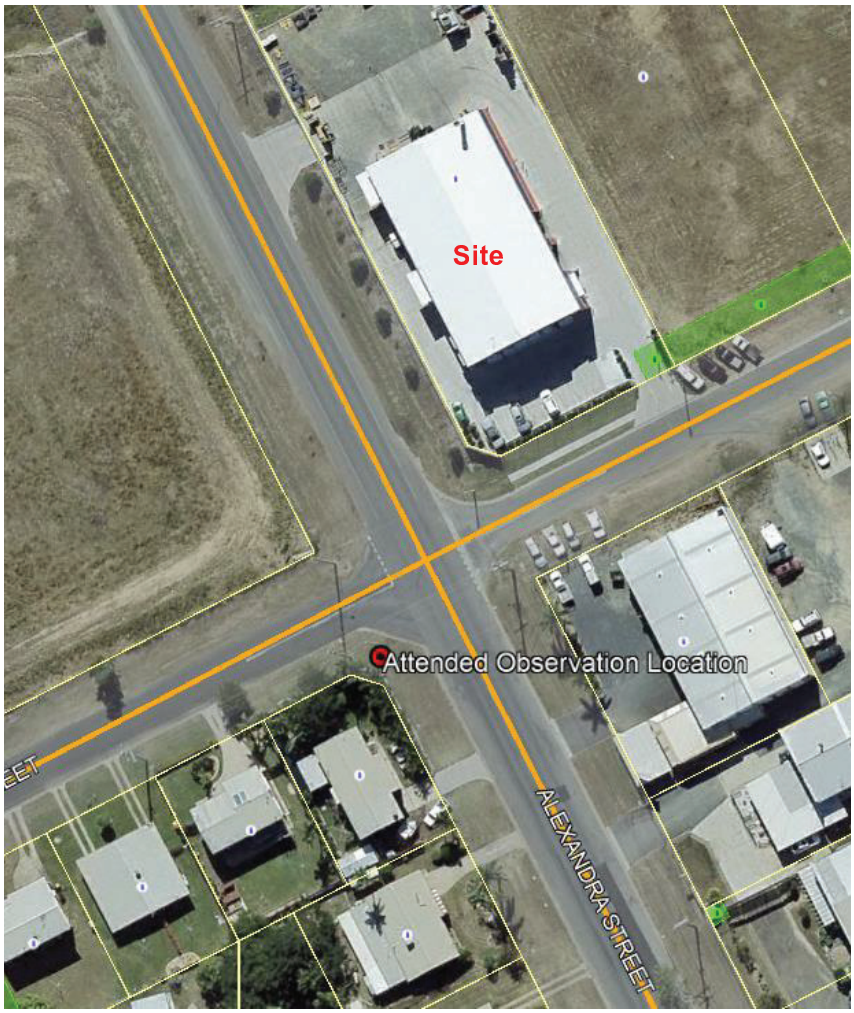

Figure 4 Observation Position for Noise from Site

Notes from the evening of the 23rd August are provided in **Table 6**. However, there was no audible sound from the site on the evening of the 31st August.

Table 6: Observations Near Residence Opposite Site

Source	Sound Level
Insects	45-46 dB(A)
People talking / car start on side street. Vehicle did a burnout	66 dB(A)
Audible voice and window closure (at Site)	
Car pass-by's on Alexandra St	64-76 dB(A)
Constantly running plant audible, but not affecting sound level (at Site)	
Compressed air release (at Site)	**48 dB(A)**
Harley Davidson MB on Alexandra St	78 dB(A)
Beating plant noise – compressor or fan? (at Site)	**46-47 dB(A)**
Truck on Alexandra St	82 dB(A)
Scraping sound, possible something being moved (at Site)	**48-49 dB(A)**
Truck on Alexandra St	68 dB(A)
4x4's on Alexandra St	70-76 dB(A)

Sanding and other general power tool noise can be tonal in nature, and based on observations a +3dB(A) penalty for this noise is appropriate when audible

Impact sounds from the site will attract a similar penalty when audible.

The adjusted noise levels from the site will therefore potentially exceed the criterion (BG + 5 dB(A)) by up to 15 dB(A).

5.2 Complaints

Several complaints have been received by Rockhampton Regional Council regarding the extended operating hours. A detailed assessment of the complaints is beyond the scope of this report. However, it is notable that some of the complaints mention specific sources such as pneumatic tools, impact noises ("banging") and compressor noises.

5.3 Implemented Mitigation Measures

Several notable noise mitigation measures have been implemented at the site, including:

- A procedure to close the roller doors facing the residences during the evening/night,
- A new screw compressor has been purchased to replace the previous noisy unit, and it has been relocated to the north-eastern side of the shed,
- Shipping containers have been purchased to store stock in the adjoining vacant lot. This will eliminate the need to use the forklift at night-time to move stock back into the shed before closing.

5.4 Potential Attenuation Measures

From **Section 2.2**, the hierarchy of preferred noise control is as follows:

1. Avoid producing the noise,
2. Minimise the noise, and
3. Manage the noise.

The complaints received indicate that impact noises and pneumatic equipment are the most significant noise sources, and should be given priority for mitigation.

The most direct approach, at least in the immediate term, is to (re)arrange work programs and site logistics such that the audible noises identified aren't produced after 7 pm i.e. have heavy items requiring the forklift already in place, any required usage of the pneumatic sander already completed etc. Furthermore, until arrangements are completed to store stock in the containers rather than the shed, it is advisable that workshop hours cease at 10pm, so that forklift and associated impact sounds, as well as the sound of roller doors closing, are not heard after 10 pm.

It is, however, considered feasible for the workshop to operate until midnight with appropriate changes in site operations, and implementation of some engineering controls. The solutions here are presented as suggestions.

Impact noises are typically a result of metal pieces dropping or placed on the concrete floor (e.g. by forklift), or pieces of metal striking each other. Work practices to avoid striking metal together and dropping metal can be developed for the evening/night shift. An engineering solution that may be considered is to use a recycled/reused conveyer belt product over the existing concrete in areas where items are commonly dropped or placed by forklift. This has potential to greatly reduce sharp "bangs" to something closer to a "thud", and thereby removing the noise level penalty for impulsiveness, as well as reducing the noise level produced. The flooring would need to be replaced periodically, however it could be readily patched when damage is local. Fire safety around hot work is an obvious consideration required when assessing where this might be feasible.

More significant controls such as partial enclosures with acoustically absorptive lining could be considered for the cleaning area and painting booth. This may also be possible for use of the pneumatic sander, with a mobile partial enclosure.

The above measures and acoustic treatments for the site, among others developed in conjunction with Site staff, will be able to achieve the required reductions in noise to operate for the desired hours. It is recommended that work practice methods, detailed design of engineering solutions, implementation timeframes, and a process for assessing the introduction of new potential noise sources to the site are developed and formalised in a Noise Management Plan.

6 Conclusion and Summary of Recommendations

RoadPro Acoustics has investigated noise emissions from a light industry operation in Maloney St, Kawana.

Background noise measurements were carried out in order to determine appropriate noise criteria for noise emissions from the site. Measurements of noise from the site were also carried out.

It was found that noise from the site exceeds the criteria at residences to the south-west of the site.

A combination of measures including engineering solutions and work practices are recommended to reduce noise emissions from the site to achieve the criteria.

Detailed design of other engineering solutions, as well as work practices adopted to reduce noise, timeframes for implementation, and a process for assessing the introduction of new potential noise sources to the site should be formalised in a Noise Management Plan.

It is recommended that in the immediate term, operating hours cease at 10 pm to eliminate audible noise from the forklift and roller doors during the night. When Site arrangements to store stock in containers, and work arrangements to eliminate audible noise at the residences are completed, the extended operating hours to midnight could be resumed.

Appendix A – Logger Measured Noise Levels

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/9/2017 17:45	56	86.7	36.7	66.8	52.8	42.7
8/9/2017 18:00	49.6	67.8	35.8	61.9	49.9	40.5
8/9/2017 18:15	48.8	67.8	36.8	59.5	50.9	40.7
8/9/2017 18:30	51.6	73.5	38.2	65.1	50.2	41
8/9/2017 18:45	48.7	70.7	36.8	60.9	49.6	40.5
8/9/2017 19:00	44.9	66.2	35.9	52.2	46.9	38.1
8/9/2017 19:15	49.8	75.1	35.5	59	49.3	38.6
8/9/2017 19:30	47	72	34	54.9	46.7	36.3
8/9/2017 19:45	45.6	65.7	30.6	59.6	44.7	34.1
8/9/2017 20:00	44.5	66.6	30.6	56.2	43.5	33.9
8/9/2017 20:15	48.5	71.5	31.2	62.5	45.7	33.7
8/9/2017 20:30	50.5	74	29.7	62.9	49.1	34.2
8/9/2017 20:45	46.4	69.5	29.6	59.3	45.8	32.2
8/9/2017 21:00	49.3	67.8	28.2	62.5	50.4	32.3
8/9/2017 21:15	41.9	54.3	30.6	50	45.7	34.8
8/9/2017 21:30	44.1	64.5	30.7	54.3	47.7	33.7
8/9/2017 21:45	45.7	70.7	33	54	45.2	36.1
8/9/2017 22:00	40.7	56	32.9	49.8	44	35.5
8/9/2017 22:15	40.1	55.7	29.8	53.3	41.2	32.2
8/9/2017 22:30	42.9	64.3	31.6	53	44.4	34.8
8/9/2017 22:45	37.8	52.6	30.8	46.9	40.7	33
8/9/2017 23:00	44.3	71.4	30.2	51.3	39.3	32.4
8/9/2017 23:15	44.6	69.7	30.8	55	41.7	32.8
8/9/2017 23:30	36.8	52	30.6	45	39.1	32.9
8/9/2017 23:45	39.1	53.8	30.5	50	41.9	33.1
8/10/2017 0:00	38.3	50.2	30	46.7	41.3	33.8
8/10/2017 0:15	42	60.2	30.1	53.6	44.4	33
8/10/2017 0:30	44.8	66.6	27.9	57.1	46.2	31.3
8/10/2017 0:45	43.4	58.2	29.8	53.5	47.6	32.2
8/10/2017 1:00	37.4	51	30.9	47	40.1	32.9
8/10/2017 1:15	43.1	60.4	31.4	54.3	46.5	33.7
8/10/2017 1:30	40.6	54.6	31.2	50.4	43.3	33.3
8/10/2017 1:45	38.5	56.8	31.2	47.5	40.7	33.3
8/10/2017 2:00	42.2	58.9	31.9	56	42.2	34
8/10/2017 2:15	40.7	56.1	31.3	52.6	42.6	32.8
8/10/2017 2:30	38.6	57	30.7	52	38.8	32.4
8/10/2017 2:45	42.4	59.9	31.7	55.2	43.9	33.4
8/10/2017 3:00	47.5	70.4	34.9	58.5	48	37.6
8/10/2017 3:15	41.4	60.2	31.1	51	43.4	34.4
8/10/2017 3:30	42.8	63.3	33.2	51.8	44.2	35.6
8/10/2017 3:45	41.3	59.5	33	51.8	43.1	35.8
8/10/2017 4:00	47.8	73.7	35.1	57.1	46.9	37.8
8/10/2017 4:15	44.9	58	35.2	53.6	48.7	38.1
8/10/2017 4:30	46.2	63	37.9	54.1	49.3	40.2
8/10/2017 4:45	44.5	64.2	37.7	52.4	46.3	40.2

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/10/2017 5:00	47.7	66.8	39.3	55.5	49.5	41.9
8/10/2017 5:15	48.7	68.3	41.1	57.9	49.8	43.8
8/10/2017 5:30	51.1	69.9	41.9	59.7	52.8	44.9
8/10/2017 5:45	54.9	79.1	43.7	66.5	54.4	46.8
8/10/2017 6:00	51.5	66.2	43.6	58.2	53.8	46.7
8/10/2017 6:15	52.9	76.3	43.9	64.4	53.6	47.1
8/10/2017 6:30	52.9	73.4	43.8	62.8	54.2	46.9
8/10/2017 6:45	54.4	72	44.4	64.2	56.2	48.9
8/10/2017 7:00	59.2	84.4	45.2	68.4	60	48.8
8/10/2017 7:15	51.8	72.1	43.9	61.6	52.1	46.3
8/10/2017 7:30	55.7	77	43.5	69.1	54.9	45.7
8/10/2017 7:45	52.1	69.1	43.6	64.6	52.9	45.4
8/10/2017 8:00	54.8	77.9	42.6	68.2	51.3	44.5
8/10/2017 8:15	55.3	77.2	42.1	67.4	56.1	44.1
8/10/2017 8:30	52.6	71.6	39.6	64.7	55	42.2
8/10/2017 8:45	54.1	74.8	37.2	66.3	55.2	40.5
8/10/2017 9:00	52.8	74.2	34.9	66.4	53	38.3
8/10/2017 9:15	55.9	76.5	36.3	67.1	58	39.2
8/10/2017 9:30	61.4	77	38.1	69.3	64.7	48.8
8/10/2017 9:45	55.4	70.2	33.4	66.7	59.6	38
8/10/2017 10:00	52.7	79.3	33.2	64.7	52.2	36.9
8/10/2017 10:15	51.5	70.3	36	64.2	53.1	39
8/10/2017 10:30	56.6	75.8	36.4	70.3	55.4	40.4
8/10/2017 10:45	52.2	71	38.1	64.3	53.3	42.6
8/10/2017 11:00	50.4	67.9	39.3	61	52.4	42.9
8/10/2017 11:15	52.6	70.2	39.3	64.9	53.9	43.2
8/10/2017 11:30	53.8	74	37.9	66.2	54.3	42.9
8/10/2017 11:45	54.3	76.7	39.8	66.6	53.6	43.9
8/10/2017 12:00	49.1	69	36.9	61.7	49.3	41.7
8/10/2017 12:15	50.6	69.1	37.2	63.3	52.2	40.4
8/10/2017 12:30	54.4	77	36.1	67.3	52.3	40.3
8/10/2017 12:45	50	69.7	35.3	63	50.6	39.4
8/10/2017 13:00	50	65.9	39.2	61.5	51.7	43
8/10/2017 13:15	48.4	68.2	38.8	56.8	50.6	42.7
8/10/2017 13:30	54.4	74.5	37.9	67.9	54.4	42.6
8/10/2017 13:45	53.1	76.6	36.9	64	53.9	41.6
8/10/2017 14:00	57.9	83.2	42.8	69.2	57	47.7
8/10/2017 14:15	52.9	74.2	40	63.5	53.2	44.4
8/10/2017 14:30	56.9	78.6	40	70.6	55.3	45.8
8/10/2017 14:45	55.1	77.7	39.6	65.6	54.5	45.1
8/10/2017 15:00	56	80.7	42.4	67.3	55.5	46.3
8/10/2017 15:15	53	69.3	41.9	63.9	55.3	45.7
8/10/2017 15:30	54.6	76.4	42.5	66.8	55.1	46.8
8/10/2017 15:45	53	69.9	40.8	64.2	54.5	46
8/10/2017 16:00	56.5	79.2	41.1	67.7	56.7	46.2
8/10/2017 16:15	55.6	77.7	39	66.2	54.9	45.2
8/10/2017 16:30	57	78.1	41.1	69.7	57.1	45.5

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/10/2017 16:45	55.1	75.9	40.9	68.7	54.2	45.4
8/10/2017 17:00	54.9	80.8	41.3	66.6	54.5	45.6
8/10/2017 17:15	50.5	65.8	39.8	61	52.6	43.8
8/10/2017 17:30	56.9	77.7	36.1	70.9	55.5	42.6
8/10/2017 17:45	54.6	76.1	39.7	66.2	56	45.1
8/10/2017 18:00	54.7	68.5	40.7	65.2	56.4	45.9
8/10/2017 18:15	53.4	67.3	48.3	60.7	54.8	50.9
8/10/2017 18:30	52.9	69.1	47.4	61.3	53.1	50.3
8/10/2017 18:45	51.4	67.8	45.2	58.1	52.3	48.8
8/10/2017 19:00	51.5	69.7	47.3	56.3	53.7	49.6
8/10/2017 19:15	54.3	82.7	45.7	60.5	52.6	47.7
8/10/2017 19:30	50.8	69.8	45.5	58.4	50.8	47.8
8/10/2017 19:45	50.2	69.5	43.6	58.4	51	46.3
8/10/2017 20:00	51.4	72.4	43.1	60.2	52.5	46
8/10/2017 20:15	50.1	70.4	39.9	61.9	50.3	42.9
8/10/2017 20:30	47.1	63.9	40.1	54.1	48.6	43.6
8/10/2017 20:45	46	57.9	38.3	51.7	48.4	42.1
8/10/2017 21:00	47	74.6	35.7	57.3	46.7	37.9
8/10/2017 21:15	42.5	62.7	32.9	51.6	45	35.6
8/10/2017 21:30	41.3	63.4	33.9	49.3	41	35.8
8/10/2017 21:45	40.3	57.3	32.3	49.3	42.7	35.3
8/10/2017 22:00	43.3	67	32.9	49.9	43	35.6
8/10/2017 22:15	47.2	70.5	32.6	60	44.7	35.7
8/10/2017 22:30	43.6	68.4	33.7	52.3	40.8	35.8
8/10/2017 22:45	41.3	60.6	33.5	52.9	43.6	35.1
8/10/2017 23:00	40.5	54.9	31.9	50.4	42.9	34.9
8/10/2017 23:15	38.7	53.2	32.3	48.1	40.7	34.8
8/10/2017 23:30	36.2	56	30.6	44.5	38.3	32.5
8/10/2017 23:45	37.1	57.5	29.8	47.5	37.5	31.7
8/11/2017 0:00	47.9	69.6	30	61.8	45.4	33
8/11/2017 0:15	35.7	51.1	29.4	45.1	38	30.8
8/11/2017 0:30	44.4	66.3	28.4	55.7	44.7	30.7
8/11/2017 0:45	41.5	57.6	30.1	53.3	43.8	32.7
8/11/2017 1:00	37.1	55.2	27.4	49.8	39.4	29.4
8/11/2017 1:15	36.9	59.9	29.3	47.8	38.4	31.3
8/11/2017 1:30	38.4	55	29.4	50.9	39.5	31.7
8/11/2017 1:45	34.9	51.4	29.9	43.2	36.7	32
8/11/2017 2:00	39.5	60	28.4	51.3	40.8	31
8/11/2017 2:15	37	49.5	29.8	46.2	39.2	32
8/11/2017 2:30	41.2	59.6	28.9	53.9	43.4	30.9
8/11/2017 2:45	45.9	72.1	30.3	55	40.7	32.4
8/11/2017 3:00	39.6	67.9	31.3	46.5	40.9	33.1
8/11/2017 3:15	39.3	59.3	29.3	51.3	39.5	31.2
8/11/2017 3:30	41	59.5	31	51.8	43.6	33.4
8/11/2017 3:45	41.9	63.8	29.9	52.9	44.4	32.5
8/11/2017 4:00	38.8	54.3	33	48.7	41	34.6
8/11/2017 4:15	43.5	67.9	32.8	50.3	43.4	35.5

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/11/2017 4:30	43.2	56.3	35	51.9	46.7	37.3
8/11/2017 4:45	46.4	67.3	36.5	53.9	48	38.9
8/11/2017 5:00	45.7	55.7	36.9	53	48.9	40
8/11/2017 5:15	46.6	68.5	37.7	54.1	47.9	40.3
8/11/2017 5:30	47	59.7	39.5	53.7	50.1	42.4
8/11/2017 5:45	53	71.8	41.4	64.5	54	46.3
8/11/2017 6:00	54.8	77.9	42.8	65.6	53.6	45.7
8/11/2017 6:15	52.8	69.6	42.8	64.6	54.4	45.8
8/11/2017 6:30	52.5	71.8	44.8	63.4	54	47.2
8/11/2017 6:45	57.3	82.3	43.7	66.5	59.4	48
8/11/2017 7:00	54.3	75.3	44.1	66.5	54	46.5
8/11/2017 7:15	53	71	42.2	66.2	53.6	44.9
8/11/2017 7:30	59.6	86.3	42.8	71.6	55.5	44.6
8/11/2017 7:45	57.4	82.6	42.1	66.2	54.9	44.2
8/11/2017 8:00	53.5	75.9	41.6	67.7	52.5	43.7
8/11/2017 8:15	55	78.2	39.3	66.1	56.4	42.7
8/11/2017 8:30	55.9	76.3	38.1	69.6	56.5	41
8/11/2017 8:45	55	80.3	36.3	66.3	53.6	39.1
8/11/2017 9:00	52.5	72.6	35.3	66	53.1	38.4
8/11/2017 9:15	53.2	72.8	34.7	65.4	54.4	37.9
8/11/2017 9:30	54.7	77.5	32.1	67.8	54.8	37.2
8/11/2017 9:45	56.3	80.8	32.5	67.4	54.7	35.7
8/11/2017 10:00	51.3	68.7	34.9	63.9	53.4	40.2
8/11/2017 10:15	49.6	71.7	38.4	61.5	49.6	42
8/11/2017 10:30	56.8	77	37.1	71.7	53.9	40.8
8/11/2017 10:45	52.5	76.6	37	62.9	51.3	41.4
8/11/2017 11:00	51.6	73.8	38.8	63.7	49.9	41.1
8/11/2017 11:15	51.8	71.4	35.8	64.8	52.2	39.9
8/11/2017 11:30	55.1	79.7	35.7	67.1	54.4	39.5
8/11/2017 11:45	51.7	70.7	37.2	64.8	52	40.7
8/11/2017 12:00	49.7	71.1	36.9	62.9	49.5	40.3
8/11/2017 12:15	50.4	71.9	37	62.2	50.2	40.5
8/11/2017 12:30	55.3	73.5	32.8	70.5	50.9	37.6
8/11/2017 12:45	52.4	76.1	32.1	63.8	50	37.2
8/11/2017 13:00	48.9	71.2	33	63	47.8	36.6
8/11/2017 13:15	52.1	72.2	30.9	65.9	50.6	35.1
8/11/2017 13:30	54.9	78.8	32.1	67.4	55.5	35.6
8/11/2017 13:45	53.1	77.9	33.4	65.9	52.7	36
8/11/2017 14:00	50.8	71.7	35	64.4	50.9	38
8/11/2017 14:15	54.4	80	32.5	66.3	51.7	35.7
8/11/2017 14:30	51.9	71.7	32.4	64.5	53.3	36.1
8/11/2017 14:45	53.3	76.8	32.2	64.4	52.2	36.3
8/11/2017 15:00	52.3	71.1	32.3	65.5	51.7	36.5
8/11/2017 15:15	54.2	76.1	31.3	67.9	52.1	35.9
8/11/2017 15:30	55.9	83.6	33.3	68.5	55.3	37.4
8/11/2017 15:45	57.9	76.9	32.3	72.2	57	38
8/11/2017 16:00	50.9	73.9	31.5	63.7	51.1	37.5

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/11/2017 16:15	53.6	76.5	32.5	65.3	53.7	38.5
8/11/2017 16:30	57.6	71.3	39.4	67.3	62.7	46.7
8/11/2017 16:45	58.1	71.6	40.9	65.7	62.4	48.2
8/11/2017 17:00	54.1	75.6	41.6	65.6	55.2	46.1
8/11/2017 17:15	52.3	72.6	36.9	63.6	53.7	43.6
8/11/2017 17:30	53.5	76.6	37.2	65.7	52.5	41.6
8/11/2017 17:45	48.7	62.5	39.3	57.3	51.3	42.5
8/11/2017 18:00	52.3	72.1	40.2	63	54.3	43.5
8/11/2017 18:15	54.1	68.9	48.8	60.4	55.7	51.2
8/11/2017 18:30	54.2	58.1	50.3	56.7	55.6	52.6
8/11/2017 18:45	54.5	59	49.2	57.1	56.3	52
8/11/2017 19:00	53.2	66.3	47.1	57.6	55.3	49.8
8/11/2017 19:15	53.8	79.7	44.1	62.6	52.3	47.2
8/11/2017 19:30	50.9	64.2	44.7	55.6	53	47.3
8/11/2017 19:45	50.9	61	41.8	54.2	53.2	44.6
8/11/2017 20:00	49.8	72	40.1	61	47.6	42.5
8/11/2017 20:15	50.5	74.6	39.6	61.2	49.3	41.7
8/11/2017 20:30	46.5	63	39	57.7	48.1	41.2
8/11/2017 20:45	48	70.7	38.2	58.4	47.3	40.4
8/11/2017 21:00	46.9	68.6	37.9	57.6	45.8	40.9
8/11/2017 21:15	52.6	78.1	36.4	61.2	46.1	39.2
8/11/2017 21:30	46	68	34.7	58.9	45	36.8
8/11/2017 21:45	50.8	76.1	33.9	63.2	46.7	36.4
8/11/2017 22:00	47.9	67.2	33.3	61.2	47.9	36.2
8/11/2017 22:15	49.6	72.2	33.1	62.7	48.1	36.2
8/11/2017 22:30	42.3	64.3	32.5	53.6	42.9	34.6
8/11/2017 22:45	43.8	68.5	31.4	52.6	40.7	33.9
8/11/2017 23:00	37.2	53.8	31.3	44.9	39	33.5
8/11/2017 23:15	47.1	72.5	33.3	56.3	45	35.2
8/11/2017 23:30	45.7	62.3	32.3	57.1	48.6	35.9
8/11/2017 23:45	47.9	71.5	32.4	55.2	48.8	36
8/12/2017 0:00	42.7	56.7	31.5	53.4	46.8	33.9
8/12/2017 0:15	42.6	65	29.3	52.9	44	32.9
8/12/2017 0:30	42.5	64	30.3	53.2	44.8	32.4
8/12/2017 0:45	39.7	56.6	30.4	50.4	43.2	32.7
8/12/2017 1:00	45.1	64.4	31.6	57.6	46.4	33.9
8/12/2017 1:15	39.3	58.8	30.2	50.1	41	32.4
8/12/2017 1:30	39.9	60.4	31	51.2	41.2	33.1
8/12/2017 1:45	38.7	52.3	32.1	47.2	41.6	34.2
8/12/2017 2:00	37.6	52.8	31.8	47.3	38.3	34.4
8/12/2017 2:15	36.5	56	29.5	45.2	37.7	31.4
8/12/2017 2:30	35.8	55.1	26.7	47.8	35.3	28.6
8/12/2017 2:45	32	49.8	26.9	42.1	33.4	28.3
8/12/2017 3:00	39.2	59.6	27.8	53.1	37.9	29.5
8/12/2017 3:15	38.3	54.6	28.2	49.3	41	30.7
8/12/2017 3:30	44.7	68.6	30	53.5	42.8	31.7
8/12/2017 3:45	43.9	65.1	30.5	57.4	43.4	32.2

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/12/2017 4:00	36.7	49.9	30.7	44.8	39	33
8/12/2017 4:15	43.1	65.3	30.7	52.9	45.2	33.1
8/12/2017 4:30	45.7	75.3	29.7	52.2	40.9	32.7
8/12/2017 4:45	42.4	59	31.8	52.4	45.2	34.6
8/12/2017 5:00	41.9	59	33.9	50.3	45.2	36
8/12/2017 5:15	42	55.6	33.9	51.7	45.8	35.2
8/12/2017 5:30	44.9	64.4	35	55.9	45.3	38.6
8/12/2017 5:45	45.9	68.5	35.4	54.3	45.8	40
8/12/2017 6:00	46.8	65.8	36.7	58.7	48.4	39.6
8/12/2017 6:15	48.3	69.4	35.1	60.1	48.9	39.6
8/12/2017 6:30	48.1	71	35.8	59.9	49.1	39.5
8/12/2017 6:45	51.2	69	38.8	61.9	54.3	42.4
8/12/2017 7:00	51.5	66.9	40.9	62.8	53.9	43.5
8/12/2017 7:15	49	70.3	40.1	59.7	50	42.2
8/12/2017 7:30	49.9	69.9	39.4	62.6	51.6	41.8
8/12/2017 7:45	50.4	72.9	38.3	63.5	49.8	41
8/12/2017 8:00	48.6	69.4	37.5	61.9	47.9	39.6
8/12/2017 8:15	54.1	73	36.5	67.5	54.5	40.2
8/12/2017 8:30	51.4	71.1	35.3	63.5	53.7	38.5
8/12/2017 8:45	51.2	66.5	32.3	62.8	55.7	36.8
8/12/2017 9:00	47.9	65.2	33.1	58.3	52.4	35.9
8/12/2017 9:15	51.4	70	34.9	65.4	52	38.2
8/12/2017 9:30	54.3	76.5	35.1	66.1	56	40.3
8/12/2017 9:45	49.8	66.4	32	61.2	53.6	36.6
8/12/2017 10:00	51.5	67.7	34.5	61.9	56.5	39.9
8/12/2017 10:15	54.7	76.2	30.3	65.5	55.2	35.5
8/12/2017 10:30	55.6	75.4	31.9	67.3	58.9	35.9
8/12/2017 10:45	48.9	71.7	31	61.6	46.4	34.7
8/12/2017 11:00	51.1	72.1	30.9	64	51.7	35.3
8/12/2017 11:15	53.5	73.3	29.2	67.4	53.9	33.1
8/12/2017 11:30	53.3	78	29.9	65.5	49.6	34.3
8/12/2017 11:45	48.5	67	31	63.4	46.3	34.2
8/12/2017 12:00	49.1	69.1	31.1	62.3	49.2	34.2
8/12/2017 12:15	45	64.1	31.4	58.9	45.3	34
8/12/2017 12:30	53.8	77.2	31.2	65.3	54.8	35
8/12/2017 12:45	52.8	76.8	31.2	65.1	54	35.5
8/12/2017 13:00	50.4	68.4	31.7	64.8	49.1	34.3
8/12/2017 13:15	43.6	64.5	32.1	56	44.3	34.9
8/12/2017 13:30	51.3	70.8	32.8	64	53.4	35.8
8/12/2017 13:45	52.4	70.6	32.6	63.8	56.2	36.7
8/12/2017 14:00	50.3	72.8	30.3	60.8	55	34.1
8/12/2017 14:15	53.2	78.5	30.9	66.2	53.9	35.8
8/12/2017 14:30	53.6	76.5	31.8	67.4	48.7	35.3
8/12/2017 14:45	46.3	66	31.8	59.4	46.7	35.3
8/12/2017 15:00	48.1	69.9	31.9	60.8	49.7	34.7
8/12/2017 15:15	46.8	71	32.2	60.5	46.2	36.3
8/12/2017 15:30	46.6	70.6	31.3	58.5	46.4	34.6

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/12/2017 15:45	50.3	67.9	33.7	63.2	52.1	38.5
8/12/2017 16:00	48.7	68.2	32.9	61.5	50.4	37.1
8/12/2017 16:15	52.4	74.9	31.6	64.8	49.6	35.8
8/12/2017 16:30	51.6	72	35.1	65.3	50.5	37.8
8/12/2017 16:45	50.8	70.8	35.1	63	52.4	39.5
8/12/2017 17:00	58.9	75.9	34.6	72.3	60.7	37.9
8/12/2017 17:15	54.1	71.7	36	66.9	56.7	40.7
8/12/2017 17:30	48.6	67.9	35.4	59.5	51	39.6
8/12/2017 17:45	46.7	66.1	35.9	56	48.7	39.6
8/12/2017 18:00	50.2	68.2	36.3	62.7	51.6	40.5
8/12/2017 18:15	54.8	61.1	49.1	57.1	56	52.7
8/12/2017 18:30	55.1	68.2	49.9	61.1	56.7	52.7
8/12/2017 18:45	54.6	66.2	49.8	62.6	55.3	52.7
8/12/2017 19:00	54.2	75.9	48.2	59.5	54.9	51.2
8/12/2017 19:15	51.5	66.9	44.9	54.1	52.6	49.7
8/12/2017 19:30	51.9	65	47.2	57	52.9	50
8/12/2017 19:45	50.7	60.5	46.1	54.9	52.1	48.6
8/12/2017 20:00	49.9	67	45.7	57	50.8	47.6
8/12/2017 20:15	49.4	69	44.9	54.3	50	47
8/12/2017 20:30	49.9	66.8	42.4	59.9	51.3	45.1
8/12/2017 20:45	47.9	68	40.7	58.8	48.3	43.1
8/12/2017 21:00	42.7	58.2	38.2	48	44.1	40.4
8/12/2017 21:15	45.1	63	37.4	57.5	45.6	40.2
8/12/2017 21:30	46.6	69.3	34.4	58.6	45.9	37.6
8/12/2017 21:45	39.3	59.7	33.7	49	41.3	35.4
8/12/2017 22:00	47.9	69.8	33.2	61.2	47.6	35.6
8/12/2017 22:15	40.3	54.6	32	48.1	44	34.2
8/12/2017 22:30	42.8	67.1	31.1	51.7	43.2	33.5
8/12/2017 22:45	38.9	57.2	31	47.4	41.5	33.2
8/12/2017 23:00	44.1	66.2	29.6	55.6	44.3	31.8
8/12/2017 23:15	45	73.3	29.4	51.4	44	31.3
8/12/2017 23:30	41.7	58.5	30.6	51.9	45.3	32.8
8/12/2017 23:45	46.1	72.5	29.7	56.3	43	32.4
8/13/2017 0:00	37.9	50.1	28.7	47	42.5	31.1
8/13/2017 0:15	44.2	69.3	28	51.3	41.9	30.4
8/13/2017 0:30	44.2	67.5	29.2	56.6	41.1	31
8/13/2017 0:45	42.2	67.5	29.8	50.5	37.6	31.7
8/13/2017 1:00	35.3	52.6	29.5	43.9	37.1	31.6
8/13/2017 1:15	36.1	52.1	29.4	46.3	38.3	31
8/13/2017 1:30	33.4	47	29	41.5	35.1	30.4
8/13/2017 1:45	31.8	45.6	28.6	36.8	33.5	29.9
8/13/2017 2:00	34.5	50.2	28.1	44.4	36.5	30
8/13/2017 2:15	34.9	47.9	27.8	45.1	37.2	30.1
8/13/2017 2:30	40.4	65.6	28.6	52.2	37.8	30.1
8/13/2017 2:45	34.5	46	27.4	42.2	37.7	29.4
8/13/2017 3:00	45.9	63.6	29.1	56.9	49.7	31.8
8/13/2017 3:15	41.2	68.3	29.7	48.4	37.3	31.8

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/13/2017 3:30	34	46.8	28.6	39.4	35.6	32
8/13/2017 3:45	43	67.2	28.8	56	37.2	30.3
8/13/2017 4:00	44.6	70.4	29.6	52	43.6	32.2
8/13/2017 4:15	35.4	48.6	31.2	42	37.3	32.7
8/13/2017 4:30	46.2	69.6	32.1	57.4	41	34.3
8/13/2017 4:45	39.7	60.1	32.8	49.3	41.7	34.7
8/13/2017 5:00	39.1	52.8	31.9	49.1	41.6	34.6
8/13/2017 5:15	39.1	50.8	31.9	45.3	42.1	35.2
8/13/2017 5:30	46.4	71.2	34.3	59.3	45.1	36.5
8/13/2017 5:45	42.6	56.9	35.8	49.9	45.3	38.3
8/13/2017 6:00	46.7	64.1	36.4	56.3	50.3	38.8
8/13/2017 6:15	52.5	72.5	35.6	65.5	53.1	39.8
8/13/2017 6:30	51.5	68.6	35.6	65.3	51.6	38.3
8/13/2017 6:45	45.5	62.8	36.1	53.3	48.6	39.1
8/13/2017 7:00	52.1	70.5	36.4	65.8	52	39.4
8/13/2017 7:15	47.2	65.9	33.8	58.3	49.9	37.1
8/13/2017 7:30	50.3	71.4	32.4	64.2	49.9	35.4
8/13/2017 7:45	47.1	68.1	32.9	59	48.5	35
8/13/2017 8:00	48.2	67.9	32.7	60.6	49.5	36
8/13/2017 8:15	46.2	64.4	31.5	57.2	51	34.3
8/13/2017 8:30	44.6	66.4	29.2	55.7	46.4	32.9
8/13/2017 8:45	47.3	69.3	28.5	61.4	45.9	32.8
8/13/2017 9:00	50.9	79.4	28	61.3	46.3	31.3
8/13/2017 9:15	48.8	68.5	27.2	63.5	46.3	30.6
8/13/2017 9:30	44.7	69.5	27.8	56.2	43.3	31
8/13/2017 9:45	48.8	73.9	27.8	61.5	50.5	32.2
8/13/2017 10:00	48.8	67.4	26.7	63.2	46.3	31.3
8/13/2017 10:15	46.3	65.4	26.7	60	47.8	30.5
8/13/2017 10:30	48.1	71.6	27.7	62.1	43	30
8/13/2017 10:45	48	72.3	27.8	61.4	48.5	31
8/13/2017 11:00	47.2	68.5	27.8	61.1	46.3	32.7
8/13/2017 11:15	49	68	28.1	63.1	49.5	30.7
8/13/2017 11:30	50.3	71.5	28.2	63.8	48.2	31.5
8/13/2017 11:45	51.7	72.9	28.3	65.3	50.8	31.4
8/13/2017 12:00	51	72.9	27.1	63.7	50.6	30.5
8/13/2017 12:15	45.5	65.8	27.8	59.2	44.6	31.1
8/13/2017 12:30	48.5	73.8	27.6	60.9	44.8	30.6
8/13/2017 12:45	49.5	70.3	28	63.1	47.5	31.9
8/13/2017 13:00	47.6	70.5	30	61.1	44.9	33.8
8/13/2017 13:15	50.5	69.1	29.2	64.5	51	34.1
8/13/2017 13:30	50.2	73	29.3	63.7	47.3	32.5
8/13/2017 13:45	56.3	84.4	28.8	63.5	49.3	33.2
8/13/2017 14:00	42.2	64.5	29.5	52.1	44.3	32.9
8/13/2017 14:15	47.3	65.5	28.4	61.4	46.8	32.9
8/13/2017 14:30	47.1	67.9	28.3	60.2	47.1	32.3
8/13/2017 14:45	46.1	65.6	30	57.2	49.7	34.1
8/13/2017 15:00	47.1	68.3	30.8	61.3	46.7	34.4

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/13/2017 15:15	48	70.5	30.7	61.7	46.4	34.2
8/13/2017 15:30	49.5	73.2	28	64	46.3	33.2
8/13/2017 15:45	47.5	66.4	26.7	60.9	48.3	31.6
8/13/2017 16:00	47.3	73.2	28.7	61.7	45.4	32.5
8/13/2017 16:15	50	73.8	28	63.8	49.7	32.5
8/13/2017 16:30	47.6	69.4	29.5	60.2	48.3	34.1
8/13/2017 16:45	48.3	70.6	31.6	60.2	50.7	36.6
8/13/2017 17:00	45.3	62.7	32.5	55.4	47.4	36.9
8/13/2017 17:15	49.8	74.7	34.4	61.5	49.4	38.8
8/13/2017 17:30	51.8	73.6	34.6	65.1	52.2	39.1
8/13/2017 17:45	58.1	85.1	35	64.9	50.3	38.9
8/13/2017 18:00	50.8	73.9	35.6	62.1	48.9	39.3
8/13/2017 18:15	59.8	85.1	43.7	63.5	54.7	47.6
8/13/2017 18:30	55.5	72.1	50	63.4	56.2	52.6
8/13/2017 18:45	52.9	58	49.8	55.1	53.8	51.8
8/13/2017 19:00	55.3	74.1	49.1	66.5	54.7	51.2
8/13/2017 19:15	52.1	65.9	48.1	56.9	53.6	50.1
8/13/2017 19:30	51	67.6	47.5	55	51.9	49.3
8/13/2017 19:45	49.5	64.1	45	57.2	50.1	47.5
8/13/2017 20:00	49.9	67.9	43.7	58.6	50.4	46.5
8/13/2017 20:15	49.6	75.1	41.2	59.2	47.6	42.5
8/13/2017 20:30	46.8	70.5	39.3	52.1	47.3	41.3
8/13/2017 20:45	47.9	69.4	37.8	58.5	49.7	40.3
8/13/2017 21:00	46.3	64.2	37.3	58	47.8	40
8/13/2017 21:15	48.3	64.8	39.8	59.7	49.2	43
8/13/2017 21:30	45.1	68.5	34.3	53.6	44.8	37.3
8/13/2017 21:45	46.8	69.3	35.5	57.9	48.2	39.1
8/13/2017 22:00	43.8	62	34.7	53.1	47.3	37.3
8/13/2017 22:15	44.1	65.9	35	52.9	44.3	37.9
8/13/2017 22:30	47.2	73.5	38.1	49.8	44.3	40.3
8/13/2017 22:45	43.5	63.1	34.3	50.7	46	37.3
8/13/2017 23:00	37.9	50.4	32.5	44.7	39.6	35.3
8/13/2017 23:15	42.9	68	29.2	51.3	42.2	31.8
8/13/2017 23:30	36.9	52.6	28.5	45.6	39.4	31.8
8/13/2017 23:45	38.8	60.7	28.9	50.4	38.1	30.4
8/14/2017 0:00	39.2	52.3	30.2	48.9	43.4	32
8/14/2017 0:15	43.5	63	28.4	55.6	46.4	31.8
8/14/2017 0:30	38.7	65.1	28.3	52.5	38.7	30.2
8/14/2017 0:45	35.9	52.3	28	47.4	37.3	30.2
8/14/2017 1:00	32.3	44.3	27.5	36.6	33.9	29.9
8/14/2017 1:15	36.5	55.9	27.5	48.2	37.7	30
8/14/2017 1:30	36	51.5	28.3	44	38.4	31.9
8/14/2017 1:45	37.4	54.1	28.5	47.6	40.3	30.4
8/14/2017 2:00	37.9	61	27.7	49.7	34.1	29.9
8/14/2017 2:15	42.8	68.6	27.8	50.3	34.8	29.4
8/14/2017 2:30	43.9	69.3	27	55.3	36.9	29.5
8/14/2017 2:45	38.3	62.9	27.6	48.5	34.1	29

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/14/2017 3:00	41.1	63	27.4	53.6	39.8	29.7
8/14/2017 3:15	37.5	53.2	28.5	47.9	40.4	31.3
8/14/2017 3:30	35.7	47.3	29.8	42.3	38.3	31.4
8/14/2017 3:45	39.8	56.5	29.7	49.1	42	31.7
8/14/2017 4:00	41.4	56	33.1	50.7	44.6	35.1
8/14/2017 4:15	44.2	70.2	29.8	51.1	42.4	32.3
8/14/2017 4:30	48.3	71.6	29.1	62.2	46.3	32.7
8/14/2017 4:45	48.1	73.6	32.9	55.2	46.5	35.9
8/14/2017 5:00	43.6	55.1	34.4	51.4	46.4	38.3
8/14/2017 5:15	44.5	58.8	35.7	51.3	47.5	39.7
8/14/2017 5:30	48.5	67.5	39.1	60.2	49	42.3
8/14/2017 5:45	50.1	69.5	40.3	59.9	51.9	44.4
8/14/2017 6:00	54.5	74.9	41.4	67.8	53.5	44.8
8/14/2017 6:15	51.1	71.4	41.6	62.8	51.9	44.7
8/14/2017 6:30	50.2	74.2	44.4	58.9	51.4	46.6
8/14/2017 6:45	55.1	78.4	45	67.1	55	48.1
8/14/2017 7:00	58.1	79	43.8	69.9	59.4	46.3
8/14/2017 7:15	49.8	67.5	42.6	59.3	51.7	44.9
8/14/2017 7:30	51.9	71.1	42.7	63.3	53.1	45.2
8/14/2017 7:45	48.8	66.9	42.4	58.7	50.2	44.2
8/14/2017 8:00	51.9	71.8	42.6	64.3	51.6	44.9
8/14/2017 8:15	53.8	77	39.1	65.1	52.6	42.3
8/14/2017 8:30	53.5	73.3	36.5	65.9	56.2	39.7
8/14/2017 8:45	53.4	77	33.3	66.1	50.5	37.2
8/14/2017 9:00	49.4	66.5	32.4	61.1	52.9	36.3
8/14/2017 9:15	51.5	77.1	34	61.6	49.8	36.8
8/14/2017 9:30	57.7	81.2	32.6	71.1	52	36.6
8/14/2017 9:45	51.4	70.6	33.6	65.7	50	36.7
8/14/2017 10:00	48.3	73.4	32.8	61.7	46.7	35.9
8/14/2017 10:15	53.8	78.9	33.8	67.5	52.5	36.7
8/14/2017 10:30	58.2	83.7	34.1	70.7	59.2	37.4
8/14/2017 10:45	53.3	76.1	33.8	65.7	51.8	36.4
8/14/2017 11:00	51	73.2	33.7	64.8	49.9	36.2
8/14/2017 11:15	50.6	72.2	32.1	64.5	48	34.4
8/14/2017 11:30	54.9	75.4	32.4	69.2	52.3	35.7
8/14/2017 11:45	51.5	77.2	31.9	65.3	50.3	36.2
8/14/2017 12:00	48.9	68.7	30.5	63	47.2	33.9
8/14/2017 12:15	48.6	67.5	31.8	61.9	49	35.6
8/14/2017 12:30	53.3	74.4	32	66.6	53.6	35.2
8/14/2017 12:45	51.9	76.5	31.9	64.3	47.9	34.5
8/14/2017 13:00	47.4	70.9	30	60.4	44	33.9
8/14/2017 13:15	52.9	77.2	30.4	64.6	50.5	33.7
8/14/2017 13:30	53.3	75.2	30.1	67.2	51.9	33.9
8/14/2017 13:45	51.7	80.5	33	62.2	49.1	36
8/14/2017 14:00	51	72.4	31.2	65	48	34.9
8/14/2017 14:15	56.4	78.8	32.5	70.5	51	35.8
8/14/2017 14:30	54.8	77.1	34.5	68.2	52.3	38.7

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/14/2017 14:45	51.1	69	33.3	64.1	52.8	38.2
8/14/2017 15:00	54.8	75.4	31.4	68.6	53.5	37.3
8/14/2017 15:15	47.9	67	34.7	60.4	49.1	38.6
8/14/2017 15:30	52.4	74.4	35	65.2	53.8	37.6
8/14/2017 15:45	55.9	79.9	34.3	70.4	53.4	38.2
8/14/2017 16:00	53.1	73.5	35.2	66.3	53.9	42.5
8/14/2017 16:15	53.2	76.9	34.5	64.8	49.8	41.4
8/14/2017 16:30	55.1	76.4	38.4	67.8	54.5	43.4
8/14/2017 16:45	52.5	72.7	39.3	63.9	53.3	44.4
8/14/2017 17:00	53	68.7	39.3	63.7	54.7	45.1
8/14/2017 17:15	51.4	66.8	38.9	61.5	53.5	45.1
8/14/2017 17:30	57	80.4	37.8	67	56.3	43.2
8/14/2017 17:45	51.7	71.2	38.2	63.3	52.6	43.3
8/14/2017 18:00	51.3	69.3	37.5	62.2	52.4	42.9
8/14/2017 18:15	55.5	71.1	48.1	64	57.4	51
8/14/2017 18:30	56.2	83.5	49.8	61.9	56.9	52.5
8/14/2017 18:45	54.9	66.5	49.8	58.5	56.5	52.4
8/14/2017 19:00	55.5	65.1	49.7	61.1	56.7	53.5
8/14/2017 19:15	54.8	63	49.3	58.5	56.9	52.2
8/14/2017 19:30	56	71.3	48.2	61.6	57.5	51.7
8/14/2017 19:45	56.2	65.2	47.3	59.4	57.5	53.3
8/14/2017 20:00	54.1	70.1	46.8	61.3	56.1	50.4
8/14/2017 20:15	54.1	67.7	47.6	58.8	56.2	50.6
8/14/2017 20:30	54	65.7	47.5	59.8	56	50.4
8/14/2017 20:45	51.6	67.2	45.5	59.3	53.4	48.3
8/14/2017 21:00	53.5	75.7	46	61.7	53.9	48.4
8/14/2017 21:15	51.1	58.2	45.9	54.3	53	48.7
8/14/2017 21:30	51.8	68.4	44.8	57.9	53	47.4
8/14/2017 21:45	46.5	59.7	40.2	55.2	50.2	43.1
8/14/2017 22:00	45.9	58	39.3	53.6	49.1	41.7
8/14/2017 22:15	49.8	73.1	39.6	59.1	50.1	42
8/14/2017 22:30	45.6	55.5	40.4	51.3	47.1	43.1
8/14/2017 22:45	46.4	64.6	40.1	53.9	47.1	43.5
8/14/2017 23:00	46.5	58.9	40.8	54.2	47.9	43.8
8/14/2017 23:15	47.6	64.5	39.3	57.6	50.2	42.3
8/14/2017 23:30	44.7	63.9	36.4	52.6	46.3	39.9
8/14/2017 23:45	44.5	60.1	35.8	50.9	46.7	39.6
8/15/2017 0:00	43.2	56.3	34.1	52.6	44.6	38.8
8/15/2017 0:15	44.2	60	34.4	55.6	45.7	37.8
8/15/2017 0:30	44.2	59.9	34.7	54	47	38.1
8/15/2017 0:45	42.8	58.5	33.8	55	43.3	37.2
8/15/2017 1:00	42	57.5	32.1	54.2	43	34.4
8/15/2017 1:15	42.9	61.8	33.3	53.4	46.2	35.2
8/15/2017 1:30	38.6	55.6	31.6	49.6	40.8	33.8
8/15/2017 1:45	37.3	48.8	30.6	43.6	40.6	33.1
8/15/2017 2:00	36.6	52.2	30.3	48.6	37.1	32.1
8/15/2017 2:15	46.6	67.3	29.7	57.8	49.6	31.8

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/15/2017 2:30	39.5	54.7	29	50.4	42.5	32.2
8/15/2017 2:45	41.9	63.2	30.8	53.4	43.8	32.8
8/15/2017 3:00	41.5	62.2	31.3	50.7	43.1	33.8
8/15/2017 3:15	43.5	60.6	29.4	54.7	46.2	32.6
8/15/2017 3:30	44.6	60.6	29.4	56.8	48.2	31.3
8/15/2017 3:45	44	61.1	33.2	54	48.3	35
8/15/2017 4:00	41.1	58.2	28.5	53.1	43.1	30.3
8/15/2017 4:15	40.1	54.5	30.2	49.8	44.8	31.8
8/15/2017 4:30	46.4	69.6	31.4	55.5	47.9	33.9
8/15/2017 4:45	50.9	73.8	32.3	62.3	51.2	36.9
8/15/2017 5:00	42.4	53	30.8	49.3	45.5	35.3
8/15/2017 5:15	44.2	57.8	34.7	50.9	47.3	38.6
8/15/2017 5:30	48.3	67	37.4	58.1	49.6	42.4
8/15/2017 5:45	51.6	70.1	42.6	63.3	52.5	45.4
8/15/2017 6:00	51.1	71.3	39.6	61.5	52.6	45.2
8/15/2017 6:15	51.7	67.9	40.6	62.3	53.5	45.4
8/15/2017 6:30	59.4	84.1	41.7	69.3	53.8	44.5
8/15/2017 6:45	53.1	78.7	41.1	61.7	52.5	44.9
8/15/2017 7:00	46.6	63.7	40.2	53.3	48.8	42.9
8/15/2017 7:15	50.6	72.8	40.1	62.1	50.6	42.3
8/15/2017 7:30	51.4	69.5	40.9	65	51.8	42.9
8/15/2017 7:45	61.6	89.7	41.6	66.7	52.5	43.9
8/15/2017 8:00	49.5	71.2	40.6	61	49.3	42.8
8/15/2017 8:15	55	79.1	40.1	67.5	52.3	42
8/15/2017 8:30	53.5	72.9	38.1	67.5	53.1	41.7
8/15/2017 8:45	53.1	75.9	36.6	65.3	52.6	39.2
8/15/2017 9:00	52.6	69.8	35.6	64.5	55.5	39
8/15/2017 9:15	55.2	79.3	35.6	65.9	56.2	38.5
8/15/2017 9:30	54.2	76.4	34.2	68.1	51.8	36.9
8/15/2017 9:45	50.4	68.1	32.5	64.2	50.3	36.1
8/15/2017 10:00	53.1	75.4	30.6	65.7	55.4	34.3
8/15/2017 10:15	53.1	75.5	31.2	63.6	56.8	35
8/15/2017 10:30	53.5	78.2	32.7	66.3	49.2	35.3
8/15/2017 10:45	54.4	77.7	32.2	67.2	51.2	34.9
8/15/2017 11:00	48.6	70.5	31.4	62.4	47	34.4
8/15/2017 11:15	47.7	70.9	30.1	60	44.9	33.9
8/15/2017 11:30	51.9	72.5	31	65.9	50.6	34
8/15/2017 11:45	56.1	80.2	32.6	70.1	56.2	36.5
8/15/2017 12:00	52.6	76.5	29.8	66.5	48.6	33.9
8/15/2017 12:15	49.8	72.2	29.9	63.1	46.9	33
8/15/2017 12:30	49.6	71.1	30.4	63.1	46.9	33.5
8/15/2017 12:45	53.8	77.2	30.3	67.1	48.9	33.9
8/15/2017 13:00	48.4	70	30.7	62.4	47.4	33.7
8/15/2017 13:15	50.3	72.2	30.4	64.6	48.8	32.8
8/15/2017 13:30	55.5	81.7	28.8	68.1	52.8	33.4
8/15/2017 13:45	52.2	74	32.2	65.7	49.5	35.1
8/15/2017 14:00	53	74.5	32.8	66.6	51.2	35.8

Start Time	Leq	Lmax	Lmin	LA1	LA10	LA90
8/15/2017 14:15	51.6	72.1	31.8	64.5	52.5	35
8/15/2017 14:30	53.8	77.1	33.7	66.1	53.1	36.7
8/15/2017 14:45	51.8	69.9	37.7	65	51.6	40.2
8/15/2017 15:00	56.2	80.7	38.7	67.6	55.8	42.7
8/15/2017 15:15	51.9	69.4	39.8	63.3	53.8	44.3
8/15/2017 15:30	52.9	69.2	40.9	64.8	54.6	44.4
8/15/2017 15:45	51.6	69.1	40.5	63.4	53	45.3
8/15/2017 16:00	54.8	78.4	42	65.1	54.2	46.2
8/15/2017 16:15	54	74.4	42.5	64.9	54.5	46.5
8/15/2017 16:30	57.7	80.7	40	70	57.9	44.8
8/15/2017 16:45	54	72.8	39.8	65.2	56.1	46.5
8/15/2017 17:00	54.5	73.6	37.6	66.4	54.6	44.4