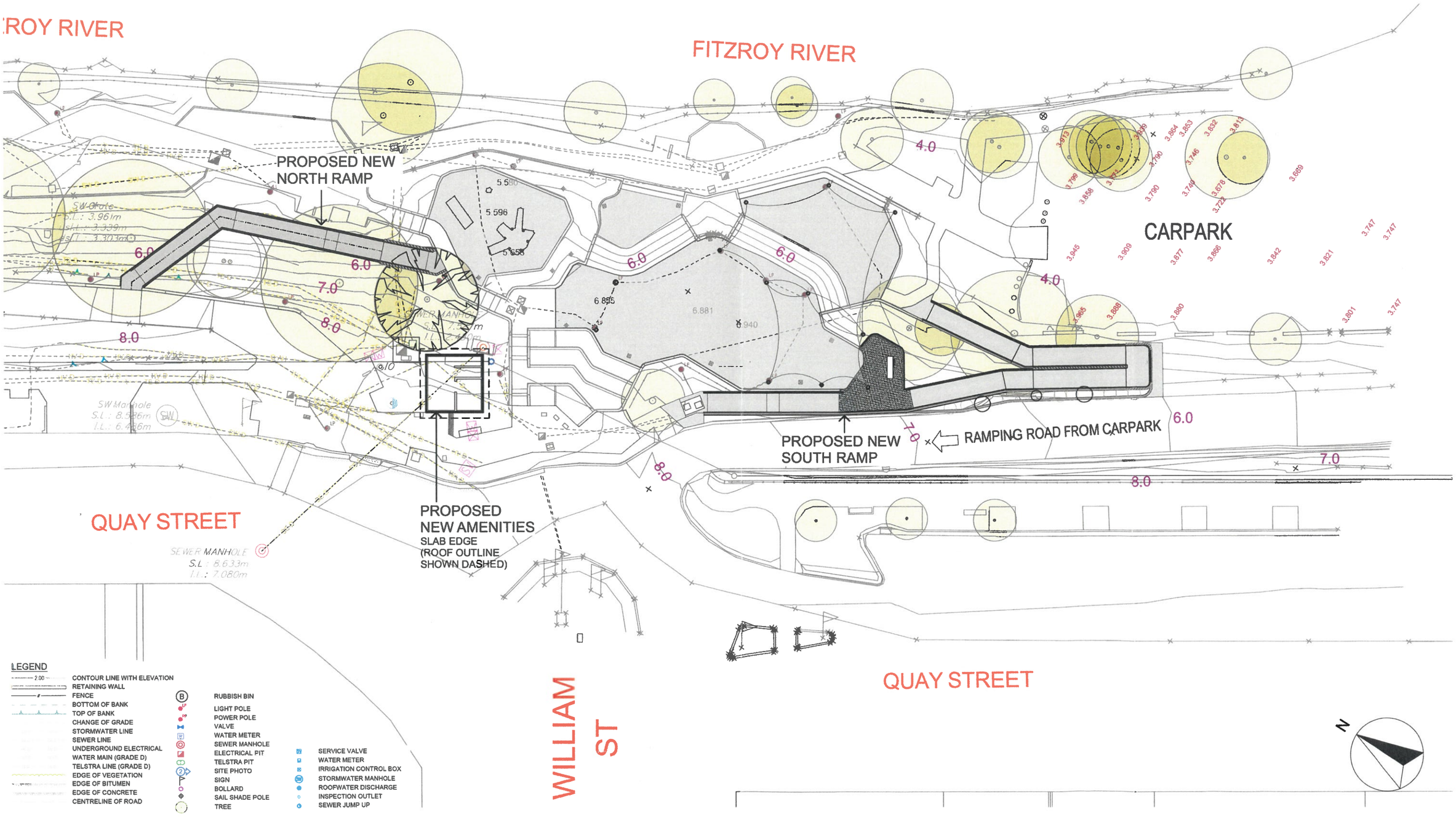
ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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

Preliminary Approval No.: D/2-2020

Dated: 02 March 2020



LEGEND

- CONTOUR LINE WITH ELEVATION
- RETAINING WALL
- FENCE
- BOTTOM OF BANK
- TOP OF BANK
- CHANGE OF GRADE
- STORMWATER LINE
- SEWER LINE
- UNDERGROUND ELECTRICAL
- WATER MAIN (GRADE D)
- TELSTRA LINE (GRADE D)
- EDGE OF VEGETATION
- EDGE OF BITUMEN
- EDGE OF CONCRETE
- CENTRELINE OF ROAD
- RUBBISH BIN
- LIGHT POLE
- POWER POLE
- VALVE
- WATER METER
- SEWER MANHOLE
- ELECTRICAL PIT
- TELSTRA PIT
- SITE PHOTO
- SIGN
- BOLLARD
- SAIL SHADE POLE
- TREE
- SERVICE VALVE
- WATER METER
- IRRIGATION CONTROL BOX
- STORMWATER MANHOLE
- ROOFWATER DISCHARGE
- INSPECTION OUTLET
- SEWER JUMP UP

Revisions			Rev
rev	date	description	isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: **Rockhampton Regional Council**

project: **Riverside Park Amenities & Ramps**

address: **Quay St., Rockhampton, QLD**

title: **Site Plan** rev. dwg no. **CD.101**

design	drawn	chkd
GC/CPI	GC/MJW	

job no. **BT190702**

date **28/01/20**

scale **1:350** orig size **A3**

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admin@beatarchitects.com.au
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Board of Architects Queensland Registration No. 2592

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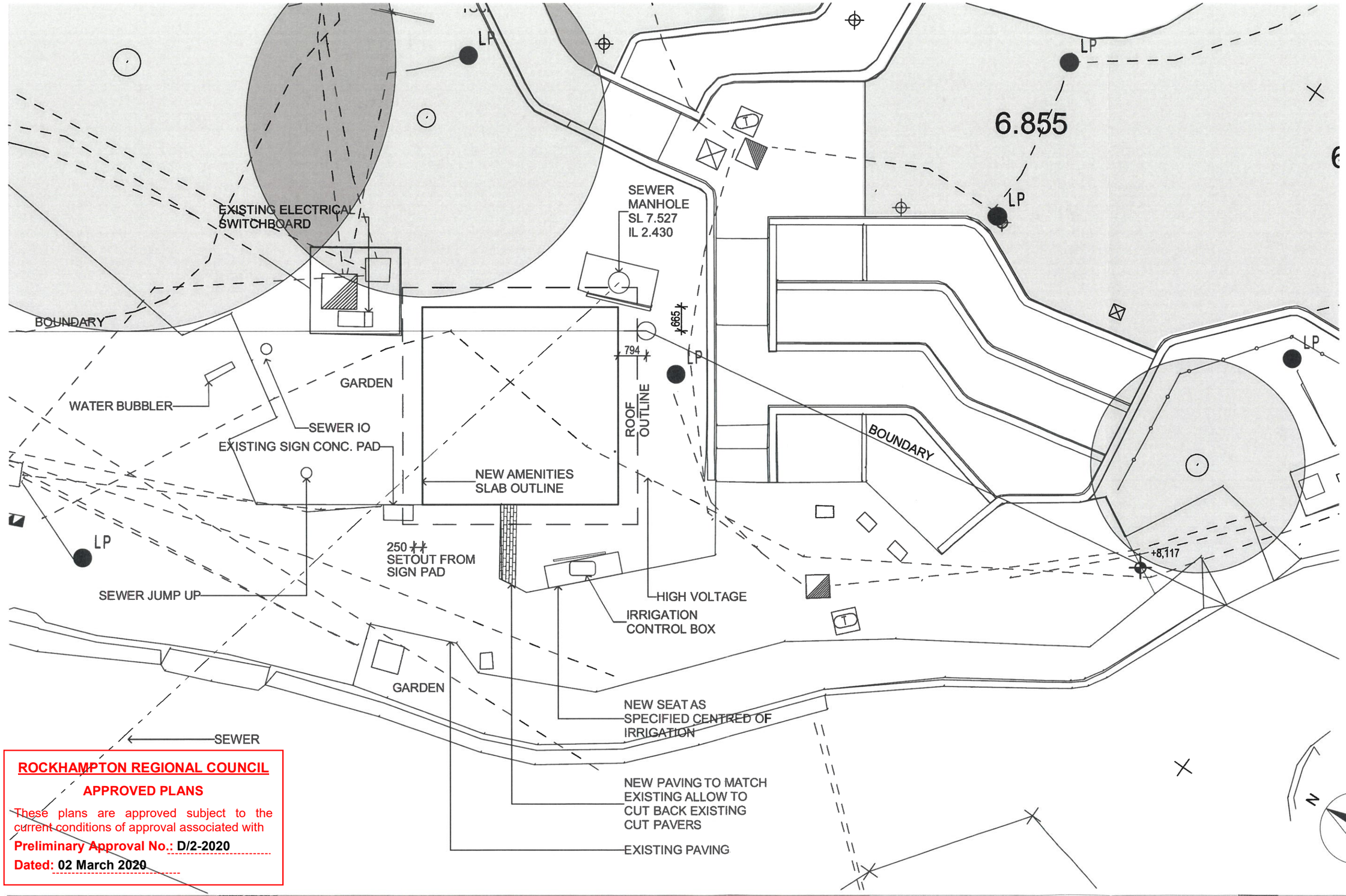

ROCKHAMPTON REGIONAL COUNCIL

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Dated: 02 March 2020

Revisions			Rev
rev	date	description	isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: **Rockhampton Regional Council**

project: **Riverside Park Amenities & Ramps**

address: **Quay St., Rockhampton, QLD**

title: **Amenities Setout Plan** rev. dwg no. **CD.102**

design	drawn	chkd
GC/CPI	GC/MJW	

job no. BT190702

date 28/01/20

scale 1:100 orig size A3

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RELOCATE EXISTING SCULPTURE

NEW LOCATION OF RELOCATE EXISTING SCULPTURE

1:14 RAMP

1:14 RAMP

1:14 RAMP

SANDSTONE CLADDED BLOCKWORK BELOW

HANDRAIL AND BALUSTRADE TYPE REFER TO DETAIL DWG NO. 402

HANDRAIL EXTENSION BOTH SIDES

NEW TACTIAL GROUND SURFACE INDICATORS SPIGOT FIXED TO CONC. (TYP.) TGSI

CONC WALL. TOP AT 1000mm ABOVE RAMP (COLOURED CONC. AS SPECIFIED)

SLOPE CONC WALL. TO FINISH FLUSH WITH EXISTING

HANDRAIL EXTENSION BOTH SIDES

PLAYGROUND

SEWER MANHOLE

Revisions			
rev	date	description	Rev isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: **Rockhampton Regional Council**

project: **Riverside Park Amenities & Ramps**

address: **Quay St., Rockhampton, QLD**

title: **North Ramp Setout Plan** rev. dwg no. **CD.103**

design GC/CPI drawn GC/MJW chkd

job no. BT190702

date 28/01/20

scale 1:100 orig size A3

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Board of Architects Queensland Registration No. 2592

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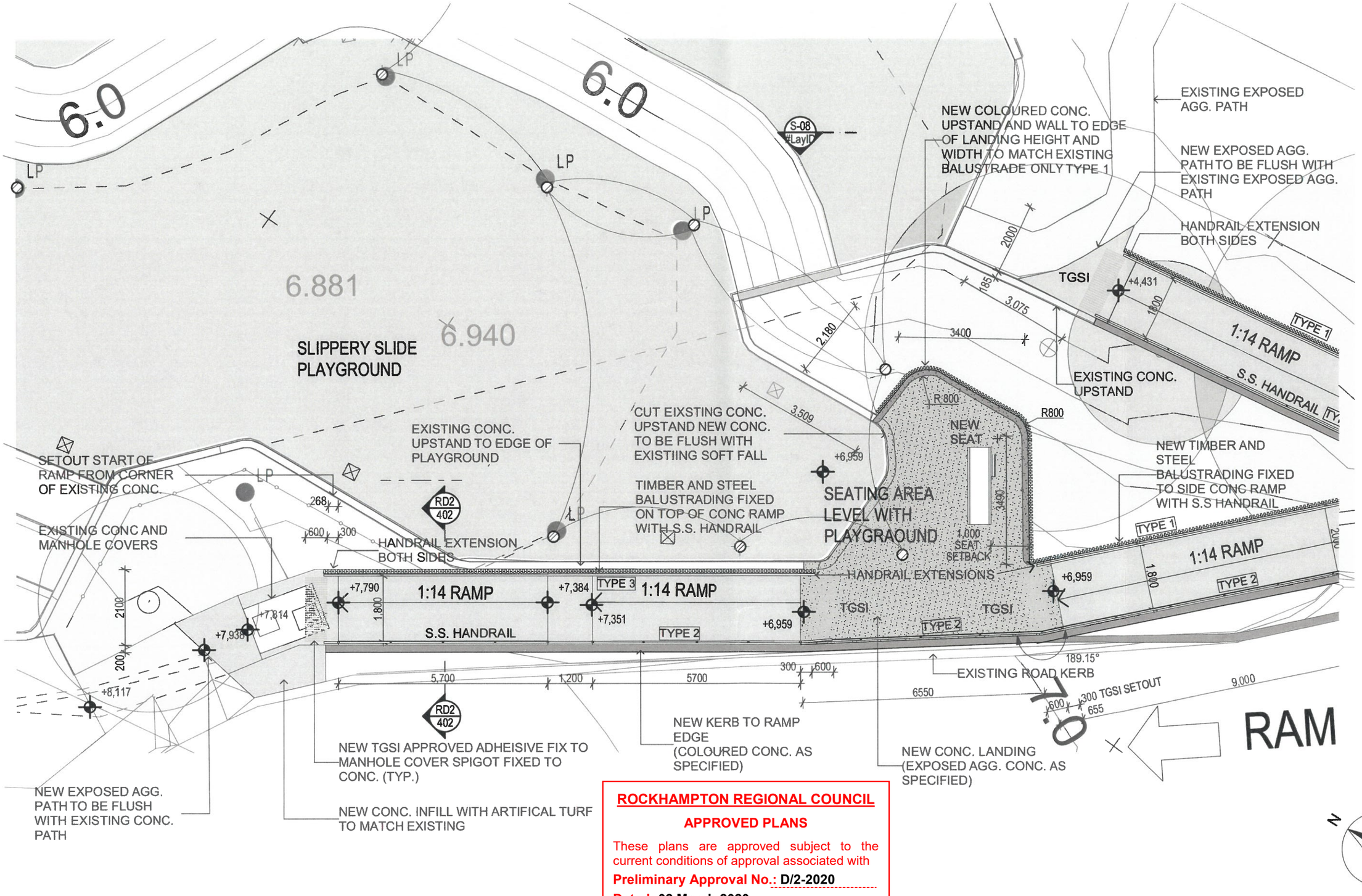

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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Preliminary Approval No.: D/2-2020

Dated: 02 March 2020

Revisions			Rev
rev	date	description	isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: **Rockhampton Regional Council**

project: **Riverside Park Amenities & Ramps**

address: **Quay St., Rockhampton, QLD**

title: **South Ramp Setout Plan sheet 1** rev.

dwg no. **CD.104**

design	drawn	chkd
GC/CPI	GC/MJW	

job no. **BT190702**

date **28/01/20**

scale **1:100** orig size **A3**

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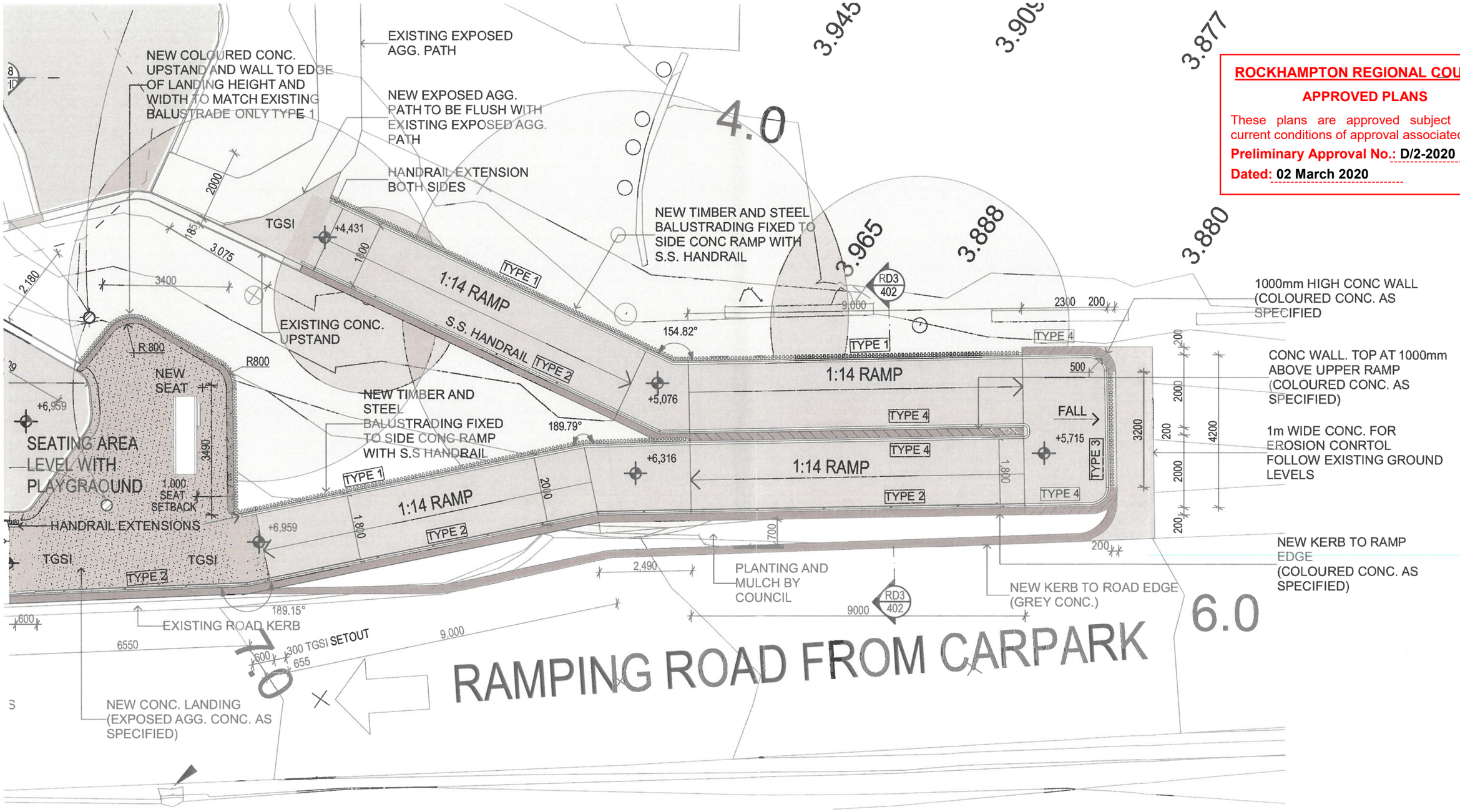

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Preliminary Approval No.: D/2-2020

Dated: 02 March 2020

Revisions			Rev
rev	date	description	isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: Rockhampton Regional Council

project: Riverside Park Amenities & Ramps

address: Quay St., Rockhampton, QLD

title: South Ramp Setout Plan sheet 2

rev.

dwg no. CD.105

design	drawn	chkd
GC/CPI	GC/MJW	

job no. BT190702

date 28/01/20

scale 1:100 orig size A3

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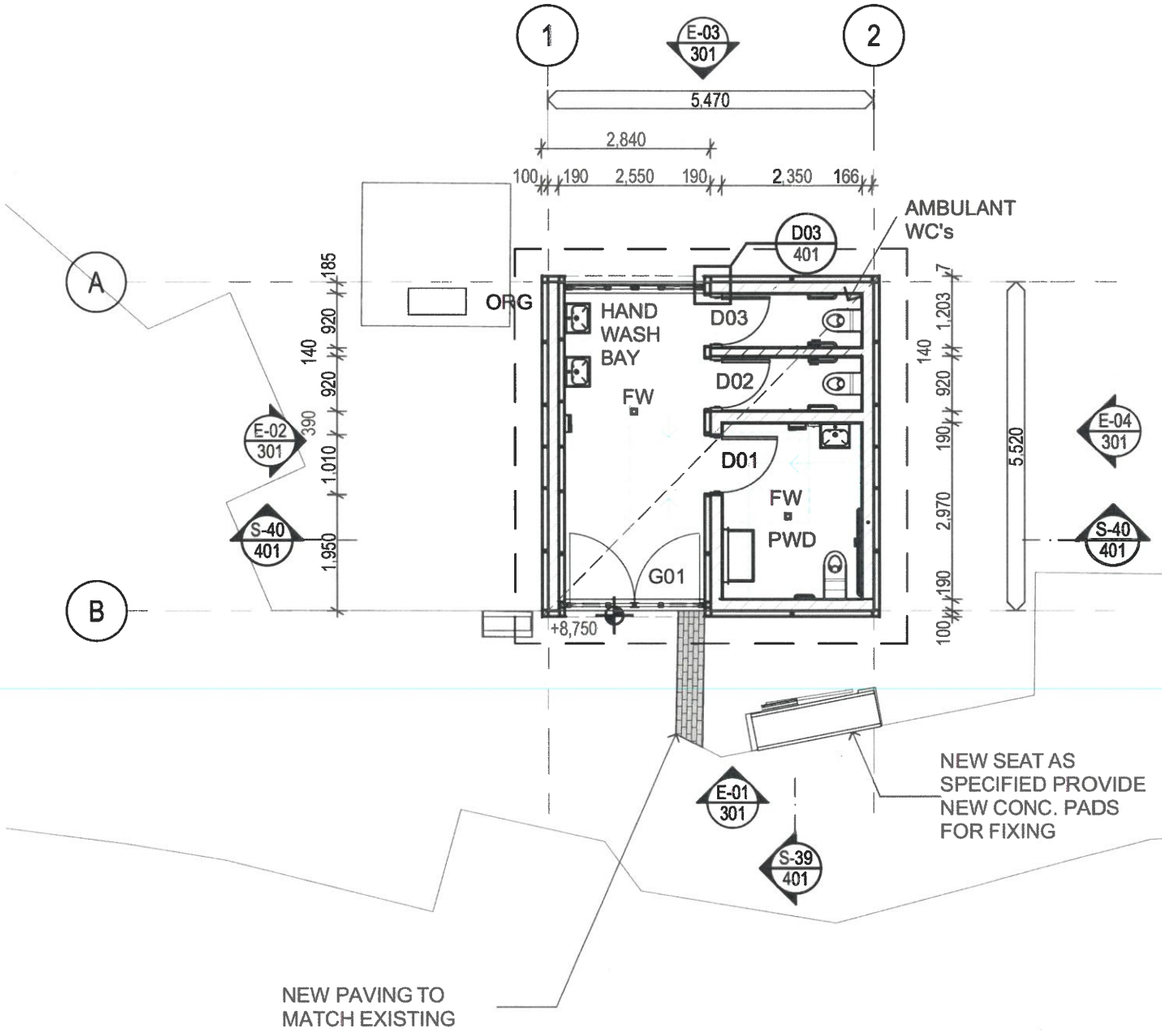

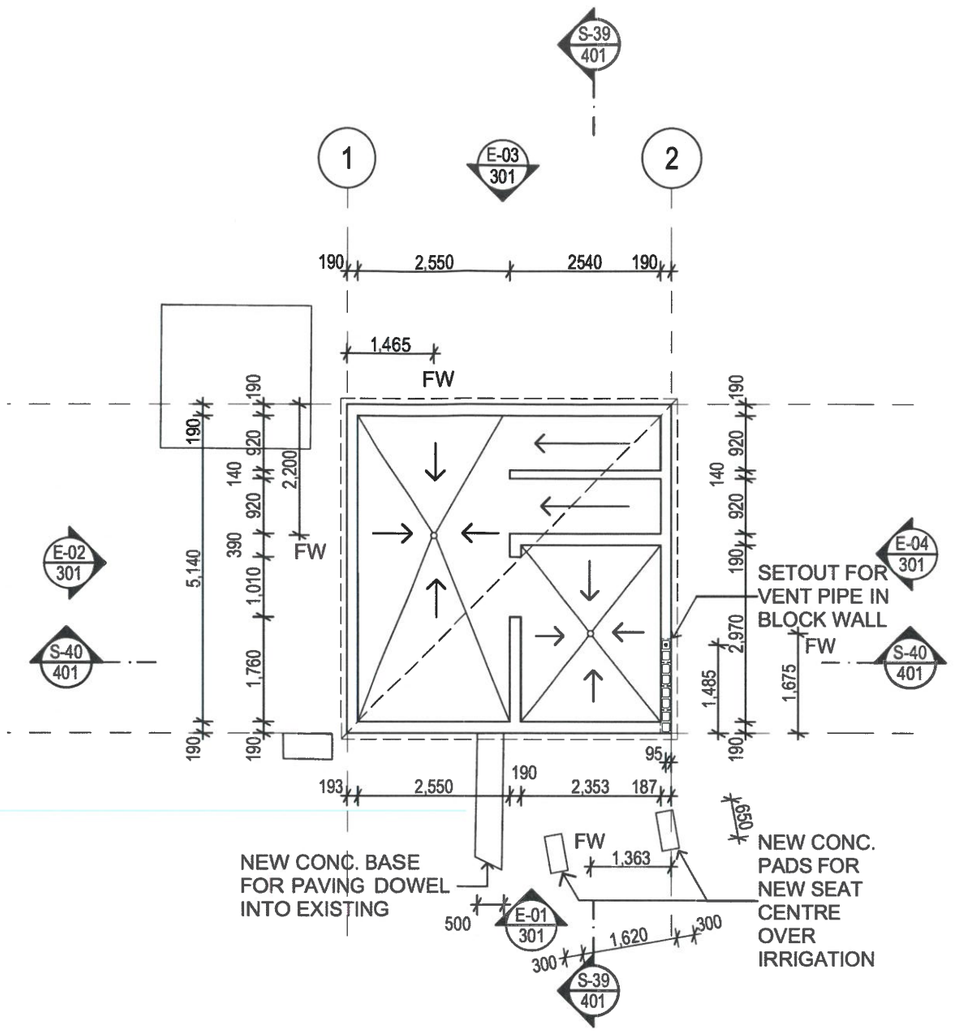

1 / - AMENITIES FLOOR PLAN
1:100

2 / - SLAB PLAN
1:100

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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Dated: 02 March 2020

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Revisions			Rev
rev	date	description	isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: Rockhampton Regional Council

project: Riverside Park Amenities & Ramps

address: Quay St., Rockhampton, QLD

title: Amenities Floor Plan & Slab Plan | rev. | dwg no. CD.201

design GC/CPI | drawn GC/MJW | chkd

job no. BT190702

date 28/01/20

scale 1:100 | orig size A3

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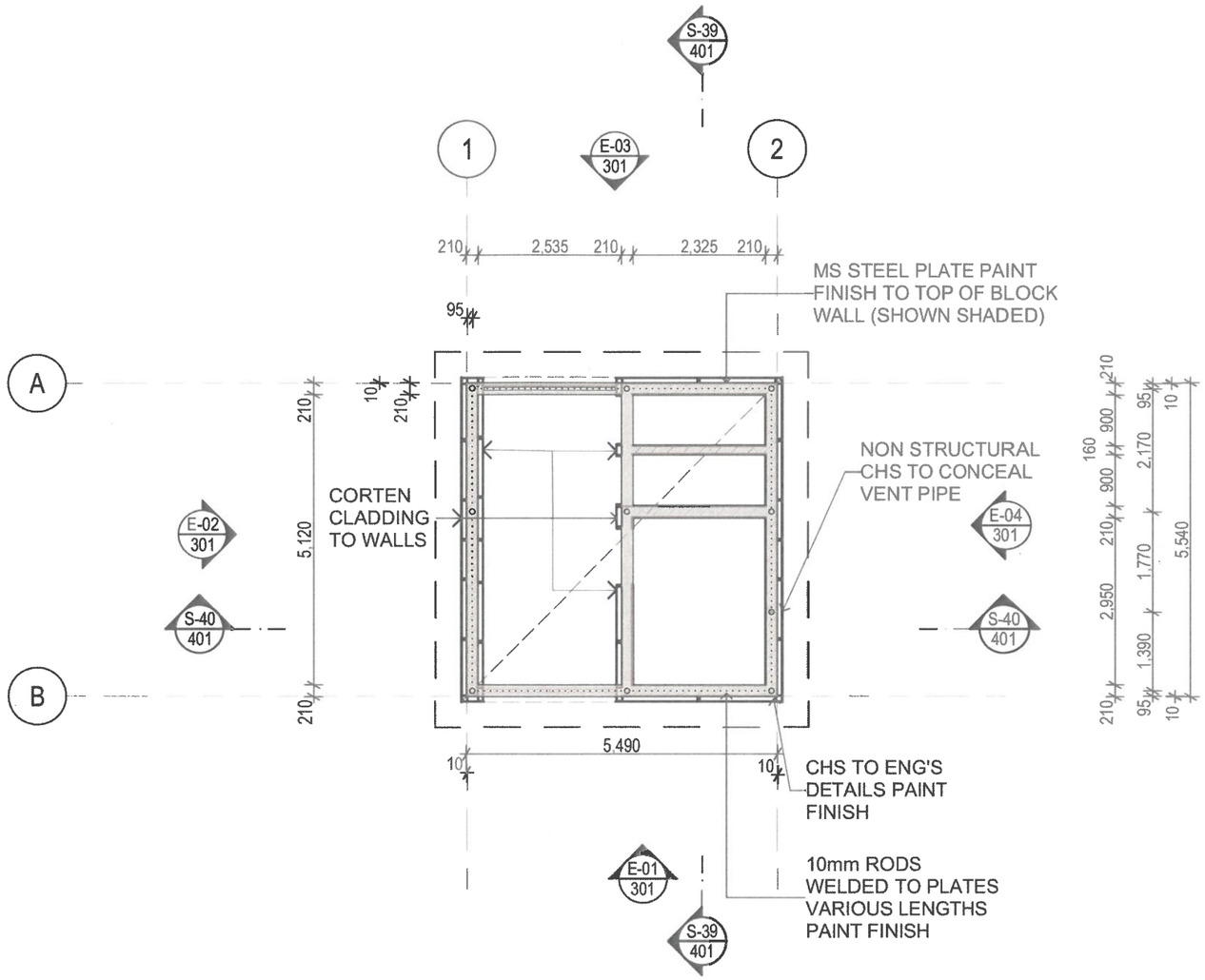
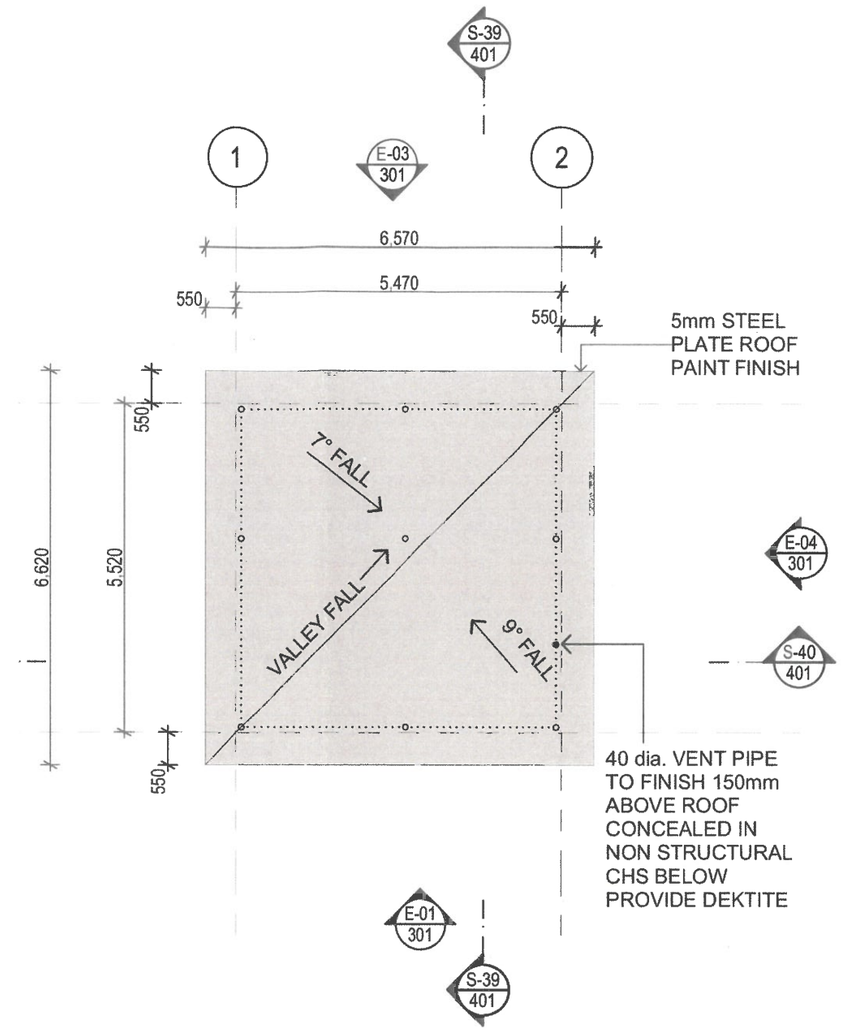


5. TOP OF BLOCK WALL PLAN
- 1:100



6. ROOF PLAN
- 1:100

N

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

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Preliminary Approval No.: D/2-2020

Dated: 02 March 2020

Revisions			
rev	date	description	Rev isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: Rockhampton Regional Council

project: Riverside Park Amenities & Ramps

address: Quay St., Rockhampton, QLD

title: Top of Wall Plan & Roof Plan

rev.

dwg no. CD.202

design	drawn	chkd
GC/CPI	GC/MJW	

job no. BT190702

date 28/01/20

scale 1:100 orig size A3

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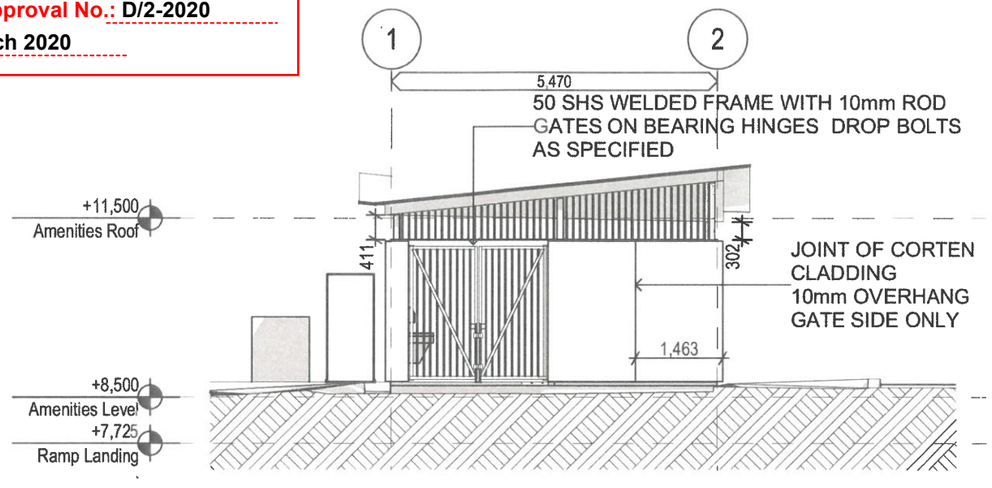
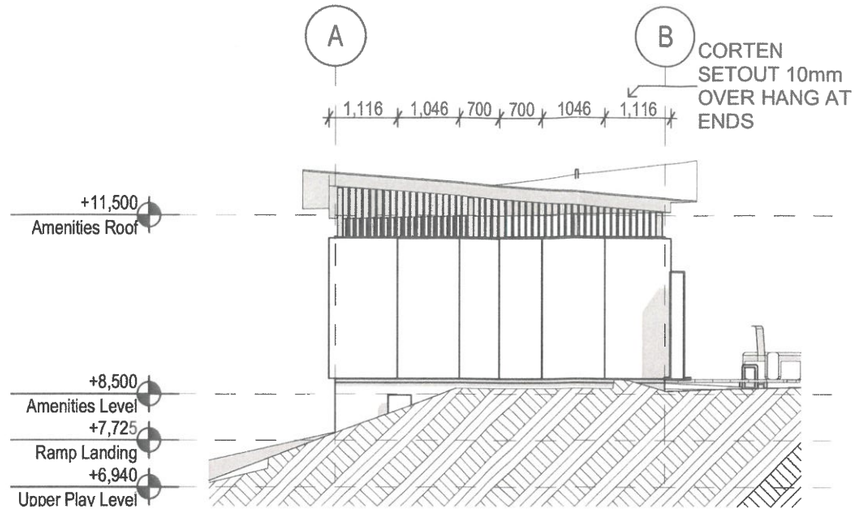
Dated: 02 March 2020



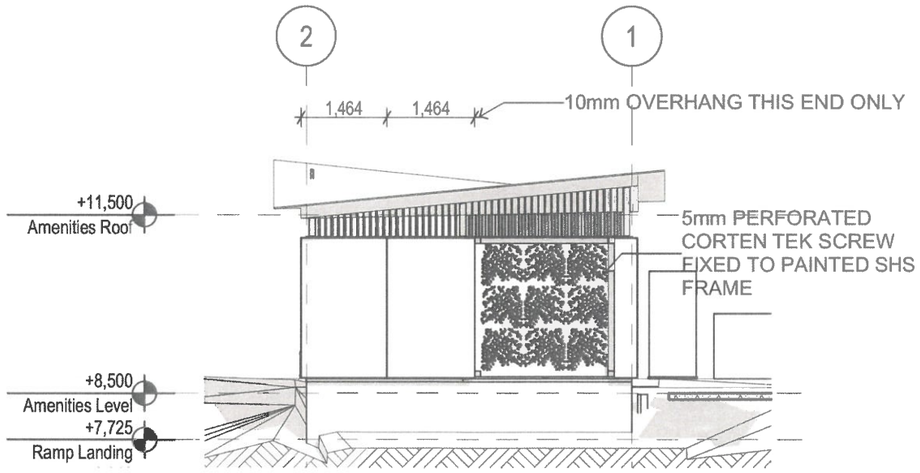
E-01
-

SOUTH ELEVATION
1:100



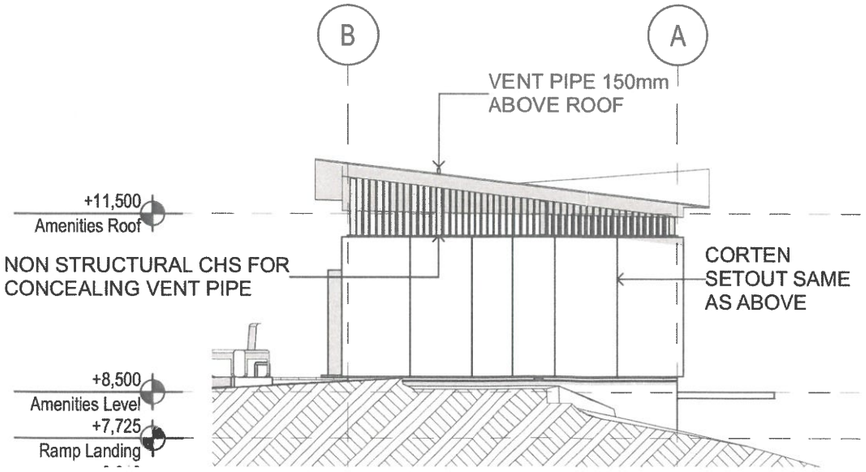
E-02
-

WEST ELEVATION
1:100



E-03
-

NORTH ELEVATION
1:100



E-04
-

EAST ELEVATION
1:100

Revisions			Rev
rev	date	description	isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: Rockhampton Regional Council

project: Riverside Park Amenities & Ramps

address: Quay St., Rockhampton, QLD

title: Amenities Elevations

rev.

dwg no. CD.301

design	drawn	chkd
GC/CPI	GC/MJW	

job no. BT190702

date 28/01/20

scale 1:100 orig size A3

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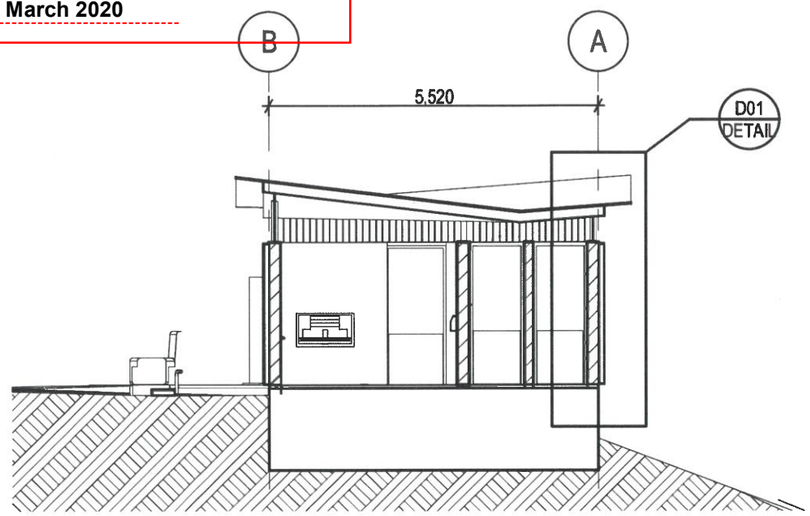
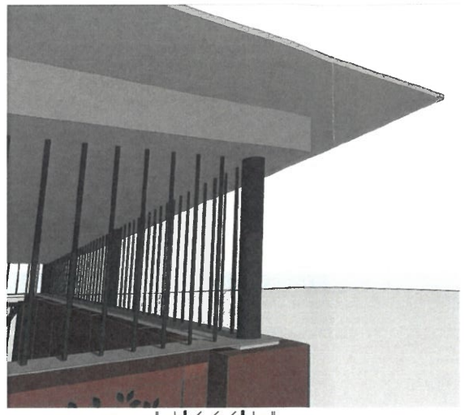
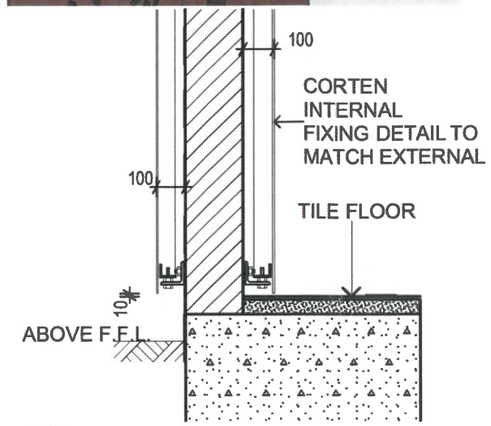
Dated: 02 March 2020

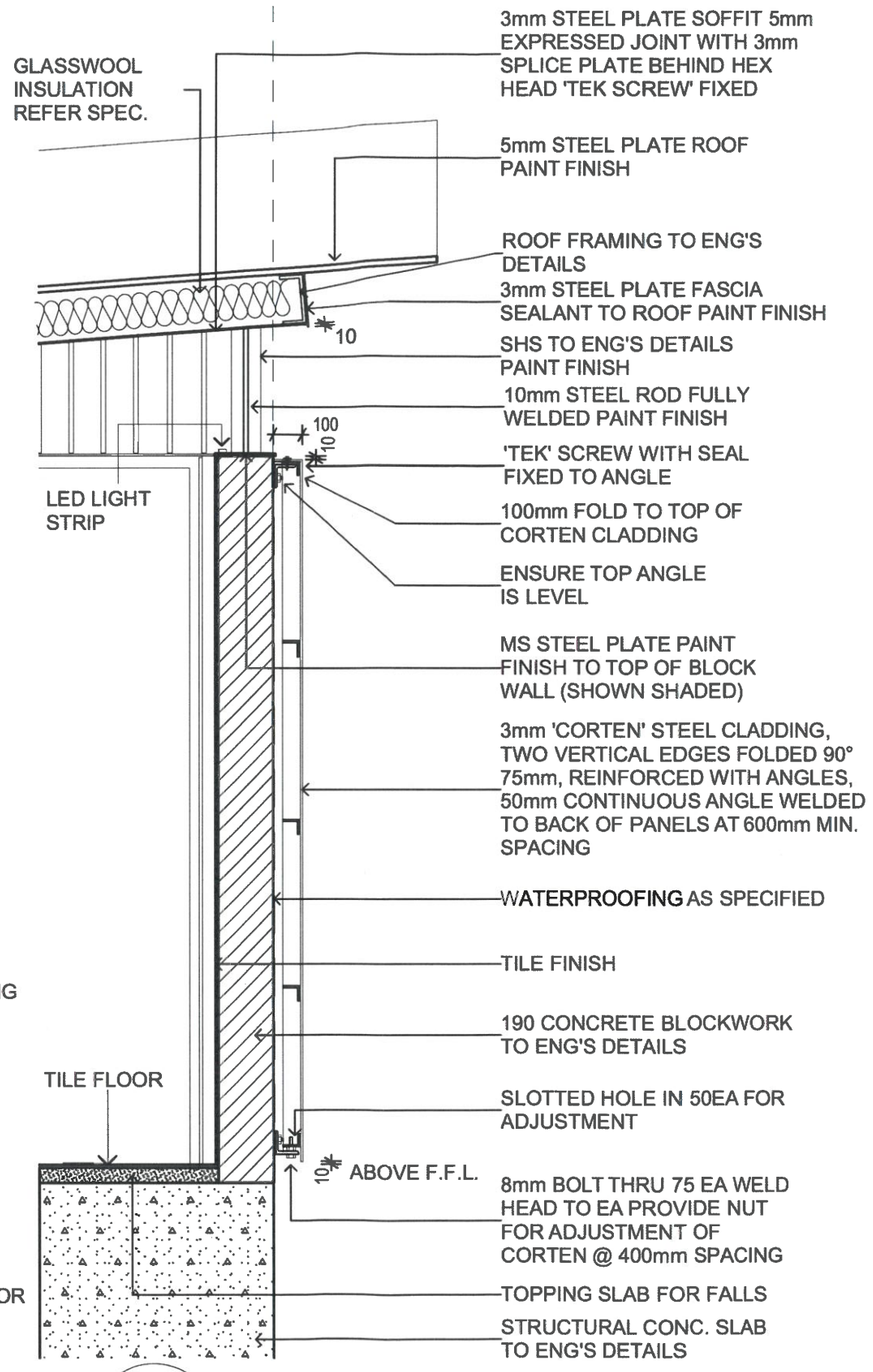


S-39 / - SECTION 1:100

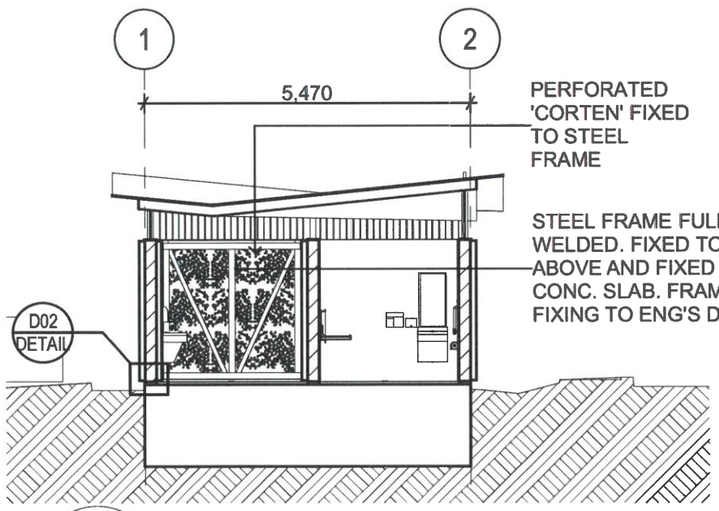




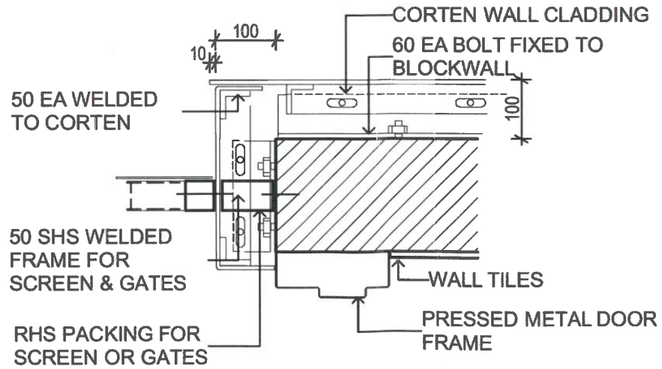
D02 / - DETAIL SECTION 2 1:20



D01 / - DETAIL SECTION 1 1:20



S-40 / - SECTION 1:100



D03 / 201 DETAIL PLAN 3 1:10

Revisions			
rev	date	description	Rev isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: **Rockhampton Regional Council**

project: **Riverside Park Amenities & Ramps**

address: **Quay St., Rockhampton, QLD**

title: **Amenities Sections** rev. dwg no. **CD.401**

design GC/CPI drawn GC/MJW chkd

job no. BT190702

date 28/01/20

scale 1:20, 1:100 orig size A3

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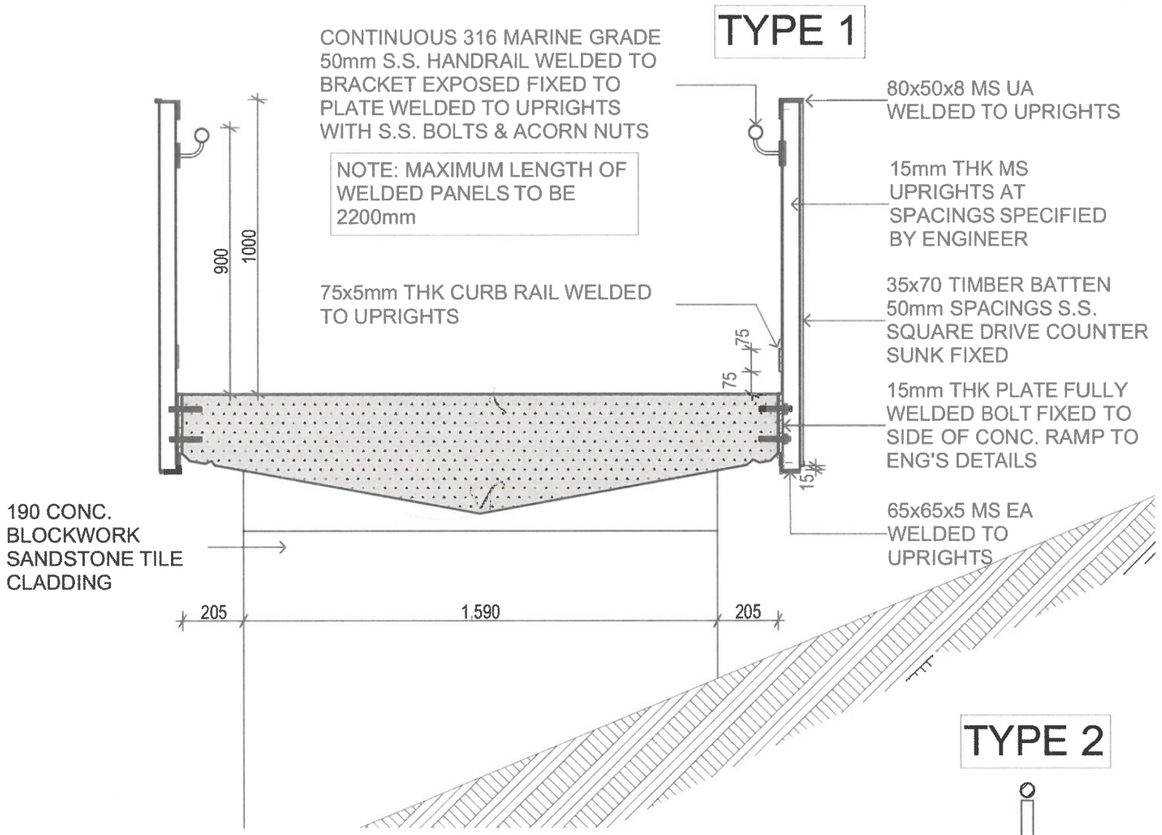
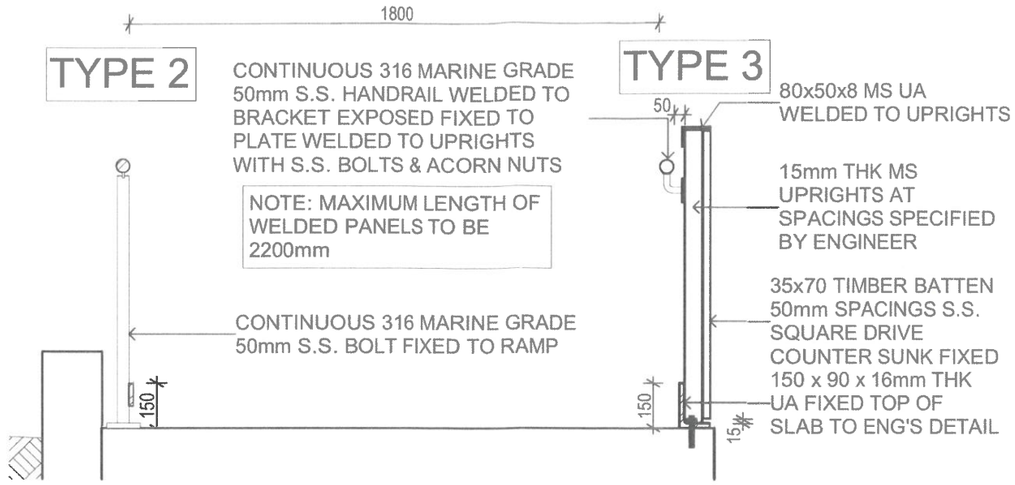
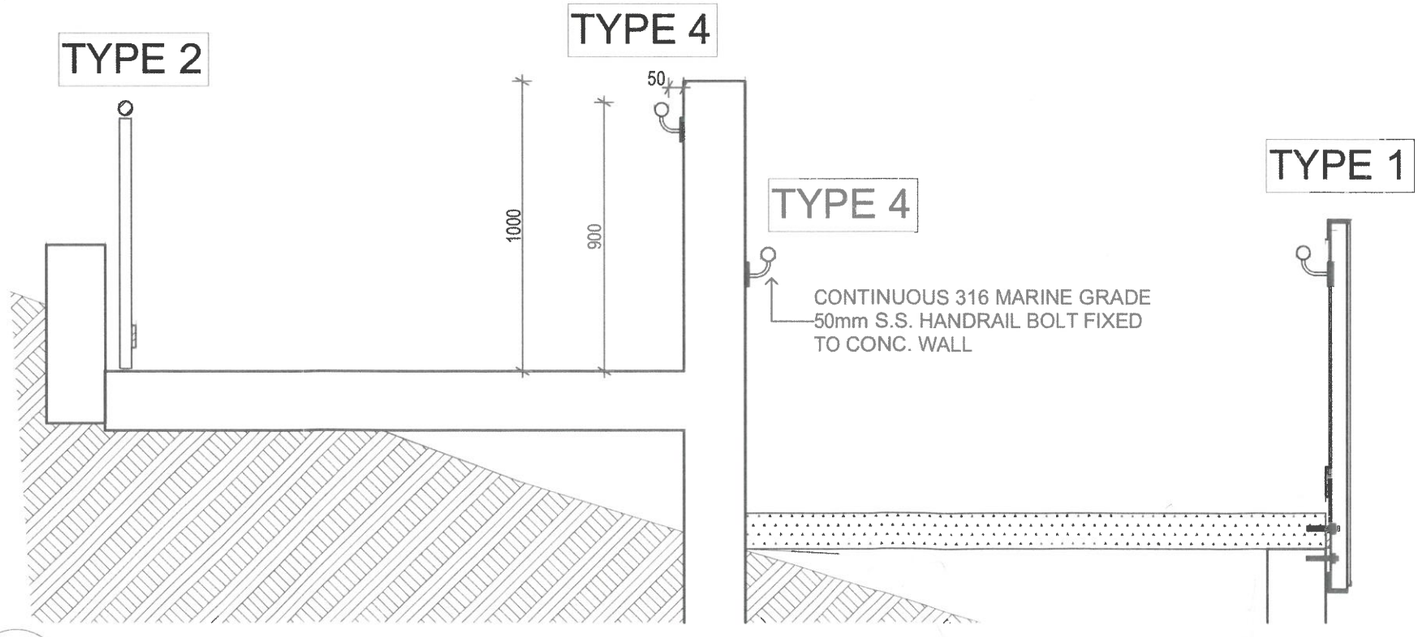


RD1 103 Conc. Suspended Ramp Detail Section 1:20

NOTE: ALL STEEL WORK BLASTED AND POWDERCOATED AFTER FABRICATION



RD2 104 Ramp & Handrail Detail Section 1:20



RD3 105 Ramp & Handrail Detail Section 1:20

ROCKHAMPTON REGIONAL COUNCIL

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Revisions			Rev
rev	date	description	isio
-	28.01.20	ISSUE FOR TENDER	MJW

Project Details

client: Rockhampton Regional Council

project: Riverside Park Amenities & Ramps

address: Quay St., Rockhampton, QLD

title: Ramp Sections

rev.

dwg no. CD.402

design GC/CPI | drawn GC/MJW | chkd

job no. BT190702

date 28/01/20

scale | orig size A3

29 (Little) Musgrave Street, North Rockhampton, QLD 4701
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Board of Architects Queensland Registration No. 2592

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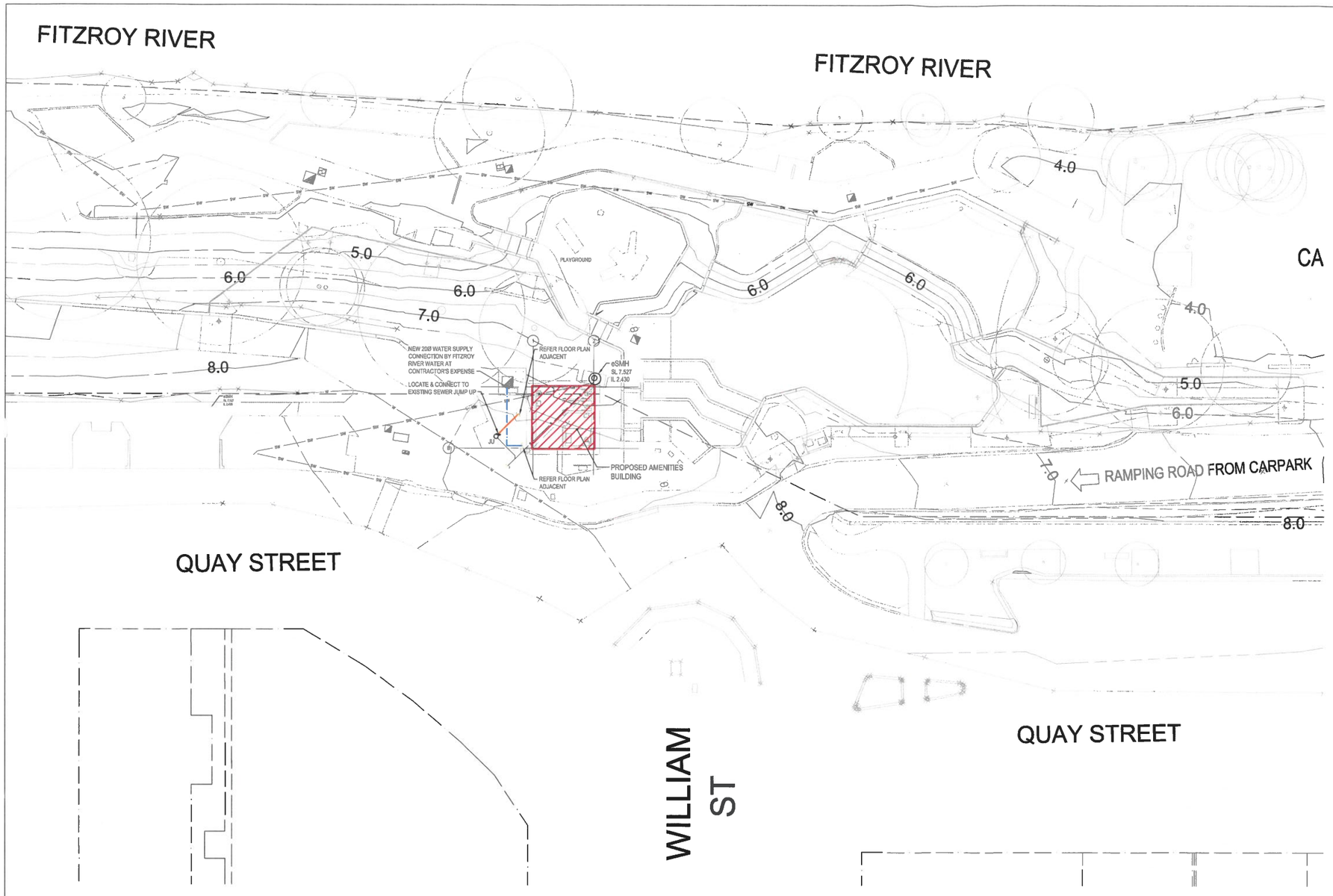
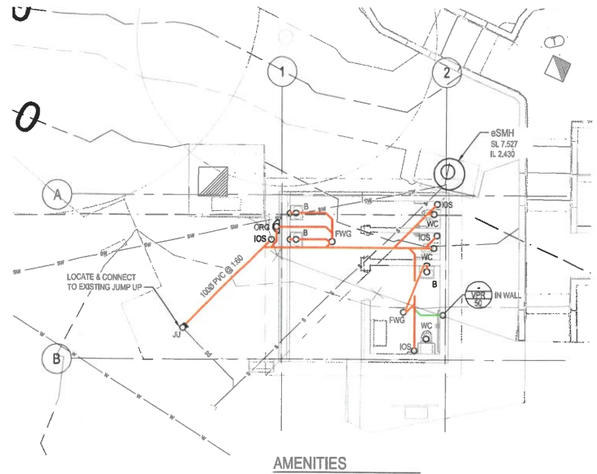
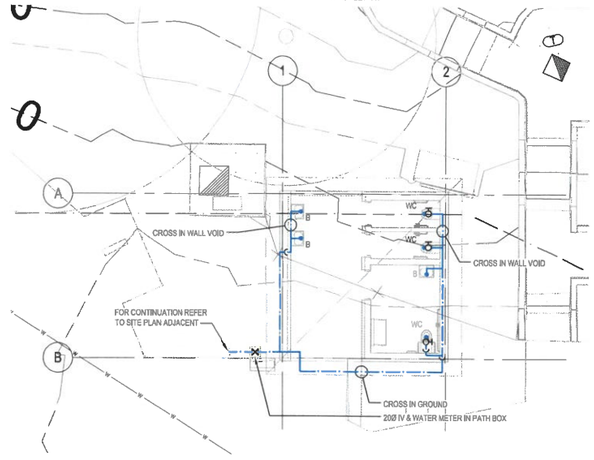


SITE PLAN
HYDRAULIC SERVICES
SCALE: 1:200 AT SHEET A1

FIXTURE TABLE	
FIXTURE	PIPE SIZE
BASIN	40Ø
WC	100Ø
FWG	100Ø
ALL HOUSE DRAINAGE TO BE 100mm @ 1:60 min. UNLESS NOTED OTHERWISE.	



AMENITIES
DRAINAGE SERVICES
SCALE: 1:100 AT SHEET A1



AMENITIES
WATER SERVICES
SCALE: 1:100 AT SHEET A1

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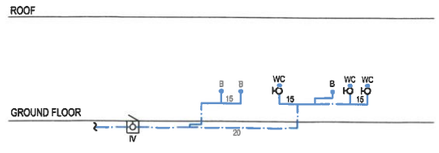

WATER SERVICES DIAGRAMMATICS
SCALE: NTS AT SHEET A1

DATE	STAGE	DESCRIPTION	REV. No.	AUTH.
29.01.20	PCP	ISSUED FOR TENDER	03	SF
23.01.20	PCP	ISSUED FOR APPROVAL	02	SF
21.01.20	PCP	ISSUED FOR APPROVAL	01	SF

ARCHITECT
BEAT ARCHITECTS
BROWN EVANS + TROPICAL

HYDRAULIC CONSULTANT
MRP HYDRAULIC & FIRE SERVICES CONSULTANTS PTY LTD
■ BRISBANE ○ SUNSHINE COAST
A: Unit 1/83 Annerley Rd, Woolloongabba, QLD PO Box 8143, Woolloongabba, QLD, 4102
P: (07) 3846 4379
F: (07) 5443 1136
E: admin@mrp.com.au
W: mrp.com.au
BSA: 1137134 ABN: 23 126 270 328 QBCC: 1137134

PROJECT DESCRIPTION & ADDRESS
AMENITIES - RIVERSIDE PRECINCT
214 QUAY STREET, ROCKHAMPTON CITY, QUEENSLAND, 4700
Lot 7 on SP289445

VERIFIED BY: DATE
DESIGNER DATE

HYDRAULIC SERVICE SHEET DESCRIPTION
SITE & AMENITIES PLAN
HYDRAULIC SERVICES

ISSUED FOR TENDER
NOT FOR CONSTRUCTION

PROJECT NUMBER	SCALE	SHEET SIZE
19-0455	Noted	A1
SHEET NUMBER	REVISION NUMBER	
H -102	03	

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Rockhampton QLD 4700
Australia
www.aecom.com

+61 7 4927 5541 tel
+61 7 4927 1333 fax
ABN 20 093 846 925

3 March 2016

Rockhampton Regional Council
PO Box 1860
Rockhampton QLD 4700

Attention: Andrew Collins

Dear Andrew

Quay Street Riverbank Development - High Level Scour Assessment

The Quay Street Riverbank Development will consist of recreational, amenity and commercial uses including promenades, piers, gardens and building structures. As the proposed development borders the Fitzroy River, there is potential for flood and scour damage of the development during flood events in which the banks of the Fitzroy River are overtopped.

With reference to Table 1 and Chart 1 below, bank overtopping within the subject site may occur for flood levels greater than approximately 4.8 mAHD (6.25 mRGD, meters Rockhampton Gauge Datum = mAHD + 1.45m).

Following completion of the high level flood impact assessment for the development, the findings of which were delivered to Rockhampton Regional Council (RRC) via email on 25 January 2016, AECOM Australia Pty Ltd (AECOM) have been engaged to undertaken a high level scour assessment of the project.

1.0 Objective

The objective of this stage of the project is to undertake a high level, qualitative scour assessment to identify areas within the proposed development that could be at potential risk of scour during an out of bank flood event in the Fitzroy River. The scour assessment is limited to the overbank area only and does not include assessment of flood risk to buildings.

The investigation is to utilise RRCs existing TUFLOW model of the Fitzroy River which has been previously calibrated and deemed suitable for this high level investigation.

2.0 Data

Information collected and reviewed to inform this high level assessment includes the following:

- Development layout plans (Urbis December 2015, Woods Bagot January 2016).
- Maximum depth, water level and velocity results file from a TUFLOW hydraulic model of the Fitzroy River.

As noted above a dynamically linked one dimensional (1D) / two dimensional (2D) TUFLOW hydraulic model has previously been prepared for the Fitzroy River for the purposes of assessing flood risk. This model covers a large reach of the Fitzroy River and has a 25m grid resolution of the greater Rockhampton area (See Figure 1). The results therefore present a coarse representation of flood water velocity at the proposed development. This flood risk model has been calibrated, verified and undergone external peer review.

The model outputs have been analysed to identify indicative flow velocities in the flood water to enable a qualitative, high level assessment of the risk of potential scour of the proposed development during an overbank flooding event.

3.0 Model Results

The 1D/2D TUFLOW model has been simulated for a range of events, including the 39%, 18%, 10%, 5%, 2% and 1% Annual Exceedance Probability (AEP) design storm events for the pre-development scenario. The model has also been simulated for the 1% AEP design storm event with a broad scale representation of the proposed Quay Street Riverbank Development within the model. A presentation of the post-development peak flood velocity and peak flood elevation for the 1% AEP design event is presented in Figure 2 and Figure 3 respectively. These figures also present the general layout of the development.

The model outputs of velocity, depth and elevation are provided in Table 1, at a location within the development area that is 100m upstream of the proposed building on Denham Street. This location has been selected as the results are representative though the whole development area.

Table 1 Model Results at one Representative Location

Model Scenario	Peak Velocity * (m/s)	Peak Depth (m)	Peak Water Level (mAHD)	Equivalent Gauge Level (mRGD) **
Pre-development 39% AEP	0.00	0.00	3.06	4.48
Pre-development 18% AEP	0.56	2.58	6.07	7.42
Pre- development 10% AEP	0.87	3.47	6.96	8.27
Pre- development 5% AEP	1.01	4.09	7.58	8.92
Pre- development 2% AEP	1.05	4.40	7.89	9.25
Pre- development 1% AEP	1.09	4.68	8.17	9.56
Post- development 1% AEP	1.01	4.69	8.18	9.56

* Peak velocities shown are depth averaged velocities extracted from the 2D model and may not represent the actual peak velocity within the water column.

** mRGD = meters Rockhampton Gauge Datum (mAHD + 1.45m), represents the equivalent peak Rockhampton flood gauge level for the AEP event. The Rockhampton flood gauge is located at the eastern end of Derby Street, approximately 300m south of the subject site.

The results in Table 1 suggest that there is negligible change in the flood characteristics of the 1% AEP event due to the development. It also indicates that although there is a difference in flood water depth / level for the design events from 5% AEP through to 1% AEP, there is only minor difference in the maximum flood velocities.

3.1 Frequency of Inundation

The proposed development has an elevation of between 4.8 mAHD and 8.0 mAHD (6.25 mRGD to 9.45 mRGD). The peak flood elevations for the events have been plotted in Chart 1. This indicates that parts of the development have less than a 25% AEP flood immunity.

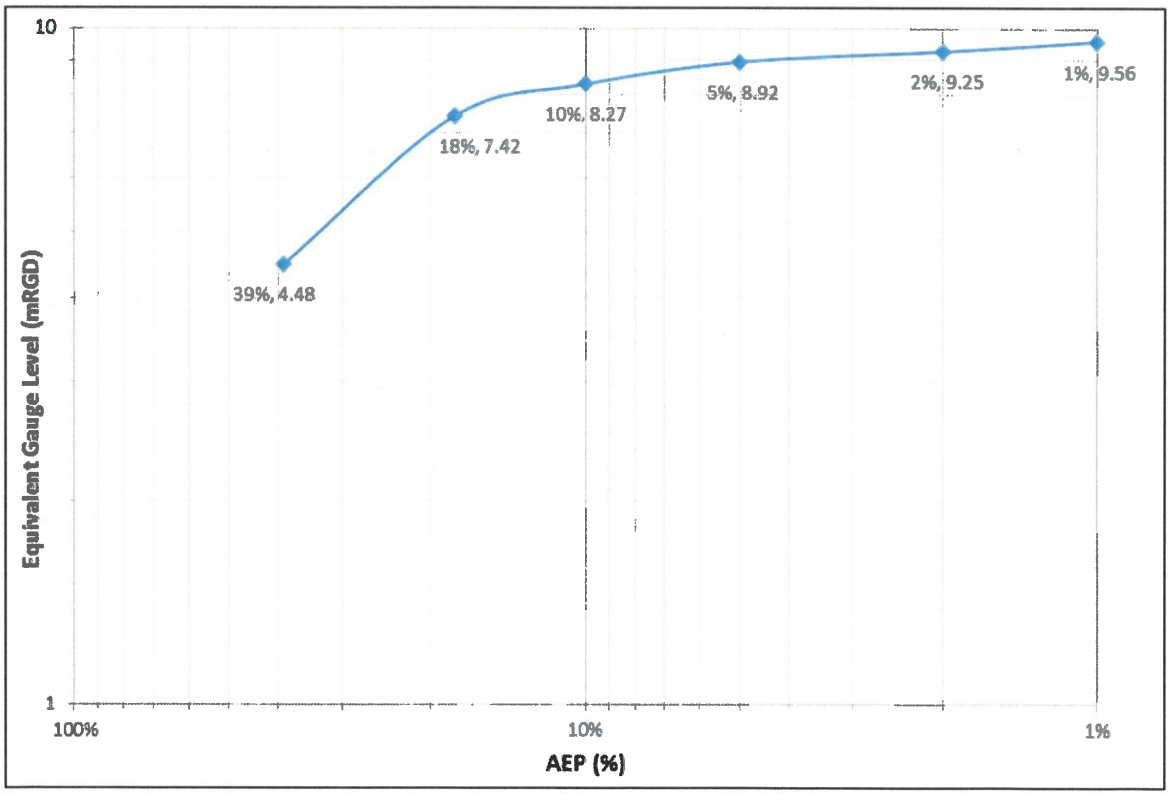

Chart 1 Peak Flood Elevation – Rockhampton Flood Gauge

4.0 High Level Scour Assessment

The model grid resolution is 25m and the development site is approximately 30m wide. There is not sufficient resolution in the model grid to determine the flow paths through the site. Due to this, the velocities modelled through the site may be significantly over or underestimated as local changes in topography across the site and obstructions to flow have not been represented in detail. To determine detailed velocity calculations throughout the site, would require a finer (1m or less) grid resolution model representing the proposed development topography.

In the absence of detailed velocity data an assessment of potential locations of scour risk at the site have been identified in Table 2. The potential locations that may be subjected to scour have been mapped and presented in Figure 4.

Table 2 Potential Areas subject to Scour

Development Feature	Potential Scour Mechanisms	Comment on Quay Street Riverbank Development Scour Potential
Pier Structures	A scour hole can occur immediately upstream and / or downstream of pier type structures due to accelerated flows, with the material being deposited immediately downstream of the pier.	All piers proposed for the project will utilise existing pier locations. It is noted that these existing piers have experienced multiple flood events with no documented scour issues. It is considered that the scour risk is therefore **low**.
Wide Obstructions (walls/buildings)	Flow will be directed around wide obstructions. This may increase localised changes in velocity and cause eddies downstream, increasing the scour potential.	There are wide obstructions proposed within the Riverbank Development which may result in localised increases in velocity and downstream eddies. The risk of scour is however considered **low** as observed during previous flood events. The existing areas of wide obstructions did not result in increased scour in the vicinity or downstream of the obstruction.
Interface between structures / pavement and non-paved	The higher strength paved areas and structures can focus energy to the adjacent non-paved area and potentially cause undermining of the pavement.	The existing ground conditions have a number of transitions between concrete and grassed areas, which have not previously been observed to experience scour during flood events. The risk is therefore considered **low** under the proposed development.
Steep change in topography	Large changes in elevation such as at walls, or steps can cause a sudden change in the flow pattern and velocity. This can cause eddies and increased scour potential.	The existing steep changes in grade do not show evidence of increased scour potential during previous flood events. Again the risk of scour is considered **low** under the proposed development.
Grassed areas	Grassed areas can form a protective barrier for the underlying soils. However, damage to the grass can expose the underlying soil and potentially lead to scour.	Due to the relatively low peak velocities predicted in the development area, the risk of damage to established grass areas is considered **low**. This is evidenced by previous overbank flooding of the area which did not result in damage to established grass areas.
Mulched garden bed	The mulch within garden beds is at risk of floatation and removal at low velocities.	Observations following previous overbank flooding have shown that garden bed areas are at a **high** risk of removal due to floatation of mulch and other light materials.

Final recommendations on treatments have not provided at this stage of the project, due to the three dimensional (3D) design of the proposed works not being available. As noted above, the current model resolution also limits a detailed assessment of scour potential.

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5.0 Conclusion and Recommendations

The high level scour assessment has identified a number of areas within the Quay Street Riverbank Development which have the potential for increased scour risk. The summary provided in Table 2 and graphically on Figure 4 identifies these areas and the reason for the potential scour risk.

As noted above at the time of completion of this high level scour assessment, the 3D design was not complete and detailed ground surface levels of the proposed development were not available. It is therefore recommended that this assessment be reviewed once the 3D design is complete.

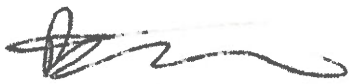
It is further recommended that the designers take this high level assessment into account and, if deemed necessary, consider undertaking a more detailed scour assessment using a finer model resolution.

6.0 Other General Comments

During our review of the proposed development design plans, we note the following general comments related to our extensive experience with Fitzroy River flooding within the study area:

- New infrastructure should be designed for easy clean down, as this area is susceptible to deposits of silt and debris once flood waters recede.
- All new structures will need to be designed for hydrodynamic loading as per the relevant standard, taking into particular account loads imposed by uplift and debris loading.
- Any below ground structures (e.g. pump stations, lifts etc) should be assessed and designed for buoyancy forces that may be imposed during Fitzroy River flood events, where the overbank area is submerged.

Yours faithfully
for AECOM Australia Pty Ltd



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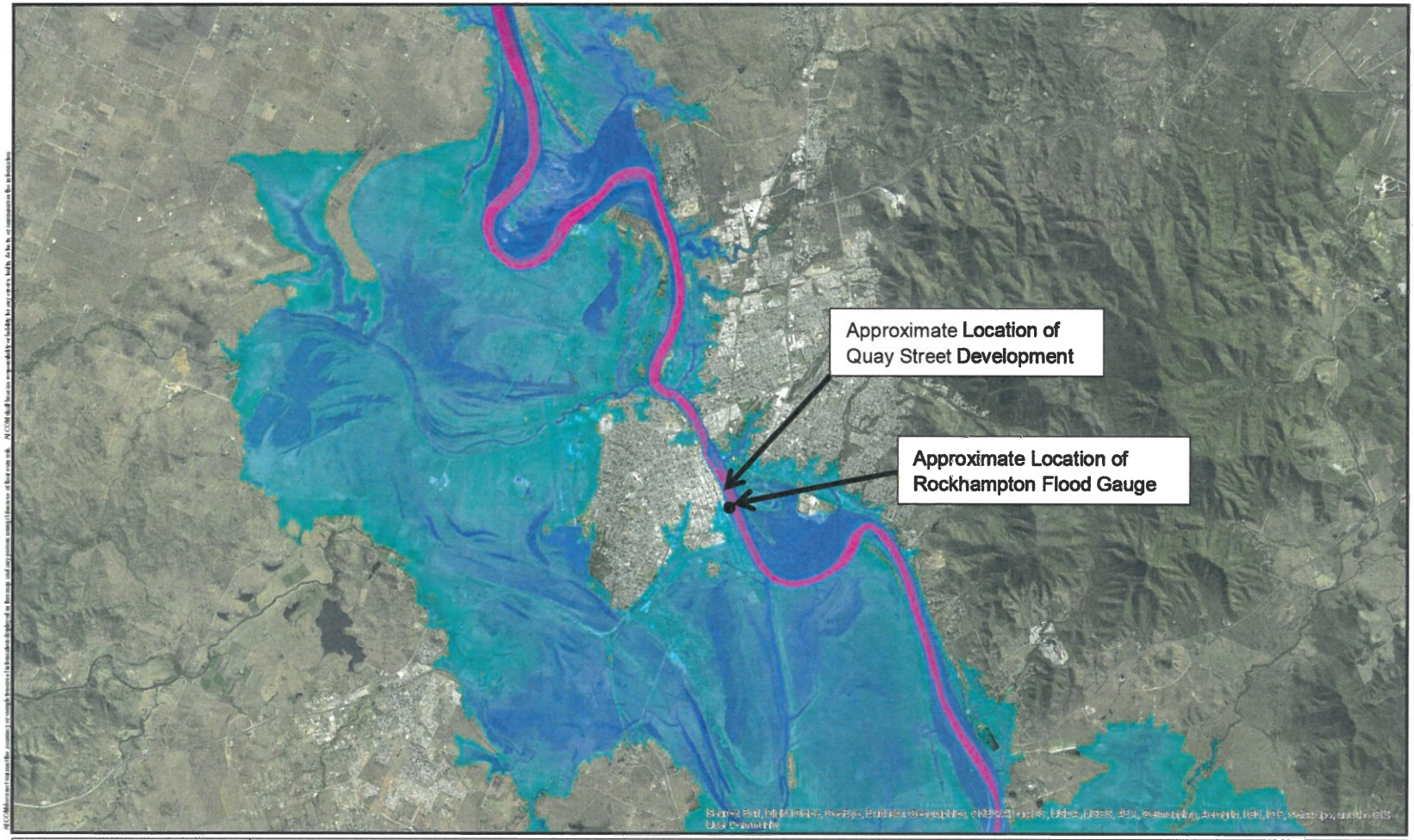
Approximate Location of Quay Street Development
Approximate Location of Rockhampton Flood Gauge
LEGEND
100yr Depth (Pre-development) (m)
High : 21.014
Low : 0
Large Scale Model Results
100yr ARI Peak Flood Depth
QUAY STREET
Figure
1

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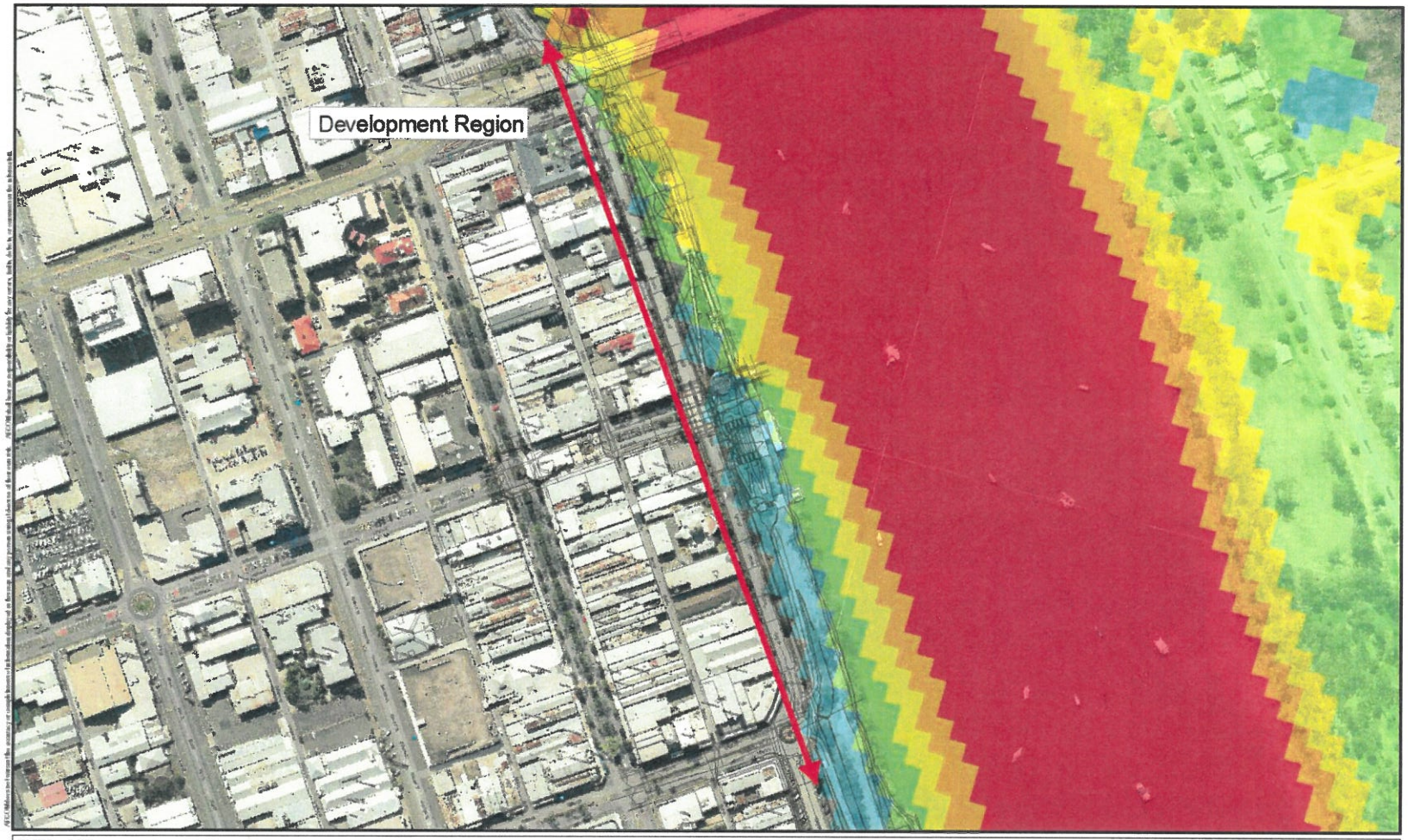

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LEGEND

— Layout 100yr Velocity (Post-development) (m/s)

- 0 - 0.5
- 0.5 - 1
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5

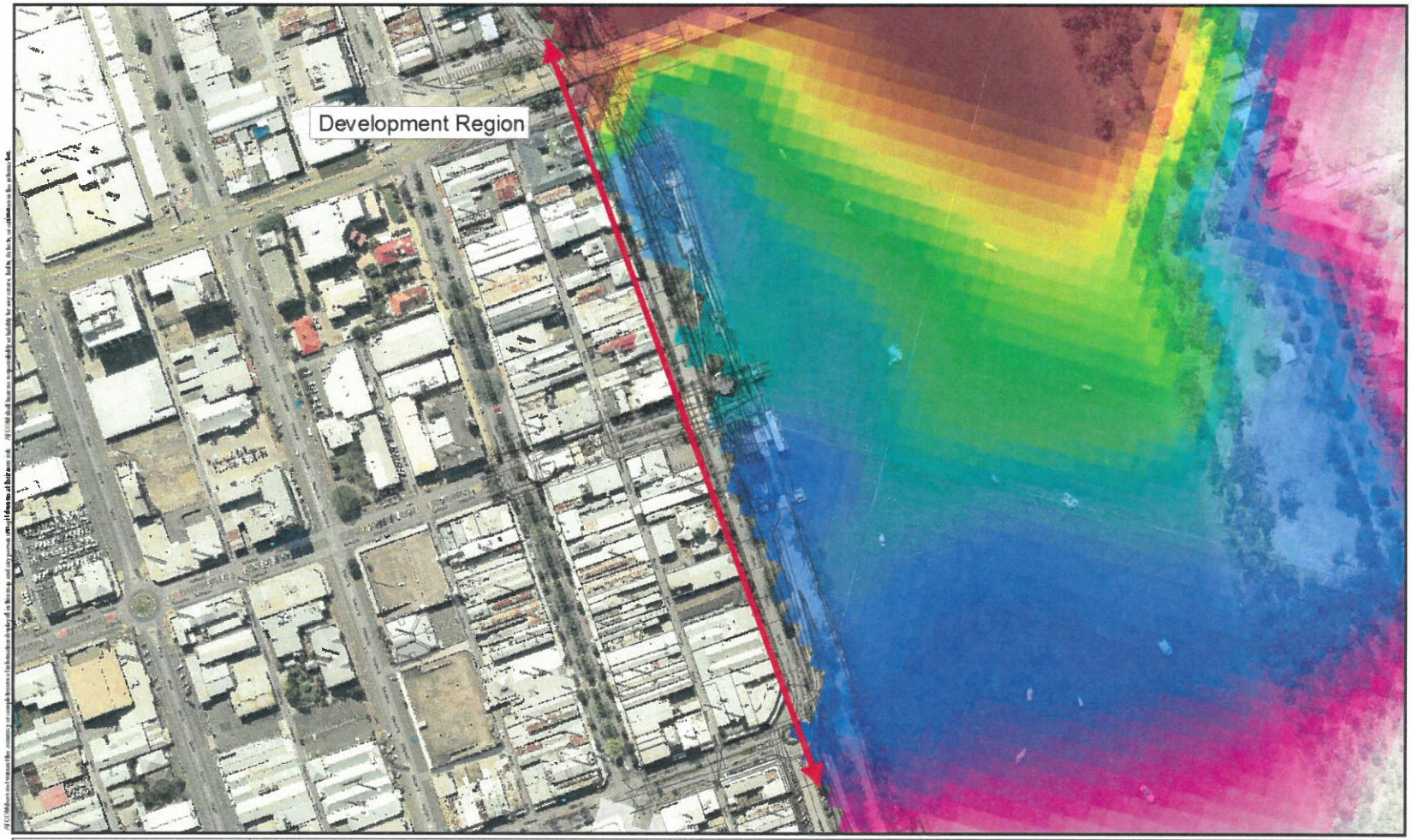
Development Model Results

100yr ARI Peak Flood Velocity

QUAY STREET

Figure 2

A3 size



LEGEND
Layout
100yr Elevation (mAHD)
High : 8.3
Low : 8.1

Development Model Results
100yr ARI Peak Flood Elevation
QUAY STREET
Figure 3
A3 size

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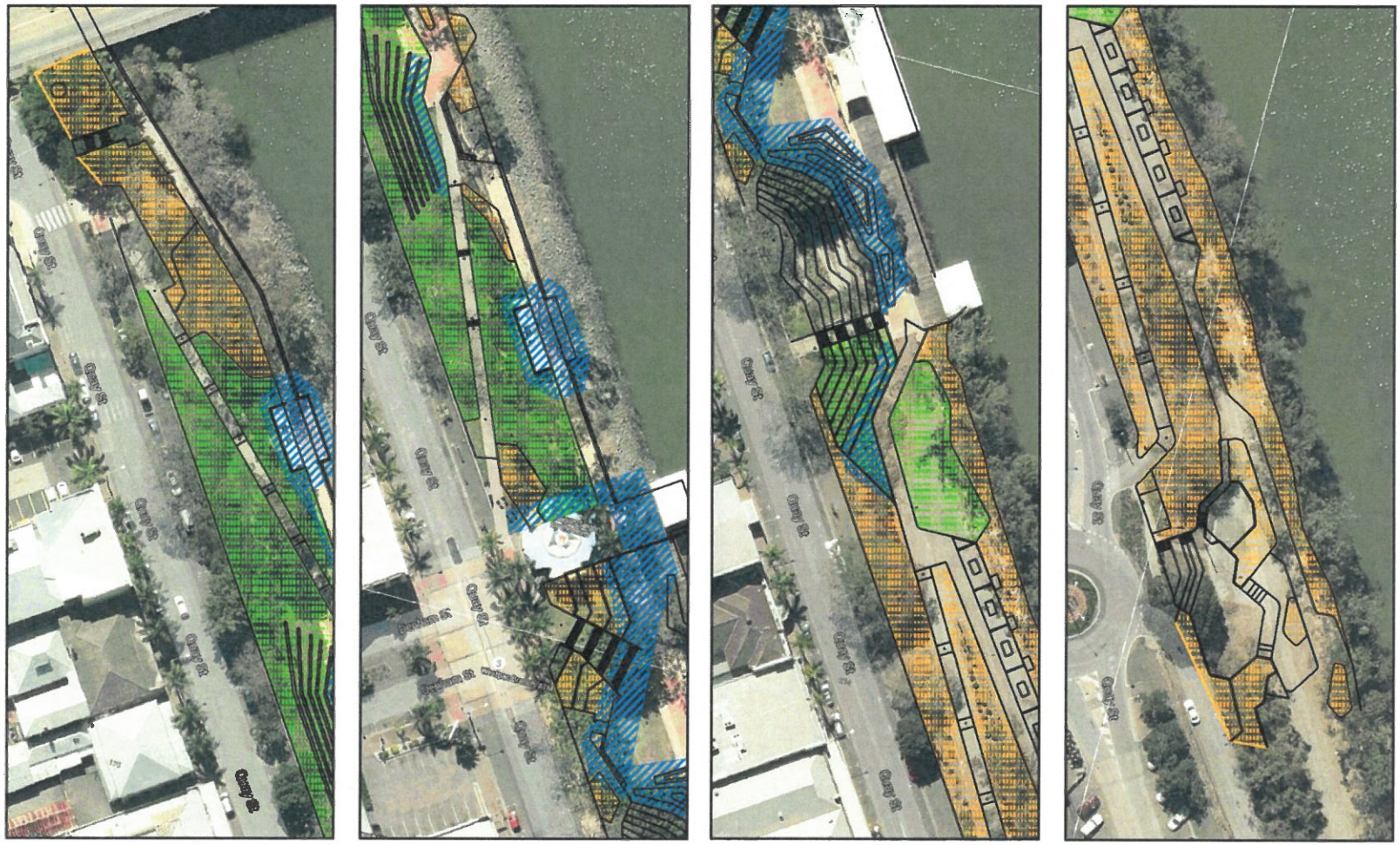

PROJECT ID: 60486367
CREATED BY: DM
APPROVED BY: NA
LAST MODIFIED: 25 FEB 2016

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DATUM GDA 1994 PROJECTION MGA ZONE 56

when plotted at A3)

Legend

Development Outline

Potential Scour Areas

Flow Direction Change

Garden

Grass

This figure presents mapping of grassed and garden areas which are typically more susceptible to scour than the non-mapped paved areas. The figure also maps locations where it is anticipated that there will be a sharp change in the flow direction, which would increase localised velocities and may increase the scour potential.

Scour Potential

QUAY STREET

Figure

4

From: Corbett, Richard <Richard.Corbett@aecom.com>
Sent: Monday, 25 January 2016 6:48 PM
To: Andrew Collins
Cc: Robert Holmes; Maree Anderson; Angus Russell; McMaster, Ben
Subject: Quay Street Riverbank Development - Results of High Level Flood Impact Assessment
Attachments: image002.emz; image015.emz; RL5-16.pdf

Andrew,

Hi, how are you? Hope you had a pleasant weekend.

The TUFLOW modelling for **Stage 1 – Project Setup and Initial High Level Flood Impact Assessment** is now complete.

The recently updated Yeppen South As-Constructed TUFLOW model was used as the Basecase for this assessment. The following changes were implemented to create the Developed Case:

- 2 x 25m grid cells raised to 99m (glass wall), over the Saigon Saigon structure.
- 1 x 25m grid cell raised by 1m over the wet play area (as per design plans provided).
- Centreline along Quay Street updated using design levels provided.

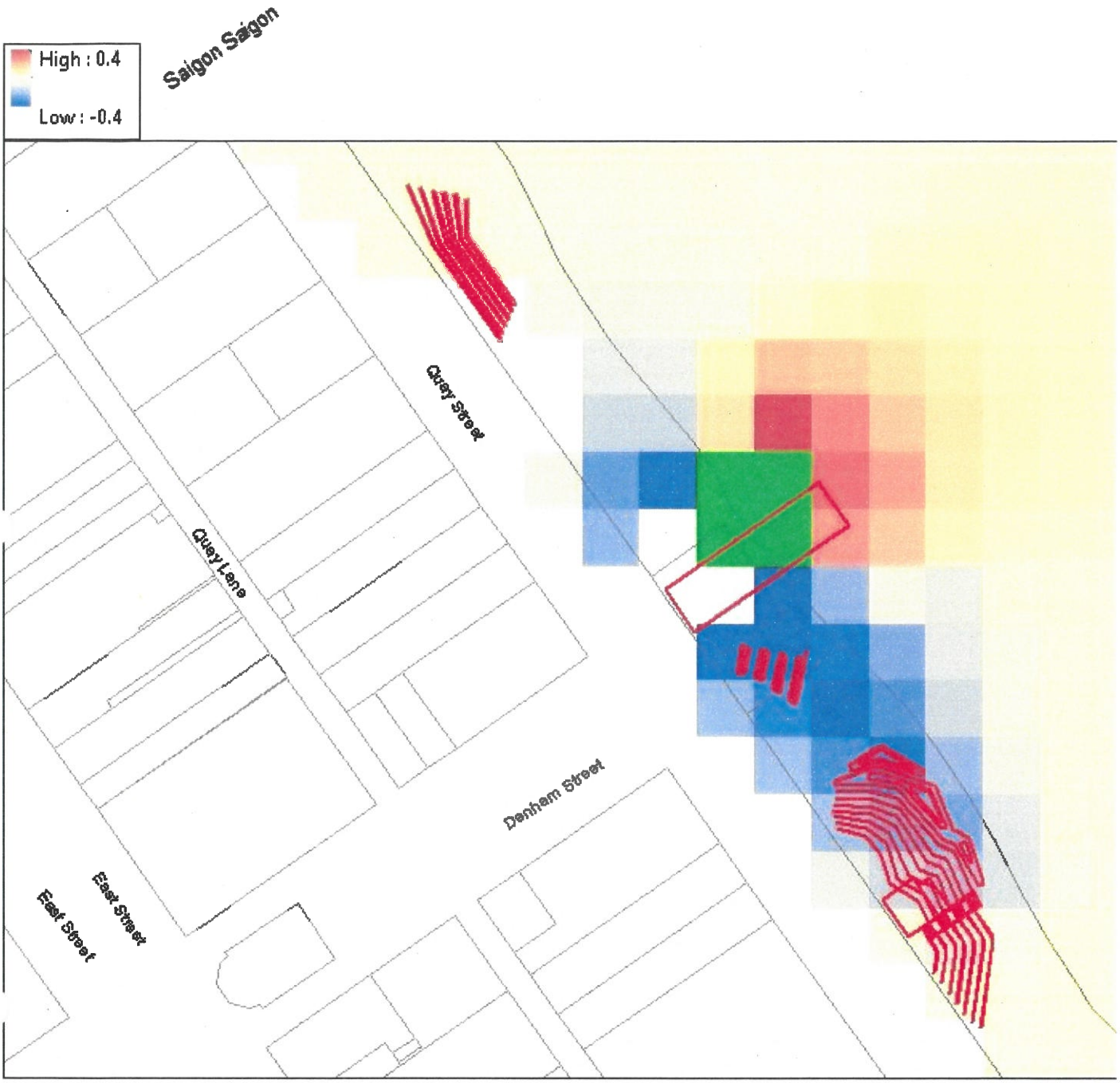
Note that the stairs to the north-west of Saigon Saigon were not altered, due to their sub-grid scale size.

The results show minimal difference in Peak Water Surface Elevations (PWSE) for the 1% AEP event (refer image below).
There is a slight increase upstream of Saigon Saigon, of ~0.01m, accompanied by a maximum ~0.03m decrease downstream.
The green area depicts a grid cell that 'was wet and is now dry'.

1% AEP Difference in PWSE

The maximum increase in velocity is ~0.4m/s adjacent to the Saigon Saigon structure, which raises the depth averaged peak velocity to ~1.65m/s.
The difference in Peak Velocity is shown in the image below.

1% AEP Difference in Peak Velocity



As the Stage 1 assessment has predicted minimal impact, AECOM recommends that there is no need to undertake **Stage 2a – Detailed Flood Impact Assessment.**
Note that our final QA is in progress and this recommendation will be confirmed on Wednesday.

We will also be in contact later in the week to discuss the requirements for **Stage 2b – Scour Assessment and Advice.**

Let me know if you require any further information regarding the Stage 1 assessment.

Regards

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