bega valley
shire council

Pambula River, Pambula Lake and Yowaka River Flood Study

Draft Report for Public Exhibition

Volume 2 of 2: Figures

Revision 2
January 2021

Catchment Simulation Solutions

►► FIGURES

Figure 1:
Pambula River, Pambula
Lake and Yowaka River
Catchment

Figure 2:
Digital Elevation Model

LEGEND
Ground Surface Elevation (mAHD)

=< 0		50	
2		75	
4		100	
6		150	
8		200	
10		250	
20		300	
30		400	
40		>= 500	

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:100,000 (at A3)

0   2.5   5.0
Km

Prepared By:
Catchment Simulation Solutions
Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name: Locality AreaDigital Elevation Model.qqs

Figure 3:
Existing Datasets

LEGEND

Plans
- Council drainage Plans
- RMS Plans

Survey
- Hydrosurvey Extent (2003)
- 2018 LiDAR Extent
- 2013 LiDAR Extent
- Cross Sections from Pambula River Data Assessment Study (1990)

Structures
- Stormwater Pipe/ Culvert
- Stormwater Pit
- Bridge

Recorded Flood Marks
- 1985
- Other

Scale 1:100,000 (at A3)

0   2.5   5.0
Km

Prepared By:

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Sydney, NSW 2000

File Name: Extent of available data.qqs

Please refer to Figure 3.1 for detail

Myrtle Mountain
Tura Beach
Merimbula
Wyndham
South Pambula
Lochiel
Greigs Flat
Broadwater
Burragate
Nethercote
Eden
Towamba

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Figure Extent

Pambula

Pambula Beach

LEGEND

Plans

◆ Council drainage Plans

◆ RMS Plans

Survey

▨ Hydrosurvey Extent (2003)

▨ 2018 LiDAR Extent

▨ 2013 LiDAR Extent

— Cross Sections from Pambula
River Data Assessment Study
(1990)

Structures

— Stormwater Pipe/ Culvert

● Stormwater Pit

▲ Bridge

Recorded Flood Marks

■ 1985

■ Other

N
W E
S

Scale 1:15,000 (at A3)

0   0.5   1.0

Km

Figure 3.1:
Existing Datasets

Prepared By:

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File Name: Extent of available data.qqs

Figure 4:
Location of Rainfall and Stream Gauges

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LEGEND

- Long Grass
- Short Grass
- Dense Trees
- Watercourse
- Sand
- Wetlands/Mangroves
- Concrete
- Paved Road
- Gravel Road
- Building

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:100,000 (at A3)

| 0 | 2.5 | 5.0 |

Km

**Figure 5:
Remote Sensing Land
Use Map**

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Sydney, NSW 2000

File Name: Remote Sensing.qqs

Myrtle Mountain
Tura Beach
Merimbula
Wyndham
Pambula
Pambula Beach
South Pambula
Lochiel
Greigs Flat
Broadwater
Burragate
Nethercote
Eden
Towamba

Figure 6:
Additional Information
Collected for Study

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Figure Extent

**Figure 7.1
XP-RAFTS Model
Layout**

Scale 1:32,000 (at A3)
0   0.75   1.5

Prepared By:

Catchment Simulation Solutions
Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name: Figure 7 XP-RAFTS Model Layout.qgs

Pambula River
MOUNT DARRAGH ROAD

Figure 7.2
XP-RAFTS Model
Layout

Figure 7.3
XP-RAFTS Model Layout

LEGEND

- Subcatchment Boundaries
- XP - RAFTS Node
- XP - RAFTS Link
- Streams
- Major Roads

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:32,000 (at A3)

Prepared By:

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File Name: Figure 7 XP-RAFTS Model Layout.qgs

Figure 7.4
XP-RAFTS Model
Layout

LEGEND

Subcatchment Boundaries
XP - RAFTS Node
XP - RAFTS Link
Streams
Major Roads

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:32,000 (at A3)
0   0.75   1.5

Prepared By:
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Sydney, NSW 2000

File Name: Figure 7 XP-RAFTS Model Layout.qgs

Figure 7.5
XP-RAFTS Model
Layout

LEGEND

- Subcatchment Boundaries
- XP - RAFTS Node
- XP - RAFTS Link
- Streams
- Major Roads

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:32,000 (at A3)

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File Name: Figure 7 XP-RAFTS Model Layout.qgs

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Figure 7.6
XP-RAFTS Model
Layout

LEGEND

- Subcatchment Boundaries
- XP - RAFTS Node
- XP - RAFTS Link
- Streams
- Major Roads

Figure 8.1
TUFLOW Model
Layout

LEGEND

TUFLOW Model Extent
Gully Lines
Hydraulic Structures
Culverts
Bridges
Boundary Conditions
Downstream Stage Boundary
100.1 Total Inflow Location
180.1 Local Inflow Location
Stormwater
Stormwater Pipe

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:27,000 (at A3)

0   0.75   1.5

Figure 8.2
TUFLOW Model
Layout

Figure 8.3
TUFLOW Model
Layout

LEGEND

TUFLOW Model Extent
Gully Lines
Hydraulic Structures
Culverts
Bridges
Boundary Conditions
Downstream Stage Boundary
100.1 Total Inflow Location
180.1 Local Inflow Location
Stormwater
Stormwater Pipe

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:27,000 (at A3)

0   0.75   1.5

Prepared By:
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Sydney, NSW 2000

File Name: Figure 8 TUFLOW Model Layout

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Pambula Beach
South Pambula
Greigs Flat
Pambula Lake
Broadwater
NETHERCOTE ROAD
PRINCES HIGHWAY

bega valley
shire council

LEGEND

- ▭ TUFLOW Model Extent
- — Gully Lines

Hydraulic Structures

- — Culverts
- — Bridges

Boundary Conditions

- +++ Downstream Stage Boundary
- • 100.1 Total Inflow Location
- ○ 100.1 Local Inflow Location

Stormwater

- — Stormwater Pipe

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:10,000 (at A3)

0   0.3   0.6

N

W   E

S

**Figure 8.4
TUFLOW Model
Layout**

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Sydney, NSW 2000

File Name:Figure 8 TUFLOW Model Layout

Pambula

PRINCES HIGHWAY

LEGEND

TUFLOW Model Extent
Gully Lines
Hydraulic Structures
Culverts
Bridges
Boundary Conditions
Downstream Stage Boundary
100.1 Total Inflow Location
100.1 Local Inflow Location
Stormwater
Stormwater Pipe

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:10,000 (at A3)

0   0.3   0.6

**Figure 8.5
TUFLOW Model
Layout**

File Name:Figure 8 TUFLOW Model Layout

Pambula Beach

Calibration Maps

Figure 9:
Isohyet Map for
2016 Storm

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Figure Extent

LEGEND
Catchment Boundary
Rainfall Isohyet (mm)
Rainfall Gauge Number
Rainfall Recorded Depth

Rainfall (mm)
<= 100
200
300
400
500
>= 600

Notes:
Aerial photograph: Google Satellite 2019

Scale 1:100,000 (at A3)
0   2.5   5
Km

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Sydney, NSW 2000

File Name: Isohyet 2016 storm

69147
211mm

220003
273mm

69153
314mm

69015
149mm

420
400
380
360
340
320
300
280
260
240
220
200
180
160

Figure 10.1
Simulated Floodwater Depths
for 2016 Flood

Figure 10.2
Simulated Floodwater Depths
for 2016 Flood

LEGEND

Simulated flood depth (m)

Description of flood depth

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

Scale 1:27,000 (at A3)

0   0.75   1.5

Prepared By:

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Sydney, NSW 2000

File Name: Figure 10 Simulated Floodwater
Depths for 2016 Flood

Figure 10.3
Simulated Floodwater Depths
for 2016 Flood

LEGEND

Simulated flood depth (m)

Description of flood depth

Depths (m)

	0.1 to 0.5
	0.5 to 1.0
	1.0 to 2.0
	2.0 to 5.0
	> 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

Scale 1:10,000 (at A3)

0   0.3   0.6

**Figure 10.4
Simulated Floodwater Depths
for 2016 Flood**

Prepared By:

CatchmentSimulation Solutions
Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name:Figure 10 Simulated Floodwater
Depths for 2016 Flood

0.85

1.0 m of water within creek

Figure 10.5
Simulated Floodwater Depths
for 2016 Flood

Figure 10.6
Simulated Floodwater Depths
for 2016 Flood

Figure Extent

LEGEND

☐ Catchment Boundary
—220— Rainfall Isohyet (mm)
▲ Rainfall Gauge Number
   Rainfall Recorded Depth

Rainfall (mm)
	<= 100
	200
	300
	400
	500
	>= 600

Notes:
Aerial photograph: Google Satellite 2019

N
W   E
S

Scale 1:100,000 (at A3)

0   2.5   5

Km

Figure 11:
Isohyet Map for
2012 Storm

Prepared By:

Catchment Simulation Solutions
Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name: Isohyet 2012 storm

69151
173mm

180

69147
184mm

69024
199mm

160

69153
160mm

69015
146mm

Figure 12.1
Simulated Floodwater Depths
for 2012 Flood

LEGEND

Simulated flood depth (m)

Description of flood depth

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

Scale 1:27,000 (at A3)

0   0.75   1.5

Prepared By:

Catchment Simulation Solutions
Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name:Figure 12 Simulated Floodwater
Depths for 2012 Flood

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shire council

bega valley shire council

N
W E
S

Scale 1:27,000 (at A3)

0   0.75   1.5

**Figure 12.2
Simulated Floodwater Depths
for 2012 Flood**

Prepared By:

CatchmentSimulation Solutions
Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name: Figure 12 Simulated Floodwater
Depths for 2012 Flood

Flooding near Harts Bridge

Yowaka River

Old Hut Creek

Nethercote

Figure 12.3
Simulated Floodwater Depths
for 2012 Flood

Figure 12.4
Simulated Floodwater Depths
for 2012 Flood

Figure 12.5
Simulated Floodwater Depths
for 2012 Flood

bega valley
shire council

N
W — E
S

Scale 1:10,000 (at A3)

0   0.3   0.6

**Figure 12.6
Simulated Floodwater Depths
for 2012 Flood**

Prepared By:

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Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name: Figure 12 Simulated Floodwater
Depths for 2012 Flood

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Figure Extent

69151
159mm

69147
110mm

69024
128mm

69066
412mm

220003
202mm

69015
178mm

120

140

160

180

200

220

240

260

280

300

320

340

360

380

400

420

N
W — E
S

Scale 1:100,000 (at A3)

0   2.5   5
Km

**Figure 13:
Isohyet Map for
2011 Storm**

Figure 14.1
Simulated Floodwater Depths
for 2011 Flood

LEGEND

Simulated flood depth (m)
○
Description of flood depth

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

Scale 1:27,000 (at A3)

0   0.75   1.5

Prepared By:
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Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name:Figure 14 Simulated Floodwater
Depths for 2011 Flood

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Figure 14.2
Simulated Floodwater Depths
for 2011 Flood

Figure 14.3
Simulated Floodwater Depths
for 2011 Flood

bega valley
shire council

LEGEND

Simulated flood depth (m)
○
Description of flood depth

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

N
W — E
S

Scale 1:10,000 (at A3)

0   0.3   0.6

**Figure 14.4
Simulated Floodwater Depths
for 2011 Flood**

Prepared By:

CatchmentSimulation Solutions
Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name:Figure 14 Simulated Floodwater
Depths for 2011 Flood

PRINCES HIGHWAY

Pambula

Figure 14.5
Simulated Floodwater Depths
for 2011 Flood

LEGEND

Simulated flood depth (m)

Description of flood depth

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

Scale 1:10,000 (at A3)

0   0.3   0.6

Prepared By:

Catchment Simulation Solutions
Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name:Figure 14 Simulated Floodwater
Depths for 2011 Flood

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Figure 14.6
Simulated Floodwater Depths
for 2011 Flood

Figure 15:
Isohyet Map for
1985 Storm

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Figure Extent

LEGEND

Catchment Boundary
Rainfall Isohyet (mm)
Rainfall Gauge Number
Rainfall Recorded Depth

Rainfall (mm)
<= 100
200
300
400
500
>= 600

Notes:
Aerial photograph: Google Satellite 2019

N
W E
S

Scale 1:100,000 (at A3)
0   2.5   5
Km

Prepared By:
Catchment Simulation Solutions
Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name: Isohyet 1985 storm

069093
160mm

069024
203mm

069066
232mm

069015
214mm

160
180
200
220
240
260

Figure 16.1
Simulated Floodwater Depths
for 1985 Flood

LEGEND

Simulated flood level (mAHD)
Surveyed flood level (mAHD)

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

Scale 1:27,000 (at A3)

0   0.75   1.5

Figure 16.3
Simulated Floodwater Depths
for 1985 Flood

Figure 16.5
Simulated Floodwater Depths
for 1985 Flood

Figure 16.6
Simulated Floodwater Depths
for 1985 Flood

LEGEND

Simulated flood level (mAHD)

Surveyed flood level (mAHD)

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

Scale 1:10,000 (at A3)

0   0.3   0.6

Prepared By:

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Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name:Figure 16 Simulated Floodwater
Depths for 1985 Flood

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Figure 17:
Isohyet Map for
1971 Storm

Figure 18.1
Simulated Floodwater Depths
for 1971 Flood

Figure 18.2
Simulated Floodwater Depths
for 1971 Flood

LEGEND

Simulated flood level (mAHD)
Surveyed flood level (mAHD)

Depths (m)
0.1 to 0.5
0.5 to 1.0
1.0 to 2.0
2.0 to 5.0
> 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

Scale 1:27,000 (at A3)
0   0.75   1.5

Prepared By:
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Sydney, NSW 2000

File Name: Figure 18 Simulated Floodwater
Depths for 1971 Flood

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Figure 18.3
Simulated Floodwater Depths
for 1971 Flood

Figure 18.4
Simulated Floodwater Depths
for 1971 Flood

Figure 18.5
Simulated Floodwater Depths
for 1971 Flood

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shire council

LEGEND

○ Simulated flood level (mAHD)
Surveyed flood level (mAHD)

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

N
W — E
S

Scale 1:10,000 (at A3)
0   0.3   0.6

Prepared By:
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Suite 10.01, 70 Phillip St
Sydney, NSW 2000

File Name:Figure 18 Simulated Floodwater
Depths for 1971 Flood

Pambula River
South Pambula

OAKLANDS ROAD
FRANCIS ROAD
OAKLANDS LANE
TOALLO STREET
RAINBOW STREET
BEGA STREET
Pambula
BULLARA STREET
PRINCES HIGHWAY
NORTHVIEW DRIVE
SHORT STREET
KING STREET
LLOYD STREET
PITT STREET
MOUNT DARRAGH ROAD
GEORGE STREET
FURNER STREET
MOUNT DARRAGH ROAD
DRIVE IN ROAD
REDFERN CLOSE
SUMMERHILL ROAD

3.00 3.35
3.32
4.02
4.09
4.08
3.41
3.42
5.32
5.51

Figure 18.6
Simulated Floodwater Depths
for 1971 Flood

LEGEND

Simulated flood level (mAHD)

○

Surveyed flood level (mAHD)

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of
more than 0.1 metres are displayed

Scale 1:10,000 (at A3)

0   0.3   0.6

Prepared By:

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Sydney, NSW 2000

File Name:Figure 12 Simulated Floodwater
Depths for 2012 Flood

Design Floodwater Depth and Level Maps

Figure 19.1
Peak Water Depths
and Levels for the
10% AEP Flood

Figure 19.2
Peak Water Depths
and Levels for the
10% AEP Flood

LEGEND

60 — Peak Flood Level Contour (5m interval) (mAHD)

— Peak Flood Level Contour (0.5m interval)

Depths (m)
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- 2.0 to 5.0
- > 5

Notes:
Aerial photograph: Google Satellite 2019
Only areas subject to inundation depths of more than 0.1 metres are displayed

Scale 1:27,000 (at A3)
0   0.75   1.5

Prepared By:
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File Name:Figure 19 Peak Water Depths and Levels for the 10%AEP

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Figure 19.3
Peak Water Depths
and Levels for the
10% AEP Flood

Figure 19.4
Peak Water Depths
and Levels for the
10% AEP Flood

Figure 19.5
Peak Water Depths
and Levels for the
10% AEP Flood