Ballina Shire Council

Ballina Island and West Ballina Overland Flow Flood Study Final Overland Flood Study Report and Mapping Appendices (A, B, C & D)

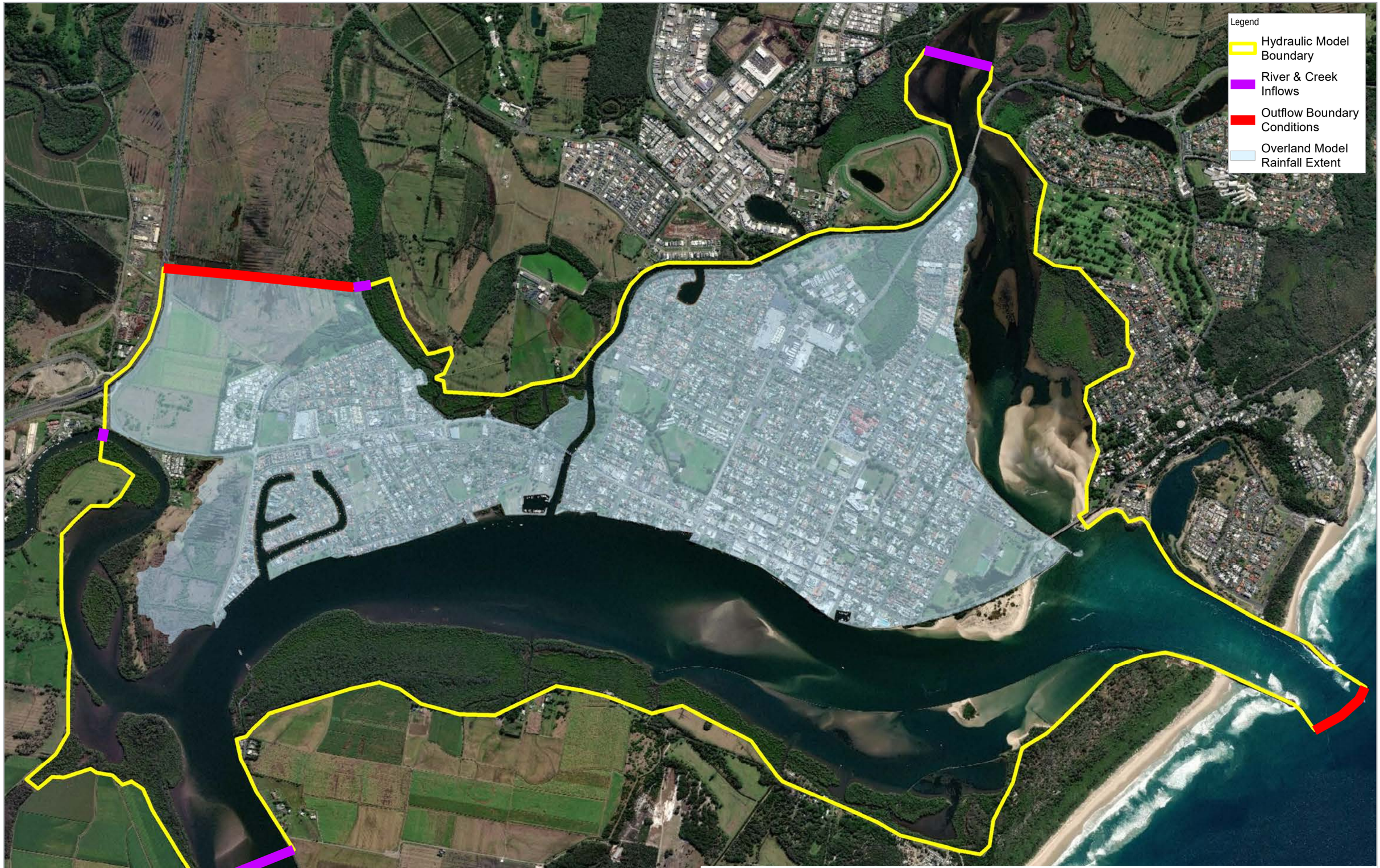
November 2020

Appendices

Appendices

Appendix A – Overland flow path model setup

Figure ID	Description
A1	Hydraulic Model Setup
A2	Digital Elevation Model (DEM)
A3	Manning's n Roughness Coefficients
A4	Stormwater Network Setup



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA94 MGA zone 56

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Hydraulic Model Set Up

Project No. 4132837
Revision No. 00
Date 28/09/2020

Figure A1

D:\99_Local_folder\Rachael\Projects\4132837_Ballina\Template_Fig_A1_2.mxd
Print date: 28 Sep 2020 - 16:41

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: rbiggins

Legend

Hydraulic Model Boundary

Elevations (mAHD)

- <= 0.0
- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- > 2.0

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA94 MGA zone 56

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

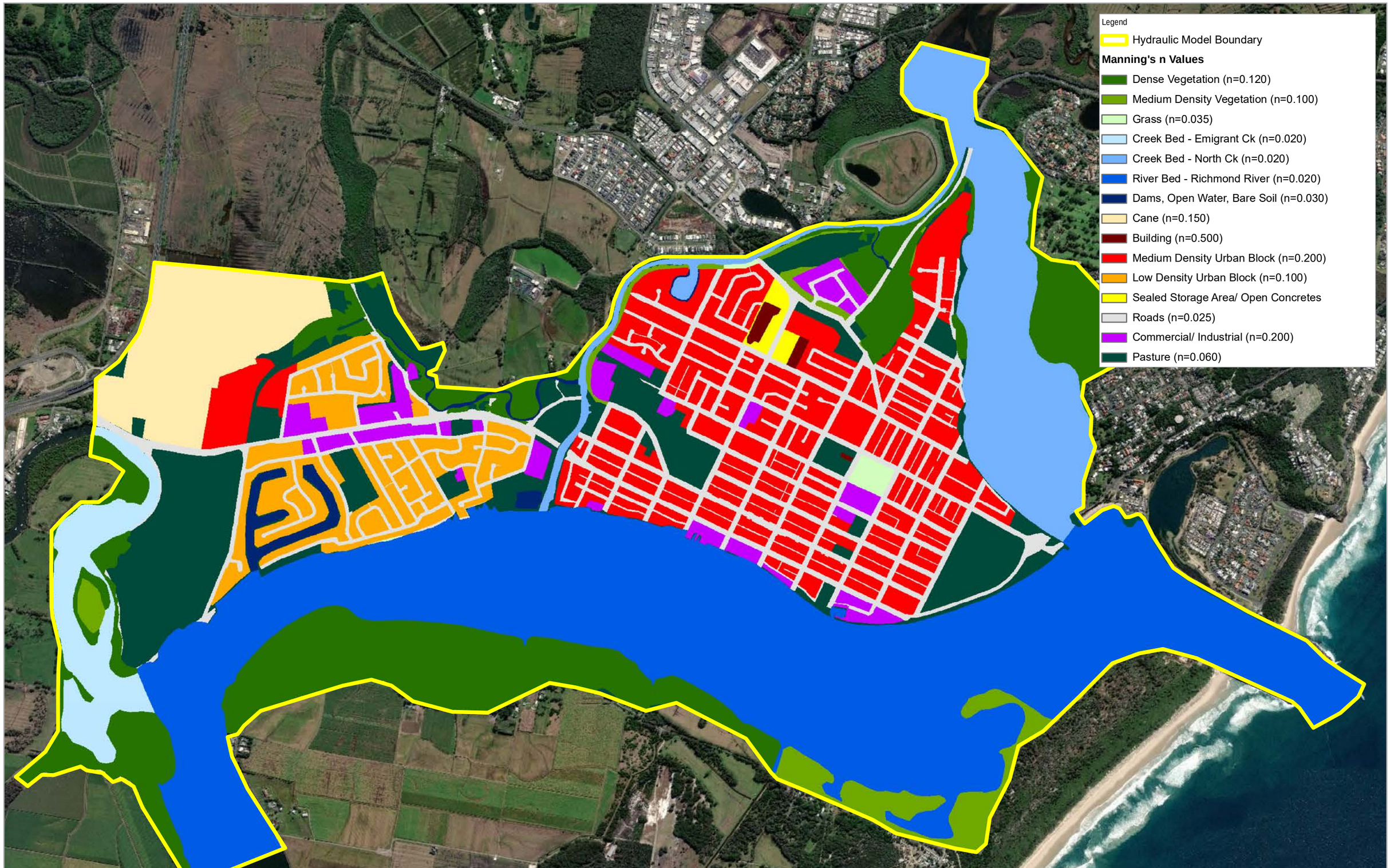
Digital Elevation Model (DEM)

Project No. 4132837
Revision No. 00
Date 21/09/2020

Figure A2

D:\99_Local_folder\Rachael\Projects\4132837_BallinaTemplate_Fig_A2.mxd
Print date: 21 Sep 2020 - 14:04

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: rbiggins



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA94 MGA zone 56

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Manning's n Roughness Coefficients

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure A3

D:\99_Local_folder\Rachael\Projects\4132837_Ballina\Template_Fig_A3.mxd
Print date: 22 Sep 2020 - 13:27

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: rbiggins

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Paper Size ISO A3

0 0.09 0.18 0.27 0.36

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA94 MGA zone 56

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Stormwater Network Set Up

Project No. 4132837
Revision No. 00
Date 21/09/2020

Figure A4

D:\99_Local_folder\Rachael\Projects\4132837_Ballina\Template_Fig_A4.mxd
Print date: 21 Sep 2020 - 14:13

Data source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: rbiggins

Appendix B – Flood depth, level and flow velocity maps – Baseline simulations – Existing conditions

Figure ID	Description	Flood event
B1	Peak Flood Depth | Existing Conditions	0.2% AEP Design Flood Event | MHWS Tide Level
B2	Peak Flood Level | Existing Conditions	0.2% AEP Design Flood Event | MHWS Tide Level
B3	Peak Flow Velocity | Existing Conditions	0.2% AEP Design Flood Event | MHWS Tide Level
B4	Peak Flood Depth | Existing Conditions	1% AEP Design Flood Event | MHWS Tide Level
B5	Peak Flood Level | Existing Conditions	1% AEP Design Flood Event | MHWS Tide Level
B6	Peak Flow Velocity | Existing Conditions	1% AEP Design Flood Event | MHWS Tide Level
B7	Peak Flood Depth | Existing Conditions	2% AEP Design Flood Event | MHWS Tide Level
B8	Peak Flood Level | Existing Conditions	2% AEP Design Flood Event | MHWS Tide Level
B9	Peak Flow Velocity | Existing Conditions	2% AEP Design Flood Event | MHWS Tide Level
B10	Peak Flood Depth | Existing Conditions	5% AEP Design Flood Event | MHWS Tide Level
B11	Peak Flood Level | Existing Conditions	5% AEP Design Flood Event | MHWS Tide Level
B12	Peak Flow Velocity | Existing Conditions	5% AEP Design Flood Event | MHWS Tide Level
B13	Peak Flood Depth | Existing Conditions	10% AEP Design Flood Event | MHWS Tide Level
B14	Peak Flood Level | Existing Conditions	10% AEP Design Flood Event | MHWS Tide Level
B15	Peak Flow Velocity | Existing Conditions	10% AEP Design Flood Event | MHWS Tide Level
B16	Peak Flood Depth | Existing Conditions	20% AEP Design Flood Event | MHWS Tide Level
B17	Peak Flood Level | Existing Conditions	20% AEP Design Flood Event | MHWS Tide Level
B18	Peak Flow Velocity | Existing Conditions	20% AEP Design Flood Event | MHWS Tide Level
B19	Peak Flood Depth | Existing Conditions	50% AEP Design Flood Event | MHWS Tide Level
B20	Peak Flood Level | Existing Conditions	50% AEP Design Flood Event | MHWS Tide Level
B21	Peak Flow Velocity | Existing Conditions	50% AEP Design Flood Event | MHWS Tide Level

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Existing Conditions
0.2% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B1

D:\99_Local_folder\Rachael\Projects\4132837_Ballina\Outputs\Fig_B1_E011_0-2_AEP_Depth_Ballina.mxd
Print date: 22 Sep 2020 - 13:31

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- > 2.5

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Existing Conditions
0.2% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B2

D:\99_Local_folder\Rachael\Projects\4132837_Ballina\Outputs\Fig_B2_E011_0-2_AEP_Level_Ballina.mxd
Print date: 22 Sep 2020 - 13:31

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Existing Conditions
0.2% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B3

D:\99_Local_folder\Rachael\Projects\4132837_Ballina\Outputs\Fig_B3_E011_0-2_AEP_Velocity_Ballina.mxd
Print date: 22 Sep 2020 - 13:32

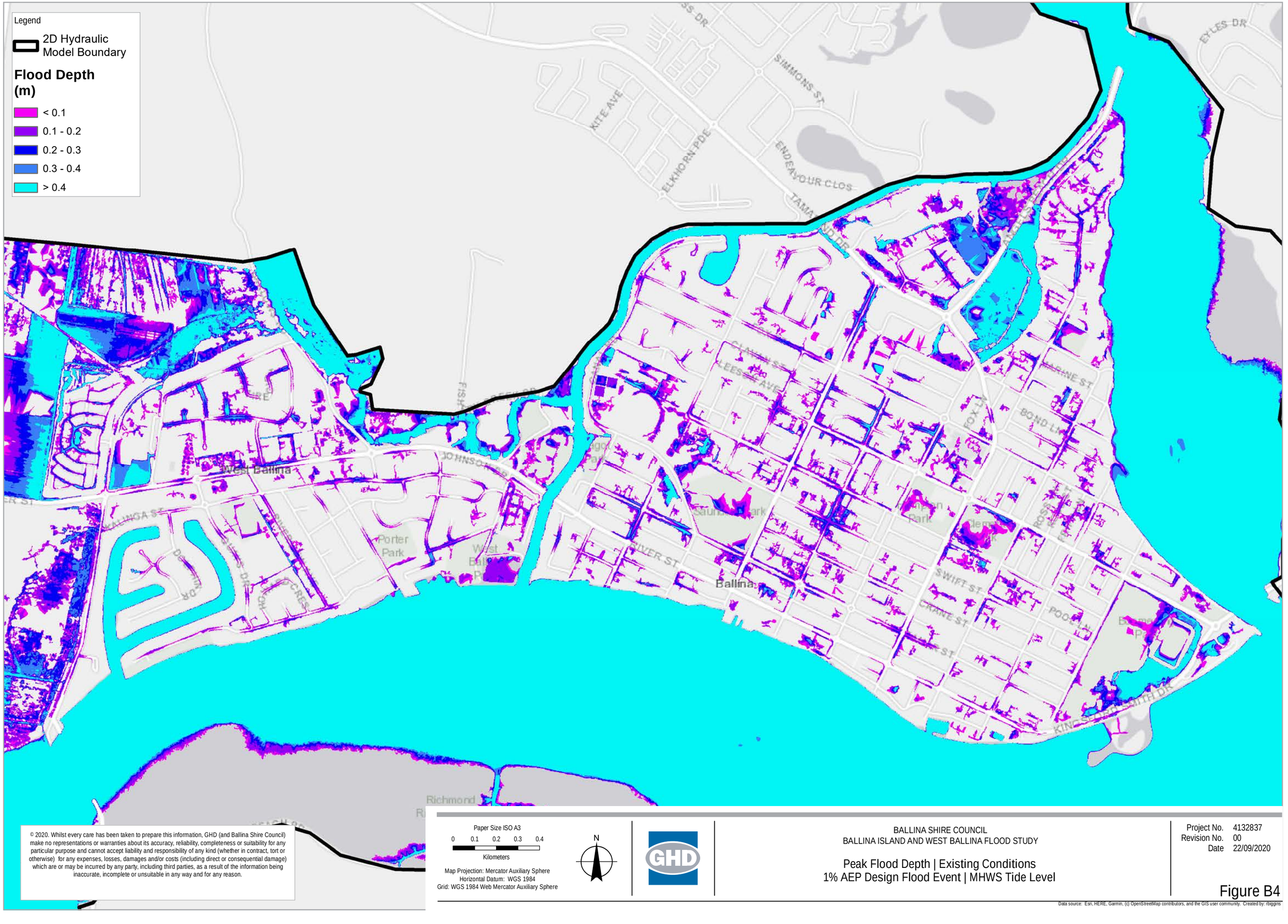
Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Existing Conditions
1% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B4

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- > 2.5

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Existing Conditions
1% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B5

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Existing Conditions
1% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B6

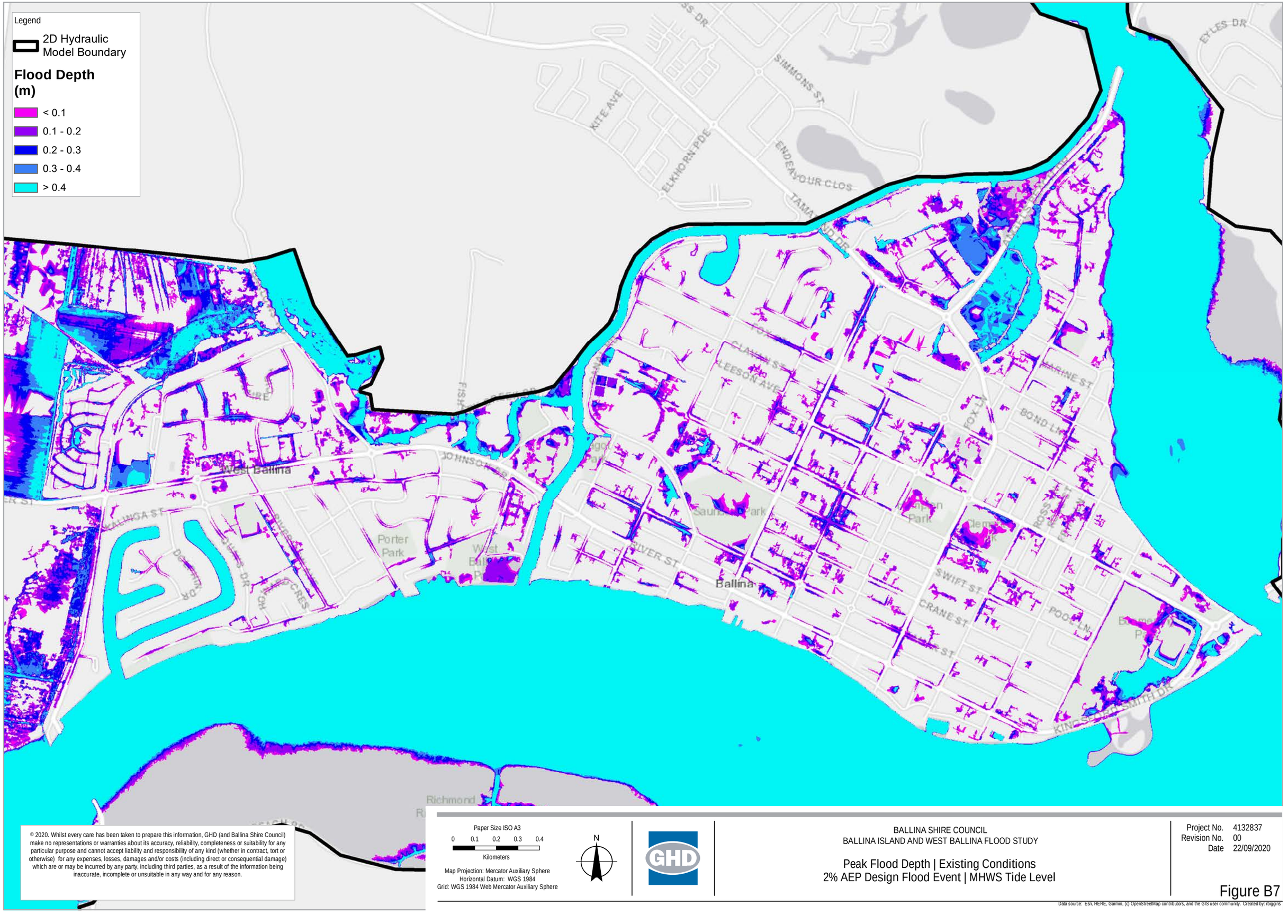
Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Existing Conditions
2% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B7

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- > 2.5

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Existing Conditions
2% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B8

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Existing Conditions
2% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B9

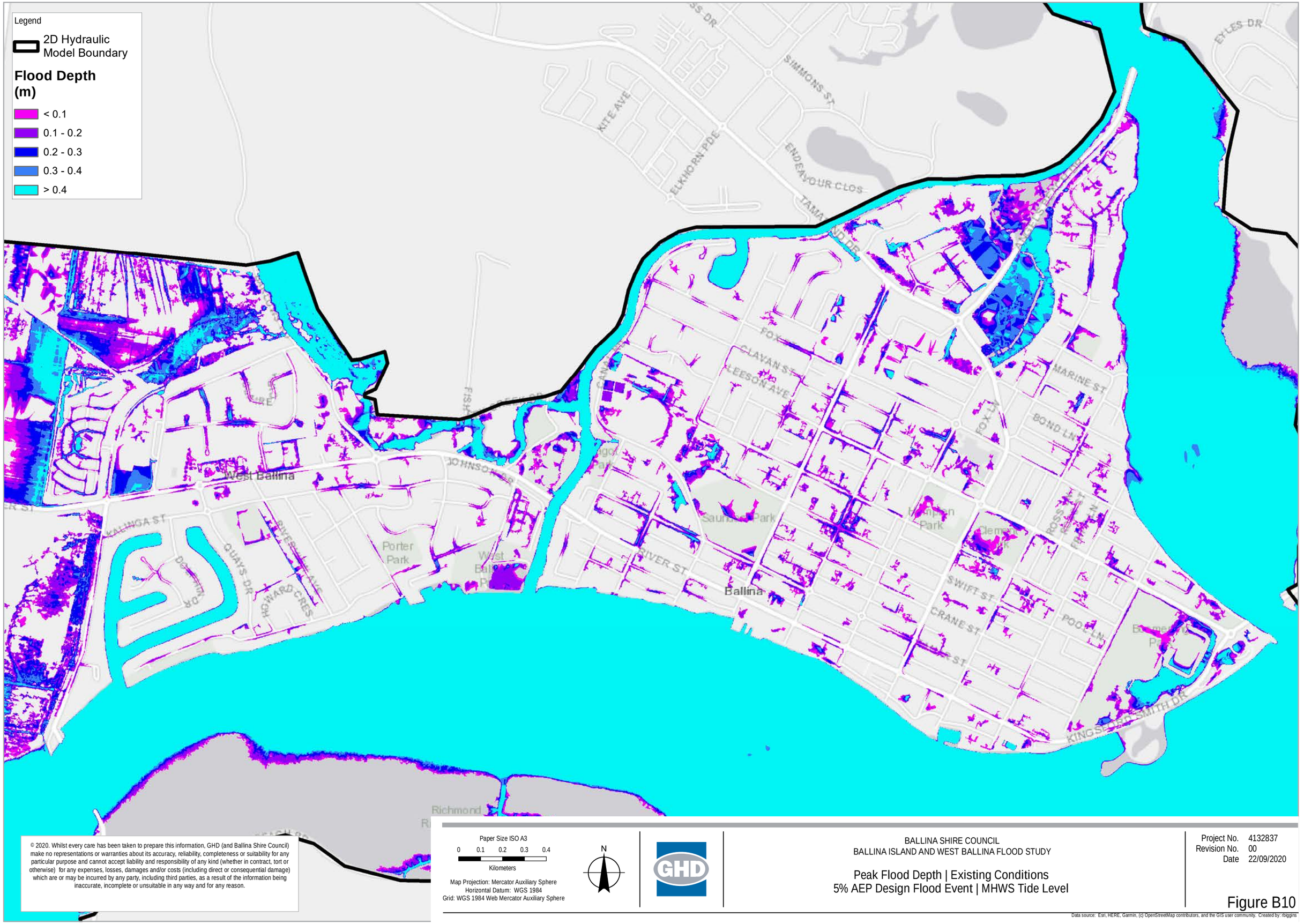
Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Existing Conditions
5% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B10

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- > 2.5

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Existing Conditions
5% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B11

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Existing Conditions
5% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B12

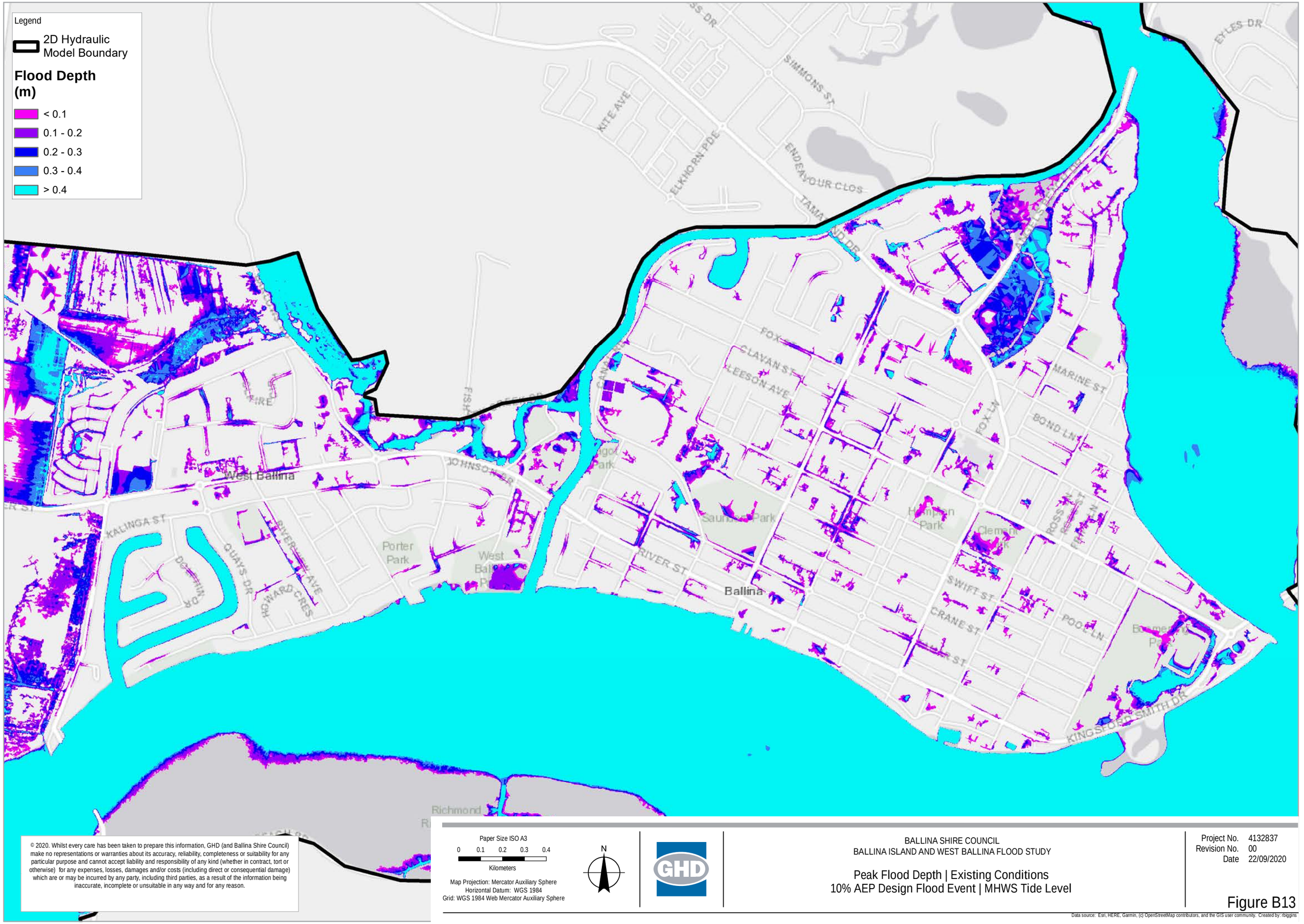
Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Existing Conditions
10% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B13

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- > 2.5

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Existing Conditions
10% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B14

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Existing Conditions
10% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B15

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Existing Conditions
20% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B16

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- > 2.5

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Existing Conditions
20% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B17

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Existing Conditions
20% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B18

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Existing Conditions
50% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B19

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.0
- 1.0 - 1.5
- 1.5 - 2.0
- 2.0 - 2.5
- > 2.5

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Existing Conditions
50% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B20

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Existing Conditions
50% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 22/09/2020

Figure B21

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Appendix C – Flood hazard maps – Baseline simulations – Existing conditions

Figure ID	Description	Flood event
C1	Peak Flood Hazard | Existing Conditions	0.2% AEP Design Flood Event | MHWS Tide Level
C2	Peak Flood Hazard | Existing Conditions	1% AEP Design Flood Event | MHWS Tide Level
C3	Peak Flood Hazard | Existing Conditions	2% AEP Design Flood Event | MHWS Tide Level
C4	Peak Flood Hazard | Existing Conditions	5% AEP Design Flood Event | MHWS Tide Level
C5	Peak Flood Hazard | Existing Conditions	10% AEP Design Flood Event | MHWS Tide Level
C6	Peak Flood Hazard | Existing Conditions	20% AEP Design Flood Event | MHWS Tide Level
C7	Peak Flood Hazard | Existing Conditions	50% AEP Design Flood Event | MHWS Tide Level

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Existing Conditions
0.2% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 28/09/2020

Figure C1

D:\99_Local_folder\Rachael\Projects\4132837_Ballina\Outputs\Fig_C1_E011_0-2_AEP_Hazard_Ballina.mxd
Print date: 28 Sep 2020 - 17:13

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Existing Conditions
1% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 28/09/2020

Figure C2

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Existing Conditions
2% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 28/09/2020

Figure C3

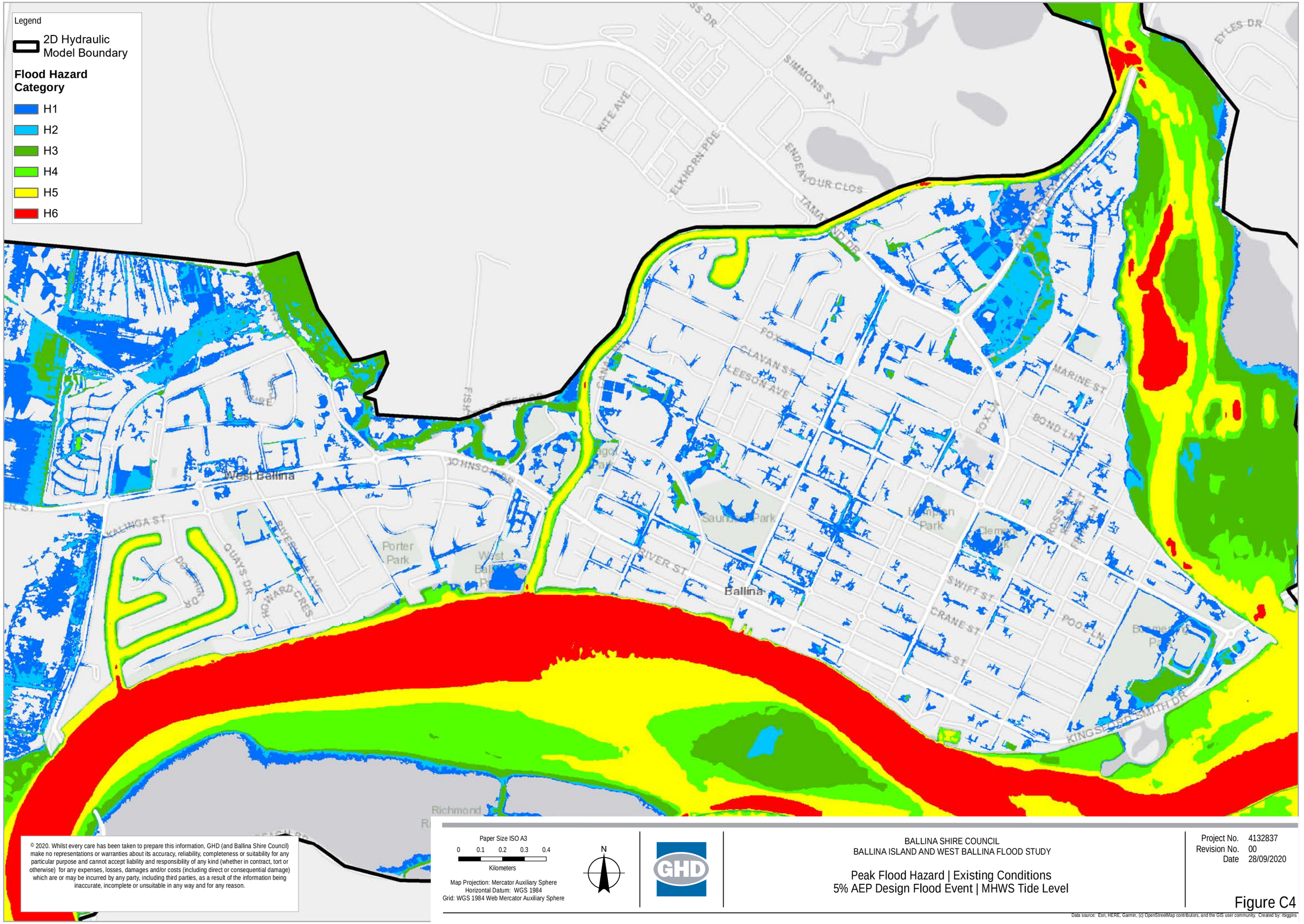
Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6



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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Existing Conditions
5% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 28/09/2020

Figure C4

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Existing Conditions
10% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 28/09/2020

Figure C5

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Existing Conditions
20% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 28/09/2020

Figure C6

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

West Ballina
Ballina
Richmond R
Porter Park
Saunders Park
Hampton Park
Clement Park
Boomerang Park
KALINGA ST
DOLPHIN DR
QUAYS DR
RIVERVIEW AVE
HOWARD CRES
JOHNSON DR
RIVER ST
FOX ST
CLAVAN ST
LEESON AVE
MARINE ST
BOND LN
SWIFT ST
CRANE ST
TAMAR ST
POOL LN
KINGSFORD SMITH DR
SIMMONS ST
KITE AVE
ELKHORN PDE
ENDEAVOUR CLOS
EYLES DR
ANGELS BEACH DR
CLAIRE CIR
CANAL RD

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Existing Conditions
50% AEP Design Flood Event | MHWS Tide Level

Project No. 4132837
Revision No. 00
Date 28/09/2020

Figure C7

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Appendix D – Flood maps – Climate change scenario

Figure ID	Description	Flood event
D1	Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario	0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D2	Peak Flood Level | Year 2100 RCP 8.5 Climate Change Scenario	0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D3	Peak Flow Velocity | Year 2100 RCP 8.5 Climate Change Scenario	0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D4	Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario	0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D5	Changes in Flood Level | Climate Change vs Existing Scenario	0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D6	Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario	1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D7	Peak Flood Level | Year 2100 RCP 8.5 Climate Change Scenario	1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D8	Peak Flow Velocity | Year 2100 RCP 8.5 Climate Change Scenario	1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D9	Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario	1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D10	Changes in Flood Level | Climate Change vs Existing Scenario	1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D11	Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario	5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D12	Peak Flood Level | Year 2100 RCP 8.5 Climate Change Scenario	5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D13	Peak Flow Velocity | Year 2100 RCP 8.5 Climate Change Scenario	5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D14	Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario	5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D15	Changes in Flood Level | Climate Change vs Existing Scenario	5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D16	Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario	No Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D17	Peak Flow Velocity | Year 2100 RCP 8.5 Climate Change Scenario	No Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D18	Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario	No Local Rainfall Event | MHWS Tide Level + Sea Level Rise
D19	Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario	No Local Rainfall Event | HAT Level + Sea Level Rise
D20	Peak Flow Velocity | Year 2100 RCP 8.5 Climate Change Scenario	No Local Rainfall Event | HAT Level + Sea Level Rise
D21	Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario	No Local Rainfall Event | HAT Level + Sea Level Rise

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario 0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D1

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D1_E019_0-2_AEP_Depth_Ballina.mxd
Print date: 18 Nov 2020 - 14:39

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.5
- 1.5 - 1.6
- 1.6 - 1.7
- 1.7 - 1.8
- > 1.8

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Year 2100 RCP 8.5 Climate Change Scenario
0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D2

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D2_E019_0-2_AEP_Level_Ballina.mxd
Print date: 18 Nov 2020 - 14:39

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Velocity | Year 2100 RCP 8.5 Climate Change Scenario
0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D3

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D3_E019_0-2_AEP_Velocity_Ballina.mxd
Print date: 18 Nov 2020 - 14:40

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario 0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D4

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D4_E019_0-2_AEP_Hazard_Ballina.mxd
Print date: 18 Nov 2020 - 14:40

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Changes in Flood Level (m)

- No change
- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Changes in Flood Level | Climage Change vs Existing Scenario
0.2% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D5

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D5_E019vsE011_0-2_AEP_Afflux_E019_Ballina.mxd
Print date: 18 Nov 2020 - 14:40

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario
1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D6

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D6_E019_1_AEP_Depth_Ballina.mxd
Print date: 18 Nov 2020 - 14:41

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.5
- 1.5 - 1.6
- 1.6 - 1.7
- 1.7 - 1.8
- > 1.8

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Year 2100 RCP 8.5 Climate Change Scenario
1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D7

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D7_E019_1_AEP_Level_Ballina.mxd
Print date: 18 Nov 2020 - 14:41

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Year 2100 RCP 8.5 Climate Change Scenario
1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D8

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D8_E019_1_AEP_Velocity_Ballina.mxd
Print date: 18 Nov 2020 - 14:42

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario
1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D9

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D9_E019_1_AEP_Hazard_Ballina.mxd
Print date: 18 Nov 2020 - 14:42

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Changes in Flood Level (m)

- No change
- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Changes in Flood Level | Climage Change vs Existing Scenario
1% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D10

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario
5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D11

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D11_E019_5_AEP_Depth_Ballina.mxd
Print date: 18 Nov 2020 - 14:43

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Level (mAHD)

- < 1.5
- 1.5 - 1.6
- 1.6 - 1.7
- 1.7 - 1.8
- > 1.8

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Level | Year 2100 RCP 8.5 Climate Change Scenario
5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D12

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D12_E019_5_AEP_Level_Ballina.mxd
Print date: 18 Nov 2020 - 14:43

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Year 2100 RCP 8.5 Climate Change Scenario
5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D13

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D13_E019_5_AEP_Velocity_Ballina.mxd
Print date: 18 Nov 2020 - 14:44

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario
5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D14

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D14_E019_5_AEP_Hazard_Ballina.mxd
Print date: 18 Nov 2020 - 14:44

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Changes in Flood Level (m)

- No change
- 0.01 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.20
- 0.20 - 0.25
- 0.25 - 0.30
- > 0.30

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Changes in Flood Level | Climage Change vs Existing Scenario
5% AEP Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D15

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario
No Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D16

D:\Rachael\Projects\4132837_BallinalOutputs\Fig_D16_E022_NoRainfall_Depth_Ballina.mxd
Print date: 18 Nov 2020 - 14:45

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Year 2100 RCP 8.5 Climate Change Scenario
No Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D17

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D17_E022_Norainfall_Velocity_Ballina.mxd
Print date: 18 Nov 2020 - 14:45

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario No Local Rainfall Event | MHWS Tide Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D18

D:\Rachael\Projects\4132837_BallinaOutputs\Fig_D18_E022_Norainfall_Hazard_Ballina.mxd
Print date: 18 Nov 2020 - 14:46

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Depth (m)

- < 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4
- > 0.4

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Depth | Year 2100 RCP 8.5 Climate Change Scenario
No Local Rainfall Event | HAT Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D19

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D19_E023_NoRainfall_Depth_Ballina.mxd
Print date: 18 Nov 2020 - 14:46

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flow Velocity (m/s)

- < 0.025
- 0.025 - 0.050
- 0.050 - 0.075
- 0.075 - 0.100
- 0.100 - 0.200
- > 0.200

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flow Velocity | Year 2100 RCP 8.5 Climate Change Scenario
No Local Rainfall Event | HAT Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D20

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D20_E023_Norainfall_Velocity_Ballina.mxd
Print date: 18 Nov 2020 - 14:46

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

Legend

2D Hydraulic Model Boundary

Flood Hazard Category

- H1
- H2
- H3
- H4
- H5
- H6

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Paper Size ISO A3

0 0.1 0.2 0.3 0.4

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

BALLINA SHIRE COUNCIL
BALLINA ISLAND AND WEST BALLINA FLOOD STUDY

Peak Flood Hazard | Year 2100 RCP 8.5 Climate Change Scenario No Local Rainfall Event | HAT Level + Sea Level Rise

Project No. 4132837
Revision No. 00
Date 18/11/2020

Figure D21

D:\Rachael\Projects\4132837_Ballina\Outputs\Fig_D21_E023_NoRainfall_Hazard_Ballina.mxd
Print date: 18 Nov 2020 - 14:47

Data source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Created by: rbiggins

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