

# South Murwillumbah Floodplain Risk Management Study & Plan

Final Report  
Volume 2 of 2: Figures



## ► FIGURES

- Figure 1: South Murwillumbah Study Area
- Figure 2: Key Hydraulic Controls
- Figure 3: Historic Flood Marks
- Figure 4: Digital Elevation Model
- Figure 5: Environmental and Heritage Constraint

### Floodwater Depth Maps

- Figure 6: Floodwater Depths for the 20% AEP Flood
- Figure 7: Floodwater Depths for the 5%AEP Flood
- Figure 8: Floodwater Depths for the 1%AEP Flood
- Figure 9: Floodwater Depths for the 0.2% AEP Flood

### Flood Level Maps

- Figure 10: Floodwater Levels for the 20% AEP Flood
- Figure 11: Floodwater Levels for the 5% AEP Flood
- Figure 12: Floodwater Levels for the 1%AEP Flood
- Figure 13: Floodwater Levels for the 0.2% AEP Flood

### Floodwater Velocity Maps

- Figure 14: Floodwater Velocities for the 20% AEP Flood
- Figure 15: Floodwater Velocities for the 5% AEP Flood
- Figure 16: Floodwater Velocities for the 1% AEP Flood
- Figure 17: Floodwater Velocities for the 0.2% AEP Flood

- Figure 18: Floodwater Surface Profiles for the Tweed River

### Flood Hazard Maps

- Figure 19: Hazard Categories for the 1% AEP Flood
- Figure 20: Hazard Categories for the 0.2% AEP Flood

### Hydraulic Category Maps

- Figure 21: Hydraulic Categories for the 1% AEP Flood
- Figure 22: Hydraulic Categories for the 0.2% AEP Flood

### Emergency Response Precinct Classifications

- Figure 23: Emergency Response Precinct Classifications for the 1% AEP Flood
- Figure 24: Emergency Response Precinct Classifications for the 0.2% AEP Flood

### Duration of Inundation Maps

- Figure 25: Duration of Inundation for the 20% AEP Flood
- Figure 26: Duration of Inundation for the 5%AEP Flood
- Figure 27: Duration of Inundation for the 1%AEP Flood
- Figure 28: Duration of Inundation for the 0.2% AEP Flood

### Miscellaneous Maps

- Figure 29: High Flow Map for the 1% AEP Flood
- Figure 30: Frequency of Above Floor Inundation
- Figure 31: Critical Flood Zone
- Figure 32: Flood Planning Category Constraint Mapping



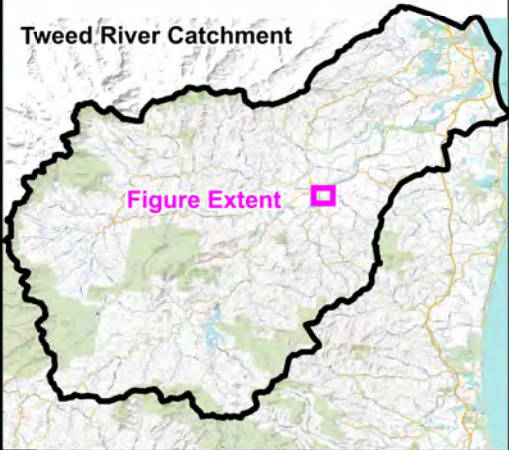
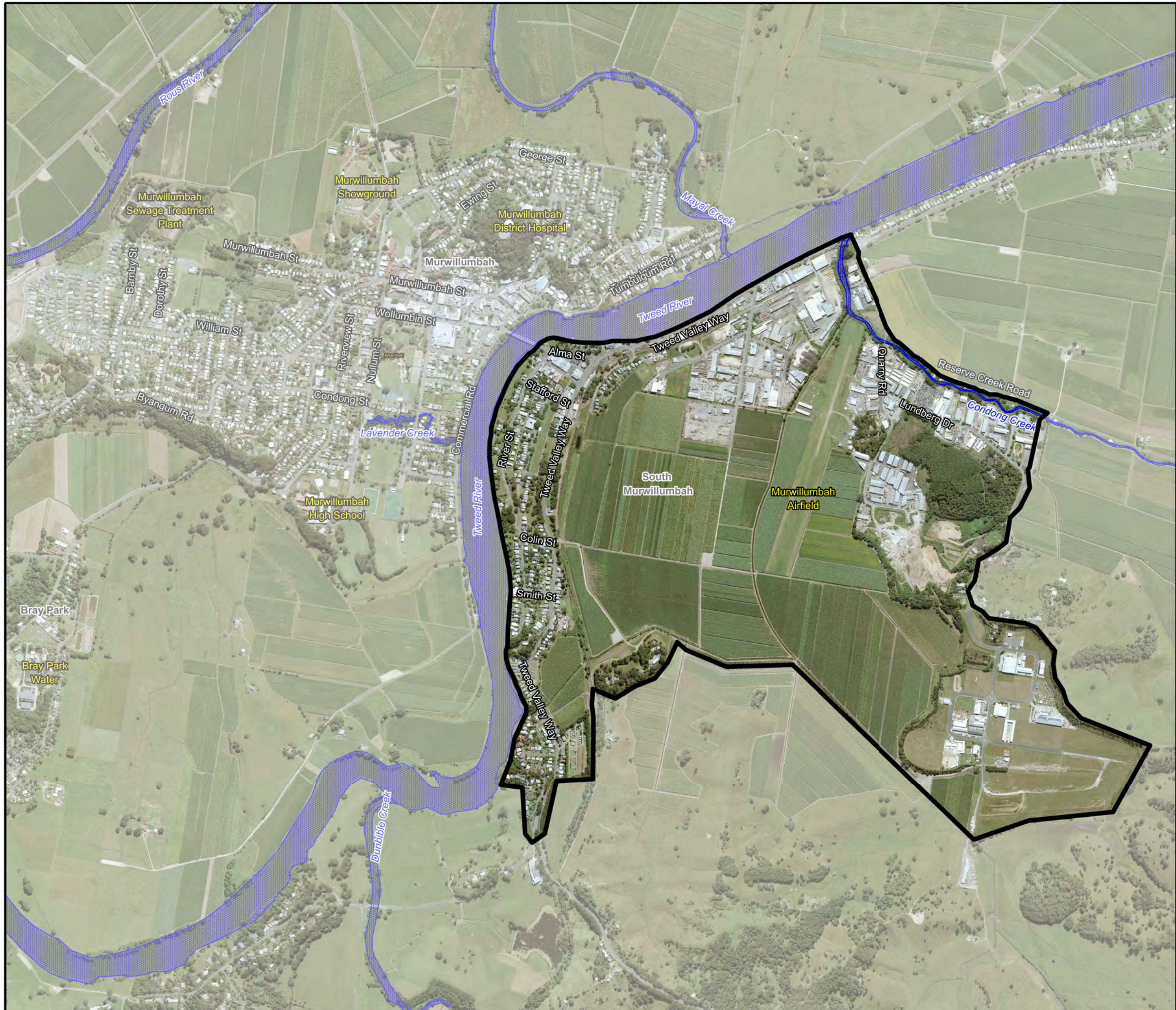
### [Concept Designs for Flood Risk Management Options](#)

- Figure 33: Concept Design for the Durrington Street flow path (FM1)
- Figure 34: Concept Design for the South Murwillumbah High Flow Bypass Option 1 (FM2)
- Figure 35: Concept Design for the South Murwillumbah High Flow Bypass Option 2 (FM3)
- Figure 36: Concept Design for Earthworks across Lot 4 DP 591604 Quarry Road (FM4)
- Figure 37: Concept Design for Earthworks across Lot 4 DP 591604 Quarry Road, Two Adjoining Lots and Airfield (FM5)
- Figure 38: Concept Design for Terrain Modifications between River Street and Tweed River (FM6)
- Figure 39: Concept Design for the South Murwillumbah Levee Rehabilitation (FM7)
- Figure 40: Concept Design for Raising the South Murwillumbah Levee to 20% AEP and Raising Height of the CBD Levee (FM8)
- Figure 41: Concept Design for Raising the South Murwillumbah Levee to 5% AEP and Raising Height of the CBD Levee (FM9)
- Figure 42: Concept Design for the Alma Street modification (FM10)
- Figure 43: Concept Design to Modify the Railway Embankment (FM11)
- Figure 44: Concept Design to Elevate Tweed Valley Way (FM12)
- Figure 45: Concept Design for Tweed River Dredging (FM13)
- Figure 46: Concept Design for Blacks Drain Modifications (FM14)
- Figure 47: Concept Design for Condong Creek Channel Modifications (FM15)
- Figure 48: Concept Design for the Condong Creek High Flow Bench (FM16)
- Figure 49: Concept Design for the High-Level Condong Creek Outlet (FM17)
- Figure 50: Suggested Modifications to Voluntary House Purchase Scheme (PM1)
- Figure 51: Commercial Properties that Would Benefit from Temporary Flood Barriers (PM2)
- Figure 52: Concept Design for Industrial Land Swap Option 1 (PM3)
- Figure 53: Concept Design for Industrial Land Swap Option 2 (PM4)
- Figure 54: Potential Properties Identified for Lot Consolidation (PM5)


### [Floodplain Risk Management Plan](#)

- Figure 55: South Murwillumbah Floodplain Risk Management Plan

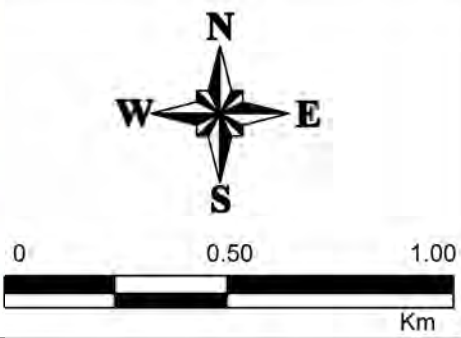




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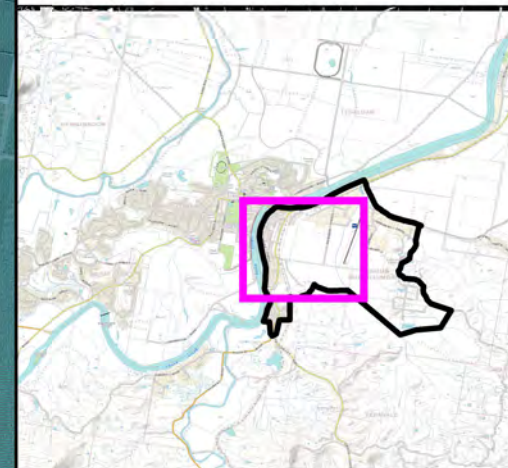
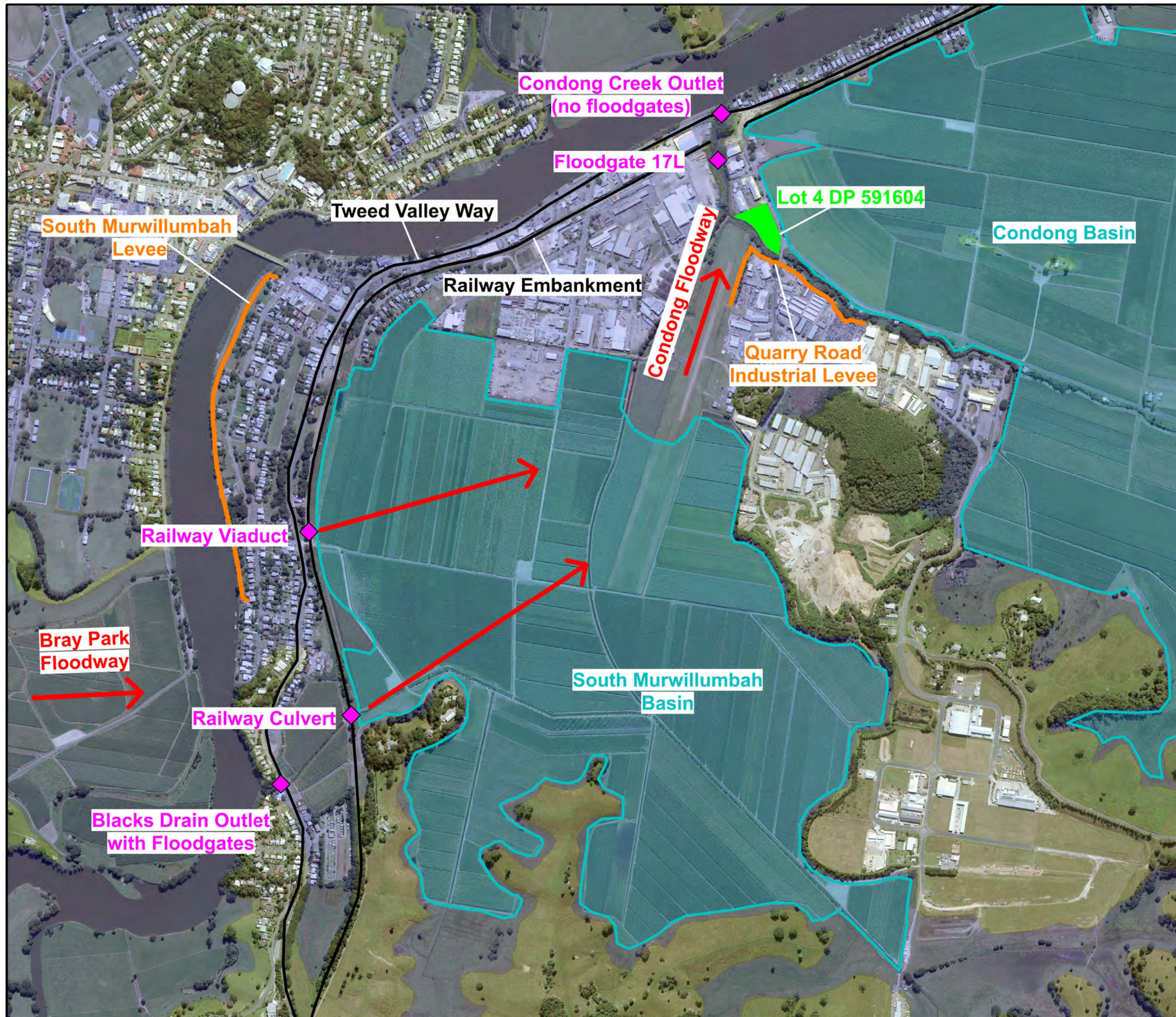
 South Murwillumbah Study Area

Notes:  
Aerial photograph date: 2016



**Figure 1:**  
**South Murwillumbah Study Area**

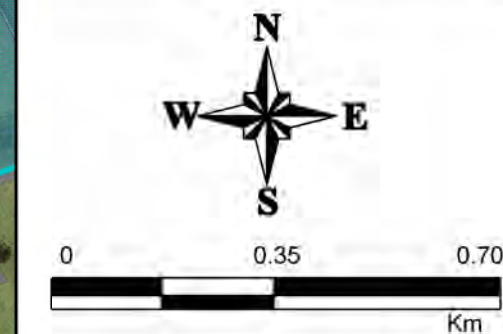




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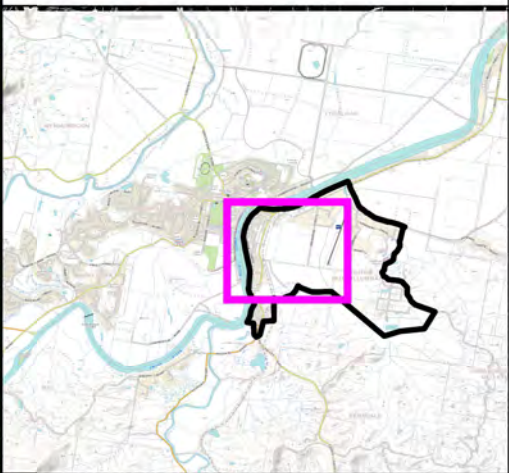
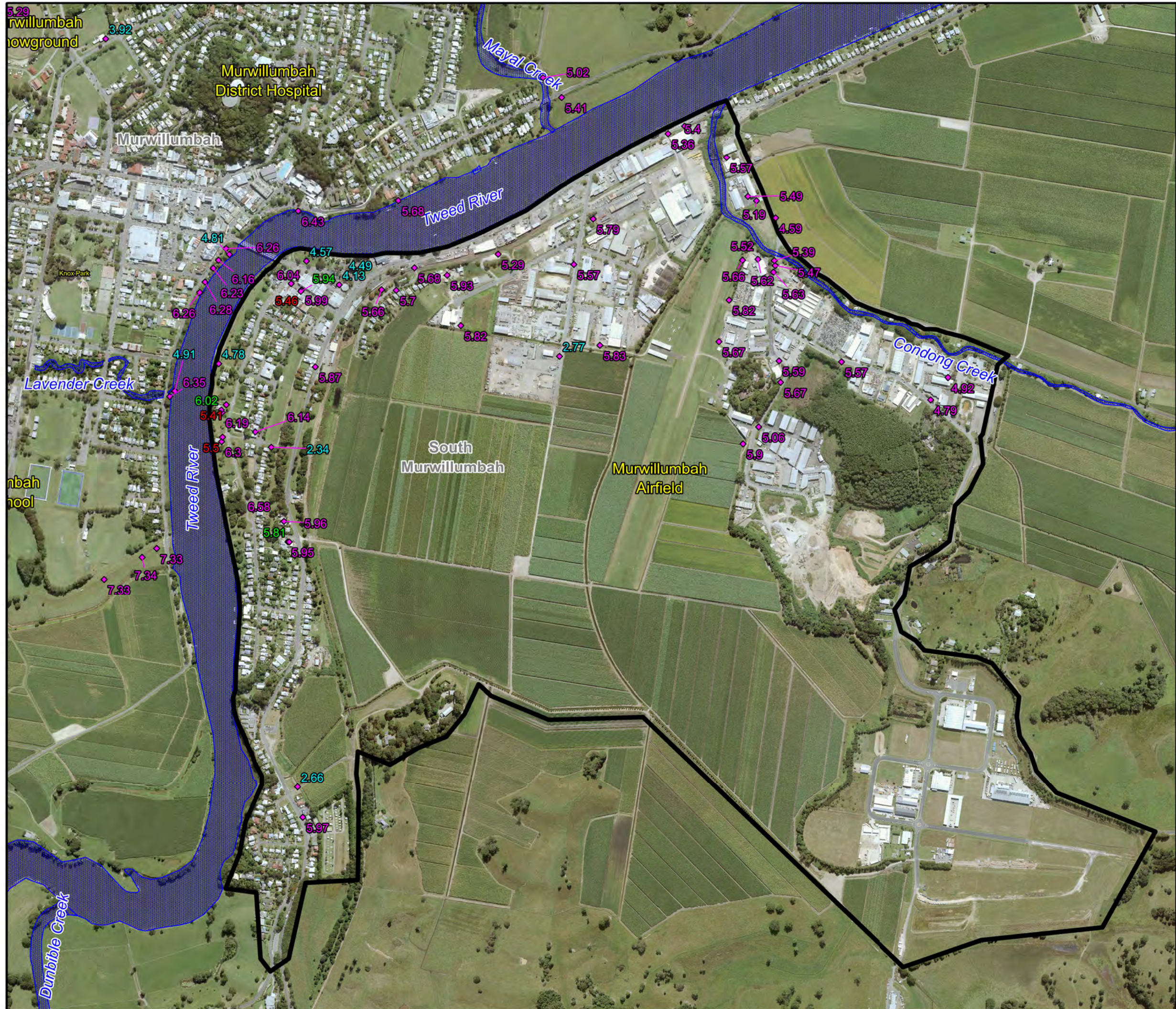
- Hydraulic Structure
- Flood Storage Basin
- Floodway
- Road / Railway
- Levee
- Existing 1% AEP Flood Extent

Notes:  
Aerial photograph date: 2016



**Figure 2:**  
**Key Hydraulic Controls**



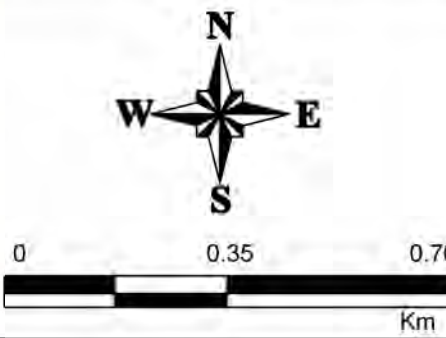


**LEGEND**

Flood Max Elevations (mAHD)

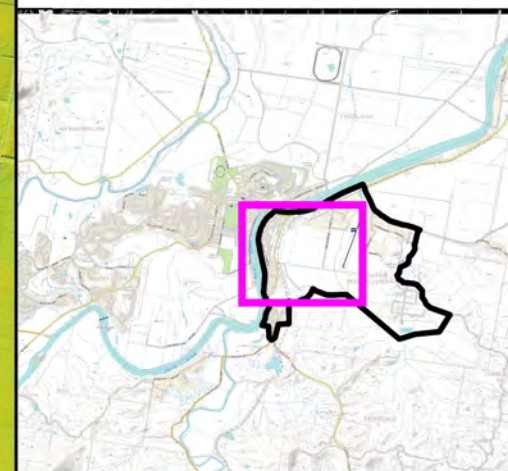
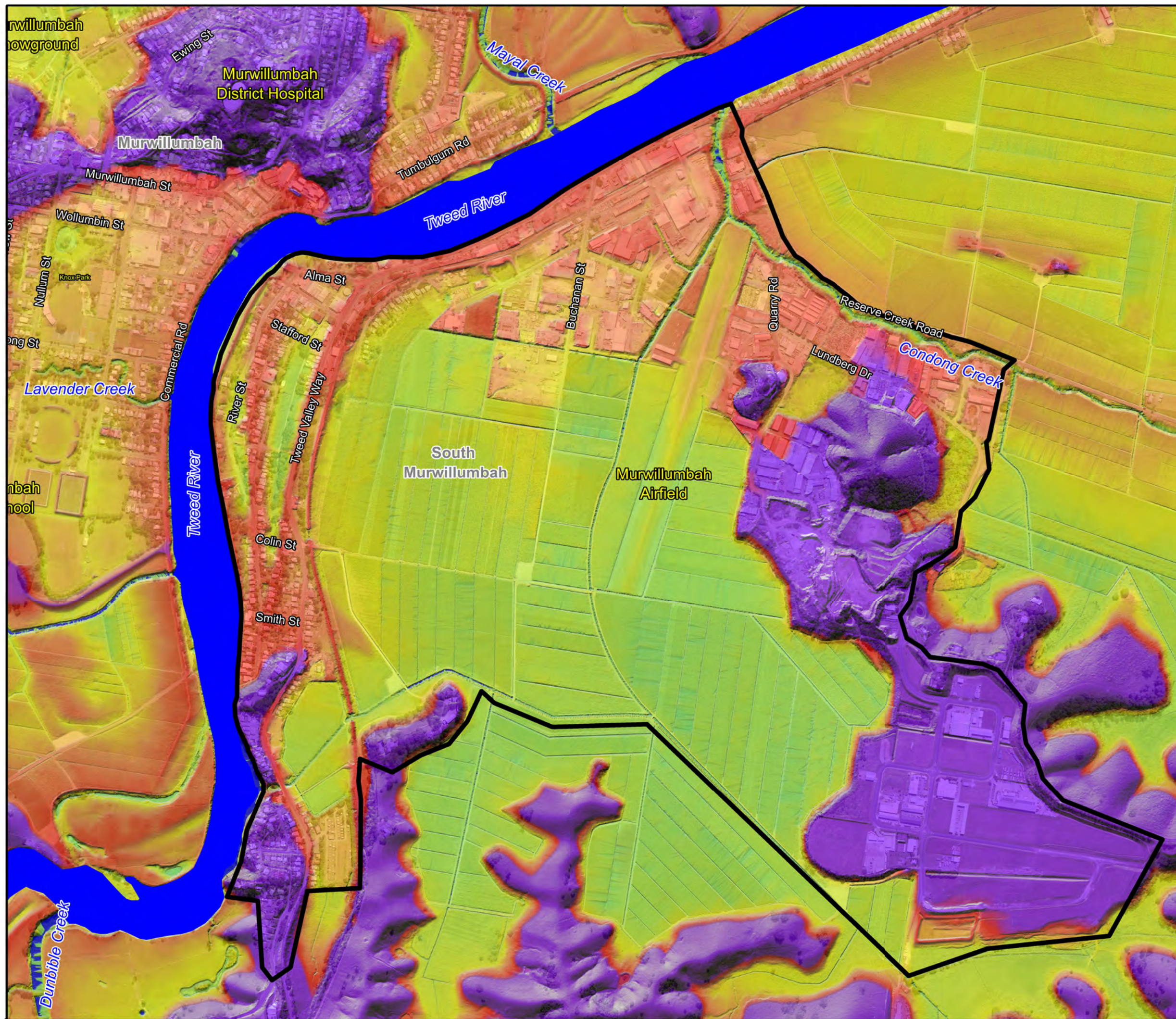
- |                     |                    |
|---------------------|--------------------|
| February 1954 Event | January 2013 Event |
| April 1989 Event    | March 2017 Event   |

Notes:  
Aerial photograph date: 2016

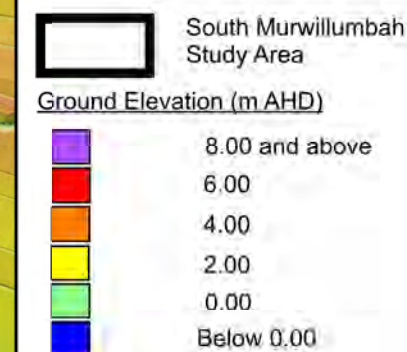


**Figure 3:  
Historic Flood Marks**

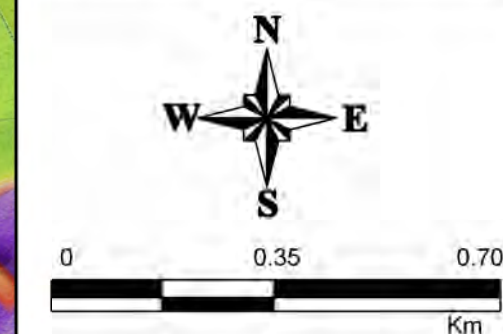




### LEGEND



Notes:  
Aerial photograph date: 2016

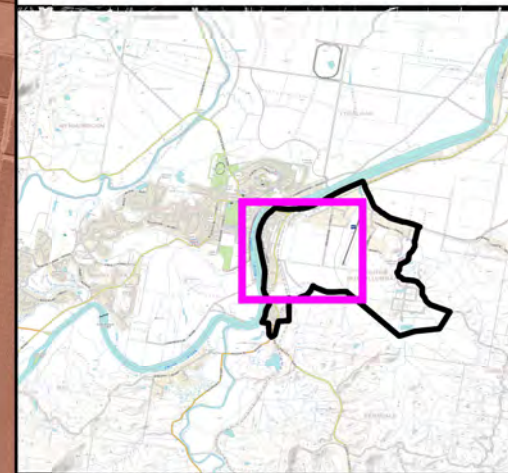
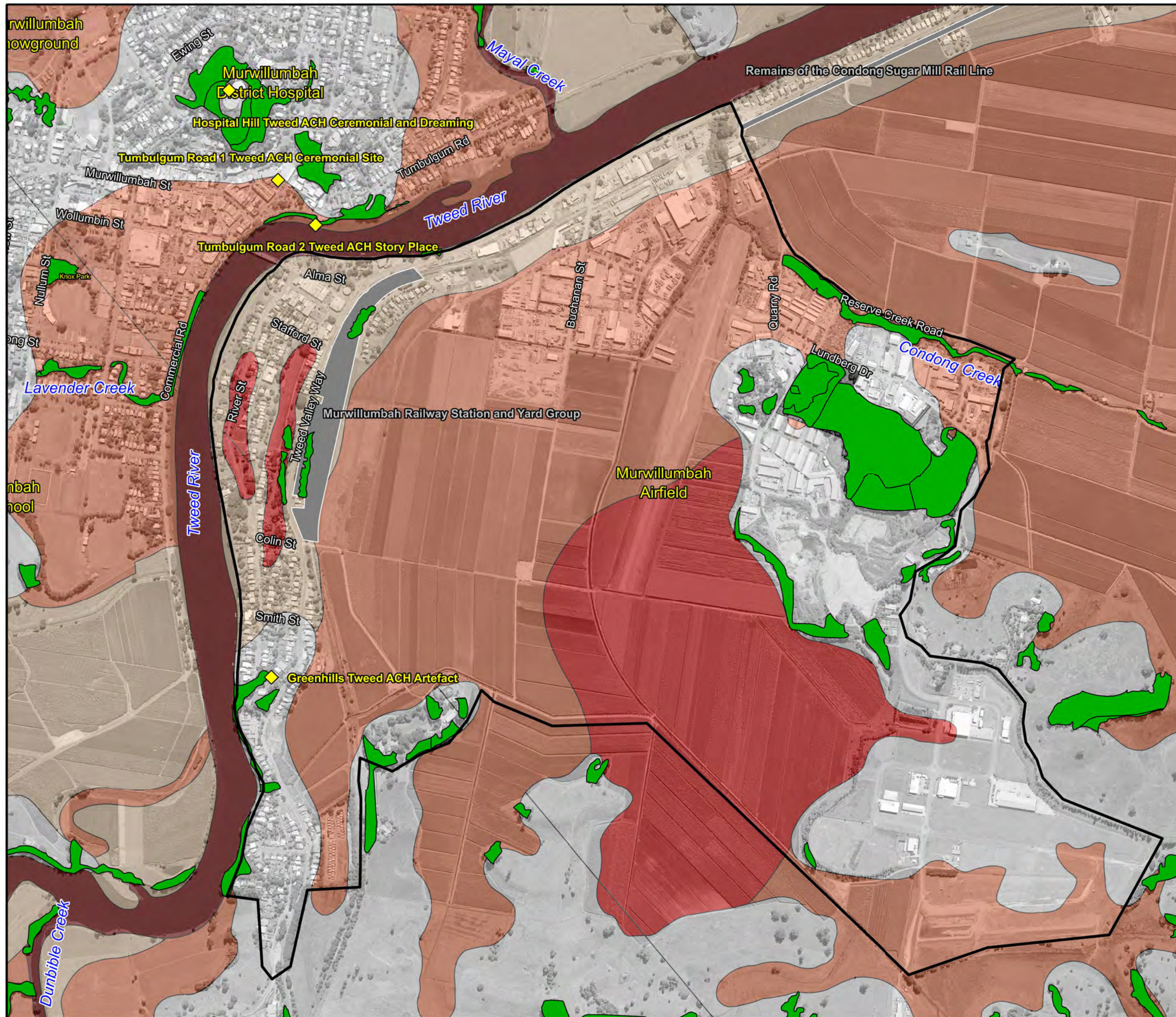


**Figure 4:**  
**Digital Elevation Model**









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

File Name: Figure 4 - Digital Elevation Model wor



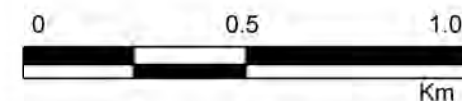


### LEGEND

-  Aboriginal heritage site
-  Heritage sites
-  Vegetated Areas
- Acid Sulphate Soil Class**
-  Class 1
-  Class 2
-  Class 3
-  Class 4
-  Class 5


### Notes:

Aerial photograph date: 2016



**Figure 5:  
Environmental and Heritage  
Constraints**

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 **Catchment Simulation Solutions**  
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Sydney, NSW 2000

File Name: Figure 5 - Environmental and Heritage Constraints.wor





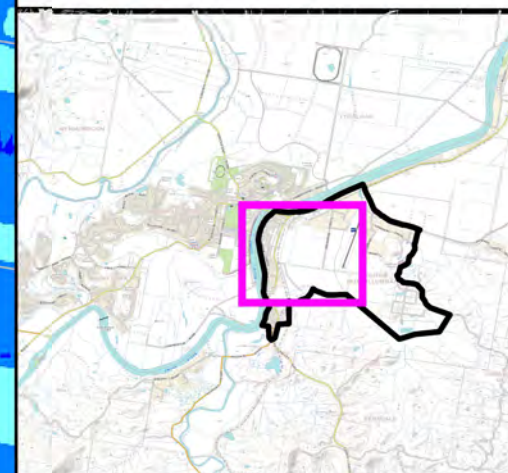
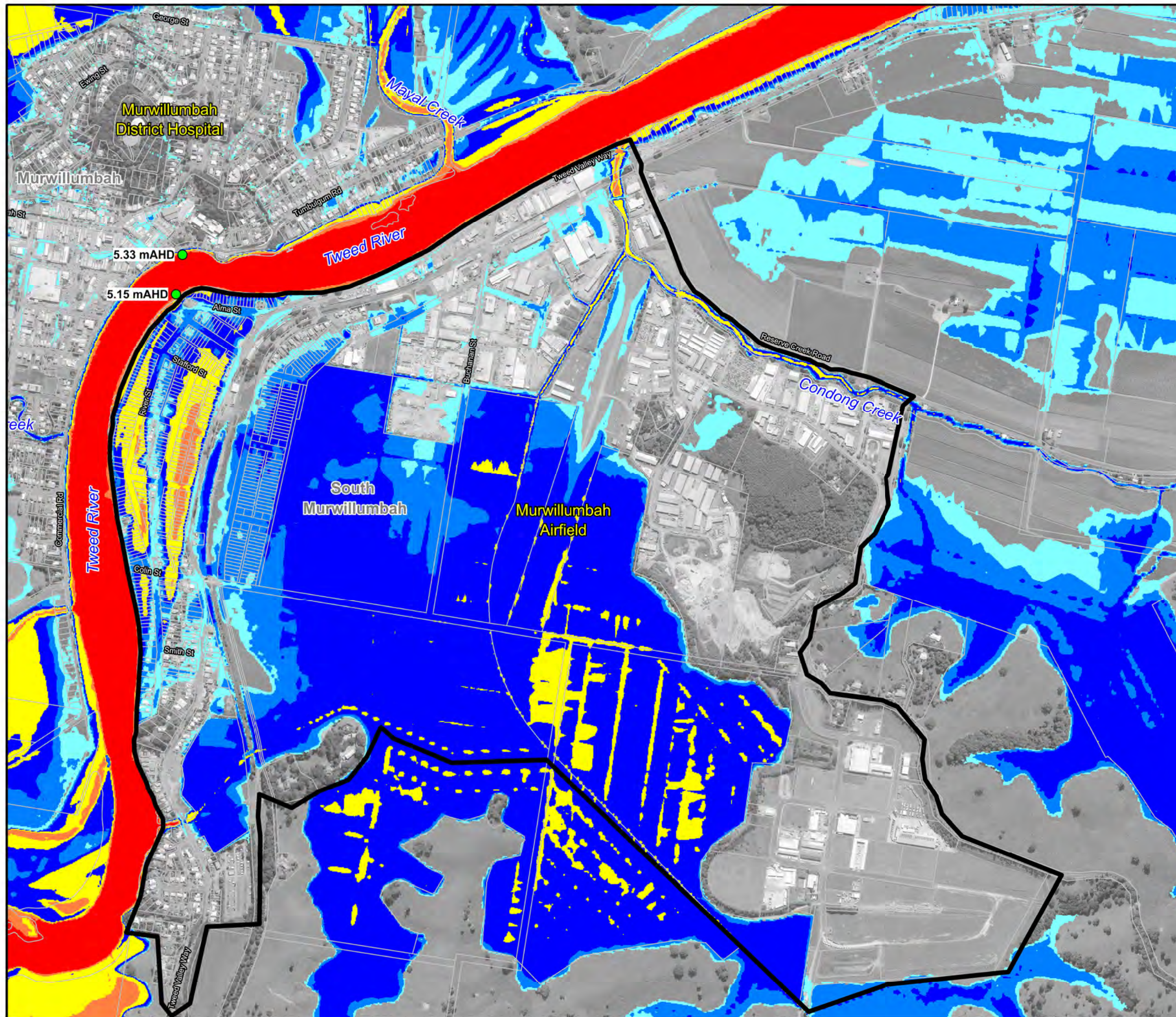
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## FLOODWATER DEPTH MAPS

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### LEGEND

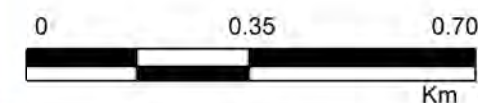
#### Depths (m)

- < 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- 2.0 - 4.0
- 4.0 - 6.0
- > 6.0

● Peak Water Level  
at Gauge


#### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m  
are shown in the mapping



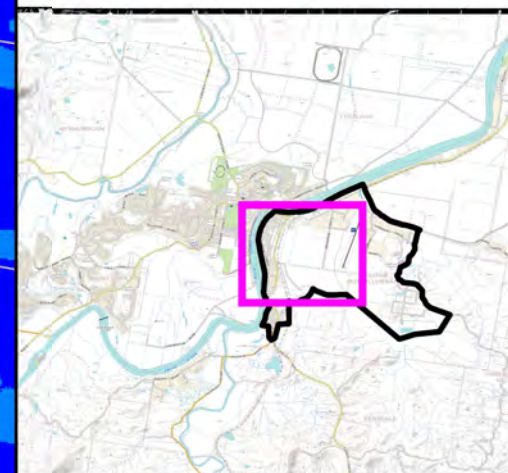
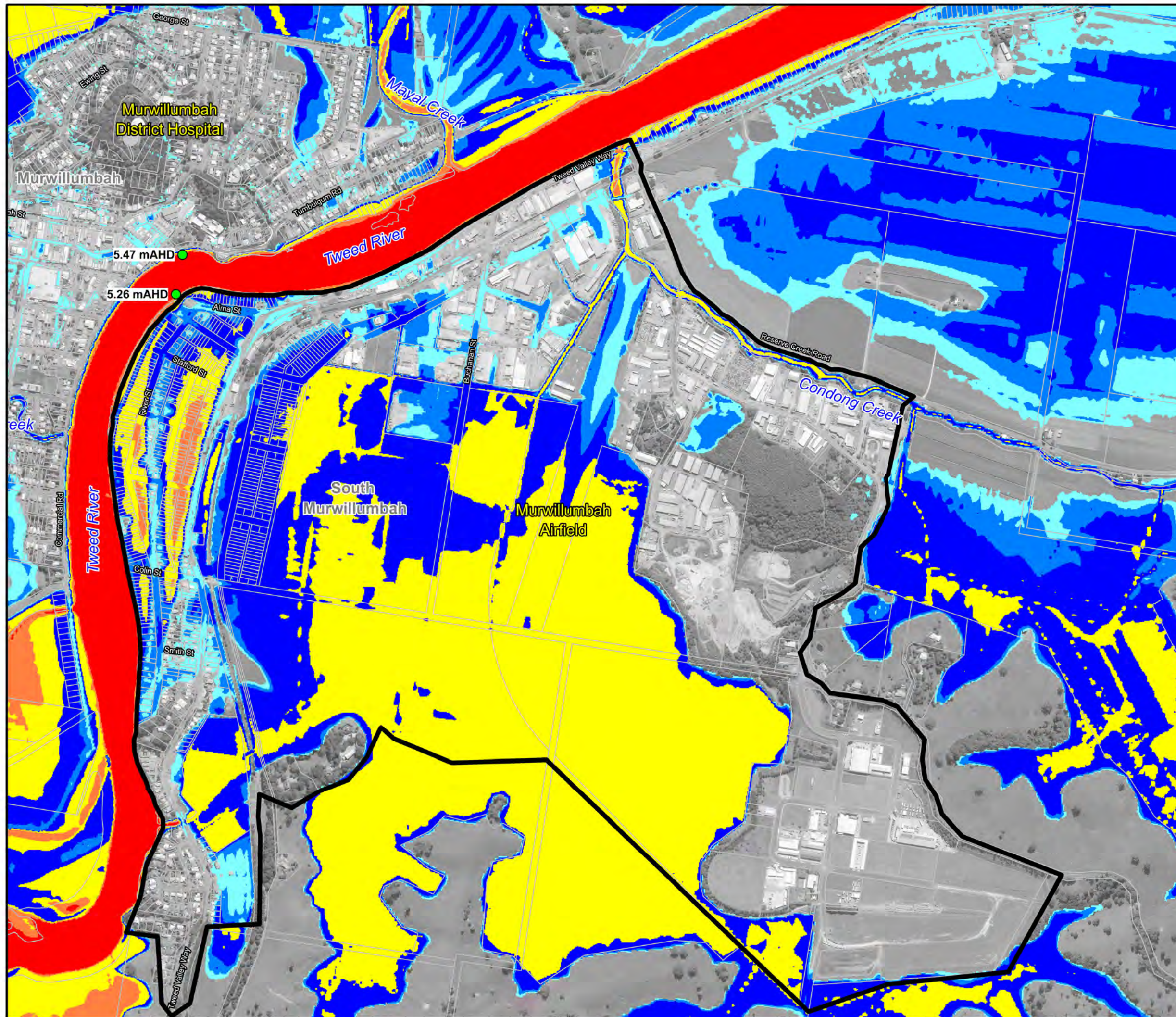
**Figure 6:**  
**Floodwater Depths for the**  
**20% AEP Flood**

Prepared By:

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

File Name: Figure 6 - Floodwater Depths for the 20% AEP  
Flood.wor






### LEGEND

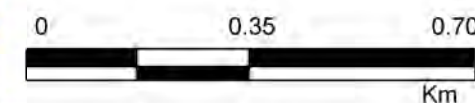
#### Depths (m)

-  < 0.5
-  0.5 - 1.0
-  1.0 - 2.0
-  2.0 - 4.0
-  4.0 - 6.0
-  > 6.0

 Peak Water Level  
at Gauge


#### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m  
are shown in the mapping



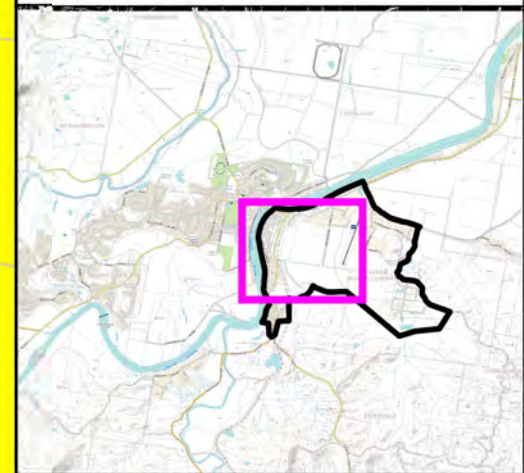
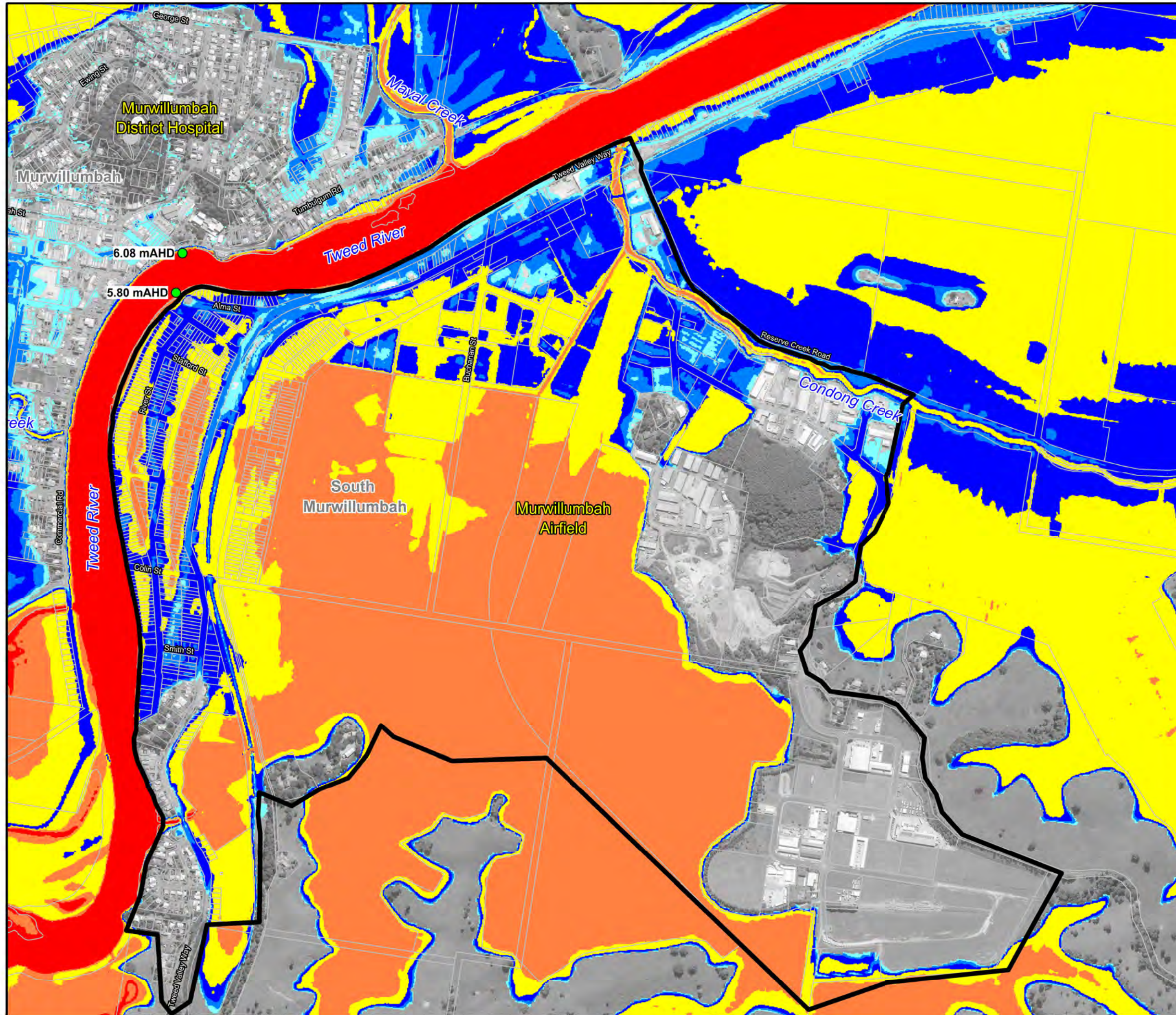
**Figure 7:**  
**Floodwater Depths for the**  
**5% AEP Flood**

Prepared By:

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

File Name: Figure 7 - Floodwater Depths for the 5% AEP  
Flood.wor






**LEGEND**

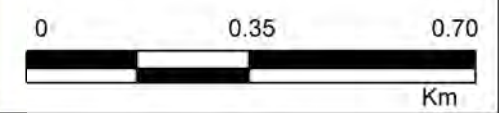
Depths (m)

-  < 0.5
-  0.5 - 1.0
-  1.0 - 2.0
-  2.0 - 4.0
-  4.0 - 6.0
-  > 6.0

 Peak Water Level at Gauge


Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



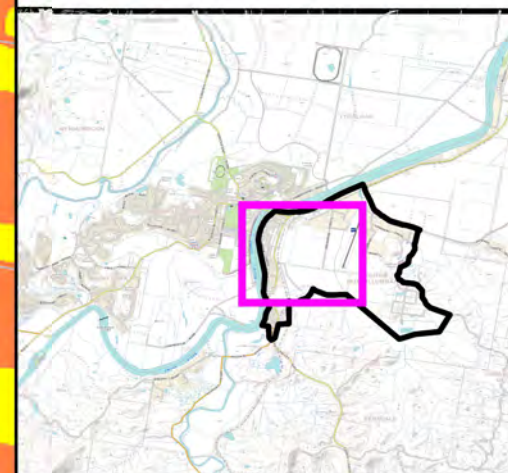
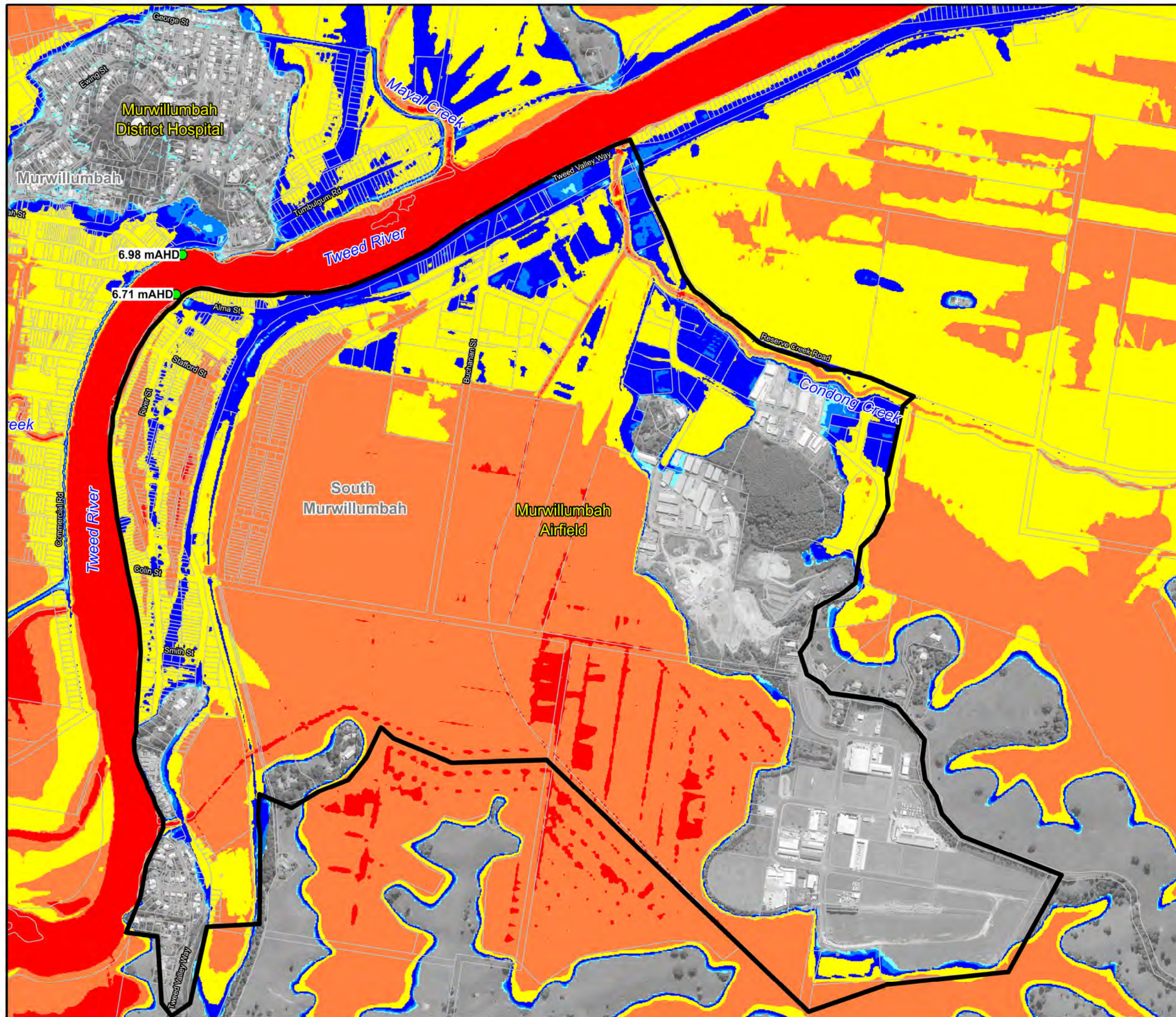
**Figure 8:**  
**Floodwater Depths for the**  
**1% AEP Flood**

Prepared By:

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

File Name: Figure 8 - Floodwater Depths for the 1% AEP Flood.wor






### LEGEND

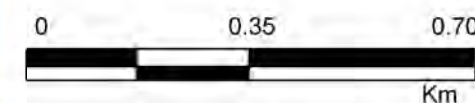
#### Depths (m)

-  < 0.5
-  0.5 - 1.0
-  1.0 - 2.0
-  2.0 - 4.0
-  4.0 - 6.0
-  > 6.0

 Peak Water Level  
at Gauge


#### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m  
are shown in the mapping



**Figure 9:  
Floodwater Depths for the  
0.2% AEP Flood**

Prepared By:

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

File Name: Figure 9 - Floodwater Depths for the 0.2% AEP  
Flood war





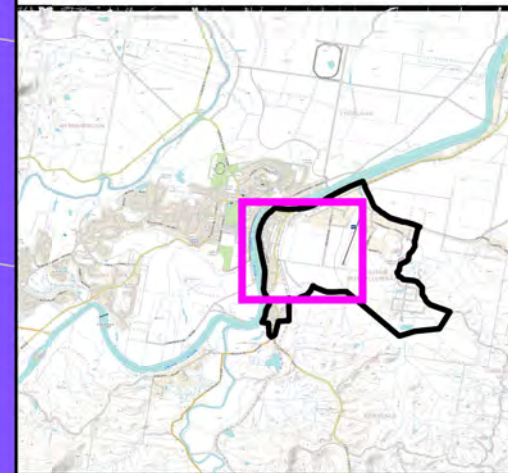
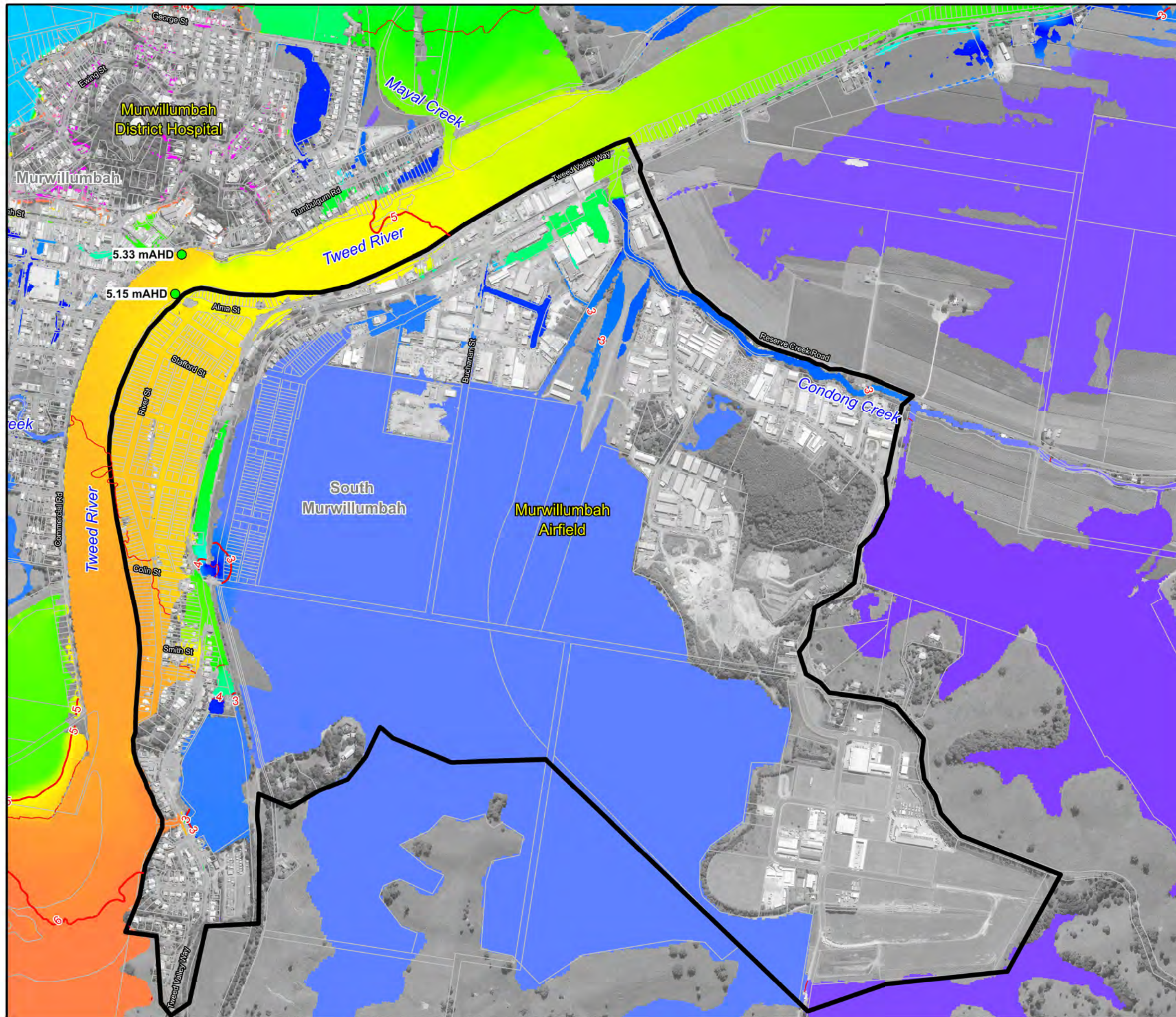
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## FLOOD LEVEL MAPS

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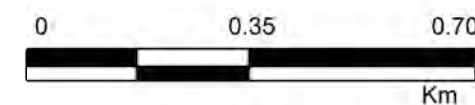
### LEGEND

Levels (m AHD)

- 2 Major Contour (1.0 m AHD)
- Minor Contour (0.5 m AHD)
- < 2.0
- 2.5
- 3.0
- 3.5
- 4.0
- 4.5
- 5.0
- 6.0
- 8.0
- 10.0
- >=15.0
- Peak Water Level at Gauge


### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



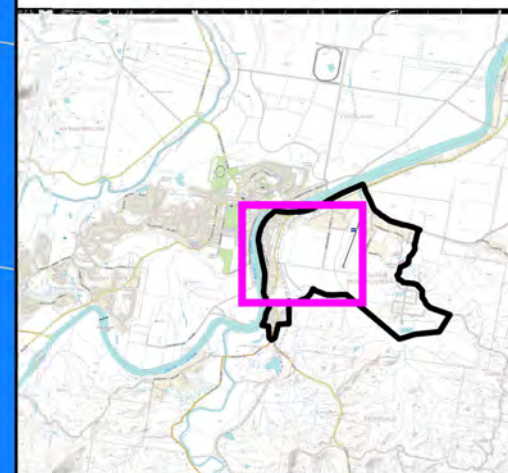
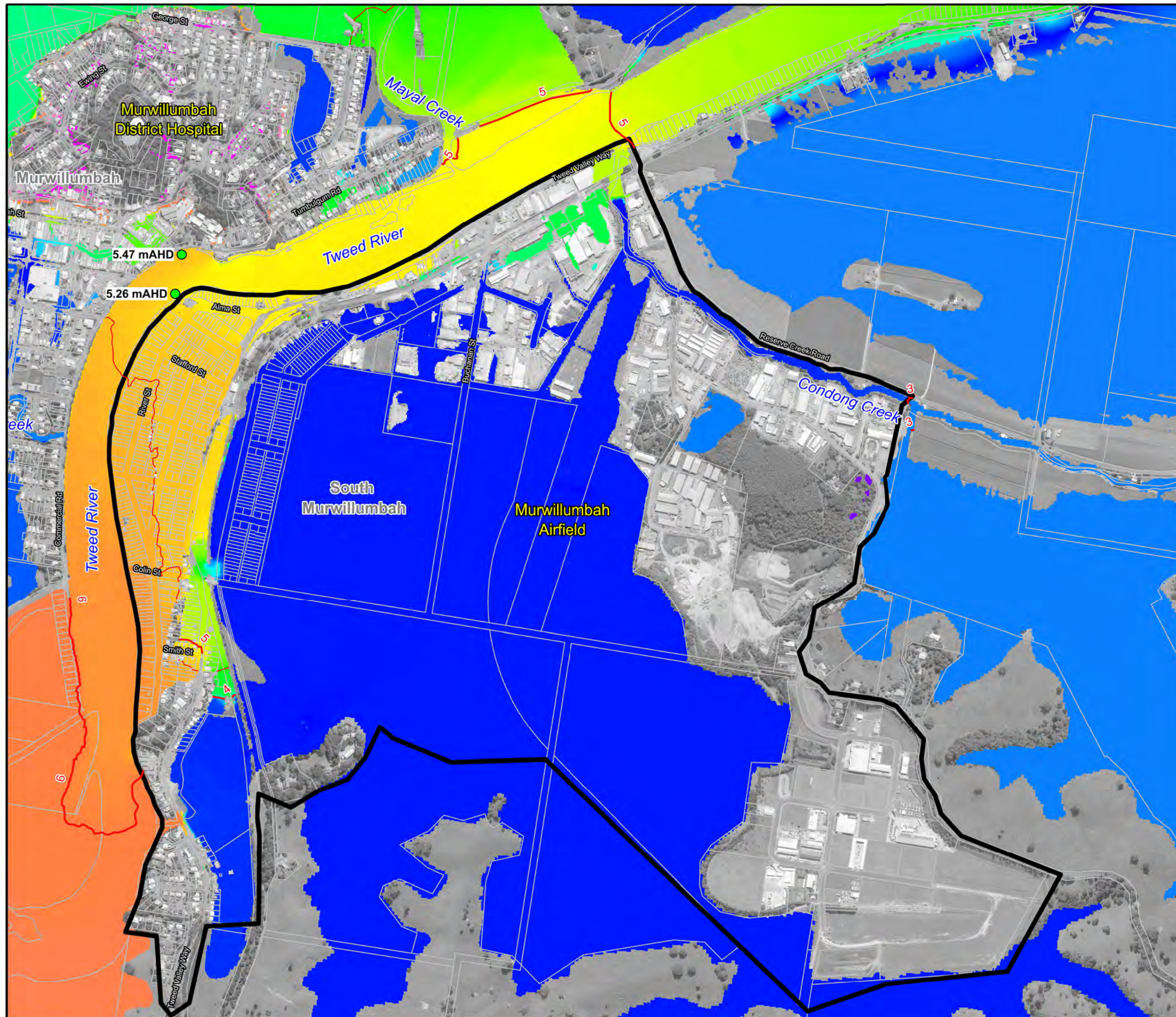
**Figure 10:**  
**Floodwater Levels for the**  
**20% AEP Flood**

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 **Catchment Simulation Solutions**  
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Sydney, NSW 2000

File Name: Figure 10 - Floodwater Levels for the 20% AEP Flood.wor





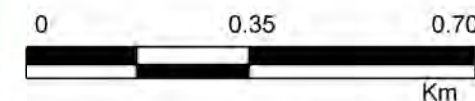
### LEGEND

Levels (m AHD)

- 2 Major Contour (1.0 m AHD)
- Minor Contour (0.5 m AHD)
- < 2.0
- 2.5
- 3.0
- 3.5
- 4.0
- 4.5
- 5.0
- 6.0
- 8.0
- 10.0
- >=15.0
- Peak Water Level at Gauge


### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



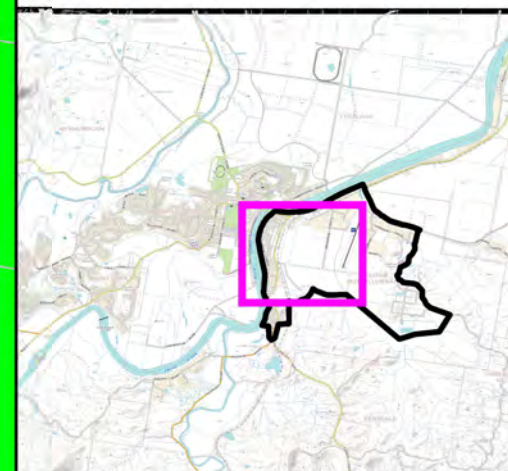
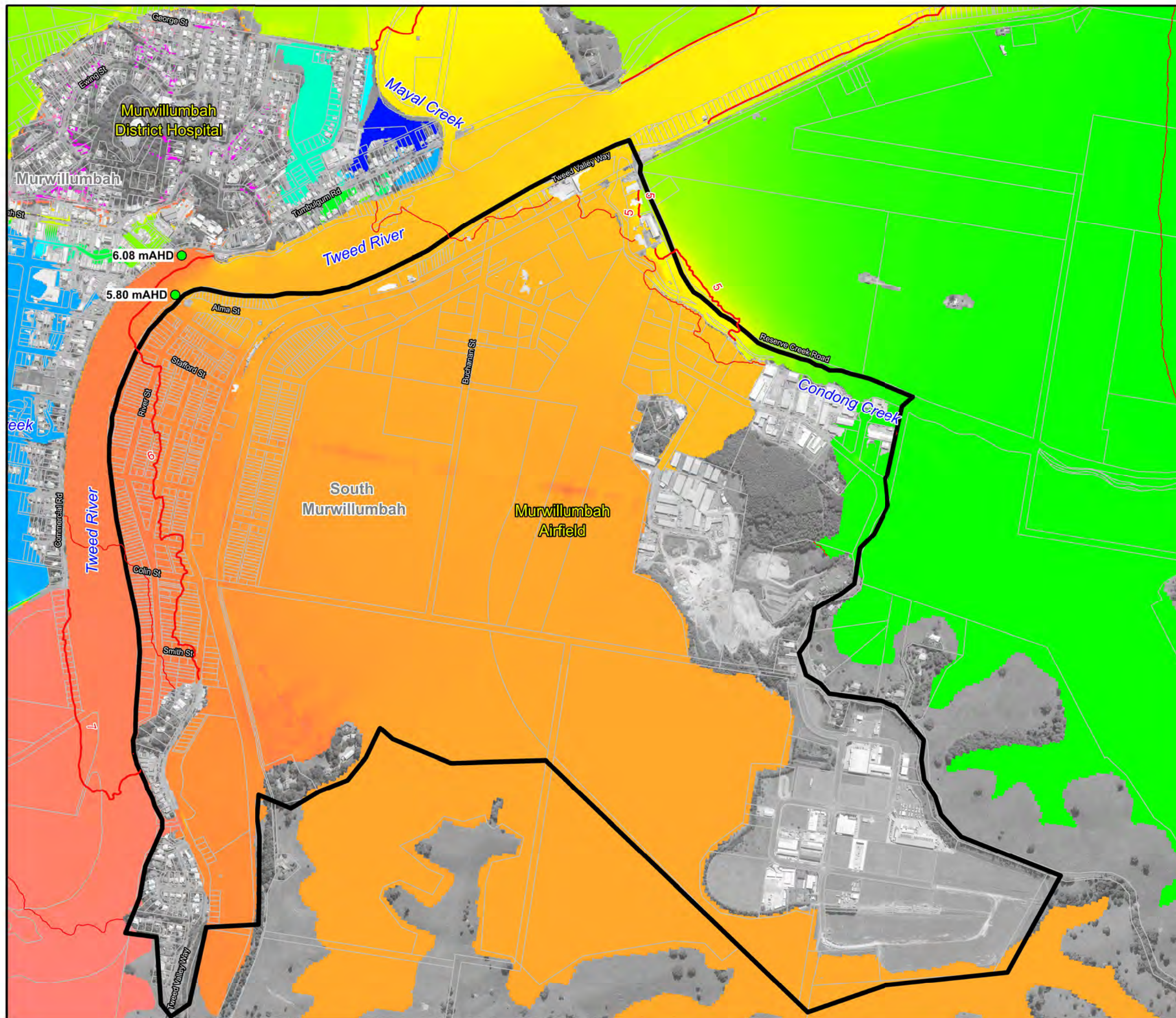
**Figure 11:**  
**Floodwater Levels for the**  
**5% AEP Flood**

Prepared By:

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















File Name: Figure 11 - Floodwater Levels for the 5% AEP Flood.war





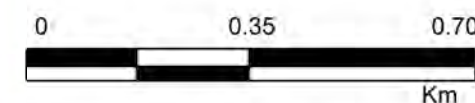
### LEGEND

Levels (m AHD)

-  Major Contour (1.0 m AHD)
-  Minor Contour (0.5 m AHD)
-  < 2.0
-  2.5
-  3.0
-  3.5
-  4.0
-  4.5
-  5.0
-  6.0
-  8.0
-  10.0
-  >= 15.0
-  Peak Water Level at Gauge


### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



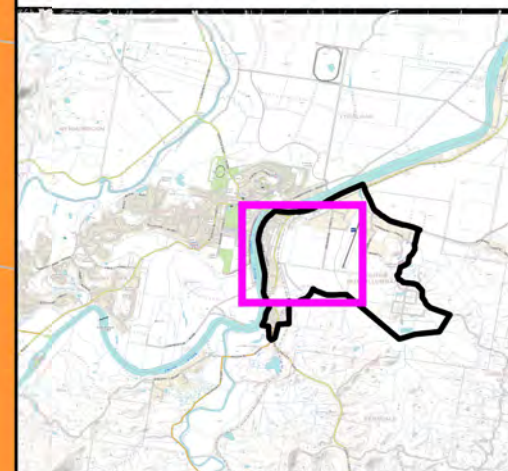
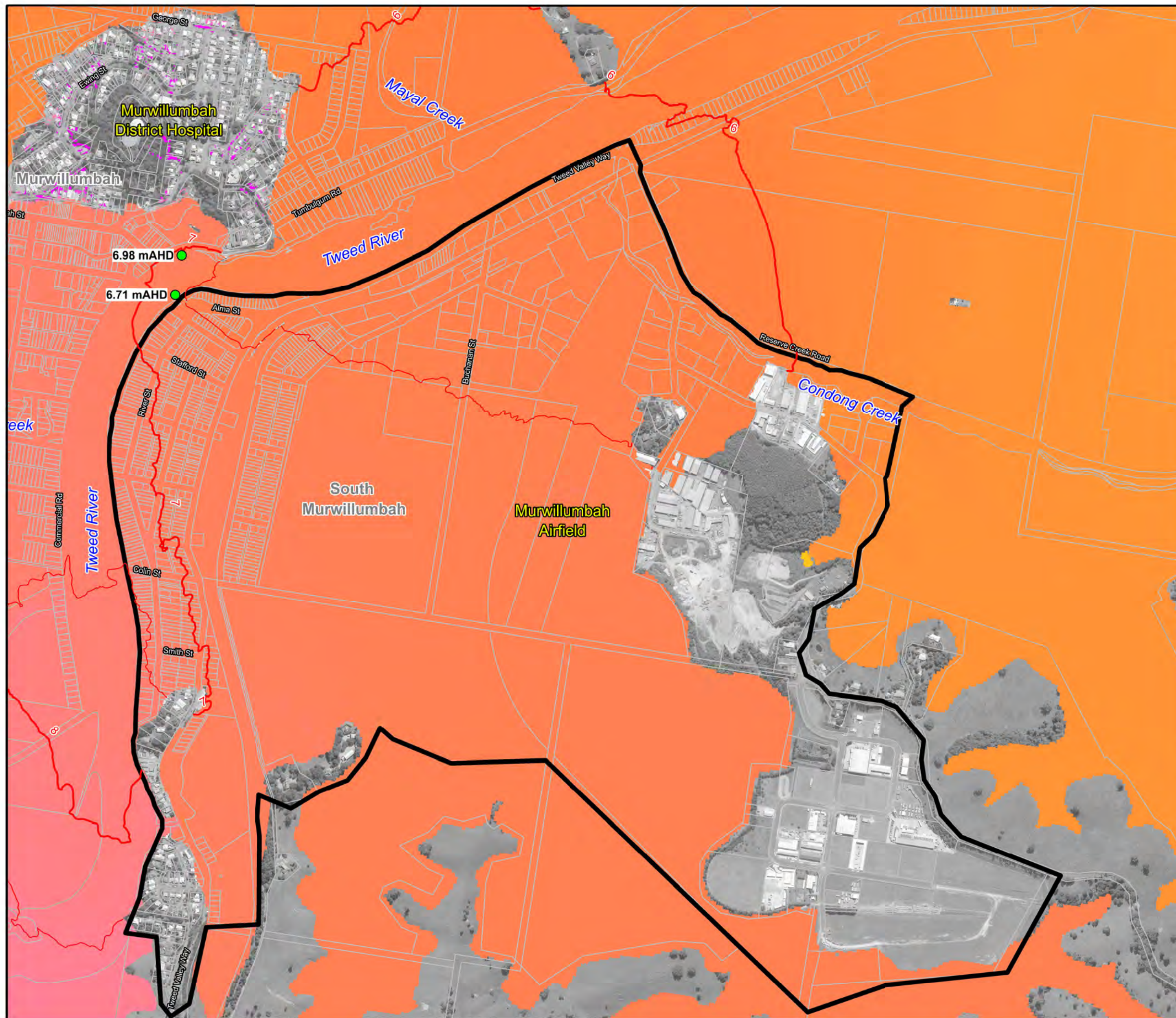
**Figure 12:**  
**Floodwater Levels for the**  
**1% AEP Flood**

Prepared By:

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

File Name: Figure 12 - Floodwater Levels for the 1% AEP Flood.wor





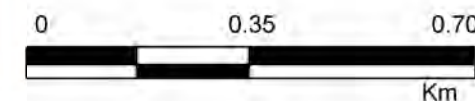
### LEGEND

Levels (m AHD)

- Major Contour (1.0 mAHD)
- Minor Contour (0.5 mAHD)
- < 2.0
- 2.5
- 3.0
- 3.5
- 4.0
- 4.5
- 5.0
- 6.0
- 8.0
- 10.0
- >=15.0
- Peak Water Level at Gauge


### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



**Figure 13:**  
**Floodwater Levels for the**  
**0.2% AEP Flood**

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Sydney, NSW 2000

File Name: Figure 13 - Floodwater Levels for the 0.2% AEP Flood.war





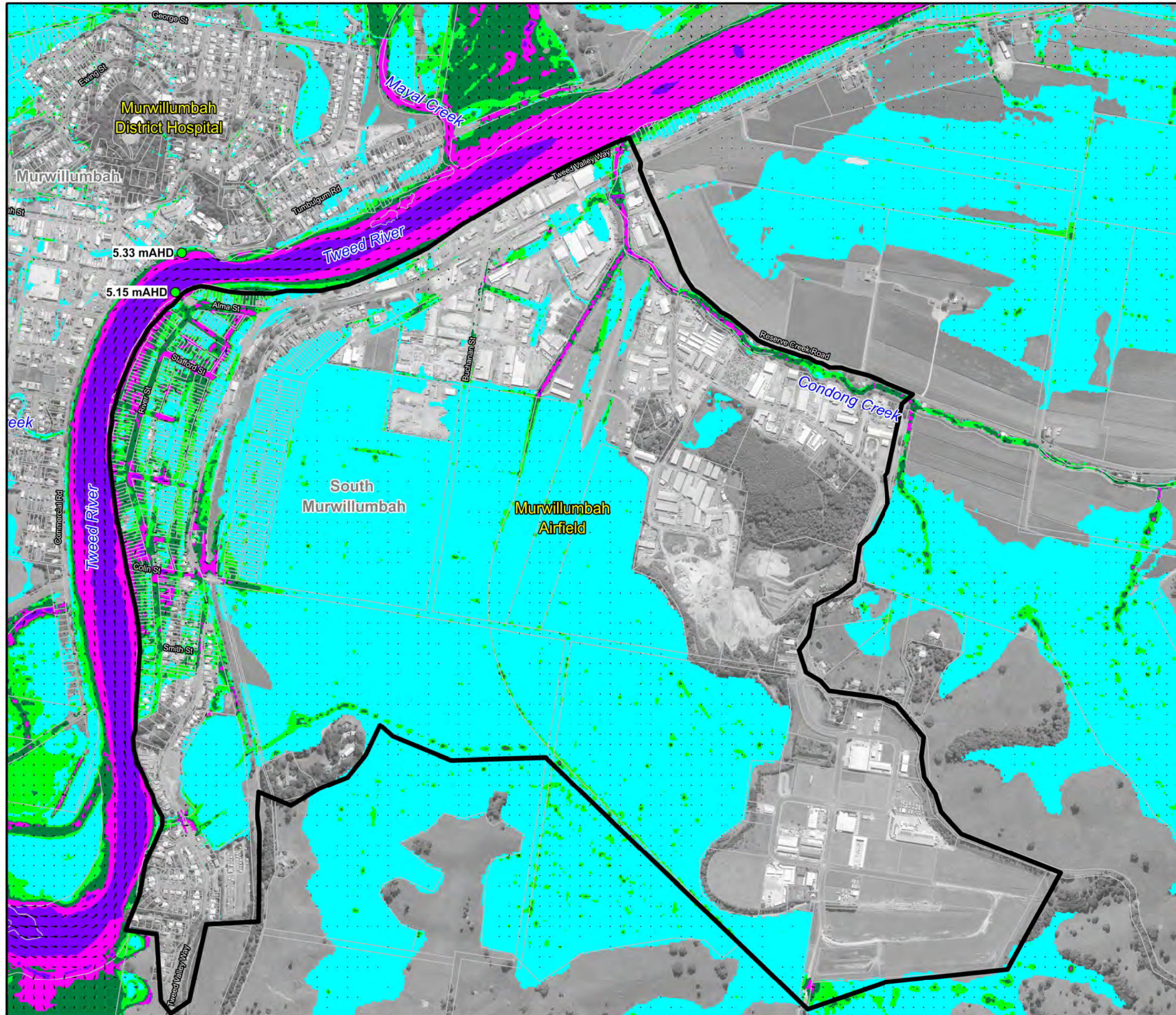
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## FLOODWATER VELOCITY MAPS

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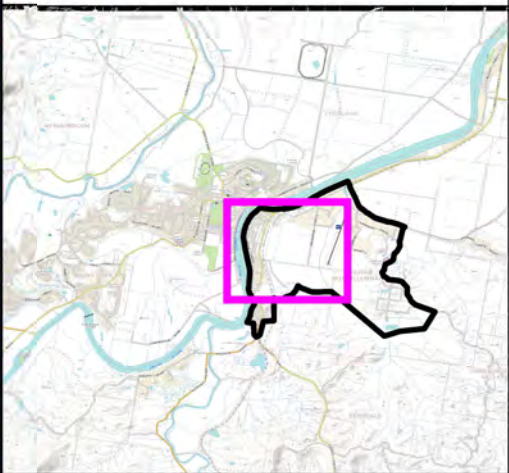









**TWEED**  
SHIRE COUNCIL



**LEGEND**


Velocity (m/s)

- 0.0-0.25
- 0.25 - 0.5
- 0.5-1.0
- 1.0-2.0
- ≥2.0

 Peak Water Level at Gauge

Notes:


Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



00.350.70  
Km

**Figure 14:**  
**Floodwater Velocities for the 20% AEP Flood**

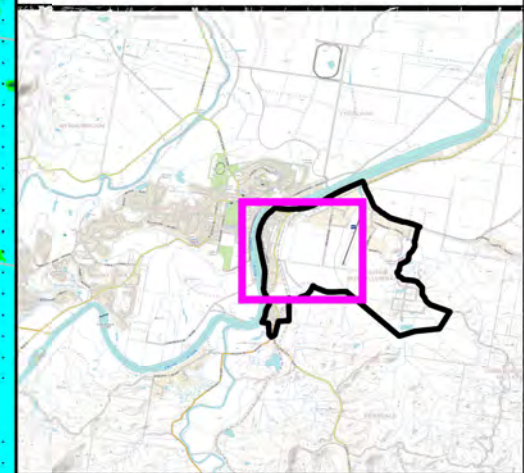
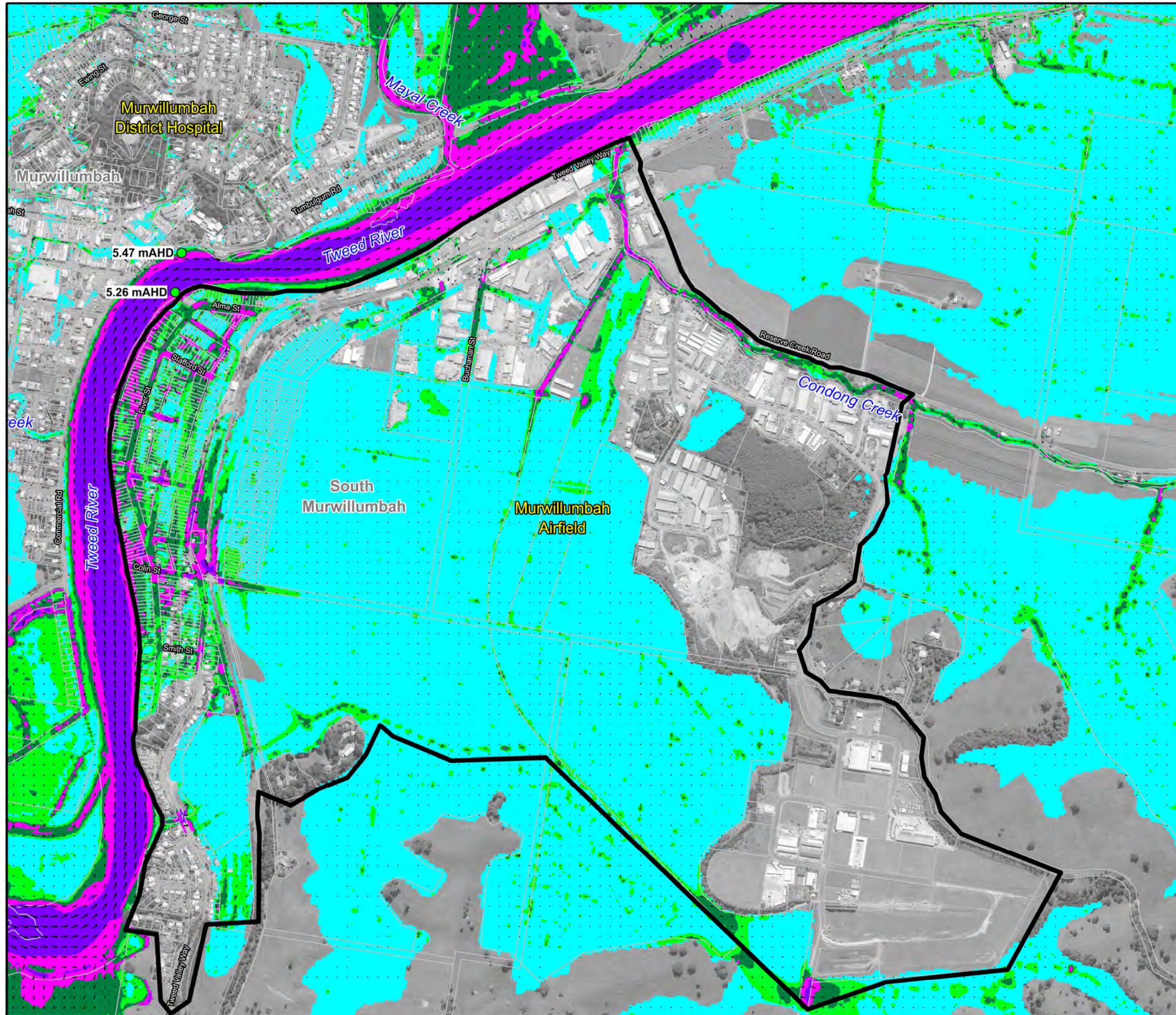
Prepared By:



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

File Name: Figure 14 - Floodwater Velocities for the 20% AEP Flood.wor

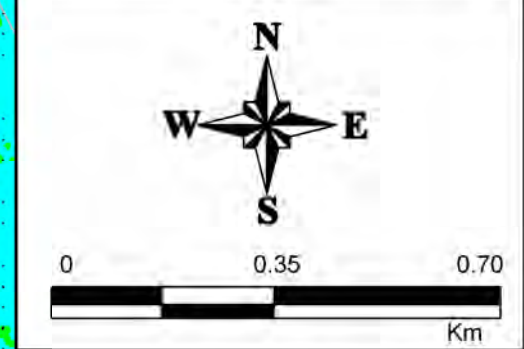




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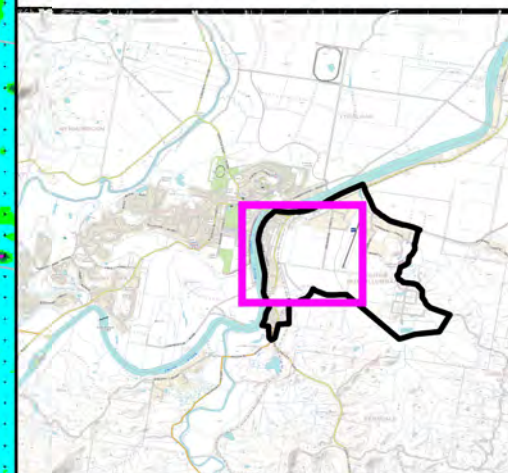
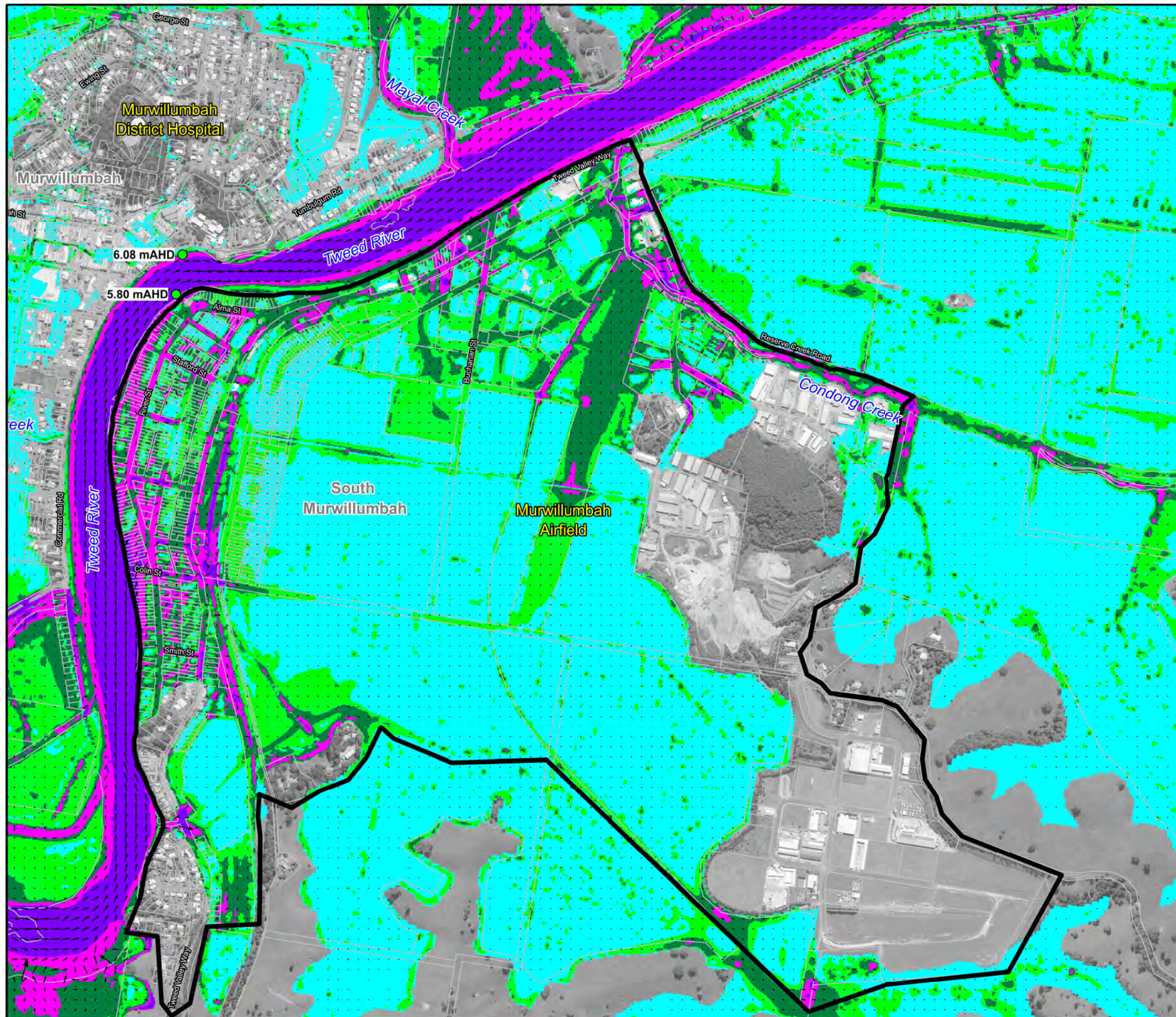
- Velocity (m/s)
- 0.0-0.25
  - 0.25 - 0.5
  - 0.5-1.0
  - 1.0-2.0
  - $\geq 2.0$
- Peak Water Level at Gauge

Notes:  
Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



**Figure 15:**  
**Floodwater Velocities for the 5% AEP Flood**





### LEGEND

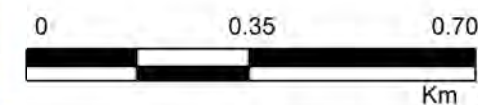
#### Velocity (m/s)

- 0.0-0.25
- 0.25 - 0.5
- 0.5-1.0
- 1.0-2.0
- $\geq 2.0$

● Peak Water Level  
at Gauge


#### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m  
are shown in the mapping



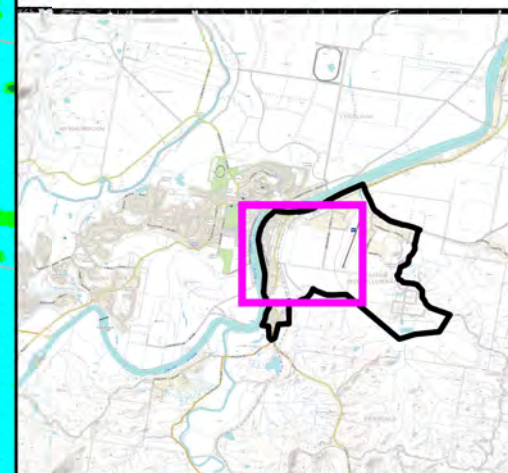
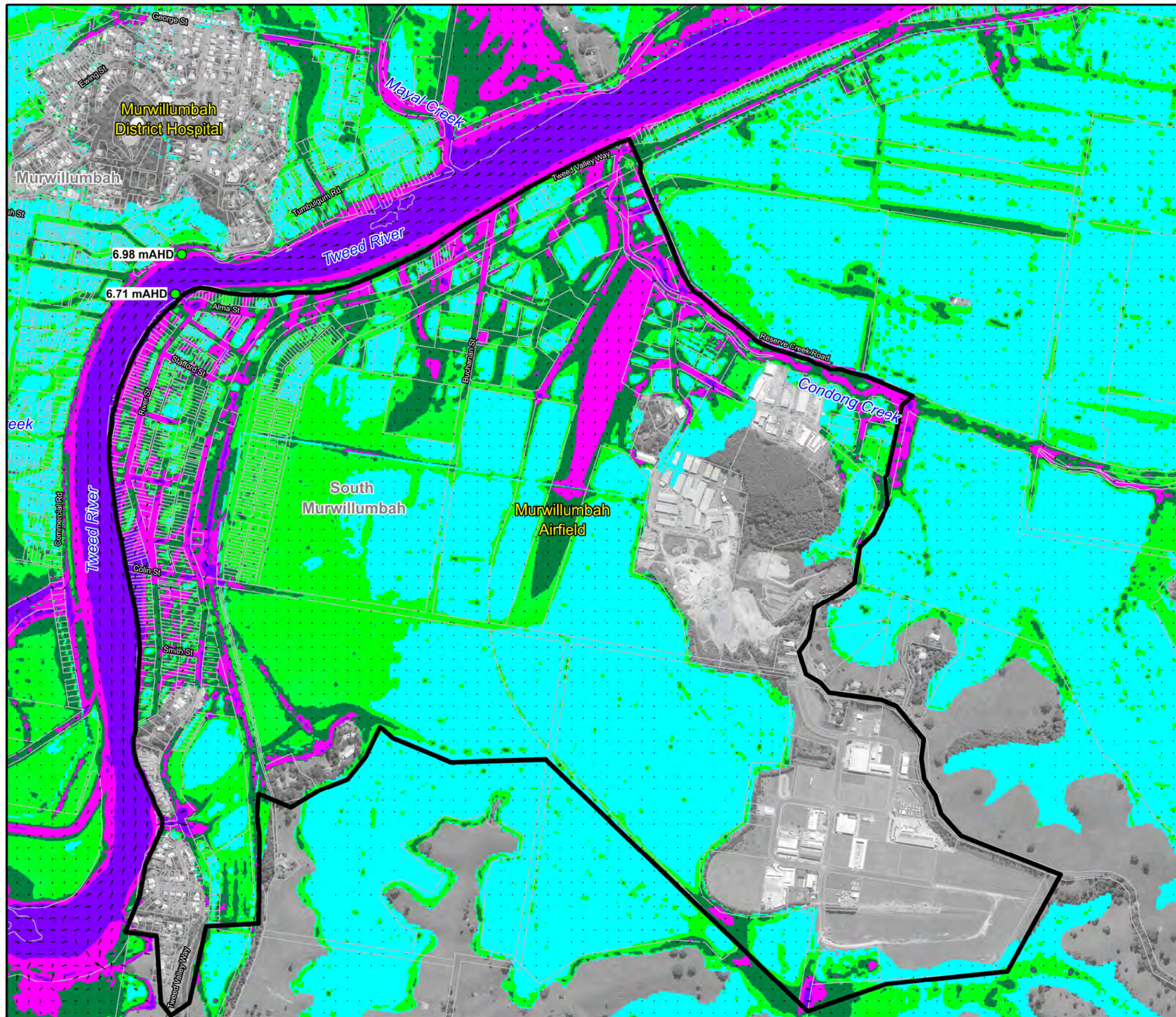
**Figure 16:**  
**Floodwater Velocities for the**  
**1% AEP Flood**

Prepared By:

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

File Name: Figure 16 - Floodwater Velocities for the 1% AEP  
Flood.wor





### LEGEND

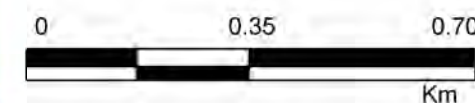
Velocity (m/s)

- 0.0-0.25
- 0.25 - 0.5
- 0.5-1.0
- 1.0-2.0
- $\geq 2.0$

● Peak Water Level  
at Gauge


### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m  
are shown in the mapping



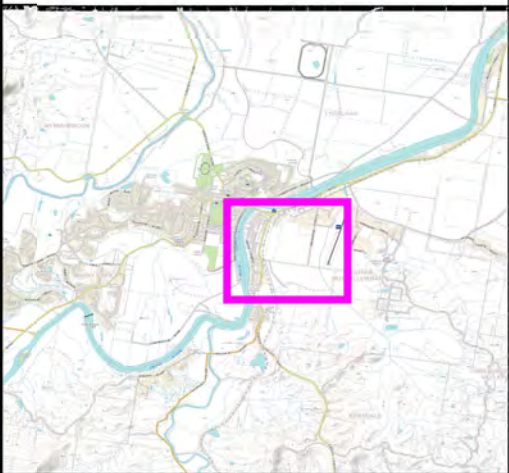
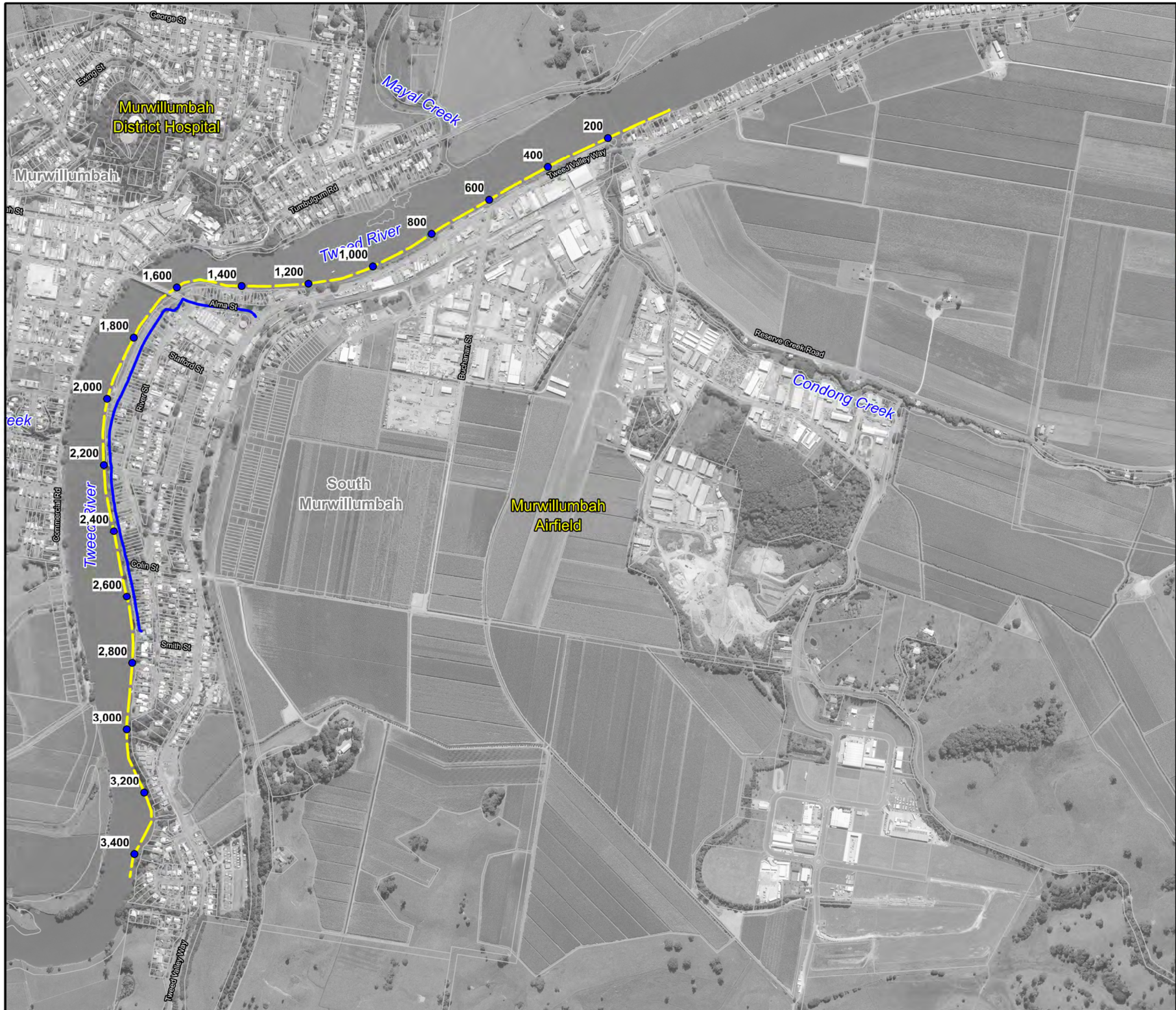
**Figure 17:**  
**Floodwater Velocities for the**  
**0.2% AEP Flood**

Prepared By:

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

File Name: Figure 17 - Floodwater Velocities for the 0.2% AEP  
Flood war

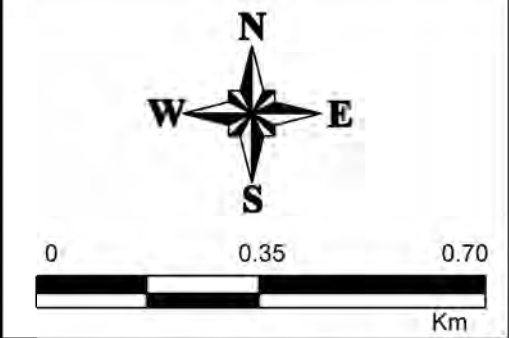




**LEGEND**

- Water Surface Profile Alignment
- Levee Alignment
- Distance Upstream from Condong Creek (m)

Notes:  
Aerial photograph date: 2016



**Figure 18:**  
**Floodwater Surface Profiles**  
**for the Tweed River**

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




### LEGEND

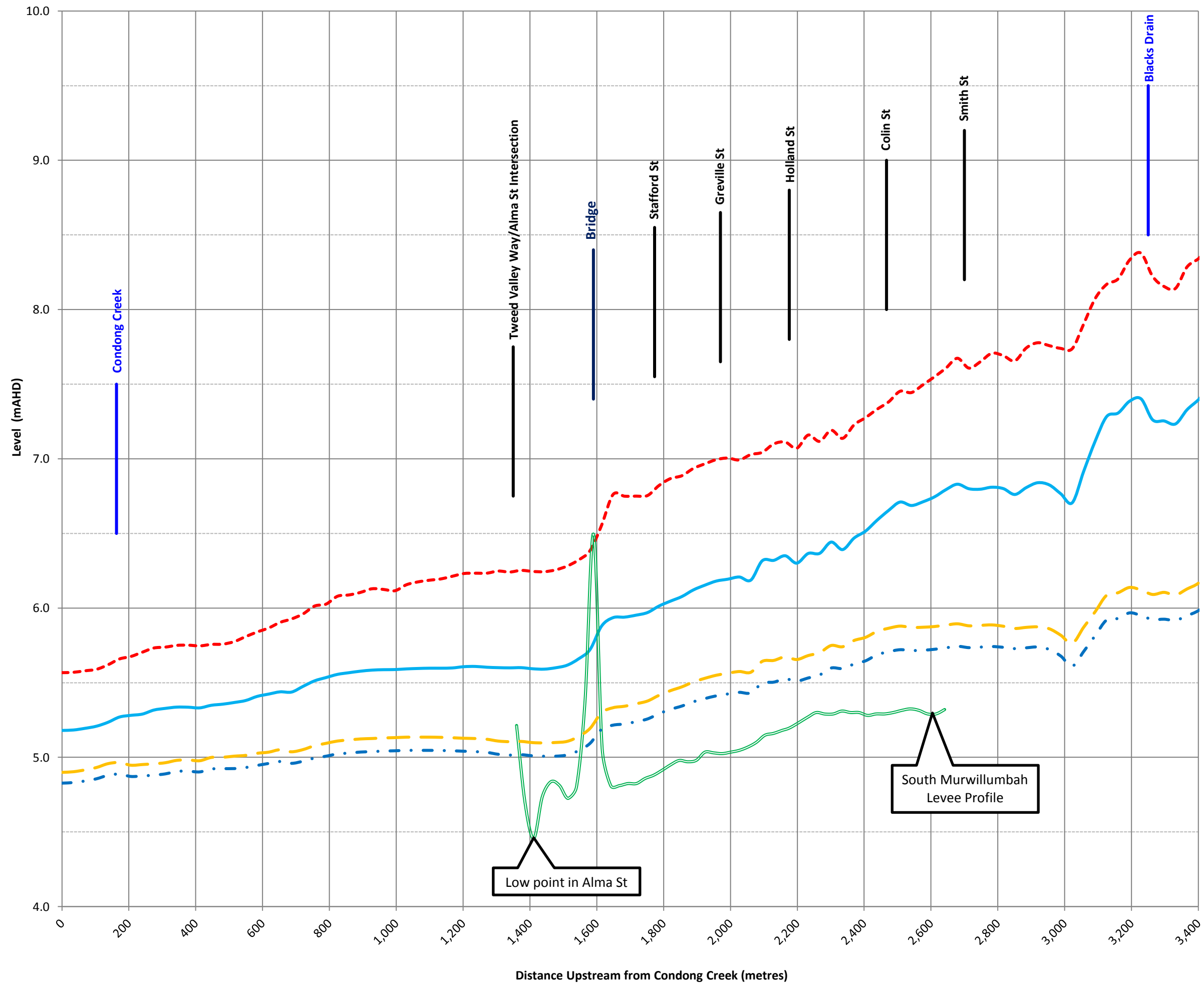
- 0.2% AEP
- 1% AEP
- 5% AEP
- · - 20% AEP

Notes:

**Figure 18.2:  
Floodwater Surface  
Profiles for the  
Tweed River**

Prepared By:  
 **Catchment Simulation Solutions**  
Suite 2.01, 210 George Street  
Sydney, NSW, 2000

File Name: Water Surface Profile-  
Design1.xlsx







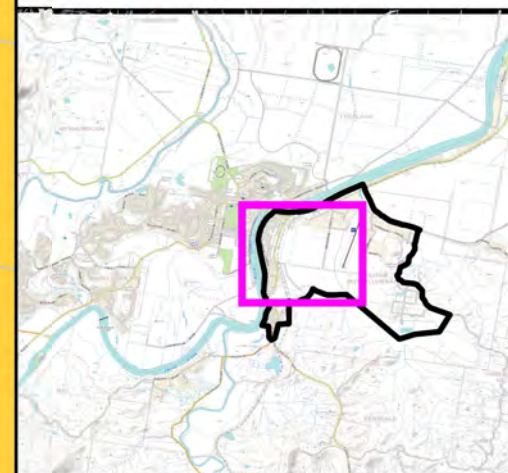
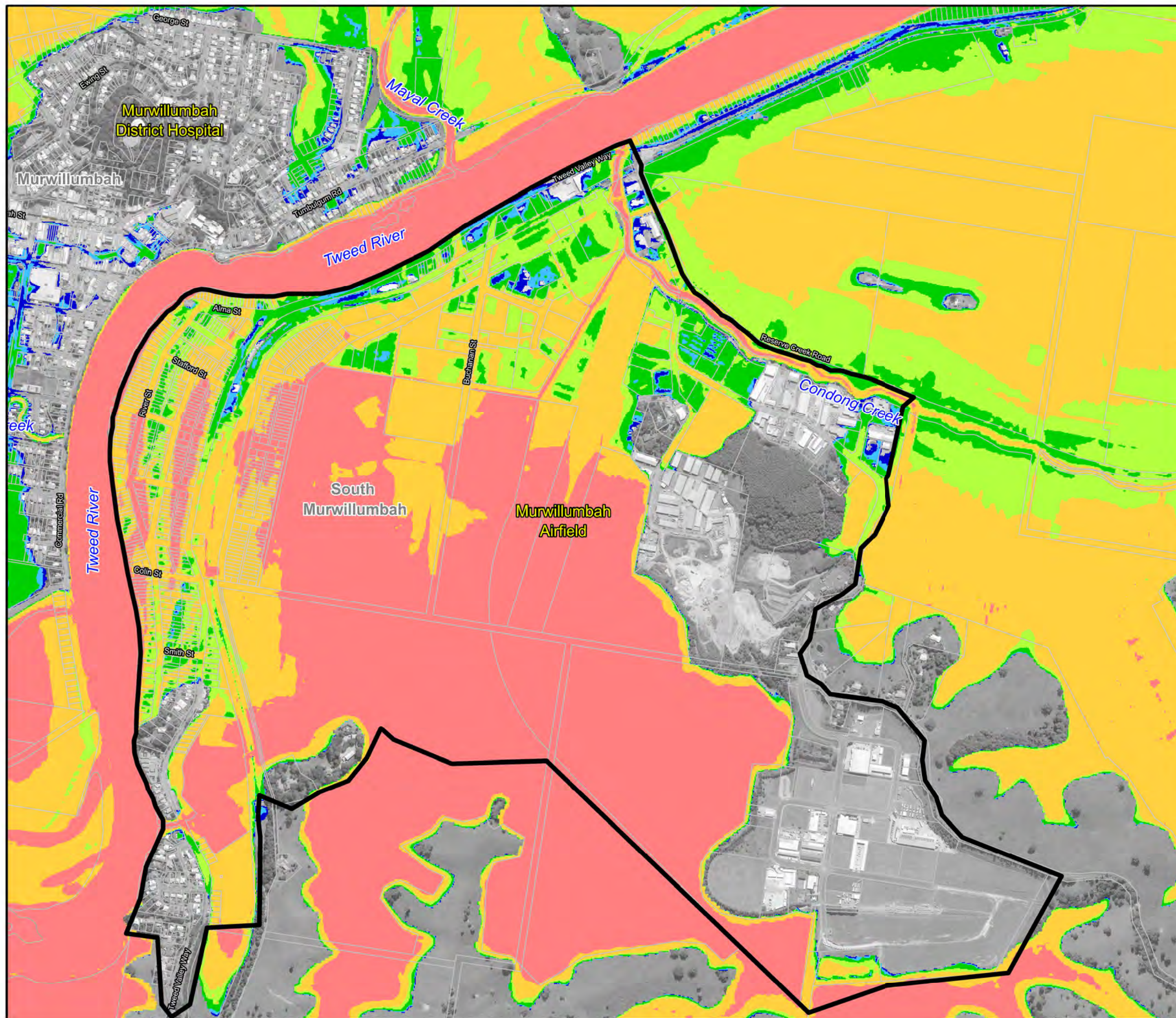
---

## FLOOD HAZARD MAPS

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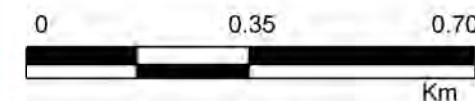
### LEGEND

#### Hazard Categories

-  H1 - generally safe for people, vehicles and buildings
-  H2 - unsafe for small vehicles
-  H3 - unsafe for vehicles, children and elderly
-  H4 - unsafe for people and vehicles
-  H5 - unsafe for people or vehicles. Buildings require special design
-  H6 - unsafe for people or vehicles. All buildings vulnerable to failure


#### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



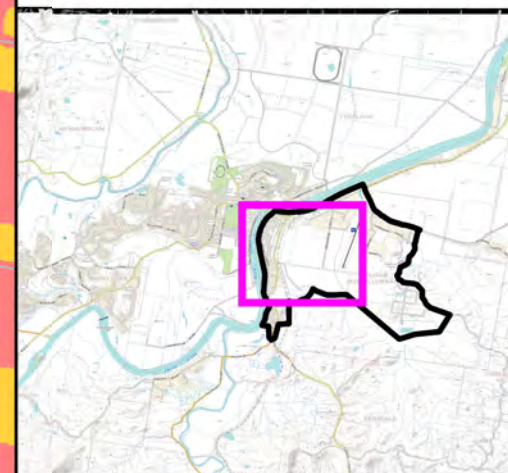
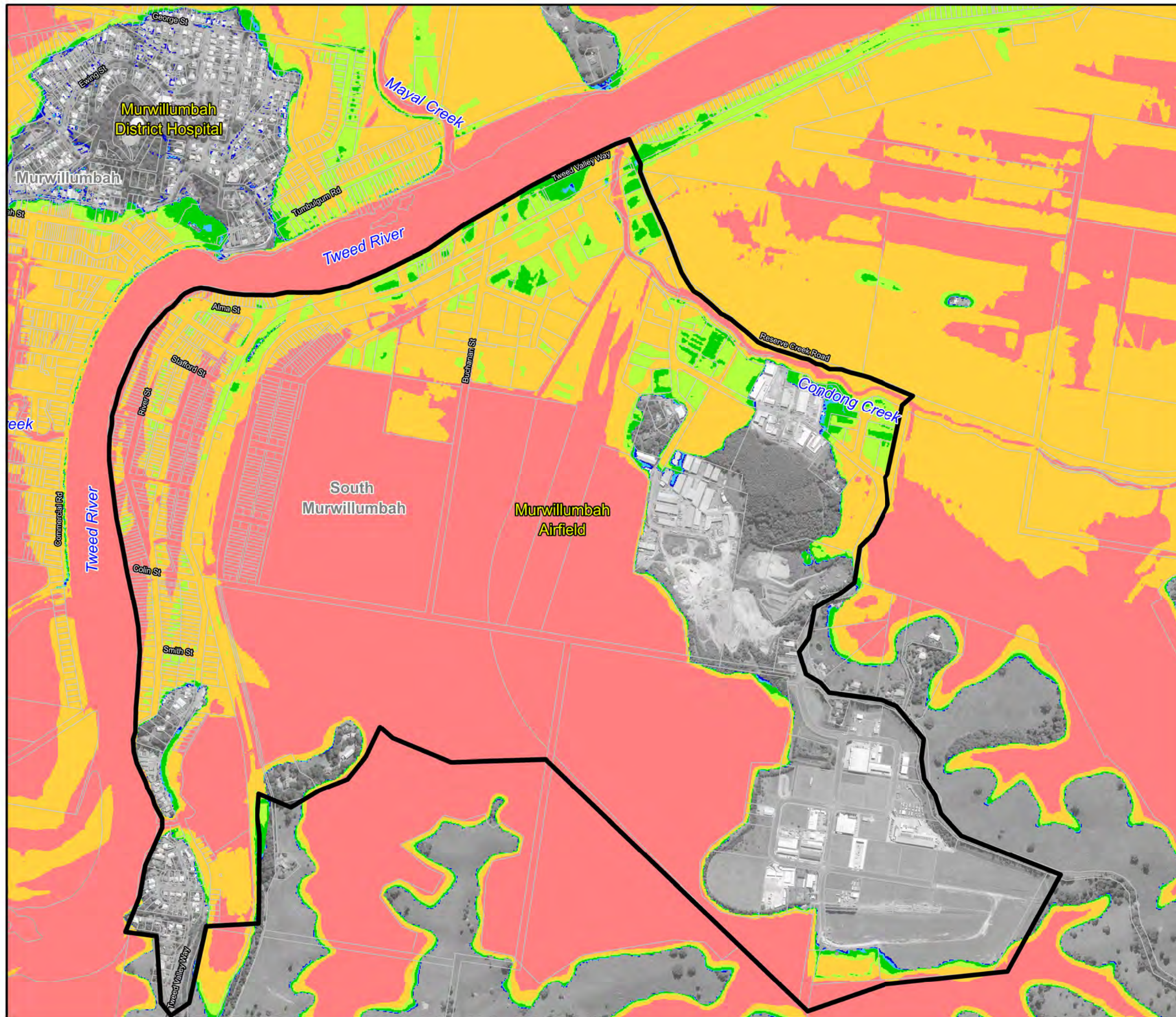
**Figure 19:**  
**Hazard Categories for the**  
**1% AEP Flood**

Prepared By:

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







File Name: Figure 19 - Hazard Categories for the 1% AEP Flood.wor





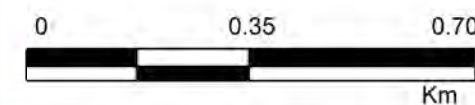
### LEGEND

#### Hazard Categories

-  H1 - generally safe for people, vehicles and buildings
-  H2 - unsafe for small vehicles
-  H3 - unsafe for vehicles, children and elderly
-  H4 - unsafe for people and vehicles
-  H5 - unsafe for people or vehicles. Buildings require special design
-  H6 - unsafe for people or vehicles. All buildings vulnerable to failure

#### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



**Figure 20:**  
**Hazard Categories for the**  
**0.2% AEP Flood**

Prepared By:

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

File Name: Figure 20 - Hazard Categories for the 0.2% AEP Flood.wor





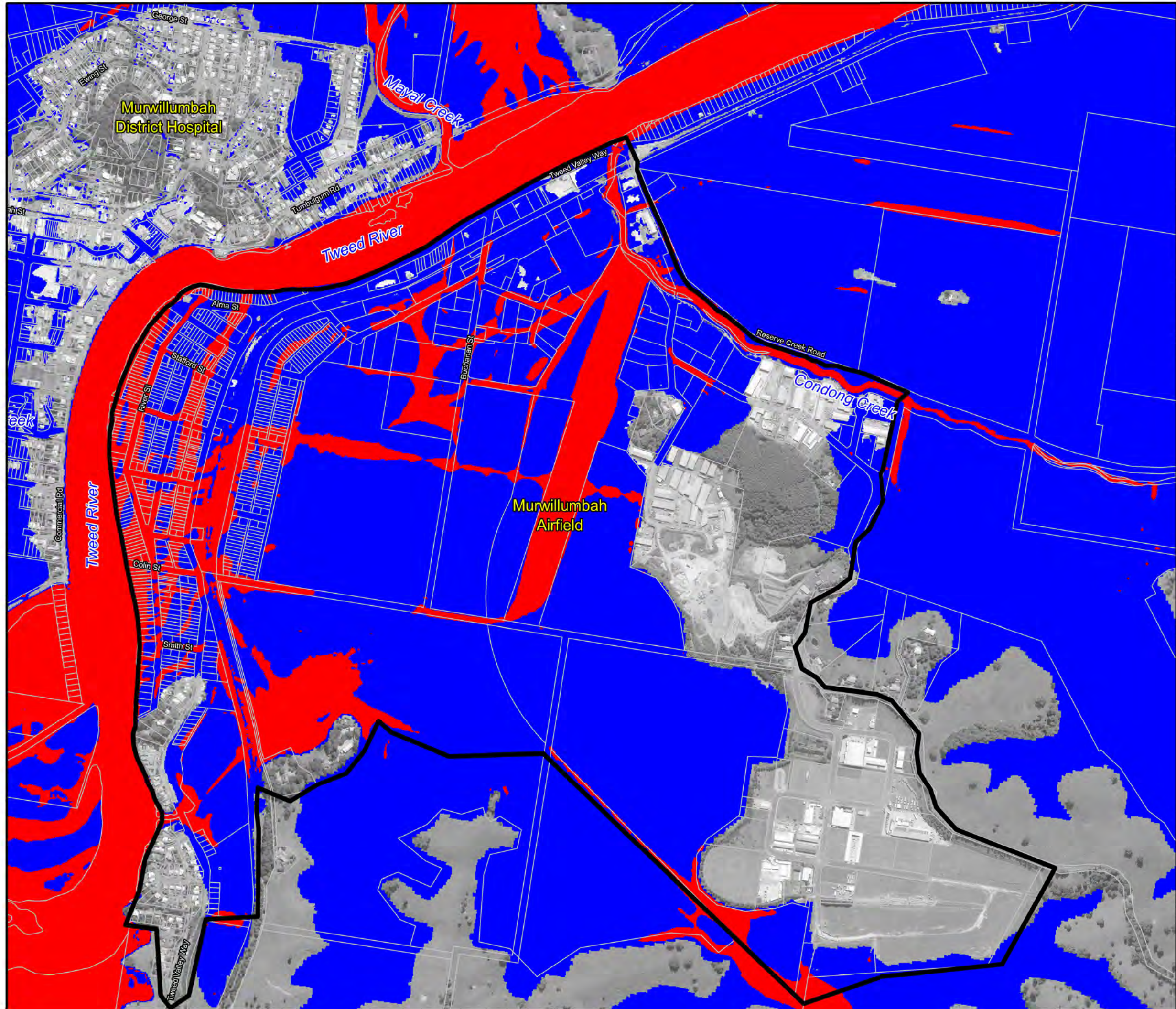
---


## HYDRAULIC CATEGORY MAPS

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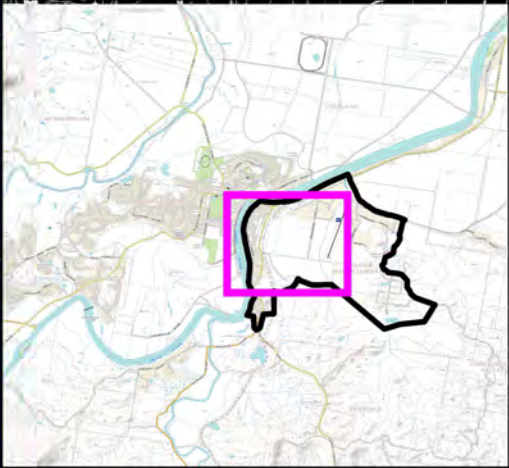








**TWEED**  
SHIRE COUNCIL



**LEGEND**  
  
Hydraulic Categories  


Flood Fringe

Flood Storage

Floodway

Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



0


0.35

0.70

Km

**Figure 21:**  
**Hydraulic Categories for the**  
**1% AEP Flood**

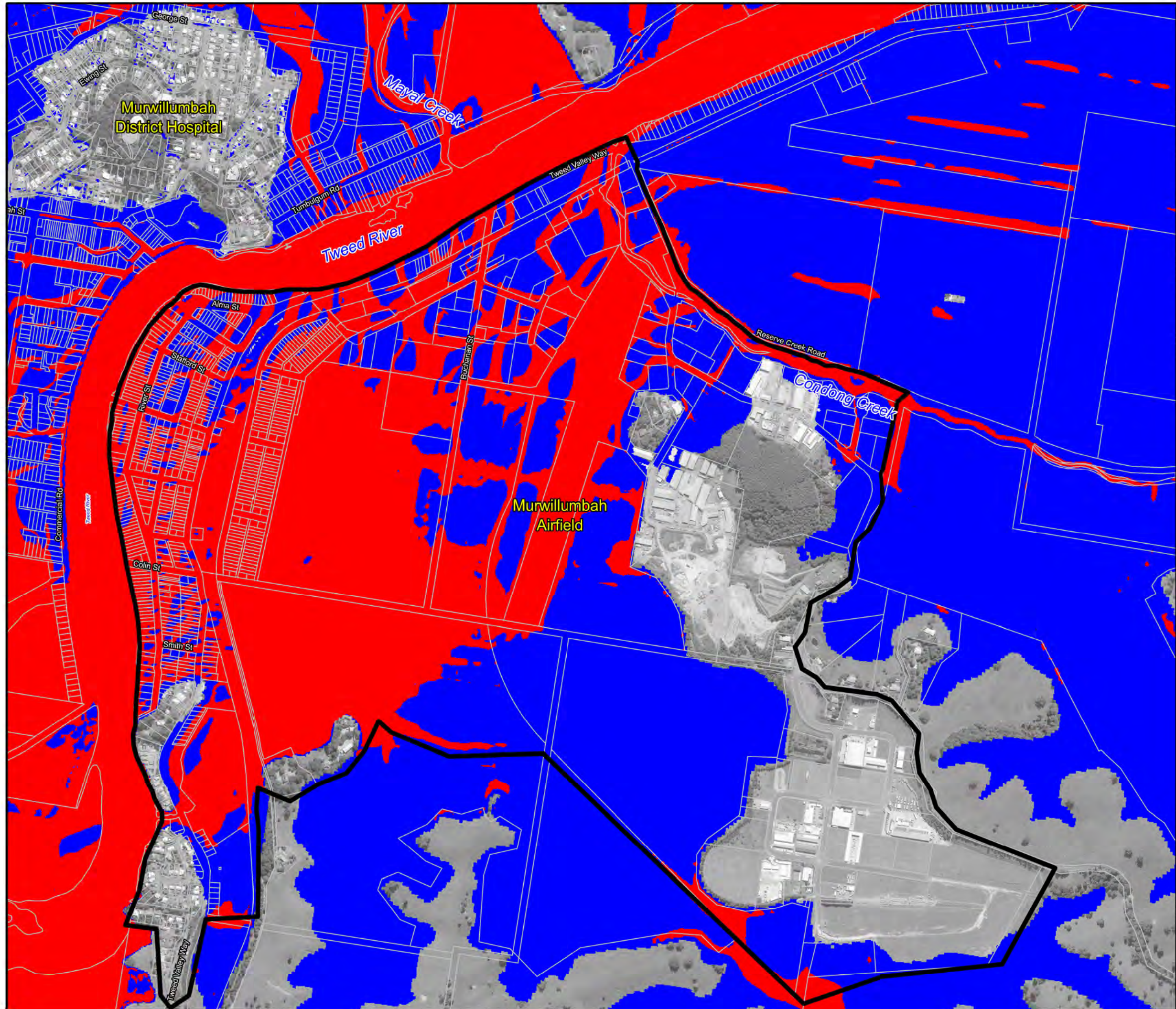
Prepared By:




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

File Name: Figure 21 - Hydraulic Categories for the 1% AEP Flood war







**TWEED**  
SHIRE COUNCIL

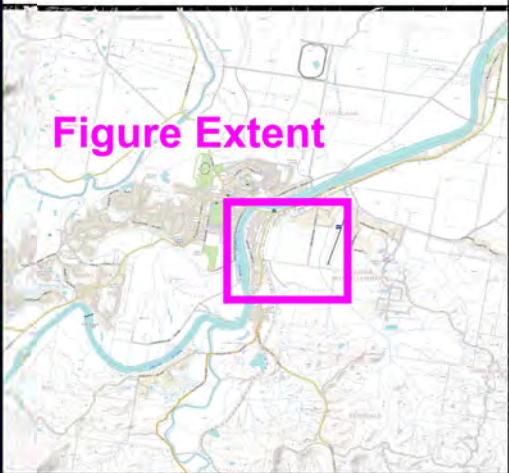


Figure Extent

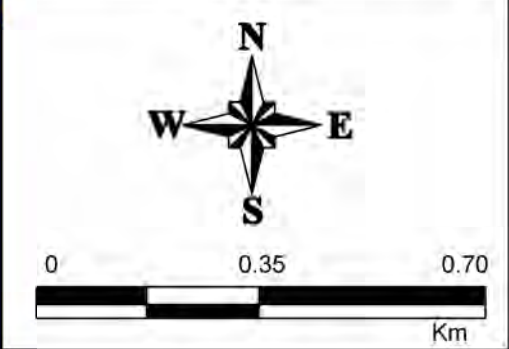
**LEGEND**

Hydraulic Categories

- Flood Fringe
- Flood Storage
- Floodway

Notes:


Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



0 0.35 0.70  
Km

**Figure 22:**  
**Hydraulic Categories**  
**for the 0.2% AEP Flood**

Prepared By:



CatchmentSimulationSolutions  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Fig22- Hydraulic Categories  
for 0.2%AEP.wor



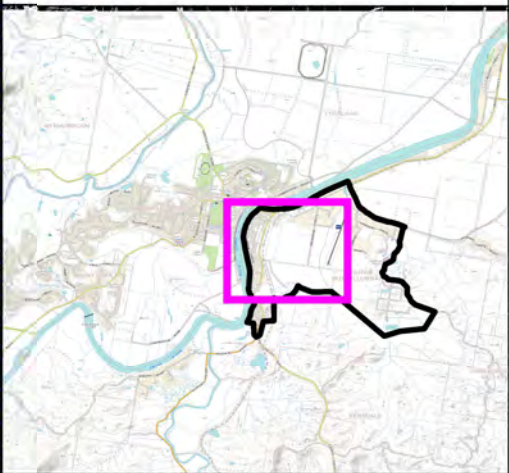
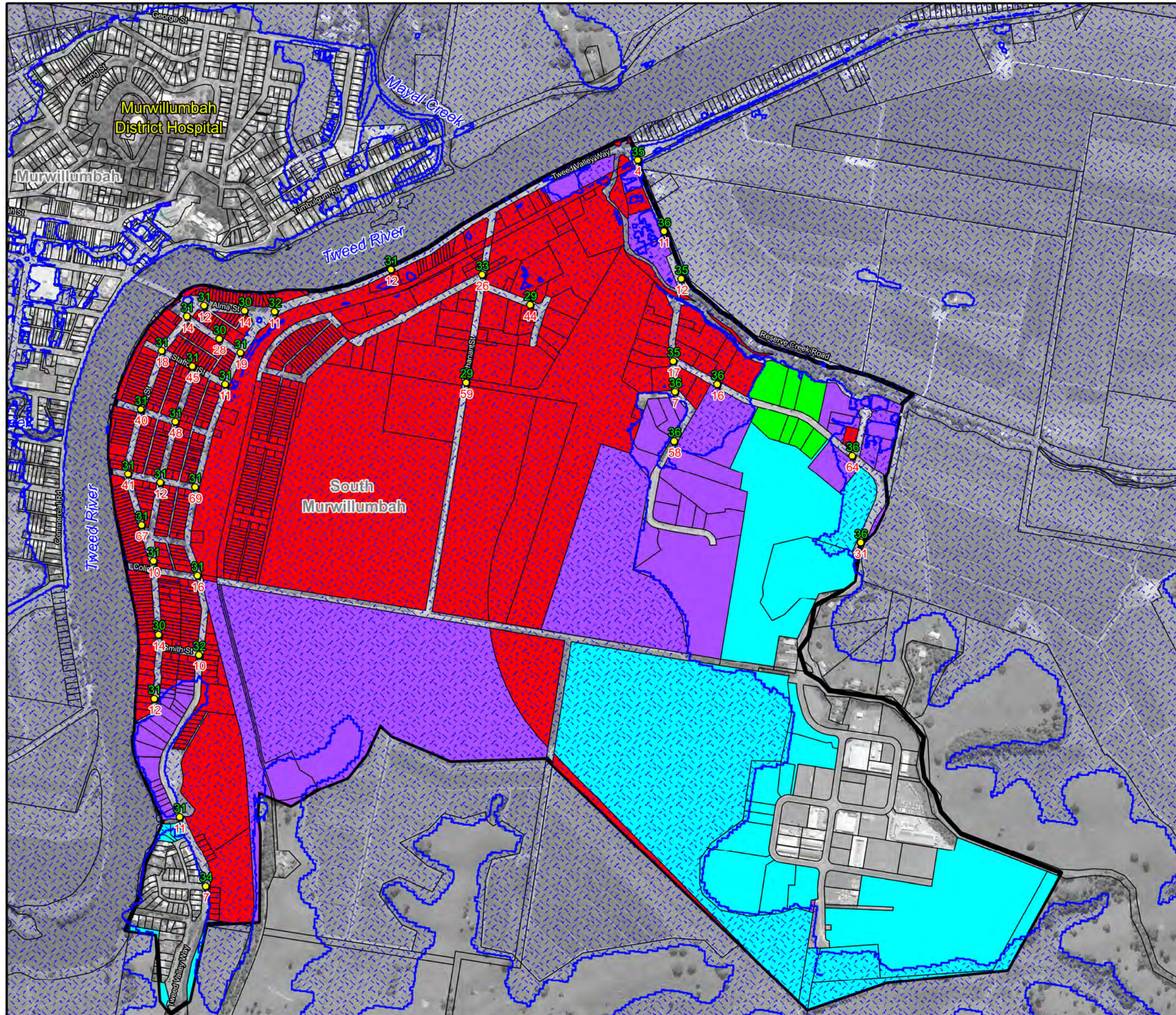
---

## EMERGENCY RESPONSE PRECINCT CLASSIFICATIONS

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**LEGEND**

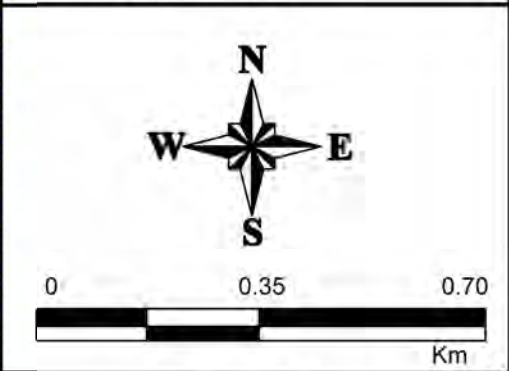
Depths (m)

- Flooded Isolated Submerged
- Flooded Isolated Elevated
- Flooded Exit Route Overland Escape Route
- Flooded Exit Rising Road Egress
- Indirect Consequences
- No Flood Impacts

Depths (m)

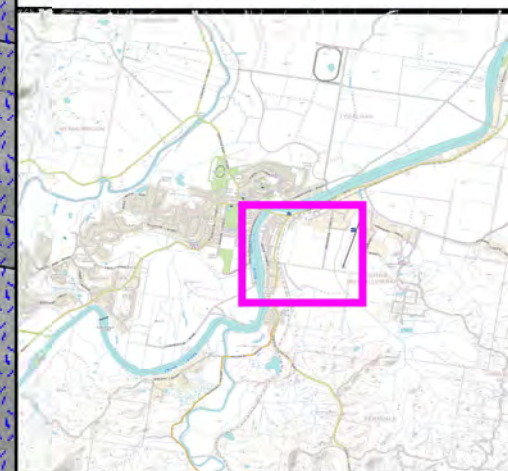
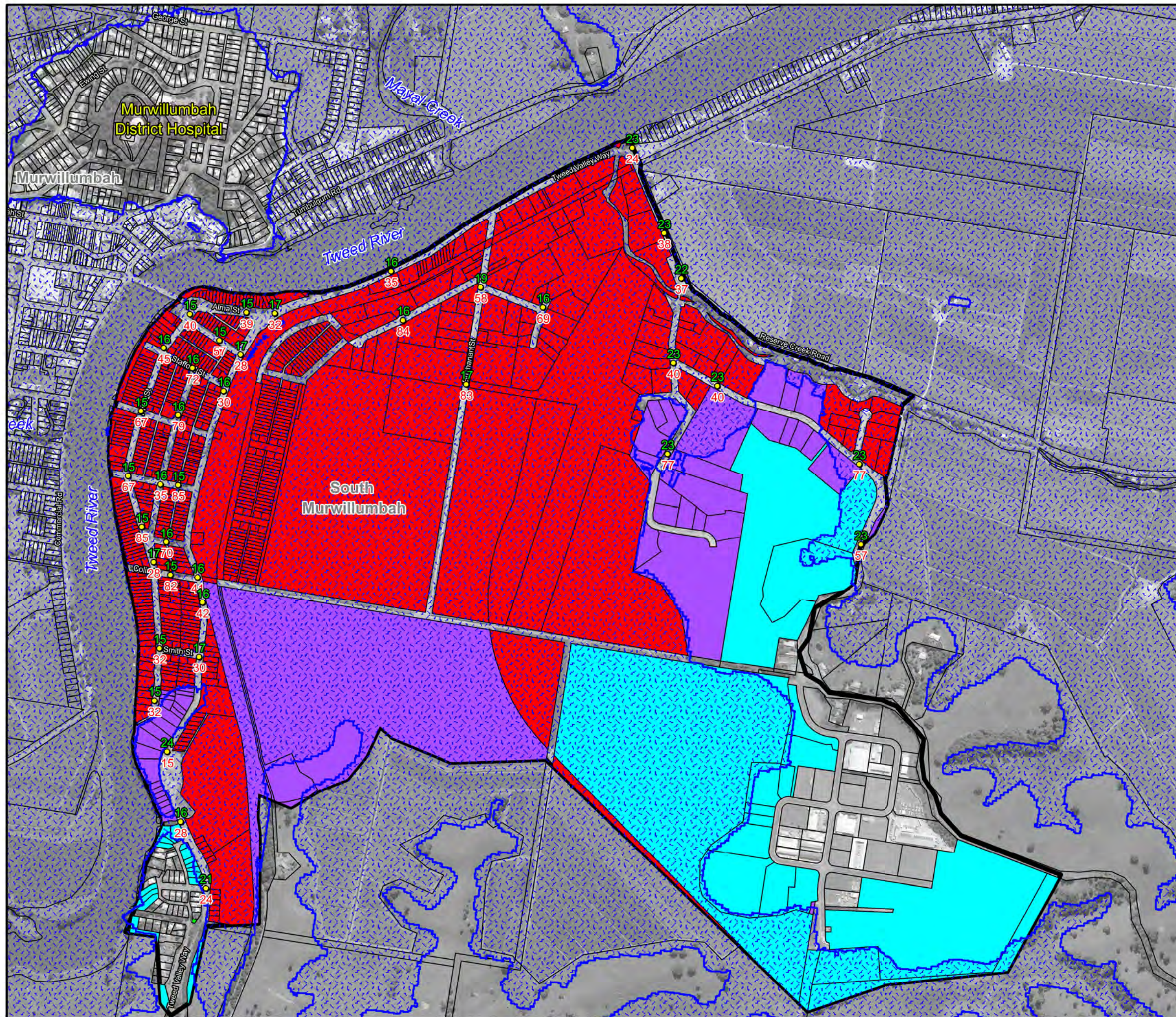
- 15 Time of road first cut (hours)
- 2.5 Duration of inundation (hours)
- Flood Extent

Notes:  
Aerial photograph date: 2016



**Figure 23:**  
**Emergency Response Precinct**  
**Classification for the 1% AEP**  
**Flood**

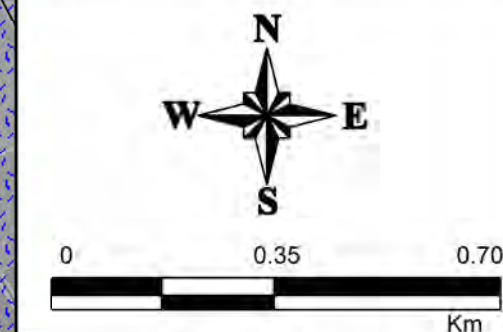




### LEGEND

- Depths (m)**
- Flooded Isolated Submerged
  - Flooded Isolated Elevated
  - Flooded Exit Route Overland Escape Route
  - Flooded Exit Rising Road Egress
  - Indirect Consequences
  - No Flood Impacts
- Depths (m)**
- 15 Time of road first cut (hours)
  - 2.5 Duration of inundation (hours)
  - Flood Extent

**Notes:**  
Aerial photograph date: 2016



**Figure 24:**  
**Emergency Response Precinct**  
**Classification for the 0.2% AEP**  
**Flood**

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

File Name: Figure 24 - Emergency Response Precinct  
Classification for the 0.2% AEP Flood.wor





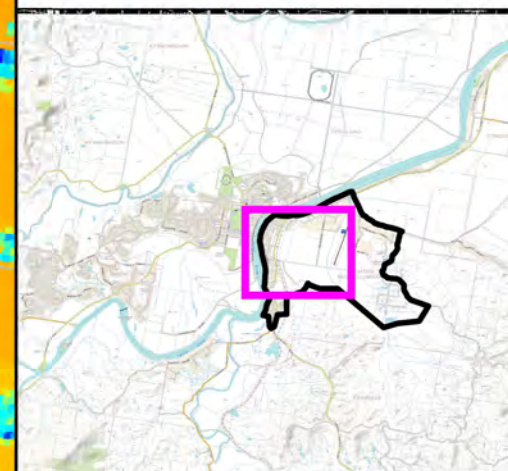
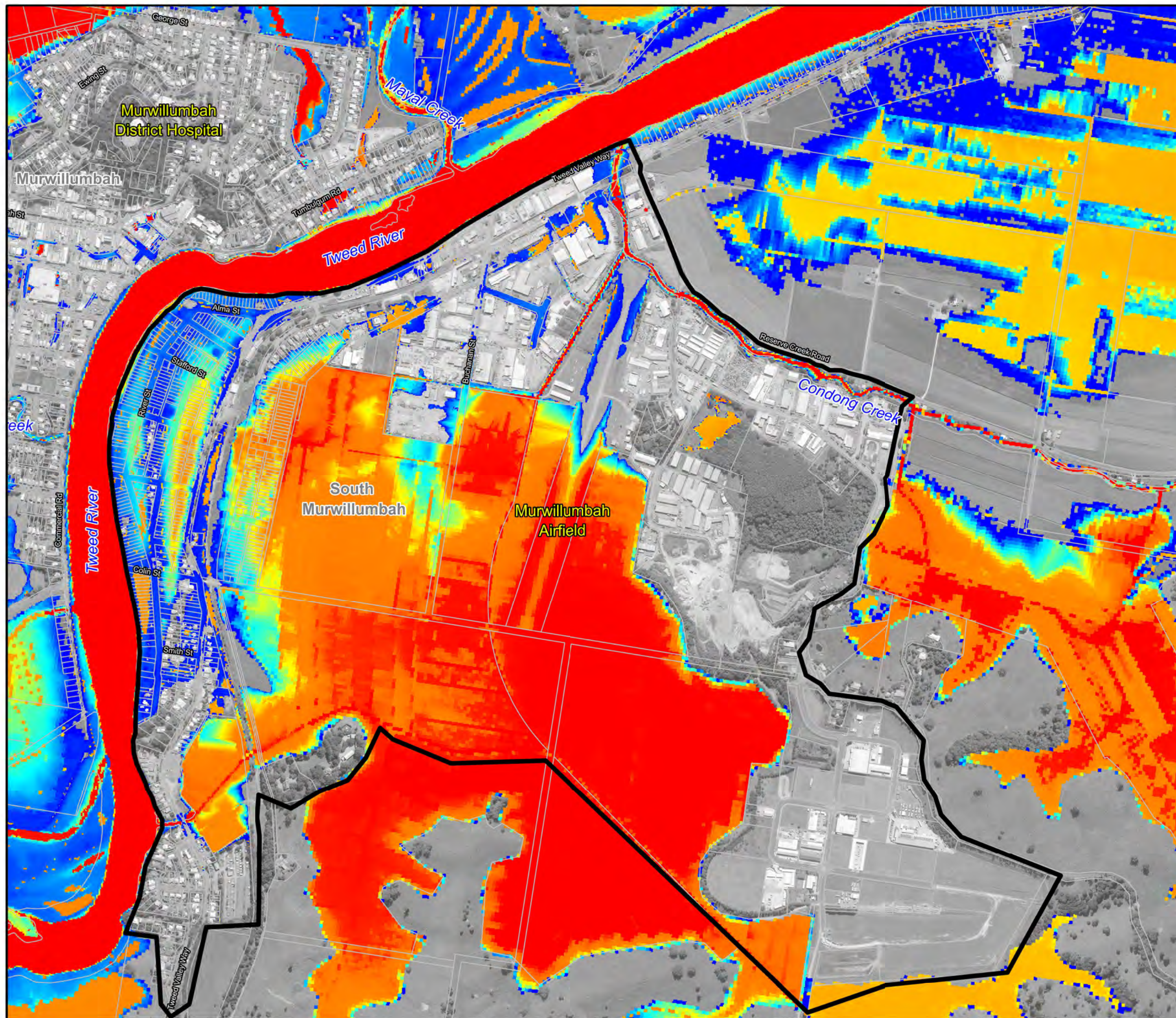
---

## DURATION OF INUNDATION MAPS

---







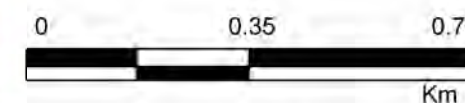
### LEGEND

Duration of Inundation (Days)



### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



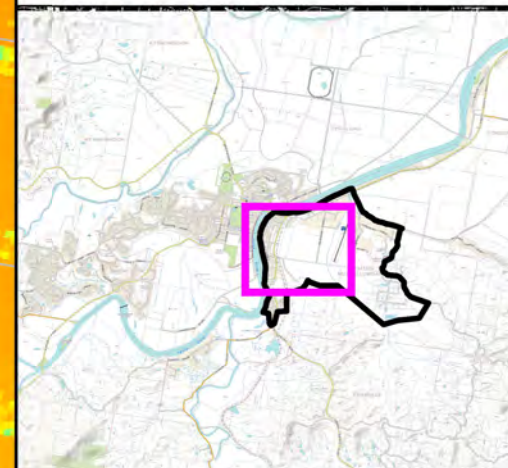
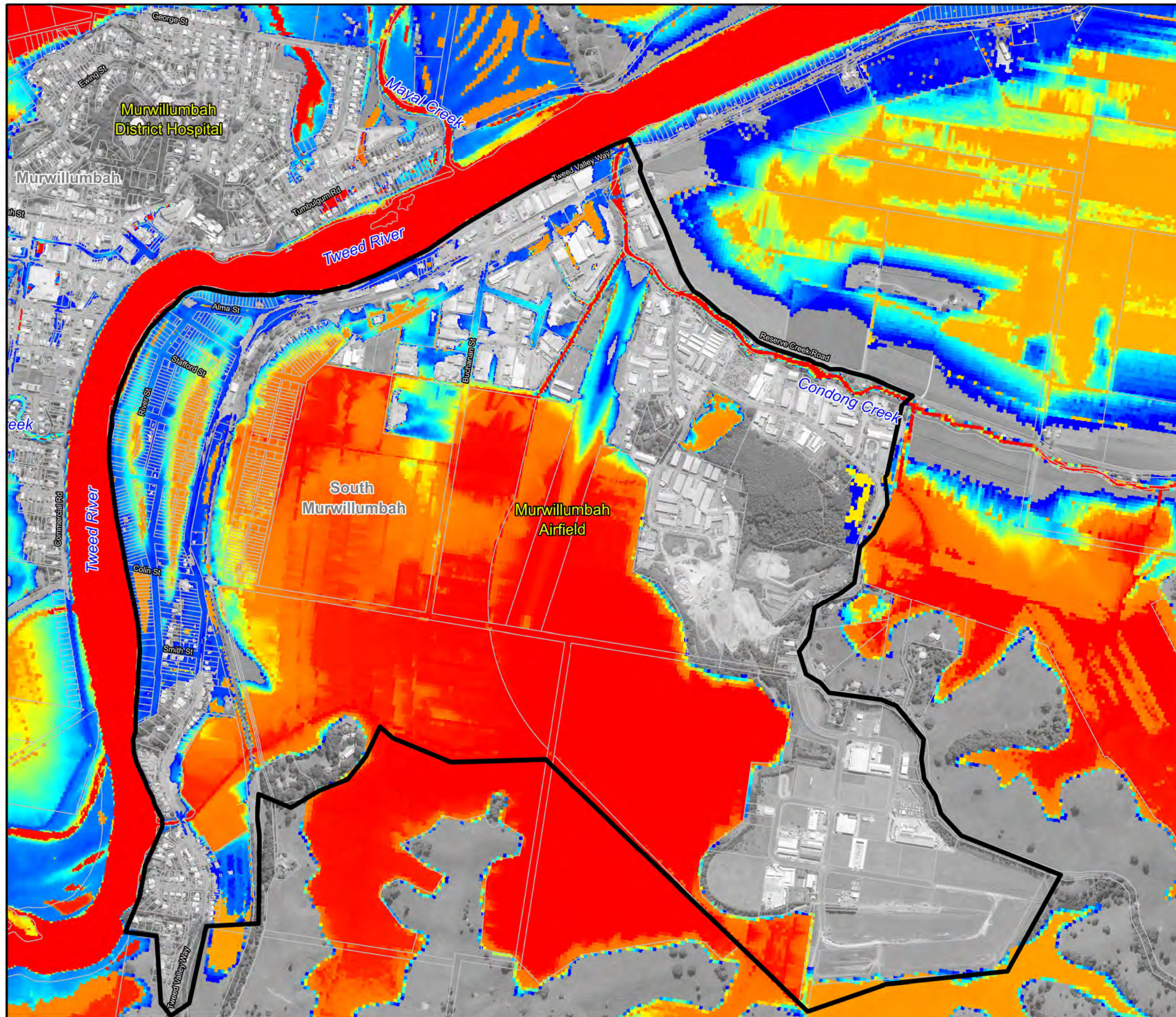
**Figure 25:**  
**Duration of Inundation**  
**for the 20% AEP Flood**

Prepared By:

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

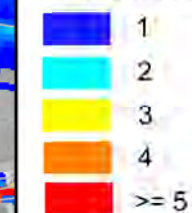
File Name: Figure 25 - Duration of Inundation for the 20% AEP Flood.wor





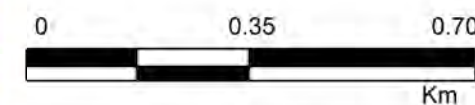
### LEGEND

Duration of Inundation (Days)




### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



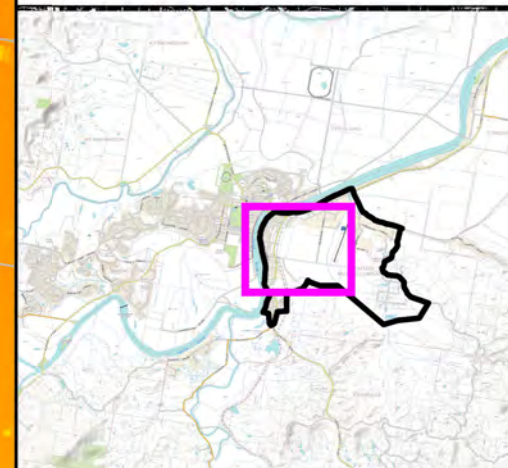
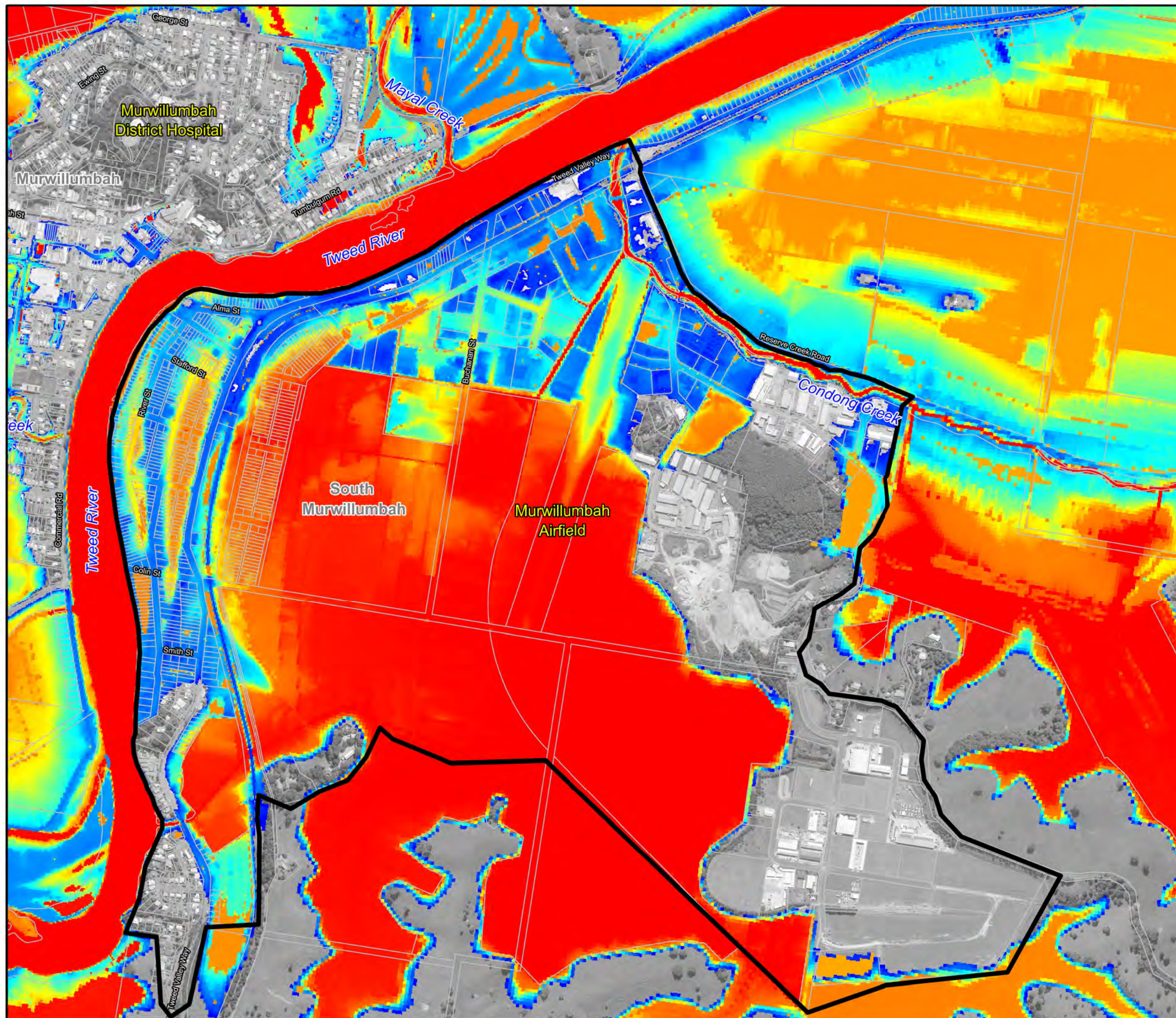
**Figure 26:**  
**Duration of Inundation**  
**for the 5% AEP Flood**

Prepared By:

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

File Name: Figure 26 - Duration of Inundation for the 5% AEP Flood.wor





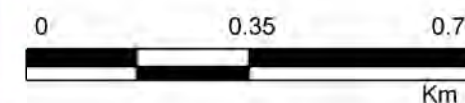
**LEGEND**

Duration of Inundation (Days)




Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



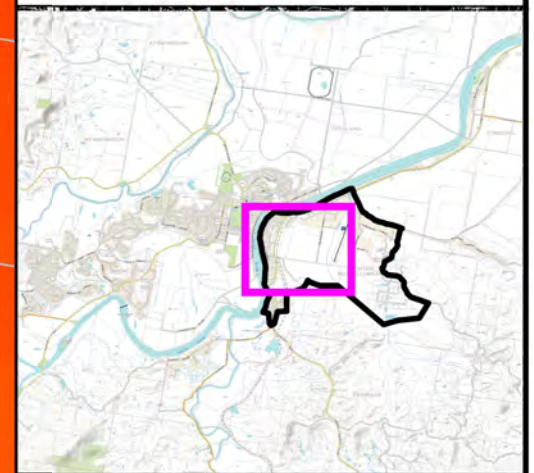
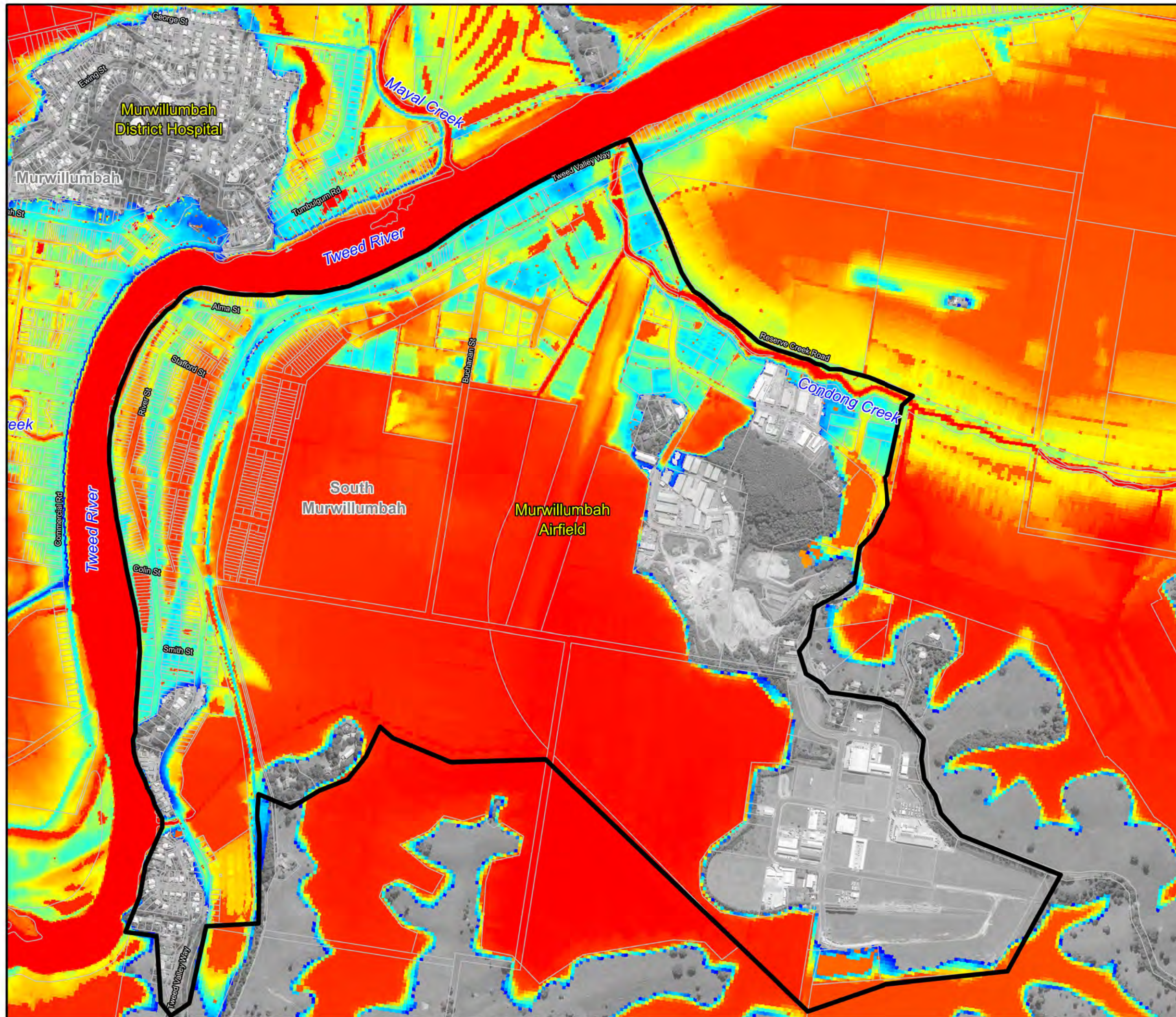
**Figure 27:  
Duration of Inundation  
for the 1% AEP Flood**

Prepared By:

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

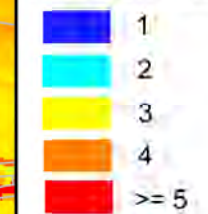
File Name: Figure 27 - Duration of Inundation for the 1% AEP Flood.wor





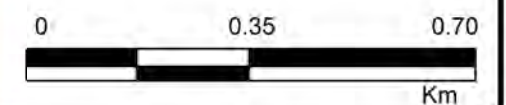
### LEGEND

Duration of Inundation (Days)




### Notes:

Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



**Figure 28:**  
**Duration of Inundation**  
**for the 0.2% AEP Flood**

Prepared By:

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

File Name: Figure 28 - Duration of Inundation for the 0.2% AEP Flood.wor





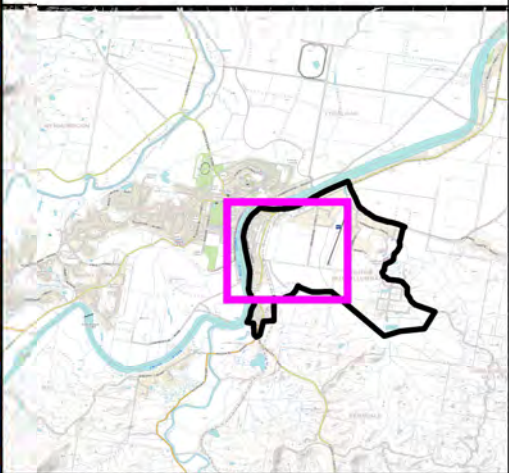
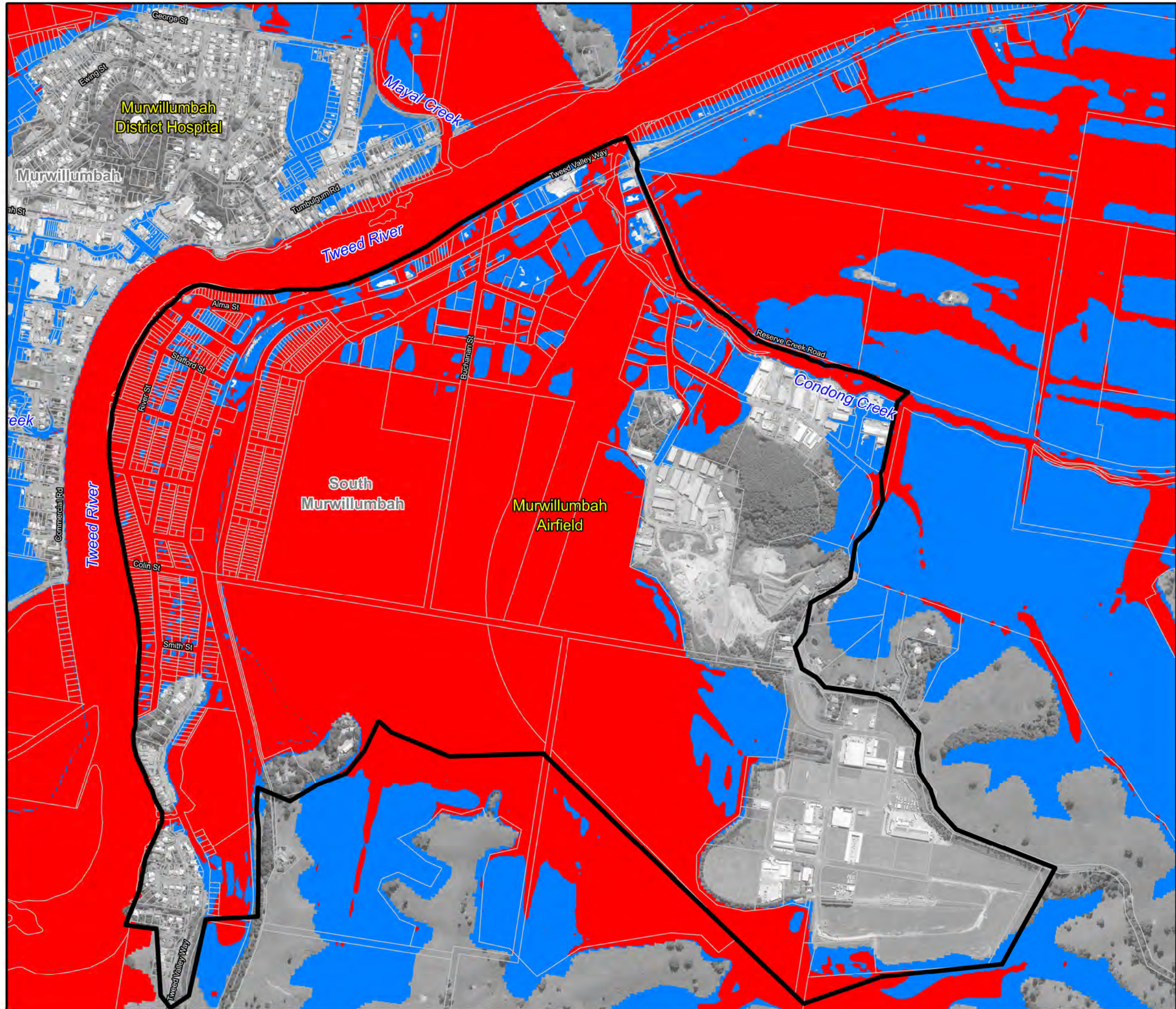
---

## MISCELLANEOUS MAPS

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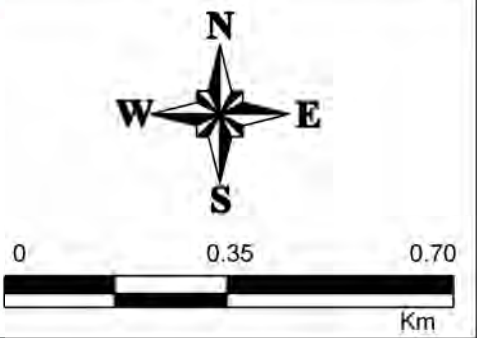




**LEGEND**

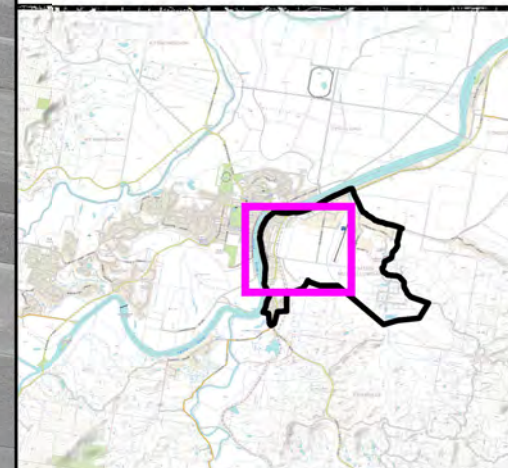
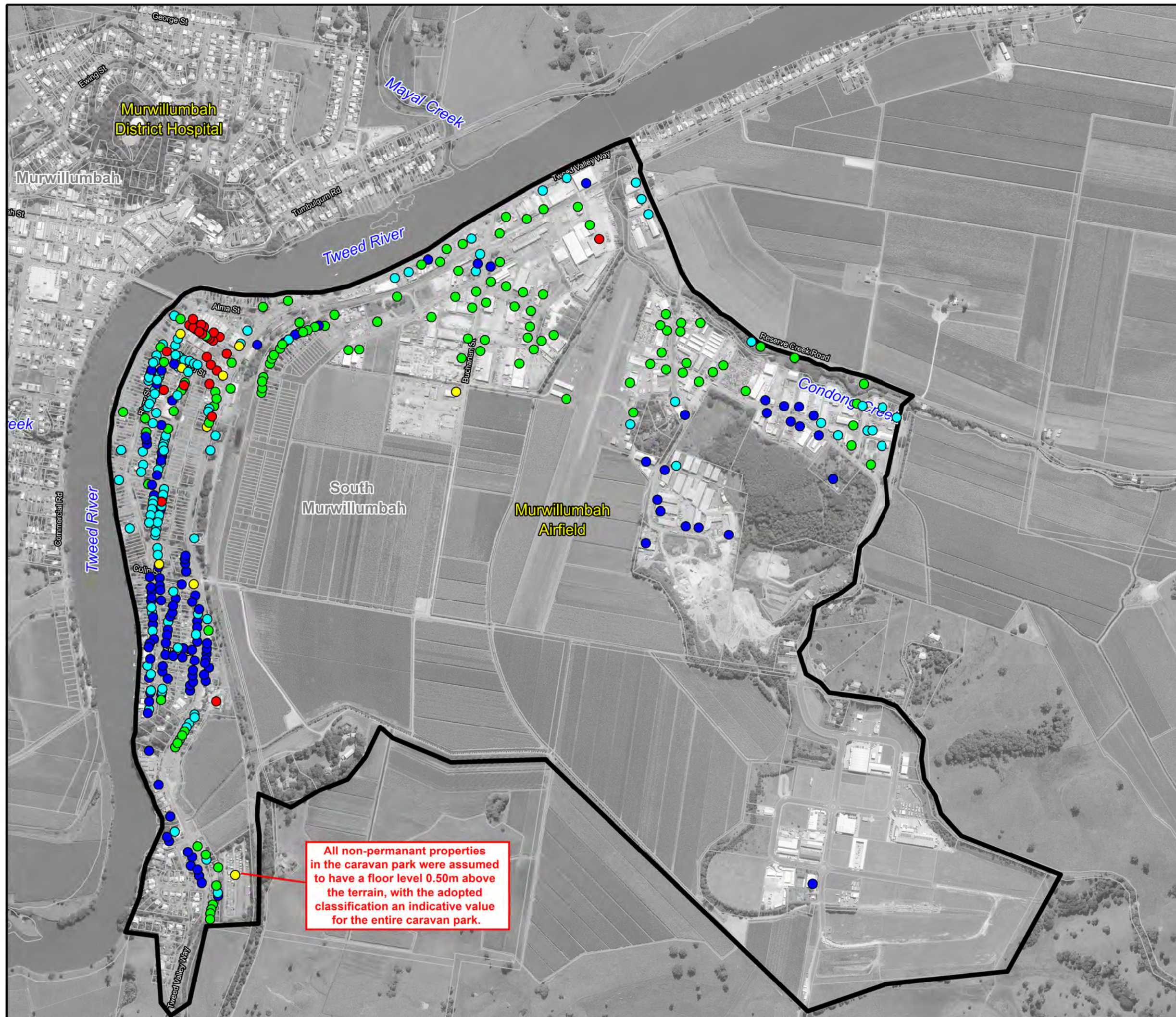
- Velocity Depth Product (m<sup>2</sup>/s)
- <= 0.3 "Low Flow Area"
  - >0.3 "High Flow Area"

Notes:  
Aerial photograph date: 2016  
Only areas exposed to depths of more than 0.15m are shown in the mapping



**Figure 29:**  
**High Flow Map for the**  
**1% AEP Flood**





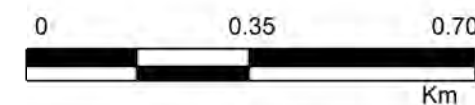
### LEGEND

Event of First Above Floor Flooding

- 20% AEP
- 5% AEP
- 1% AEP
- 0.2% AEP
- PMF


### Notes:

Aerial photograph date: 2016



**Figure 30:**  
**Frequency of Above Floor**  
**Inundation**

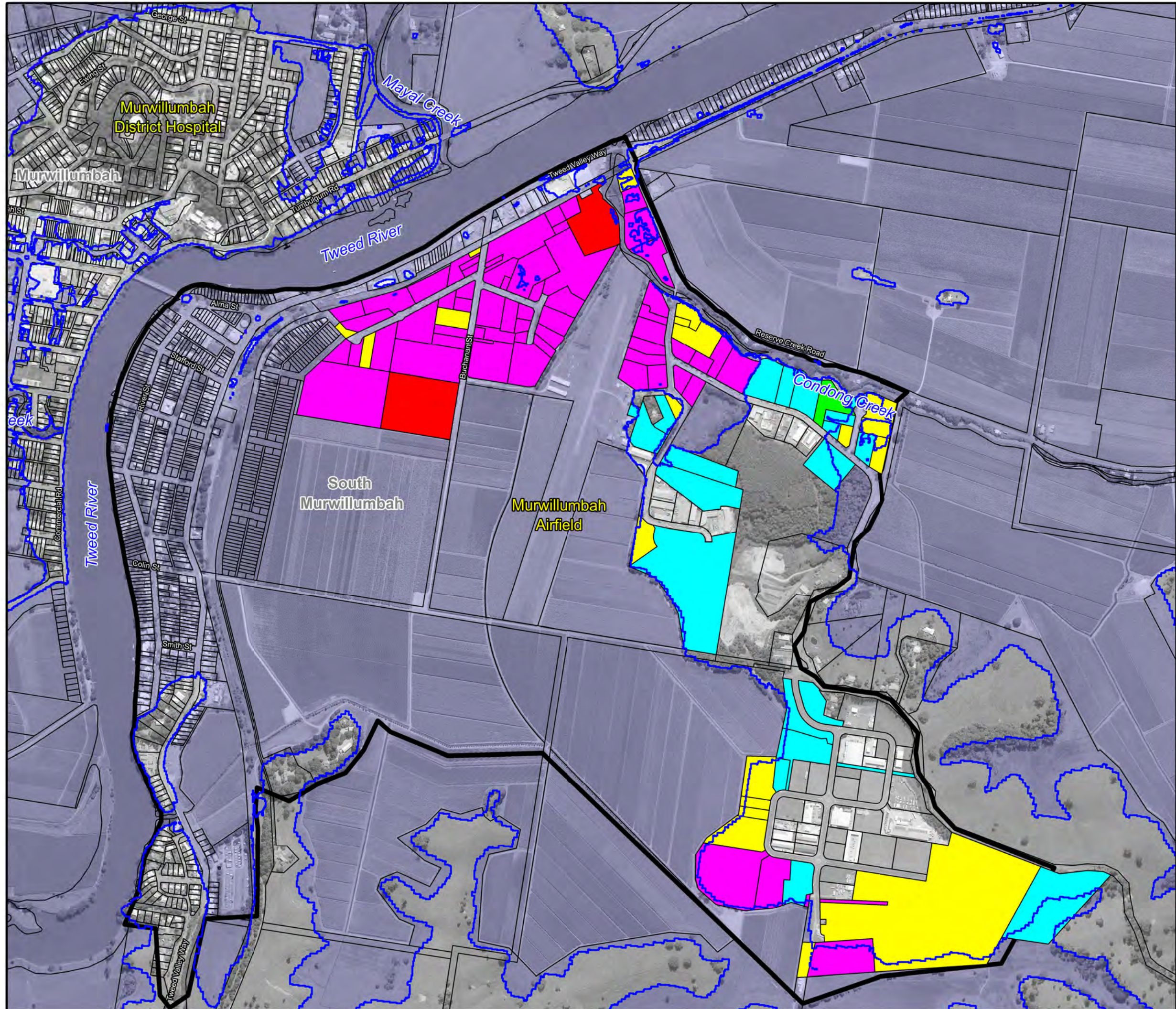
Prepared By:


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

File Name: Figure 30 - Frequency of Above Floor Inundation.wor

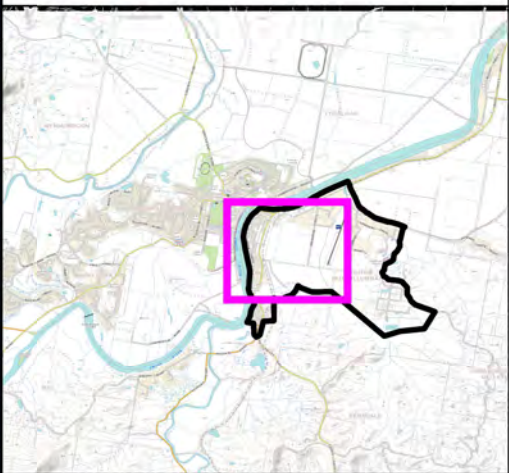
All non-permanent properties in the caravan park were assumed to have a floor level 0.50m above the terrain, with the adopted classification an indicative value for the entire caravan park.








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SHIRE COUNCIL



**LEGEND**  
Critical Flood Zone Score  


- 1-5
- 6-10
- 11-15
- 16-20
- >20
- 1% AEP Flood Extent

Notes:  
Aerial photograph date: 2016



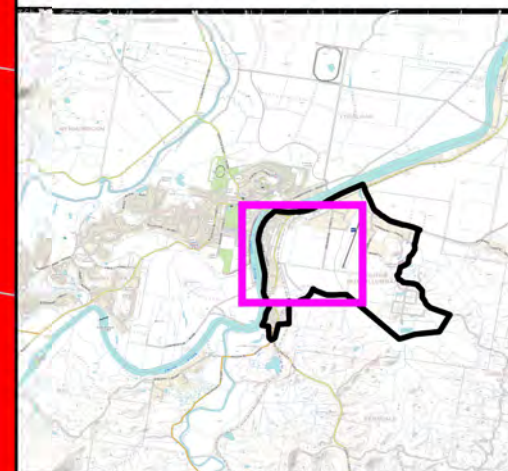
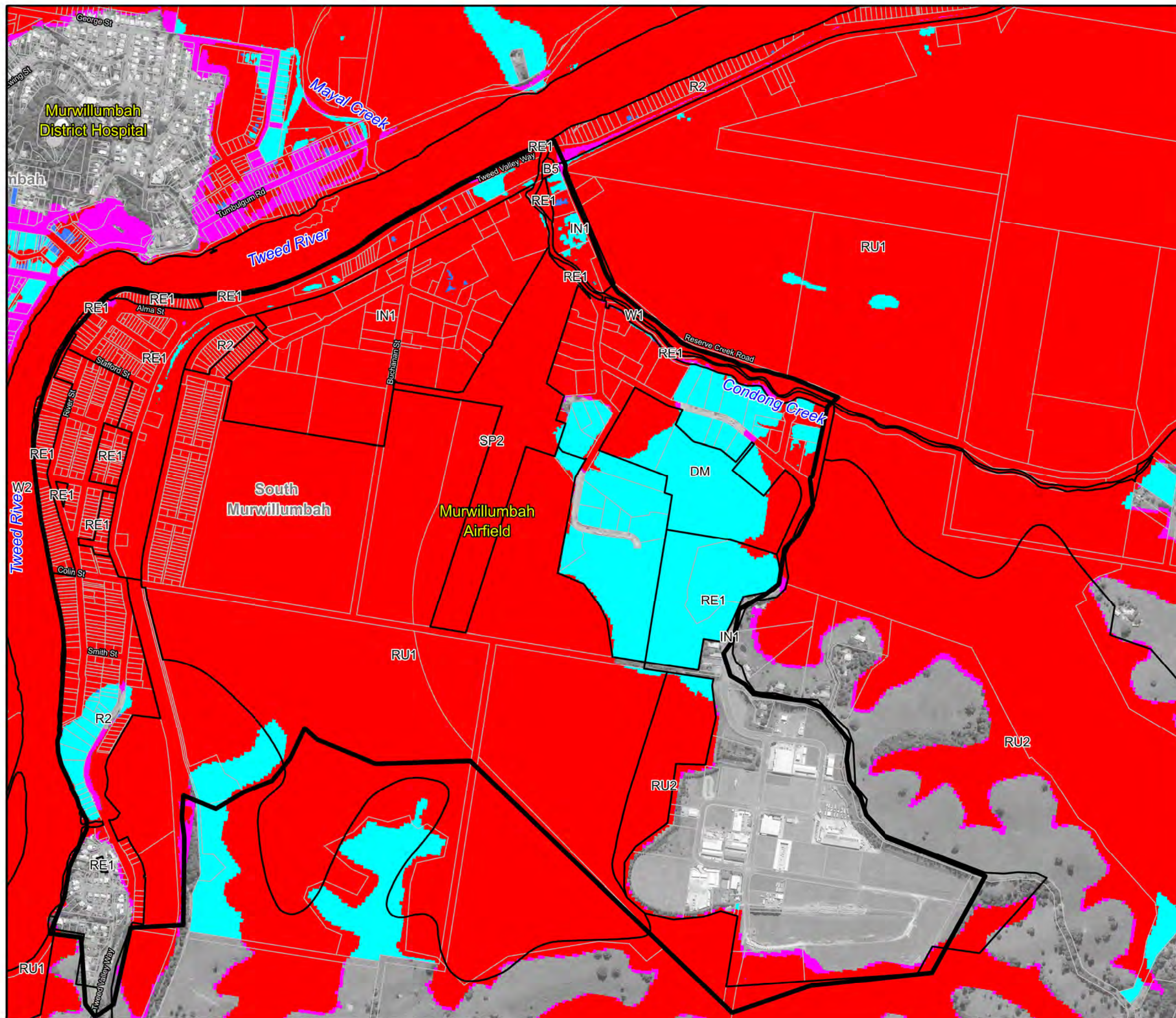
00.350.70  
Km

**Figure 31:  
Critical Flood Zone**

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

File Name: Figure 31 - Critical Flood Zone.wor



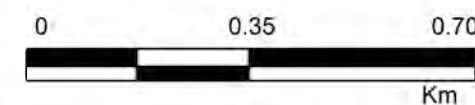


**LEGEND**

- Category 1
- A
  - B
- Category 2
- A
  - B
  - C
  - D
  - E
- Category 3
- 
- Category 4
- 
- [R2] Land Zone Extent

Notes:

Aerial photograph date: 2016



**Figure 32:**  
**Flood Planning Category**  
**Constraint Mapping**

Prepared By:

**CatchmentSimulationSolutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 32 - Flood Planning Category Constraint Mapping.wor





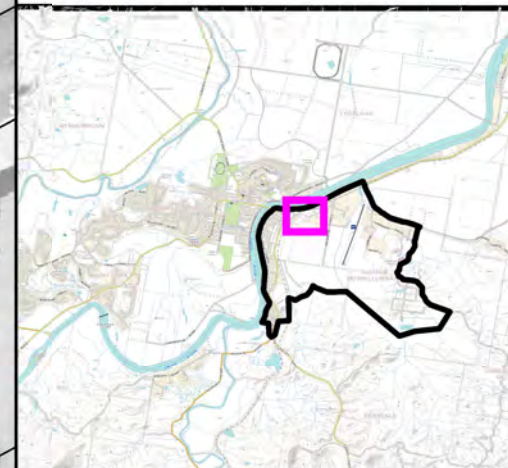
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## CONCEPT DESIGNS FOR FLOOD RISK MANAGEMENT OPTIONS

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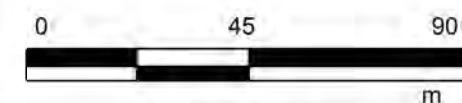


### LEGEND

-  Extent of Works
-  Terrain Changes
-  Lots to Aquire
-  Existing Building within Acquired Lots
-  Additional Drainage


### Notes:

Aerial photograph date: 2016



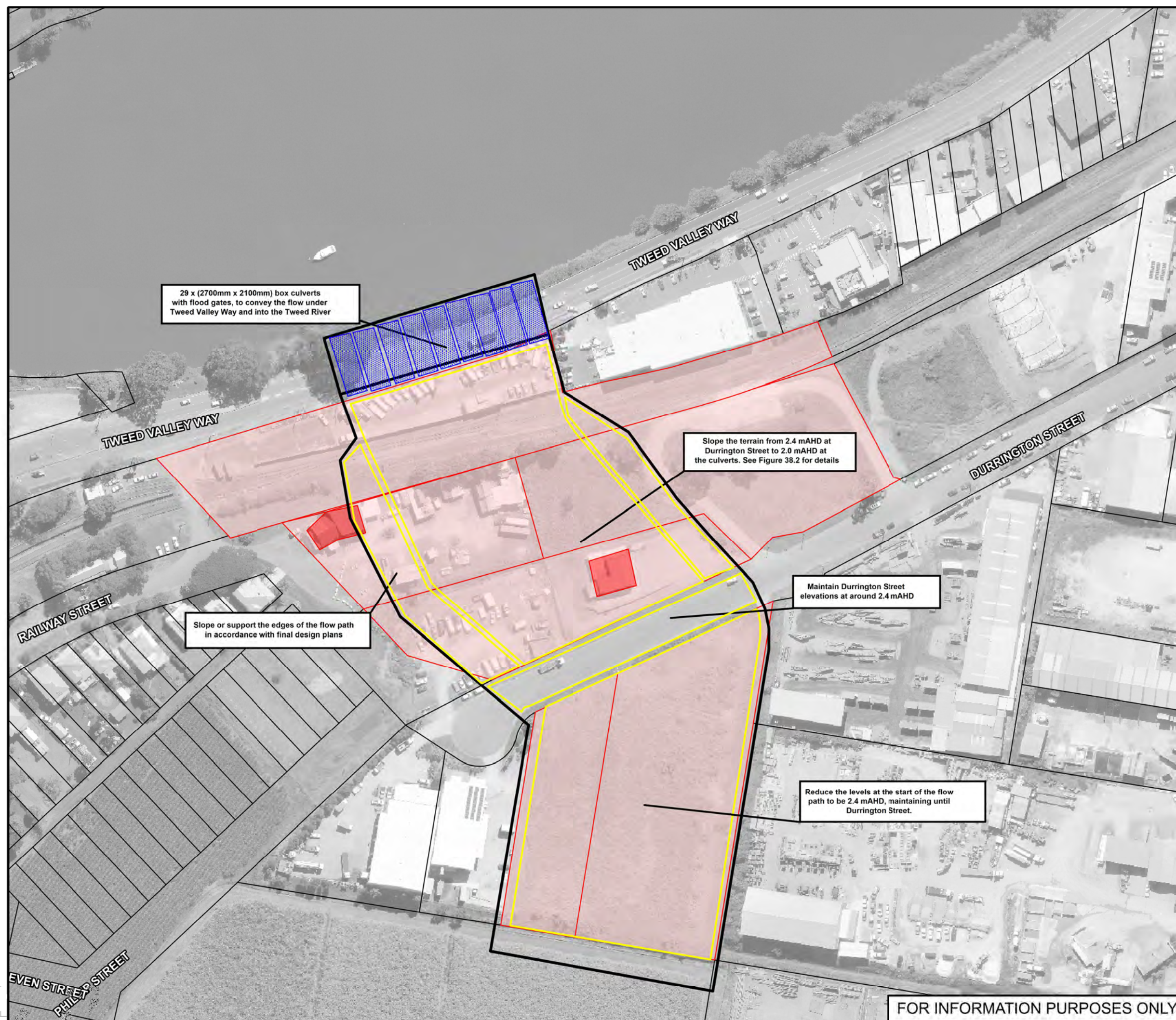
**Figure 33.1:**  
**Concept Design for the**  
**Durrington Street Flow Path**  
**(FM1)**

Prepared By:

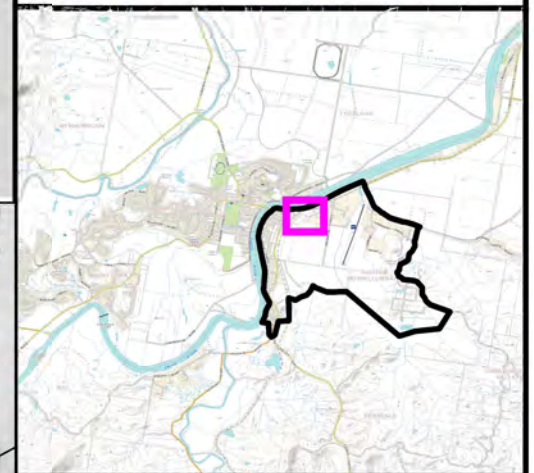
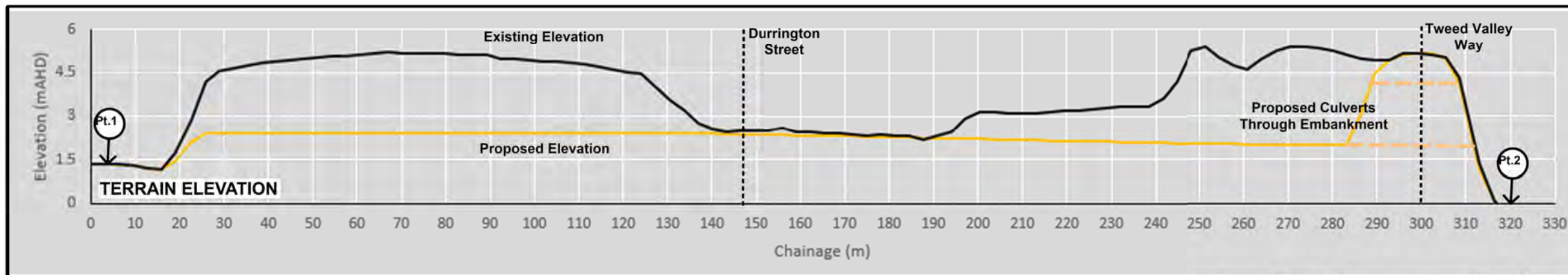
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 33.1 - Concept Design for the Durrington Street Flow Path (FM1).wor

FOR INFORMATION PURPOSES ONLY



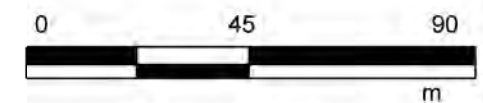




### LEGEND

- Extent of Works
- Design Terrain Level
- Cross Section
- Depth of Cut**
  - Upto -1.2m
  - 1.2m to -2.4m
  - 2.4m to -3.6m

**Notes:**  
Aerial photograph date: 2016



**Figure 33.2:**  
**Concept Design for the**  
**Durrington Street Flow Path**  
**(FM1)**

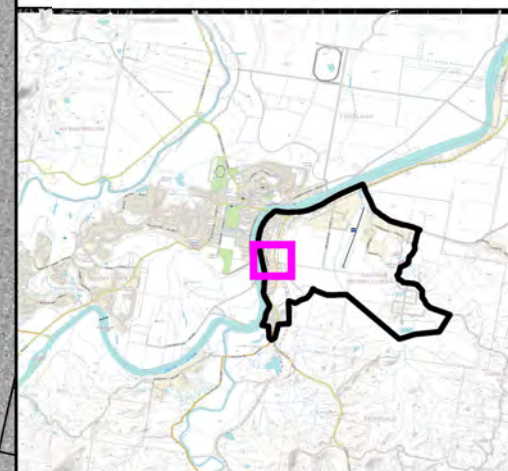
Prepared By:  
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 33.2 - Concept Design for the Durrington Street Flow Path (FM1).wor



FOR INFORMATION PURPOSES ONLY

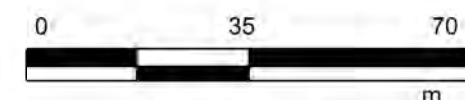




### LEGEND

-  Extent of Works
-  Design Terrain Level
-  Terrain Changes
-  Lots to Acquire
-  Existing Building within Acquired Lots
-  Additional Drainage

Notes:  
Aerial photograph date: 2016

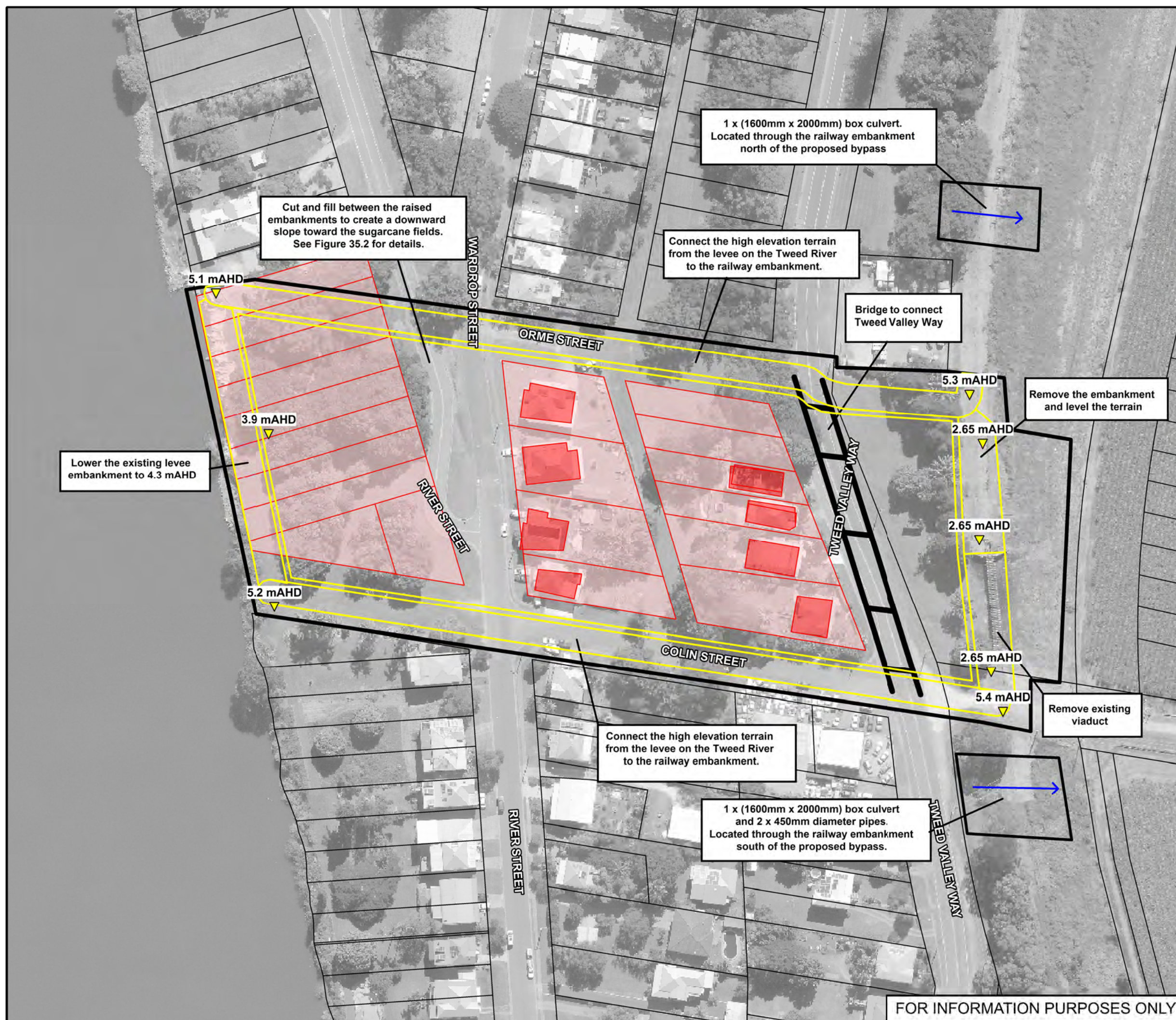


**Figure 34.1:**  
**Concept Design for the**  
**South Murwillumbah High**  
**Flow Bypass Option 1 (FM2)**

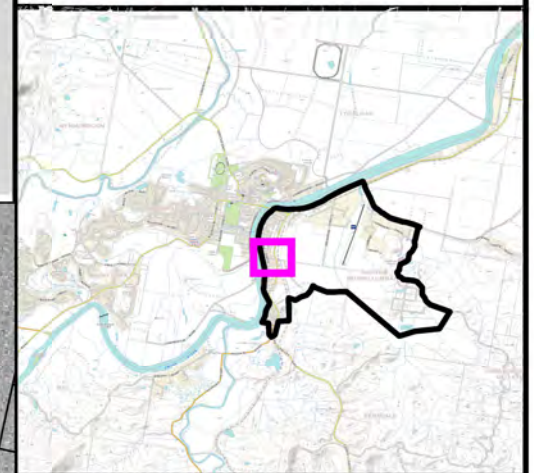
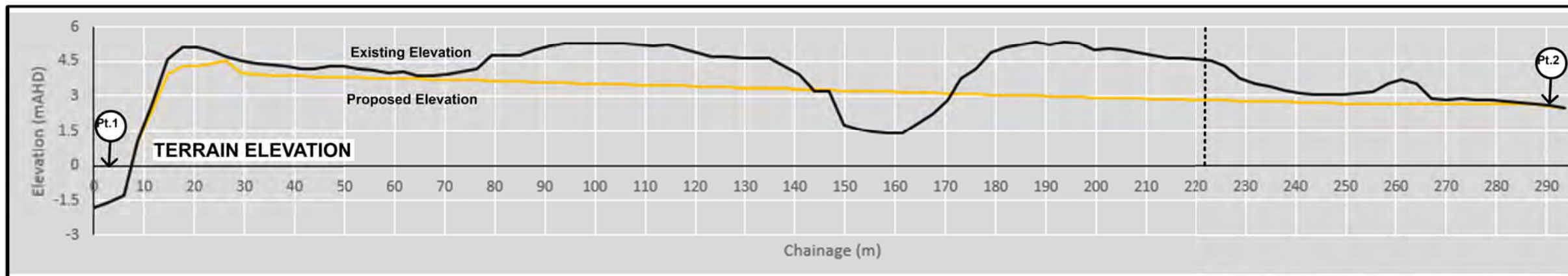
Prepared By:  
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 34.1 - Concept Design for the South Murwillumbah High Flow Bypass Option 1 (FM2).wor

FOR INFORMATION PURPOSES ONLY



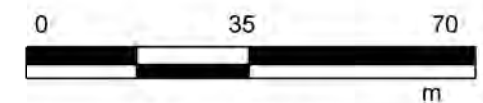




### LEGEND

- Extent of Works
- Design Terrain Level
- Cross Section
- Depth of Fill**
  - Upto 1.5m
  - 1.5m to 3.0m
  - 3.0m to 4.5m
- Depth of Cut**
  - Upto -1.5m
  - 1.5m to -3.0m
  - 3.0m to -4.5m

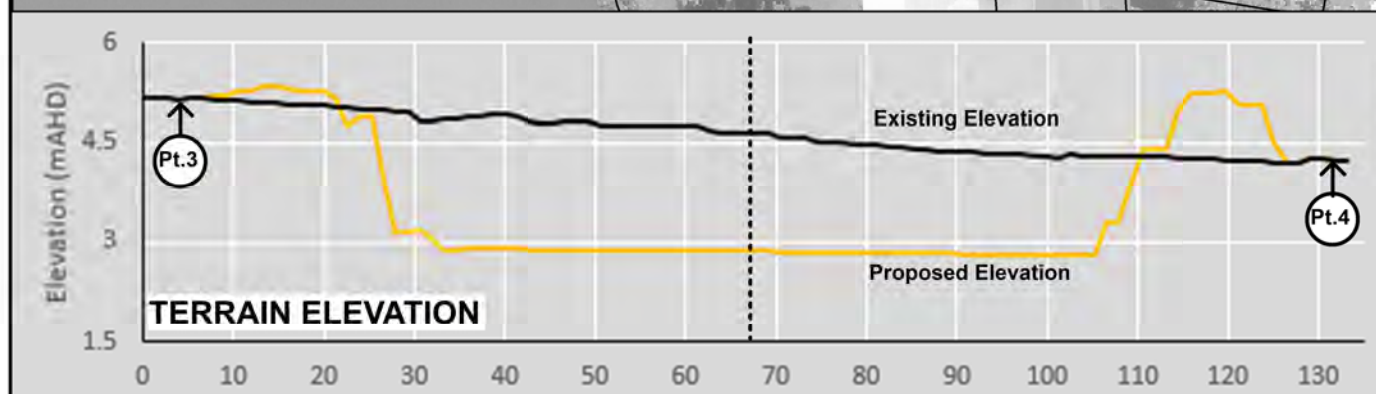
**Notes:**  
Aerial photograph date: 2016



**Figure 34.2:**  
**Concept Design for the**  
**South Murwillumbah High**  
**Flow Bypass Option 1 (FM2)**

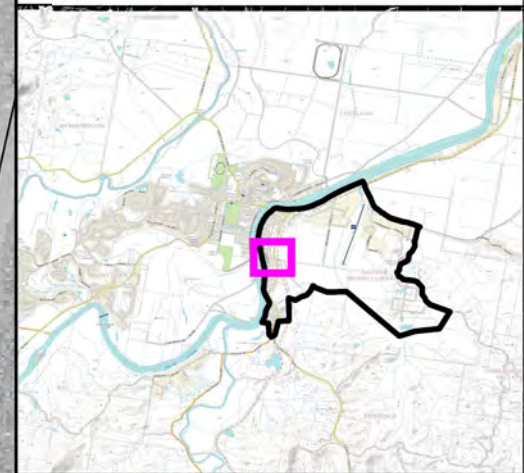
Prepared By:  
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 34.2 - Concept Design for the South Murwillumbah High Flow Bypass Option 1 (FM2).war



FOR INFORMATION PURPOSES ONLY

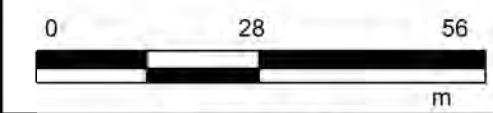





**LEGEND**

-  Extent of Works
-  Design Terrain Level
-  Terrain Changes
-  Lots to Acquire
-  Existing Building within Acquired Lots

Notes:  
Aerial photograph date: 2016



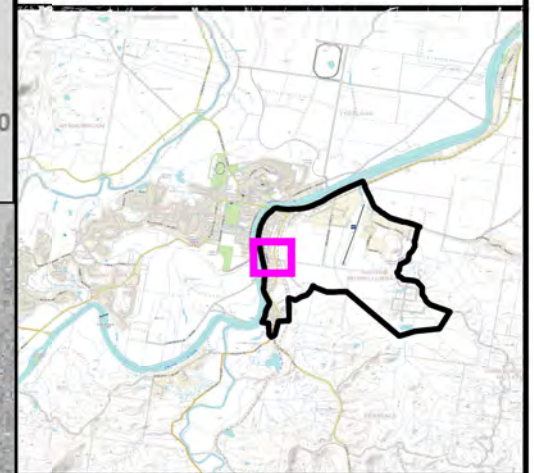
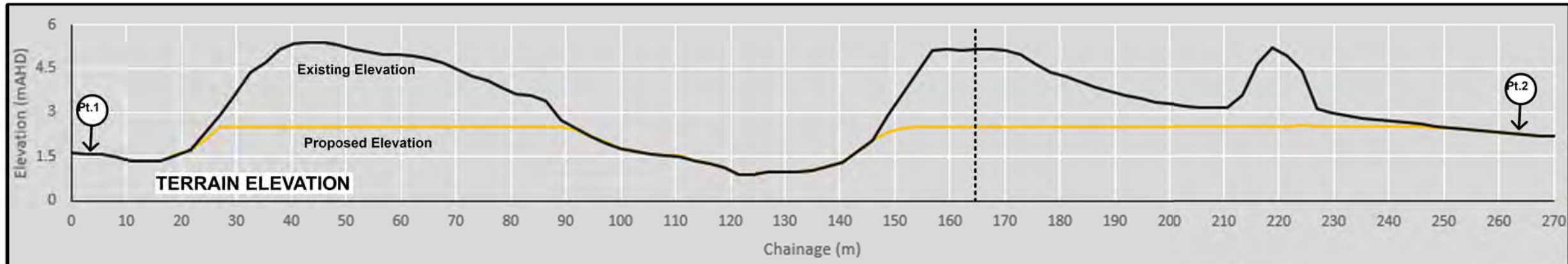
**Figure 35.1:**  
**Concept Design for the**  
**South Murwillumbah High**  
**Flow Bypass Option 2 (FM3)**

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

File Name: Figure 35.1 - Concept Design for the South Murwillumbah High Flow Bypass Option 2 (FM3).wor

FOR INFORMATION PURPOSES ONLY

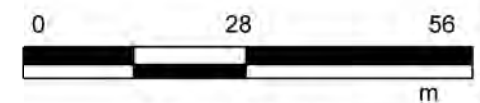




**LEGEND**

- Extent of Works
- 4.8 mAH
- Design Terrain Level
- Cross Section
- Depth of Cut**
  - Upto -1.5m
  - 1.5m to -3.0m
  - 3.0m to -4.5m

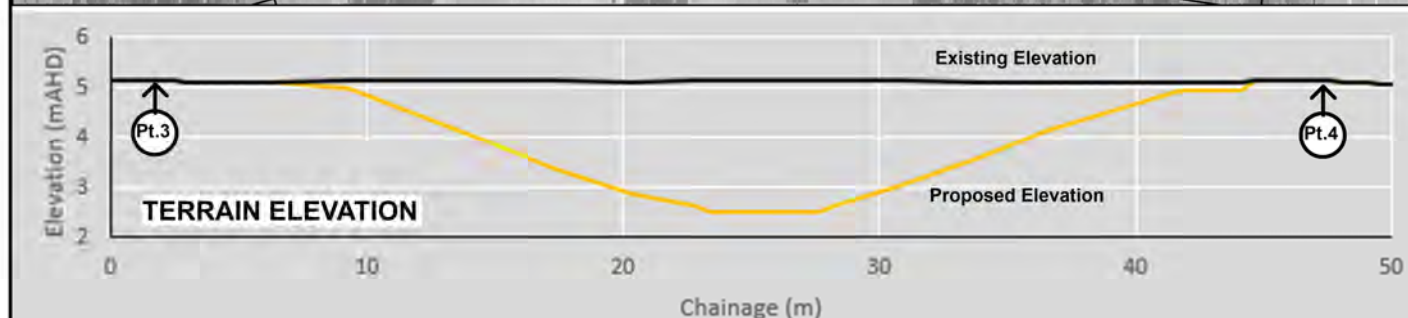
**Notes:**  
Aerial photograph date: 2016



**Figure 35.2:**  
**Concept Design for the**  
**South Murwillumbah High**  
**Flow Bypass Option 2 (FM3)**

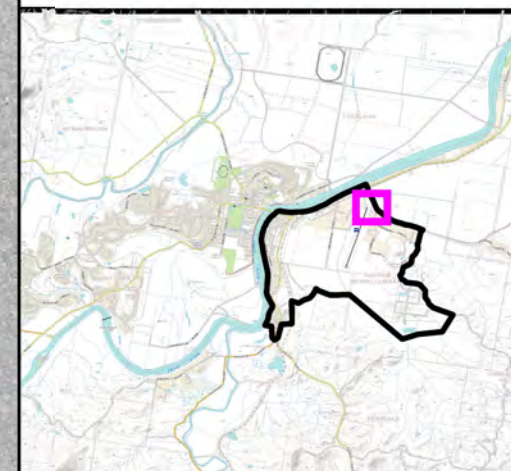
Prepared By:  
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 35.2 - Concept Design for the South Murwillumbah High Flow Bypass Option 2 (FM3).wor






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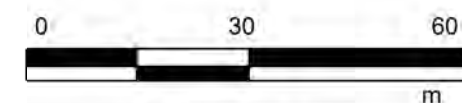




### LEGEND

-  Extent Of Works
- Depth of Cut
  -  Up to -1.0m
  -  -1.0m to -2.0m
  -  Over -2.0m

Notes:  
Aerial photograph date: 2016



**Figure 36:**  
**Concept Design for the**  
**Earthworks across Lot 4 DP**  
**591604 Quarry Rd (FM4)**

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

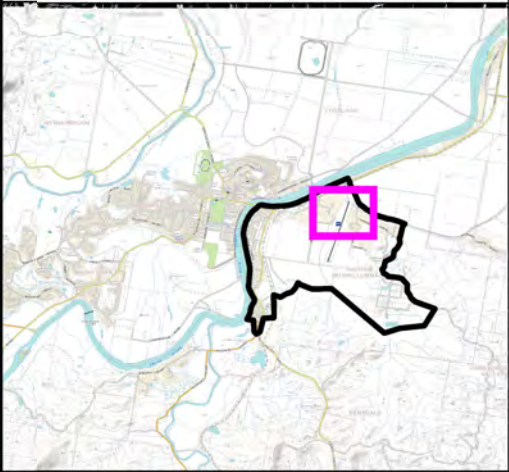
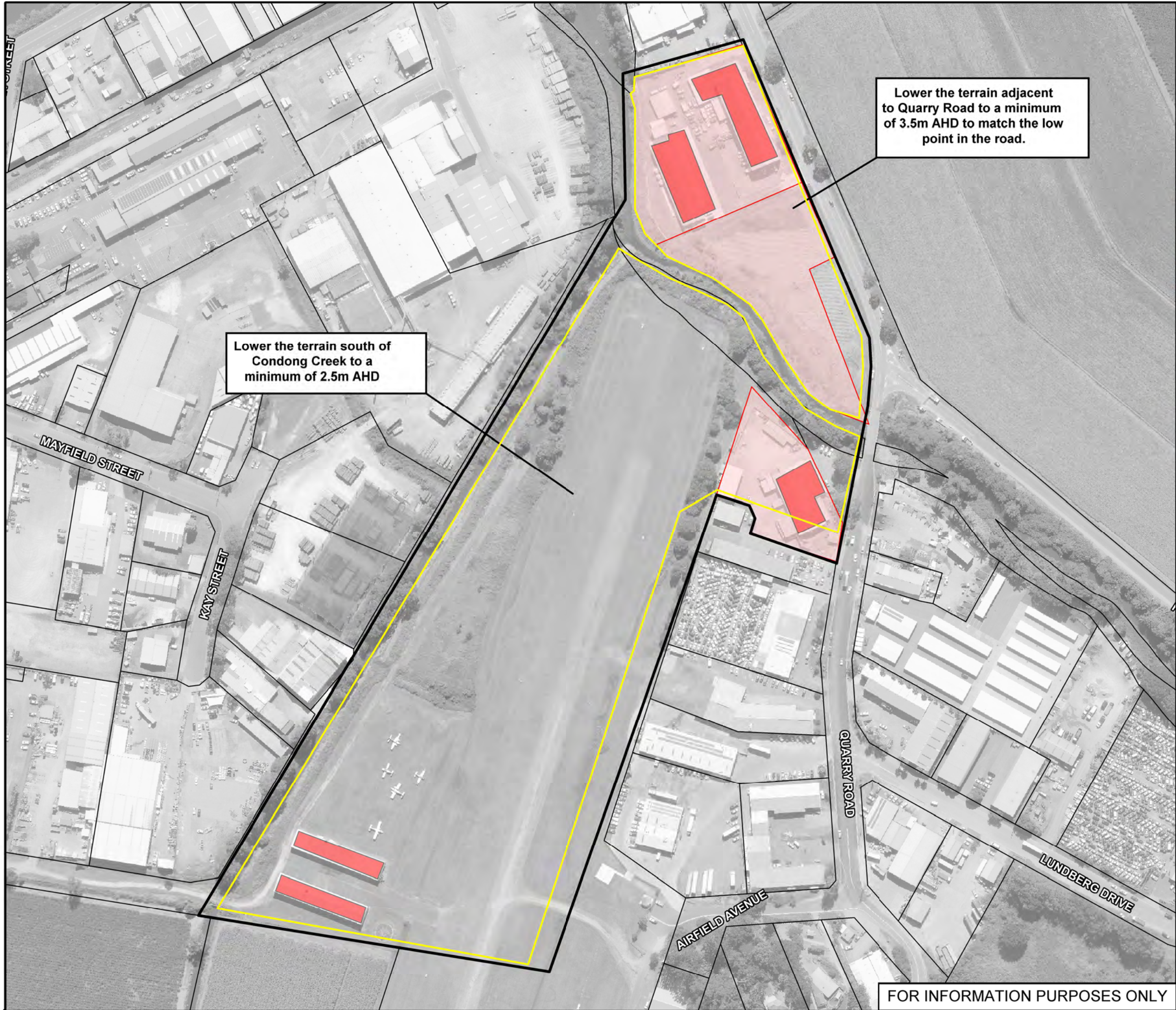
File Name: Figure 36 - Concept Design for the Earthworks across  
Lot 4 DP 591604 Quarry Rd (FM4).wor

FOR INFORMATION PURPOSES ONLY

Lower terrain to 3.5m AHD

QUARRY ROAD






- LEGEND**
-  Extent Of Works
  -  Terrain Changes
  -  Properties Identified for Earthworks
  -  Buildings To Be Removed

**Notes:**  
Aerial photograph date: 2016



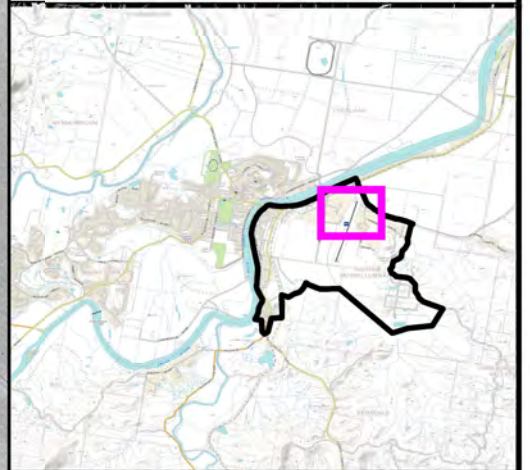
**Figure 37.1: Concept Design for the Earthworks across Lot 4 DP 591604 Quarry Rd, airfield and two adjoining lots (FM5)**

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




File Name: Figure 37.1 - Concept Design for the Earthworks across Lot 4 DP 591604 Quarry Rd plus airfield and two adjoining lots (FM5).wor

**FOR INFORMATION PURPOSES ONLY**

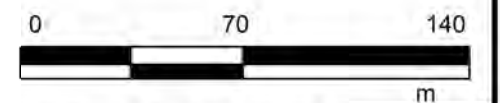




#### LEGEND


-  Extent of Works
- Depth of Cut
-  Upto -1.0m
  -  -1.0m to -2.0m
  -  -2.0m to -3.0m

Notes:  
Aerial photograph date: 2016



**Figure 37.2: Concept Design for the Earthworks across Lot 4 DP 591604 Quarry Rd, airfield and two adjoining lots (FM5)**

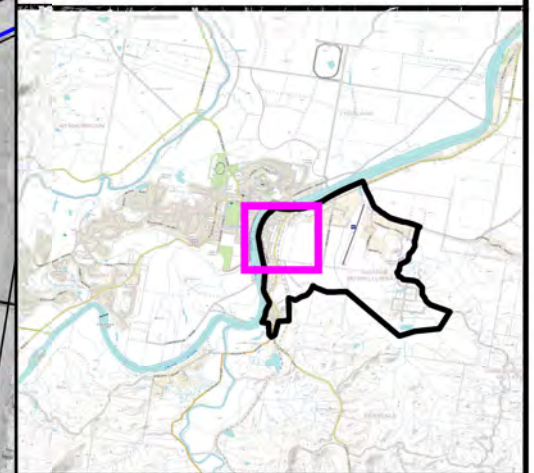
Prepared By:

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

File Name: Figure 37.2 - Concept Design for the Earthworks across Lot 4 DP 591604 Quarry Rd plus airfield and two adjoining lots (FM5).wor

FOR INFORMATION PURPOSES ONLY



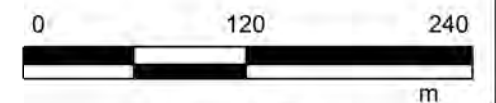


### LEGEND

-  Extent Of Works
-  Terrain Changes
-  Properties Identified for Purchase
-  Buildings To Be Removed
- Stormwater Network Updates
  -  Pipes to be retained
  -  Pipes to be removed
  -  Pipes to be modified


### Notes:

Aerial photograph date: 2016



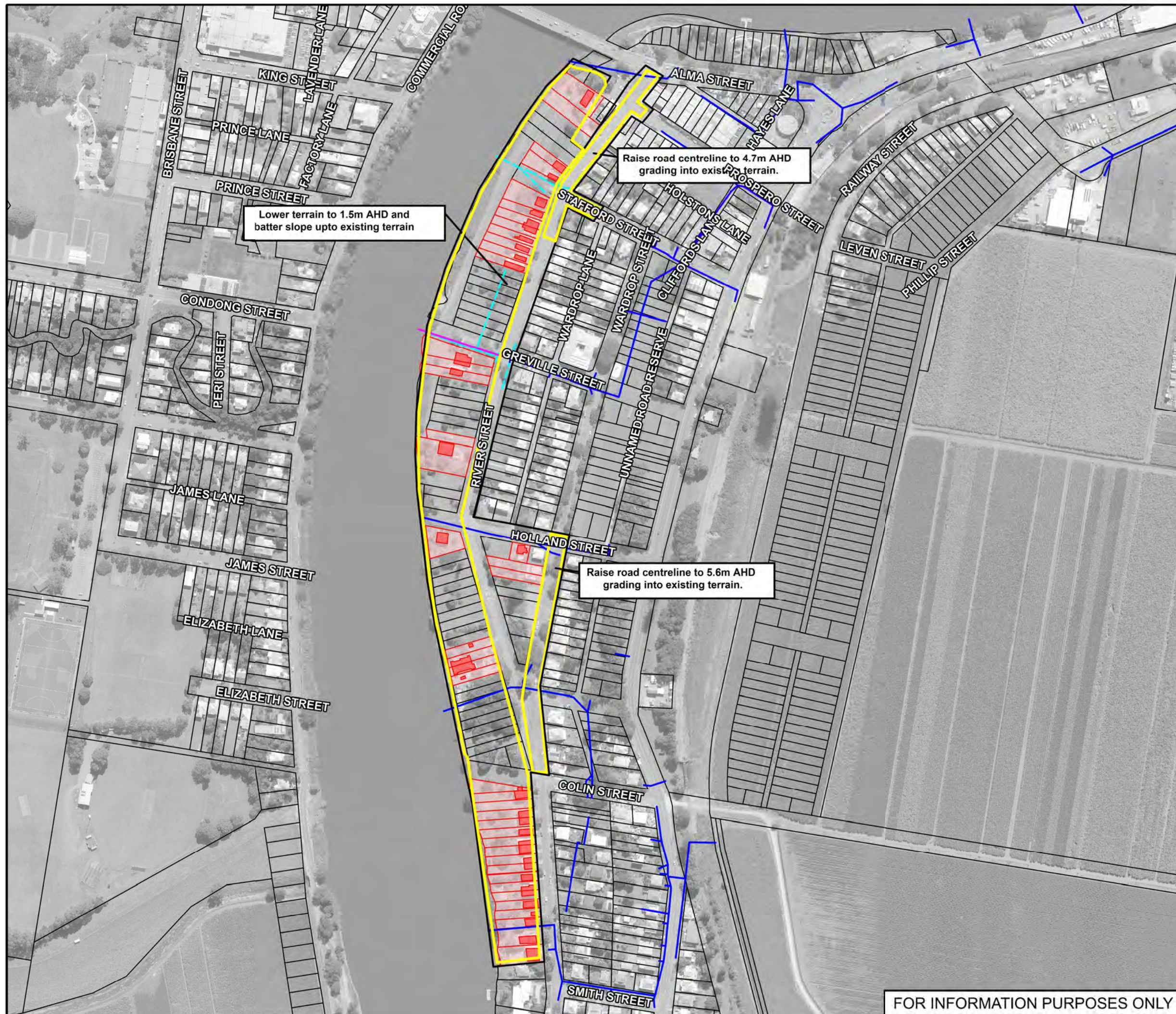
**Figure 38.1:**  
**Concept Design for Terrain**  
**Modifications Between River**  
**Street and Tweed River (FM6)**

Prepared By:

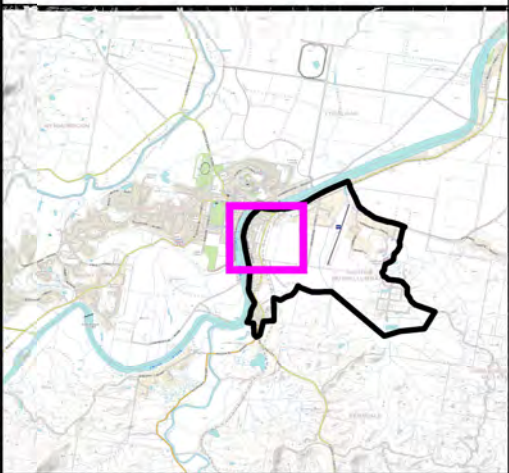
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 38.1 - Concept Design for Terrain Modifications between River Street and Tweed River (FM6).wor

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**LEGEND**

 Extent of Works


Depth of Fill

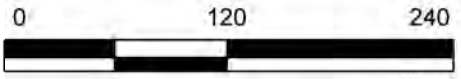
-  Upto 1.5m
-  1.5m to 3.0m
-  3.0m to 4.5m

Depth of Cut

-  Upto -1.5m
-  -1.5m to -3.0m
-  -3.0m to -4.5m

Notes:  
Aerial photograph date: 2016

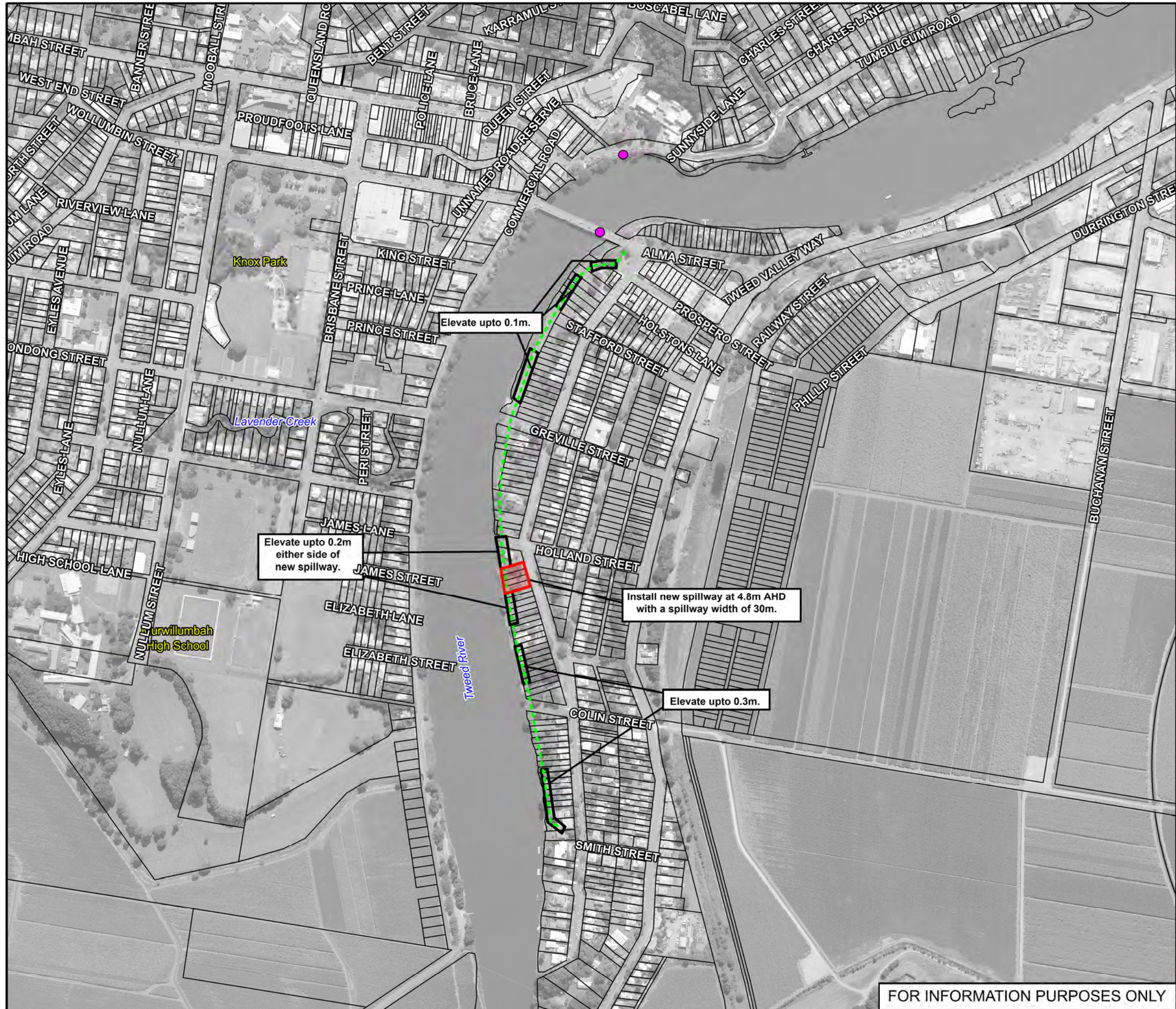





0 120 240  
m

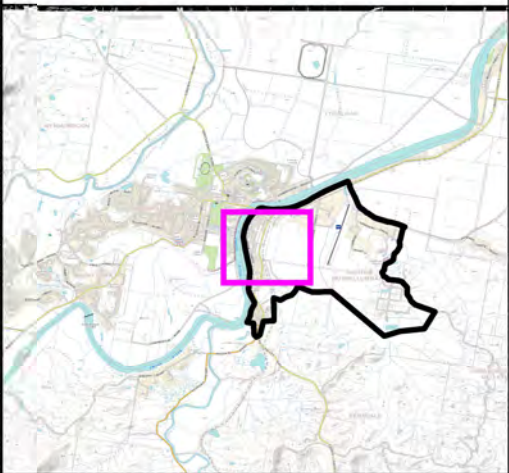
**Figure 38.2:**  
**Concept Design for Terrain**  
**Modifications Between River**  
**Street and Tweed River (FM6)**











**TWEED**  
SHIRE COUNCIL




**LEGEND**

-  Extent of Works
-  Existing Levee Alignment
-  New Spillway Area
-  Existing Stream Gauges

**Notes:**


Aerial photograph date: 2016



0 0.19 0.38  
km

**Figure 39.1:  
Concept Design for the South  
Murwillumbah Levee  
Rehabilitation (FM7)**

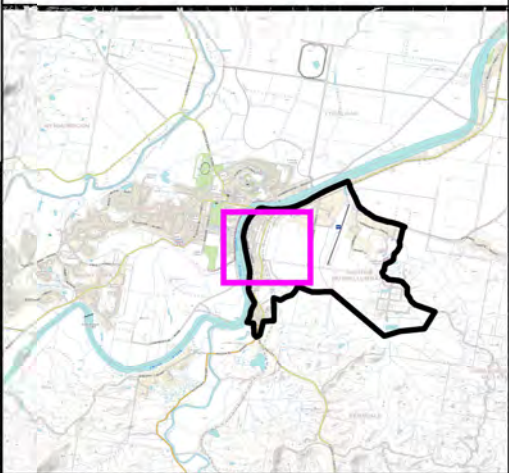
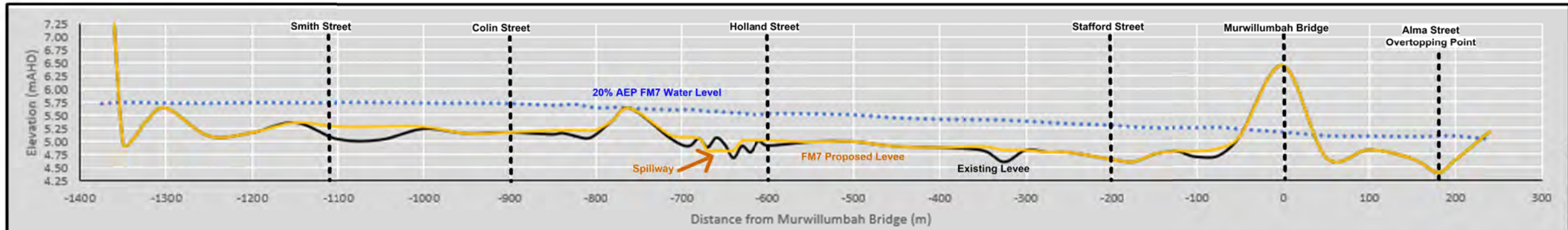
Prepared By:

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

File Name: Figure 39.1 - Concept Design for the South Murwillumbah Levee Rehabilitation (FM7)

FOR INFORMATION PURPOSES ONLY

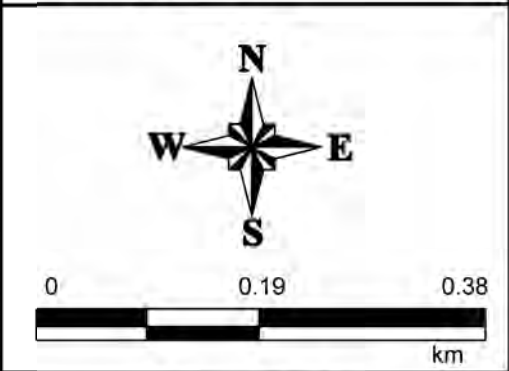




**LEGEND**

- Profile Alignment
- Distance from Murwillumbah Bridge (m)

**Notes:**  
Aerial photograph date: 2016



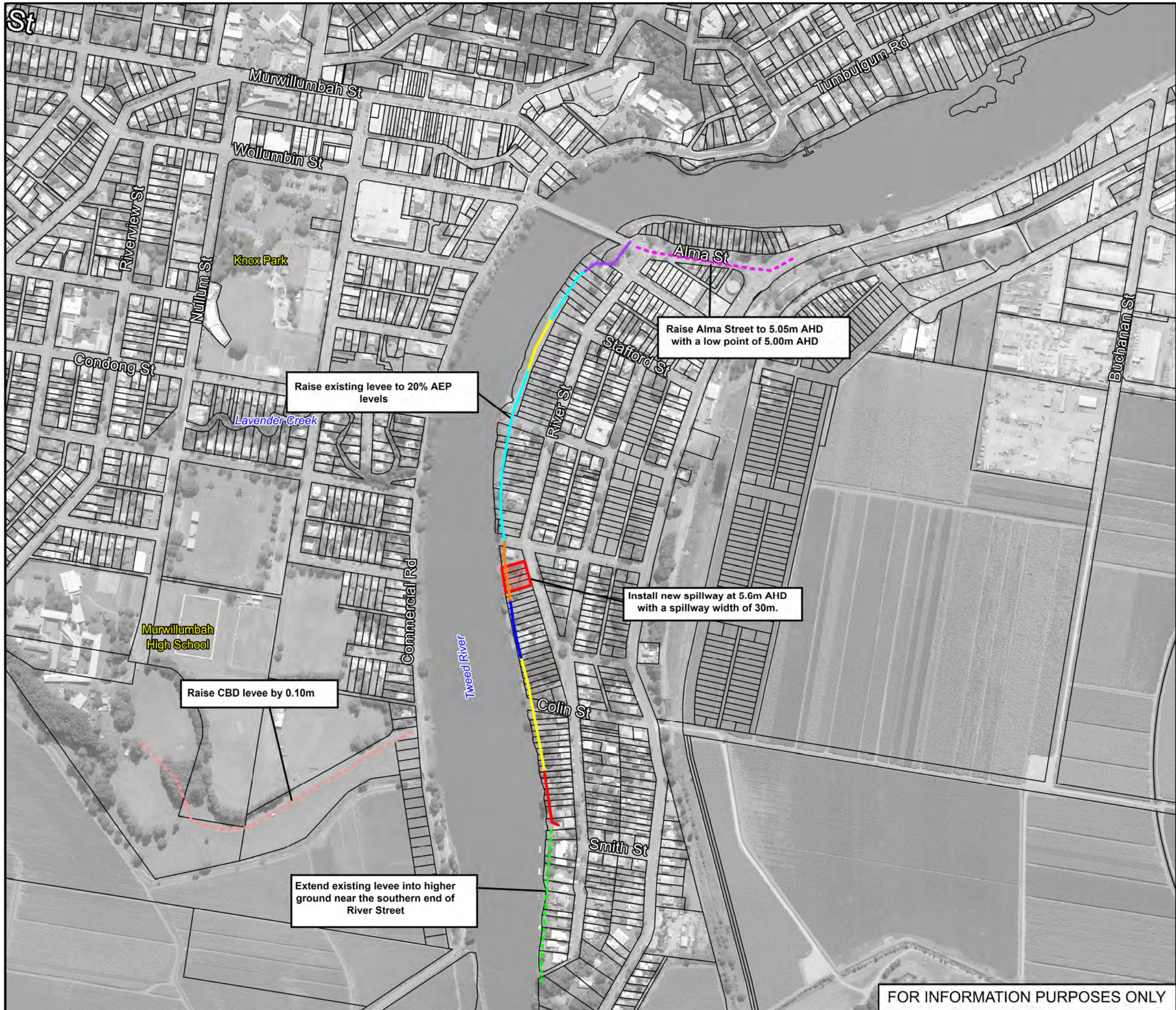
**Figure 39.2:  
Concept Design for the South  
Murwillumbah Levee  
Rehabilitation (FM7)**


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

File Name: Figure 39.2 - Concept Design for the South Murwillumbah Levee Rehabilitation (FM7)

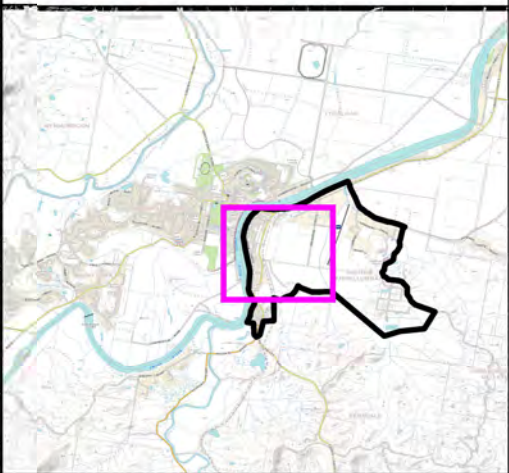
FOR INFORMATION PURPOSES ONLY















**TWEED**  
SHIRE COUNCIL



**LEGEND**


-  New Spillway Area
-  New levee extension
-  Extent of Alma Street raised
-  Extent of CBD Levee raised

Changes to Existing Levee (m)

-  +0.3
-  +0.4
-  +0.5
-  +0.6
-  +0.7
-  +0.8

Notes:

Aerial photograph date: 2016



0 0.19 0.38  
km

**Figure 40.1:**  
**Concept Design for Raising the South Murwillumbah Levee to 20% AEP and Raising Height of the CBD Levee (FM8)**

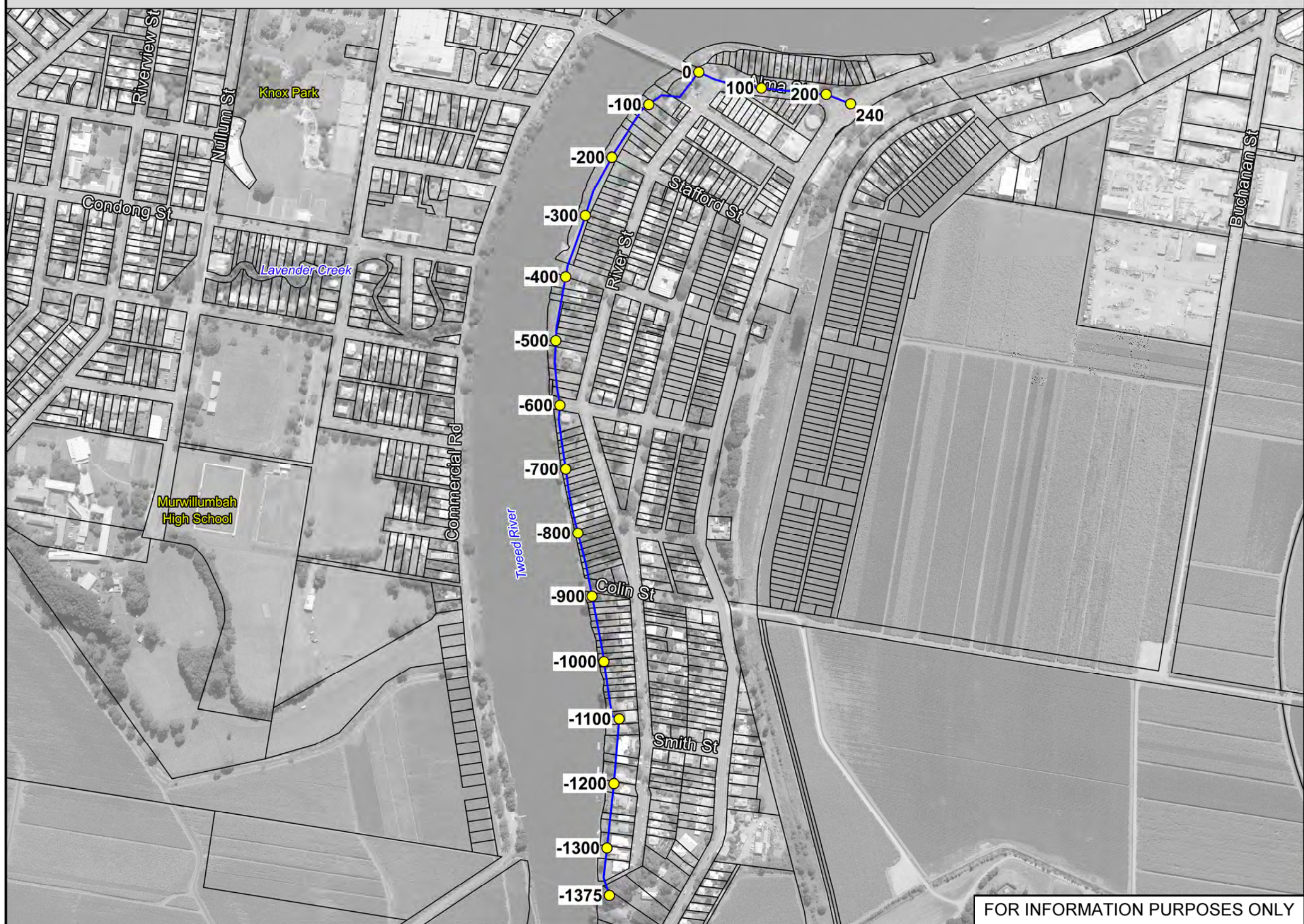
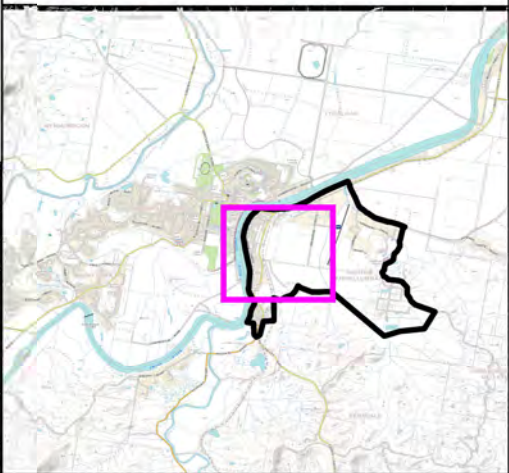
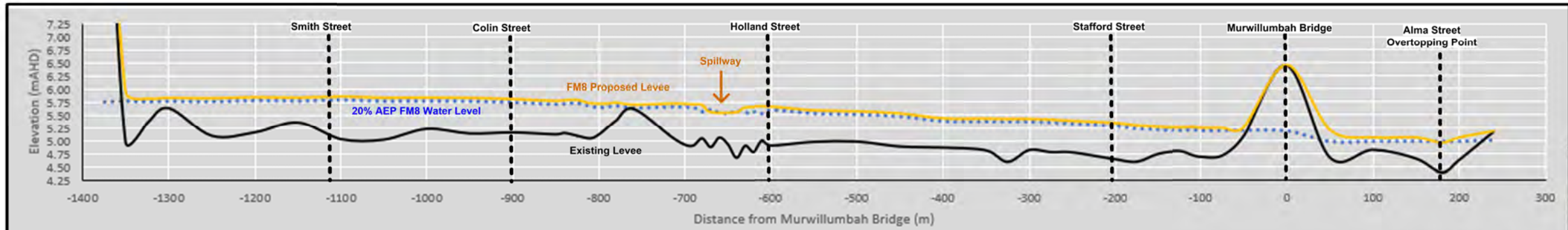
Prepared By:

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

File Name: Figure 40.1 - Concept Design for Raising the South Murwillumbah Levee to 20% AEP (FM8).wor

FOR INFORMATION PURPOSES ONLY

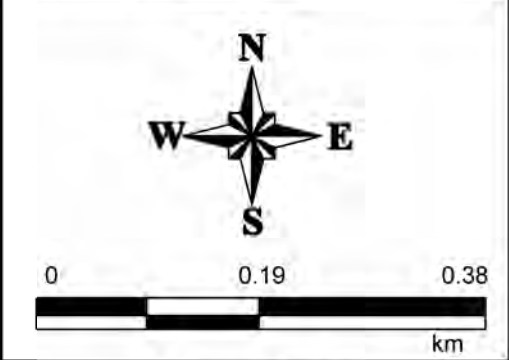




**LEGEND**

- Profile Alignment
- Distance from Murwillumbah Bridge (m)

**Notes:**  
Aerial photograph date: 2016



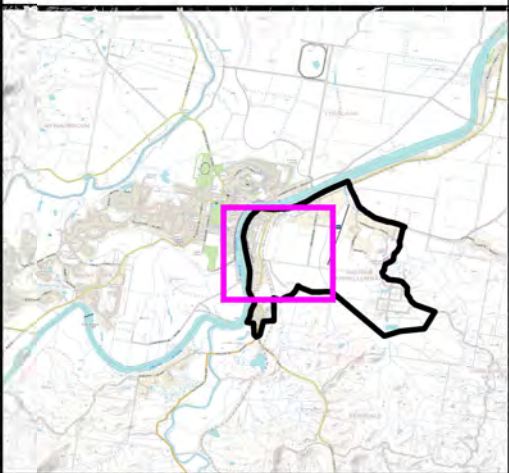
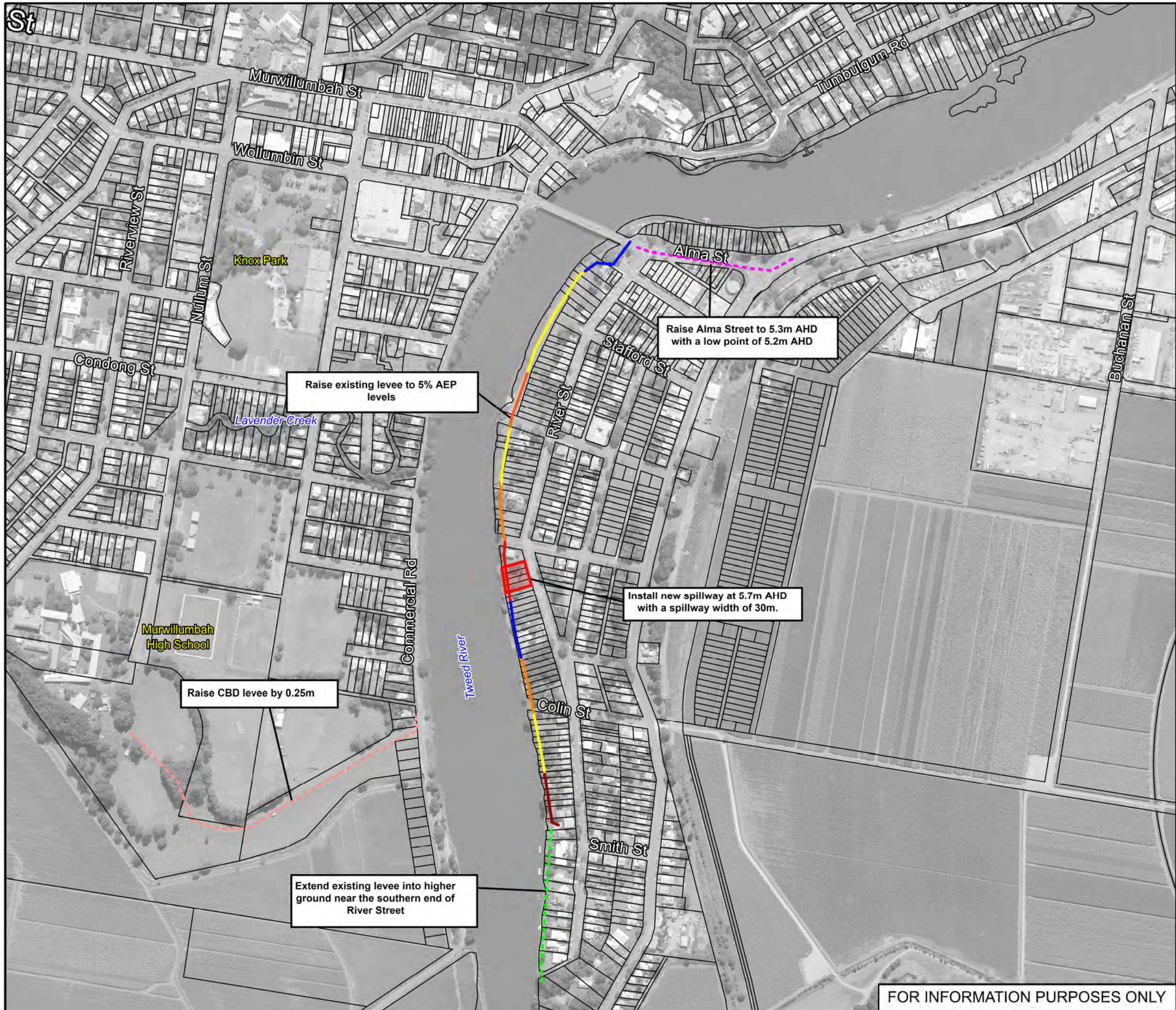
**Figure 40.2:**  
Concept Design for Raising the South Murwillumbah Levee to 20% AEP and Raising Height of the CBD Levee (FM8)

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











File Name: Figure 40.2 - Concept Design for Raising the South Murwillumbah Levee to 20% AEP (FM8).wor

FOR INFORMATION PURPOSES ONLY

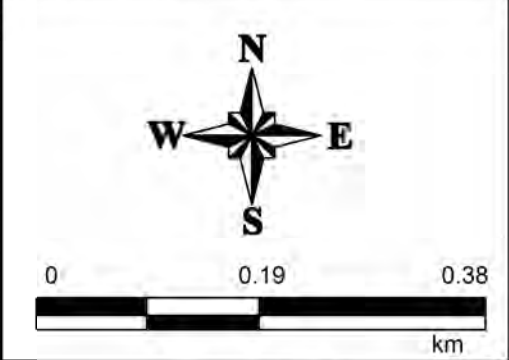




**LEGEND**

-  New Spillway Area
-  New levee extension
-  Extent of Alma Street raised
-  Extent of CBD Levee raised
- Changes to Existing Levee (m)
  -  +0.5
  -  +0.6
  -  +0.7
  -  +0.8
  -  +0.9
  -  +1.0

Notes:  
Aerial photograph date: 2016



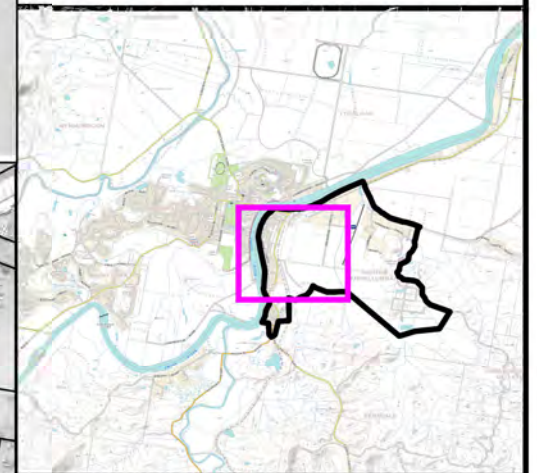
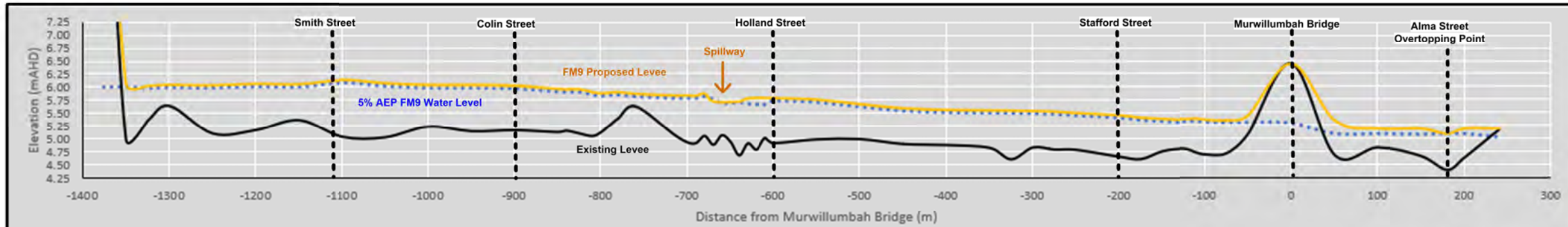
**Figure 41.1:**  
**Concept Design for Raising the South Murwillumbah Levee to 5% AEP and Raising Height of the CBD Levee (FM9)**

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

File Name: Figure 41.1 - Concept Design for Raising the South Murwillumbah Levee to 5% AEP (FM9).wor

FOR INFORMATION PURPOSES ONLY

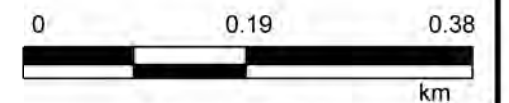




#### LEGEND

- Profile Alignment
- Distance from Murwillumbah Bridge (m)

Notes:  
Aerial photograph date: 2016



**Figure 41.2:**  
Concept Design for Raising the South Murwillumbah Levee to 5% AEP and Raising Height of the CBD Levee (FM9)

Prepared By:

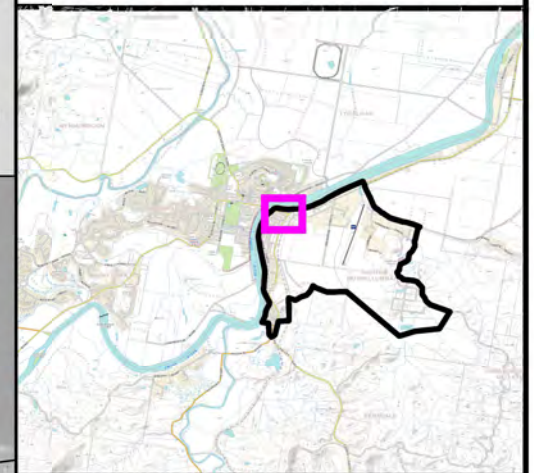
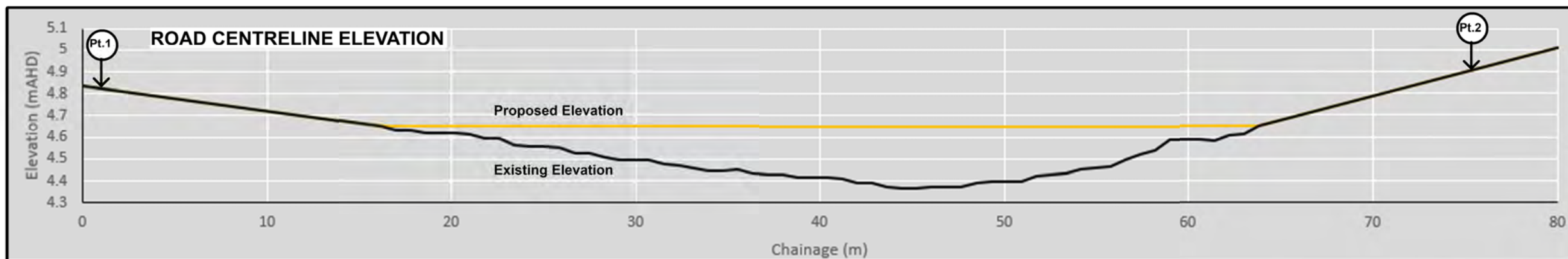
**CatchmentSimulationSolutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 41.2 - Concept Design for Raising the South Murwillumbah Levee to 5% AEP (FM9).wor



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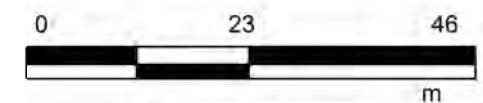




**LEGEND**

- Extent of Works
- Road Centreline
- Depth of Fill
  - Upto 0.1m
  - 0.1m to 0.2m
  - 0.2m to 0.3m

Notes:  
Aerial photograph date: 2016



**Figure 42:**  
**Concept Design for the**  
**Alma Street Modifications**  
**(FM10)**

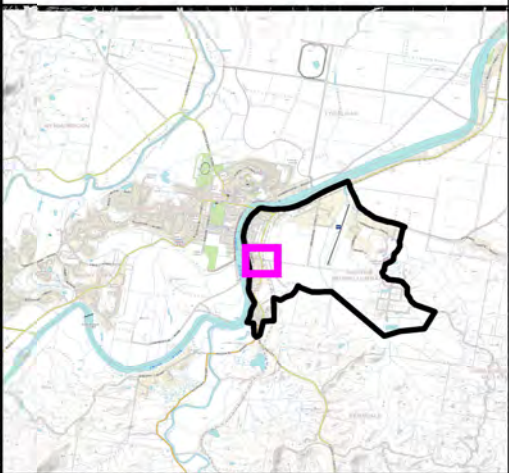
Prepared By:  
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 41 - Concept Design for the Alma Street Modifications.wor








FOR INFORMATION PURPOSES ONLY

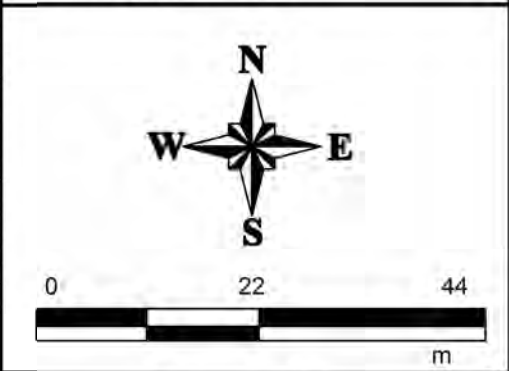




**LEGEND**

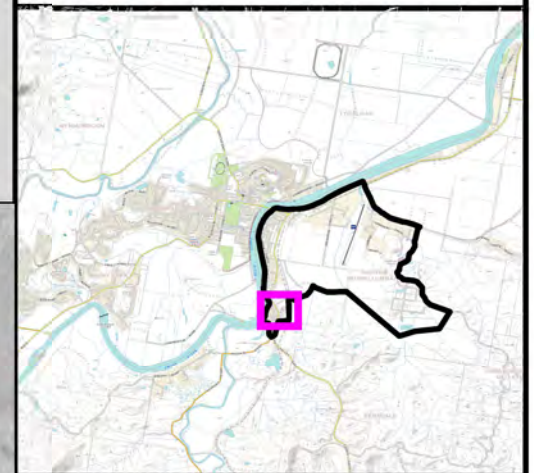
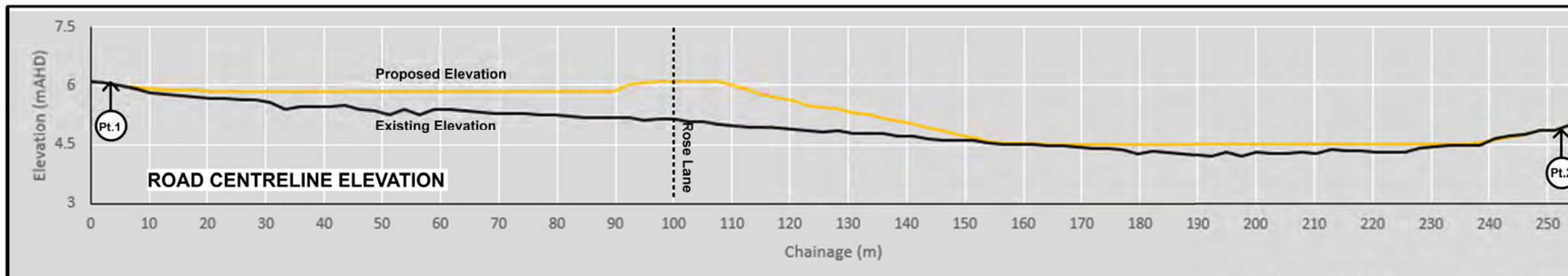
	Extent of Works
	Design Terrain Level
Depth of Cut	
	Upto -1.0m
	-1.0m to -2.0m
	-2.0m to -3.0m

Notes:  
Aerial photograph date: 2016



**Figure 43:**  
**Concept Design to**  
**Modify the Railway**  
**Embankment (FM11)**

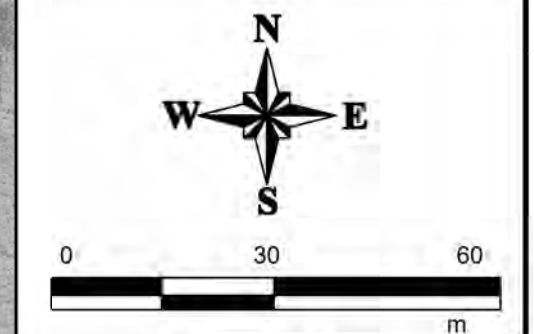




### LEGEND

- Extent of Works
- Design Terrain Level
- Road Centreline
- Depth of Fill**
  - Upto 0.5m
  - 0.5m to 1.0m
  - 1.0m to 1.5m

Notes:  
Aerial photograph date: 2016



**Figure 44:**  
**Concept Design to**  
**Elevate Tweed Valley**  
**Way (FM12)**

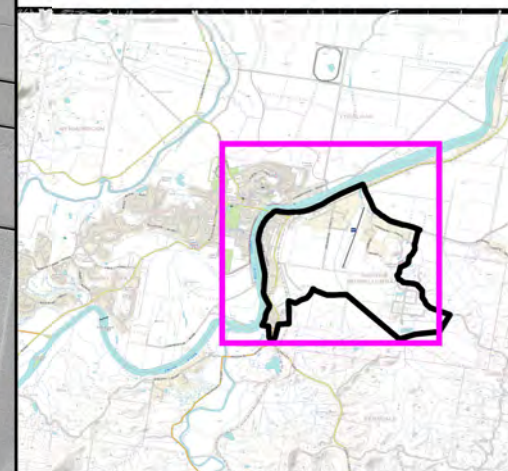
Prepared By:  
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 44 - Concept Design to Elevate Tweed Valley Way (FM12).wor

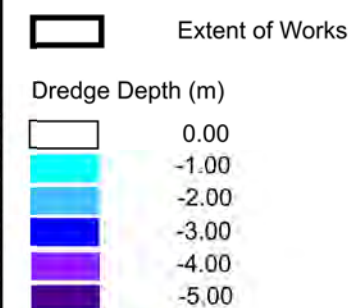


FOR INFORMATION PURPOSES ONLY

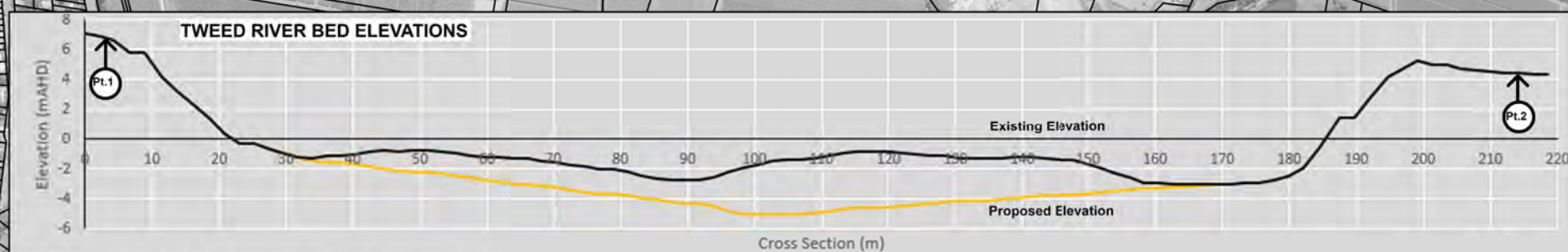




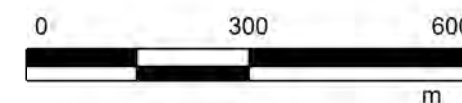
### LEGEND



Dredging to primarily target "shallow" sections of riverbed upstream of the bridge



Notes:  
Aerial photograph date: 2016



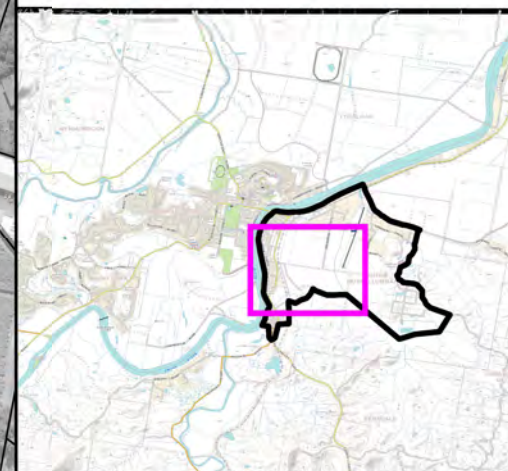
**Figure 45:  
Concept Design for  
Tweed River Dredging  
(FM13)**

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





File Name: Figure 45 - Concept Design for Tweed River Dredging (FM13).wor

FOR INFORMATION PURPOSES ONLY



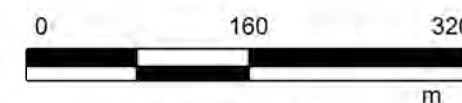


### LEGEND

-  Extent of Works
-  Existing Channel
-  Channel Modifications
-  Terrain Changes


### Notes:

Aerial photograph date: 2016

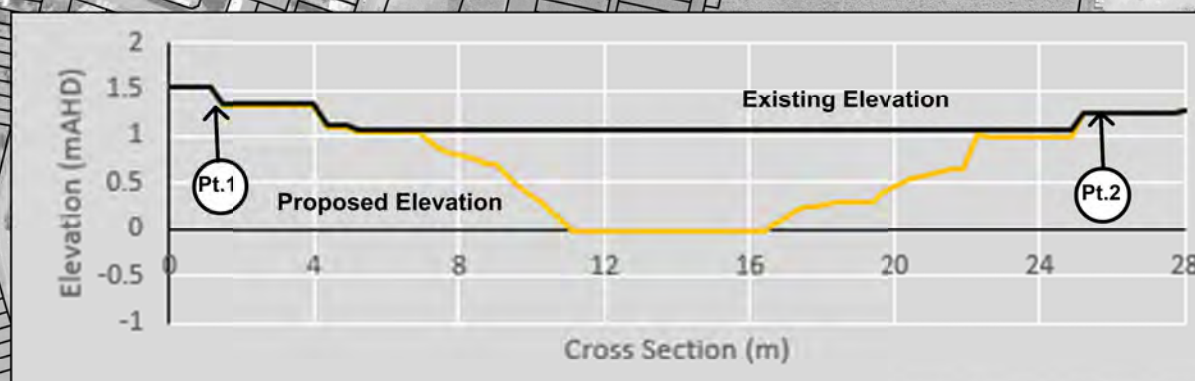


**Figure 46:  
Concept Design for Blacks  
Drain Modifications  
(FM14)**

Prepared By:

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

File Name: Figure 46 - Concept Design for Blacks Drain Modifications (FM14).wor



New channel would be created to link existing Blacks Drain Channel with Condong Creek Channel

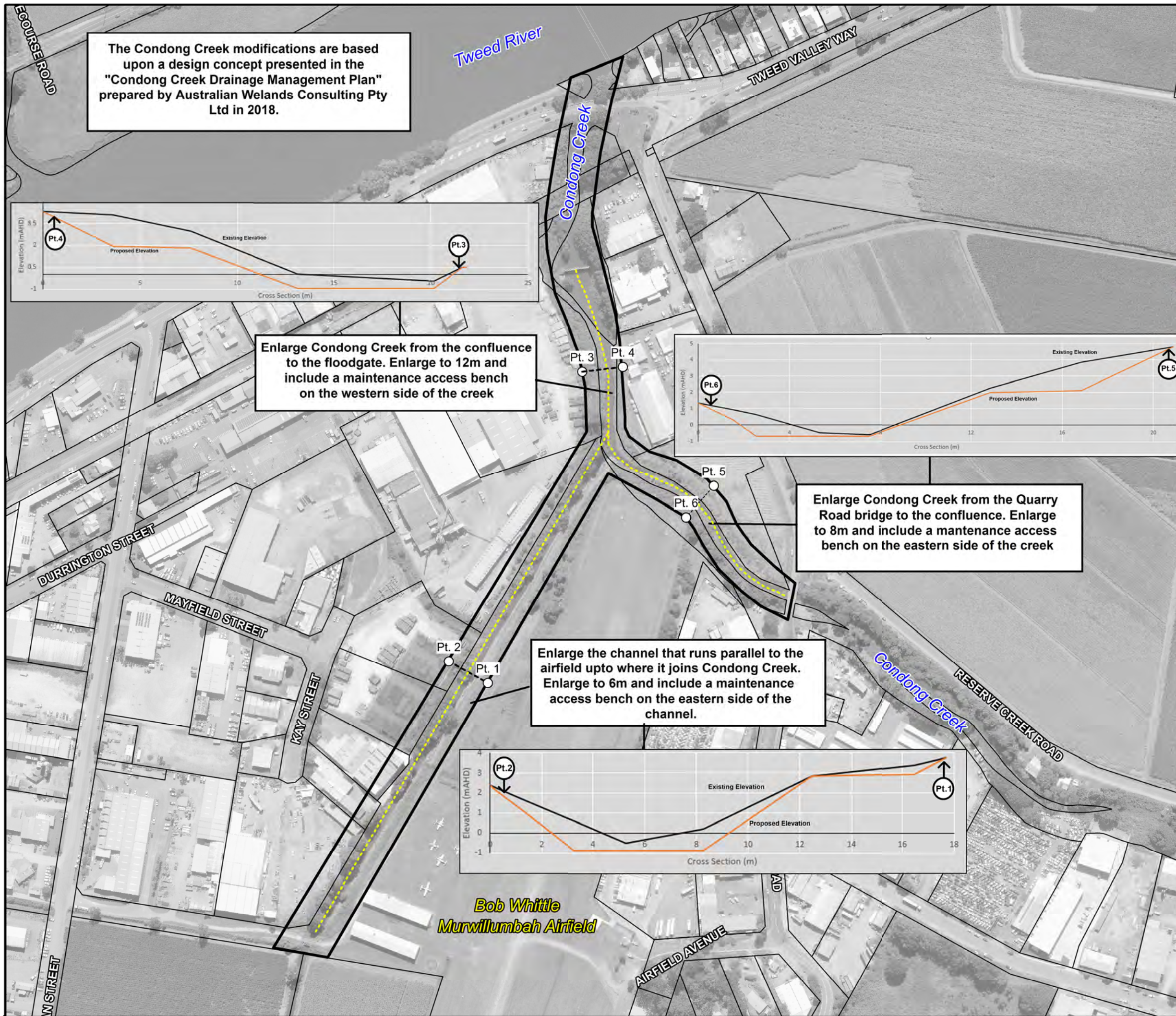
The existing channel would be enlarged with a smaller low flow channel and a higher flow bench on either side to convey large events and provide maintenance access.

The existing gap in the railway embankment would be widened to match the updated channel width

Widen the existing inlet

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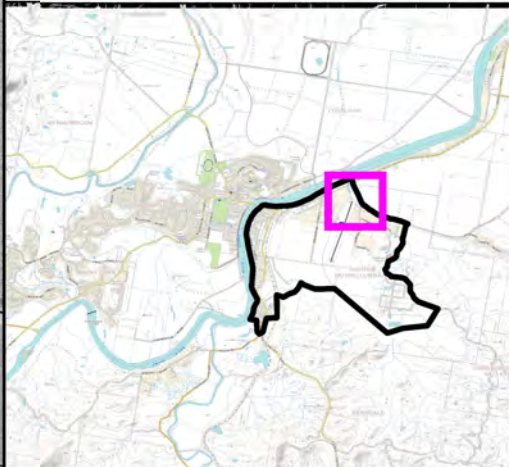


The Condong Creek modifications are based upon a design concept presented in the "Condong Creek Drainage Management Plan" prepared by Australian Welands Consulting Pty Ltd in 2018.

Enlarge Condong Creek from the confluence to the floodgate. Enlarge to 12m and include a maintenance access bench on the western side of the creek

Enlarge Condong Creek from the Quarry Road bridge to the confluence. Enlarge to 8m and include a maintenance access bench on the eastern side of the creek

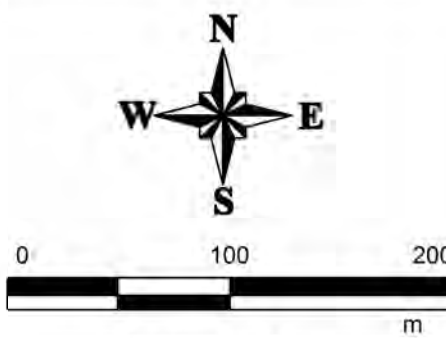
Enlarge the channel that runs parallel to the airfield upto where it joins Condong Creek. Enlarge to 6m and include a maintenance access bench on the eastern side of the channel.



**LEGEND**

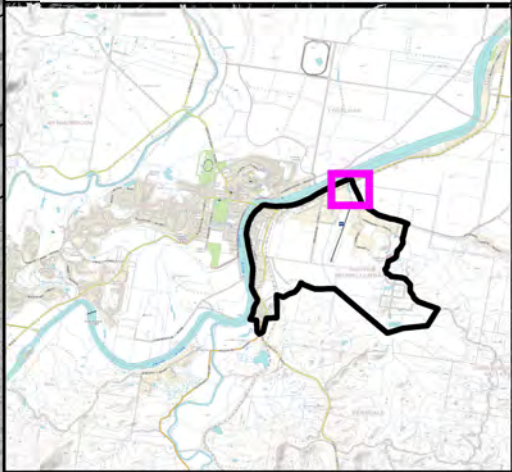
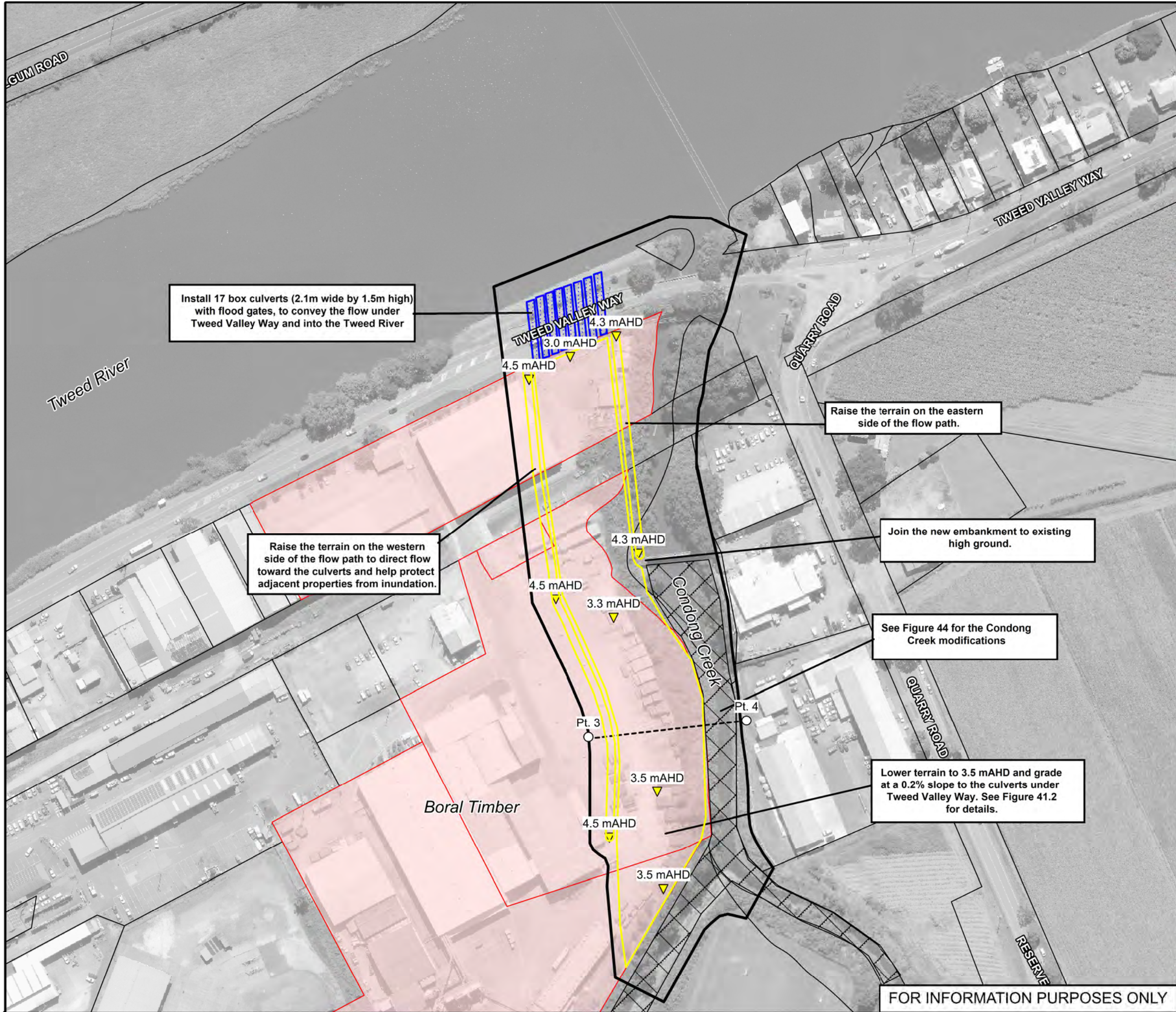
- Extent of Works
- Channel Modifications

Notes:  
Aerial photograph date: 2016



**Figure 47:**  
Concept Design for Condong Creek Channel Modifications (FM15)

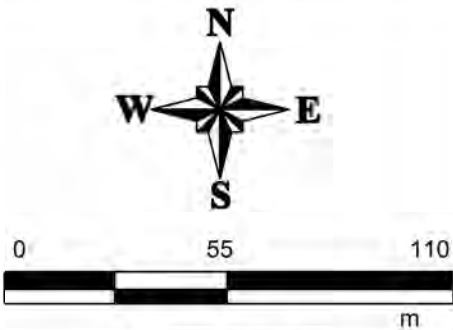





**LEGEND**

-  Extent of Works
-  Design Terrain Level
-  Terrain Changes
-  Properties Impacted by Proposed Design
-  Proposed Culverts

Notes:  
Aerial photograph date: 2016



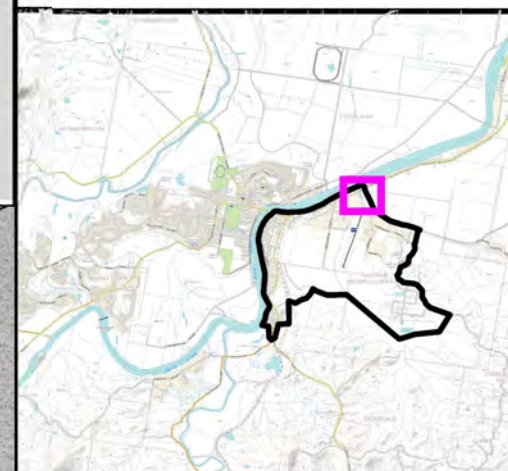
**Figure 48.1:**  
**Concept Design for the**  
**Condong Creek High Flow**  
**Bench (FM16)**

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









File Name: Figure 48.1 - Concept Design for the Condong Creek High Flow Bench (FM16).wor

FOR INFORMATION PURPOSES ONLY



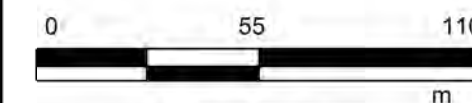


### LEGEND

-  Extent of Works
-  Section Alignment
- Depth of Fill**
  -  Upto 1.0m
  -  1.0m to 2.0m
  -  2.0m to 3.0m
- Depth of Cut**
  -  Upto -1.0m
  -  -1.0m to -2.0m
  -  -2.0m to -3.0m


### Notes:

Aerial photograph date: 2016

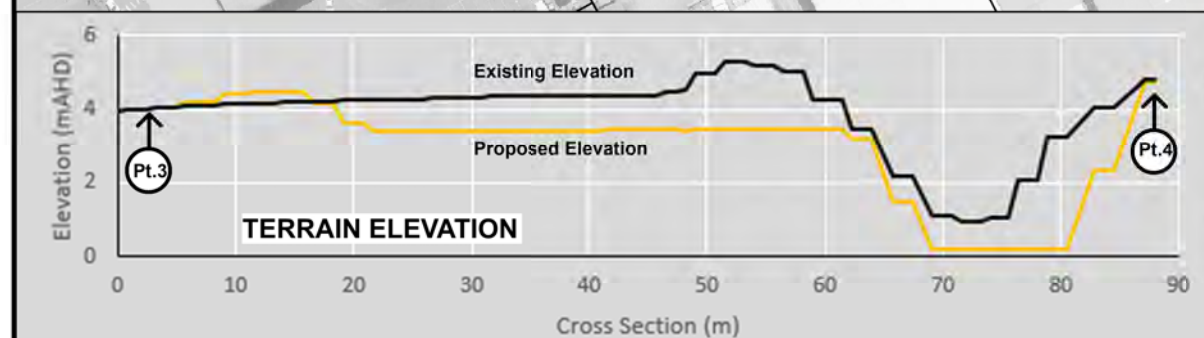
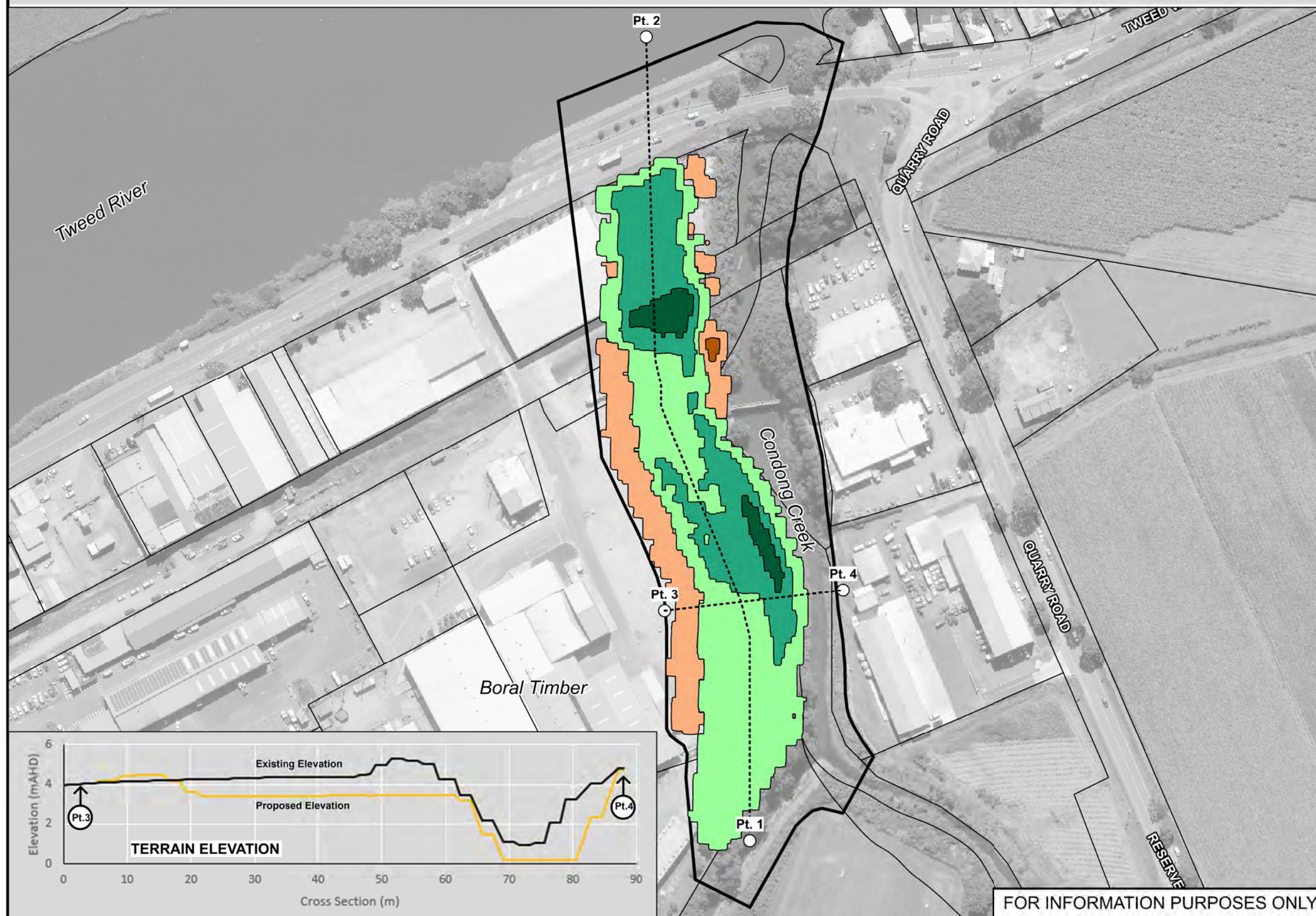
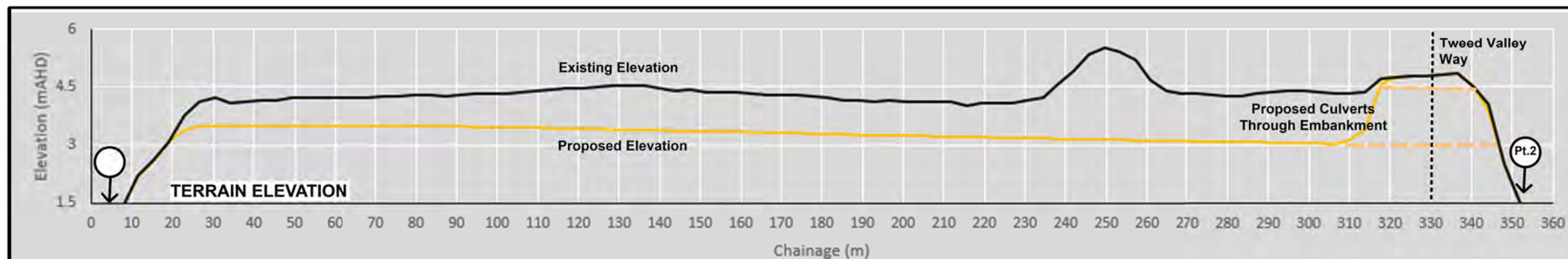


**Figure 48.2:**  
**Concept Design for the**  
**Condong Creek High Flow**  
**Bench (FM16)**

Prepared By:

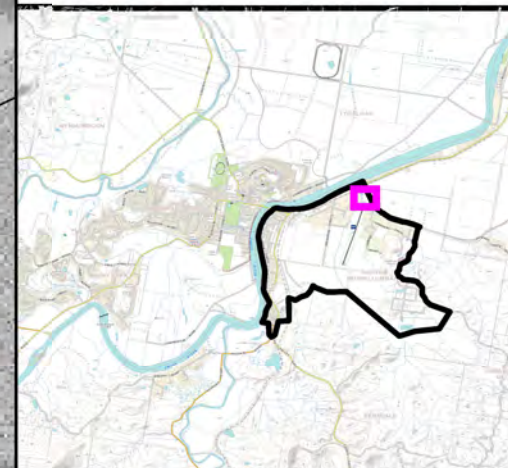
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 48.2 - Concept Design for the Condong Creek High Flow Bench (FM16).wor





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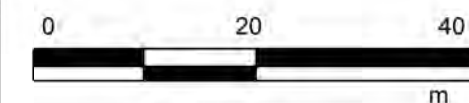


### LEGEND

-  Extent of Works
-  Additional Drainage


### Notes:

Aerial photograph date: 2016



**Figure 49:**  
**Concept Design for the**  
**High Level Condong Creek**  
**Outlet (FM17)**

Prepared By:

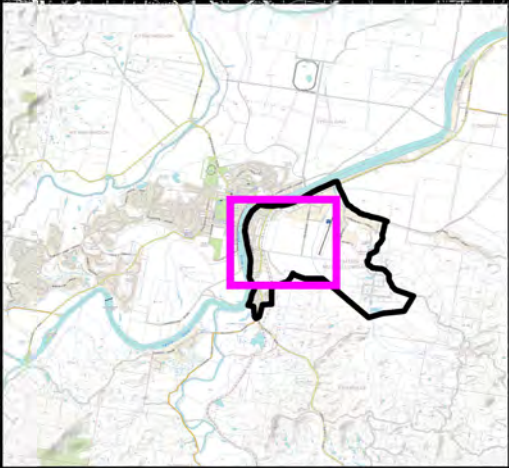
 **Catchment Simulation Solutions**  
Suite 10.01, 70 Phillip St  
Sydney, NSW 2000

File Name: Figure 49 - Concept Design for the High Level  
Condong Creek Outlet (FM17).wor






QUARRY ROAD

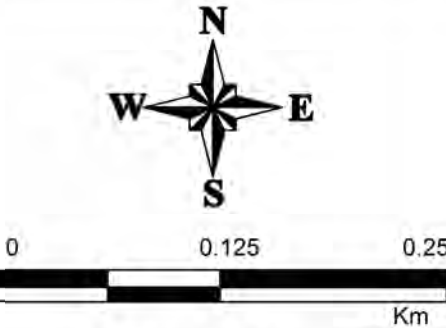





**LEGEND**

-  Designated VHP Scheme Area
-  Future Expanded VHP Scheme Area
-  Additional Residential Lots (without buildings) that Council Could Consider For Purchase or Rezoning

Notes:  
Aerial photograph date: 2016

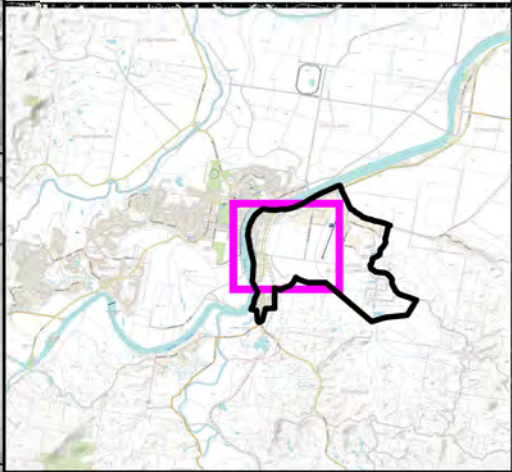


**Figure 50:  
Suggested Modifications to  
Voluntary House Purchase  
Scheme (PM1)**

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

File Name: Figure 50 - Suggested Modifications to Voluntary House Purchase Scheme (PM1).wor

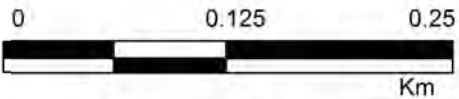





**LEGEND**

- High Priority
- Medium Priority

Notes:  
Aerial photograph date: 2016

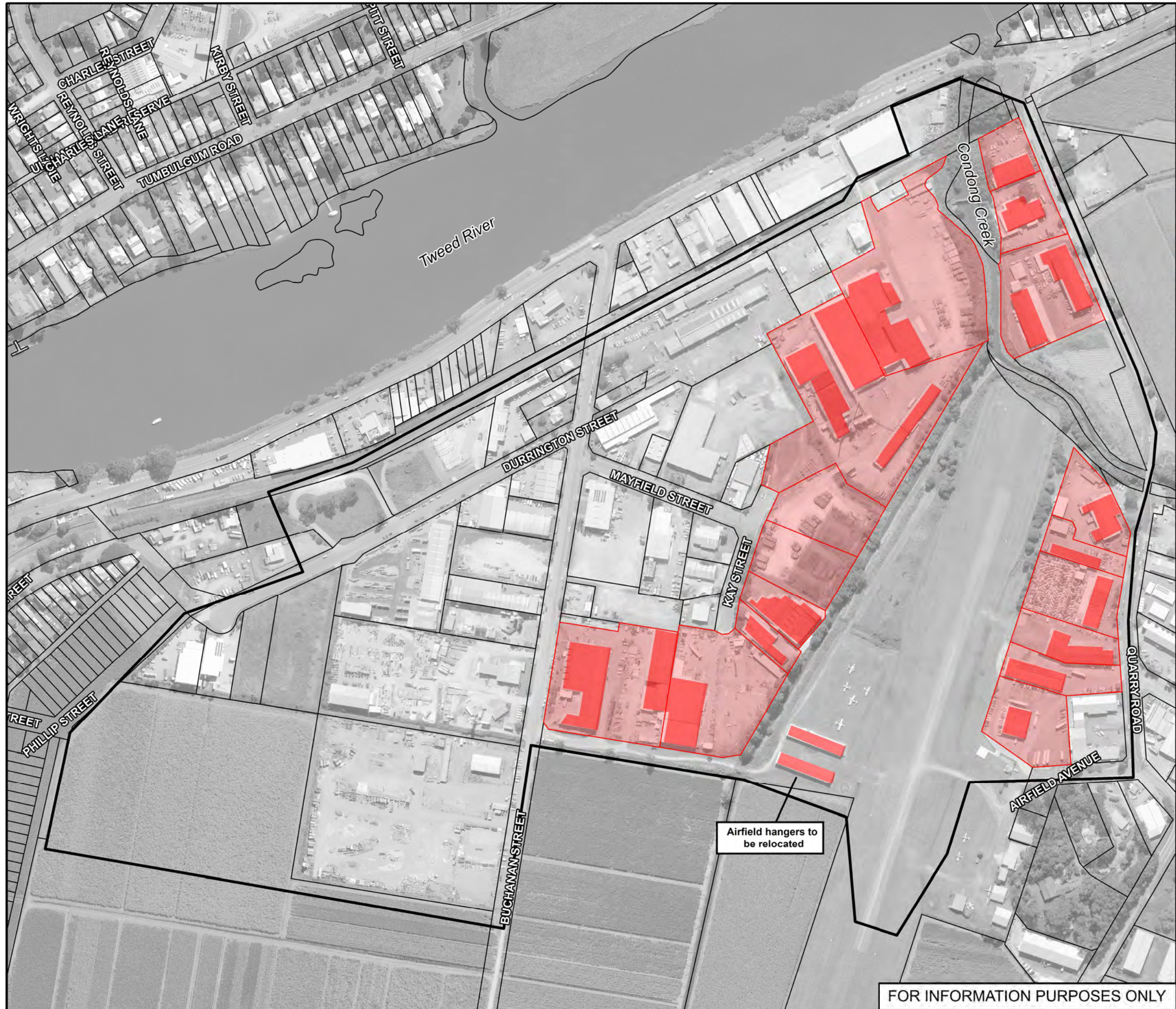


**Figure 51:**  
**Commercial Properties that**  
**Would Benefit from Temporary**  
**Flood Barriers (PM2)**

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

File Name: Figure 51 - Commercial Properties that Would Benefit from Temporary Flood Barriers (PM2).wor







**TWEED**  
SHIRE COUNCIL



**LEGEND**

-  Extent Of Works
-  Land Swap Properties
-  Buildings To Be Removed

Notes:

Aerial photograph date: 2016



**Figure 52.1:**  
**Concept Design for Industrial**  
**Land Swap Option 1**  
**(PM3)**

Prepared By:



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

File Name: Figure 52.1 - Concept Design for Industrial Land Swap Option 1 (PM3).wor

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**TWEED**  
SHIRE COUNCIL



**LEGEND**

 Extent of Works

Depth of Cut

 Up to -1.0m

 -1.0m to -2.0m

 Over -2.0m

Notes:

Aerial photograph date: 2016



0300600  
m

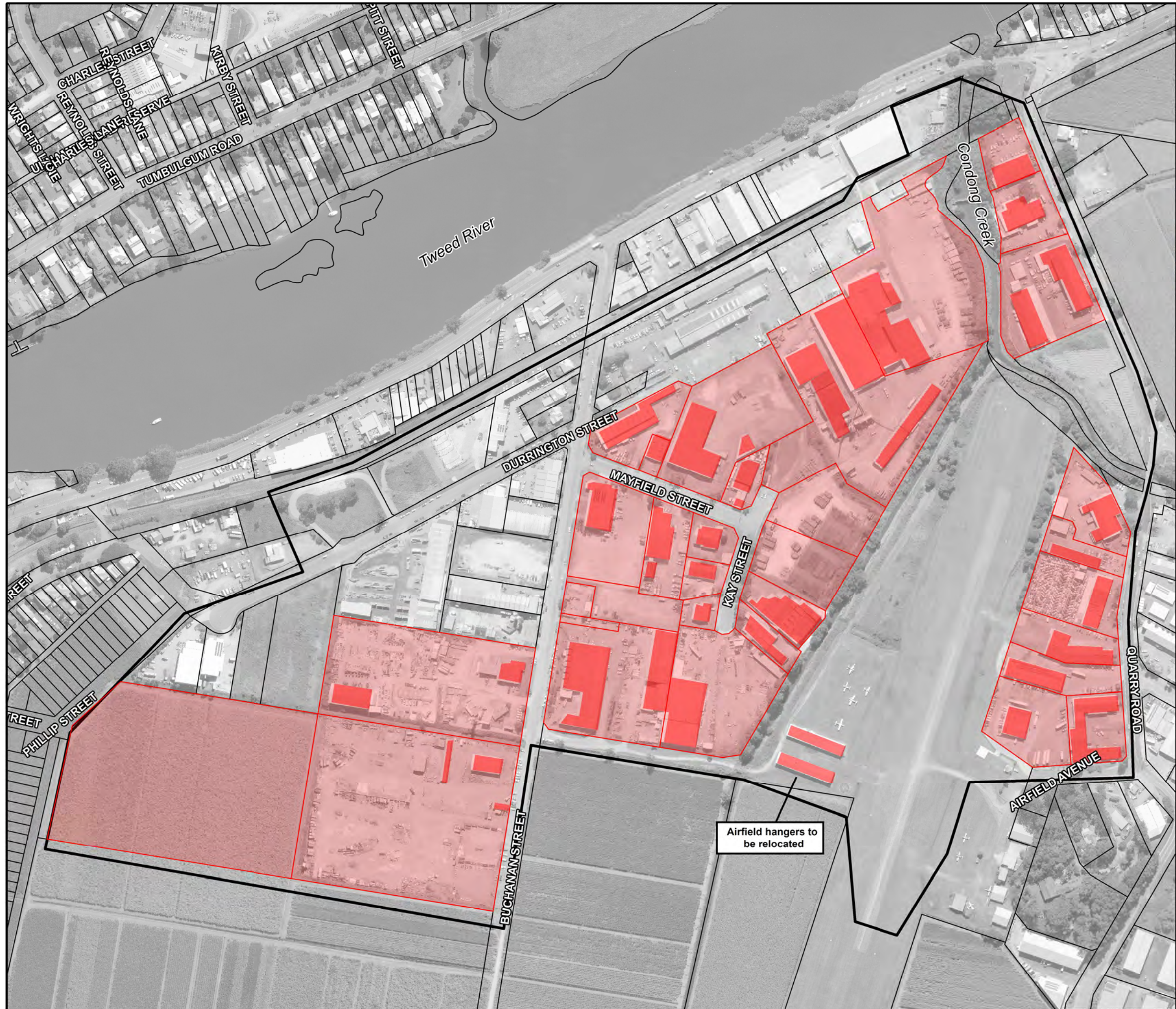
**Figure 52.2:**  
**Concept Design for Industrial**  
**Land Swap Option 1**  
**(PM3)**

Prepared By:

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

File Name: Figure 52.2 - Concept Design for Industrial Land Swap Option 1 (PM3).wor







**TWEED**  
SHIRE COUNCIL



**LEGEND**

-  Extent Of Works
-  Land Swap Properties
-  Buildings To Be Removed

Notes:

Aerial photograph date: 2016



**Figure 53.1:**  
**Concept Design for Industrial**  
**Land Swap Option 2**  
**(PM4)**

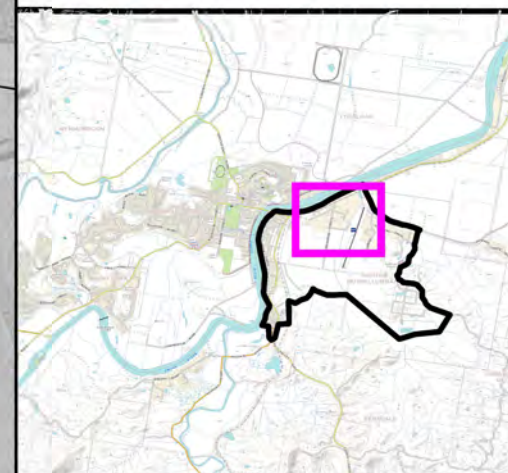
Prepared By:







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

File Name: Figure 53.1 - Concept Design for Industrial Land Swap Option 2 (PM4).wor

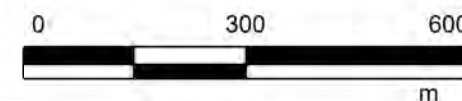




### LEGEND

-  Extent of Works
- Depth of Cut
-  Up to -1.0m
  -  -1.0m to -2.0m
  -  Over -2.0m

Notes:  
Aerial photograph date: 2016

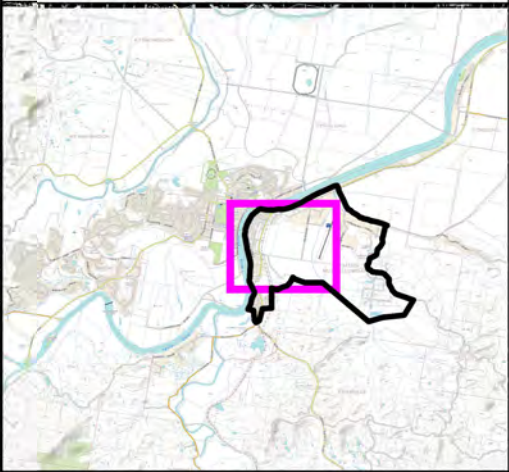


**Figure 53.2:**  
**Concept Design for Industrial**  
**Land Swap Option 2**  
**(PM4)**


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

File Name: Figure 53.2 - Concept Design for Industrial Land Swap Option 2 (PM4).wor

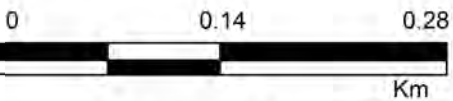





**LEGEND**

 Property with a single dwelling on multiple lots

Notes:  
Aerial photograph date: 2016



**Figure 54:  
Potential Properties Identified  
for Lot Consolidation  
(PM5)**

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

File Name: Figure 54 - Potential Properties Identified for Lot Consolidation (PM5).wor





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# FLOODPLAIN RISK MANAGEMENT PLAN

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