Wentworth Hospital Redevelopment

Flood Emergency Response Plan

Health Infrastructure

May 2023

rp311015-00304rg_crt230503-Wentworth Hospital Redevelopment FERP

Advisian
Worley Group

advisian.com

This page is intentionally blank

Disclaimer

Company details

Advisian Pty Ltd
ABN 50 098 008 818

Level 17 141 Walker Street
North Sydney NSW 2060
Australia

T: +61 2 9495 0500
F: +61 2 9810 5777

Project Name: **Wentworth Hospital Redevelopment**
Flood Emergency Response Plan

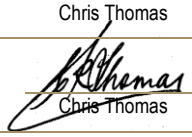
Rev	Description	Author	Review	Advisian Approval	Date
A	**Draft Report for internal review**	RG R Golaszewski	CRT C Thomas		18-11-2022
B	**Draft Report – Issue for Client Review**	RG R Golaszewski	CRT CR Thomas	CRT Chris Thomas	30-11-2022
C	**Final Draft Report**	RG R Golaszewski	CRT CR Thomas	CRT Chris Thomas	01-02-2023
D	**Updated Final Draft Report**	RG R Golaszewski	CRT CR Thomas	CRT Chris Thomas	17-02-2023
E	**Final Report**	RG R Golaszewski	CRT CR Thomas	 Chris Thomas	03-05-2023

Table of Contents

Appendices

This page is intentionally blank

1 Description of the Flood Risk

1.1 Background

The proposed redevelopment of Wentworth Hospital involves the replacement of the existing hospital building at 24 Hospital Road, Wentworth. Development plans indicate that the new hospital will be constructed within the boundaries of the existing Hospital Levee and to the south-west of the existing building.

Records from historic floods indicate that the Hospital Levee can provide protection to the site during major flooding of the Murray and Darling Rivers. During the 1956 and 1974 floods the Hospital Levee was not breached with peak flood levels reaching elevations that were 0.5 and 1.3 metres below the typical levee crest elevation, respectively. These events are estimated to be in the order of the 1% and 5% Annual Exceedance Probability (AEP) events for Wentworth, respectively.

Without the Hospital Levee the site would be at risk of inundation during flood events as frequent as the 5% Annual Exceedance Probability (AEP) flood. Accordingly, the viability of the existing site for use as a hospital precinct is heavily reliant on maintaining the levee.

The proposed hospital redevelopment has called for the preparation of a Flood Emergency Response Plan (FERP) given the flood risks outlined above. The FERP considers the potential for flooding to require the preparation and evacuation of the hospital due to an oncoming threat of severe flooding.

A Preliminary Flood Assessment (PFA) was completed for the proposed hospital and is documented in a report titled, '*Wentworth Hospital Redevelopment – Preliminary Flood Assessment*' (*Advisian, September 2022*) (*referred to as the PFA Report herein*).

The flood risks to the Hospital Redevelopment, including to the site and surrounds, are discussed in the following.

1.2 Overview of the Hospital Site and Levee

The location of the hospital site is shown in **Figure 1** relative to Wentworth Town and the Murray and Darling Rivers. The footprint of the proposed hospital redevelopment is shown in **Figure 2** with existing terrain elevations in the vicinity of the hospital site superimposed. As shown, the proposed hospital is to be constructed to the south-west of the existing hospital and within the bounds of the existing hospital levee.

The existing topographic mapping is based on site survey collected as part of the hospital redevelopment. The survey indicates that topographic elevations across the site generally vary between 34.0 and 35.0 mAHD. These elevations are 1 to 2 metres below the crest elevations of the Hospital Levee, which typically range between 35.6 and 35.8 mAHD (*refer* **Figure 2**). A maximum crest elevation along the levee of 35.85 mAHD was surveyed near the north-western corner of the levee.

Crest elevations along Hospital Road and the Hospital Levee are shown as a longitudinal profile on **Figure 3**. The profile indicates that there is a low-point along the levee system at the Hospital Road entrance to the site. Hospital Road has a crest elevation of 35.3 mAHD at the entrance. In comparison, the levee create either side of the road entrance is around 35.7 mAHD (*refer* **Plate 1**).

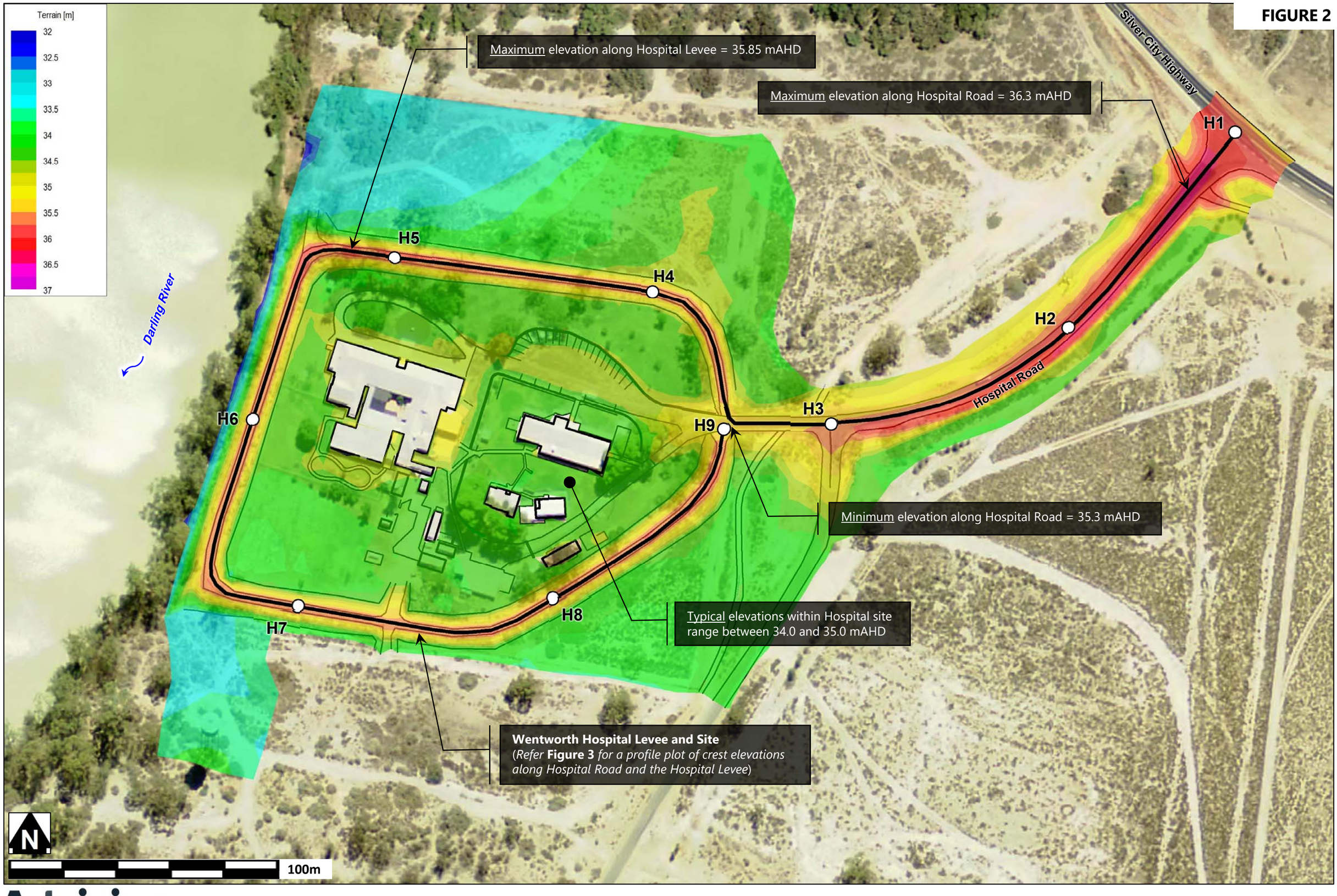
FIGURE 1

Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

LOCATION OF THE EXISTING WENTWORTH HOSPITAL SITE

FIGURE 2

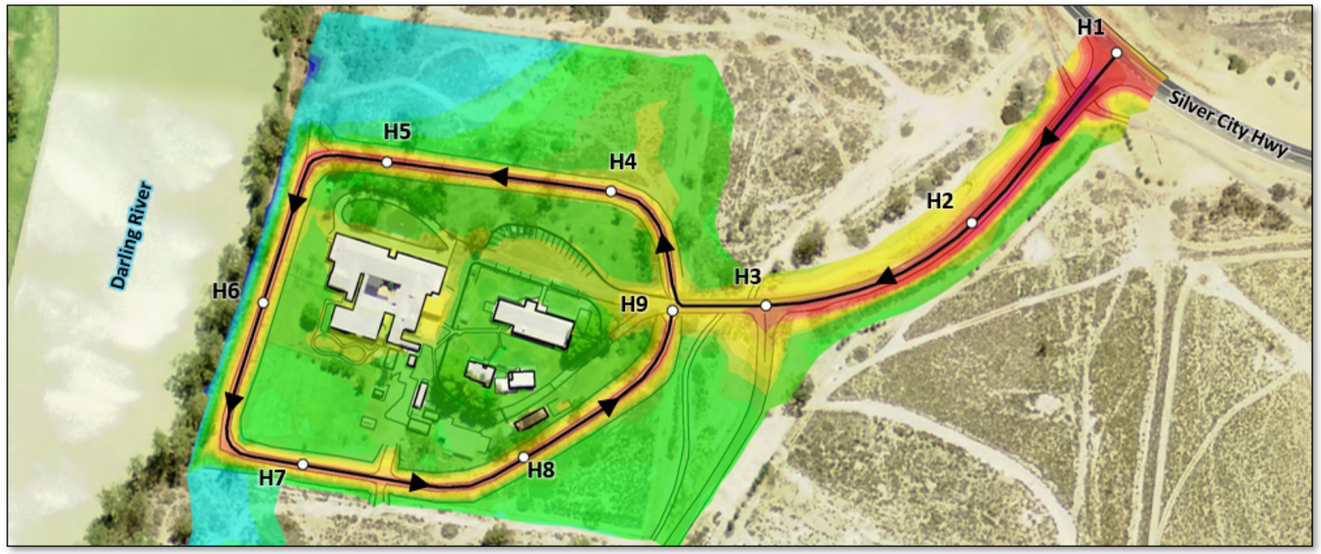


Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

EXISTING TOPOGRAPHY ACROSS THE EXISTING HOSPITAL SITE BASED ON SITE SURVEY

FIGURE 3



LEGEND

- Topography along the Hospital Road and Levee
- Predicted 5% AEP Flood Levels
- Predicted 1% AEP Flood Levels
- Predicted 1 in 200 AEP Flood Levels
- Predicted Extreme Flood Levels
- Predicted Historic 1956 Flood Levels
- Predicted Historic 1974 Flood Levels

Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

EXISTING TOPOGRAPHY AND PREDICTED FLOOD SURFACE PROFILES ALONG THE HOSPITAL ROAD AND LEVEE

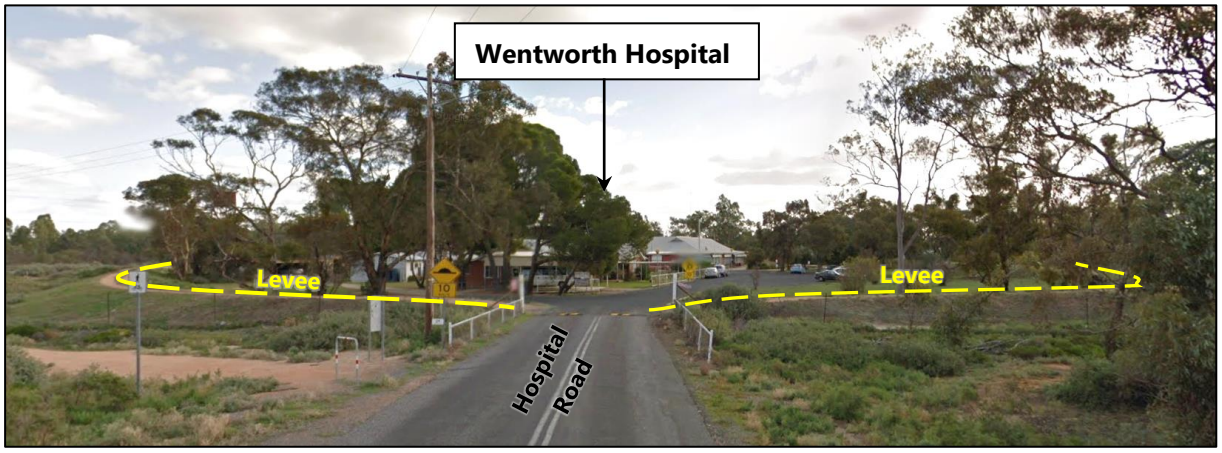


Plate 1 Google Street View image showing the gap in the Hospital Levee at the Hospital Road entrance (Source: Google Maps)

1.3 Existing Flood Behaviour

Flood behaviour along the Lower Murray and Darling Rivers is documented in the '*Wentworth Flood Study*' (*Rev D – Final Draft, July 2021*). Predicted flood behaviour in the vicinity of the hospital site is also documented in the PFA Report prepared by Advisian for the 5%, 1% and 1 in 200 AEP events, and the adopted 'extreme' flood. The flood behaviour is summarised below.

- Flood levels at the Hospital site for a range of historic and design events are listed in **Table 1.1**.

Table 1.1 Flood Levels at the Wentworth Hospital Site for Historic and Design Flood Events

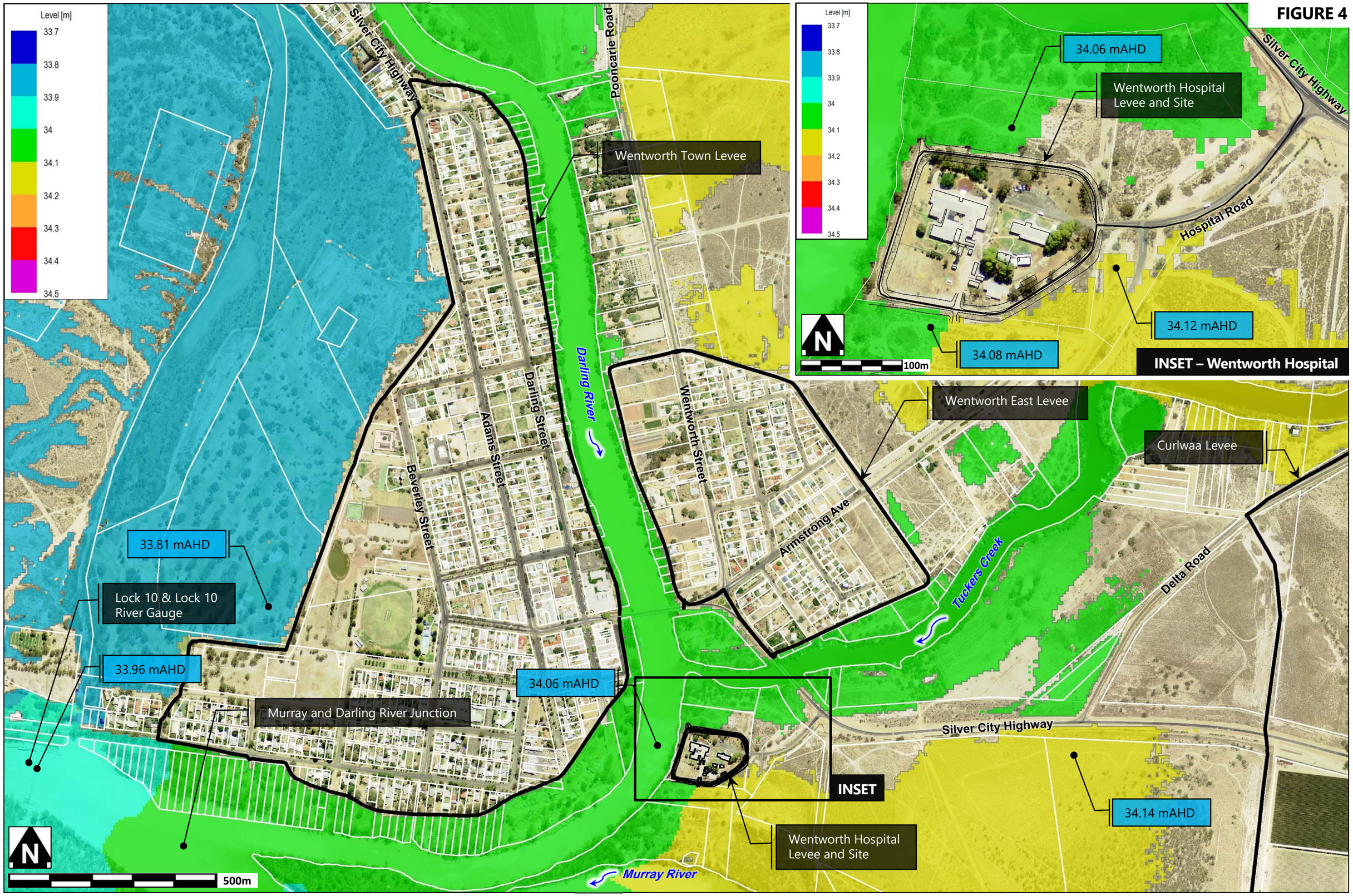
Event	Flood Level ^ (mAHD)	Rank (*Largest = 1, Smallest = 7*)
1870 Historic Flood	35.15	2
1956 Historic Flood	34.85	5
1974 Historic Flood	34.06	7
5% AEP	Between 34.06 and 34.12	6
1% AEP	Between 34.82 and 34.86	4
1 in 200 AEP	Between 35.08 and 35.13	3
Extreme Event ^^	Between 35.91 and 35.95	1

^ *Flood levels for design events are based on modelling results documented in the 'Wentworth Flood Study' (Final Draft, 2011).*

^ *The adopted 'Extreme' flood event is based on the adoption of inflows that are three (3) times those determined for the 1% AEP event.*

- Predicted flood levels and flood extents at the peak of the 5% and 1% AEP events and the 1 in 200 AEP event are shown in **Figures 4** to **6**, respectively. Peak flood levels and extents for the extreme event are shown in **Figure 7**.
- Flow velocities are predicted to range between 0.1 and 0.4 m/s around the Wentworth Hospital Levee during floods up to and including a 1 in 200 AEP event.

FIGURE 4

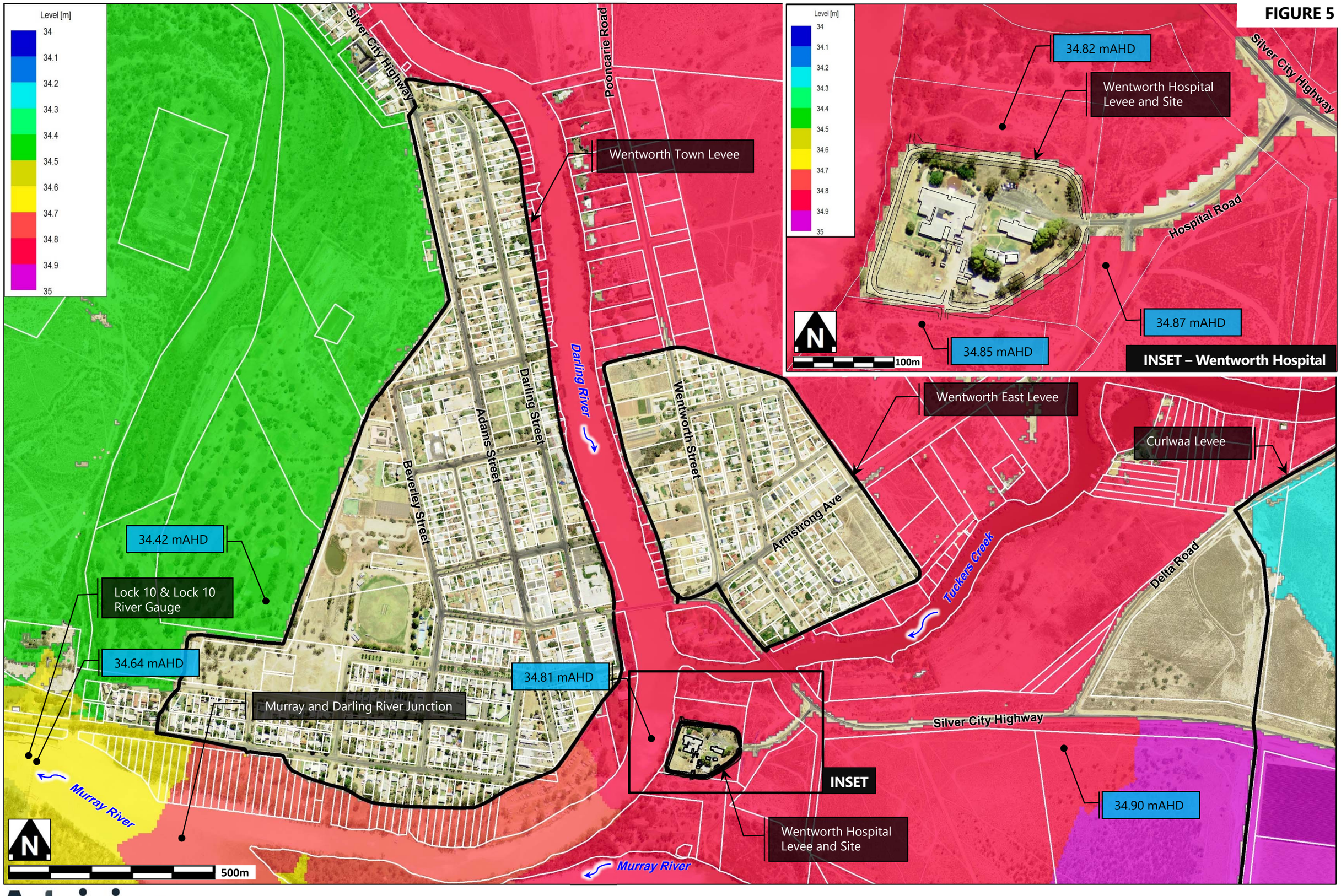


Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

PREDICTED FLOOD LEVELS AT THE PEAK OF A 5% AEP FLOOD ALONG THE MURRAY AND DARLING RIVERS

FIGURE 5



Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

PREDICTED FLOOD LEVELS AT THE PEAK OF A 1% AEP FLOOD ALONG THE MURRAY AND DARLING RIVERS

FIGURE 6

Level [m]
34.5
34.6
34.7
34.8
34.9
35
35.1
35.2
35.3
35.4
35.5
35.6

Silver City Highway
Pooncarie Road
Wentworth Town Levee
Darling River
Adams Street
Darling Street
Beverley Street
Wentworth Street
Armstrong Ave
Wentworth East Levee
Curlwaa Levee
Tuckers Creek
Delta Road
Silver City Highway
34.60 mAHD
Lock 10 & Lock 10 River Gauge
34.85 mAHD
Murray and Darling River Junction
35.06 mAHD
35.17 mAHD
INSET
Wentworth Hospital Levee and Site
Murray River
Murray River
N
500m

Level [m]
34.5
34.6
34.7
34.8
34.9
35
35.1
35.2
35.3
35.4
35.5
35.6

35.08 mAHD
Wentworth Hospital Levee and Site
Silver City Highway
Hospital Road
35.13 mAHD
35.09 mAHD
N
100m
INSET – Wentworth Hospital

Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

PREDICTED FLOOD LEVELS AT THE PEAK OF A 1 IN 200 AEP FLOOD ALONG THE MURRAY AND DARLING RIVERS

FIGURE 7

Level [m]
35
35.1
35.2
35.3
35.4
35.5
35.6
35.7
35.8
35.9
36
36.1
36.2
36.3
36.4
36.5

Silver City Highway
Pooncarie Road
Wentworth Town Levee
Darling River
Adams Street
Darling Street
Beverley Street
Wentworth Street
Armstrong Ave
Wentworth East Levee
Curlwaa Levee
Tuckers Creek
Delta Road
Silver City Highway
35.43 mAHD
Lock 10 & Lock 10 River Gauge
35.60 mAHD
Murray and Darling River Junction
35.89 mAHD
INSET
Wentworth Hospital Levee and Site
36.05 mAHD
Murray River
Murray River
N
500m

Level [m]
35
35.1
35.2
35.3
35.4
35.5
35.6
35.7
35.8
35.9
36
36.1
36.2
36.3
36.4
36.5

35.92 mAHD
Wentworth Hospital Levee and Site
Silver City Highway
Hospital Road
35.95 mAHD
35.91 mAHD
N
100m
INSET – Wentworth Hospital

Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

PREDICTED FLOOD LEVELS AT THE PEAK OF A PMF EVENT ALONG THE MURRAY AND DARLING RIVERS

1.4 Flood Immunity of the Proposed Hospital

The proposed hospital redevelopment is to include the following components:

- The main hospital building is to be constructed on a fill mound with crest elevations at or above the predicted peak flood level for the extreme event; i.e., at or above 35.95 mAHD.
- Elevations across the remainder of the hospital site are to remain largely unchanged and therefore consistent with elevation mapping presented as **Figure 2**.
- Two existing buildings will remain and be used for staff and student. These buildings will remain at existing elevations.
- No changes are proposed to the extent or crest elevations of the existing Hospital Levee.

The main hospital building will therefore not be at risk of inundation during floods up to and including the 'extreme' event. Notwithstanding, floodwaters could still inundate the hospital site and those existing buildings that are proposed to remain. This is not predicted to occur during floods up to and including the 1 in 200 AEP event.

2 Flood Evacuation and Warning Time

Consultation has been undertaken with Mr Marcus Wilson, the Disaster Manager for the Far West Local Health District (FWLHD), to understand the emergency response protocols that would be followed over the course of a major flood event. This includes information such as the most likely evacuation destinations and the organisations with whom co-ordination will be required.

The following evacuation protocols were discussed during this consultation.

- Evacuation of the Wentworth Hospital would likely first be directed to the Wentworth Airfield followed by either the Mildura Airport or to the Mildura Base Hospital.
- Evacuation to the airports would be undertaken to transport patients to alternate facilities outside of the Wentworth Local Government Area (LGA) in advance of the oncoming flood. The Wentworth Airport is the preferred location for evacuation by air.
- Evacuation to the Mildura Base Hospital would also be an option. However, this would require close communication between Wentworth and Mildura Hospital to confirm there is sufficient resources and capacity to assist. This option may not be possible given existing resources and capacity may already be low and stretched based on the severity of the flood situation that would be unfolding.

The following sections assess the potential evacuation routes and warning times based on evacuation to the Wentworth Airport and to Mildura; from where the Mildura Base Hospital or Mildura Airport could be accessed.

2.1 Flood Evacuation Routes

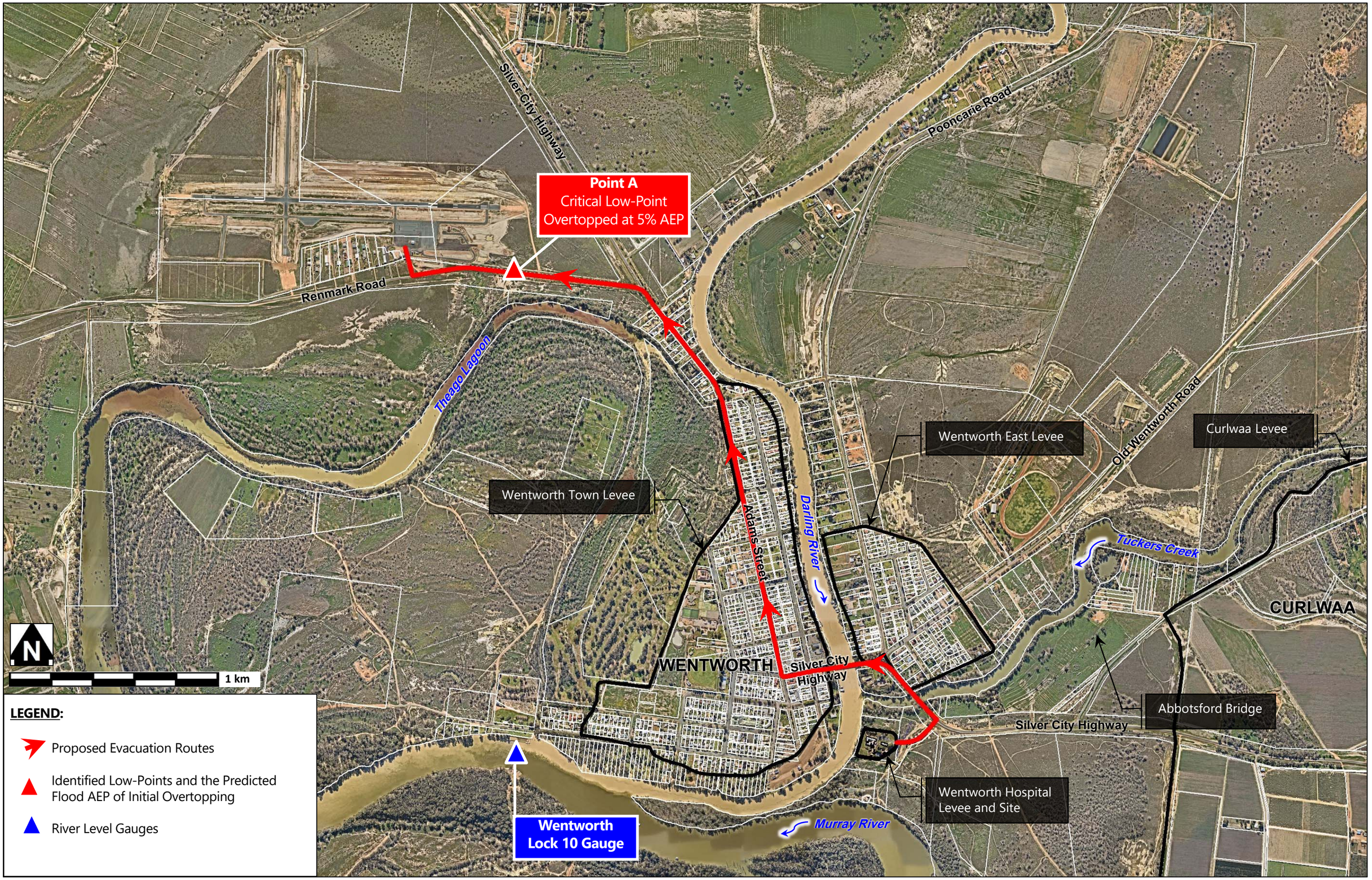
As discussed above, evacuation from the Wentworth Hospital would be directed to either the Wentworth Airport or to Mildura, and from there to the Mildura Base Hospital or Mildura Airport. The flood immunity of the potential evacuation routes that could be followed to reach each location are discussed in the following.

2.1.1 Evacuation to Wentworth Airfield

The Wentworth Airfield is located four (4) kilometres north-west of Wentworth Hospital. As shown in **Figure 8**, the Wentworth Airfield can be accessed by following Hospital Road onto the Silver City Highway, before crossing over the Darling River and continuing through Wentworth Town via Adams Street to Renmark Road. This is the nominated evacuation route to reach the airfield.

Light Detection and Ranging (LiDAR) survey indicates that elevations along the evacuation route are lowest along Renmark Road. A low-point exists along Renmark Road about 720 metres west of the turn off from the Silver City Highway. The low-point has crest elevations of about 33.8 mAHD.

Flood modelling undertaken as part of the *Wentworth Flood Study* (*Rev D, July 2021*) indicates that the evacuation route will remain dry until around the peak of a 5% AEP event. As shown in **Table 2.1**, the low point along Renmark Road would be overtopped by up to 0.02 metres at the peak of a 5% AEP flood. Depths of inundation over Renmark Road increase to 0.8 metres at the peak of a 1 in 200 AEP event.



Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

EVACUATION ROUTE FROM THE WENTWORTH HOSPITAL TO WENTWORTH AIRFIELD
[With Aerial Photograph]

Predicted flood extents along the evacuation route for the 5%, 1% and 1 in 200 AEP events are shown in **Figure 9**. The location of the low point is clearly marked on the figure.

Table 2.1 Predicted Flood Levels and Overtopping Depths at the Low-Point Along Renmark Road

Event (AEP)	**Peak Flood Level** (mAHD)	**Depth of Overtopping** ^ (m)
5%	33.82	0.02
1%	34.42	0.62
1 in 200	34.60	0.80
Extreme Flood	35.42	1.62

^ *Based on a minimum crest elevation of 33.8 mAHD along Renmark Road.*

2.1.2 Evacuation towards Mildura

Evacuation to Mildura is recommended based on it being a large regional city with hospital facilities and an airport for onward travel, if necessary. As shown in **Figure 10**, the majority of Mildura is also predicted to remain flood free during floods up to and including the adopted extreme event. The only other towns that are nearby and predicted to remain unaffected by flooding are Dareton and Merbein within NSW and Victoria, respectively.

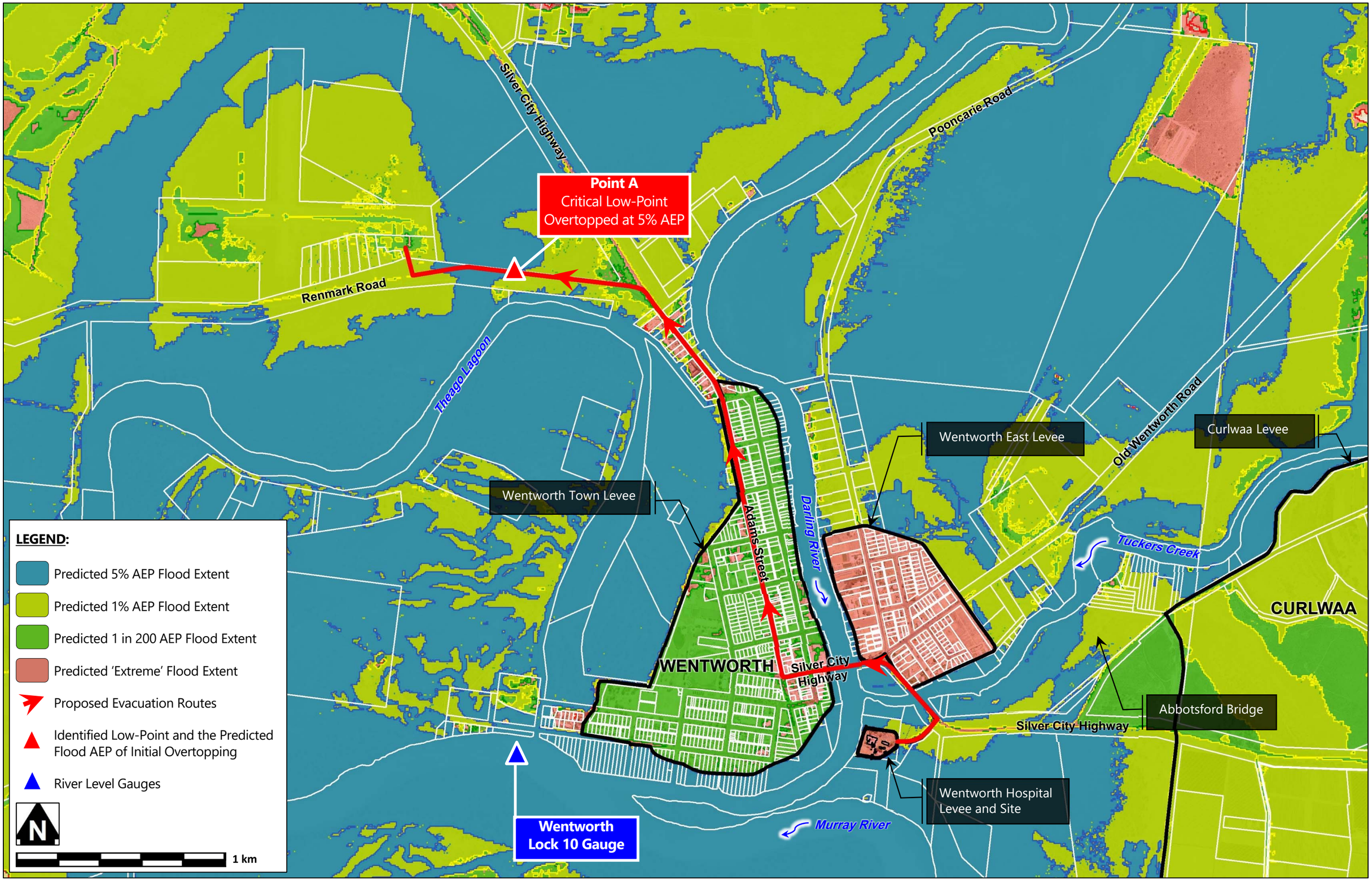
There are two possible evacuation routes to Mildura which both follow the same initial route through Curlwaa via the Silver City Highway. As shown in **Figure 10**, the evacuation routes diverge west of the Abbotsford Bridge, with Route 1 continuing east onto the Calder Highway then over Abbotsford Bridge towards Merbein, and Route 2 turning north-east and continuing on the Silver City Highway towards Dareton.

The travel distance to reach Dareton, Merbein and Mildura is listed in **Table 2.2** for each evacuation route.

Table 2.2 Travel Distance to Mildura, Dareton and Merbein

Destination	**Route No. 1**	**Route No. 2**
Dareton	12.5 km	Not Applicable
Merbein	Not Applicable	17.5 km
Mildura	30 km	36 km

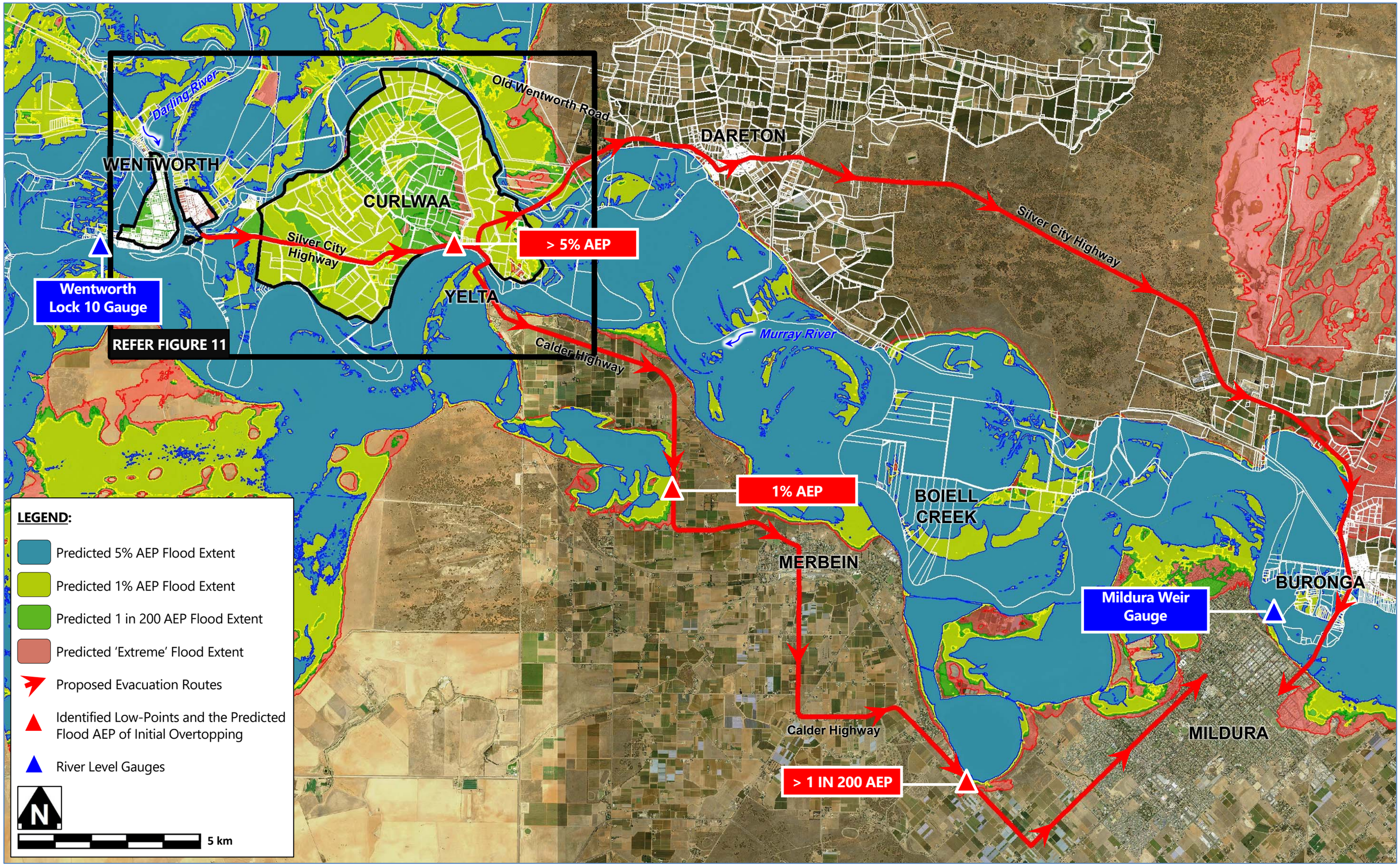
The potential for overtopping of the Curlwaa Levee is critical to both evacuation routes and in general for evacuation from the wider Wentworth area. Modelling undertaken for the *Wentworth Flood Study* (*Rev D, July 2021*) indicates that the Curlwaa Levee is overtopped at a low-point located between the Abbotsford Bridge crossing of the Murray River (*near Yelta*) and at the intersection of the Calder Highway and Silver City Highway (*refer Point A indicated on* **Figure 11**).



Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

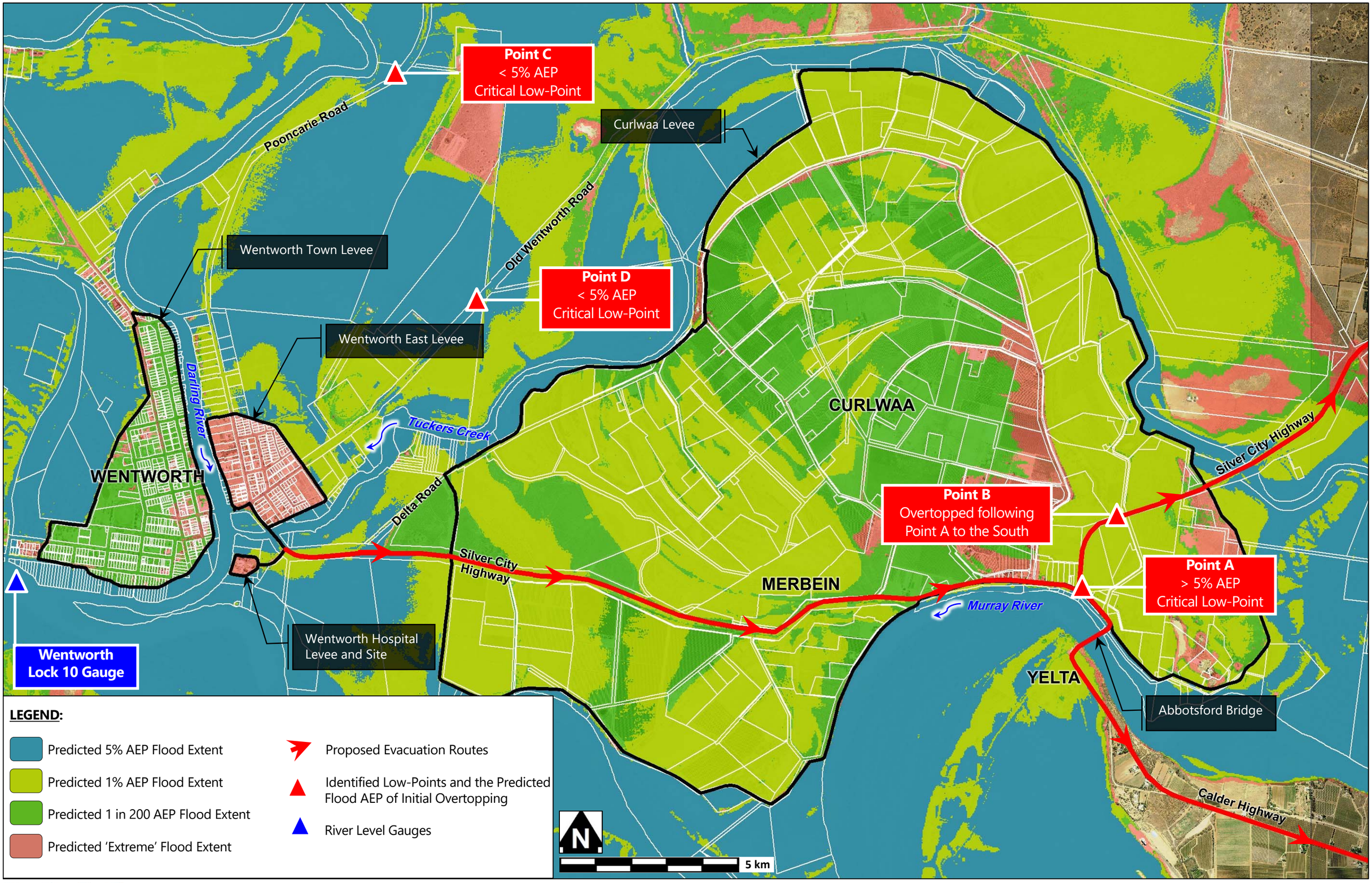
EVACUATION ROUTE FROM THE WENTWORTH HOSPITAL TO WENTWORTH AIRFIELD
[With Predicted Flood Extents]



Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

EVACUATION ROUTES FROM THE WENTWORTH HOSPITAL TO MILDURA
[OVERVIEW]



Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

EVACUATION ROUTES FROM THE WENTWORTH HOSPITAL TO MILDURA
[EVACUATION THROUGH CRITICAL LOW-POINT]

Floodwaters overtopping the Curlwaa Levee (*at Point A on* **Figure 11**) are expected to lead to inundation of low-lying sections of the Calder Highway before spreading across the Curlwaa floodplain and overtopping the Silver City Highway (*refer Point B on* **Figure 11**).

The modelling indicates that around the same time that the low-point A is overtopped, additional overtopping is predicted to commence at other locations along the Curlwaa Levee, which would serve to increase the rate-of-rise of floodwaters across the Curlwaa floodplain. The next low-points along the Curlwaa Levee expected to overtop are located downstream of the Abbotsford Bridge along Williamsville Road. Accordingly, evacuation through Curlwaa via both Route No. 1 and No. 2 will no longer be a safe and reliable option once the low-point marked as Point A on **Figure 11** is overtopped.

As shown in **Figure 11**, the modelling indicates that the Curlwaa Levee would be overtopped around the peak of a 5% AEP flood leading to both evacuation route options becoming inundated and unsafe. The elevation of the low-point along the Calder Highway is 35.55 mAHD based on available LiDAR survey.

2.2 Flood Warning Analysis

The Murray-Darling River system consists of large catchments, long rivers and substantial areas of floodplain storage. Significant floods such as in 1956 and 1974 led to inundation of the region for periods ranging from weeks to several months. Floodwaters arrived with advanced warning in the order of weeks and rose gradually once they reached Wentworth.

These characteristics of flooding in the lower reaches of the Murray-Darling River system make flood emergency response planning unique compared to most other river systems. Whereas evacuation is typically constrained by an inability to obtain sufficient and effective warning time, the Murray River system has this in such abundance that complacency becomes the greatest risk to the community.

The following sections discuss the available warning times for site preparation and evacuation based on the rate-of-rise of floodwaters during a 1% AEP event and the adopted 'extreme' flood. Warning times are assessed based on the monitoring of real-time river height data available from the Wentworth Weir (Lock 10) river gauge which the State Emergency Services (SES) relies on for the dissemination of flood warnings. Warning times have been assessed for evacuation to the Wentworth Airfield and towards Mildura through Curlwaa.

2.2.1 River Level Gauges

The '*Wentworth Shire Flood Emergency Sub Plan*' (*2018*) was prepared by the NSW State Emergency Services (SES). It identifies the river level gauges listed in **Table 2.3** as being actively monitored by the Bureau of Meteorology (BOM) for the dissemination of flood warnings and for determining height-time predictions. The river distances from each gauge to Wentworth are also provided.

River level data for each of the gauges listed in **Table 2.3** for the Murray River can be accessed via the BOM website using the following links:

- Euston Weir Downstream - http://www.bom.gov.au/fwo/IDN60237/IDN60237.049115.plt.shtml
- Mildura Weir Upstream - http://www.bom.gov.au/fwo/IDN60237/IDN60237.076124.plt.shtml
- Wentworth Weir (Lock 10) - http://www.bom.gov.au/fwo/IDN60237/IDN60237.047100.plt.shtml

Table 2.3 River Level Gauges Relied Upon by BOM for Flood Warnings

River System	Gauge Site and Number	Owner	Distance Upstream from Wentworth	Flood Warning Heights ^		
				Minor	Moderate	Major
Murray River	Euston Weir Downstream (414203)	VIC	285 km	50.9 mAHD	51.6 mAHD	52.1 mAHD
	Mildura Weir Upstream (414202)	VIC	53 km	36.0 mAHD	37.5 mAHD	38.5 mAHD
	Wentworth Weir (Lock 10) (425992)	BOM	0 km	32.1 mAHD	32.7 mAHD	33.9 mAHD
Darling River	Menindee (425001)	DWR	710 km	8.5	9.1	9.7
	Pooncarie (425005)	BOM	320 km	6.8	7.6	8.7
	Burtundy (425007)	DWR	180 km	6.1	/	7.7

^ *Gauge heights are to a local height datum unless otherwise noted.*

River level data for each of the gauges listed in **Table 2.3** for the Darling River can be accessed via the BOM website using the following links:

- Pooncarie - http://www.bom.gov.au/fwo/IDN60238/IDN60238.047103.plt.shtml
- Burtundy - http://www.bom.gov.au/fwo/IDN60238/IDN60238.547015.plt.shtml
- Menindee Town - http://www.bom.gov.au/fwo/IDN60238/IDN60238.047101.plt.shtml

The nearest river level gauge to Wentworth Hospital is the Wentworth Weir (Lock 10) gauge. Due to its close proximity, there is very little difference between flood heights recorded at the gauge and those experienced upstream at the site. This is reinforced by the flood level mapping shown in **Figures 4** to **7** which indicates a maximum difference between flood levels at the Lock 10 gauge and the Wentworth Hospital of 0.3 metres; which occurs during the 'extreme' event.

In the 1% AEP flood the difference in peak level between the Hospital site and the Wentworth Weir (Lock 10) gauge is only 0.17 metres (*refer* **Figure 5**).

River level data recorded at the Wentworth Weir (Lock 10) gauge will be critical for evacuation planning and decision making. Gauges upstream of the hospital site such as Euston Weir (Downstream) (414203) along the Murray River, and Pooncarie (425005) along the Darling River, are important as they can provide advanced warning and an early indication of the size of the event and stage of the flood cycle.

It is worth noting that the moderate and major gauge heights assigned to the Wentworth Weir (Lock 10) gauge are similar to the peak flood levels predicted for a 20% and 5% AEP events, respectively.

2.2.2 Available Warning for Evacuation

As discussed in **Section 2.1**, there are two destinations to which evacuation from the Wentworth Hospital would be directed. These are the Wentworth Airfield (Option 1) and road travel to Mildura (Option 2).

The available flood warning times can be determined for each evacuation route based on the elevation of low-points along each route and the rate-of-rise of floodwaters at these low-points and at the Wentworth Weir (Lock 10) gauge. As discussed in **Section 2.2.1**, the Lock 10 gauge is relied upon by the SES and BOM for the dissemination of flood warnings.

It is worth noting that advanced warning times could be achieved for the Murray River if flood levels were also monitored at the Euston Weir (Downstream) gauge or for the Darling River if flood levels were monitored at the Pooncarie gauge. An alternative to this would be to monitor flood warnings and flood bulletins issued by the SES and BOM. These updates typically provide a good overview of the flood event including projections of the height and timing of the flood peak at key locations such as at Wentworth and the Wentworth Weir (Lock 10) gauge.

The available warning times before evacuation is no longer possible to the Wentworth Airfield and to Mildura are discussed in the following.

Evacuation to the Wentworth Airfield

As discussed in **Section 2.1.1**, the preferred evacuation route towards the Wentworth Airfield starts to become inundated near the peak of a 5% AEP flood event. Once this occurs, floodwaters will start to overtop Renmark Road at the location identified as "Point A" in **Figure 9**. Accordingly, evacuation of the Wentworth Hospital to the Wentworth Airfield by vehicle will no longer be possible once this occurs.

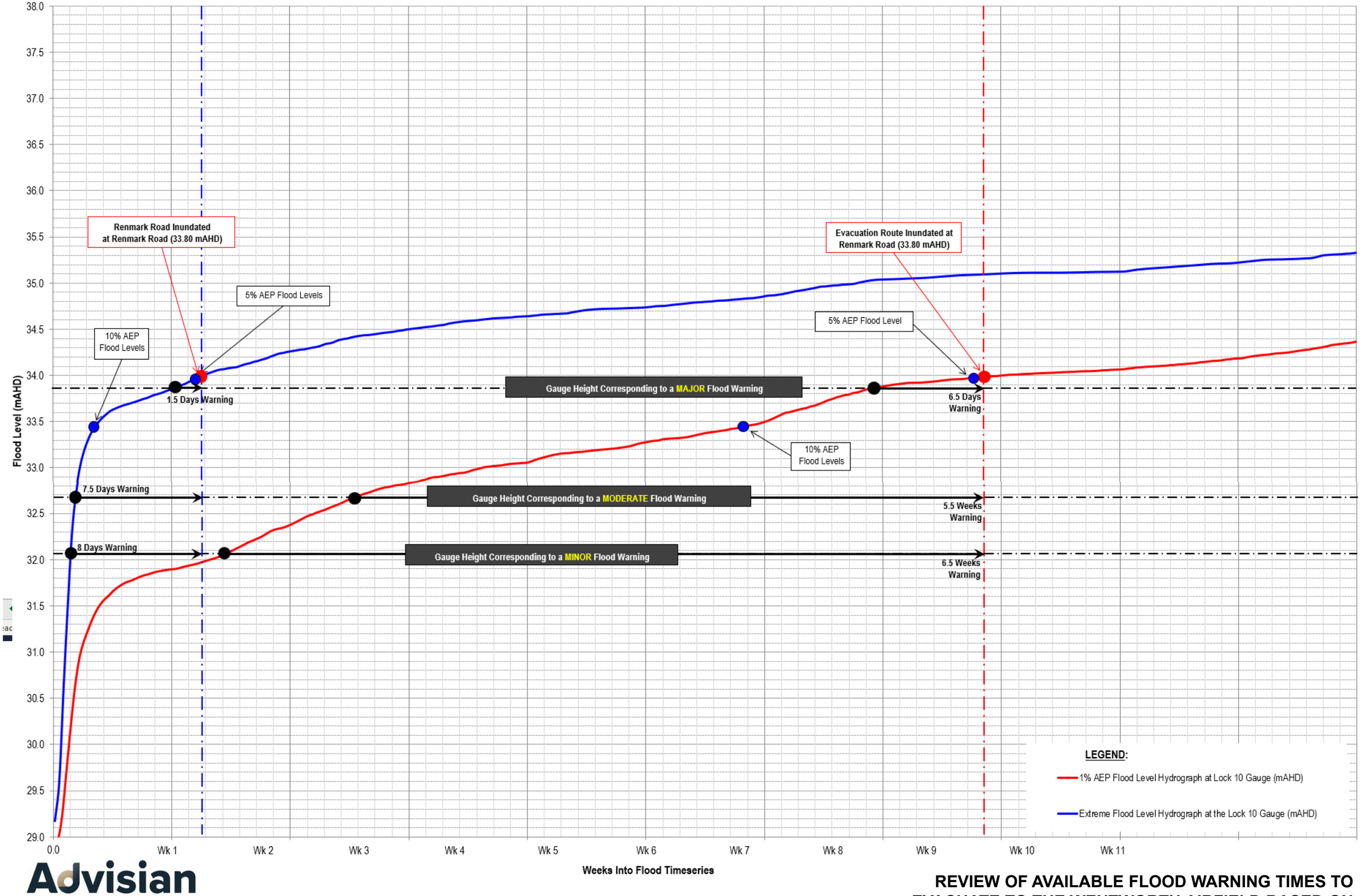
Analysis of the modelling results for the 1% AEP and extreme events shows that flood levels at the low-point along Renmark Road are around 0.2 metres lower than those predicted at the Wentworth Weir (Lock 10) gauge. This indicates that Renmark Road would overtop once flood levels at the gauge reach a level of around 34.0 mAHD. This level aligns closely with the predicted peak of a 5% AEP event.

Flood level (or stage) hydrographs at the Wentworth Weir (Lock 10) gauge are plotted in **Figure 12** for the 1% AEP flood and for the 'extreme' event. Although the 1% AEP event provides a more realistic assessment of flood warning times, consideration of the extreme event ensures that a conservative assessment has been undertaken. This is because the rate-of-rise in the extreme flood is substantially faster than for the more frequent or smaller flood events (refer **Figure 12**).

As shown in **Figure 12**, the cut-off for evacuation has been set to the time at which levels at the gauge reach 34.0 mAHD. As discussed above, this gauge level is predicted to coincide with a peak flood level of around 33.8 mAHD at Renmark Road.

Table 2.4 summarises the predicted warning times available for evacuation based on the predicted flood level hydrographs exported for the 1% AEP event and the extreme event. All warning times are provided for the time up to overtopping of Renmark Road at the low-point identified as "Point A" on **Figure 9**.

FIGURE 12



Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

REVIEW OF AVAILABLE FLOOD WARNING TIMES TO EVACUATE TO THE WENTWORTH AIRFIELD BASED ON THE 1% AEP AND EXTREME FLOOD EVENTS

Table 2.4 Flood Warning Assessment for Evacuation to the Wentworth Airfield Based on Monitoring Flood Levels at the Wentworth Weir (Lock 10) gauge

Event	Elevation of Low-Point (*mAHD*)	Available Warning Time (*Days/Weeks*)		
		Minor Flood level Reached (*32.1 mAHD*)	Moderate Flood level Reached (*32.7 mAHD*)	Major Flood level Reached (*33.9 mAHD*)
1% AEP	33.80	45 days or 6.5 weeks	38 days or 5.5 weeks	6.5 days or 1 week
Extreme Flood	33.80	8 days or 1 week	7.5 days or 1 week	1.5 days

The warning times are based on the Wentworth Weir (Lock 10) gauge heights at which BOM, in conjunction with the SES, issue minor, moderate and major flood warnings. These gauge heights are listed in **Table 2.3**.

The analysis presented in **Table 2.4** and shown as **Figure 12** indicates that significant warning time in the order of 1 week would be available even if the rate-of-rise for an extreme event is adopted and evacuation is not actioned until receipt of a Moderate flood warning. The warning time reduces to 1½ days if evacuation is not actioned until receipt of a Major flood warning. The available warning time would more than double to 2½ weeks if the analysis were based on the rate of rise predicted for the 1% AEP event.

The limited warning time available following receipt of a Major flood warning may make evacuation to the Wentworth Airfield difficult. This is because evacuation would not be complete upon arrival at the airfield. Complete evacuation will require patients to be loaded onto aircraft and for the associated aircraft to taxi and complete a successful take-off. Delaying evacuation to the Wentworth Airport until a Major flood warning is issued could lead to risks isolation of hospital patients at the airport if logistical issues associated with loading and take-off play out. Isolation could occur if Renmark Road were overtopped after those evacuating had reached the airfield and if aircraft take-off could not be effected before runway inundation.

Based on the above, it is recommended that any plans to utilise the Wentworth Airfield for evacuation be completed before the Major gauge level is reached at the Wentworth Weir (Lock 10) gauge.

Accordingly, evacuation should be commenced once a Moderate flood warning is received. This would provide between 7½ and 38 days to organise and complete the aerial evacuation.

The limited warning time between the Minor and Moderate flood levels being reached makes it critical that advanced warning be obtained by monitoring flood bulletins and flood watches. This advanced warning could be used as a trigger for preparation and planning which could involve the re-scheduling of medical procedures and appointments, organising staff and supplies and liaising with the Wentworth Airfield.

Evacuation to Mildura

As discussed in **Section 2.1.2**, the alternate evacuation destination towards Mildura, through Curlwaa and then either Dareton or Merbein, will be 'cut' once the low-point along the Curlwaa Levee is overtopped. Once this occurs, floodwaters would inundate parts of the Calder Highway and the Silver City Highway thereby preventing evacuation by motor vehicle. Accordingly, evacuation of the Wentworth Hospital by vehicle will no longer be possible once this occurs.

Flood level (or stage) hydrographs at the low-point along the Curlwaa Levee and at the Wentworth Weir (Lock 10) gauge are plotted in **Figure 13**. Flood level hydrographs have been extracted from the modelling for the 1% AEP flood and for the 'extreme' event.

Table 2.5 summarises the predicted warning times available for evacuation based on the predicted flood level hydrographs exported for the 1% AEP event and the extreme event. All warning times are provided for the time up to overtopping of the Curlwaa Levee, at which point the evacuation routes would soon be at risk of inundation and considered unsafe for evacuation of patients or staff from the hospital unless in an emergency.

The warning times are based on the Wentworth Weir (Lock 10) gauge heights at which BOM, in conjunction with the SES, issue minor, moderate and major flood warnings. These gauge heights are listed in **Table 2.3**.

Table 2.5 Flood Warning Assessment for Evacuation towards Mildura Based on Monitoring Flood Levels at the Wentworth Weir (Lock 10) gauge

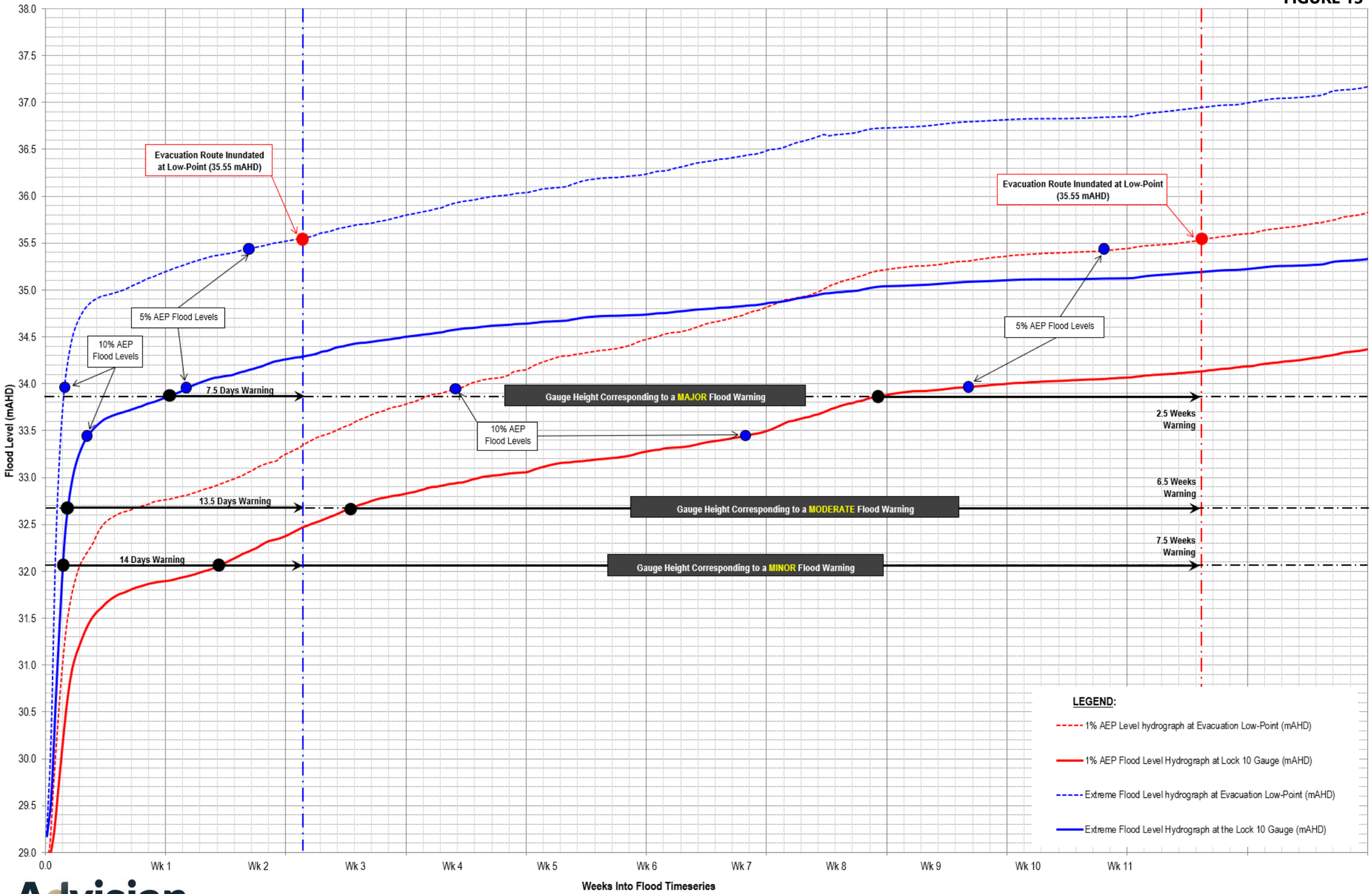
Event	Elevation of Low-Point *(mAHD)*	Available Warning Time (*Days/Weeks*)		
		Minor Flood level Reached (*32.1mAHD*)	**Moderate Flood level Reached** (*32.7mAHD*)	**Major Flood level Reached** (*33.9mAHD*)
1% AEP	35.55	52 days or 7.5 weeks	45 days or 6.5 weeks	18 days or 2.5 week
Extreme Flood	35.55	14 days or 2 weeks	13.5 days or 2 weeks	7.5 days or 1 week

The analysis presented in **Table 2.5** and shown as **Figure 13** indicates that significant warning time in the order of 1 week would be available even if the rate-of-rise for an extreme event is adopted and evacuation is not actioned until receipt of a major flood warning. The available warning time would more than double to 2.5 weeks if the analysis were based on the 1% AEP event.

The significant warning time available following receipt of a major flood warning indicates that a final decision to evacuate the hospital towards Mildura would not need to be made before this time and following the receipt of the minor or moderate warnings. Minor and moderate warnings could therefore be used as triggers for preparation and planning which could involve the re-scheduling of medical procedures and appointments, organising staff and supplies.

Even if these planning steps are not commenced until receipt of a moderate flood warning there would still be between 1 and 4 weeks before a major flood warning could be expected.

FIGURE 13



Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

REVIEW OF AVAILABLE FLOOD WARNING TIMES TO EVACUATE TO MILDURA BASED ON THE 1% AEP AND EXTREME FLOOD EVENTS

2.2.3 Available Warning Before Site Inundation

The mapping of flood extents and levels presented as **Figures 4** to **7** shows that the hospital site is predicted to remain flood free during events up to and including a 1 in 200 AEP flood. The evacuation routes to the Wentworth Airfield or to Mildura are predicted to be overtopped during floods exceeding the 5% AEP event.

The length of time between overtopping of the evacuation route and inundation of the site can be extrapolated from the flood level hydrographs shown in **Figure 14**. The difference in time is based on the rate-of-rise of flood levels at the site and at the low-point along the Curlwaa Levee. Note that the 1% AEP flood has been excluded from this plot as the site is not inundated during this event.

As shown in **Figure 14**, there is predicted to be almost 5 weeks (*34 days*) between when the evacuation route is inundated by floodwaters overtopping the Curlwaa Levee and floodwaters reaching the low-point at the Hospital Road entrance to the site. As discussed in **Section 2.2**, there is a "gap" in the Hospital Levee at Hospital Road which has a minimum crest elevation of 35.3 mAHD.

The significant difference in time means that the hospital and the site itself will not be in any immediate risk in the short term after the available evacuation routes are cut by floodwaters. During this time, access to the Wentworth town centre would still be possible.

The 5 weeks of additional warning time could be used to further safeguard the hospital or to organise and complete further evacuations via helicopter or boat. Note that this is considered to be a fall-back position and is not a strategy that is recommended to be incorporated as part of the emergency response management plan for the hospital.

2.2.4 Available Warning Before Hospital Inundation

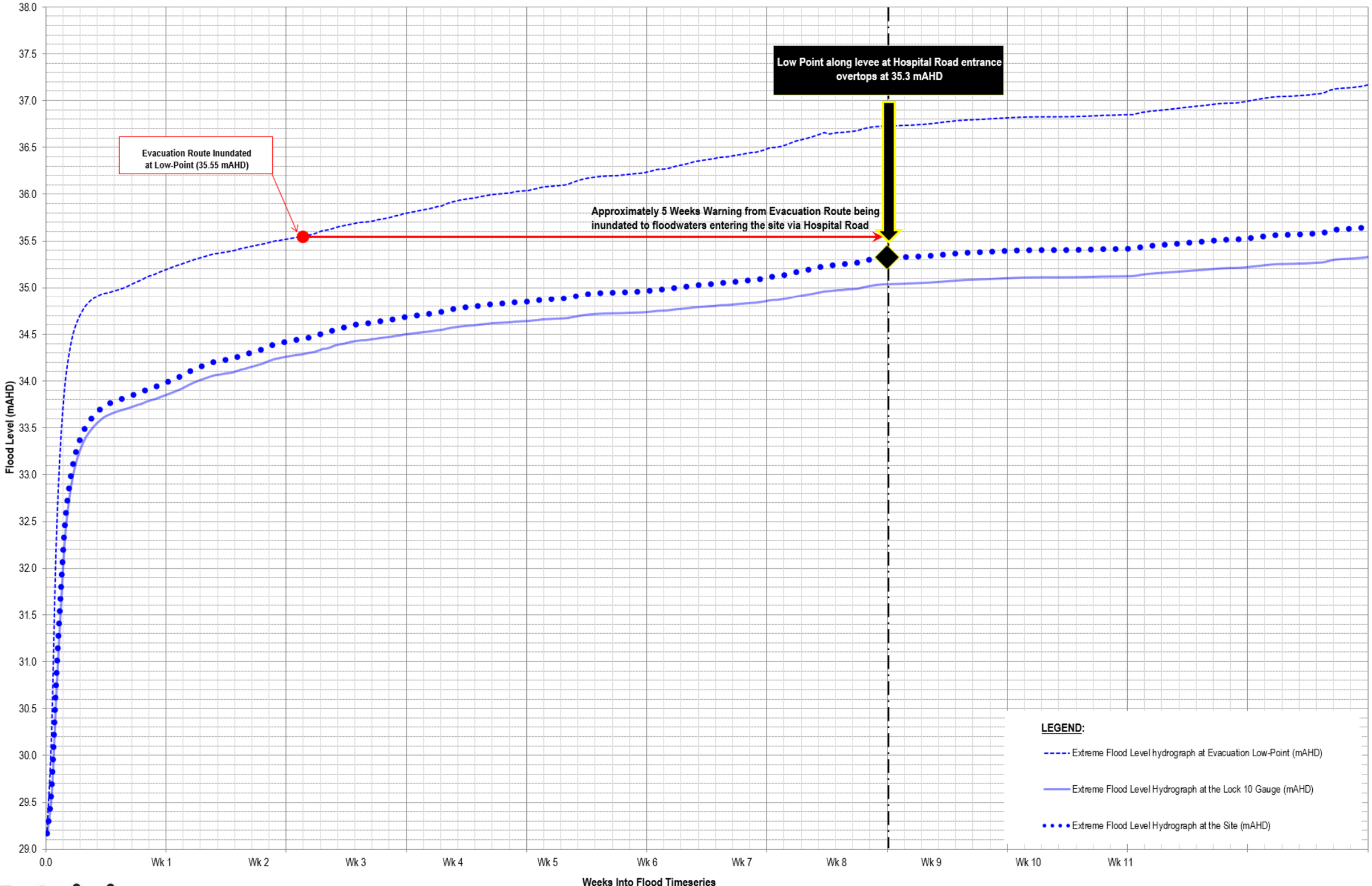
It is understood that the proposed hospital building is to be constructed on a fill mound with surface elevations at, or above, the predicted peak level of the extreme flood. As discussed in **Section 1.3** and shown in **Figure 7**, this means that the fill mound will need to be constructed with a minimum surface level of 35.95 mAHD.

As the hospital is to be raised above the predicted peak level of the extreme event there is no potential for the hospital to be inundated. Therefore, as the hospital will not be inundated a warning time for inundation cannot be calculated. It is more important that a warning time be established and noted for when critical services at the hospital might become compromised; e.g., loss of power or sewerage facilities.

2.3 Flood Awareness and Preparation

The successful implementation of emergency response measures is highly dependent on the flood awareness of those affected within the floodplain, and their knowledge of the protocols that need to be followed during a flood.

The information presented in the preceding sections indicates that there are suitable triggers available on which to base site preparation and evacuation procedures. Notwithstanding this, flood education and emergency response training will need to be undertaken for the future workforce of the hospital. This will include detailed training of an appointed flood warden responsible for monitoring weather warnings issued by the Bureau of Meteorology (BOM) and flood warnings issued by the SES.



Advisian
Worley Group

311015-00304 – Wentworth Hospital Redevelopment
Fg311015-00304_220817_Wentworth Hospital FIRA_A3L.pptx

REVIEW OF AVAILABLE FLOOD WARNING TIMES BETWEEN INUNDATION OF THE EVACUATION ROUTE AND FLOODWATERS INUNDATING THE HOSPITAL SITE

This is necessary so that informed decisions can be made for the operation of the hospital in a timely manner and in accordance with this FERP. Flood awareness workshops for employees should also be held at least yearly to allow for staff turnover and to keep staff up-to-date with current flood and road information. If it has been longer than three (3) months since the last workshop, refresher training should be held again at the receipt of a flood watch from the SES.

To ensure the hospital receives early warning of a potential flood risk, the flood warden will be responsible for the monitoring of any weather warnings issued by the BOM and SES warnings and regional flood advice. Based on the long travel times for floodwaters along the Murray and Darling Rivers, it is expected that receipt of an initial flood watch advice would provide at least two (2) weeks of additional warning ahead of Minor level flooding at the Wentworth Wier (Lock 10) gauge.

In order to monitor BOM and SES flood and weather warnings it is recommended that the flood warden access the following websites upon receiving any news indicating a potential flood event. Once a flood event is forecast it is recommended that the websites be viewed daily to proactively review the forecast timing and level predictions at Wentworth and the Wentworth Wier (Lock 10) gauge.

- Bureau of Meteorology Warnings: http://www.bom.gov.au/nsw/warnings/flood/murrayriver.shtml
- SES Warnings and News: https://www.ses.nsw.gov.au/regions/murray/?suburbName=WENTWORTH

The NSW SES also provides the following list of radio stations that are used for to distribute flood warnings and updates to the local community:

- ABC Riverina :: 675 AM
- 1521 QN :: 1521 AM
- 2AY :: 1494 AM
- 2REM :: 107.3 FM
- STAR FM :: 104.9 FM

Upon receipt a flood or weather warning for the Murray and/or Darling River, the flood warden will be required to start to also actively monitor the real-time river height data for the Wentworth Wier (Lock 10) gauge (*Gauge No. 425992*) via the Bureau of Meteorology (*BOM*) website. The links to this data in a chart and table format are as follows.

- Table Format: http://www.bom.gov.au/fwo/IDN60237/IDN60237.047100.tbl.shtml
- Chart Format: http://www.bom.gov.au/fwo/IDN60237/IDN60237.047100.plt.shtml

Once threshold levels are reached to trigger site preparation and/or evacuation, the site supervisor or flood warden will be responsible for taking appropriate action. The appropriate actions are described in detail in **Section 3** of this report.

2.4 Flood Warden

It is necessary that a flood warden be appointed during operation of the hospital. It is recommended that the flood warden be a senior member of the team such as a manager or team leader.

In general, and as discussed above, the flood warden will be responsible for monitoring flood warnings and weather conditions, communicating the 'level' of risk to workers, staff education (*ensuring staff are inducted*) and co-ordinating emergency response actions. This should include planning for an oncoming flood event by monitoring upcoming appointments and patient numbers and co-ordinating the evacuation planning for the hospital.

The following equipment is required for the flood warden to effectively monitor alerts and weather conditions and to communicate information and instructions to staff and patients:

- a working mobile phone or computer with internet access to monitor the BOM website and other relevant websites; and,
- contact details for all emergency services and relevant authorities.

Specific actions that would be required of the flood warden are outlined in **Section 3**.

3 Flood Emergency Response Procedures

The following outlines the responsibilities of the appointed flood warden to ensure that the Wentworth Hospital is prepared for potential future Murray and Darling River flooding. This includes:

(i) preparation of staff and resources;

(ii) review of upcoming appointments and patient movements; and,

(iii) co-ordinate and monitor the requirement for evacuation to the Wentworth Airfield or towards Mildura.

3.1 Preparation of the Hospital and Staff

The following actions must be followed by the flood warden to ensure the hospital is prepared for a future flood event. The actions are also necessary to ensure that protocols are not initiated unnecessarily; for example, during floods that do not reach a sufficient level to require evacuation.

- All staff to be inducted on the requirements of this FERP.
- The flood warden is required to have read and understood this FERP to ensure the risks are understood. This includes the procedures for:
  - monitoring for potential flood events,
  - monitoring the progress of an unfolding flood event,
  - reviewing upcoming appointments and rescheduling if required,
  - reviewing upcoming staff movements and rosters,
  - reviewing expected patient numbers and investigating alternate locations for care, if required,
  - liaising with emergency and ambulance services, operators of the Wentworth Airfield and Mildura Base Hospital as the likelihood of evacuation increases, and
  - available warning times, trigger levels and evacuation routes.
- An emergency contact sheet is to be displayed within the flood warden's office and a copy must be accessible by the flood warden at all times. An example of the Emergency Contact Sheet (*which is to be filled in and completed prior to operation of the Wentworth Hospital*) is included as **Appendix A**.
- Sign-off of a checklist once evacuation and relocation has been completed. At minimum, the checklist is to require sign-off that all staff and patients are accounted for.

3.2 Emergency Response Triggers and Actions

A flood event of sufficient size to trigger the need for evacuation from the hospital will require severe and prolonged rainfall across a significant number of the catchments of the Murray and Darling Rivers. In that regard, flash flooding or short duration high intensity rainfall bursts would not be sufficient to generate flows along the Murray River that would cause inundation of the hospital site or require evacuation.

In order to monitor regional weather and warnings, the flood warden will need to undertake the following.

(1) Access the Australian Government Bureau of Meteorology (**BOM**) website (*refer links below*) to monitor weather/flood warnings. Due to the slow developing nature of flooding along the Murray and Darling Rivers, there is no need to access the website daily or even weekly. However, the website should be accessed and monitored daily at the earliest sign of a potential flood.

Specific warnings for the Murray and Darlings Rivers can be accessed via the following links. The link for the Murray River is most useful as it includes specific warnings and forecasts for Wentworth.

http://www.bom.gov.au/nsw/warnings/flood/murrayriver.

http://www.bom.gov.au/nsw/warnings/flood/barwon-darling-us-bourke.shtml

The BOM issues three types of weather/flood warnings as shown below.

- **Severe Weather Warning**

  Severe Weather Warnings are issued by the BOM to advise that potentially hazardous or dangerous weather is expected that is not solely related to severe thunderstorms, tropical cyclones or bushfires. A Severe Weather warning can be issued if very heavy rain is forecast that may lead to flash flooding. An "East Coast Low" is a typical weather pattern for which a Severe Weather warning could be issued.

- **Flood Watch**

  A Flood Watch provides early advice of potential riverine flooding to emergency services and communities at risk. Flood Watches are issued when the combination of forecast rainfall and catchment or other hydrological conditions indicate that there is a significant risk of potential flooding.

- **Flood Warning**

  Flood Warnings are issued by the BOM to advise that flooding is occurring or expected to occur in a geographical area based on defined criteria. Flood Warnings may include either qualitative or quantitative predictions or may include a statement about future flooding that is more general. The type of prediction provided depends on the quality of real-time rainfall and river level data, the capability of rainfall and hydrological forecast models and the level of service required.

If any of the above weather/flood warnings are issued by the BOM for the Murray or Darling River the flood warden is to actively monitor SES warnings and gauge levels at the Wentworth Weir (*Lock 10*) gauge (*refer next point*). The flood warden should also re-familiarise themselves with the '*Emergency Response Triggers, Actions and Checklist*' sheet included as **Appendix B**.

Upon receipt of a flood or weather warning from BOM, the flood warden will be required to actively monitor forecast flooding conditions at Wentworth via the BOM website (*links provided above*). This should be done daily and will provide the earliest possible indication of the expected peak and timing for the Minor flood level to be reached.

Should projections for Wentworth indicate that the flood will not reach above the Moderate flood warning height of 32.7 mAHD at Wentworth and the Wentworth Weir (Lock 10) gauge, the flood warden is to proceed on the basis that evacuation of the hospital will not be required. Notwithstanding, the flood warden must still be on high alert and monitor the projections daily to determine whether the projections has been updated and is now higher and above the Moderate level.

(2) If projections for Wentworth indicate that flood levels are expected to exceed the Moderate level, the real-time river height data for the Wentworth Weir (*Lock 10*) gauge via the Bureau of Meteorology (*BOM*) website is also to be monitored concurrently and daily. The links to this data in a chart and table format is as follows.

Table Format: http://www.bom.gov.au/fwo/IDN60237/IDN60237.047100.tbl.shtml

Chart Format: http://www.bom.gov.au/fwo/IDN60237/IDN60237.047100.plt.shtml

The gauge data will confirm when the Minor, Moderate and Major flood levels are reached. These gauge levels are relied upon to trigger various actions and therefore need to be closely monitored. The predicted warning times that would remain for evacuation to be completed to the Wentworth Airfield after each level is reached are indicated below.

- Minor: 32.1 metre (AHD) Gauge height (*at least 8.0 days warning time*)
- Moderate: 32.7 metre (AHD) Gauge height (*at least 7.5 days warning time*)
- Major: 33.9 metre (AHD) Gauge height (*at least 1.5 days warning time*)

The predicted warning times that would remain for evacuation to be completed to Mildura after each level is reached are indicated below.

- Minor: 32.1 metre (AHD) Gauge height (*at least 14.0 days warning time*)
- Moderate: 32.7 metre (AHD) Gauge height (*at least 13.5 days warning time*)
- Major: 33.9 metre (AHD) Gauge height (*at least 7.5 days warning time*)

If flood levels reach any of the above warning levels the flood warden must initiate the actions outlined within the '*Emergency Response Triggers, Actions and Checklist*' sheet included as **Appendix B**.

If at any time gauge levels start to decline prior to the trigger level being reached, the flood warden must continue to actively monitor the gauge until the level is below Minor. This recognises that floods can often have multiple peaks, which is reflective of the complex catchment processes and potential differences in timing between the Murray and Darling Rivers.

(3) If flood levels exceed the Minor warning height, the flood warden will also be required to access the SES website https://www.ses.nsw.gov.au/regions/murray/?suburbName=WENTWORTH for regular updates on flood evacuation warnings or evacuation orders. This is particularly critical with all of the potential evacuation routes requiring travel through areas protected by flood protection levees; i.e., the Wentworth Town Levee or the Culrwaa Levee. If there is a risk of levee failure it is expected that a flood evacuation warning or evacuation order would be issued.

- **Flood Evacuation Warning**

  A Flood Evacuation Warning is an announcement to the community that there is a real possibility that flooding will significantly impact an area.

- **Flood Evacuation Order**

  When flooding is about to impact a community significantly, the SES will issue a Flood Evacuation Order. This means that people in the affected area must evacuate according to the time frames outlined in the order. This could be over a period of time or immediately.

  In the event a Flood Evacuation Warning or Flood Evacuation Order is issued by the SES the flood warden is to abide by the orders and act appropriately. This is particularly important due to the potential for levee failures to significantly affect the evacuation routes.

(4) If available, follow SES on Facebook for updates at **https://www.facebook.com/NSW.SES** and/or listen for Flood Bulletins that are broadcast by the SES on local television or radio stations. The following radio stations are listed on the NSW SES website for the local area:

- ABC Riverina :: 675 AM
- 1521 QN :: 1521 AM
- 2AY :: 1494 AM
- 2REM :: 107.3 FM
- STAR FM :: 104.9 FM

(5) Regularly review the SES Flood Safe website at **http://www.floodsafe.com.au/** to be familiar the latest flood safety processes suggested by the SES.

3.3 Flood Recovery and Clean-up

In the event a significant flood occurs that is sufficient to trigger evacuation of the hospital site, it is likely that staff will not be able to return for a number of weeks. This is based on the slow moving nature of a Murray River flood which leads to the slow rise and fall of floodwaters.

Once roads have been cleared as safe and the hospital site can be reached, it is important that the buildings are inspected and certified as safe. It is likely that the hospital site will not have been inundated based on the small probability that the flood would have exceeded a 1 in 200 AEP event leading to overtopping of Hospital Road. Furthermore, even if Hospital Road is overtopped and floodwaters enter behind the levee, the proposed hospital building will remain dry based on its position on a fill mound raised above the extreme event. Accordingly, the main hospital building would not have been affected by flooding.

Upon returning to the site the following must be followed:

- The hospital site and building is to be inspected for any signs of damage. This includes potential storm damage, such as leaking roofs or damage to local powerlines by winds or fallen trees.
- Call SES on 13 25 00 if assistance is required to gain access.
- Any areas that were inundated during the flood, including inside or outside, are to be taped-off by the Flood Warden or SES to prevent access until:

- A licensed electrician or electrical authority (e.g., Ausgrid) has attended the area to confirm that all electrical threats have been eliminated or has otherwise completed any required repairs to damaged electrical systems.
- The area has been cleared of flood debris, floodwaters removed and professionally cleaned in order to address any sanitation issues.
- If required, contact the relevant health authorities to gain clearance for the Hospital to be reopened.

The FERP is to be reviewed following any flood event. This will ensure any lessons learnt or first-hand knowledge is incorporated into the plan. The review will also include a review of emergency response procedures and monitoring protocols to confirm if appropriate or if improvements can be implemented.

4 References

- Advisian (*July 2021*), '*Wentworth Flood Study*'; (*Rev D, Final Draft*), prepared for Wentworth Shire Council.
- Advisian (*August, 2022*), *'Wentworth Hospital Redevelopment – Preliminary Flood Assessment'*; prepared for Health Infrastructure.
- New South Wales Government (*2005*), *'Floodplain Development Manual: the management of flood liable land'*; ISBN 0 7347 5476 0.
- NSW State Emergency Service (*2018*) '*Wentworth Shire Local Flood Plan*'
- NSW State Emergency Service (*2004*) '*The Application of Timelines to Evacuation Planning*'
- NSW State Emergency Service (*August 2021*), *'Planning Proposal for Lot 1 DP 1193874 Pooncarie Road, Wentworth'*; prepared for Wentworth Shire Council
- Wentworth Shire Council (*July 2021*), '*Wentworth Local Environmental Plan (Kelso Station)*'; prepared by the NSW Department of Planning, Infrastructure and Environment.
- Wentworth Shire Council, '*Wentworth Shire Development Control Plan 2011*' (WSDCP 2011).

Appendix A
Emergency Contact Sheet

Table A1 Emergency Contact Sheet

Name	Organisation	Role	Contact
NA	State Emergency Services (SES)	To contact if emergency assistance is required	132 500
NA	Emergency Services	Fire/Ambulance/Police (to call in a life threatening emergency)	000 or 112 from mobile phones
NA	NSW Rural Fire Service	Dareton Station	(03) 5027 4422
NA	SES Western Zone	SES Unit for Wentworth	(03) 6841 3160
NA	NSW Ambulance	Wentworth Ambulance Station	
Marcus Wilson	Far West Local Health District	District Disaster Manager	(08) 8080 2270
NA	Wentworth Airfield	Management	
NA	Mildura Base Hospital	Management / Warden	
NA	Mildura Airport	Management	
NA	Wentworth Shire Council	Local Council	(03) 5027 5027
NA	Bureau of Meteorology (BOM)	National Directory for Flood Warnings	1300 659 210

Appendix B
Flood Emergency Response Triggers/ Actions

Table B1 Emergency Response Triggers and Actions

TRIGGER	ACTIONS FOR THE FLOOD WARDEN
Check weekly (minimum)	Monitor general weather and flood warnings from BOM: http://www.bom.gov.au/nsw/warnings/flood/murrayriver Note: weather watch indicates that conditions are favourable for that event to occur, while weather warnings indicate that the conditions are occurring or are imminent.
SES Flood Evacuation Order (if issued at any stage)	Follow all instructions issued by the NSW SES or Local SES Wentworth Unit. If ordered by SES, commence off-site evacuation. Evacuation may be ordered if there is a risk of levee failure that could impact the evacuation potential of the hospital site. ▪ Phone SES on 13 25 00 if in need of assistance. ▪ Phone 000 if there is a life-threatening situation.
BOM **Severe Weather Warning** for the Murray/Darling Catchment	Increased likelihood of a flood event requiring evacuation. Increase frequency of monitoring for flood warnings from BOM to daily. http://www.bom.gov.au/nsw/warnings/flood/murrayriver Monitor flood levels at the Wentworth Weir (Lock 10) gauge and be alert to levels approaching the Minor warning height of 32.1 metres (AHD). ▪ Table Format: http://www.bom.gov.au/fwo/IDN60237/IDN60237.047100.tbl.shtml ▪ Chart Format: http://www.bom.gov.au/fwo/IDN60237/IDN60237.047100.plt.shtml *Note: Substantial rises in flood levels around the hospital and at Wentworth would still be approximately 2 to 3 weeks away. Minor Warning level potentially 2 to 3 weeks away.*
BOM **Flood Warning** issued for the Murray River at Wentworth	Flood Warden or nominated person to monitor flood updates daily to ensure decisions are made based on latest forecasts. Updates are to be monitored to determine whether flood levels are predicted to exceed or remain below the Moderate warning height. ▪ If predictions are that levels will not exceed Moderate, then operations are to proceed based on evacuation not being required. ▪ If predictions are that levels will exceed Moderate, the flood warden is to initiate: - Review of upcoming appointments and scheduled procedures. - Initiate dialogue with emergency and ambulance services, Local Health District Disaster Manager and contacts at the Wentworth Airfield and Mildura Base Hospital. - Review upcoming staff movements and rosters. Flood levels at the Wentworth Weir (Lock 10) gauge to be monitored daily (*refer above for links*) to review levels against Minor warning height.

Wentworth Weir (Lock 10) **Gauge Height reaches the Minor warning height of 32.1 metres** (Minor Flood Level)	At least 8 days warning time is expected before evacuation route to Wentworth Airfield is inundated at Renmark Road. At least 14 days warning time is expected before evacuation routes through Curlwaa towards Mildura are inundated. If flood levels at the Wentworth Weir (Lock 10) gauge are still rising and if forecasts predict flooding to reach the Major warning height and above, then evacuation plans are to be confirmed. This is to include planning for evacuation to the Wentworth Airfield and towards Mildura.
Wentworth Weir (Lock 10) **Gauge Height reaches the Moderate warning height of 32.7 metres** (Moderate Flood Level)	At least 7 days warning time is expected before evacuation route to Wentworth Airfield is inundated at Renmark Road. At least 13 days warning time is expected before evacuation routes through Curlwaa towards Mildura are inundated. Hospital is to downscale patient and staff numbers as much as possible. If flood levels at the Wentworth Weir (Lock 10) gauge are still rising and if forecasts predict flooding to reach the Major warning height and above, then evacuation is to commence for those utilising the Wentworth Airfield. The evacuation route is shown in **Figure 8** and **9**. Evacuation towards Mildura could also be commenced however, there is expected to still be at least 7 days warning time if evacuation is not commenced until the Major warning level. *Notify the local Wentworth SES Unit that the hospital has commenced internal evacuation towards the Wentworth Airfield via Renmark Road. Maintain dialogue with the SES to assist with monitoring of local road closures, particularly along Renmark Road, the Silver City Highway and Calder Highway.* *Western SES Unit: (03) 6841 3160*
Wentworth Weir (Lock 10) **Gauge Height reaches the Major warning height of 33.9 metres** (Major Flood Level)	At least 1 day warning time is expected before evacuation route to Wentworth Airfield is inundated at Renmark Road. At least 7 days warning time is expected before evacuation routes through Curlwaa towards Mildura are inundated. If floodwaters have overtopped the low-point along Renmark Road then alternate evacuation is to be organised; i.e., to Mildura. Evacuation towards Mildura is to continue via the evacuation routes shown in **Figures 10** and **11**. It is expected the evacuation route will be 'cut' once flood level at the Wentworth Weir (Lock 10) gauge reach 34.3 metres (AHD). ▪ Table Format: http://www.bom.gov.au/fwo/IDN60237/IDN60237.047100.tbl.shtml ▪ Chart Format: http://www.bom.gov.au/fwo/IDN60237/IDN60237.047100.plt.shtml If at any time floodwaters have overtopped the low-point along the Calder Highway or Silver City Highway, then vehicles are to return to the hospital site and evacuation is to cease. The local Wentworth SES Unit is to be notified that the hospital is under shelter-in-place conditions due to all evacuation routes being cut. Western SES Unit: (03) 6841 3160 A checklist is to be maintained during evacuation to track patients and staff that have completed, or are yet to complete, evacuation.

Flood recovery and return to site	Flood recovery and return to the hospital site is unlikely to be possible until flood levels at the Wentworth Weir (Lock 10) gauge fall below 34.3 metres (AHD). For safety, it is recommended staff do not return to the hospital until: ▪ Flood levels are below the Major warning height and river levels are continually falling at the following upstream gauges: - Euston Weir Downstream - http://www.bom.gov.au/fwo/IDN60237/IDN60237.049115.plt.shtml - Menindee Town - http://www.bom.gov.au/fwo/IDN60238/IDN60238.047101.plt.shtml ▪ Clearance has been given by the local Wentworth SES Unit. ▪ A building inspection is to be conducted upon return to determine whether any damage has occurred from floodwaters, wind or rain. The FERP is to be reviewed after each event.