Department of Education
GPO BOX 33
SYDNEY NSW 2001

Job No. FS638

Attn: Ms Natalie Harris

23 May 2025

Re: Albury Thurgoona Public School – Flood Impact and Risk Assessment

Dear Madam

As requested, we have prepared a flood impact and risk assessment (**FIRA**) for the new public school that School Infrastructure is proposing to build at Thurgoona east of Albury.

1. Project Description

This FIRA has been prepared by Lyall & Associates on behalf of the Department of Education (**DoE**) (**the Proponent**) to assess the potential environmental impacts that could arise from the new school and preschool at 356 Kerr Road, Wirlinga; Part Lot 27 DP 1243505 (**the site**).

This report has been prepared to define the nature of flooding in the vicinity of the site and to assess both the flood related impact and risk associated with its construction and operation.

This report accompanies a Review of Environmental Factors (**REF**) that seeks approval for the construction and operation of a new primary school and preschool at the site, which involves the following works:

- Construction of a new school building, including learning hubs and an administration and library building.
- Construction of a multi-purpose hall.
- Construction and operation of a preschool.
- Construction of car parking, waste storage and loading area.
- Associated site landscaping and open space improvements.
- New road and public domain works.
- Associated off-site infrastructure works to support the school, including (but not limited) services, driveways and pedestrian crossings.

For a detailed project description, refer to the REF prepared by EPM Projects.

Based on the identification of potential impacts and an assessment of the nature and extent of the impacts of the proposed activity, it is determined that all potential impacts can be appropriately mitigated to ensure that there is minimal impact on the locality, community and/or the environment.

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The key flood mitigation measures that have been incorporated in the project comprise the following:

a) the raising of natural surface levels so as to prevent the inundation of the school site (with the exception of the proposed stormwater detention basin and batter of the proposed playing field) by floodwater during all events up to the Probable Maximum Flood (**PMF**);

b) the provision of a suitably sized transverse drainage structure beneath the proposed access road in combination with a suitably sized interception channel along its southern (upslope) side so as to prevent its inundation for all storms up to 1% Annual Exceedance Probability (**AEP**); and

c) the limiting of the height of the proposed access road so as to as far as practical limit the impact that it would have on flooding conditions in existing residential development during a PMF event.

Note that the flood mitigation measures that have been incorporated in the project have been configured based on flood behaviour that would be experienced under near-term climatic conditions.[1]

2. Site Description

The site is located on 356 Kerr Road, Wirlinga (part Lot 27 DP 1243505). The site is located within the Albury City Local Government Area and is zoned R1 General Residential (**the R1 zone**) under the *Albury Local Environmental Plan 2010* (**the LEP**).

Figure 1 is a site plan showing the location of the proposed school within its regional context, while **Figure 2** over the page is an aerial photograph of the site and its immediate surrounds.

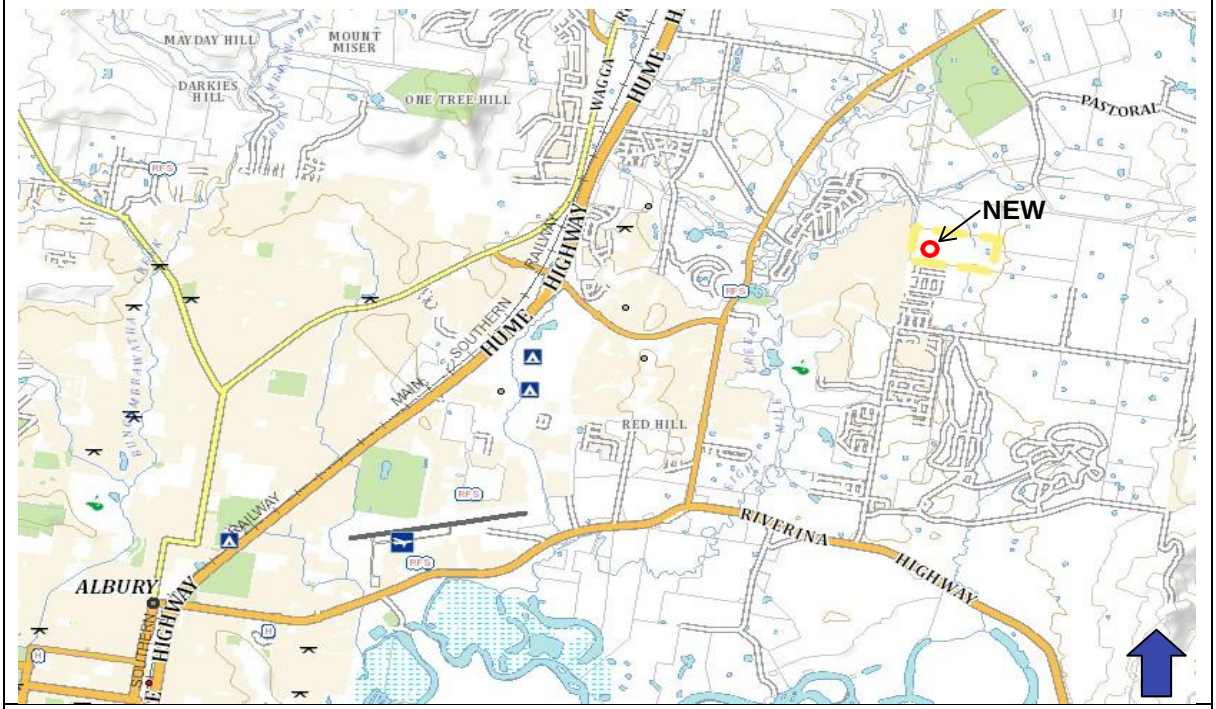


***Figure 1**: Location of the proposed Albury Thurgoona New Primary School and New Public Preschool (Source: Planning Spatial Viewer)*

[1] Near-term climatic conditions are defined as rainfall intensities that would be experienced in the year 2030 under a Shared Socioeconomic Pathway (**SSP**) 2-4.5 projection (refer **Section B1** in **Annexure B** of this letter for further details).

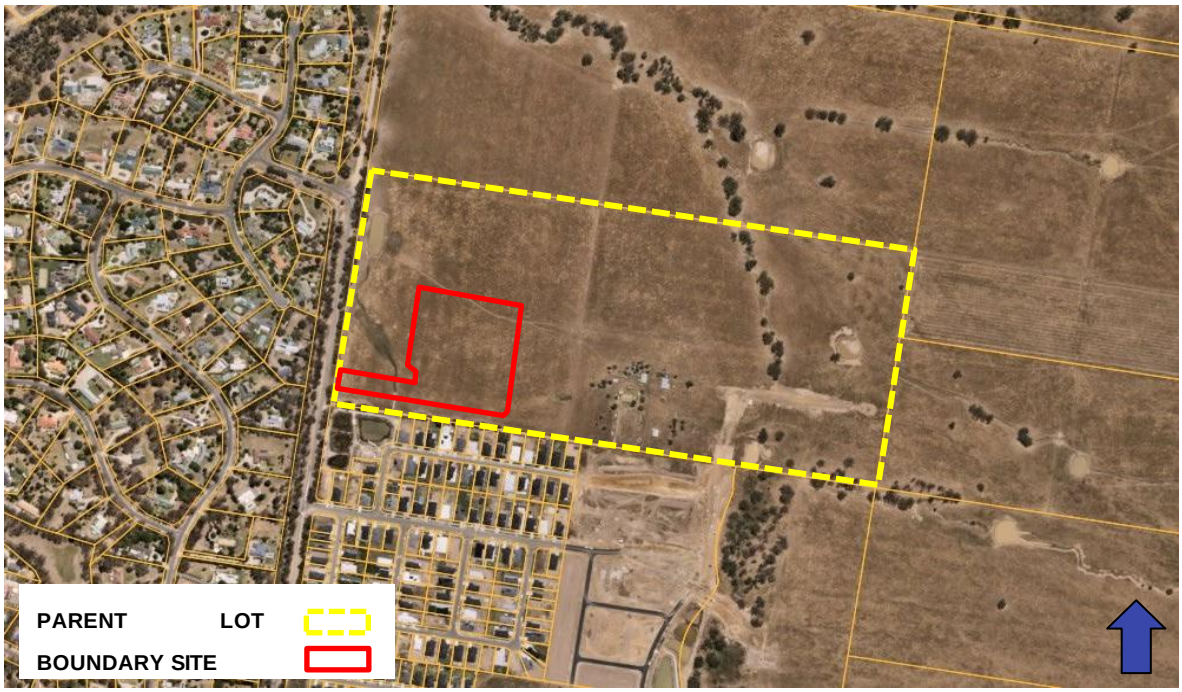


***Figure 2**: Aerial photograph of the site showing the location of the new school, preschool and access road (Source: Nearmap 19 November 2024)*

The boundary of the REF works is shown in **Figure 3** and comprises the following two (2) components:

- **School site**: This is the location of the future primary school and public preschool. The school site has a total area of 30,324 m^2 with a frontage to the future road of 181.65 metres. The school site doesn't contain any existing buildings or structures and has been cleared of existing vegetation and trees.
- **Future road reserve**: This is the location of the future road that provides vehicle access to the school site from Kerr Road. The future road reserve has a total area of 6,966 m^2.

In addition, there are works located outside of the REF works boundary.

3. Other Key Features in the Vicinity of the Site

While the school site is located on rising ground that lies to the east of Kerr Road, the future road reserve crosses an existing natural depression and channel that both run in a north-south direction between Kerr Road and the school site.

As shown on **Figure 4**, the site is located in the middle reaches of the Woolshed Creek catchment, it being a major tributary of Eight Mile Creek. While land use in the upper reaches of the Woolshed Creek catchment typically comprises rural farmland, both large and small-lot residential type development is located in its middle and lower reaches.

Figure 5 shows that the site lies to the north of a recently constructed residential subdivision development (denoted the "Springview Estate" by the developer). While provision has been incorporated in Springview Estate for the temporary detention of stormwater runoff, flow discharging from the series of ponds that are located in its north-west corner (denoted herein as the "**Springview Estate stormwater detention basins**") contributes to flow in the aforementioned natural depression and incised drainage line. **Annexure A** of this letter contains a copy of four design drawings showing details of the Springview Estate stormwater detention basins.

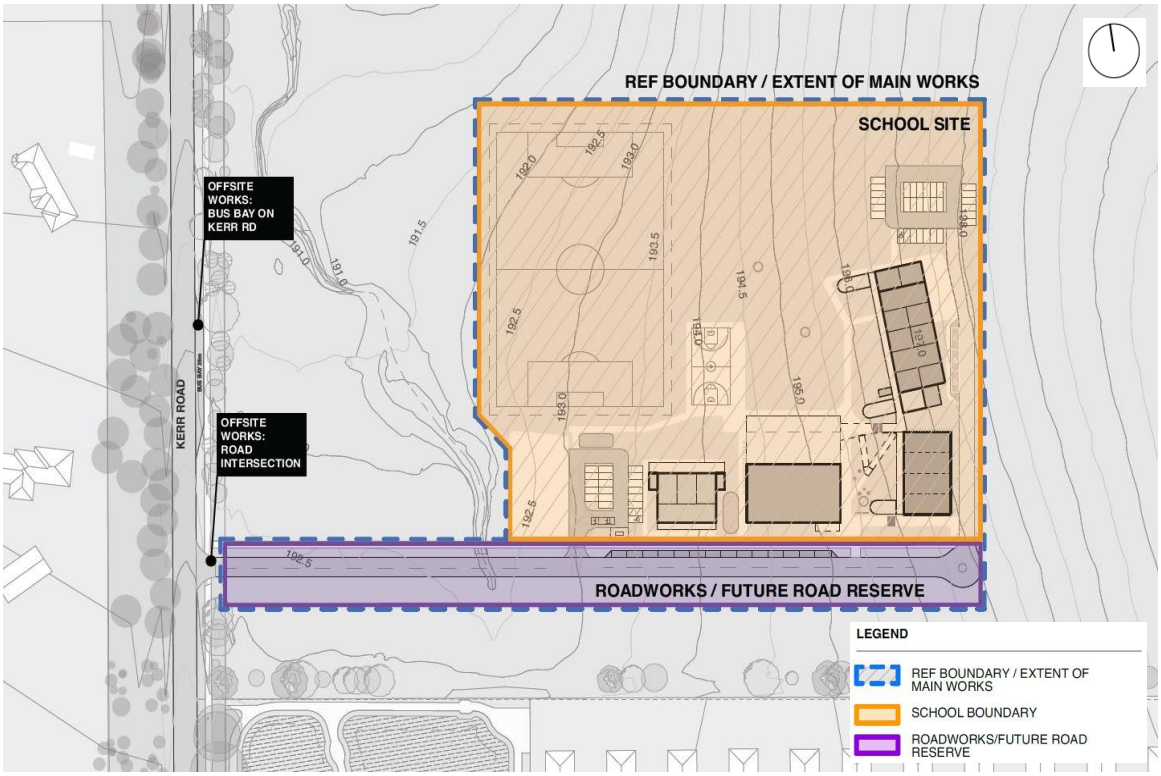


***Figure 3**: Extent of proposed works at Albury Thurgoona New Primary School and New Public Preschool (Source: Bennett & Trimble)*

An existing 525 mm diameter pipe is shown to control flow discharging from the Springview Estate stormwater detention basins, while a defined spillway that is about 3 m in width and has an elevation of about RL 193.5 m AHD is located a short distance to its west.

While the design drawings show that the crest elevation of the Springview Estate stormwater detention basins should have been set at an elevation of RL 193.75 m AHD, the LiDAR survey data that were provided by Albury City Council show that a low point is present in the earthen embankment in its north-west corner, the elevation of which approximate that of the designated spillway.

The aforementioned 525 mm diameter pipe extends north from the Springview Estate a distance of about 32 m, where its outlet is located within the future road reserve. Flow discharging from the 525 mm diameter pipe is conveyed by an existing channel which runs in a northerly direction over a distance of about 250 m to the location of an existing farm dam that is located on the eastern side of Kerr Road.

Flow discharging from the existing farm dam is conveyed across Kerr Road via an existing 750 mm diameter pipe that discharges to engineered channel that runs in a westerly direction along the southern side of Hopwood Road. The engineered channel continues to run in a westerly direction through large-lot residential development where it discharges to the main arm of Woolshed Creek.

4. Definition of Flood Behaviour under Present Day Catchment Conditions

As no formal flood study has been undertaken by Albury City Council for the Woolshed Creek catchment, a new set of hydrologic (DRAINS) and hydraulic (TUFLOW) models were developed as part of the present assessment (collectively referred to herein as the “flood models”).

Figure 6 shows the layout of the sub-catchments which comprise the hydrologic (DRAINS) model that was developed as part of the present assessment (denoted herein as the '**Woolshed Creek DRAINS Model**"), as well as the rainfall-runoff modelling approach that was applied to each, while **Figure 7** shows the layout of the two-dimensional (in plan) hydraulic (TUFLOW) model that was developed as part of the present assessment (denoted herein as the '**Woolshed Creek TUFLOW Model**"). **Annexure B** of this letter provides background to the development of the flood models.

The flood models were used to define the nature of flooding in the vicinity of the site under present day catchment and near-term climatic conditions for design storms with AEPs of 1%, 0.5% and 0.2%, as well as the PMF.

5. Description of Flood Behaviour under Present Day Catchment Conditions

Figure 8 (2 sheets) shows the indicative extent and depth of inundation, while **Figure 9** (2 sheets) shows the flood hazard vulnerability classification of flow in the Woolshed Creek catchment, including in the immediate vicinity of the school site and future road reserve under present day (i.e. pre-public school) catchment conditions for a 1% AEP flood event. Similar information is shown on **Figures 10** to **15** (2 sheets each) for floods with AEPs of 0.5% and 0.2%, as well as the PMF.

The key features of flood behaviour in the vicinity of the school site and future road reserve under present day (i.e. pre-public school) catchment conditions are as follows:

i. While the design drawings contained in **Annexure A** show that the Springview Estate stormwater detention basins were designed to contain flows generated by storms up to 1% AEP in intensity, with only minor overtopping of the designated spillway, the present assessment found that flow surcharges not only the designated spillway, but also the crest of the earthen embankment that runs along their northern side during a 1% AEP storm event. **Table 1** sets out the peak flow (piped and overland) discharging from the Springview Estate along its northern boundary for storms with AEPs of 1%, 0.5% and 0.2%, as well as the PMF under present day (i.e. pre-public school) conditions.

TABLE 1
PEAK FLOW DISCHARGING FROM SPRINGVIEW ESTATE
(m^3/s)

Design Storm Event	Peak Flow
1% AEP	3.7
0.5% AEP	4.3
0.2% AEP	5.2
PMF	85

ii. Flow discharging from the Springview Estate extends over a width of about 120 m for storms up to about 0.2% AEP in intensity where it discharges through the future road reserve, increasing to about 140 m during a PMF event.

iii. Flow discharging from the Springview Estate also extends a short distance into the school site in its south-west corner during storms up to 0.2% AEP in intensity, with the width of the encroaching flow increasing to about 30 m during a PMF event.

iv. Depths of inundation in the future road reserve generally don't exceed 0.1 m during storms up to 0.2% AEP in intensity, with the exception of the existing channel where the depth of flow reaches a maximum of about 0.6 m.

v. During a PMF event, the depth of inundation in the future road reserve generally doesn't exceed 0.5 m, with the exception of the existing channel where the depth of flow reaches a maximum of about 1.2 m.

vi. It is noted that flooding conditions in the vicinity of the school site and future road reserve during a PMF event are exacerbated by floodwater which breaks out of the Unnamed Tributary of Woolshed Creek along its western bank and flows through Springview Estate.

vii. With the exception of the deeper flow that is present in the existing channel the flood hazard vulnerability classification of the flow which discharges through the future road reserve and encroaches on the school site in its south-west corner does not exceed a value of H1 for all storms up to 0.2% AEP in intensity.

viii. During a PMF event, the flood hazard vulnerability classification of the flow which discharges through the future road reserve and encroaches on the school site in its south-west corner is a maximum of H4, with H5 type conditions shown to be present in the immediate vicinity of the existing channel.

6. Definition of Flood Behaviour under Post-Public School Conditions

The structure of the TUFLOW model representing present day conditions was modified to include the proposed finished levels on the school site and the future road reserve, details of which were provided by WSP in an email dated 3 April 2025. **Annexure C** of this letter contains an architectural plan showing the key features of the proposed school, while **Figure 16** shows the depth of cut and fill that is proposed on the school site and future road reserve.

A new transverse drainage structure comprising 2 off 3.6 m wide by 0.6 m high reinforced concrete box culverts were incorporated in the TUFLOW model where the new road will cross the existing channel (denoted herein as the "**new transverse drainage structure**"), noting that it was necessary to shorten the existing 525 mm diameter pipe which drains the Springview Estate stormwater detention basins where it extends into the future road reserve. A 5 m wide channel was also incorporated in the TUFLOW model along the southern side of the future road reserve which extended between Kerr Road and the inlet of the new transverse drainage structure, noting that this was not included in the 3D model that was provided by WSP (denoted herein as the "**new 5 m wide interception channel**").[2]

7. Description of Flood Behaviour under Post-Public School Conditions

Figure 17 (2 sheets) shows the indicative extent and depth of inundation, while **Figure 18** (2 sheets) shows the flood hazard vulnerability classification of flow in the Woolshed Creek catchment, including in the immediate vicinity of the school site and future road reserve under post-public school conditions for a 1% AEP flood event. **Figure 19** (2 sheets) shows the impact that the proposed school would have on flood behaviour for the 1% AEP flood event. Similar information is shown on **Figures 20** to **28** (2 sheets each) for floods with AEPs of 0.5% and 0.2%, as well as the PMF.

The key features of flood behaviour in the vicinity of the school site and future road reserve under post-public school conditions are as follows:

i. Flows discharging from the Springview Easte stormwater detention basins would be conveyed across the future road reserve via the new transverse drainage structure for all storms up to 1% AEP in intensity.

[2] Note that the exact dimensions of the interception channel will need to be confirmed during the detailed design of the access road.

ii. While the works associated with the proposed school would result in an increase in peak 1% AEP flood levels external to the school site and future road reserve, the impacts are confined to land which is presently undeveloped.

iii. While overtopping of the new access road would occur for storms that are more intense than 1% AEP, they would not exceed H1 type hazard vulnerability conditions for storms up to 0.2% AEP intensity.

iv. While the extent to which peak flood levels would be increased as a result of the proposed school for storms up to 0.2% AEP in intensity, the affected area would also be confined to land that is presently undeveloped.

v. Floodwater would inundate the access road to a maximum depth of about 0.6 m during a PMF event, with H4 type flood hazard vulnerability conditions experienced along most of its length where it extends between the school site and Kerr Road.

vi. While floodwater would inundate the school site during a PMF event, the affected areas would be limited to the proposed detention basin and the batter of the proposed playing field.

vii. While peak flood levels would be increased in two existing residential allotments that are located in the Springview Estate during a PMF event, the impacts would be confined to a relatively small area along their northern boundary where there are no structures.

viii. Further to the above, while peak PMF levels would be increased in three existing large-lot residential allotments that are located on the western side of Kerr Road, the resulting increase of less than 50 mm would not measurably alter the flood risk in these properties, noting that the flood hazard vulnerability classification internal to the three allotments does not generally exceed a value of H2. It is also noted that the flood related impacts associated with the proposed school would not alter the nature of flooding on the local road network that services the three allotments.

ix. Using the 0.5% and 0.2% AEP storm events as being analogous to a potential 10% and 30% increase in 1% AEP rainfall intensities associated with future climate change, respectively, the results of the TUFLOW modelling show that the proposed access road could potentially be inundated by floodwater during storms more frequent than 1% AEP, albeit it to relatively shallow depths which are not considered to be dangerous to children and the elderly.

8. Concluding Remarks

Based on the findings of the FIRA, it can be concluded that the school site would generally remain flood free for all events up to the PMF, with only the proposed stormwater detention basin and batter of the proposed playing field impacted by floodwater during a flood of this magnitude. Furthermore, the access road to the proposed school would remain flood free during storms up to 1% AEP in intensity, with only minor overtopping shown to occur during storms up to 0.2% AEP intensity.

While a Flood Emergency Response Plan (**FERP**) would need to be prepared for the proposed school, it is envisaged that a shelter-in-place type approach would need to be adopted during storms that result in the inundation of the access road, noting that during such storm events, the local public road network would also likely be impacted by floodwater, thereby rendering them similarly unserviceable.

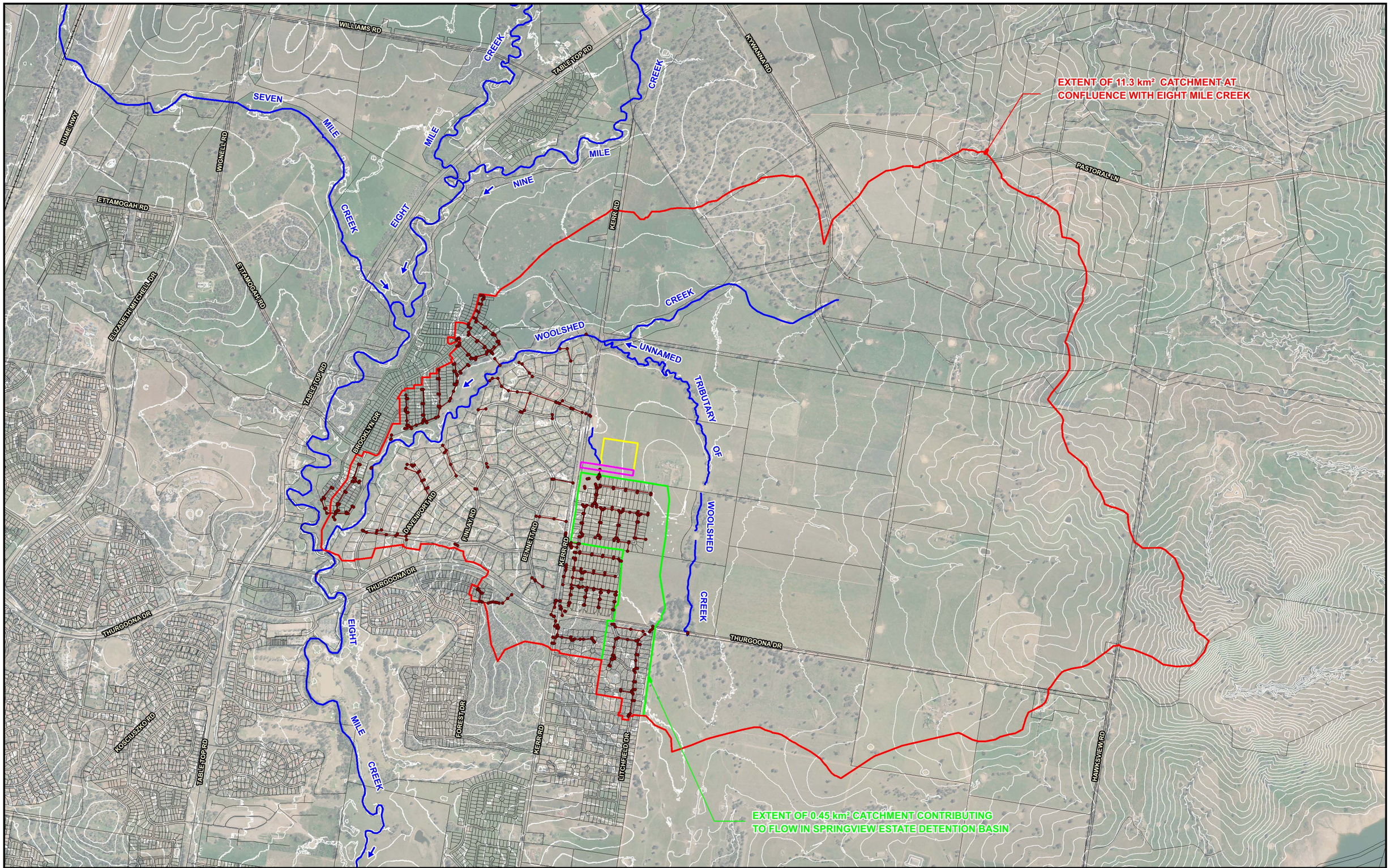
As the local public road network is likely to be subject to flooding during storms more intense than 1% AEP, the provision of a larger transverse drainage structure under the proposed access road which is aimed at rendering it flood free under potential future climate change conditions is not justified.

We trust that the findings of the FIRA will assist DoE in finalising the documentation for the proposed public school. However, please do not hesitate to contact the undersigned should you have any queries or wish to discuss any aspect of this report.

Yours faithfully
Lyall & Associates Consulting Water Engineers

Scott Button
Principal

LIST OF FIGURES



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Scale: 1:20,000

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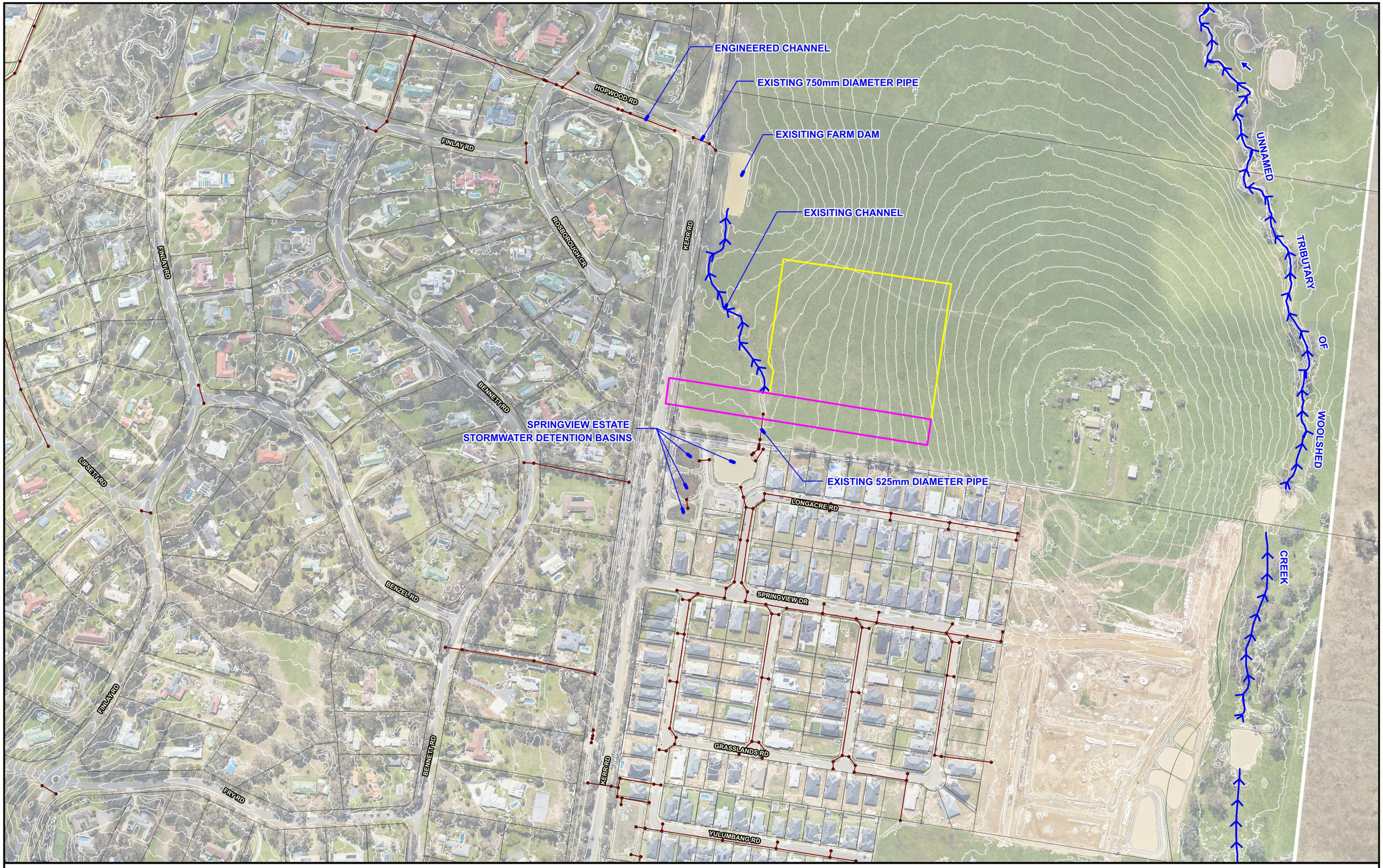
LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Lidar-Based Ground Contour (5m Intervals)

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 4

CATCHMENT PLAN



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Scale: 1:4,000

Lyall & Associates

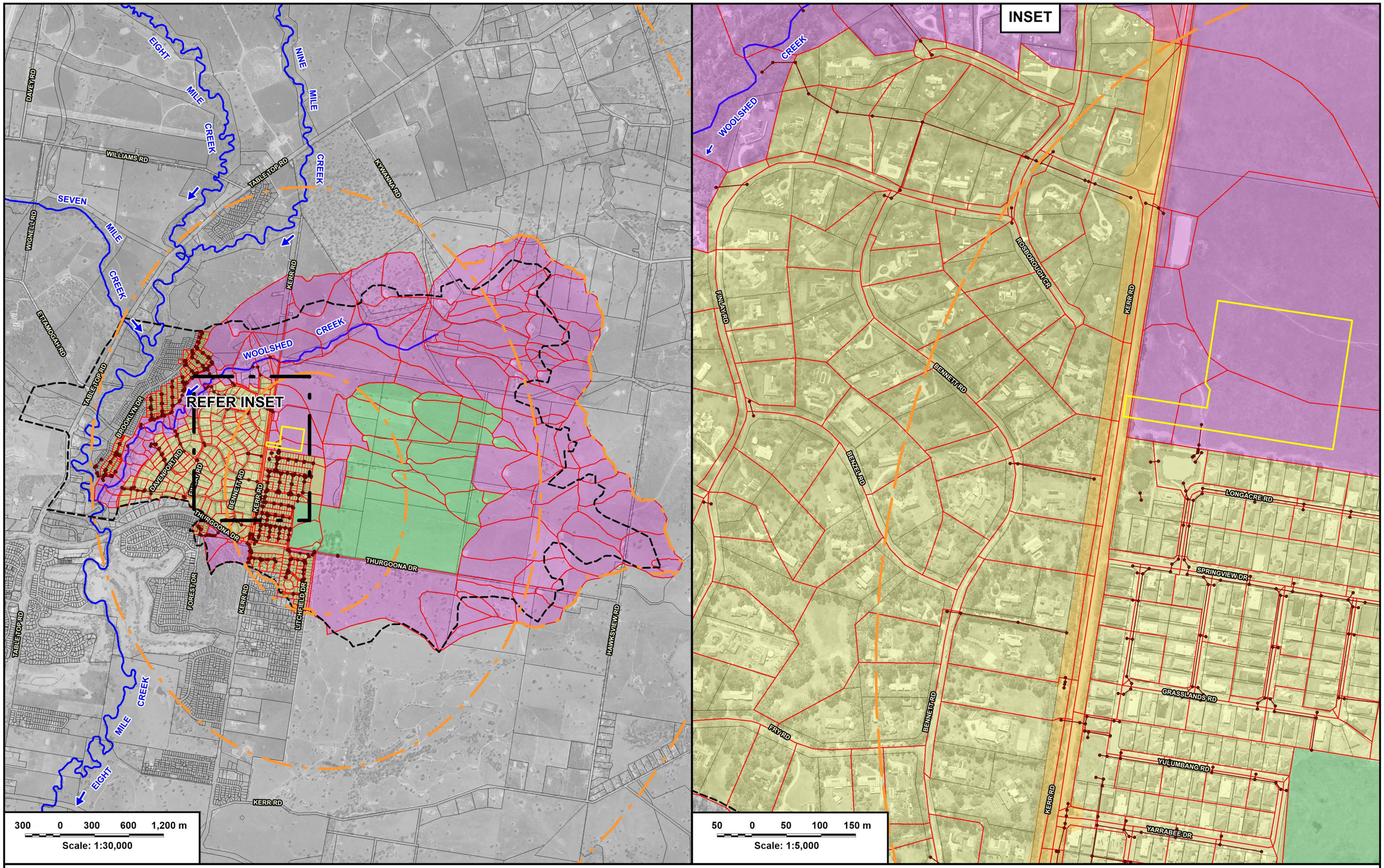
LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Lidar-Based Ground Contour (0.5m Intervals)

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 5

KEY FEATURES IN VICINITY OF SCHOOL SITE AND FUTURE ROAD RESERVE


INSET
REFER INSET
EIGHT MILE CREEK
NINE MILE CREEK
SEVEN MILE CREEK
WOOLSHED CREEK
DAVEY RD
WILLIAMS RD
TABLETOP RD
KYWANNA RD
WIGNELL RD
ETTAMOGAH RD
KERR RD
BROOKLYN DR
DAVENPORT RD
FRY RD
BENNETT RD
THURGOONA DR
FOREST DR
LITCHFIELD DR
HAWKSVIEW RD
ROSSBOROUGH CR
FINLAY RD
LONGACRE RD
SPRINGVIEW DR
GRASSLANDS RD
YULUMBANG RD
YARRABEE DR
300 0 300 600 1,200 m
Scale: 1:30,000
50 0 50 100 150 m
Scale: 1:5,000
N
LEGEND
RAFTS Sub-Catchment
IL-CL Sub-Catchment
TUFLOW Modelled Sub-Catchment
Site Boundary
Two-Dimensional Model Boundary
Modelled Stormwater Drainage System
PMP Ellipses
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ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT
Figure 6
WOOLSHED CREEK DRAINS MODEL LAYOUT

TUFLOW BOUNDARY CONDITIONS

- Inflow - Rain Boundary
- Inflow - Direct Rainfall
- Inflow - Point Source
- Inflow Boundary
- Outlet - Free Draining
- Outflow Boundary
- Two-Dimensional Model Boundary

TUFLOW ONE-DIMENSIONAL ELEMENT

- Inlet Pit
- Junction Pit
- Headwall
- Pipe
- Box Culvert

INSET

REFER INSET

EIGHT MILE CREEK
NINE MILE CREEK
SEVEN MILE CREEK
WOOLSHED CREEK
DAVEY RD
WILLIAMS RD
TABLETOP RD
KWANIARA RD
WIGNELL RD
KERR RD
ETAMOGAH RD
BROOKLYN DR
DAVENPORT RD
FINLAY RD
BENNETT RD
THURGOONA DR
FOREST DR
LITCHFIELD DR
HAWKSVIEW RD
ROSSBOROUGH CR
BENVEIL RD
FRY RD
LONGACRE RD
SPRINGVIEW DR
GRASSLANDS RD
YULUMBANG RD
YARRABEE DR

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Scale: 1:30,000

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Scale: 1:5,000

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LEGEND

Site Boundary

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ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 7

WOOLSHED CREEK TUFLOW MODEL LAYOUT

Indicative Depth of Inundation (m)

- < 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

REFER INSET

REFER SHEET 2

INSET

EIGHT MILE CREEK

NINE MILE CREEK

SEVEN MILE CREEK

WOOLSHED CREEK

DAVEY RD
WILLIAMS RD
TABLETOP RD
KYWANNA RD
WIGNELL RD
KERR RD
ETTAMOGAH RD
BROOKLYN DR
DAVENPORT RD
BENNETT RD
THURGOONA DR
FOREST DR
LITCHFIELD DR
HAWKSVIEW RD

CREEK
WOOLSHED
FINLAY RD
ROSSBOROUGH CR
BENNETT RD
BENZEL RD
FRY RD
LONGACRE RD
SPRINGVIEW DR
GRASSLANDS RD
YULUMBANG RD
YARRABEE DR

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Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

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NOTE:
The ground surface model incorporated in TUFLOW is based on LiDAR survey which has been sampled on a 2 m (min) grid and does not necessarily incorporate localised features which can influence flooding behaviour in individual allotments.

Flood depths are therefore approximate only and require interpretation by a suitably qualified engineer to determine flooding behaviour in individual allotments. Any assessment of flooding in individual allotments may also require a site survey.

TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- Site Boundary
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System

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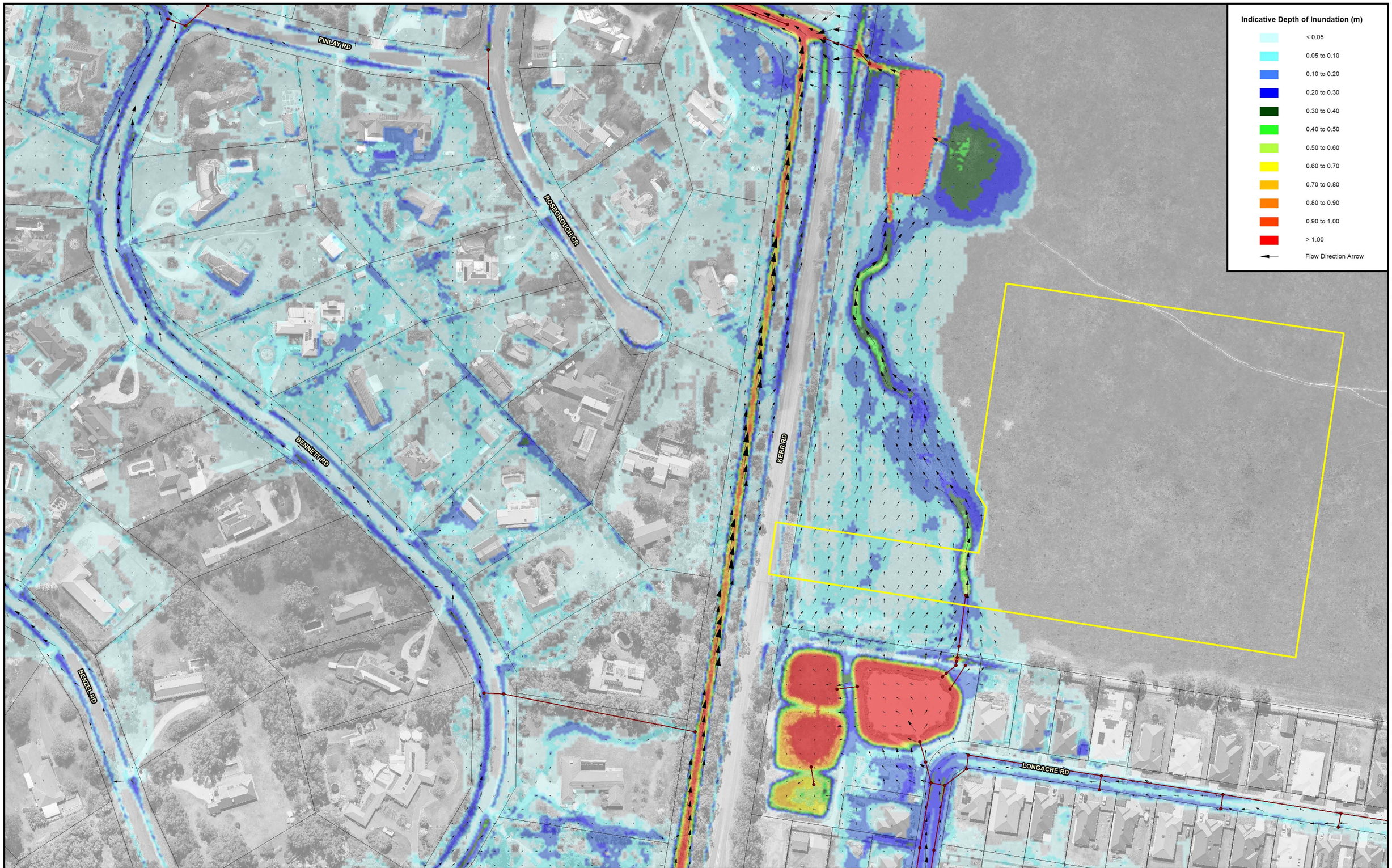
ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 8
(Sheet 1 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
1% AEP - PRE-PUBLIC SCHOOL CONDITIONS



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20 0 20 40 60 m

Scale: 1:2,000

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LEGEND

Site Boundary

Modelled Stormwater Drainage System

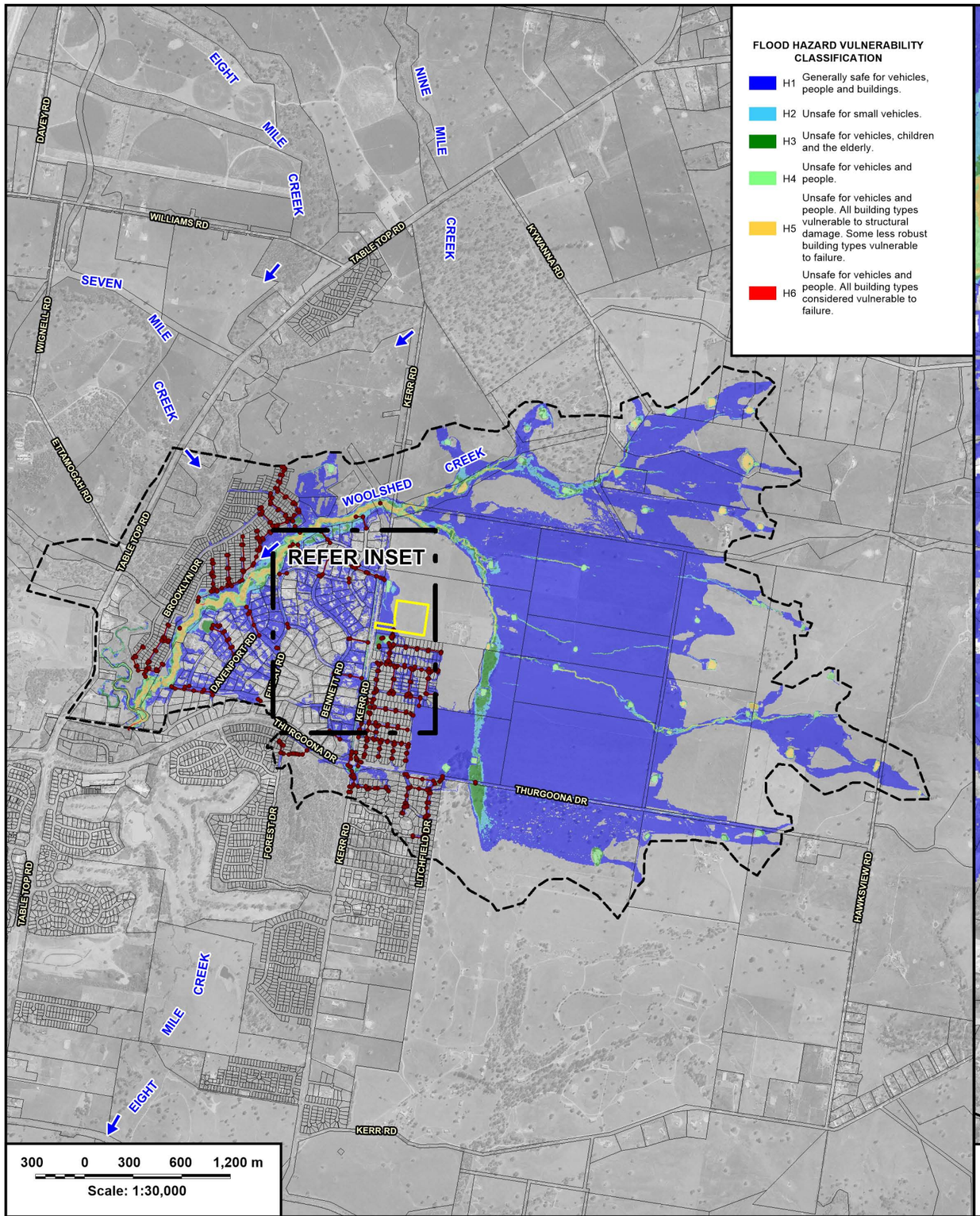
ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

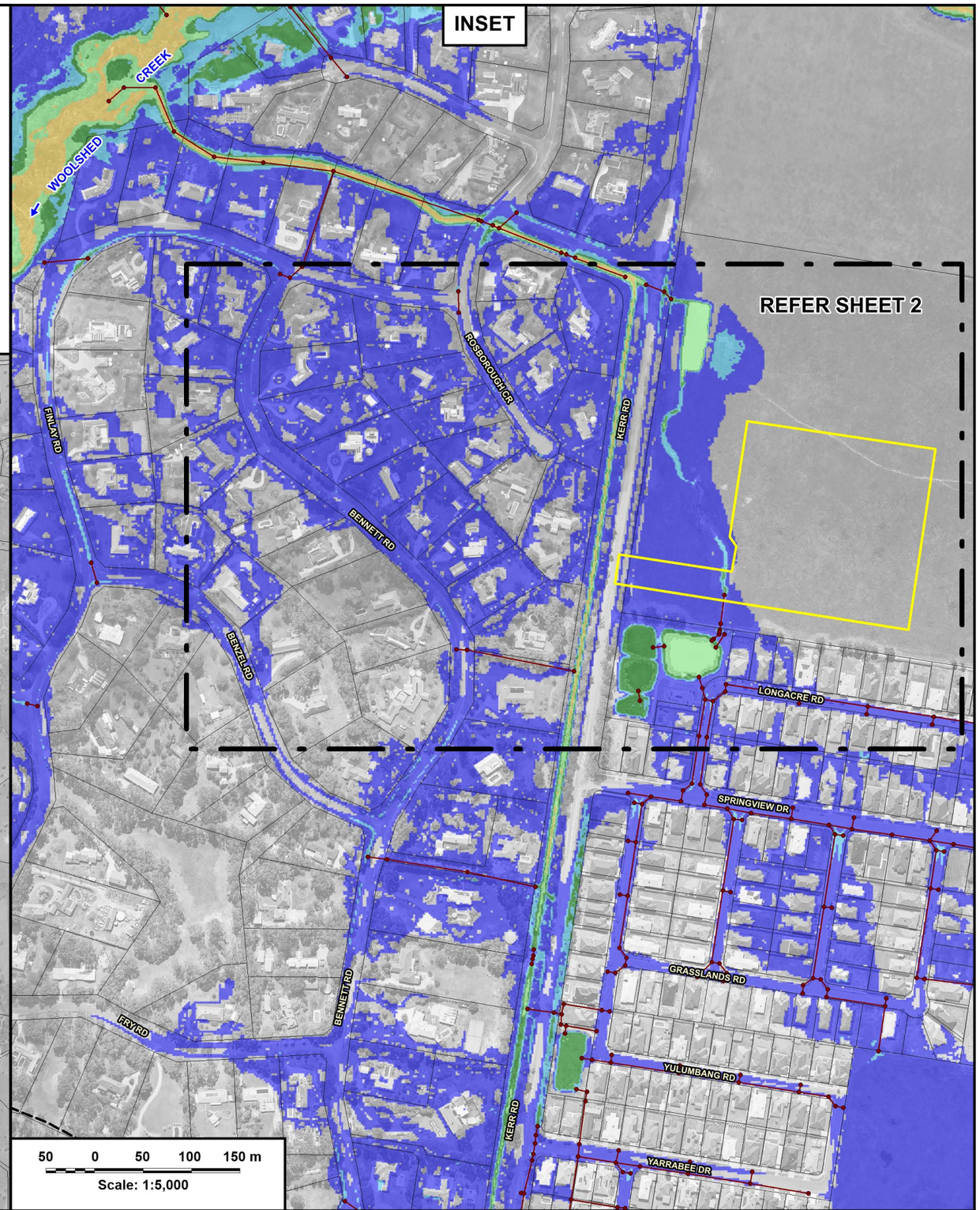
Figure 8
(Sheet 2 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
1% AEP - PRE-PUBLIC SCHOOL CONDITIONS

FLOOD HAZARD VULNERABILITY CLASSIFICATION

H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.





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Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

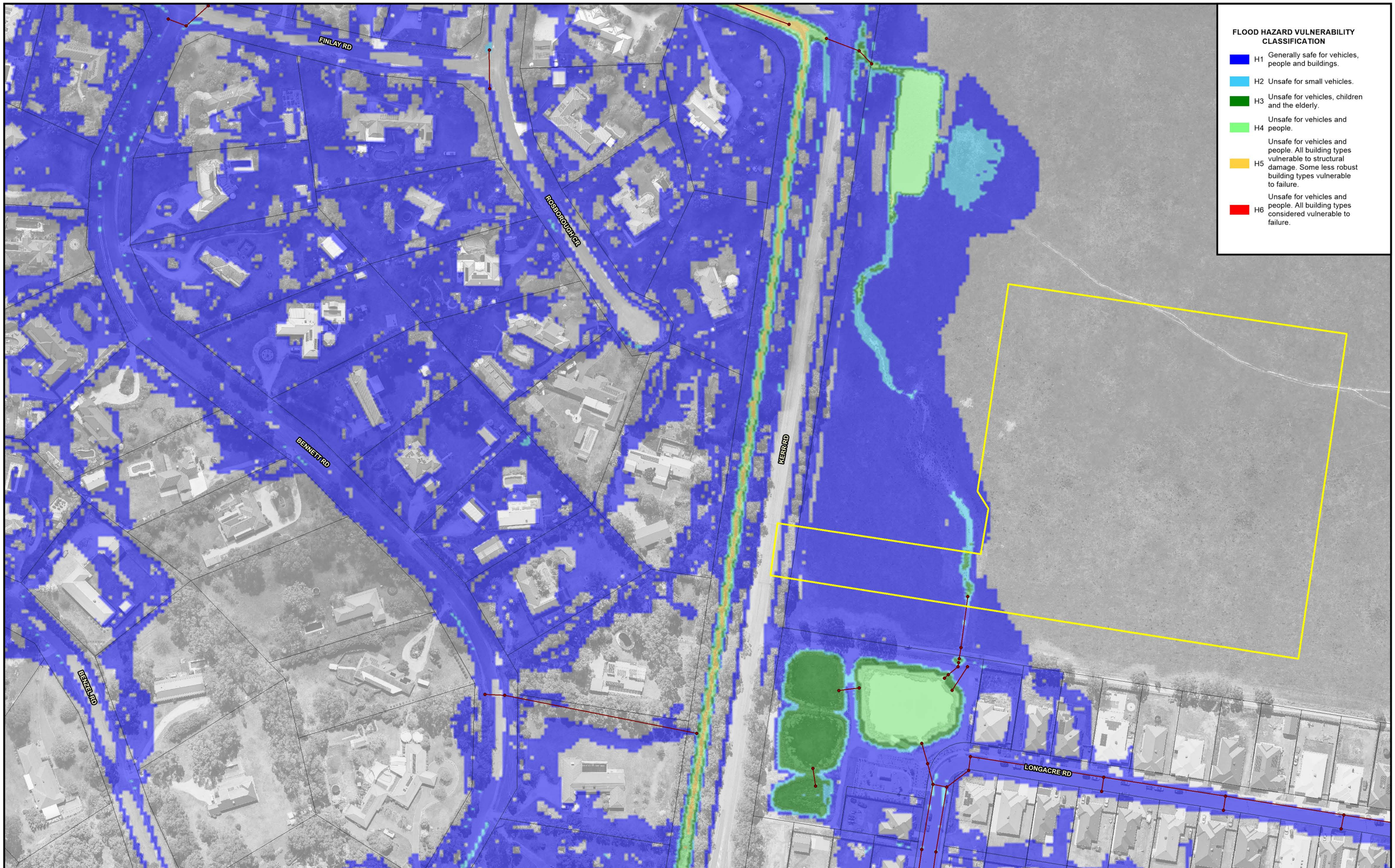
LEGEND

- Site Boundary
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 9
(Sheet 1 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
1% AEP - PRE-PUBLIC SCHOOL CONDITIONS



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Scale: 1:2,000

Lyall & Associates

NOTE:

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

Site Boundary

Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 9
(Sheet 2 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
1% AEP - PRE-PUBLIC SCHOOL CONDITIONS

Indicative Depth of Inundation (m)

- < 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

REFER INSET

REFER SHEET 2

INSET

EIGHT MILE CREEK

NINE MILE CREEK

SEVEN MILE CREEK

WOOLSHED CREEK

DAVEY RD
WILLIAMS RD
TABLETOP RD
KYWANNA RD
WIGNELL RD
ETTAMOGAH RD
KERR RD
BROOKLYN DR
DAVENPORT RD
BENNETT RD
THURGOONA DR
FOREST DR
LITCHFIELD DR
HAWKSVIEW RD
FRY RD
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GRASSLANDS RD
YULUMBANG RD
YARRABEE DR

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

NOTE:
The ground surface model incorporated in TUFLOW is based on LiDAR survey which has been sampled on a 2 m (min) grid and does not necessarily incorporate localised features which can influence flooding behaviour in individual allotments.

Flood depths are therefore approximate only and require interpretation by a suitably qualified engineer to determine flooding behaviour in individual allotments. Any assessment of flooding in individual allotments may also require a site survey.

TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

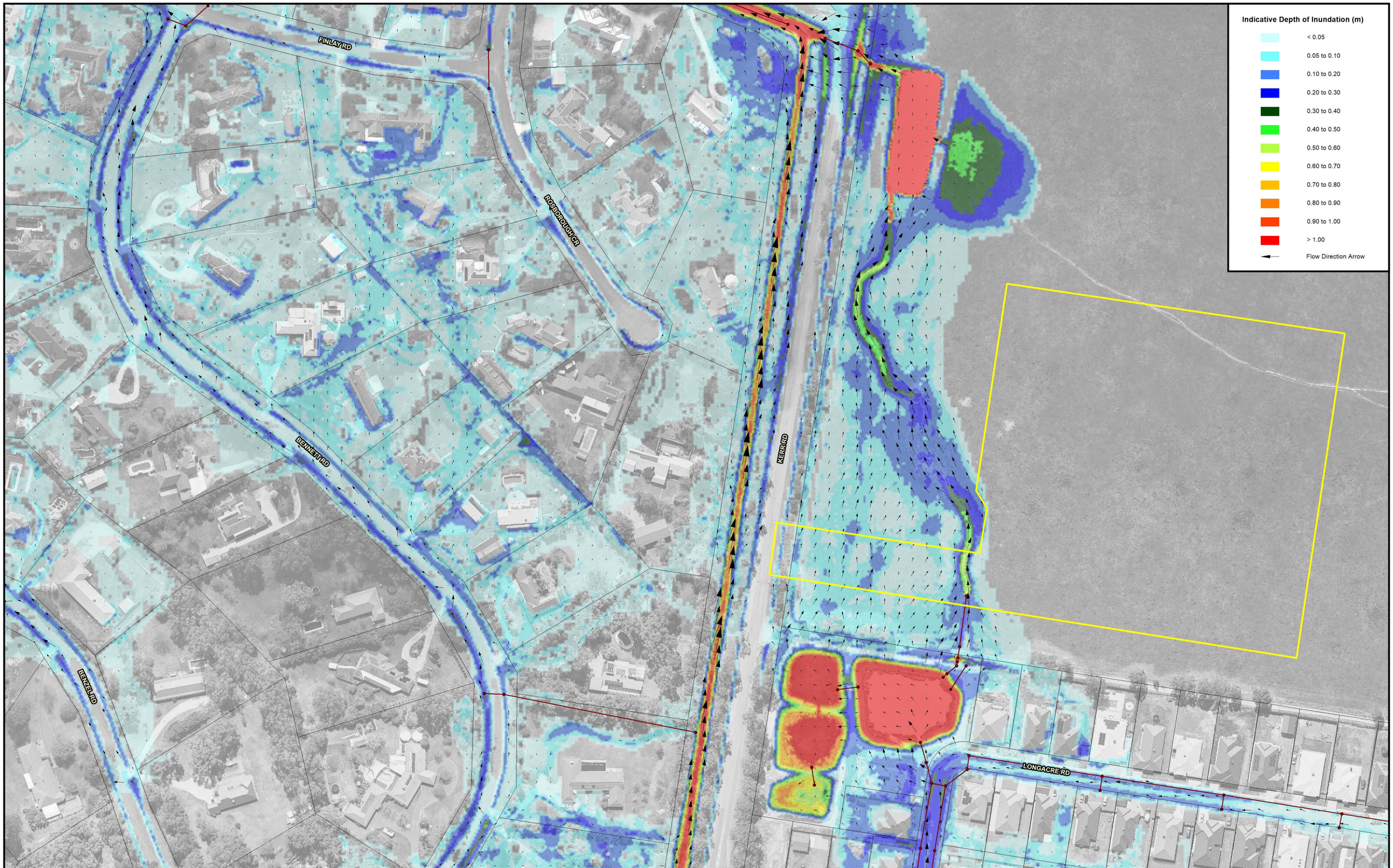
- Site Boundary
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System

Lyall & Associates

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 10
(Sheet 1 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
0.5% AEP - PRE-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

NOTE:
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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

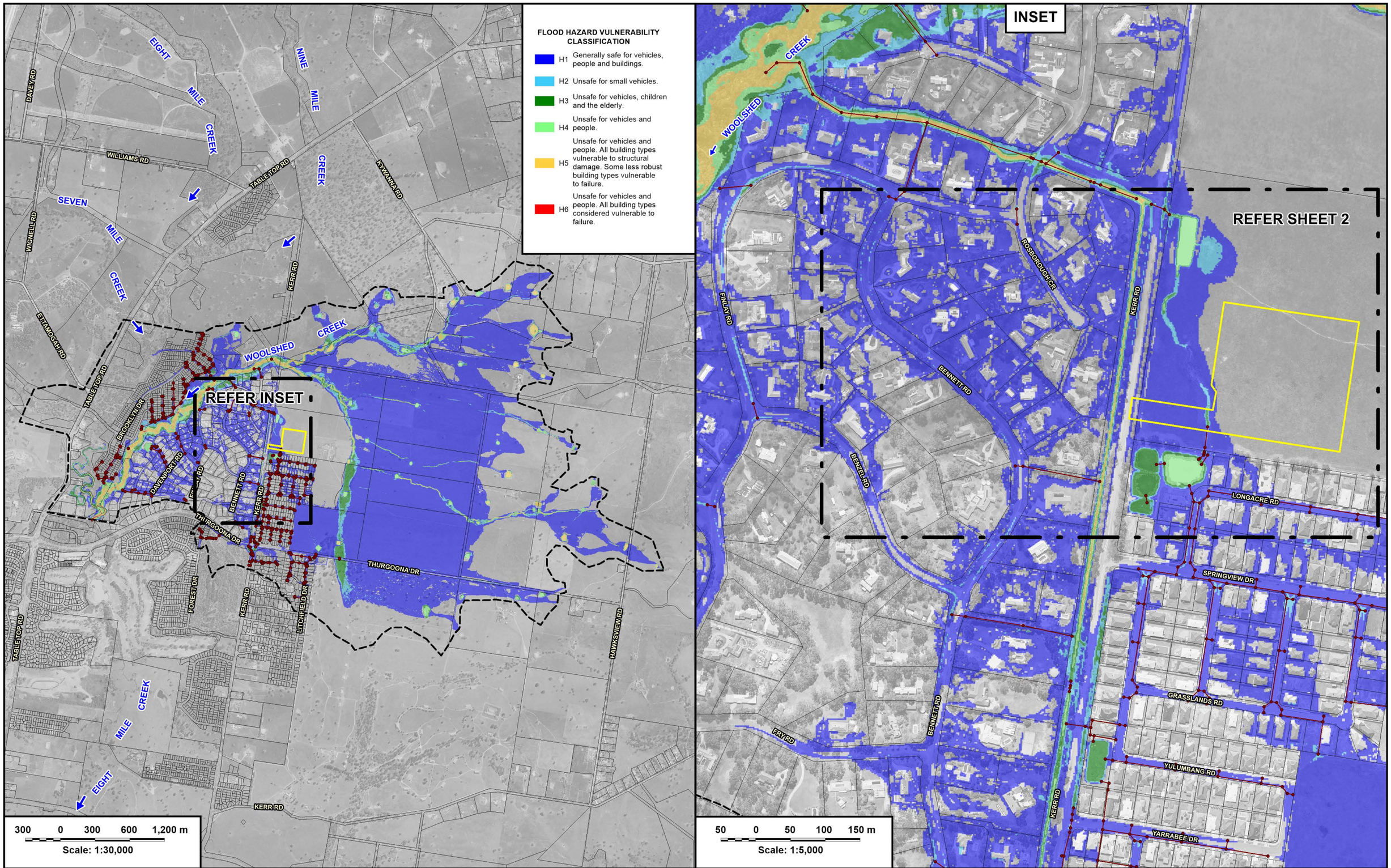
Site Boundary

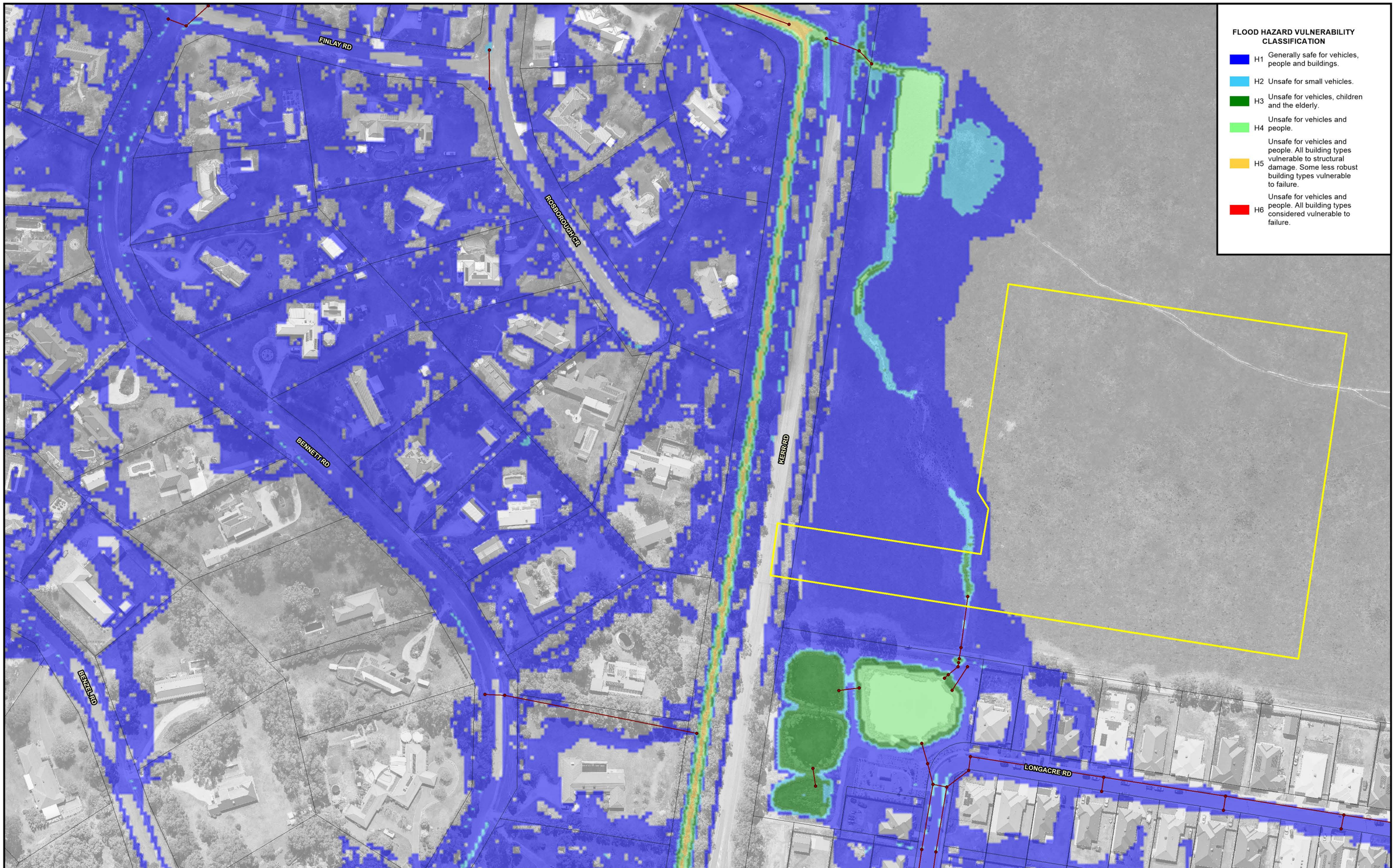
Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 10
(Sheet 2 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
0.5% AEP - PRE-PUBLIC SCHOOL CONDITIONS


FLOOD HAZARD VULNERABILITY CLASSIFICATION
H1 Generally safe for vehicles, people and buildings.
H2 Unsafe for small vehicles.
H3 Unsafe for vehicles, children and the elderly.
H4 Unsafe for vehicles and people.
H5 Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6 Unsafe for vehicles and people. All building types considered vulnerable to failure.
INSET
REFER INSET
REFER SHEET 2
EIGHT MILE CREEK
NINE MILE CREEK
SEVEN MILE CREEK
WOOLSHED CREEK
DAVEY RD
WILLIAMS RD
TABLETOP RD
KYWANNA RD
WIGNELL RD
KERR RD
ETTAMOGAH RD
BROOKLYN DR
DAVENPORT RD
FINLAY RD
BENNETT RD
THURGOONA DR
FOREST DR
LITCHFIELD DR
HAWKSVIEW RD
ROSSBOROUGH GR
BENZEL RD
LONGACRE RD
SPRINGVIEW DR
GRASSLANDS RD
YULUMBANG RD
YARRABEE DR
FRY RD
300 0 300 600 1,200 m
Scale: 1:30,000
50 0 50 100 150 m
Scale: 1:5,000
N
NOTE:
The ground surface model incorporated in TUFLOW is based on LiDAR survey which has been sampled on a 2 m (min) grid and does not necessarily incorporate localised features which can influence flooding behaviour in individual allotments.
Flood depths are therefore approximate only and require interpretation by a suitably qualified engineer to determine flooding behaviour in individual allotments. Any assessment of flooding in individual allotments may also require a site survey.
TUFLOW model results not shown within the footprint of existing buildings.
LEGEND
Site Boundary
Two-Dimensional Model Boundary
Modelled Stormwater Drainage System
Lyall & Associates
ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT
Figure 11
(Sheet 1 of 2)
FLOOD HAZARD VULNERABILITY CLASSIFICATION
0.5% AEP - PRE-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

NOTE:

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

Site Boundary

Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 11
(Sheet 2 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
0.5% AEP - PRE-PUBLIC SCHOOL CONDITIONS

Indicative Depth of Inundation (m)

- < 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

EIGHT MILE CREEK
NINE MILE CREEK
SEVEN MILE CREEK
WOOLSHED CREEK
DAVEY RD
WILLIAMS RD
TABLETOP RD
KYWANNA RD
WIGNELL RD
ETTAMOGAH RD
KERR RD
REFER INSET
BROOKLYN DR
DAVENPORT RD
FOREST DR
BENNETT RD
THURGOONA DR
LITCHFIELD DR
HAWKSVIEW RD

300 0 300 600 1,200 m
Scale: 1:30,000

INSET
REFER SHEET 2
WOOLSHED CREEK
FINLAY RD
ROSSBOROUGH CR
KERR RD
BENNETT RD
BENGEL RD
FRY RD
LONGACRE RD
SPRINGVIEW DR
GRASSLANDS RD
YULUMBANG RD
YARRABEE DR

50 0 50 100 150 m
Scale: 1:5,000

N

Lyall & Associates

NOTE:
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TUFLOW model results not shown within the footprint of existing buildings.

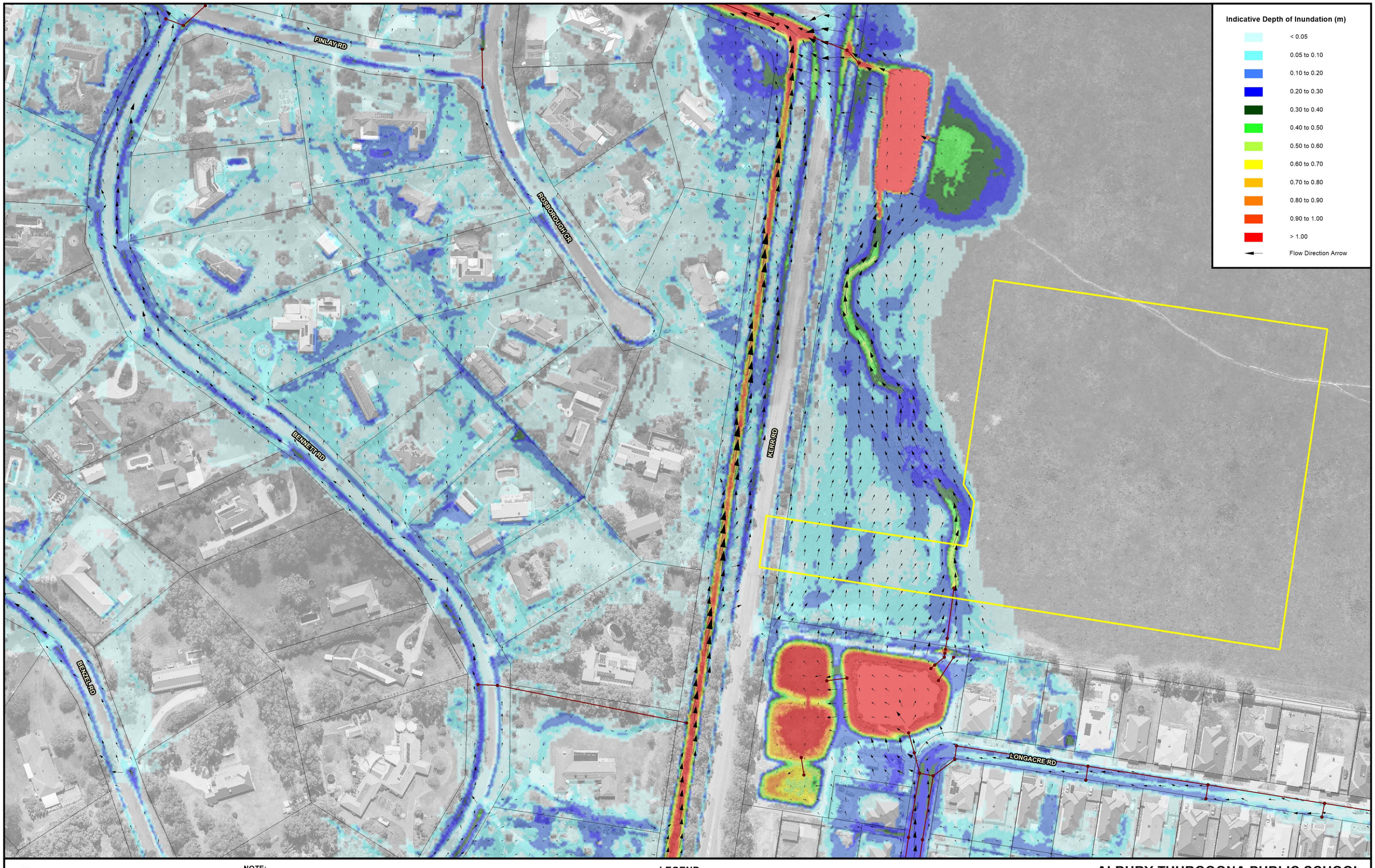
LEGEND

- Site Boundary
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL FLOOD IMPACT AND RISK ASSESSMENT

Figure 12
(Sheet 1 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
0.2% AEP - PRE-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

NOTE:

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

Site Boundary

Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 12
(Sheet 2 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
0.2% AEP - PRE-PUBLIC SCHOOL CONDITIONS

FLOOD HAZARD VULNERABILITY CLASSIFICATION

H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

REFER INSET

REFER SHEET 2

INSET

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

Lyall & Associates

NOTE:
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TUFLOW model results not shown within the footprint of existing buildings.

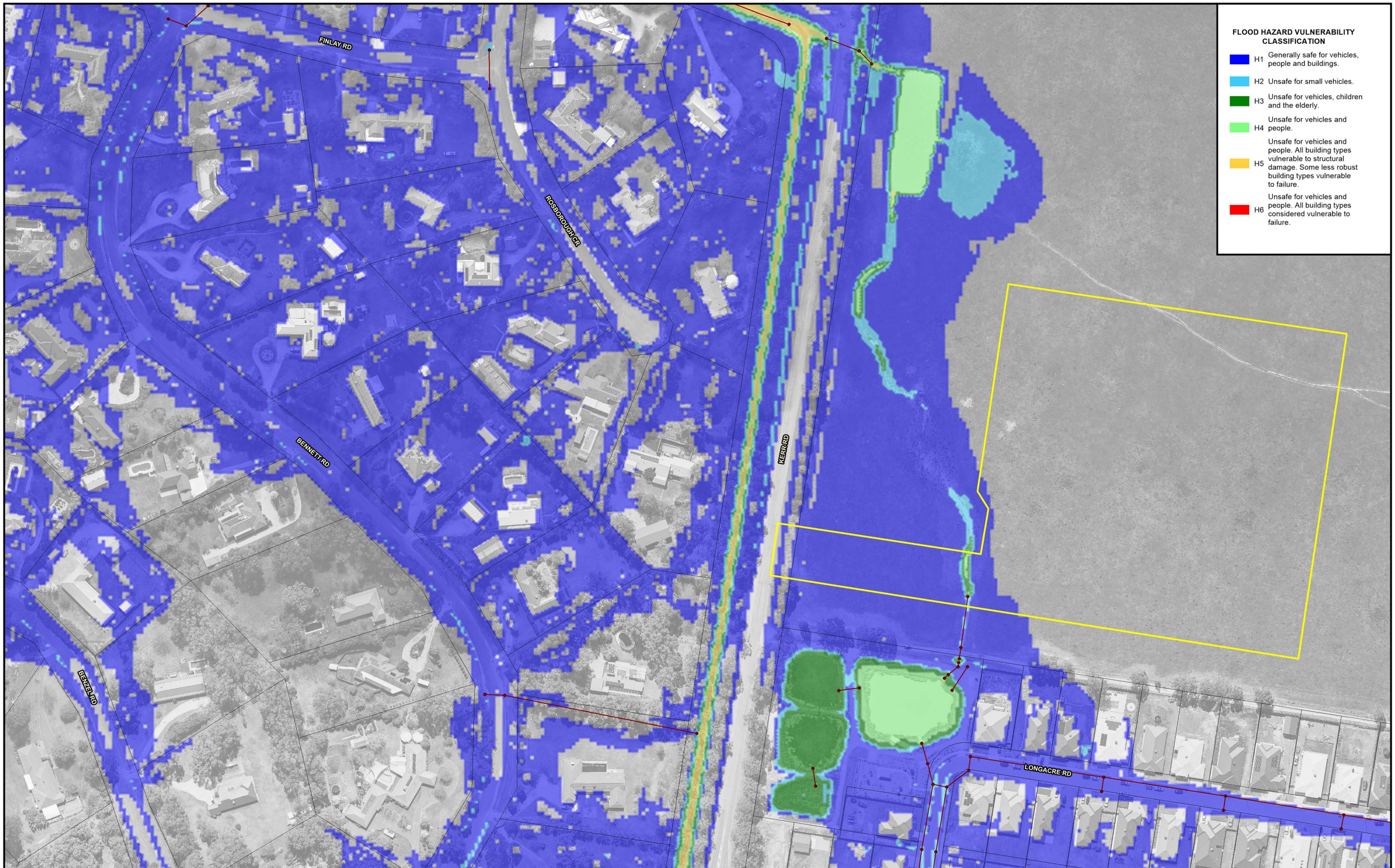
LEGEND

- Site Boundary
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 13
(Sheet 1 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
0.2% AEP - PRE-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

NOTE:

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

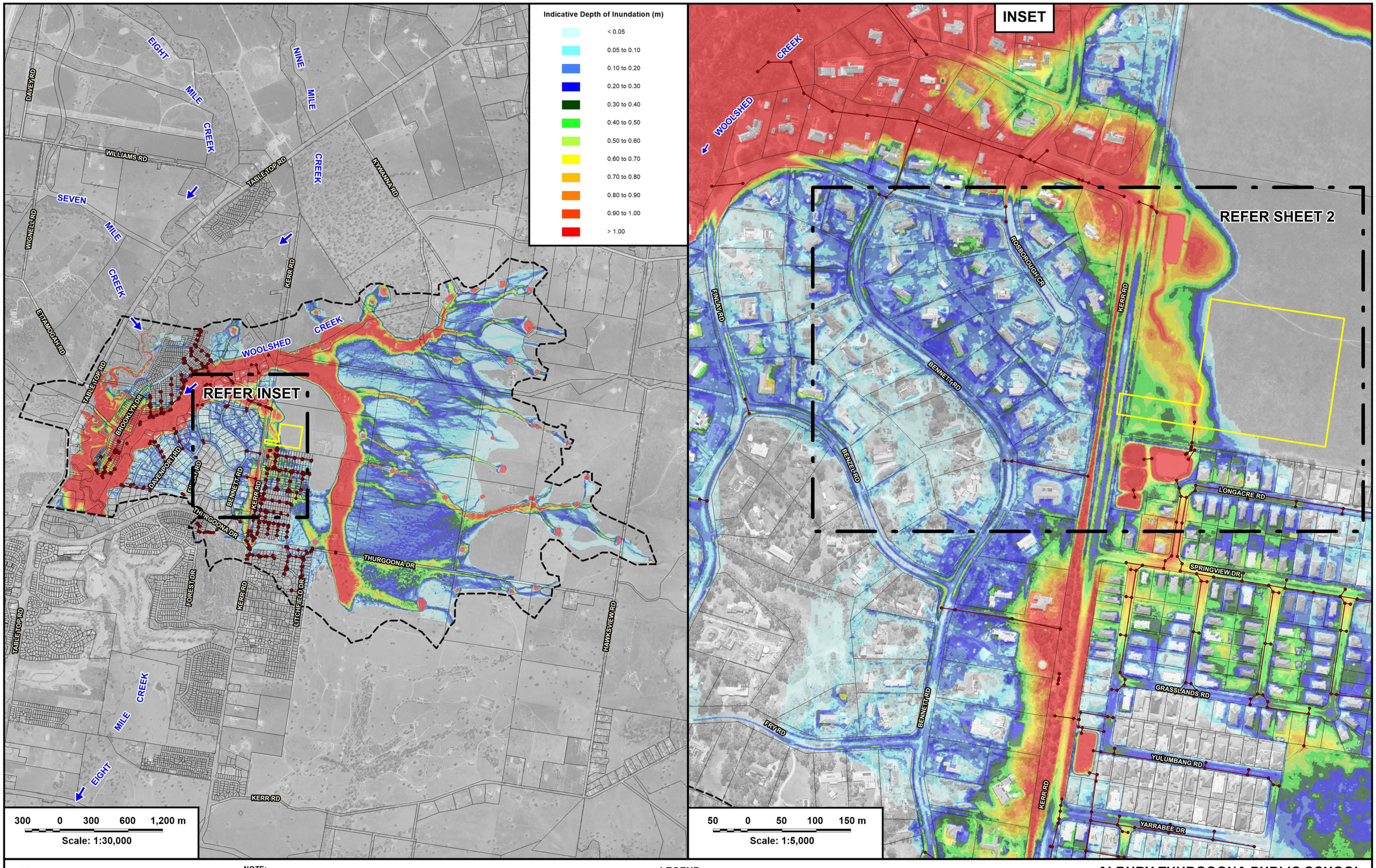
Site Boundary

Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 13
(Sheet 2 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
0.2% AEP - PRE-PUBLIC SCHOOL CONDITIONS



N

Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

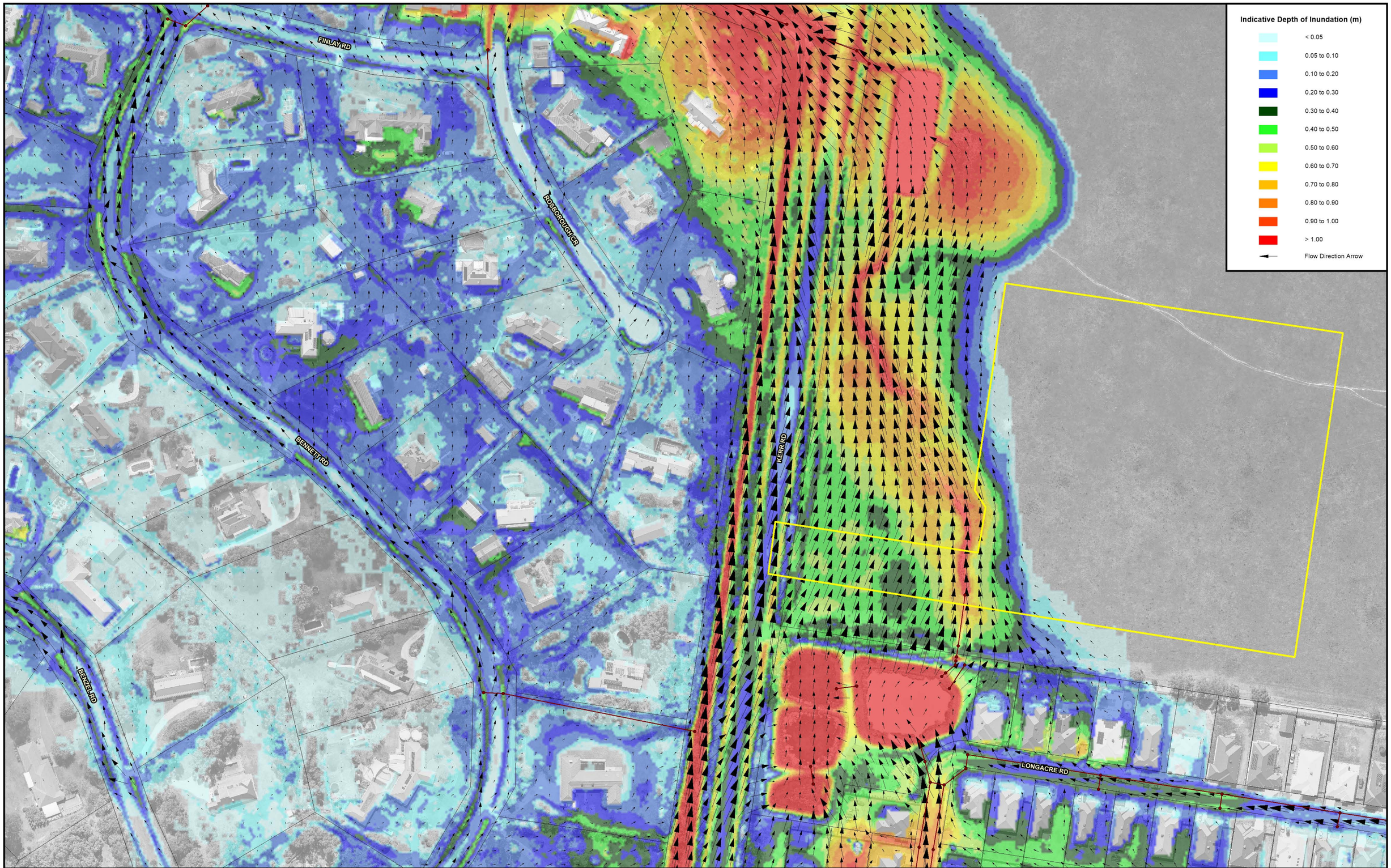
LEGEND

- Site Boundary
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 14
(Sheet 1 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
PMF - PRE-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

NOTE:

The ground surface model incorporated in TUFLOW is based on LiDAR survey which has been sampled on a 2 m (min) grid and does not necessarily incorporate localised features which can influence flooding behaviour in individual allotments.

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

Site Boundary

Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 14
(Sheet 2 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
PMF - PRE-PUBLIC SCHOOL CONDITIONS

FLOOD HAZARD VULNERABILITY CLASSIFICATION

H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

REFER INSET

REFER SHEET 2

INSET

EIGHT MILE CREEK

NINE MILE CREEK

SEVEN MILE CREEK

WOOLSHED CREEK

DAVEY RD

WILLIAMS RD

TABLETOP RD

KYWANNA RD

WIGNELL RD

KERR RD

ETAMOGAH RD

BROOKLYN DR

DAVENPORT RD

FINLAY RD

BENNETT RD

THURGOONA DR

FOREST DR

LITCHFIELD DR

HAWKSVIEW RD

ROSSBOROUGH GR

LONGACRE RD

SPRINGVIEW DR

GRASSLANDS RD

YULUMBANG RD

YARRABEE DR

FRY RD

300 0 300 600 1,200 m

Scale: 1:30,000

50 0 50 100 150 m

Scale: 1:5,000

N

Lyall & Associates

NOTE:

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TUFLOW model results not shown within the footprint of existing buildings.

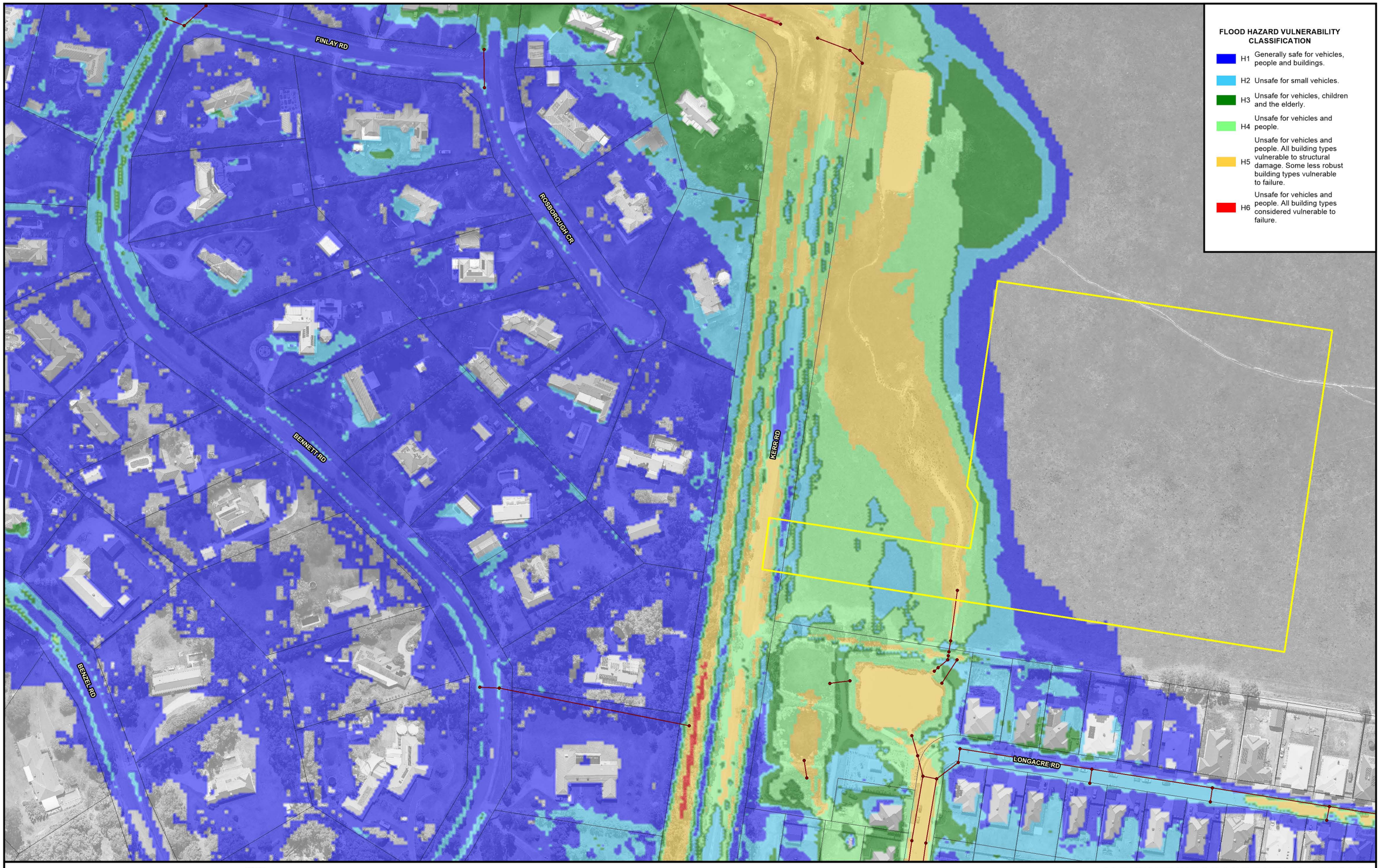
LEGEND

- Site Boundary
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 15
(Sheet 1 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
PMF - PRE-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

NOTE:

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

Site Boundary

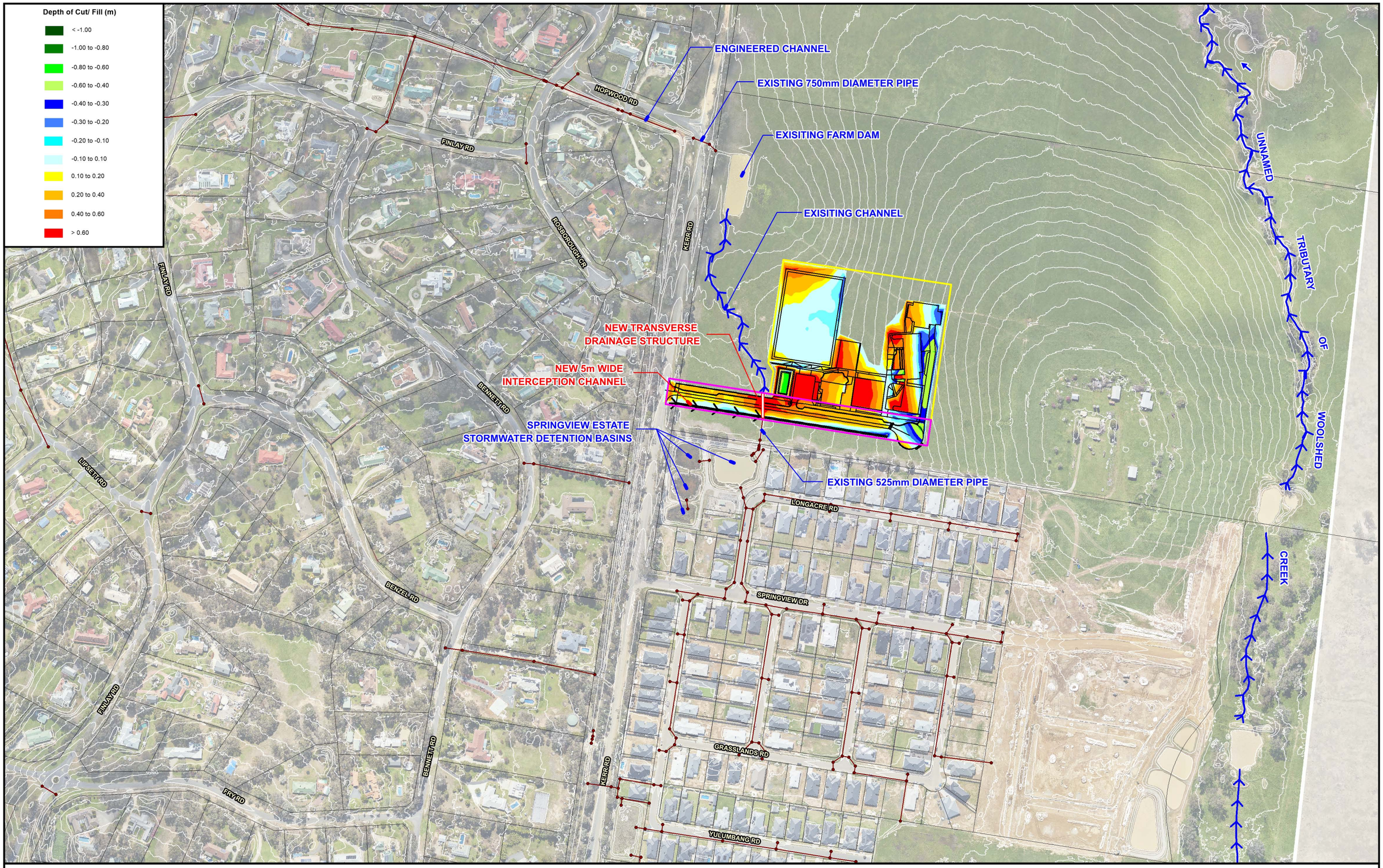
Modelled Stormwater Drainage System

Lyall & Associates

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 15
(Sheet 2 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
PMF - PRE-PUBLIC SCHOOL CONDITIONS



N

40 0 40 80 120 m

Scale: 1:4,000

Lyall & Associates

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Lidar-Based Ground Contour (0.5m Intervals)
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 16

PROPOSED DEPTH OF CUT AND FILL ASSOCIATED WITH PROPOSED PUBLIC SCHOOL

Indicative Depth of Inundation (m)

- < 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

REFER INSET

REFER SHEET 2

INSET

EIGHT MILE CREEK
NINE MILE CREEK
SEVEN MILE CREEK
WOOLSHED CREEK
DAVEY RD
WILLIAMS RD
TABLETOP RD
KYWANNA RD
WIGNELL RD
KERR RD
ETTAMOGAH RD
BROOKLYN DR
DAVENPORT RD
FINLAY RD
BENNETT RD
THURGOONA DR
FOREST DR
LITCHFIELD DR
HAWKSVIEW RD
ROSSBOROUGH CR
LONGACRE RD
SPRINGVIEW DR
GRASSLANDS RD
YULUMBANG RD
YARRABEE DR
FRY RD

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

NOTE:
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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

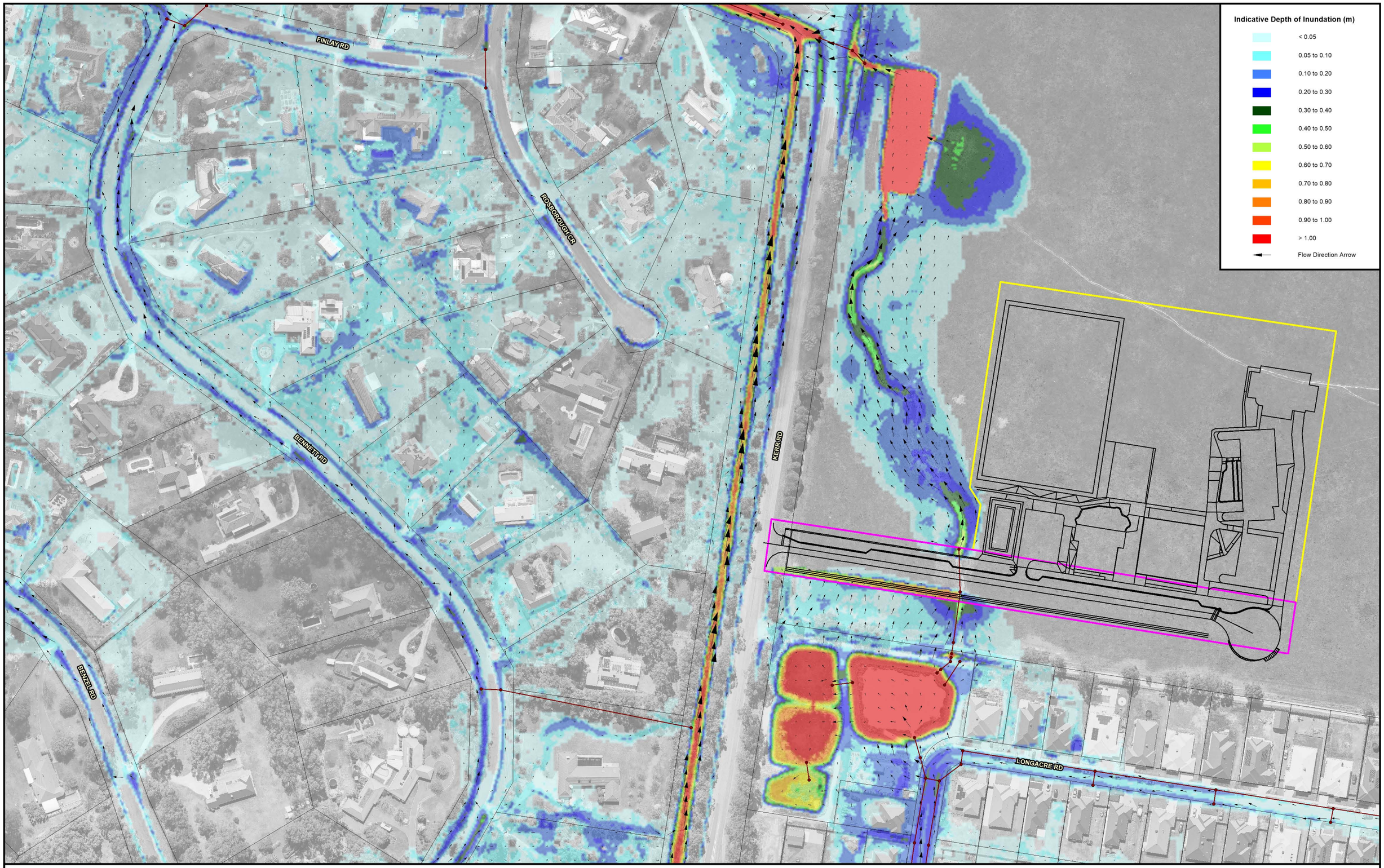
- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Design Strings

Lyall & Associates

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 17
(Sheet 1 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
1% AEP - POST-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

NOTE:

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL FLOOD IMPACT AND RISK ASSESSMENT

Figure 17
(Sheet 2 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
1% AEP - POST-PUBLIC SCHOOL CONDITIONS

FLOOD HAZARD VULNERABILITY CLASSIFICATION

H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

REFER INSET

REFER SHEET 2

INSET

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

Lyall & Associates

NOTE:
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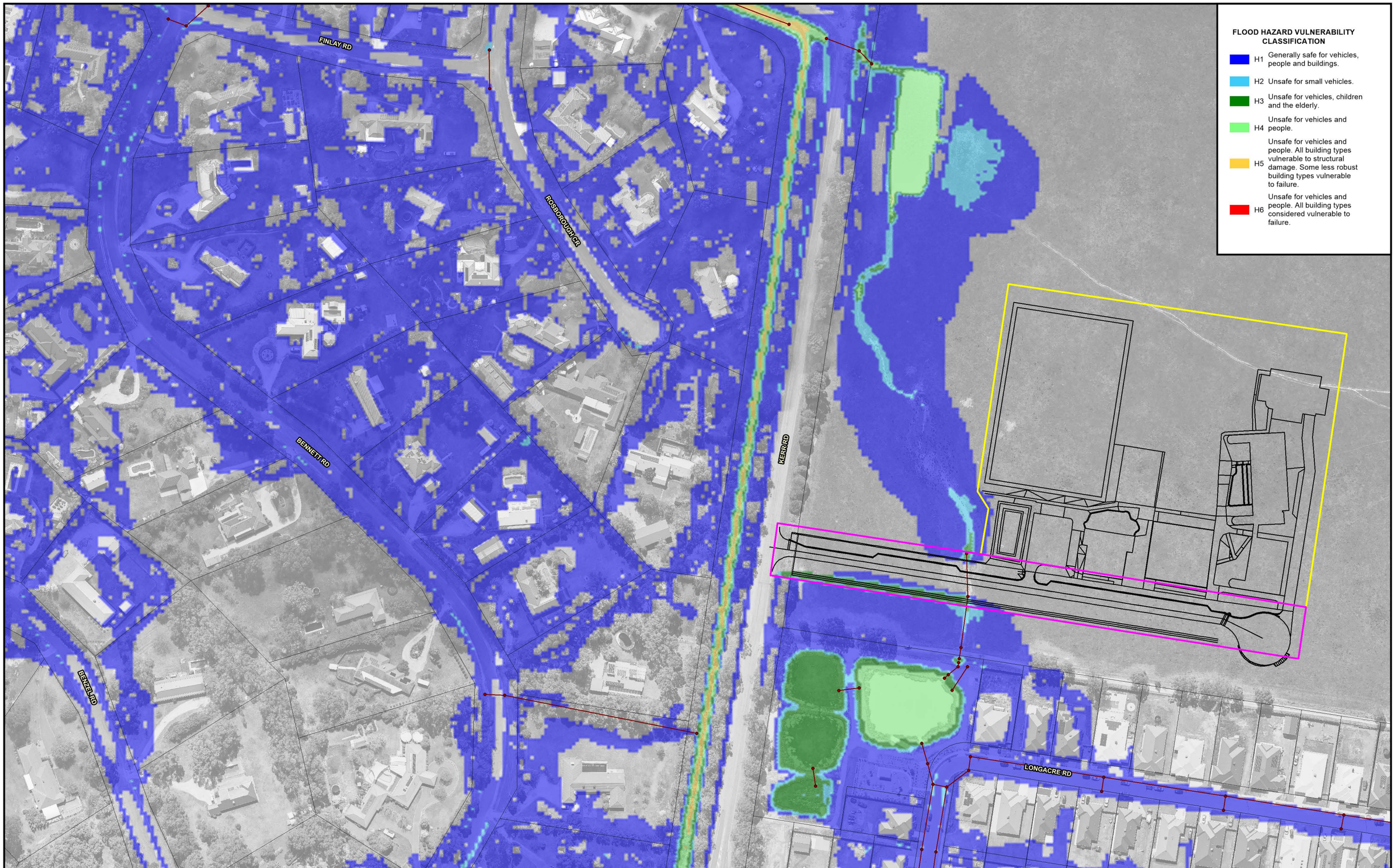
LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 18
(Sheet 1 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
1% AEP - POST-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 18
(Sheet 2 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
1% AEP - POST-PUBLIC SCHOOL CONDITIONS

Afflux (m)

- < -0.2
- -0.20 to -0.10
- -0.10 to -0.01
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.50
- > 1.00
- Land Rendered Flood Free as a Result of Change
- Additional Area of Land Flooded as a Result of Change

REFER INSET

REFER SHEET 2

INSET

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

NOTE:
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TUFLOW model results not shown within the footprint of existing buildings.

Lyall & Associates

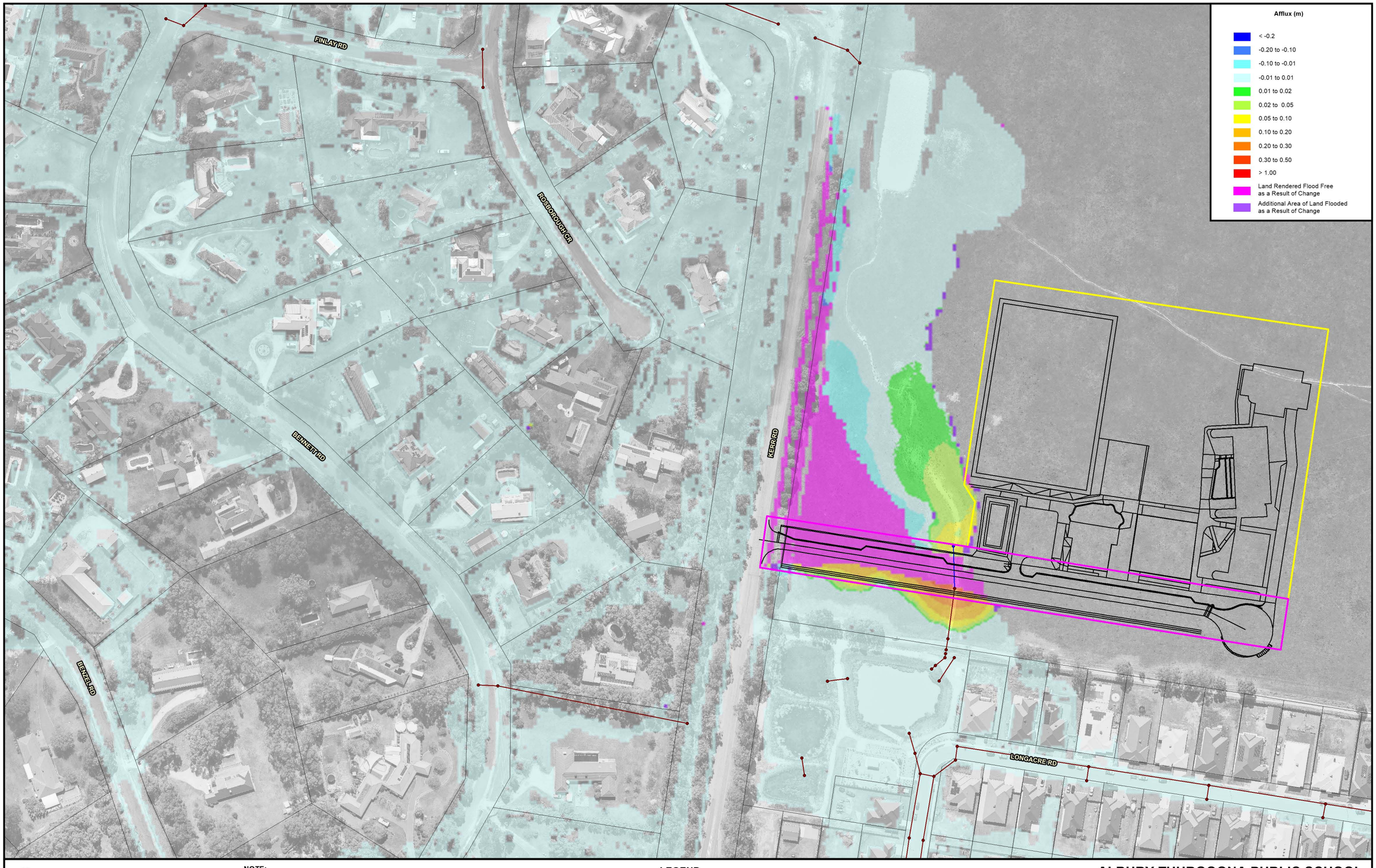
LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Proposed Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 19
(Sheet 1 of 2)

IMPACT OF PROPOSED PUBLIC SCHOOL ON FLOOD BEHAVIOUR
1% AEP



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Proposed Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 19
(Sheet 2 of 2)

IMPACT OF PROPOSED PUBLIC SCHOOL ON FLOOD BEHAVIOUR
1% AEP

Indicative Depth of Inundation (m)

- < 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

REFER INSET

REFER SHEET 2

INSET

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

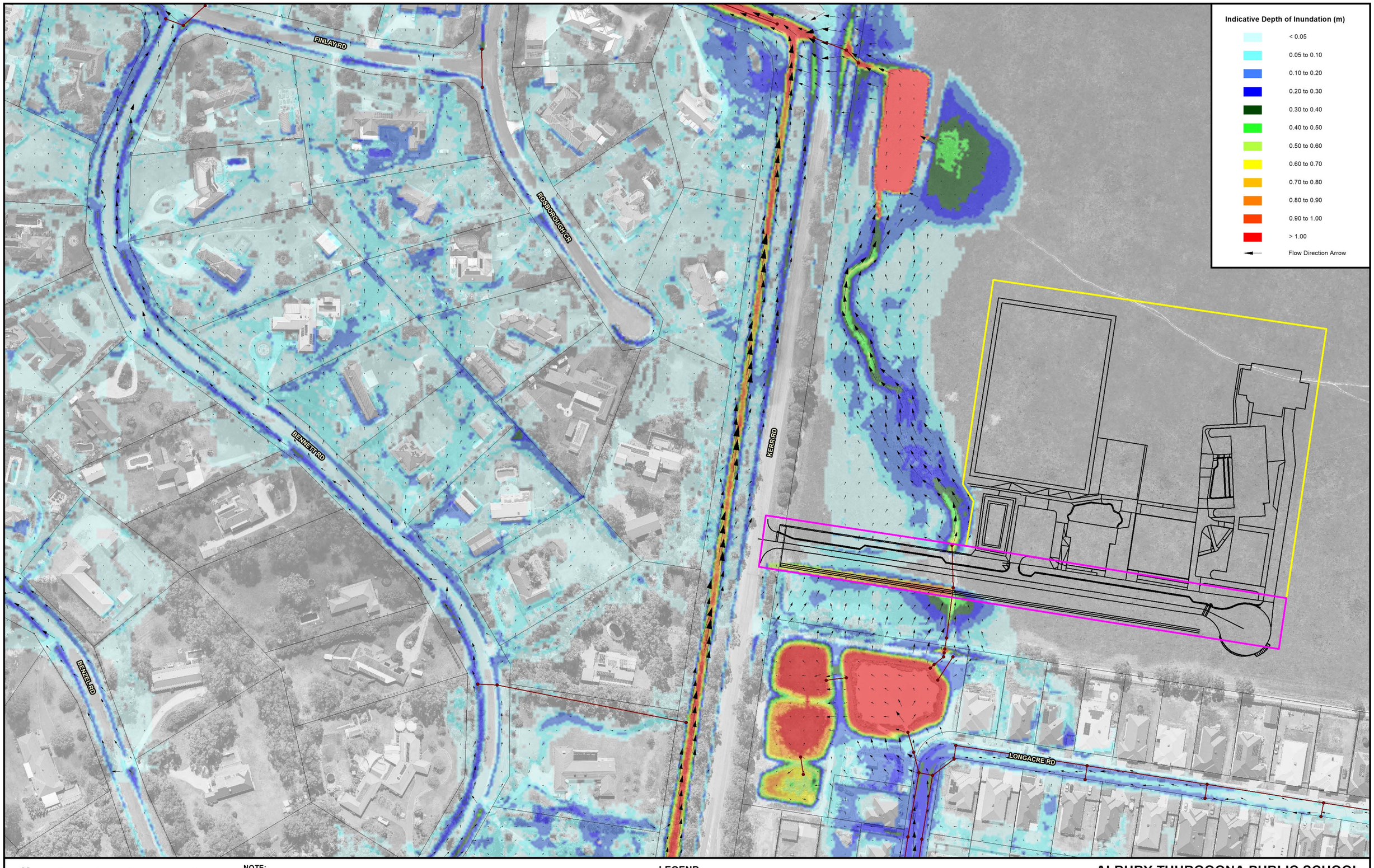
LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 20
(Sheet 1 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
0.5% AEP - POST-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

NOTE:

The ground surface model incorporated in TUFLOW is based on LiDAR survey which has been sampled on a 2 m (min) grid and does not necessarily incorporate localised features which can influence flooding behaviour in individual allotments.

Flood depths are therefore approximate only and require interpretation by a suitably qualified engineer to determine flooding behaviour in individual allotments. Any assessment of flooding in individual allotments may also require a site survey.

TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 20
(Sheet 2 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
0.5% AEP - POST-PUBLIC SCHOOL CONDITIONS

FLOOD HAZARD VULNERABILITY CLASSIFICATION

- H1 Generally safe for vehicles, people and buildings.
- H2 Unsafe for small vehicles.
- H3 Unsafe for vehicles, children and the elderly.
- H4 Unsafe for vehicles and people.
- H5 Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 Unsafe for vehicles and people. All building types considered vulnerable to failure.

REFER INSET

REFER SHEET 2

INSET

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

Lyall & Associates

NOTE:
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TUFLOW model results not shown within the footprint of existing buildings.

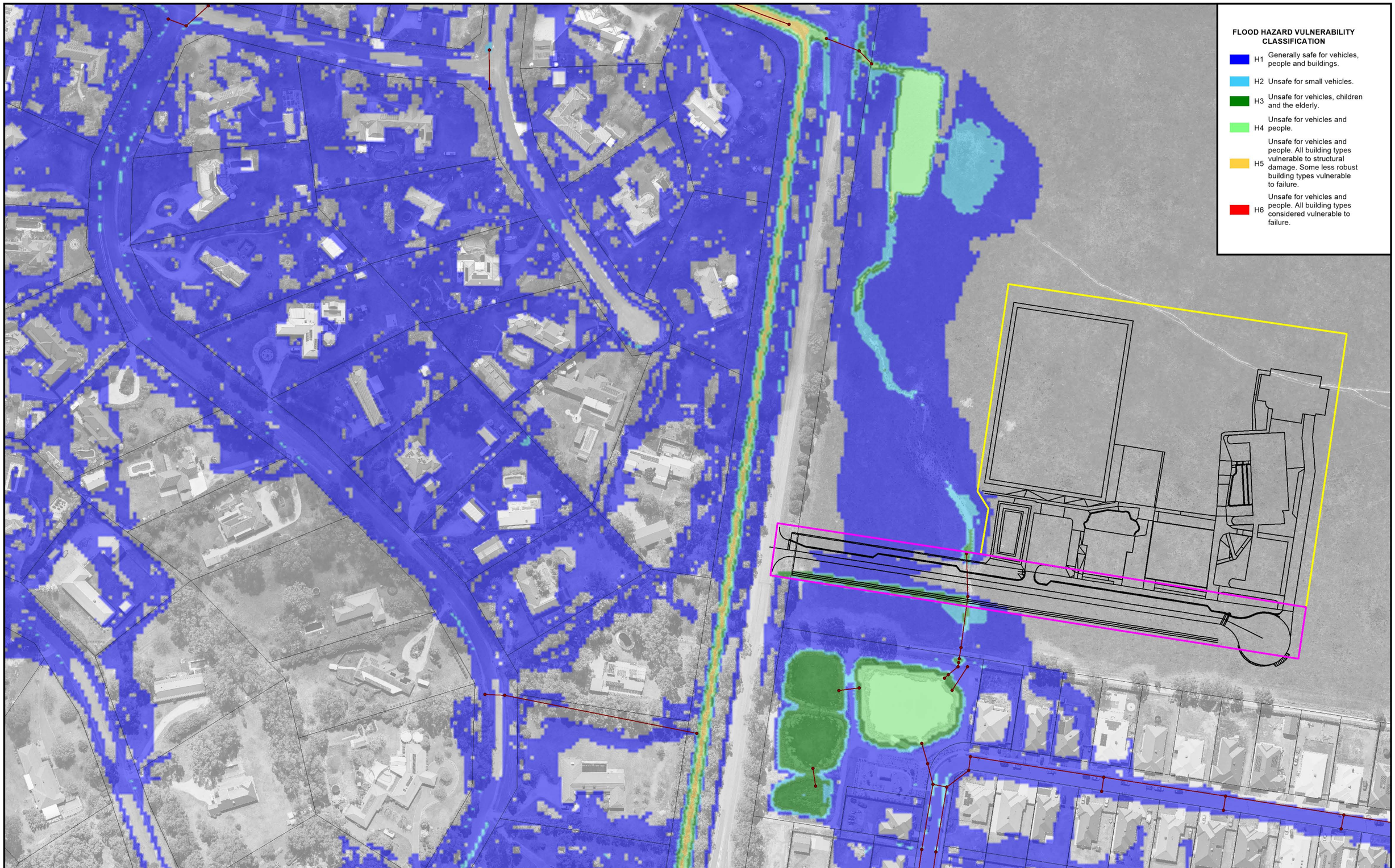
LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 21
(Sheet 1 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
0.5% AEP - POST-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 21
(Sheet 2 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
0.5% AEP - POST-PUBLIC SCHOOL CONDITIONS

Afflux (m)

- < -0.2
- -0.20 to -0.10
- -0.10 to -0.01
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.50
- > 1.00
- Land Rendered Flood Free as a Result of Change
- Additional Area of Land Flooded as a Result of Change

REFER INSET

REFER SHEET 2

INSET

EIGHT MILE CREEK
NINE MILE CREEK
SEVEN MILE CREEK
WOOLSHED CREEK
DAVEY RD
WILLIAMS RD
TABLETOP RD
KWANIWAN RD
WIGNELL RD
KERR RD
ETAMOGAH RD
BROOKLYN DR
DAVENPORT RD
THURGOONA DR
FOREST DR
LITCHFIELD DR
HAWKSVIEW RD
FRY RD
BENNETT RD
BENWELL RD
ROSSBOROUGH GR
LONGACRE RD
SPRINGVIEW DR
GRASSLANDS RD
YULUMBANG RD
YARRABEE DR

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

Lyall & Associates

NOTE:
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TUFLOW model results not shown within the footprint of existing buildings.

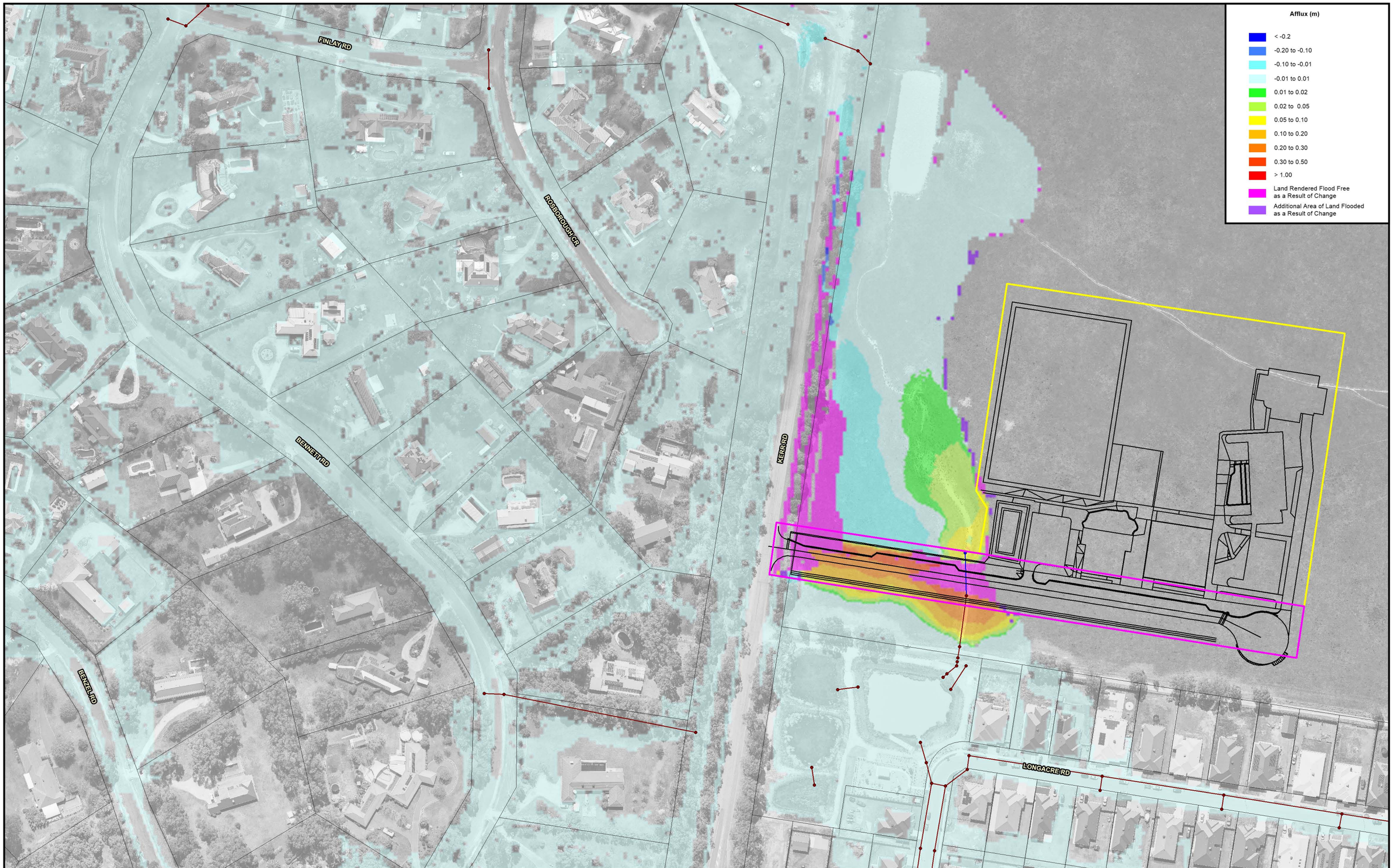
LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Proposed Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL FLOOD IMPACT AND RISK ASSESSMENT

Figure 22
(Sheet 1 of 2)

IMPACT OF PROPOSED PUBLIC SCHOOL ON FLOOD BEHAVIOUR
0.5% AEP



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Proposed Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 22
(Sheet 2 of 2)

IMPACT OF PROPOSED PUBLIC SCHOOL ON FLOOD BEHAVIOUR
0.5% AEP

Indicative Depth of Inundation (m)

- < 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

REFER INSET

REFER SHEET 2

INSET

300 0 300 600 1,200 m

Scale: 1:30,000

50 0 50 100 150 m

Scale: 1:5,000

N

NOTE:
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Flood depths are therefore approximate only and require interpretation by a suitably qualified engineer to determine flooding behaviour in individual allotments. Any assessment of flooding in individual allotments may also require a site survey.

TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

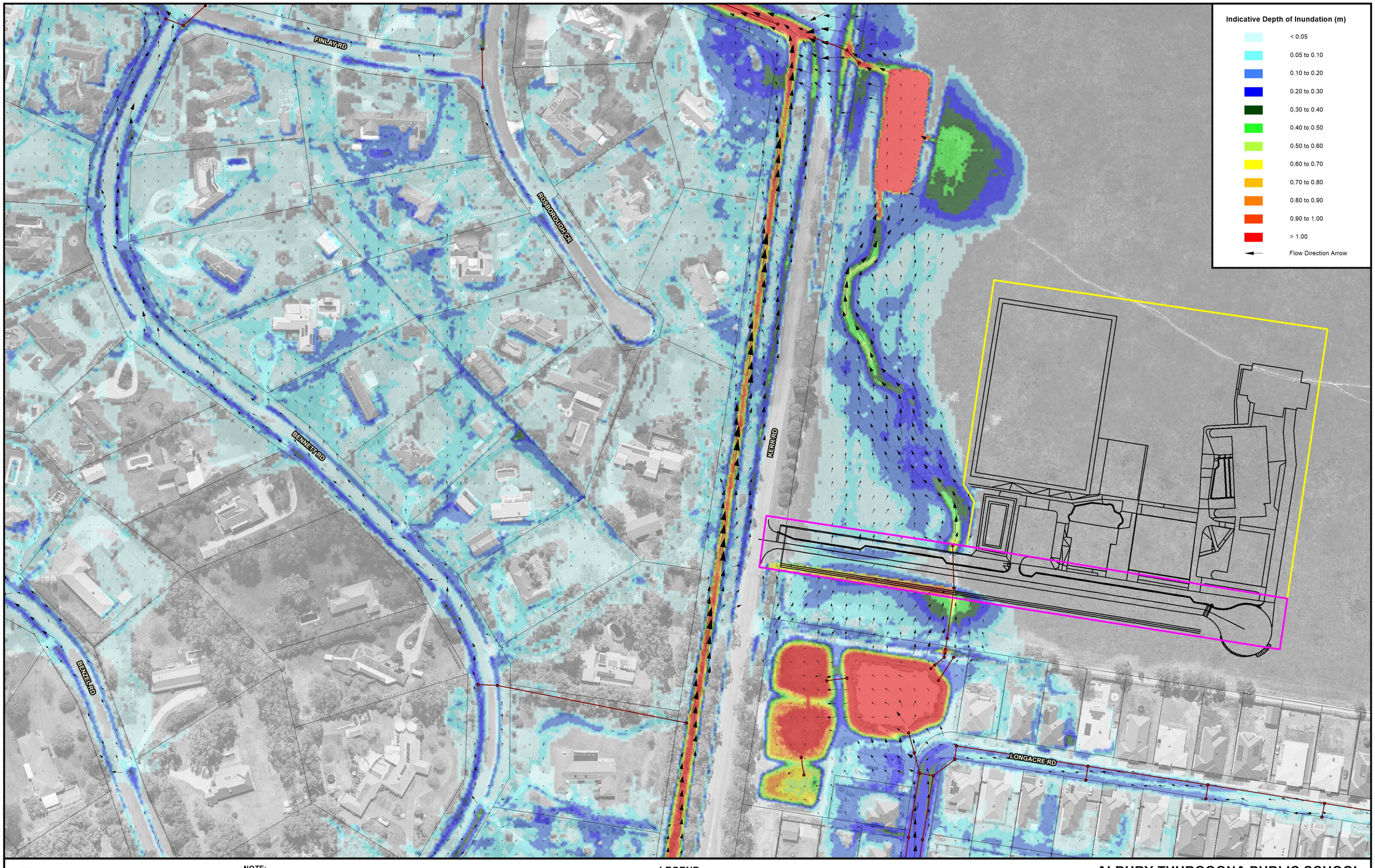
- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Design Strings

Lyall & Associates

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 23
(Sheet 1 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
0.2% AEP - POST-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL FLOOD IMPACT AND RISK ASSESSMENT

Figure 23
(Sheet 2 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
0.2% AEP - POST-PUBLIC SCHOOL CONDITIONS

FLOOD HAZARD VULNERABILITY CLASSIFICATION

H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

REFER INSET

REFER SHEET 2

INSET

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

Lyall & Associates

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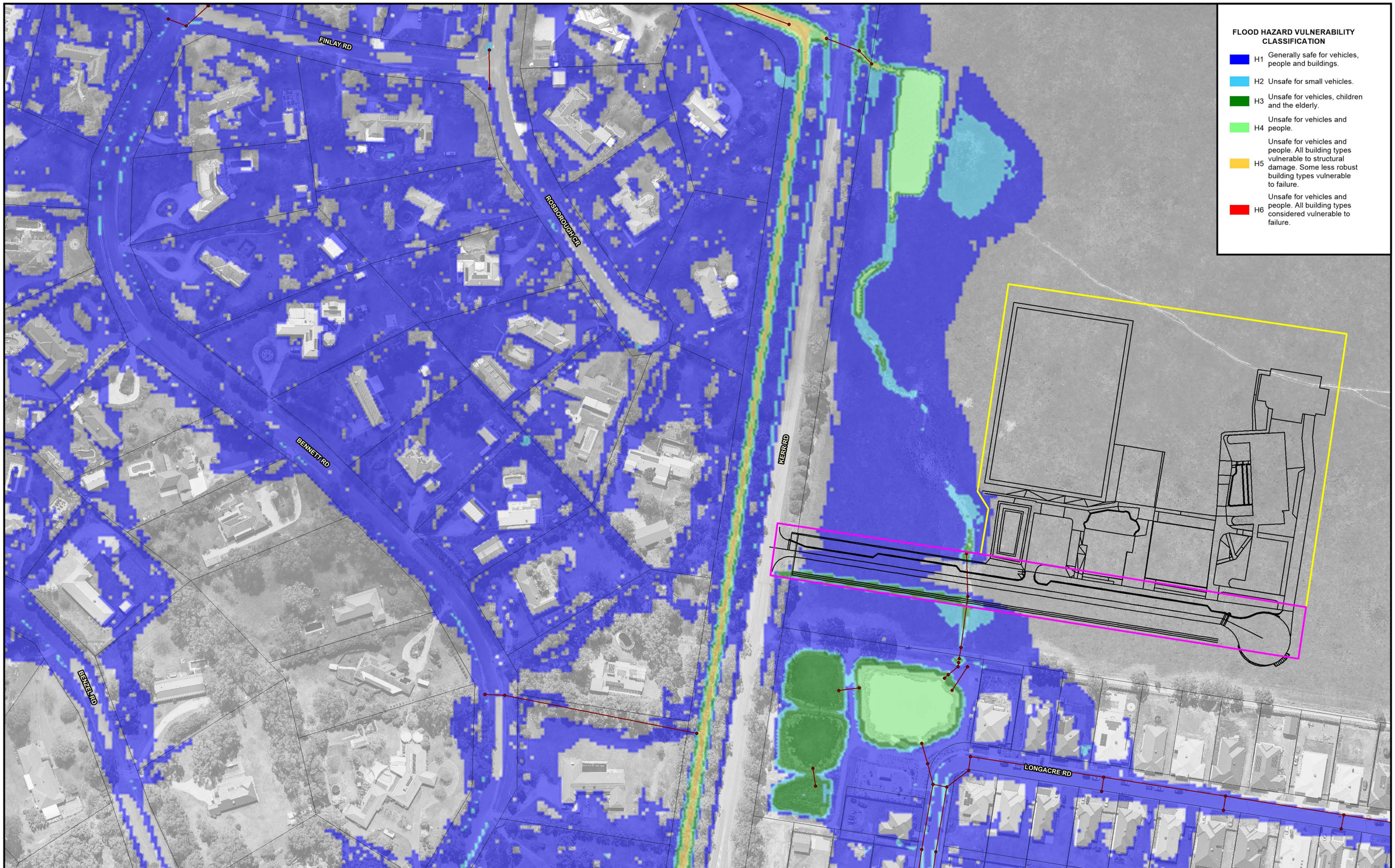
LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 24
(Sheet 1 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
0.2% AEP - POST-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

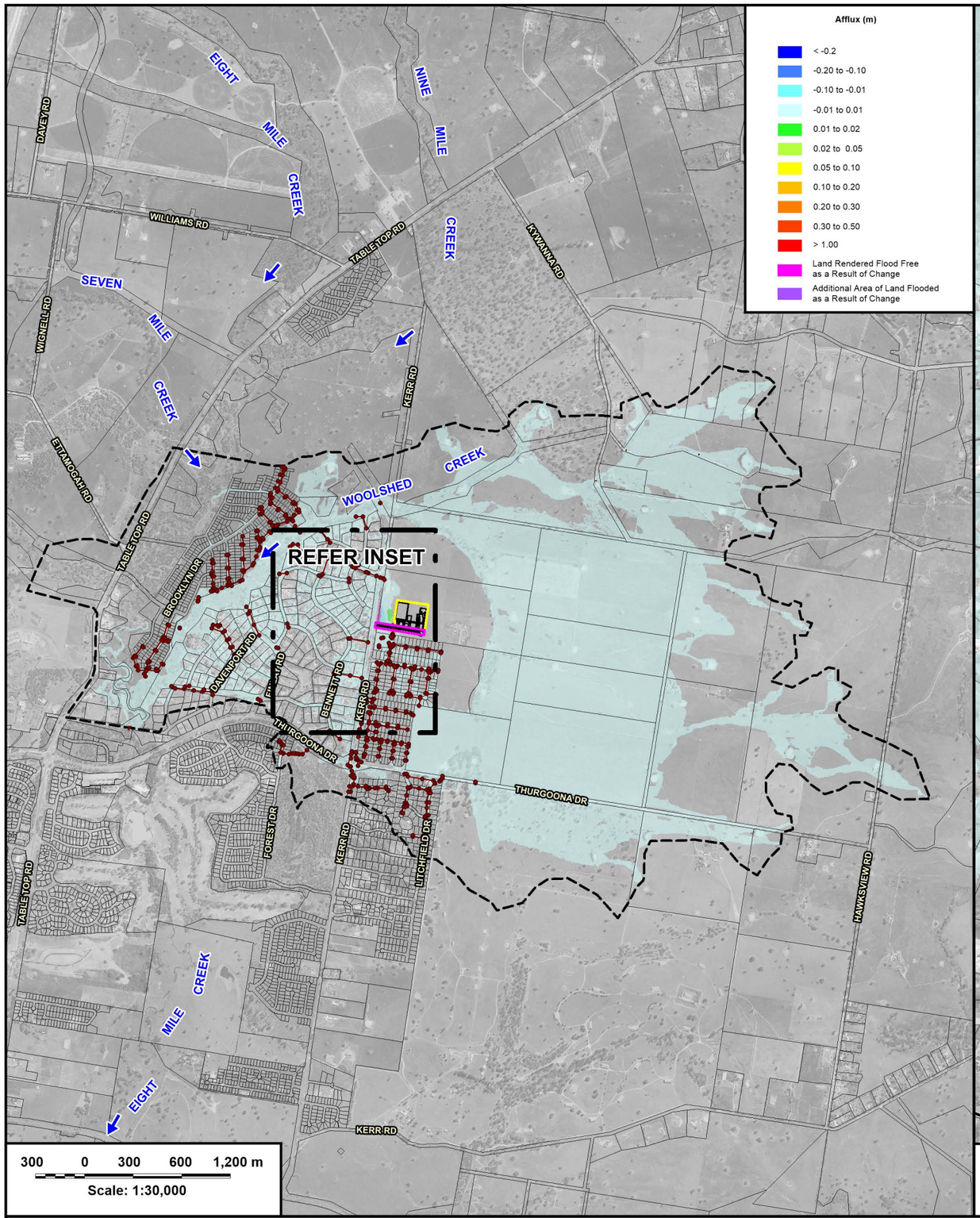
LEGEND

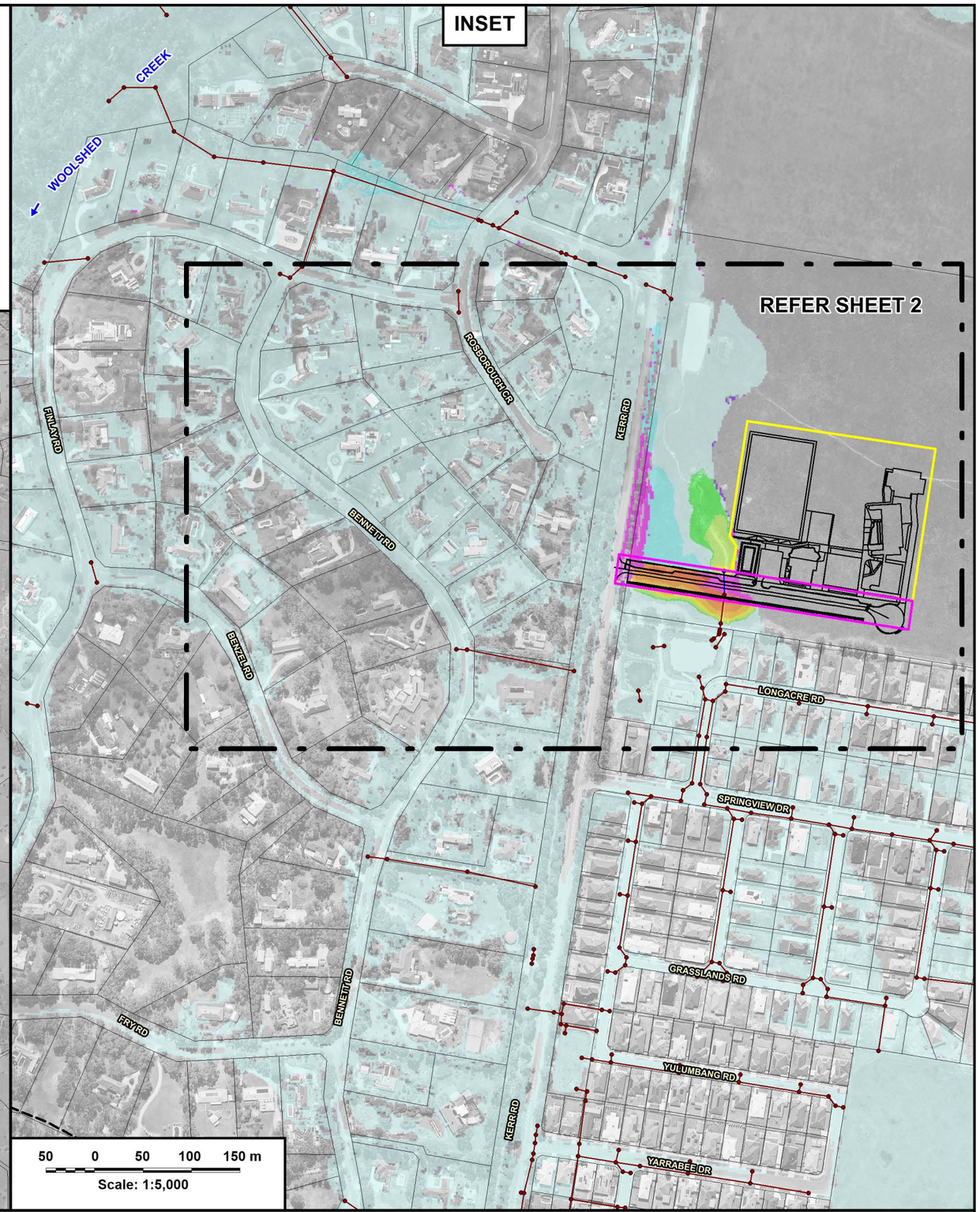
- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 24
(Sheet 2 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
0.2% AEP - POST-PUBLIC SCHOOL CONDITIONS





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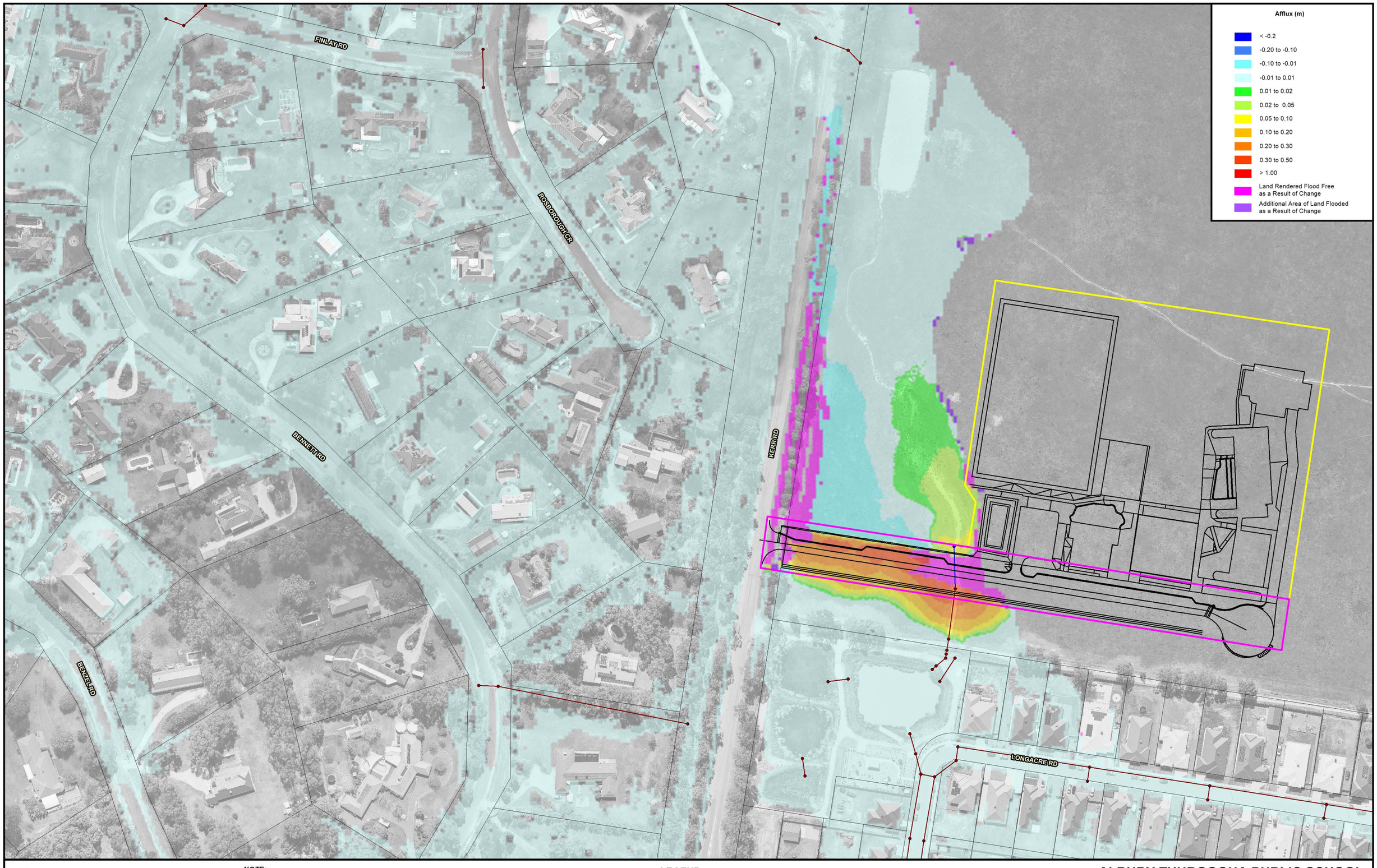
LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Proposed Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL FLOOD IMPACT AND RISK ASSESSMENT

Figure 25
(Sheet 1 of 2)

IMPACT OF PROPOSED PUBLIC SCHOOL ON FLOOD BEHAVIOUR
0.2% AEP



N

20 0 20 40 60 m

Scale: 1:2,000

Lyall & Associates

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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Proposed Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 25
(Sheet 2 of 2)

IMPACT OF PROPOSED PUBLIC SCHOOL ON FLOOD BEHAVIOUR
0.2% AEP

Indicative Depth of Inundation (m)

- < 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.40
- 0.40 to 0.50
- 0.50 to 0.60
- 0.60 to 0.70
- 0.70 to 0.80
- 0.80 to 0.90
- 0.90 to 1.00
- > 1.00

REFER INSET

REFER SHEET 2

INSET

300 0 300 600 1,200 m

Scale: 1:30,000

50 0 50 100 150 m

Scale: 1:5,000

N

NOTE:

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TUFLOW model results not shown within the footprint of existing buildings.

Lyall & Associates

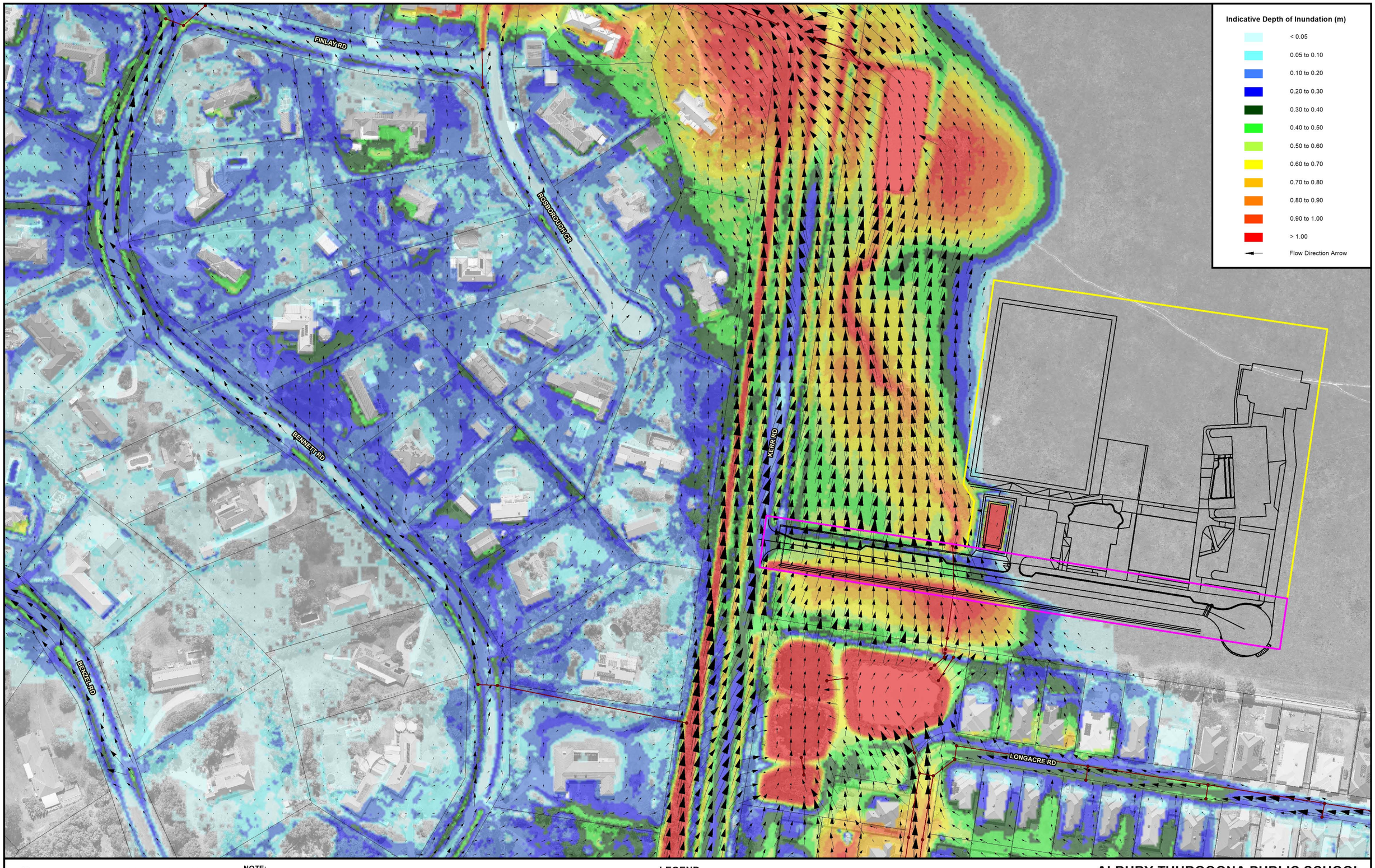
LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 26
(Sheet 1 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
PMF - POST-PUBLIC SCHOOL CONDITIONS



N

20 0 20 40 60 m

Scale: 1:2,000

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TUFLOW model results not shown within the footprint of existing buildings.

Lyall & Associates

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 26
(Sheet 2 of 2)

INDICATIVE EXTENT AND DEPTHS OF INUNDATION
PMF - POST-PUBLIC SCHOOL CONDITIONS

FLOOD HAZARD VULNERABILITY CLASSIFICATION

H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

REFER INSET

REFER SHEET 2

INSET

EIGHT MILE CREEK

NINE MILE CREEK

SEVEN MILE CREEK

WOOLSHED CREEK

DAVEY RD
WILLIAMS RD
WIGNELL RD
ETAMOGAH RD
TABLE TOP RD
BROOKLYN DR
DAVENPORT RD
FINLAY RD
BENNETT RD
KERR RD
THURGOONA DR
FOREST DR
LITCHFIELD DR
KYWANNA RD
HAWKSVIEW RD
ROSSBOROUGH CR
BENNETT RD
BENNELL RD
FRY RD
LONGACRE RD
SPRINGVIEW DR
GRASSLANDS RD
YULUMBANG RD
YARRABEE DR

300 0 300 600 1,200 m
Scale: 1:30,000

50 0 50 100 150 m
Scale: 1:5,000

N

Lyall & Associates

NOTE:
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TUFLOW model results not shown within the footprint of existing buildings.

LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 27
(Sheet 1 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
PMF - POST-PUBLIC SCHOOL CONDITIONS

FINLAY RD

ROSBOROUGH CR

BENNETT RD

BENZEL RD

KERR RD

LONGACRE RD

FLOOD HAZARD VULNERABILITY CLASSIFICATION

H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles, children and the elderly.
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N

20 0 20 40 60 m

Scale: 1:2,000

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LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Design Strings

Lyall & Associates

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 27
(Sheet 2 of 2)

FLOOD HAZARD VULNERABILITY CLASSIFICATION
PMF - POST-PUBLIC SCHOOL CONDITIONS

Afflux (m)

- < -0.2
- -0.20 to -0.10
- -0.10 to -0.01
- -0.01 to 0.01
- 0.01 to 0.02
- 0.02 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.30
- 0.30 to 0.50
- > 1.00
- Land Rendered Flood Free as a Result of Change
- Additional Area of Land Flooded as a Result of Change

REFER INSET

REFER SHEET 2

INSET

300 0 300 600 1,200 m

Scale: 1:30,000

50 0 50 100 150 m

Scale: 1:5,000

N

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Lyall & Associates

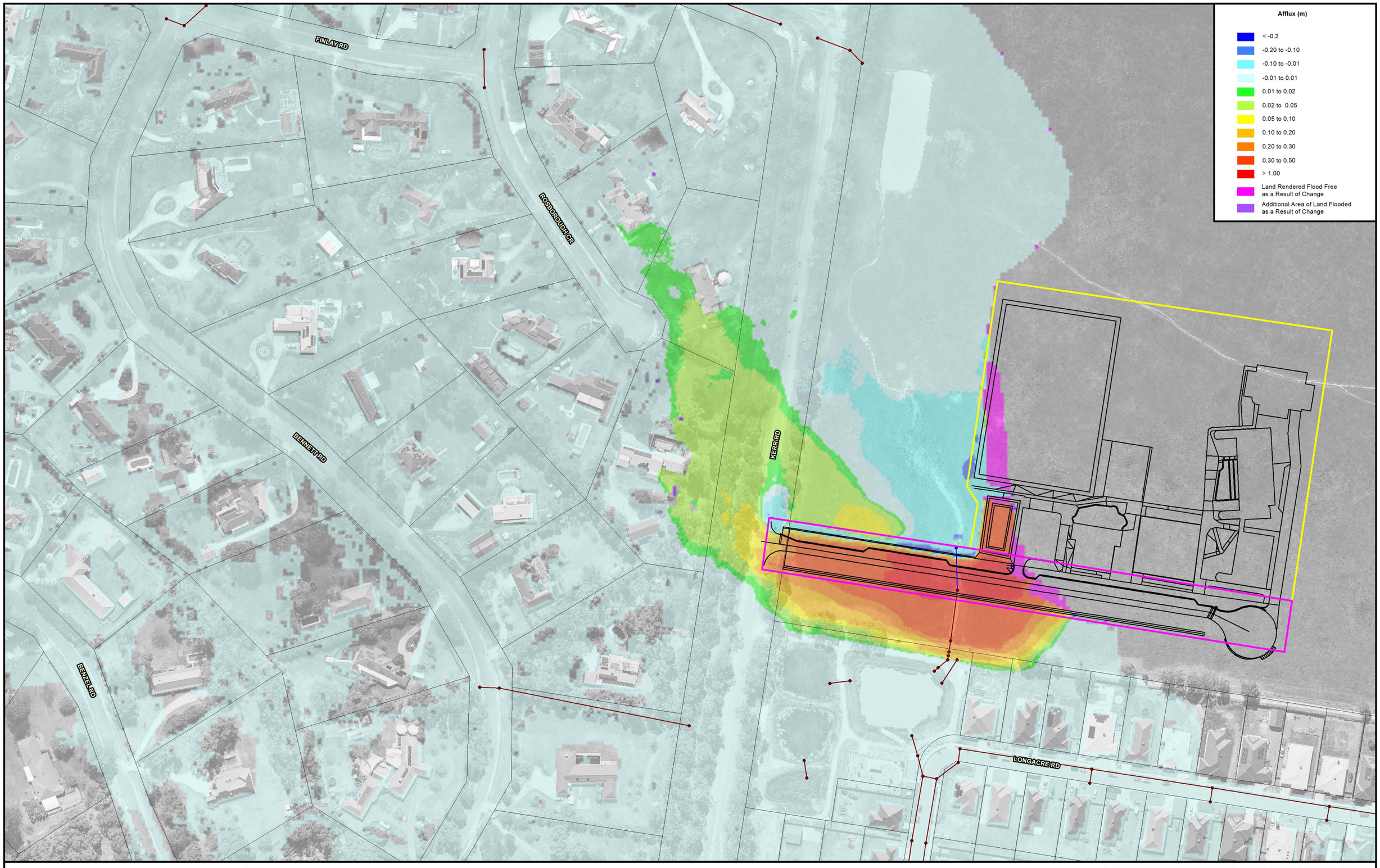
LEGEND

- School Site
- Future Road Reserve
- Two-Dimensional Model Boundary
- Modelled Stormwater Drainage System
- Proposed Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL FLOOD IMPACT AND RISK ASSESSMENT

Figure 28
(Sheet 1 of 2)

IMPACT OF PROPOSED PUBLIC SCHOOL ON FLOOD BEHAVIOUR
PMF



N

20 0 20 40 60 m

Scale: 1:2,000

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Lyall & Associates

LEGEND

- School Site
- Future Road Reserve
- Modelled Stormwater Drainage System
- Proposed Stormwater Drainage System
- Design Strings

ALBURY THURGOONA PUBLIC SCHOOL
FLOOD IMPACT AND RISK ASSESSMENT

Figure 28
(Sheet 2 of 2)

IMPACT OF PROPOSED PUBLIC SCHOOL ON FLOOD BEHAVIOUR
PMF

ANNEXURE A

PLANS SHOWING KEY FEATURES OF SPRINGVIEW ESTATE STORMWATER DETENTION BASINS

ACCURACIES
ALL 'AS CONSTRUCTED' AND EXISTING SURFACE LEVELS MUST BE QUOTED TO TWO DECIMAL PLACES OF A METRE, WITH A RELATIVE ACCURACY TOLERANCE OF +/− 0.02M IN RESPECT TO THE ADOPTED DATUM POINTS.

PROPOSED SERVICES

- PROPOSED DRAINAGE
- PROPOSED SEWER
- SRM — PROPOSED SEWER RISINGMAIN
- PROPOSED WATER
- PROPOSED GAS
- PROPOSED TELSTRA
- PROPOSED POWER
- E+T — PROPOSED POWER & TELSTRA
- SSD — PROPOSED SUBSOIL DRAIN

H2.5 0 5 10 15
SCALE 1:250 @ A1 1:500 @ A3

N W E S

KERR ROAD

1.5m WIDE ACCESS TRACK. RAMP DOWN ACCESS TO KERR ROAD. INSTALL BOLLARD EITHER SIDE OF TRACK AT THE BOUNDARY

GRAVEL MAINTENANCE TRACK MIN 3.0m WIDTH WITH 150mm CLASS 3 FCR COMPACTED TO 95% MMDD ±2.0% OMC

RETAINING WALL TOP−RL 193.75 VARYING OVERALL HEIGHT

DRAINAGE NOTES:−
−ALL INTERNAL DRAINAGE CALCULATIONS HAVE BEEN UNDERTAKEN WITH ARD DESIGN SOFTWARE (RATIONAL DESIGN METHOD)
−BASIN DESIGN HAS BEEN UNDERTAKEN WITH WATERCOM DRAINS SOFTWARE (SUCCESSOR TO THE ILSAX PROGRAM)

ROCK LINED SPILLWAY. REFER TO DETAIL ON SHEET 64. 150−200mm NOMINAL SIZE ROCK WITH GEOTEXTILE FILTER FABRIC UNDERLAY. 0−150mm GRADED MATERIAL TO SEAL VOIDS BETWEEN LARGER LINING ROCKS.

TAIL OUT DRAIN REFER TO SHEET 61

SPILLWAY DETAIL	
OVERFLOW LEVEL	193.50
WEIR WIDTH	4.0m
10% OVERLAND FLOW	NILL
10% OVERLAND DEPTH	NILL
1% OVERLAND FLOW	0.853m³/s
1% OVERLAND DEPTH	0.057m

BASIN OUTLET (LINE 33)	
525ø RCP	13.1m @ 0.60%
(10%)_Qmax	0.501m³/s
(10%)_Vmax	2.46m/s

WATER LEVEL RL 193.10
WETLANDS BASE RL 192.80

TRACK / BASIN BANK RL 193.75

1% AEP WATER LEVEL RL 193.557
10% AEP WATER LEVEL RL 193.05

125mm THICK 25MPa CONCRETE SPILLWAY WITH SL82 MESH PLACED CENTRALLY

OVERFLOW RL 193.50

BASIN BASE RL 192.00

REFER TO SHEETS 63−65 FOR ADDITIONAL DETAILS

REFER TO SHEET 63 FOR ADDITIONAL OVERFLOW STRUCTURE DETAILS.

INVERT LEVEL RL 192.80

SV 1000 PVC

INVERT LEVEL RL 192.70

INVERT LEVEL RL 192.00

1200 RCP

1000 STORMPRO

32.3 PIP TYPE B

CONCRETE ACCESS PAD. 3.0m x 5.0m. 180mm THICK WITH LAYER OF SL72 MESH (30MPa). FINAL LOCATION TO BE COMFIRMED ONSITE WITH SPS

BASIN INLET (LINE 32)		
300ø STORMPRO	DESIGN FLOW
ARD DESIGN	67.9 L/s

SECTION No.1

WETLANDS CELL 3

TEMPORARY SEDIMENT BASIN/ DETENTION BASIN

SILT SUMP RL 191.50

SECTION No.5

REFER TO SHEETS 63−65 FOR ADDITIONAL DETAILS

CONCRETE ACCESS TRACK MIN 3.0m WIDTH GENERALLY IN ACCORDANCE WITH ACC INDUSTRIAL DRIVEWAY STD−R−38.

ACCESS TRACK (9.5%)

10% AEP WATER LEVEL RL 193.05
1% AEP WATER LEVEL RL 193.557

TRACK / BASIN BANK − VARIES

BASIN BASE RL 192.00

INVERT LEVEL RL 192.00

SRM

LOT 402

OVERFLOW RL 193.30

INSTALL ROCLA IRRIGATION L−STOP UNIT (OR SIMILAR). OPENING SIZE 600x500.

TRACK / BASIN BANK RL 193.75

BASIN BASE RL 192.00

WETLANDS CELL 2

WATER LEVEL RL 193.10
WETLANDS BASE RL 192.80

SECTION No.2

INVERT LEVEL RL 192.80

WETLANDS BASE RL 192.80

WATER LEVEL RL 193.10

TRACK / WETLANDS BANK − VARIES

BASIN INLET (LINE 1)
1200ø RCP DESIGN FLOW
ARD DESIGN 1833 L/s

ACCESS DRIVEWAY IN ACCORDANCE WITH ACC STANDARD LIGHT INDUSTRIAL CROSSING STD−R−38.

2000 RCP

GPT

ACCESS ROAD No.4

SEE SHEET 65 FOR WETLAND CONNECTION DETAILS

OVERFLOW RL 193.30

SV 1000 PVC

INVERT LEVEL RL 192.90

LOCALISED SHAPING OVER WETLAND PIPES

LOT 401 PLAYGROUND BY OTHERS

CONCRETE ACCESS PAD. 4.0m x 4.0m (INCLUDING GPT LID). 180mm THICK WITH LAYER OF SL72 MESH (30MPa)

PIP TYPE F

LOT 427

SECTION No.4

WETLANDS CELL 1

DEEP MARSH RL 192.60

SHALLOW MARSH RL 193.00

PERMEABLE ROCK WALL

INVERT LEVEL RL 192.80

WETLANDS BASE RL 193.03

WATER LEVEL RL 193.30

SECTION No.3

1500 PIP

WETLANDS INLET (LOT 428)
150ø PVC DESIGN FLOW
ARD DESIGN 11.41 L/s

BASIN OUTPUT RESULTS	
10% HWL	193.050
10% DEPTH	1.050m
10% FREEBOARD	0.700m
1% HWL	193.557
1% DEPTH	1.557m
1% FREEBOARD	0.193m

LOT 428

PREDEVELOPED CATCHMENT	
PAVED/GRASS	(20.7Ha) 0%/100%
CATCHMENT LENGTH	400m
CATCHMENT SLOPE	2.5%
CALCULATED Tc	10mins

SEDIMENT STORAGE ZONE & SETTLING ZONE VOLUME

PREDEVELOPED Vs DEVELOPED	
10% PREDEVELOPED	0.534m³/s
10% DEVELOPED	1.58m³/s
1% PREDEVELOPED	1.95m³/s
1% DEVELOPED	3.07m³/s

BASIN INPUT DATA	
CATCHMENT	AREA (Ha)
TOTAL	25.48
DISTURBED	6.281

WETLANDS INLET (LINE 30)
300ø PVC DESIGN FLOW
ARD DESIGN 46.26 L/s

CONCRETE ACCESS PAD. 2.5m x 4.0m. 180mm THICK WITH LAYER OF SL72 MESH (30MPa)

BYPASS PIT. REFER TO SHEET 65 FOR DETAILS

ROCK BEACHING. 200−300mm NOMINAL SIZE ROCK WITH GEOFABRIC FILTER UNDERLAY (5m²). 0−150mm GRADED MATERIAL TO SEAL VOIDS BETWEEN LARGER ROCKS. SHAPE ROCKS TO ACT AS A DISSIPATOR. BLEND INTO SURROUNDING GROUND.

10% STORM EVENT	
HWL	193.550
PIPE OUTLET	0.501m³/s
DEPTH	1.050m
FREEBOARD	0.700m
SPILLWAY FLOW	NILL
PREDEVELOPED	0.534m³/s

1% STORM EVENT	
HWL	194.057
PIPE OUTLET	0.642m³/s
DEPTH	1.557m
FREEBOARD	0.193m
SPILLWAY FLOW	0.853m³/s
TOTAL OUTLET	1.495m³/s
PREDEVELOPED	1.950m³/s

BASIN FACTORS	
R	2500
K	0.05
LS	0.1
P	1.3
C	1.0
RUNOFF COEFFIECENT	0.56
5 DAY TOTAL RAINFALL DEPTH	23.7mm

BASIN OUTPUT RESULTS	
SETTLING ZONE VOLUME	3382m³
SEDIMENT STORAGE ZONE VOLUME	13m³
TOTAL VOLUME	3395m³

LOT 101 **LOT 102** **LOT 103** **LOT 104**

31.1 PIP TYPE E
30.4 PIP TYPE D
30.5 PIP TYPE D

SPRINGVIEW ESTATE STAGES 1−4 KERR RD, THURGOONA

WETLANDS & BASIN LAYOUT PLAN

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AMENDMENTS\ACTIONS:−	DATE:
1. FOR APPROVAL ISSUE	12/03/21
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3. DPIE WETLAND AMENDMENTS	20/08/21
4. ELEC & NBN SERVICES UPDATE	1/09/21
5. AS CONSTRUCTED ISSUE	15/09/22
6. AS CONSTRUCTED ISSUE V2	05/10/22

PLEASE NOTE :

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ONLY THOSE TREES & SHRUBS THAT ARE MARKED FOR REMOVAL SHALL BE REMOVED.

ALL TRENCHES IN LOTS/NATURE STRIPS ARE TO BE RESTORED WITH A MINIMUM OF 100mm THICK TOPSOIL.

THE FACE OF KERBS ABOVE CONDUIT LOCATIONS ARE TO BE MARKED WITH A NEAT 'E' 'W' 'G' AND 'T' AS APPROPRIATE.

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AS CONSTRUCTED ISSUE
DATE:− 05/10/2022

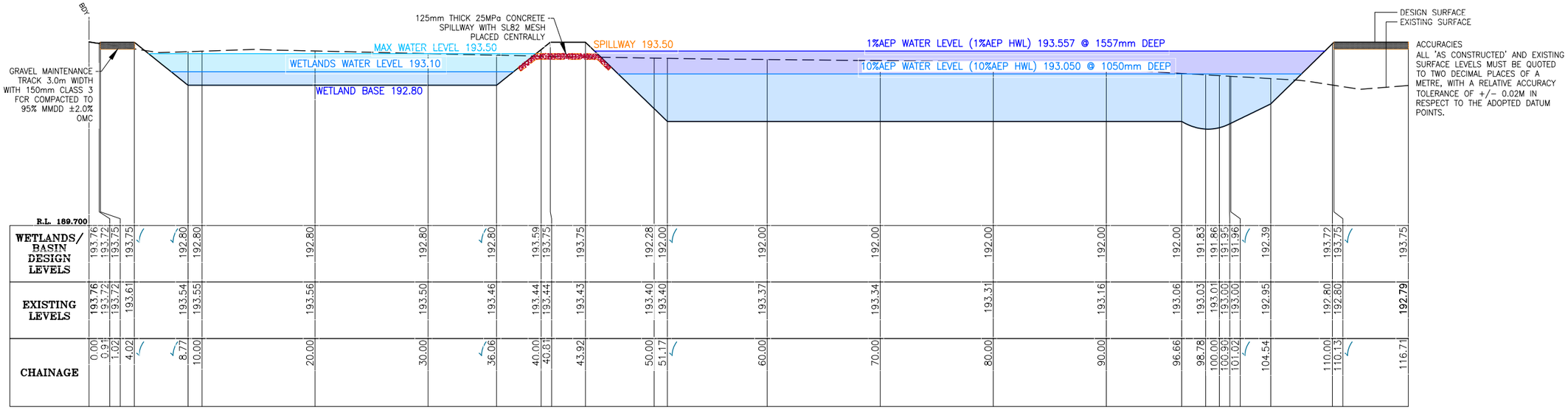
ESLER CHECKED:
S.ALTMEIER 10/03/2021

AUTHORITY APPROVED:
ACC DC 10.2020.37505.1

DATUM:	DRAWN:	DATE:
A.H.D	B.WALLACE	DEC−2020

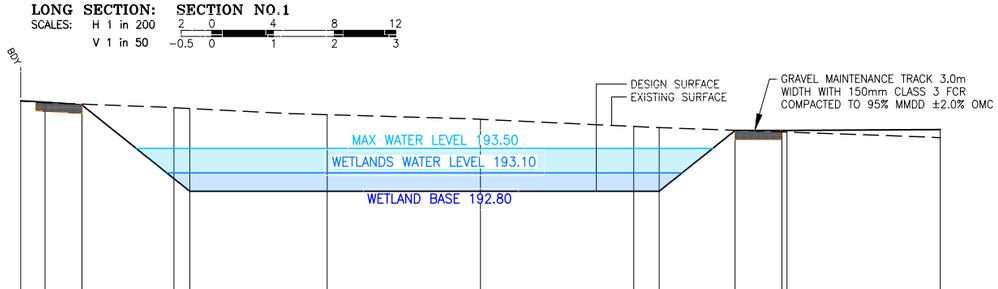
PROJECT No: 00017425 REV: 6

SHEET 62 OF 89 A1



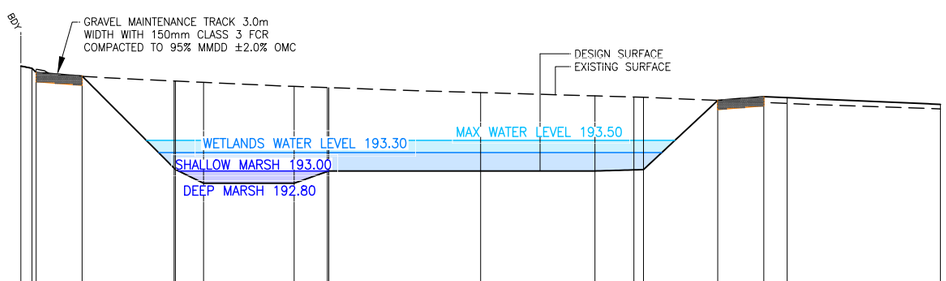
CHAINAGE	WETLANDS/ BASIN DESIGN LEVELS	EXISTING LEVELS
0.00	193.76	193.76
0.91	193.72	193.72
1.02	193.72	193.72
4.02	193.75	193.61
8.77	192.80	193.54
10.00	192.80	193.55
20.00	192.80	193.56
30.00	192.80	193.50
36.06	192.80	193.46
40.00	193.59	193.44
40.81	193.75	193.44
43.92	193.75	193.43
50.00	192.28	193.40
51.17	192.00	193.40
60.00	192.00	193.37
70.00	192.00	193.34
80.00	192.00	193.31
90.00	192.00	193.16
96.66	192.00	193.06
98.78	191.83	193.03
100.00	191.86	193.01
100.90	191.95	193.00
101.02	191.96	193.00
104.54	192.39	192.95
110.00	193.72	192.80
110.13	193.75	192.80
116.71	193.75	192.79

LONG SECTION: SECTION NO.1
SCALES: H 1 in 200, V 1 in 50



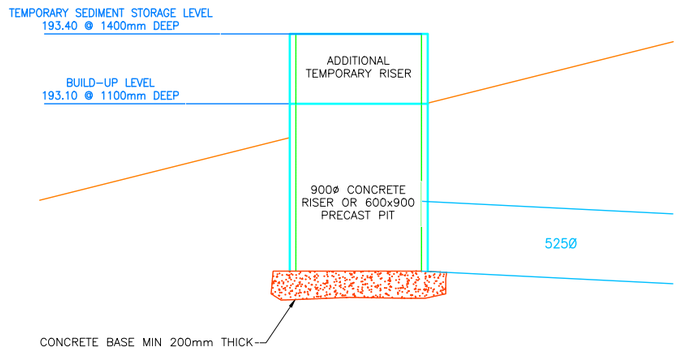
CHAINAGE	WETLANDS/ BASIN DESIGN LEVELS	EXISTING LEVELS
0.00	194.27	194.27
1.59	194.25	194.24
4.00	194.21	194.22
10.00	193.01	194.16
11.03	192.80	194.15
20.00	192.80	194.05
30.00	192.80	193.97
40.00	192.80	193.86
41.66	192.80	193.84
46.62	193.79	193.79
49.67	193.79	193.77
50.00	193.79	193.76
60.00	193.81	193.67

LONG SECTION: SECTION NO.2
SCALES: H 1 in 200, V 1 in 50

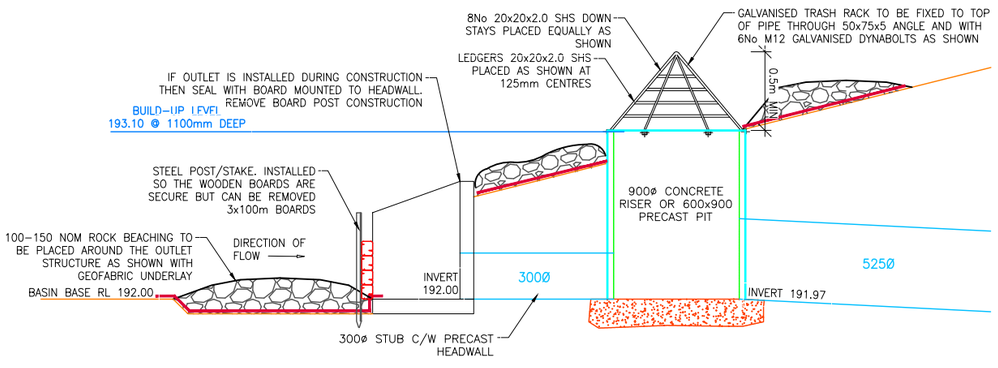


CHAINAGE	WETLANDS/ BASIN DESIGN LEVELS	EXISTING LEVELS
0.00	194.71	194.71
0.73	194.67	194.67
1.00	194.61	194.66
4.00	194.55	194.54
10.00	193.05	194.47
10.08	193.02	194.47
11.92	192.80	194.44
17.83	192.80	194.38
20.00	192.99	194.36
20.09	193.00	194.36
30.00	193.00	194.28
37.46	193.00	194.22
40.00	193.02	194.21
40.62	193.02	194.20
45.47	194.15	194.15
48.47	194.21	194.12
50.00	194.19	194.10
60.00	194.09	194.01

LONG SECTION: SECTION NO.3
SCALES: H 1 in 200, V 1 in 50



OVERFLOW STRUCTURE DURING CONSTRUCTION
SCALE: NTS



OVERFLOW STRUCTURE – TO NATURAL WATERCOURSE POST CONSTRUCTION
SCALE: NTS

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WETLANDS & BASIN SECTION VIEWS

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AS CONSTRUCTED ISSUE
DATE:– 05/10/2022

ESLER CHECKED: S.ALTMEIER 10/03/2021

AUTHORITY APPROVED: ACC DC 10.2020.37505.1

DATUM:	DRAWN:	DATE:
A.H.D	B.WALLACE	DEC–2020

PROJECT No: 00017425 REV: 6

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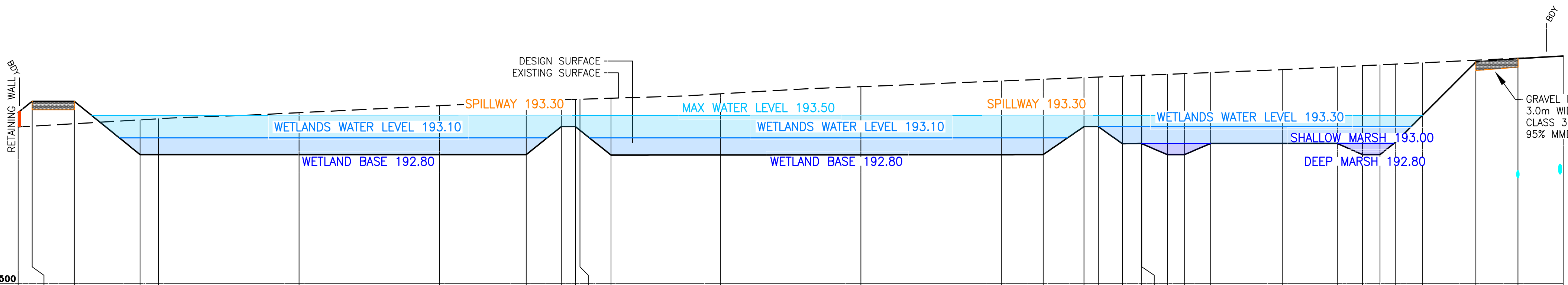
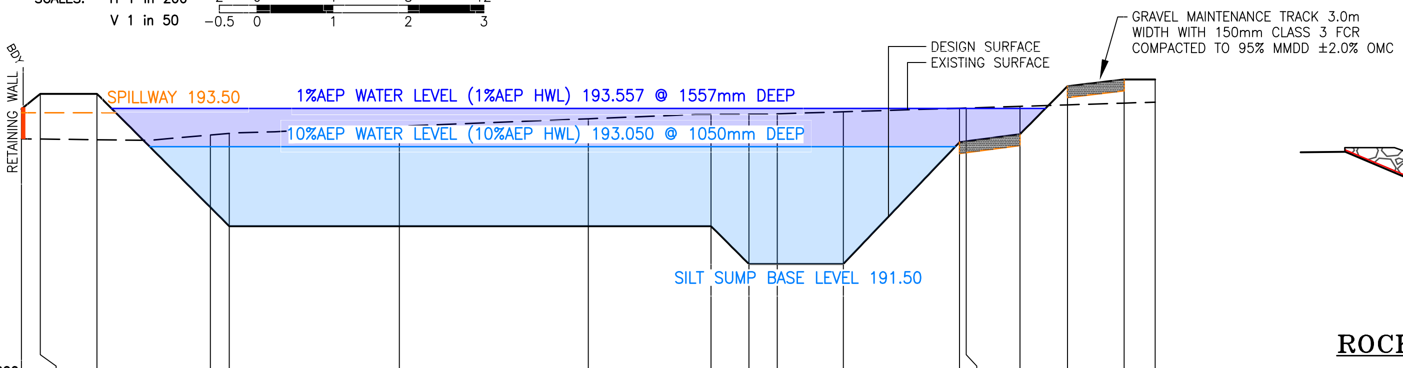
ACCURACIES
ALL 'AS CONSTRUCTED' AND EXISTING SURFACE LEVELS MUST BE QUOTED TO TWO DECIMAL PLACES OF A METRE, WITH A RELATIVE ACCURACY TOLERANCE OF +/- 0.02M IN RESPECT TO THE ADOPTED DATUM POINTS.



R.L. 190.500

CHAINAGE	WETLANDS/ BASIN DESIGN LEVELS	EXISTING LEVELS
0.00	193.55	193.29
1.00	193.75	193.31
4.00	193.75	193.35
8.69	192.80	193.42
10.00	192.80	193.44
20.00	192.80	193.55
30.00	192.80	193.67
36.17	192.80	193.75
38.67	193.30	193.78
39.67	193.30	193.79
40.00	193.23	193.79
42.21	192.80	193.81
50.00	192.80	193.88
60.00	192.80	194.01
70.00	192.80	194.11
72.98	192.80	194.14
75.88	193.30	194.17
76.90	193.30	194.18
78.62	193.00	194.20
79.96	193.00	194.21
80.00	193.00	194.21
81.82	192.80	194.23
83.03	192.80	194.24
84.90	193.00	194.26
90.00	193.00	194.32
93.91	193.00	194.36
95.71	192.80	194.39
96.96	192.80	194.40
98.08	193.03	194.41
100.00	193.51	194.44
103.78	194.45	194.48
106.78	194.51	194.52
110.00	194.56	194.56

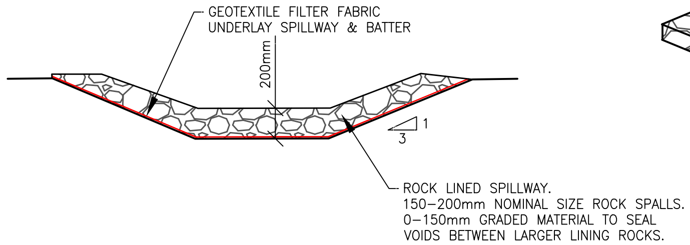
LONG SECTION: SECTION NO.4
SCALES: H 1 in 200 (2 0 4 8 12)
V 1 in 50 (-0.5 0 1 2 3)



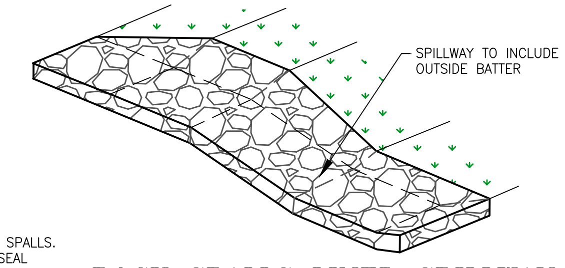
R.L. 190.000

CHAINAGE	WETLANDS/ BASIN DESIGN LEVELS	EXISTING LEVELS
0.00	193.55	193.15
1.00	193.75	193.15
4.00	193.75	193.14
10.00	192.25	193.21
11.00	192.00	193.23
20.00	192.00	193.32
30.00	192.00	193.42
36.50	192.00	193.48
38.50	191.50	193.48
40.00	191.50	193.49
43.50	191.50	193.51
49.64	193.11	193.56
50.00	193.12	193.56
52.84	193.22	193.59
55.36	193.85	193.61
58.36	193.94	193.63
60.00	193.94	193.64

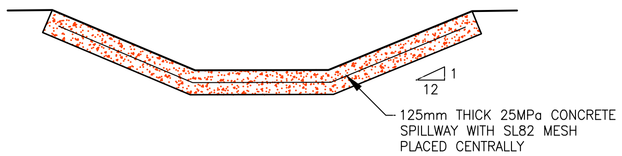
LONG SECTION: SECTION NO.5
SCALES: H 1 in 200 (2 0 4 8 12)
V 1 in 50 (-0.5 0 1 2 3)



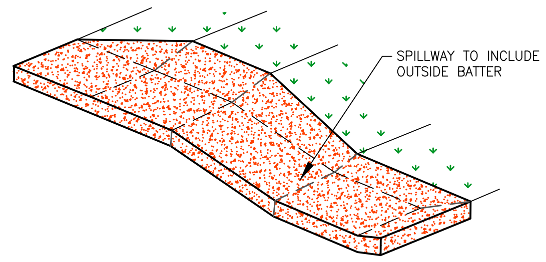
ROCK SPALLS LINED SPILLWAY CROSS SECTION
SCALE: NTS



ROCK SPALLS LINED SPILLWAY ISOMETRIC VIEW
SCALE: NTS



CONCRETE LINED SPILLWAY CROSS SECTION
SCALE: NTS



CONCRETE LINED SPILLWAY ISOMETRIC VIEW
SCALE: NTS

CONSTRUCTION NOTES:- BASIN WITHIN CUT EXCAVATION - IMPERVIOUS MATERIALS.

- TOPSOIL STRIPPING - ALL TOPSOIL AND LOW PLASTICITY SILT/CLAY MATERIAL ARE TO BE STRIPPED FROM THE PROPOSED BASIN FOOTPRINT AREA. THESE MATERIALS ARE TO BE STOCKPILED ON SITE FOR LATER USE IN TOPDRESSING OF THE EMBANKMENTS.
- INITIAL EXCAVATION - AFTER EXCAVATION OF THE IMPOUNDING AREA TO THE DESIGN LINES THE EXPOSED SOILS IN THE BASE AND WALL SHOULD BE INSPECTED. IF LOW PLASTICITY SILT/CLAY OR GRANULAR SOILS ARE EXPOSED THEY SHOULD BE OVER EXCAVATED AND REPLACED WITH COMPACTED SELECT FILL MATERIAL AS PER "PLACEMENT OF SELECT FILL" NOTE. BASIN INVERT TO INCLUDE LOCALISED SHAPING TO ALLOW FOR SELF-DRAINING.
- PLACEMENT OF SELECT FILL - IF NON SUITABLE MATERIAL IS FOUND AS PART OF TOPSOIL STRIPPING OR INITIAL EXCAVATION WORK THE NON SUITABLE MATERIAL IS TO BE REMOVED TO A MINIMUM DEPTH OF 500mm TO REPLACE WITH APPROVED SELECT FILL MATERIAL. SELECT FILL MATERIAL IS TO BE PLACED IN LOOSE LAYERS NOT EXCEEDING 250mm IN THICKNESS AND UNIFORMLY MECHANICALLY COMPACTED TO 98% STD, INCLUDING MOISTURE CONDITIONING WITHIN ± 2% OPTIMUM MOISTURE CONTENT
- ALL BASIN AREAS ARE TO BE TOP-DRESSED WITH 100mm THICK TOPSOIL REPLACEMENT MATERIAL. BASIN TO BE SPRAY SEEDED FOLLOWING FINAL INSPECTION WITH COUNCIL.
- EROSION PROTECTION - ALL DRAINAGE INLETS INTO BASIN ARE TO INCLUDE MINIMUM 2x2m ROCK BEACHING, 100-150mm NOM DIA INCLUDING GEO-FABRIC UNDERLAY.
- PLACEMENT OF SELECT FILL - IF NON SUITABLE MATERIAL IS FOUND AS PART OF TOPSOIL STRIPPING OR INITIAL EXCAVATION WORK THE NON SUITABLE MATERIAL IS TO BE REMOVED TO A MINIMUM DEPTH OF 500mm TO REPLACE WITH APPROVED SELECT FILL MATERIAL. SELECT FILL MATERIAL IS TO BE PLACED IN LOOSE LAYERS NOT EXCEEDING 250mm IN THICKNESS AND UNIFORMLY MECHANICALLY COMPACTED TO 98% STD, INCLUDING MOISTURE CONDITIONING WITHIN ± 2% OPTIMUM MOISTURE CONTENT.

CONSTRUCTION NOTES:-

- A STEEL MARKER POST IS TO BE INSTALLED AT THE BASE OF THE SILT SUMP(S) TO PROVIDE A SEDIMENT BUILD MARKER. THE POST IS TO BE MARKED 500mm FROM THE BASE OF THE SILT SUMP. ONCE THE SEDIMENT LEVEL REACHES THE NOMINATED LEVEL, THE BASIN IS TO BE DESILTED AND REINSTATED.
- THE PIPE OUTLET IS TO BE INSTALLED AS LATE AS POSSIBLE IN THE CONSTRUCTION PROCESS. THIS WILL ALLOW ALL CAPTURED FLOWS ON THE SITE TO BE CONTAINED WHOLLY WITHIN THE BASIN AND ABLE TO BE TREATED ACCORDINGLY.

INITIAL CONSTRUCTION:-

- THE BASIN AND OUTFALL DRAINAGE IS TO BE CONSTRUCTED AFTER INSTALLATION SOIL AND WATER MANAGEMENT MEASURES
- THE BASIN IS TO BE TOPSOILED IMMEDIATELY AFTER BASIN BULK EARTHWORKS TO PROMOTE GRASS GROWTH.
- POURUS ROCK WALL TO BE INSTALLED AS PART OF INITIAL CONSTRUCTION. IF REQUIRED, BASIN INLETS/OUTLETS ARE TO BE INSTALLED SO BASIN WALL IS NOT DISTURBED/WEAKENED.

DURING CONSTRUCTION:-

- AFTER A RAIN EVENT, THE ALL RECEIVED WATER IS TO REMAIN FOR A 5 DAY PERIOD TO ALLOW SETTLEMENT AND TREATMENT.
- THE BASIN SHOULD NOT OVERFLOW UNLESS MORE THAN 28.4mm OF RAIN IS RECEIVED IN ANY 5 DAY PERIOD. FOR RAIN EVENTS GREATER THAN 28.4mm, THE WATER WILL OVERTOP INTO THE INLET PIT AND ENTER THE DRAINAGE SYSTEM, ONCE THE PIPE CAPACITY HAS BEEN REACHED, ALL FLOWS WILL SPILL OVER THE SPILLWAY.
- THE SETTLE PERIOD RESETS IF ANY RAINFALL OCCURS WITHIN THE 5 PERIOD OF THE INITIAL RAIN EVENT.
- THE CONTRACTOR IS TO NOTIFY THE CONSULTANT OF ANY CONCERNS REGARDING THE WATER QUALITY AND THE TREATMENTS EFFECTIVENESS
- AFTER 5 DAYS OF SETTLEMENT, THE BASIN IS TO BE INSPECTED BY THE CONSULTANT AND CONTRACTORS AND IF ACCEPTABLE, PUMP THE BASIN TO A NOMINATED POINT.

MAINTENANCE (DURING CONSTRUCTION):-

AS PART OF THE REGULAR INSPECTIONS BY THE CONSULTANT AND THE CONTRACTOR, THE OUTGOING FLOWS FROM THE BASIN ARE TO BE OBSERVED. IF THERE ARE ANY CONCERNS REGARDING THE EFFECTIVENESS OF THE BASIN AND THE SOIL & WATER MEASURES THEN THE FOLLOWING PROCEDURE IS TO BE FOLLOWED:

- RECTIFY ALL SOIL & WATER MEASURES SHOWN ON THE APPROVED SWMP
- CHECK THE AMOUNT OF SEDIMENT BUILD UP WITHIN THE BASIN. IF HIGHER THAN THE MARK ON THE MARKER POST, THEN REMOVE SEDIMENT
- INSTALL ADDITIONAL SOIL & WATER MEASURES AS DIRECTED BY THE CONSULTANT

ONCE THE ABOVE HAS BEEN COMPLETED AND THERE ARE STILL CONCERNS:

- FIELD TEST BY CONSULTANT AND CONTRACTOR
- MANUAL DOSING OF BASIN USING GYPSUM (FLOCCULATION)

IF FLOCCULATION IS REQUIRED THEN THE SETTLING AGENT AND APPLICATION RATE IS TO BE DETERMINED AT THE TIME AS THE AGENT AND RATE WILL BE SITE SPECIFIC.

AFTER CONSTRUCTION:-

- THE OUTLET PIPE IS TO BE INSTALLED TO THE BASE OF THE BASIN.
- SILT FROM THE SUMP IS TO BE CLEANED OUT
- THE BASIN IS TO BE REINSTATED TO A DETENTION BASIN & FUNCTIONAL IN PREPARATION FOR LANDSCAPING.

SPRINGVIEW ESTATE STAGES 1-4 KERR RD, THURGOONA

WETLANDS & BASIN SECTION VIEWS

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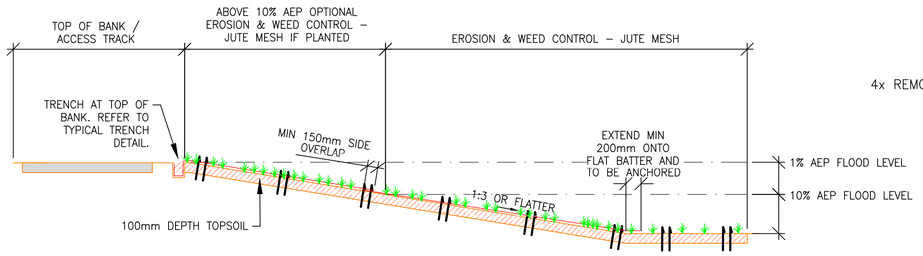
AS CONSTRUCTED ISSUE
DATE:- 05/10/2022

ESLER CHECKED: S.ALTMEIER 10/03/2021
AUTHORITY APPROVED: ACC DC 10.2020.37505.1

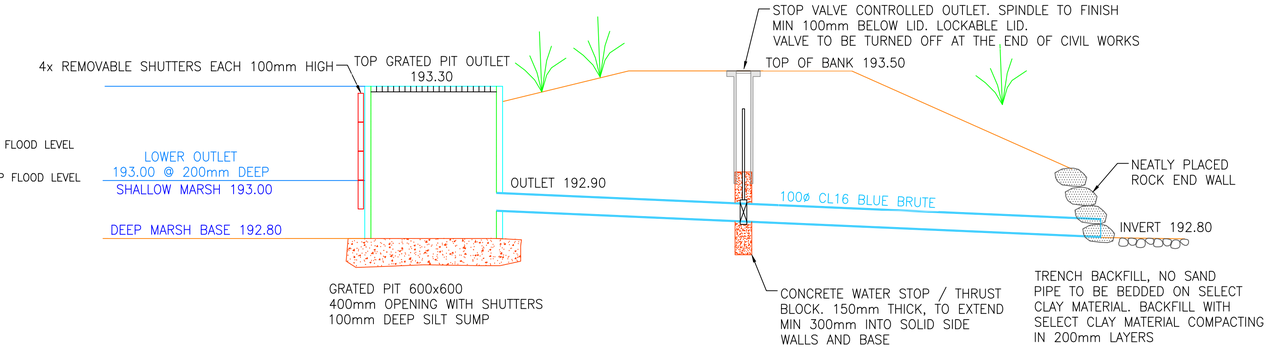
DATUM:	DRAWN:	DATE:
A.H.D	B.WALLACE	DEC-2020

PROJECT No: 00017425 | REV: 6
SHEET 64 OF 89 | A1



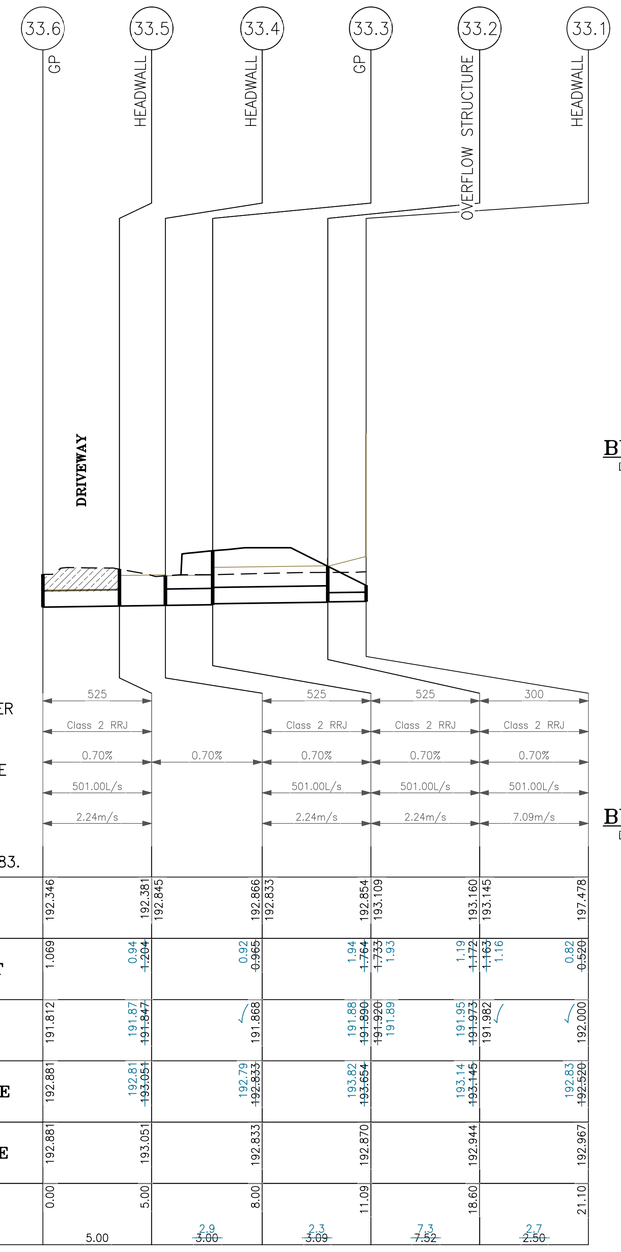
EROSION & WEED CONTROL MESH – BASIN TYPICAL SECTION

SCALE: NTS



CONTROLLED WETLANDS OUTLET (CWO) – CELL 1

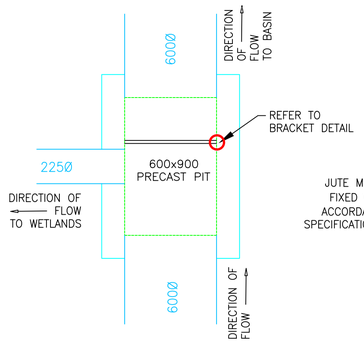
SCALE: NTS



PIPE DIAMETER		525		525	525	300
PIPE CLASS		Class 2 RRJ		Class 2 RRJ	Class 2 RRJ	Class 2 RRJ
SLOPE/GRADE		0.70%	0.70%	0.70%	0.70%	0.70%
FLOW Q		501.00L/s		501.00L/s	501.00L/s	501.00L/s
VELOCITY V		2.24m/s		2.24m/s	2.24m/s	7.09m/s
DATUM RL 183.						
HGL (10% AEP)	192.346	192.381 192.845	192.866 192.833	192.854 193.109	193.160 193.145	197.478
DEPTH TO INVERT	1.069	0.94<~~1.204~~	0.92<~~0.965~~	1.94<~~1.764~~ 1.93<~~1.733~~	1.19<~~1.172~~ 1.16<~~1.116~~	0.82<~~0.520~~
INVERT LEVEL	191.812	191.87<~~191.847~~	191.868	191.88<~~191.990~~ 191.89<~~191.920~~	191.95<~~191.973~~ 191.982	192.000
FINISHED SURFACE	192.881	192.81<~~193.051~~	192.79<~~192.833~~	193.62<~~193.654~~	193.14<~~193.145~~	192.83<~~192.520~~
EXISTING SURFACE	192.881	193.051	192.833	192.870	192.944	192.967
CHAINAGE	0.00	5.00	8.00	11.09	18.60	21.10
		5.00	2.9<~~3.00~~	2.3<~~3.09~~	7.3<~~7.52~~	2.7<~~2.50~~

LINE–33

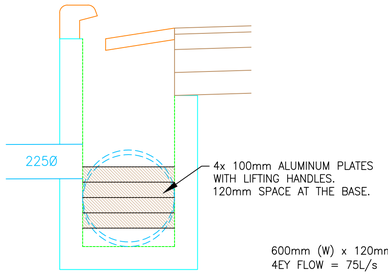
SCALES: H 1:200 V 1:100



BYPASS PIT (DGGP SURFACE FINISH)

DGGP GENERALLY IN ACCORDANCE WITH ACC STANDARD DRAWING STD–D–10

SCALE: NTS

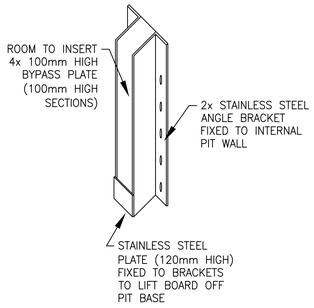


600mm (W) x 120mm (H) ORIFICE = 83L/s
4EY FLOW = 75L/s

BYPASS PIT (DGGP SURFACE FINISH)

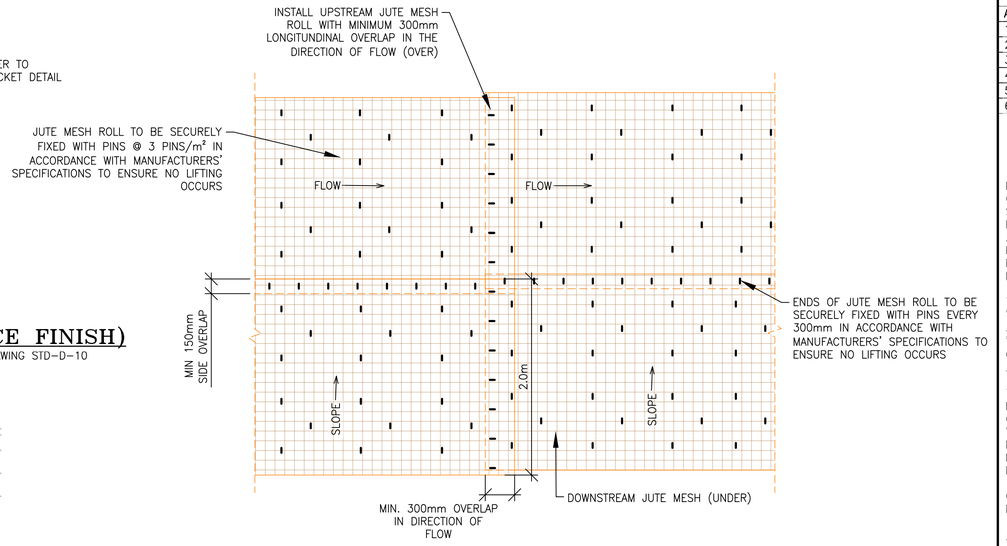
DGGP GENERALLY IN ACCORDANCE WITH ACC STANDARD DRAWING STD–D–10

SCALE: NTS



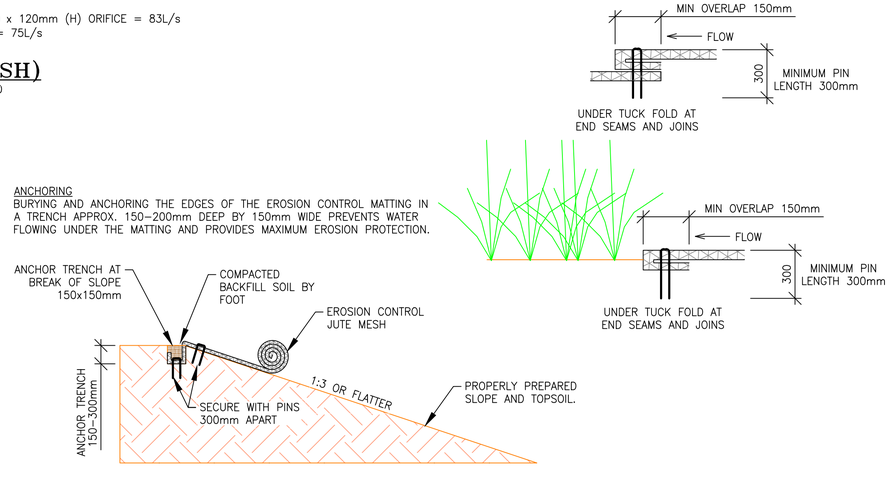
BRACKET DETAIL

SCALE: NTS



EROSION & WEED MESH PIN DETAIL – TYPICAL

SCALE: NTS



EROSION & WEED MESH ANCHORING DETAILS

SCALE: NTS

SPRINGVIEW ESTATE STAGES 1–4 KERR RD, THURGOONA

WETLANDS & BASIN DETAIL PLAN DRAINAGE LONG SECTION 33

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PROJECT No: 00017425 REV: 6

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ANNEXURE B

BACKGROUND TO DEVELOPMENT OF FLOOD MODELS

B1 Hydrologic Model Development

Both the IL-CL and RAFTS rainfall-runoff modelling approaches which are built into the DRAINS software were used to generate discharge hydrographs from the urban and rural portions of the catchment, respectively, as this combined approach was considered to provide a more accurate representation of the rainfall runoff process. The hydrologic response of generally sloping land that lies to the east of the site where the existing drainage system is ill-defined was simulated using the rainfall-on-grid approach which is built into the TUFLOW software.

Sub-catchment slopes used for input to the Woolshed Creek DRAINS Model were derived using the vectored average slope approach for sub-catchments characterised as rural (which are modelled using the RAFTS approach) and the average sub-catchment slope approach for sub-catchments characterised as urbanised (which are modelled using the IL-CL approach). Digital Elevation Models derived from the available LiDAR survey data were used as the basis for computing the slope.

The percentage of impervious area within each sub-catchment was based on a visual inspection of the aerial photography and experience in determining appropriate values for different land-use types.

The procedures used to obtain temporally and spatially accurate and consistent Intensity-Frequency-Duration (**IFD**) design rainfall curves for the assessment of flood behaviour in the Woolshed Creek catchment are presented in the lates edition of *Australian Rainfall and Runoff* (Geoscience Australia, 2019) (**ARR 2019 Rev 4.2**).

Design storms for frequencies of 1%, 0.5% and 0.2% Annual Exceedance Probability (**AEP**) were derived for storm durations ranging between 30 minutes and 6 hours. The IFD dataset were initially downloaded from the Bureau of Meteorology's (**BoM's**) *2016 Rainfall IFD Data System* and then adjusted to incorporate the multiplication factors that are applicable to the Year 2030 Shared Socioeconomic Pathway (**SSP**) 2-4.5, values of which were taken from the *ARR Data Hub*. These rainfall intensities are considered to represent "near-term" climatic conditions in the Woolshed Creek catchment.

Estimates of Probable Maximum Precipitation (**PMP**) were made using the Generalised Short Duration Method (**GSDM**) as described in BoM's publication entitled *The Estimation of Probable Maximum Precipitation in Australia: Generalised Short-Duration Method* (BoM, 2003). This method is appropriate for estimating extreme rainfall depths for catchments up to 1000 km^2 in area and storm durations up to 3 hours. Again the design PMP rainfall intensities were adjusted to incorporate the aforementioned SSP2-4.5 multiplication factors.

ARR 2019 Rev 4.2 prescribes the analysis of an ensemble of 10 temporal patterns per storm duration for various zones in Australia. These patterns are used in the conversion of a design rainfall depth with a specific AEP into a design flood of the same frequency. The patterns may be used for AEPs down to 0.2 per cent where the design rainfall data is extrapolated for storm events with an AEP less than 1 per cent. The temporal pattern ensembles that are applicable to Rare (rarer than 3.2% AEP) storm events were obtained from the *ARR Data Hub*[3], while those for the very rare events were taken from BoM, 2003 and Jordan et. al., 2005.

The initial and continuing loss values that were applied in flood hydrograph estimation for storms up to 0.2% AEP in intensity were derived using the NSW jurisdictional specific procedures set out in the *ARR Data Hub*. For example, while the raw Probability Neutral Burst Initial Loss (**PNBIL**)

[3] It is noted that the temporal pattern data set for the *Murray-Darling Basin* region is suitable for use in the study area.

values obtained from the *ARR Data Hub* were reviewed and adjusted to remove inconsistencies in values with varying storm probability and duration and used as input to the Woolshed Creek DRAINS Model, the raw (or unadjusted) continuing loss value of 4.5 mm/hr was multiplied by a factor of 0.4 (i.e. 1.8 mm/.hr). Values of 0 mm for initial loss and 1.8 mm/hr for continuing loss were adopted for generating design discharge hydrographs relating to the PMF.

The Woolshed Creek DRAINS Model was used to generate design discharge hydrographs for design storms with AEPs of 1%, 0.5% and 0.2%, as well as the PMP. These were then used as input to the hydraulic (TUFLOW) model (refer below for further details).

B2 Hydraulic Model Development

An important consideration of two-dimensional modelling is how best to represent the roads, fences, buildings and other features which influence the passage of flow over the natural surface. Two-dimensional modelling is very computationally intensive, and it is not practicable to use a mesh of very fine elements without excessive times to complete the simulation, particularly for long duration flood events. The requirement for a reasonable simulation time influences the way in which these features are represented in the model.

A grid spacing of 2 m was found to provide an appropriate balance between the need to define features on the floodplain versus model run times and was adopted for the assessment. Ground surface elevations for model grid points were initially assigned using LiDAR survey data that was captured in September 2024 on behalf of Albury City Council and supplemented by LiDAR survey data captured in November 2020 that was obtained from *Geoscience Australia's* online database in the headwaters of the catchment.

Ridge and gully lines were added to the Woolshed Creek TUFLOW Model where the grid spacing was considered to be too coarse to accurately represent important topographic features which influence the passage of overland flow. The elevations for these ridge and gully lines were determined from inspection of the LiDAR survey data.

Gully lines were also used to represent the major creeks and watercourses in the study area. The use of gully lines ensured that positive drainage was achieved along the full length of these watercourses and thus avoided creation of artificial ponding areas as artefacts of the 'bumpy' nature of the underlying LiDAR survey data.

The local farm dams were assumed full at the start of the model simulation (i.e. at the onset of flood producing rain).

The footprints of individual buildings located in the two-dimensional model domain were digitised and assigned a high hydraulic roughness value relative to the more hydraulically efficient roads and flow paths through allotments. This accounted for their blocking effect on flow while maintaining a correct estimate of floodplain storage in the model.

The existing pit and pipe stormwater drainage system which is present in the Woolshed Creek catchment was represented as a series of one-dimensional elements, details of which were based on information contained in Albury City Council's GIS-based stormwater asset database and detailed ground survey data where available, as well as those shown on a series of drainage plans that related to recent subdivision type development.

The main physical parameter for TUFLOW is the hydraulic roughness. Hydraulic roughness is required for each of the various types of surfaces comprising the overland flow paths, as well as inbank areas of the creeks. In addition to the energy lost by bed friction, obstructions to flow also dissipate energy by forcing water to change direction and velocity and by forming eddies. Hydraulic modelling traditionally represents all of these effects via the surface roughness parameter known as "Manning's n". Flow in the piped system also requires an estimate of hydraulic roughness.

Table B.1 sets out the best estimate hydraulic roughness values which were incorporated in the Woolshed Creek TUFLOW Model.

TABLE B.1
BEST ESTIMATE HYDRAULIC ROUGHNESS VALUES

Surface Treatment	Manning's n Value
Concrete piped elements	0.015
Asphalt or concrete road surface	0.02
Overbank area, including grass and lawns	0.045
Vegetated areas	0.08
Allotments (between buildings)	0.10
Buildings	10

The locations where sub-catchment inflow hydrographs were applied to the Woolshed Creek TUFLOW Model are shown on **Figure 7**. These comprise both point-source inflows at selected locations around the perimeter of the two-dimensional model domain and as distributed inflows via "Rain Boundaries".

The Rain Boundaries act to "inject" flow into the Woolshed Creek TUFLOW Model, firstly at a point which has the lowest elevation, and then progressively over the extent of the Rain Boundary as the grid in the two-dimensional model domain becomes wet as a result of overland flow. The Rain Boundaries have been digitised at the outlet of the catchment in order to reduce the "double-routing" of runoff from the sub-catchment.

The direct-rainfall-on-grid approach involves the application of rainfall excess to the two-dimensional model domain, with the routing of the rainfall excess (runoff) simulated across each grid cell within the area shown on **Figure 7**.

The downstream boundary of the model comprises a TUFLOW-derived normal depth relationship which is located on the main arm of Eight Mile Creek immediately downstream of its confluence with the main arm of Woolshed Creek. The downstream boundary has been located a sufficient distance downstream of the study area so as to not impact flood behaviour in the vicinity of the site.

ANNEXURE C

ARCHITECTURAL PLAN SHOWING KEY FEATURES OF PROPOSED SCHOOL

NORTH

Drawing Disclaimer:
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Verify all dimensions on site before commencing work.

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ISSUE

REV	FOR	DATE
01	REF - DRAFT	20/12/2024
02	REF	6/2/2025
03	REF Update	13/5/2025

Refer A-0002 for works required for completion of Schematic Design

CLIENT

NSW DEPARTMENT OF EDUCATION

NSW GOVERNMENT Education

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PROJECT NAME
ALBURY THURGOONA NEW PRIMARY SCHOOL AND NEW PRESCHOOL

ADDRESS
356 KERR ROAD
WIRLINGA NSW 2640

PROJECT NUMBER
211209

STATUS
SCHEMATIC DESIGN

DRAWING TITLE
SITE PLAN

DRAWING NUMBER
A-0005

REVISION
03

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1:500 @ A1

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