

E1 FLOOD RISK ASSESSMENT OF CANDIDATE SITES FOR REZONING

1.1 Overview

Murrumbidgee Council have indicated the desire to increase the land available for potential development around the Darlington Point area. A draft report '*Land Use Plan for Candidate Sites at Darlington Point*' was prepared by Habitat Planning on 1 July 2020. The information contained within this planning report was assessed with respect to the flood hazard at each site based on the information developed in this floodplain risk management study.

A detailed analysis of the flood hazard at each of these sites nominated for potential rezoning has been assessed and is outlined below. This assessment has only used the information contained within this floodplain risk management study and the report by Habitat Planning (2020) only. The Habitat (2020) report includes an aerial photograph of each location considered for rezoning, its site address and property details (lot and DP), and lists its current zone and proposed zone. No further information is provided of the reasoning or need for the selection of each lot for rezoning, or its potential use once rezoned.

Issues such as ecological constraints, Aboriginal cultural heritage constraints or noise and visual amenity of these candidate sites has not been considered during this analysis. Accordingly, the comments related to the support or non-support for the rezoning of each site is based on flooding constraints only.

A summary of the review of flood risks at each of these sites has been include in **Table E.2** at the end of this appendix.

1.2 Assessment Methodology

A range of information was used during the assessment of each site to determine its suitability for rezoning. These include:

- Consistency with the NSW Governments' Ministerial Direction No. 4.3 Flood Prone Land, issued in 2007 under the then Section 117 (now Section 9.1) of the EP&A Act 1979, particularly the sites location within flood planning area proposed in this floodplain risk management study and if the changes are of minor significance.
- Emergency management considerations.

This assessment includes consideration of flood hazards on the site itself as well as flood hazards on the road access to the site and the change in emergency management requirements from the existing to the proposed land use.

1.2.1 Section 9.1 of the EP&A Act 1979

Ministerial Direction No. 4.3 Flood Prone Land issued under Section 117 (now Section 9.1) of the EP&A Act 1979 has been reproduced in **Plate E.1**

LOCAL PLANNING DIRECTIONS

Section 117(2) of the *Environmental Planning and Assessment Act 1979*

4.3 Flood Prone Land

Objectives

- (1) The objectives of this direction are:
 - (a) to ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the *Floodplain Development Manual 2005*, and
 - (b) to ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land.

Where this direction applies

- (2) This direction applies to all councils that contain flood prone land within their LGA.

When this direction applies

- (3) This direction applies when a council prepares a draft LEP that creates, removes or alters a zone or a provision that affects flood prone land.

What a council must do if this direction applies

- (4) A draft LEP shall include provisions that give effect to and are consistent with the NSW Flood Prone Land Policy and the principles of the *Floodplain Development Manual 2005* (including the *Guideline on Development Controls on Low Flood Risk Areas*).
- (5) A draft LEP shall not rezone land within the flood planning areas from Special Use, Special Purpose, Recreation, Rural or Environmental Protection Zones to a Residential, Business, Industrial, Special Use or Special Purpose Zone.
- (6) A draft LEP shall not contain provisions that apply to the flood planning areas which:
 - (a) permit development in floodway areas,
 - (b) permit development that will result in significant flood impacts to other properties,
 - (c) permit a significant increase in the development of that land,
 - (d) are likely to result in a substantially increased requirement for government spending on flood mitigation measures, infrastructure or services, or
 - (e) permit development to be carried out without development consent except for the purposes of agriculture (not including dams, drainage canals, levees, buildings or structures in floodways or high hazard areas), roads or exempt development.
- (7) A draft LEP must not impose flood related development controls above the residential flood planning level for residential development on land, unless a council provides adequate justification for those controls to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).
- (8) For the purposes of a draft LEP, a council must not determine a flood planning level that is inconsistent with the *Floodplain Development Manual 2005* (including the *Guideline on Development Controls on Low Flood Risk Areas*) unless a council provides adequate justification for the proposed departure from that Manual to the satisfaction of the Director-General (or an officer of the Department nominated by the Director-General).

Consistency

- (9) A draft LEP may be inconsistent with this direction only if council can satisfy the Director-General (or an officer of the Department nominated by the Director-General) that:
 - (a) the draft LEP is in accordance with a floodplain risk management plan prepared in accordance with the principles and guidelines of the *Floodplain Development Manual 2005*, or
 - (b) the provisions of the draft LEP that are inconsistent are of minor significance.

Plate E.1 - Local Planning Direction 4.3 issued under Section 9.1 of EP&A Act 1979

1.2.2 Definition of flood hazards

Provisional hazard categories were prepared in the floodplain risk management study based on criteria contained within the Australian Institute for Disaster Resilience's (AIDR) '*Technical Flood Risk Management Guideline: Flood Hazard*' (2014). The hazard curves are reproduced in Error! Reference source not found. and are also described in **Table E.1** below. As shown in in **Plate E.2** the hazard curves assess the potential vulnerability of people (of differing physical abilities), cars and structures based upon the depth and velocity of floodwaters at a particular location.

These guidelines were used to update the hazard maps with the results of the updated modelling. The flood hazard category maps are included in **Figures 26 - 28** for the 5% AEP, 1% AEP and extreme design flood events for the local catchment flooding behind the levee. **Figures 29 - 31** present the provisional hazard category maps for the mainstream Murrumbidgee River flooding at Darlington Point for the same design events.

The 1% AEP design flood hazard, and extreme flood hazard at each site, have been used as the basis for this assessment. For areas behind the levee, the greater of the flood hazard from either the local flooding extreme flood event or extreme flood event in the Murrumbidgee River, has been used.

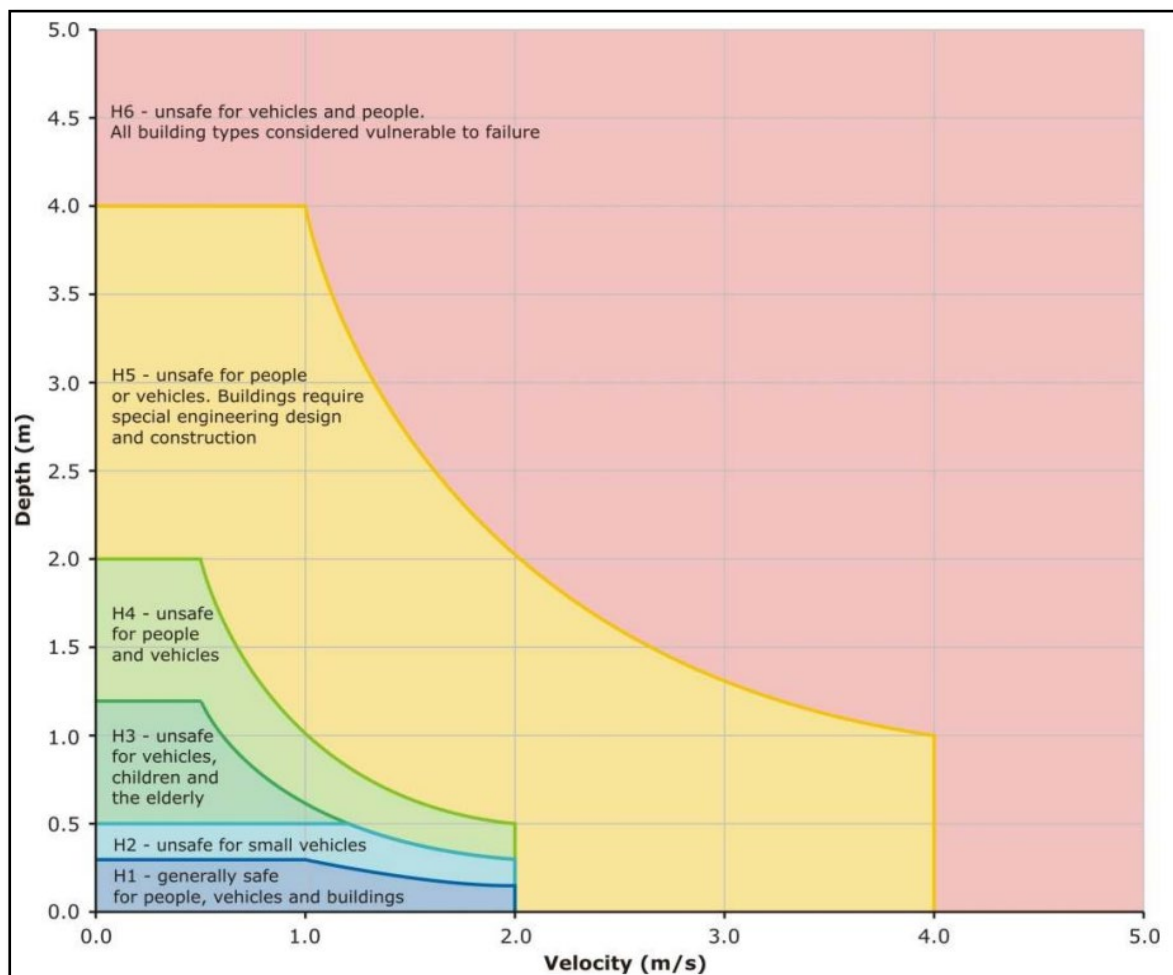


Plate E.2 - Flood Hazard Vulnerability Curves (AIDR, 2014)

Table E.1 - Description of Adopted Flood Hazard Categories (Australian Government, 2014)

Hazard Category	Description
H1	Generally safe for vehicles, people and buildings. Relatively benign flood conditions. No vulnerability constraints
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.

1.2.3 Support or non-support for rezoning at each site

The assessment of flood hazards at each site governed the support or non-support for rezoning of that site. There were minor differences between the methodology applied for the rezoning potential for sites identified for residential development and the rezoning potential for sites identified for commercial and industrial land uses.

For sites identified for future residential development, support for the potential change in use and rezoning of a site was offered if the site is not located within the (proposed) flood planning area. If parts of the site are located within the (proposed) flood planning area and are currently assessed as low flood hazards (flood hazards H1 or H2), they have also been indicated as possible to rezone on flooding grounds as these flood hazards are considered reasonable to manage through the planning and development application stages. There is potential that the entirety of these lots could be rezoned if the different components of the Section 4.3 Direction are addressed, particularly if the inconsistencies are of minor significance. With the preliminary information that was available for this flood risk assessment on the potential land use of each site, these discussions could not be presented as part of this study.

For sites identified for future commercial or industrial or special uses, support for the potential change in use and rezoning of a site was offered if the site is not located within the (proposed) flood planning area. If the site is located within the flood planning area, then the density of proposed land use was taken into consideration compared to the current land use, and consideration of the potential flood risk management options available, in conjunction with potential loss of life and flood damages to the future land use. For example, rezoning a site from RU5 Village to B6 Business Park within the flood planning area, would result in reduced flood damages in future if appropriate flood related development controls are applied to the developments in the business park and a reduced risk to life.

As stated in **Section 6.3** and **Section 7.2** of the floodplain risk management study, there is currently no SES unit in Darlington Point. An important component of flood risk management in the study area involves emergency management planning and evacuation, which requires the involvement of the SES. Therefore, the density of residential and commercial development

should not be intensified in the study area until the flood emergency management systems for Darlington Point have been updated, including the SES local flood plan. This should also be linked to, but can be undertaken separately, to flood awareness and flood education with the local community to ensure the residual flood risks are understood and emergency management procedures will presumably be understood and followed during future flood events. Evacuation of residents is not a guarantee of reduction or elimination of flood risk, as it relies on human behaviour during a flood, which cannot be modelled or predicted accurately.

It must also be stressed that the NSW SES does not support the use of private evacuation plans as a condition of development consent. The NSW SES does not have the statutory authority to endorse, review or enforce private flood plans. The NSW Floodplain Development Manual 2005 also states that the use of private flood plans as part of development consent conditions, should be avoided.

Therefore, if emergency management requirements for the sites proposed for rezoning are considered to be consistent with current emergency management requirements of adjacent land uses and would not place a significant increase on these resources, then the change in use was considered possible on flooding grounds, subject to updates to the emergency management systems and processes as recommended in this study.

Upgrading the flood vulnerability of roads in the area, such as The Kidman Way, Whitton Darlington Pont Road and Hay Road, could strengthen the support for this rezoning as it would assist in emergency management of the area, in addition to updates to the local flood plan and other emergency management planning activities.

It is recommended that comment should also be sought from the NSW SES on these strategic planning activities that would impact on their emergency management planning and processes around the Darlington Point area.

Non flood related constraints at each site, such as vegetation or Aboriginal or Cultural Heritage, have not been considered as part of this assessment.

1.3 Candidate Sites

1.3.1 Site 1

Site address: 7 Boyd Street

Property details: Lot 2, DP357732

Current Zone: RE1 Public Recreation

Proposed Zone: RU5 Village

Existing flood hazard in 1% AEP design flood event: H1

Existing flood hazard in Extreme flood event (local catchment): H3







Existing flood hazard in Extreme flood event (Murrumbidgee River): H3 – H4

Comment: Refer to **Plate E.3** Plate E.5: Site 2 - 1%AEP design flood event hazard Plate E.6: Site 2 - Extreme flood event hazard – Murrumbidgee River

and **Plate E.4** for details of the flood hazards at this site. This site has minor inundation during the 1% AEP design flood from the local catchment, which is estimated to be H1 flood hazard. During the local extreme flood event, this local catchment flooding would be considered as H3 flood hazard. During the Murrumbidgee River Extreme flood event, when it is estimated the levee would be overtopped, this site would be impacted by flooding considered as flood hazards H3 and H4.

This site is located behind the existing levee. The site is not located within the proposed flood planning area. There is a minor area of flooding in the local 1% AEP design flood event which is located within the small depressions close to the existing oval. There is only minor flooding expected during the local 0.2 % AEP and 0.5% AEP design flood event. The site would be impacted by flooding during an extreme flood event from the Murrumbidgee River, as would many areas behind the levee. Development of this site would result in additional development that would need to be included in the emergency management considerations for the SES.

Accordingly, this initial flood risk assessments at this site suggests that it could be possible to change the zoning from RE1 to RU5, not considering other potential non-flood related constraints that may be present.

Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

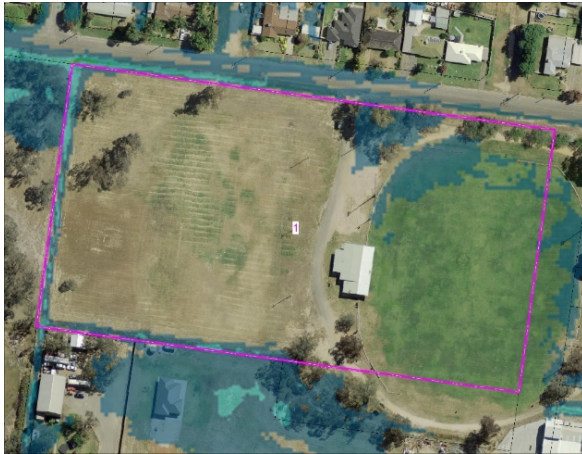


Plate E.3: Site 1 - 1%AEP design flood event hazard



Plate E.4: Site 1 - Extreme flood event hazard – Murrumbidgee River

1.3.2 Site 2

Site address: Hay Road

Property details: Lot 7306, DP1153889

Current Zone: RU1 Primary Production

Proposed Zone: RU5 Village

Existing flood hazard in 1% AEP design flood event: H1

Existing flood hazard in Extreme flood event (local catchment): H1 - H2

Existing flood hazard in Extreme flood event (Murrumbidgee River): H1 – H3

Comment: Refer to **Plate E.5** and **Plate E.6** for details of the flood hazards at this site. This site has minor inundation during the 1% AEP design flood from the local catchment, with depths less than 150mm and estimated to be H1 flood hazard. During the local extreme flood event, this local catchment flooding would be considered as H1 flood hazard. During the Murrumbidgee River Extreme flood event, when it is estimated the levee would be overtopped, this site would be impacted by flooding considered as flood hazards H1, H2 and H3.

This site is located behind the existing levee. The site is not located within the proposed flood planning area as the flood planning area includes filtering of the flood depths lower than 0.15 metres. There is a minor area of flooding estimated during the local 1% AEP design flood event, 0.2 % AEP and 0.5% AEP design flood event. The site would be impacted by flooding during an extreme flood event from the Murrumbidgee River, as would all of the area behind the levee. Development of this site would result in additional development that would need to be included in the emergency management considerations for the SES.

Accordingly, this initial flood risk assessments at this site suggests that it could be possible to change the zoning from RU1 to RU5, not considering other potential non-flood related constraints that may be present.







Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure



Plate E.5: Site 2 - 1%AEP design flood event hazard



Plate E.6: Site 2 - Extreme flood event hazard – Murrumbidgee River

1.3.3 Site 3

Site address: Kidman Way, Kooba Street, 23 Narrand Street, 2305 Whitton Darlington Point Road (part), 2365 Whitton Darlington Point Road (part), 2385 Whitton Darlington Point Road (part), Darlington Street (part)

Property details: Lot 7306, DP1155816; Lot 77, DP704430; Lot 9, DP758340; Lot 7009, DP1021250; Lot 76, DP257340 (part); Lots 38 & 39, DP751688; Lot 2, DP513791; Lots 70 & 71, DP751688; Lot 66, DP751688 (part)

Current Zone: RU1 Primary Production

Proposed Zone: RU5 Village

Existing flood hazard in 1% AEP design flood event (Murrumbidgee River): H1 – H5

Existing flood hazard in Extreme flood event (Murrumbidgee River): H3 – H5

Comment: This site is composed of a number of smaller sites, which have been assessed individually, refer to **Plate E.7** and **Plate E.8** for details of the flood hazards at each site within this area.

Site 3A – Flood hazard is H1 during 1% AEP design flood event and H3 - H4 during the extreme flood event in Murrumbidgee River. Only a small portion in the southern section of this site is located within the proposed flood planning area. Flooding constraints support rezoning of this site.

Site 3B - Flood hazard is H3 during 1% AEP design flood event and H3 - H4 during the extreme flood event in Murrumbidgee River. This area is considered as flood storage during the 1% AEP design flood event. The lots are located within the proposed flood planning area. Flooding constraints do not supported rezoning to a more intense land use that include residential or permanent residences.

Site 3C - Flood hazard is H3 - H5 during 1% AEP design flood event and H3 - H5 during the extreme flood event in Murrumbidgee River. Most of this area is considered as floodway during the 5% AEP and 1% AEP design flood event. The lots are located within the proposed flood planning area. Flooding constraints do not supported rezoning to a more intense land use.

Site 3D - Flood hazard is H3 - H5 during 1% AEP design flood event and H4 - H5 during the extreme flood event in Murrumbidgee River. Most of this area is considered as floodway during the 5% AEP and 1% AEP design flood event. The lots are located within the proposed flood planning area. Flooding constraints do not supported rezoning to a more intense land use.







Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure



Plate E.7: Site 3 - 1%AEP design flood event hazard

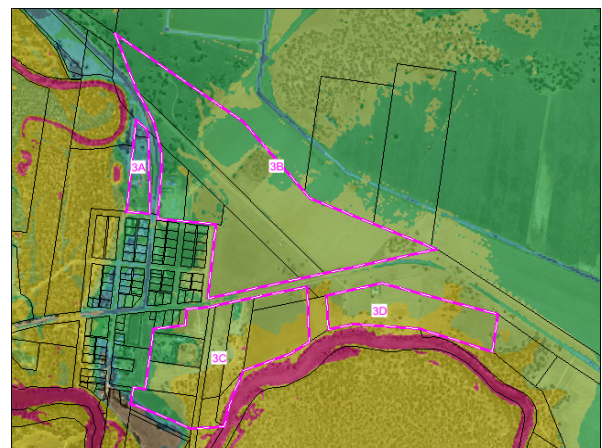


Plate E.8: Site 3 - Extreme flood event hazard

1.3.4 Site 4

Site address: Darlington Street (part)

Property details: Lot 66, DP751688 (part)

Current Zone: RU1 Primary Production







Proposed Zone: R5 Large Lot Residential

Existing flood hazard in 1% AEP design flood event (Murrumbidgee River): H1 – H5

Existing flood hazard in Extreme flood event (Murrumbidgee River): H1 – H5

Comment: Refer to **Plate E.5** and **Plate E.6** for details of the flood hazards at this site. The site itself is not floodprone, however access in to and away from site does become inundated in 1% AEP design flood event, similar to the existing North Darlington Point development.

Accordingly, this initial flood risk assessments at this site suggests that it could be possible to change the zoning from RU1 to RU5, not considering other potential non-flood related constraints that may be present. Future rezoning investigations need to include considerations of the emergency management of the site during flood times.

Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

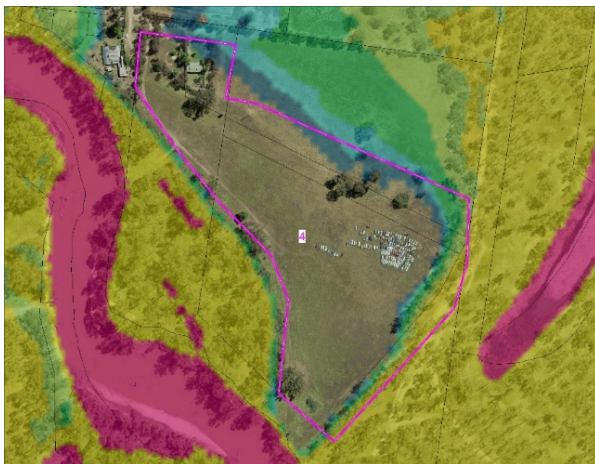


Plate E.9: Site 4 - 1%AEP design flood event hazard

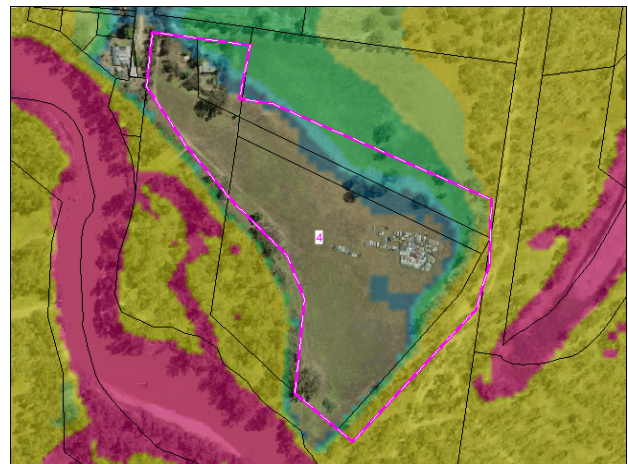


Plate E.10: Site 4 - Extreme flood event hazard

1.3.5 Site 5

Site address: 20 Bundure Street, 33 Ferry Street, 15166 Sturt Highway, 15173 Sturt Highway

Property details: Lot 153, DP750908; Lots 2-3, DP218805; Lot 1, DP727279; Lot 149, DP750908 (part); Lot 288, DP750908; Lot 150, DP750908 (part)

Current Zone: RU5 Village, RU1 Primary Production

Proposed Zone: IN1 General Industrial,

Existing flood hazard in 1% AEP design flood event (Murrumbidgee River): H1 – H3

Existing flood hazard in Extreme flood event (Murrumbidgee River): H1 – H3

Comment: This site is composed of a number of smaller sites, which have been assessed individually, refer to **Plate E.11** and **Plate E.12** for details of each site within this area.

Site 5A: Is not floodprone in the 1% AEP design flood event and would be impacted with H3 flooding from the Murrumbidgee River during and extreme flood event. Accordingly, the flood risk at this site would support rezoning of this site from RU1 to IN1.

Site 5B: This site is floodprone in the 1% AEP design flood event with H1 flood hazards estimated to occur. During the Murrumbidgee River extreme flood event, H3 hazards are estimated to occur across these lots. Accordingly, the flood risk across these lots would support rezoning of this site from RU1 to IN1 with the application of appropriate flood related development controls, including floor levels above the flood planning level.







Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure



Plate E.11: Site 5 - 1%AEP design flood event hazard



Plate E.12: Site 5 - Extreme flood event hazard

1.3.6 Site 6

Site address: Hay Road (part)

Property details: Lot 120, DP750908 (part); Lot 7009, DP1030723; Lot 272, DP750908 (part)

Current Zone: RU1 Primary Production







Proposed Zone: RE1 Public Recreation and/or RE2 Private Recreation

Existing flood hazard in 1% AEP design flood event: H1 – H3

Existing flood hazard in Extreme flood event (Murrumbidgee River): H3 – H4

Comment: Flood hazards for this site are shown on **Plate E.13** and **Plate E.14**. It is estimated this site would experience flooding during the 1% AEP design flood event that would be H1 and H2 hazards, with a very minor section of H3 hazard. These hazards are estimated to increase to H3 and H4 during and extreme flood event in the Murrumbidgee River.

It has been assumed that this rezoning is to update the zoning to be consistent with the current land use that includes a golf course. The flood risk at this site would support rezoning of this site from RU1 to RE1 or RE2. The land use associate with this rezoning may allow for development of infrastructure or buildings within the flood prone areas so site specific investigations should be undertaken as part of any future rezoning process to determine the impact of infrastructure or development on the site. Any future development is to ensure appropriate flood related development controls are applied, including the application of floor level controls for any structure.

Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

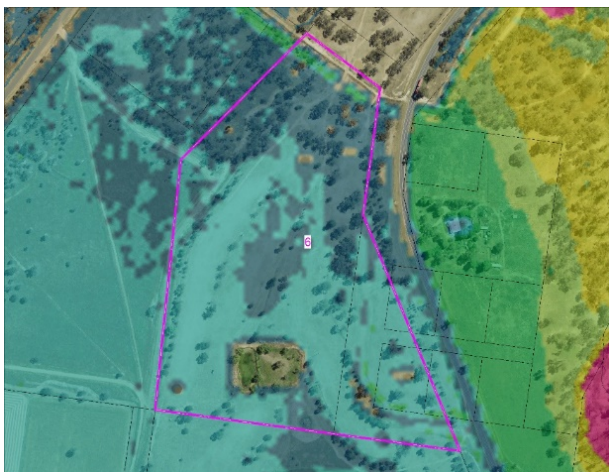


Plate E.13: Site 6 - 1%AEP design flood event hazard

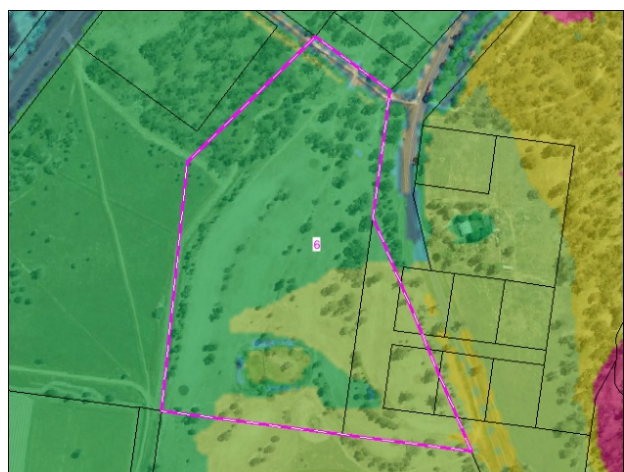


Plate E.14: Site 6 - Extreme flood event hazard

1.3.7 Site 7

Site address: 20 Bridge Street

Property details: Lot 101, DP914881

Current Zone: E1 National Park

Proposed Zone: SP2 Special Use or SP3 Tourist

Existing flood hazard in 1% AEP design flood event: H1 – H5

Existing flood hazard in Extreme flood event (Murrumbidgee River): H1 – H5

Comment: Flood hazards for this site are shown on **Plate E.15** and **Plate E.16**. It is estimated the access road to this site gets cut with H1/H2 during the 1% AEP design flood event, with a very minor section of H3 hazard. Part of the site would be impacted by flood hazards of H1 – H5 during the 1% AEP design flood event. These hazards are estimated to increase to H1 to H5 during an extreme flood event in the Murrumbidgee River, with most of the site impacted by H3 and H4 flooding. Parts of the site are located within the proposed flood planning area.

The flood risk at this site would support rezoning of this site from E1 to SP2 or SP3 with land uses restricted outside the flood planning area. Any future development would need to be located in the areas outside of the flood planning area and above the flood planning level.

Discussions with Council suggest that there is potential for this site to be used for large numbers of visitors (e.g. wedding venue, function centre). If these facilities are intended, it would need to be included in the emergency management considerations for the SES.







Hazard Categories		
	H1 – Generally Safe	 H3 – Unsafe for vehicles, children and elderly
	H2 – Unsafe for small vehicles	 H5 – Unsafe for people and vehicles, Buildings require special design
	 H4 – Unsafe for people and vehicles	 H6 – Unsafe for people and vehicles. All buildings vulnerable to failure



Plate E.15: Site 7 - 1%AEP design flood event hazard



Plate E.16 - Site 7 - Extreme flood event hazard

1.3.8 Site 8

Site address: 43 Boyd Street

Property details: Lot 5, DP787691; Lot 1, DP627896

Current Zone: RU1 Primary Production

Proposed Zone: SP2 Special Activities







Existing flood hazard in 1% AEP design flood event: H1 – H4

Existing flood hazard in Extreme flood event (local catchment): H1 – H3

Existing flood hazard in Extreme flood event (Murrumbidgee River): H3 – H4

Comment: Flood hazards for this site are shown on **Plate E.17** and **Plate E.18**. It is assumed that the rezoning will be for an extension of the water treatment plant. It is currently unknown what the proposed uses will be on the site, however it is assumed that it will involve the construction of critical infrastructure associated with the water treatment plant.

Accordingly, this initial flood risk assessments at this site suggests that it could be possible to change the zoning from RU1 to SP2, not considering other potential non-flood related constraints that may be present and subject to appropriate development controls for the location of critical infrastructure on the site.

Hazard Categories		
	H1 – Generally Safe	 H3 – Unsafe for vehicles, children and elderly
	H2 – Unsafe for small vehicles	 H5 – Unsafe for people and vehicles, Buildings require special design
	 H4 – Unsafe for people and vehicles	 H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

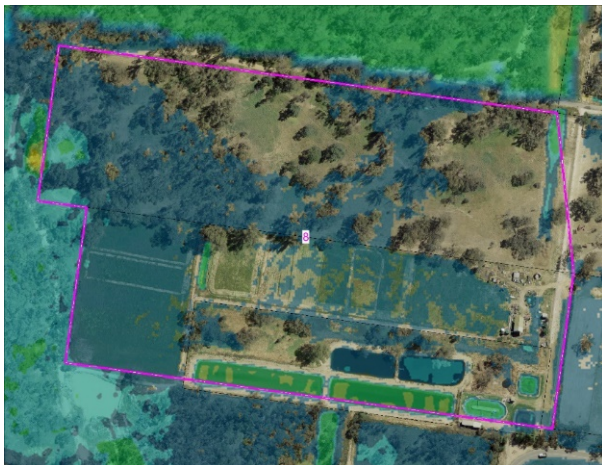


Plate E.17: Site 8 - 1%AEP design flood event hazard



Plate E.18 - Site 8 - Extreme flood event hazard

1.3.9 Site 9

Site address: Sturt Highway

Property details: Lot 71, DP750908 (part)

Current Zone: RU1 Primary Production

Proposed Zone: SP1 Special Activities

Existing flood hazard in 1% AEP design flood event: H1 – H3

Existing flood hazard in Extreme flood event (Murrumbidgee River): H3 – H5

Comment: Flood hazards for this site are shown on **Plate E.19** and **Plate E.20**. It is estimated this site would experience flooding during the 1% AEP design flood event that would be H1 and H2 hazards, with a very minor section of H3 hazard. These hazards are estimated to increase to H3 during the extreme flood event in the Murrumbidgee River, with area estimated to be a floodway during the extreme flood event.

At the time of writing, it is understood this site may be used as a waste transfer station and the proposed rezoning is to update some of the current land use activities.

The flood risk at this site would not support rezoning of this site from RU1 to SP1 to facilitate the operation of a waste transfer facility.







Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure



Plate E.19: Site 9 - 1%AEP design flood event hazard



Plate E.20: Site 9 - Extreme flood event hazard

1.3.10 Site 10 – Parts A to C

Site address: 92, 164, 266 Britts Road, Hay Road

Property details: Lot 169, DP750908 (part), Lot 1, DP1103528 (part); Lot 5, DP1115843 (part); Lot 120, DP750908 (part)

Current Zone: RU1 Primary Production

Proposed Zone: E1 National Park and/or E3 Environmental Management

Existing flood hazard in 1% AEP design flood event: H1 – H6







Existing flood hazard in Extreme flood event (Murrumbidgee River): H3 – H6

Comment: This site is composed of a number of smaller sites, which have been assessed individually, refer to **Plate E.21** and **Plate E.22** for details of the flood hazard at each site within this area.

Site 10A – All of the site is impacted by flooding in the 1% AEP design flood event. It is estimated this site would experience flooding during the 1% AEP design flood event that would be H1 to H5 hazards, that are estimated to increase to H4 and H5 during the extreme flood event in the Murrumbidgee River. Accordingly, the initial flood risk assessment at this site suggests that it could be possible to change the zoning from RU1 to E1 only, not considering other potential non-flood related constraints that may be present

Site 10B – All of the site is impacted by flooding in the 1% AEP design flood event. It is estimated this site would experience flooding during the 1% AEP design flood event that would be H1 to H6 hazards, that are estimated to increase to H3 to H6 during the extreme flood event in the Murrumbidgee River. Accordingly, the initial flood risk assessment at this site suggests that it could be possible to change the zoning from RU1 to E1 only, not considering other potential non-flood related constraints that may be present.

Site 10C – All of the site is impacted by flooding in the 1% AEP design flood event. It is estimated this site would experience flooding during the 1% AEP design flood event that would be H1 to H6 hazards, that are estimated to increase to H3 to H6 during the extreme flood event in the Murrumbidgee River. Accordingly, the initial flood risk assessment at this site suggests that it could be possible to change the zoning from RU1 to E1 only, not considering other potential non-flood related constraints that may be present.

Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

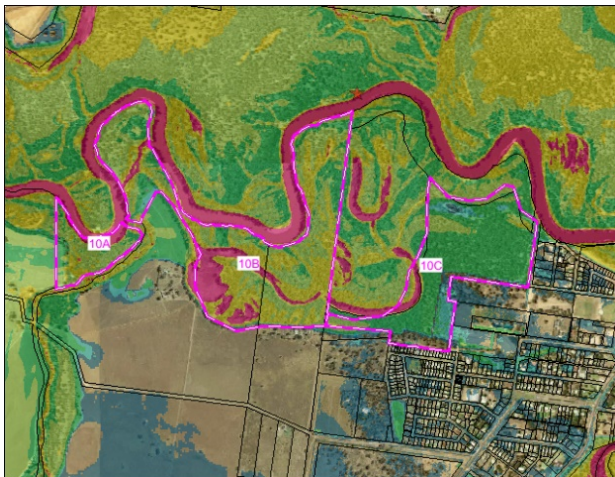


Plate E.21: Site 10 - 1%AEP design flood event hazard

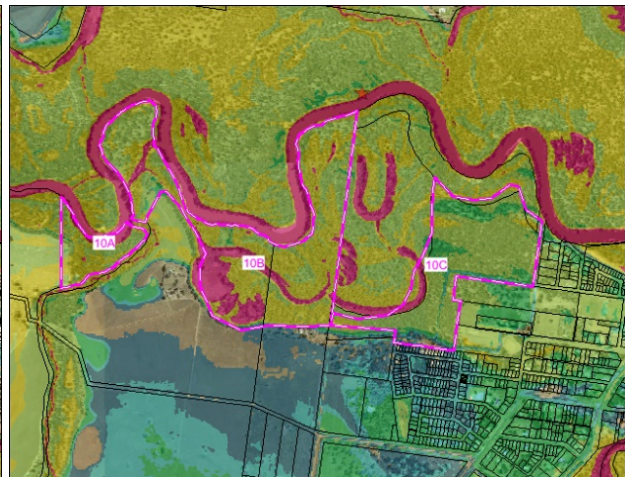


Plate E.22 - Site 10 - Extreme flood event hazard

1.3.11 Site 10 – Parts D to E

Site address: 92, 164, 266 Britts Road, Hay Road

Property details: Lot 169, DP750908 (part), Lot 1, DP1103528 (part); Lot 5, DP1115843 (part); Lot 120, DP750908 (part)

Current Zone: RU1 Primary Production

Proposed Zone: E1 National Park and/or E3 Environmental Management

Existing flood hazard in 1% AEP design flood event: H1 – H6

Existing flood hazard in Extreme flood event (Murrumbidgee River): H3 – H6







Comment: This site is composed of a number of smaller sites, which have been assessed individually, refer to **Plate E.23** and **Plate E.24** for details of the flood hazards at each site within this area.

Site 10D – All of the site is impacted by flooding in the 1% AEP design flood event. It is estimated this site would experience flooding during the 1% AEP design flood event that would be H2 to H6 hazards, that are estimated to have increased areas of H4 to H6 during the extreme flood event in the Murrumbidgee River. Accordingly, the initial flood risk assessment at this site suggests that it could be possible to change the zoning from RU1 to E1 only, not considering other potential non-flood related constraints that may be present.

Site 10E – All of the site is impacted by flooding in the 1% AEP design flood event. It is estimated this site would experience flooding during the 1% AEP design flood event that would be H5 to H6 hazards, that are estimated to have increased areas of H6 during the extreme flood event in the Murrumbidgee River. Accordingly, the initial flood risk assessment at this site suggests that it could be possible to change the zoning from RU1 to E1 only, not considering other potential non-flood related constraints that may be present

Site 10F – All of the site is impacted by flooding in the 1% AEP design flood event. It is estimated this site would experience flooding during the 1% AEP design flood event that would be H5 to H6

hazards, that are estimated to have increased areas of H6 during the extreme flood event in the Murrumbidgee River. Accordingly, the initial flood risk assessment at this site suggests that it could be possible to change the zoning from RU1 to E1 only, not considering other potential non-flood related constraints that may be present.

Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

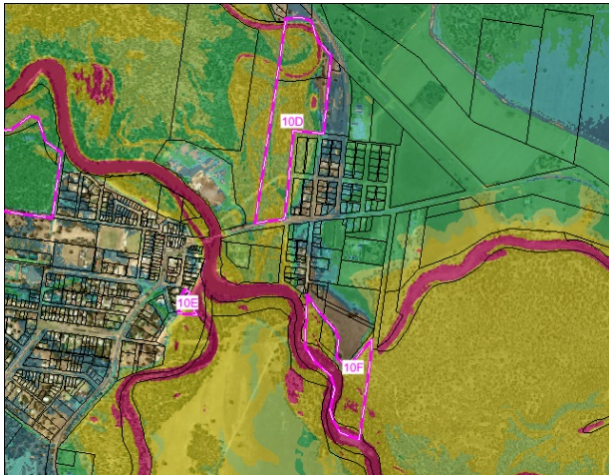


Plate E.23: Site 10 - 1%AEP design flood event hazard

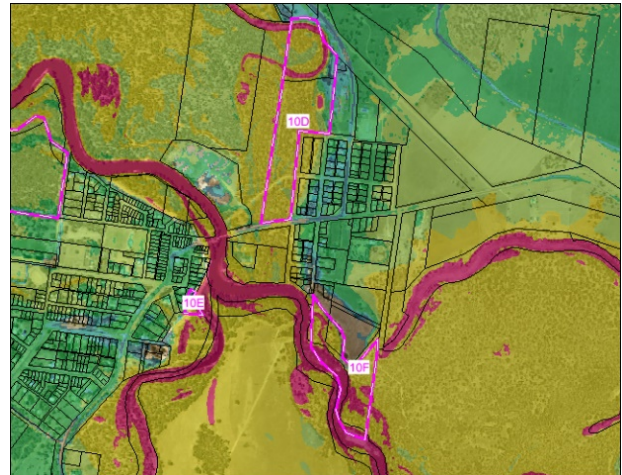


Plate E.24 - Site 10 - Extreme flood event hazard

1.3.12 Site 11

Site address: 92 Britts Road (part) and 164 Britts Road (part)

Property details: Lot 5, DP1115843 (part) and Lot 1, DP1103528 (part)

Current Zone: RU1 Primary Production

Proposed Zone: RU5 Village (future)

Existing flood hazard in 1% AEP design flood event: H1 – H4

Existing flood hazard in Extreme flood event (Murrumbidgee River): H1 – H4

Comment: Refer to **Plate E.25** and **Plate E.26** for details of the flood hazards at this site. The site itself is impacted by a very minor area of flooding during the 1% AEP design flood event. However access to this site does become inundated in 1% AEP design flood event. Upgrading the flood vulnerability of access roads from this site would strengthen the support on flooding grounds for this rezoning as it would assist in emergency management of the area during flooding.

Accordingly, this initial flood risk assessment at this site suggests that it could be possible to change the zoning from RU1 to RU5, not considering other potential non-flood related constraints that may be present.

Hazard Categories		
 H1 – Generally Safe	 H3 – Unsafe for vehicles, children and elderly	 H5 – Unsafe for people and vehicles, Buildings require special design
 H2 – Unsafe for small vehicles	 H4 – Unsafe for people and vehicles	 H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

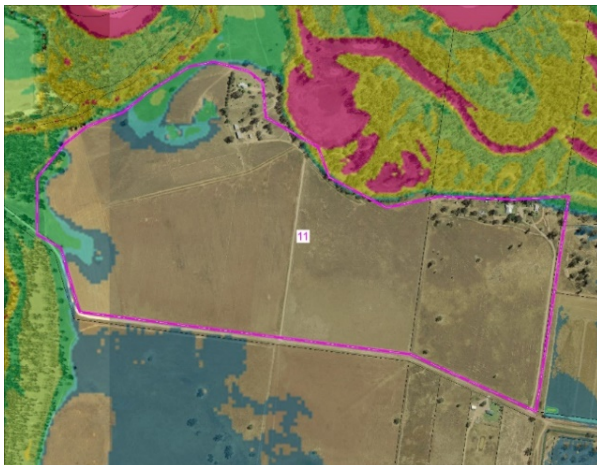


Plate E.25: Site 11 - 1%AEP design flood event hazard

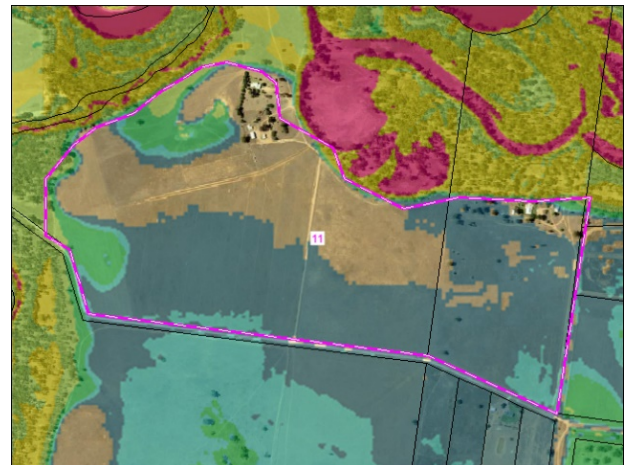


Plate E.26: Site 11 - Extreme flood event hazard

1.3.13 Site 12

Site address: Britts Road

Property details: Lot 2, DP1103528 (part)

Current Zone: RU1 Primary Production

Proposed Zone: R5 Large Lot Residential (future)







Existing flood hazard in 1% AEP design flood event: H1 – H2

Existing flood hazard in Extreme flood event (Murrumbidgee River): H1 – H3

Comment: Refer to **Plate E.27** and **Plate E.28** for details of the flood hazards at this site. Almost half of this site is impacted by flooding during the 1% AEP design flood event with H1 flood hazards. In addition, access to this site does become inundated in 1% AEP design flood event.

Accordingly, this initial flood risk assessments at this site suggests that it could be possible to change the zoning from RU1 to RU5 in the parts of the site that are impacted by H1 flood hazard in the 1% AEP design flood event with the application of appropriate flood related development controls, such as siting the building envelope on the flood free parts of the land, and/or on land located adjacent to food free access from the site. This assessment does not consider other potential non-flood related constraints that may be present.

In addition, future rezoning investigations need to include considerations of flood emergency management at the site during flood times.

Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

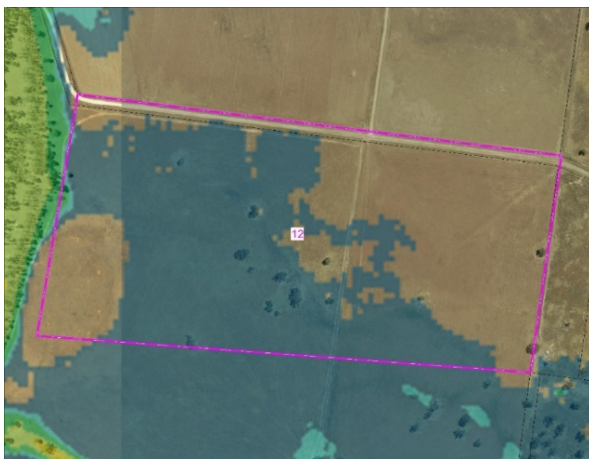


Plate E.27: Site 12 - 1%AEP design flood event hazard

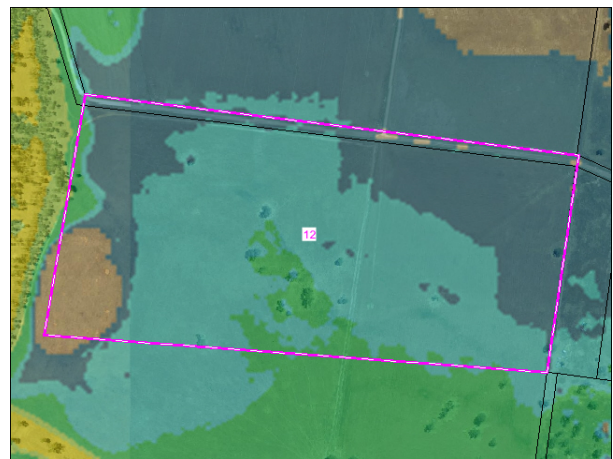


Plate E.28: Site 12 - Extreme flood event hazard

1.3.14 Site 13

Site address: 54 Bundure Street

Property details: Lot 216, DP750908

Current Zone: RU1 Primary Production







Proposed Zone: RE1 Public Recreation and/or RE2 Private Recreation (future) (Note: pending relocation of football oval)

Existing flood hazard in 1% AEP design flood event: H1 – H2

Existing flood hazard in Extreme flood event (Murrumbidgee River): H1 – H4

Comment: refer to **Plate E.29** and **Plate E.30** for details of the flood hazards at this site. The land use for this site is not known at the time of writing. Almost half of this site is impacted by flooding during the 1% AEP design flood event considered as H1 and H2 flood hazard. This flood hazard increases during the extreme flood event to H1 – H4, with a very minor part of the site impacted by H5 flooding during extreme flood event which traces along the north-eastern border only. In addition, access to this site does become inundated in 1% AEP design flood event.

Accordingly, this initial flood risk assessments at this site suggests that it could be possible to change the zoning from RU1 to RE1 or RE2, with the application of appropriate flood related development controls, including. Locating future development or buildings or infrastructure outside the (proposed) flood planning area.

Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

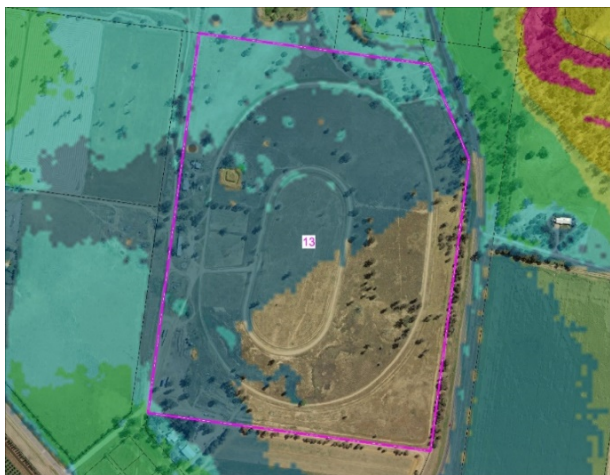


Plate E.29: Site 13 - 1% AEP design flood event hazard

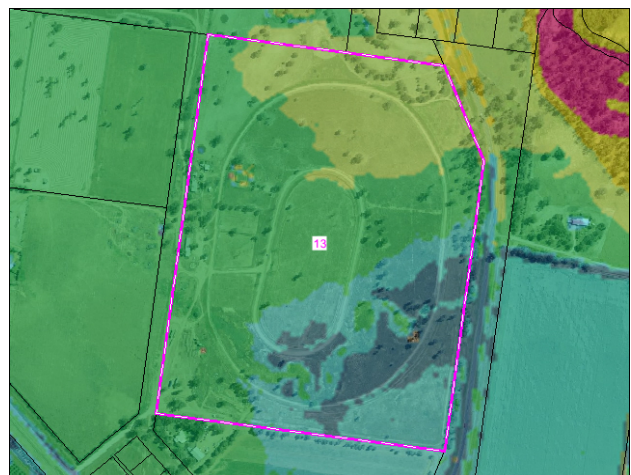


Plate E.30: Site 13 - Extreme flood event hazard

1.3.15 Site 14

Site address: Clarke Street (part)

Property details: Lots 1-8, DP759030 and Lot 2, DP218805

Current Zone: RU1 Primary Production and RU5 Village

Proposed Zone: B6 Business Park

Existing flood hazard in 1% AEP design flood event: H1 – H4

Existing flood hazard in Extreme flood event (Murrumbidgee River): H2 – H5

Comment: refer to Plate E.31 Plate E.31: Site 14 - 1% AEP design flood event hazard Plate E.32: Site 14 -
Extreme flood event hazard

and **Plate E.32** for details of the flood hazards at this site. The proposed development types associated with the B6 zoning proposed for this site is not known at the time of writing as the land use zone of B6 Business Park is currently not in use in the Murrumbidgee LEP 2013.

The entire site is impacted by flooding during the 1% AEP design flood event, considered as H1 and H2 flood hazard, with a small area of H3 flooding. This flood hazard increases during the extreme flood event to H2 and H3, with some small areas of H1 and H4 and H5 flood hazard. This site is located within the proposed flood planning area.

Attention should be paid to Clause 5 of the of the Environmental Planning and Assessment Act (EP&A) 1979 Section 9.1 Direction - Local Planning Direction 4.3 Flood Prone Land. It states that: *A draft LEP shall not rezone land within the flood planning areas from Special Use, Special Purpose, Recreation, Rural or Environmental Protection Zones to a Residential, Business, Industrial, Special Use or Special Purpose Zone.*

In addition, the change in zone at this site from RU5 to B6 may be possible, based on the potential reduction in risk to life and risk to property from the existing zoning. Development types and land uses associated with the B6 zoning could potentially reduce flood damages and flood losses during a flood event from those currently permitted under the current RU5 zoning. There is potential that the residual flood risk, including the risk to life may be reduced due to a lower density of development associated with the B6 zone and going from a residential to a non-residential land use.

If rezoning of this site progresses, detailed consideration of the variation in flood risk across the site will be required, with careful consideration of the vulnerability of development types permissible within the proposed zone and their appropriateness with the flood hazards at that location. Rezoning and development of these lots should focus on the less flood prone areas of the site.

Rezoning of this site will require site specific flood investigations to be undertaken to ensure future development is designed and located appropriately in accordance with the flood risk. The residual risk to property associated with the B6 zone may be managed through appropriate flood related planning and development controls, such as setting of floor heights, use of flood compatible building materials within the floodplain.







Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure



Plate E.31: Site 14 - 1% AEP design flood event hazard



Plate E.32: Site 14 - Extreme flood event hazard

1.3.16 Site 15

Site address: Clarke Street (part) and 20 Bundure Street

Property details: Lot 153, DP750908 and Lot 1, DP759030 (part)

Current Zone: RU5 Village

Proposed Zone: RE1 Public Recreation or RE2 Private Recreation (caravan park)







Existing flood hazard in 1% AEP design flood event: H1 – H3

Existing flood hazard in Extreme flood event (Murrumbidgee River): H2 – H3

Comment: Refer to **Plate E.33** and **Plate E.34** for details of the flood hazards at this site. A large portion of this site is impacted by flooding during the 1% AEP design flood event, considered as H1, H2 and H3 flood hazard. As such, most of this site is located within the proposed flood planning area. This flood hazard increases during the extreme flood event to H2 and H3, with the entire site impacted by flooding during the extreme flood event.

Rezoning of this site will require detailed consideration of the variation in flood risk across the site, with careful consideration of the vulnerability of development types permissible within the proposed zone and their appropriateness with the flood hazards at that location. Rezoning and development of these lots should focus on the less flood prone areas of the site. This support would be for non-permanent residential development at the site that are currently impacted by H1 flood hazards during the 1% AEP design flood event.

Rezoning of this site will require site specific flood investigations to be undertaken to ensure future development is designed and located appropriately in accordance with the flood risk. The residual risk to future development may be managed through appropriate flood related planning and development controls, such as setting of floor heights, use of flood compatible building materials within the floodplain emergency management and evacuation planning for the site during flood times.

Hazard Categories					
	H1 – Generally Safe		H3 – Unsafe for vehicles, children and elderly		H5 – Unsafe for people and vehicles, Buildings require special design
	H2 – Unsafe for small vehicles		H4 – Unsafe for people and vehicles		H6 – Unsafe for people and vehicles. All buildings vulnerable to failure

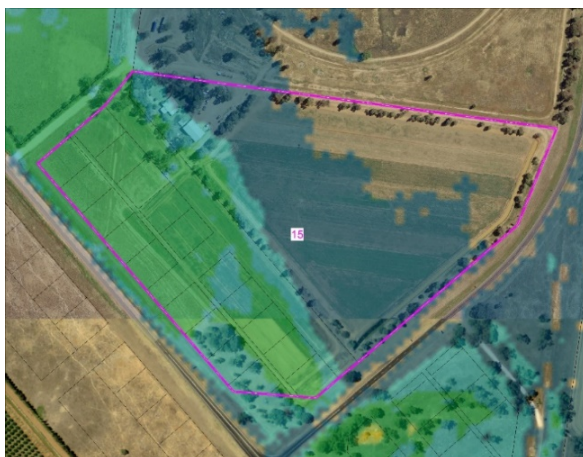


Plate E.33: Site 15 - 1% AEP design flood event hazard



Plate E.34: Site 15 - Extreme flood event flood hazard

1.3.17 Site 16

Site address: Hay Road (part); 197, 205, 209, 213 Hay Road, and 211 Sturt Highway

Property details: Lot 120, DP750908 (part), Lot 1, DP507949, Lots 3-5, DP869939, Lot 1, DP837504

Current Zone: RU1 Primary Production

Proposed Zone: RU5 Village (future)

Existing flood hazard in 1% AEP design flood event: H1 – H3

Existing flood hazard in Extreme flood event (Murrumbidgee River): H3

Comment: Refer to **Plate E.35** and **Plate E.36** for details of the flood hazards at this site. All of this site is impacted by flooding during the 1% AEP design flood event, considered as H1, H2 and H3 flood hazard. This flood hazard increases during the extreme flood event to primarily H3. This site is located within the proposed flood planning area.

Rezoning of this site would increase the density of residential development within the floodplain. Accordingly, the flood hazard at this site would not support rezoning this site from RU1 to RU5.

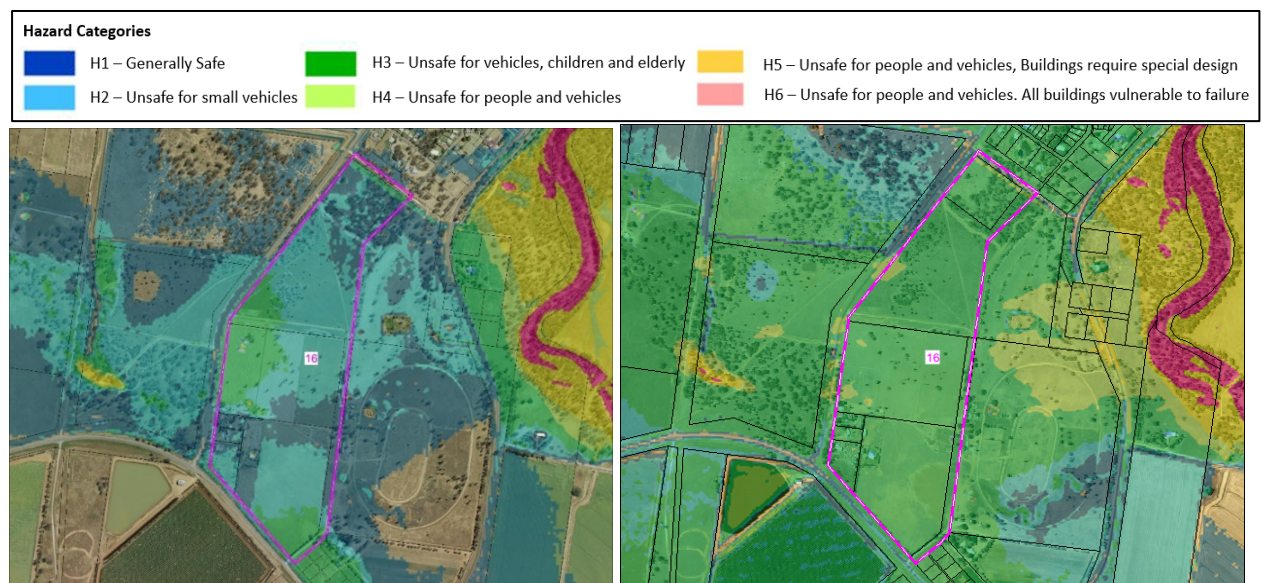


Plate E.35: Site 16 - 1% AEP design flood event hazard

Plate E.36: Site 16 - Extreme flood event flood hazard

1.3.18 Site 17

Site address: 8192 Kidman Way (part)

Property details: Lot 11, DP750908

Current Zone: RU1 Primary Production

Proposed Zone: RU5 Village (future)

Existing flood hazard in 1% AEP design flood event: H1 – H5

Existing flood hazard in Extreme flood event (Murrumbidgee River): H2 – H5

Comment: Refer to Plate E.31: Site 14 - 1% AEP design flood event hazard
event hazard

Plate E.32: Site 14 - Extreme flood

Plate E.37 and **Plate E.38** for details of the flood hazards at this site. All of this site is impacted by flooding during the 1% AEP design flood event and the extreme flood event. This site is located within the proposed flood planning area.

Rezoning of this site would increase the density of residential development within the floodplain. Accordingly, the flood hazard at this site would not support rezoning this site from RU1 to RU5.

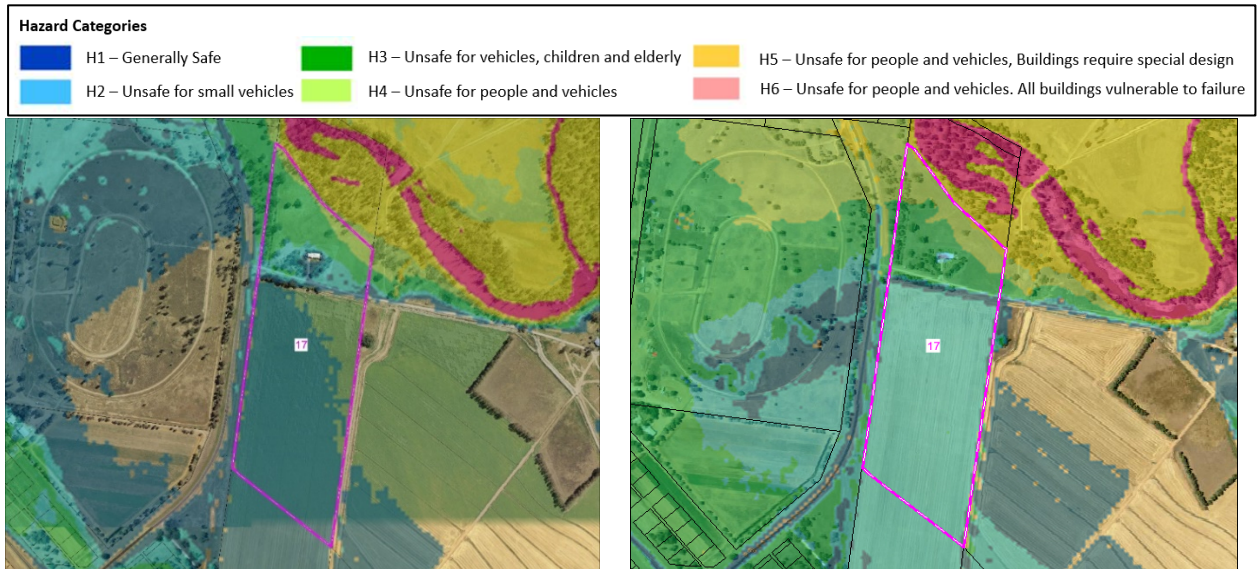


Plate E.37: Site 17 1% AEP design flood event hazard

Plate E.38: Site 17 - Extreme flood event flood hazard

1.4 Summary

Table E.2 summarises the review of the flood risk assessment of the future development sites as defined in the report prepared by Habitat Planning *Land Use Plan for Candidate Sites at Darlington Point*, July 2020. This review includes consideration of flood risk only. Other constraints, such as ecological constraints, Aboriginal Cultural Heritage constraints or noise and visual amenity of these candidate sites has not been considered during this analysis.

Table E.2 - Summary of flood risk assessment of future development sites

Site No	Site Address	Current Zone	Proposed Zone	Murrumbidgee River Flood Hazard (1% AEP)	Local Hazard (Extreme)	Murrumbidgee River Flood Hazard (Extreme)	Comment
1	7 Boyd Street	RE1 Public Recreation	RU5 Village	H1	H3	H3-H4	Flood constraints suggest change in use possible.
2	Hay Road	RU1 Primary Production	RU5 Village	H1	H1-H2	H1-H3	Flood constraints suggest change in use possible for water treatment plant operations.
3	Kidman Way, Kooba Street, 23 Narrand Street, 2305 Whitton Darlington Point Road (part), 2365 Whitton Darlington Point Road (part), 2385 Whitton Darlington Point Road (part), Darlington Street (part)	RU1 Primary Production	RU5 Village	H1-H5	N/A	H3-H5	-
3A				H1	N/A	H3-H4	Flood constraints suggest change in use possible.
3B				H3	N/A	H3-H4	Flooding constraints do not supported rezoning to a more intense land use that include residential or permanent residences.
3C				H3-H5	N/A	H3-H5	Flooding constraints do not support rezoning.
3D				H3-H5	N/A	H4-H5	Flooding constraints do not support rezoning.

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4	Darlington Street (part)	RU1 Primary Production	R5 Large Lot Residential	H1-H5	N/A	H1-H5	Flood constraints suggest change in use possible. Future rezoning investigations need to include considerations of the emergency management of the site during flood times
5	20 Bundure Street, 33 Ferry Street, 15166 Sturt Highway, 15173 Sturt Highway	RU5 Village, RU1 Primary Production	IN1 General Industrial, 5A	H1	N/A	H3	-
5A				no flooding	N/A	H3	Flood constraints suggest change in use possible.
5B				H1	N/A	H3	Flooding constraints suggest change in use possible subject to the application of appropriate flood related development controls to all future development on this site.
6	Hay Road (part)	RU1 Primary Production	RE1 Public Recreation	H1-H3	N/A	H3-H4	It has been assumed that this rezoning is to update the zoning to be consistent with the current land use that includes a golf course. Flooding constraints suggest change in zone possible.
7	20 Bridge Street	E1 National Park	SP2 Special Use	H1-H5	N/A	H1-H5	Flood constraints suggest change in use possible with future development supported in areas outside of the flood planning area only.
8	43 Boyd Street	RU1 Primary Production	SP2 Special Activities	H1-H4	H1-H3	H3-H4	Flood constraints suggest change in use possible for use and function of water treatment plant and subject to appropriate flood related development controls for

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Appendix E – Flood Risk Assessment of Future Development Sites

							the location of critical infrastructure on the site.
9	Sturt Highway	RU1 Primary Production	SP1 Special Activities	H1-H3	N/A	H3 - H5	The flood risk at this site would not support rezoning of this site from RU1 to SP1 to facilitate the operation of a waste transfer facility.
10	92, 164, 266 Britts Road, Hay Road	RU1 Primary Production	E1 National Park and/or E3 Environmental Management	H1-H6	N/A	H3-H6	-
10A				H1-H5	N/A	H4-H5	Flood constraints suggest change in use possible to zone E1 only
10B				H1-H6	N/A	H3-H6	Flood constraints suggest change in use possible to zone E1 only
10C				H1-H6	N/A	H3-H6	Flood constraints suggest change in use possible to zone E1 only
10D				H2-H6	N/A	H2-H6	Flood constraints suggest change in use possible to zone E1 only
10E				H5-H6	N/A	H5-H6	Flood constraints suggest change in use possible to zone E1 only
10F				H5-H6	N/A	H5-H6	Flood constraints suggest change in use possible to zone E1 only
11	92 Britts Road (part) and 164 Britts Road (part)	RU1 Primary Production	RU5 Village (future)	H1-H4	N/A	H1-H4	Flooding constraints suggest change in use possible.
12	Britts Road (part)	RU1 Primary Production	R5 Large Lot Residential (future)	H1-H2	N/A	H1-H3	Flooding constraints suggest change in use possible. Future rezoning investigations need to include considerations of flood emergency management at the site.

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Appendix E – Flood Risk Assessment of Future Development Sites

13	54 Bundure Street	RU1 Primary Production	RE1 Public Recreation and/or RE2 Private Recreation	H1-H2	N/A	H1-H4	Flood constraints suggest change in use possible with the application of appropriate flood related development controls.
14	Clarke Street (part)	RU5 Village and RU1 Primary Production	B6 Business Park	H1-H4	N/A	H2-H5	The change in zone at this site from RU5 to B6 may be possible, based on the potential reduction in risk to life and risk to property during flooding from the existing zoning. Rezoning of this site will require site specific flood investigations to be undertaken to ensure future development is designed and located appropriately in accordance with the flood risk.
15	Clarke Street	RU5 Village	RE1 Public Recreation or RE2 Private Recreation (caravan park)	H1-H3	N/A	H2-H3	Flooding constraints suggest change in use possible based on the potential reduction in risk to life and risk to property during flooding from the existing zoning. Rezoning of this site will require site specific flood investigations to be undertaken to ensure future development is designed and located appropriately in accordance with the flood risk.
16	Hay Road (part)	RU1 Primary Production	RU5 Village (future)	H1-H3	N/A	H3	Flooding constraints do not support rezoning
17	8192 Kidman Way (part)	RU1 Primary Production	RU5 Village (future)	H1-H5	N/A	H2-H5	Flooding constraints do not support rezoning

