

*Building Wodonga's resilient communities, ecosystems
and park infrastructure (Project RR1-082)*

BRIDGE FEASIBILITY REPORT

Prepared by 12P Consulting

VERSION 2.0 (FINAL)
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Table of Contents

<u>INTRODUCTION</u>	3
<u>METHODOLOGY AND FINDINGS</u>	4
<u>SUMMARY FINDINGS</u>	4
1. FLANAGAN'S CREEK WEST	4
2. FLANAGAN'S CREEK EAST	5
3. KIEWA RIVER	5
4. RYANS CK WEST	5
5. RYANS CK EAST	6
GENERAL FINDINGS	6
<u>TABLE 1 - SUMMARY OF DESIGN CONSIDERATIONS</u>	7
<u>CONSULTATION SESSION NOTES</u>	12
NECMA MEETING	12
KEY DISCUSSION POINTS:	12
PERMIT APPLICATION PROCESS:	12
DELWP MEETING	13
KEY DISCUSSION POINTS:	13
<u>SITE PHOTOS</u>	15
FLANAGAN'S CREEK WEST	15
FLANAGAN'S CREEK EAST	19
KIEWA RIVER	23
RYAN'S CREEK WEST	27
RYAN'S CREEK EAST	31
<u>ENGINEERING COST ESTIMATES</u>	34

Introduction

12P Consulting was engaged by Parklands Albury Wodonga to prepare a feasibility study for the technical review of 5 proposed pedestrian bridges and one vehicular bridge for the traversing of waterways that cross the Murray River Adventure Trail (MRAT) alignment in around Wodonga in North East Victoria.

The aim of the study was to investigate suitable alignments at each location, review, understand and report technical parameters and provide a preliminary budget for the construction of pedestrian water crossings at the following locations (Fig 1):

1. Flanagan's Creek West (36°5.924'S, 146°53.248'E)
2. Flanagan's Creek East (36°6.351'S, 146°54.247'E)
3. Kiewa River (36°6.840'S, 146°56.829'E)
4. Ryan's Creek West (36°5.720'S, 146°57.073'E)
5. Ryan's Creek East (36°5.636'S, 146°58.722'E)
6. Browns Island East (36° 6.596' S, 146° 55.057' E)

Note: Brown's Island East was added as an extra site from the original scope of works. The intent for the crossing is to facilitate pedestrian access and for a vehicle crossing for access by the landholder and Parklands managers (tractor, farm ute).



Figure 1. Locations of proposed bridges.

Methodology and Findings

Between April and July 2022, 12P Consulting carried out field work at each site comprising a combination of ground and aerial surveying, photography, and onsite data collection to inform the concept plans for each bridge site.

Specifically, the work included the following.

- Ground and aerial feature and level surveys were completed at each location.
 - a. Flanagan's Creek West: surveyed 01/04/22
 - b. Flanagan's Creek East: surveyed 05/07/22
 - c. Kiewa River: surveyed 24/05/22
 - d. Ryan's Creek West: surveyed 15/07/22
 - e. Ryan's Creek East: surveyed 19/05/22
 - f. Brown's Island East: tba
- Water levels were measured at each site
- Site photos and aerial imagery/photospheres (360° photography)
- Bridge design considerations and concept plans were prepared. AutoCAD drawing layouts appended to the back of this report show simplified site plans with flood levels, site constraints and preferred bridge alignments.
- 3D model renders of the preferred bridge type within the captured site landscape
- Consultation sessions with NECMA and DELWP
- Construction cost estimates for proposed footbridges

The consultation sessions held with DELWP and NECMA have helped inform the alignments and other site considerations to ensure that the concepts are as close to "shovel ready" as possible without undertaking more detailed geotechnical and structural design work. A summary table showing the design considerations captured during the research stage and these consultation sessions is shown below in Table 1.

Summary Findings

1. Flanagan's Creek West

The alignment at Flanagan's Creek West is constrained by the limited area of Crown Land (based on the best available dataset from Victorian Government) on the southern embankment that will allow connection with the proposed trail. A narrow peninsula forms the banks of Wodonga Creek and Flanagan's Creek at the confluence where the proposed 25m single span pedestrian bridge has been located. Erosion over time has reduced the available land on which to construct a bridge abutment and rock beaching or other bank protection measures will be required to protect the remaining bank. The alignment is also constrained by native vegetation along both sides of the creek. The proposed bridge has been sited to avoid the removal of large trees but their proximity to the bridge may require an arborist assessment into the impact on these trees. The bridge could either be designed so that the soffit is 500mm above the 100-year ARI (1% AEP) flood level or,

alternatively, designed for inundation to eliminate the requirement for significant ramps at each end.

2. Flanagan's Creek East

A 50m suspension bridge is proposed for the alignment across Flanagan's Creek East in a location that provides the best solution for the shortest span whilst avoiding significant native vegetation. However, some small Eucalypts will need to be removed or trimmed on the northern abutment and willows will need to be managed at the southern side. The design intent is to avoid placing intermediate piers within the creek due to the construction difficulty of operating in this waterway. There is adequate room available within the Crown Land envelope to accommodate the backstays of a 50m suspension bridge. The soffit of the bridge must be well above the 1% AEP flood level (to ensure that the bridge is essentially flood-immune) and this could be more easily achieved by including a positive camber in the deck.

3. Kiewa River

A 65m suspension bridge is proposed for the alignment across the Kiewa River. The locations selected for the main bridge towers provide the best solution for the shortest span whilst avoiding large native trees and a shallow depression on the southern embankment as well as providing a connection to the existing trail on the southern end. Some minor trimming or removal of existing Acacias is unavoidable. The design intent is to avoid placing intermediate piers within the Kiewa River due to the construction difficulties of this undertaking. There is adequate room available within the Crown Land envelope to accommodate the backstays of a suspension bridge. The soffit of the bridge must be well above the 1% AEP flood level and this could be more easily achieved by including a positive camber in the deck.

4. Ryans Ck West

The alignment at Ryans Creek West is constrained by the limited area of Crown Land (based on the best available dataset from Victorian Government) on the southern embankment that will allow connection with the proposed trail without traversing freehold land. On the northern bank at the mouth of Ryans Creek, the ground is low-lying and typically submerged during periods of higher than normal flows. The design intent of the proposed bridge is to construct a 72m multi-span, low-level pedestrian bridge supported on driven piles across the mouth of Ryans Creek. Whilst it would be technically feasible to design the bridge above the 1% AEP flood level this would place the bridge around 4m above the existing ground level. Thus, the bridge should be designed for inundation including debris loading. The trail alignment on the northern approach to the bridge will need to keep to elevated ground. On the southern approach, the bridge alignment is constrained by a patch of native vegetation and large trees. Consequently, the position of the southern abutment crosses an existing fence line and consultation with the landholder will be required, including possible land acquisition or lease – even though the proposed alignment is within the VicMAP-defined Crown Land envelope.

5. Ryans Ck East

A 100m multi-span pedestrian bridge supported on driven piles is proposed for the alignment across Ryans Creek East just downstream from the rock weir. An additional 10m single span bridge will be needed to cross a localized depression on the trail alignment. Due to the limited area available at the southern abutment (Crown Land envelope and existing farm tracks and fencing), a suspension bridge with long back stay lengths was not considered suitable. The structure could be designed for flood immunity (ie above the 0.5% AEP level), or slightly lower which would require consideration of inundation and debris loading. The deck height should best match the existing ground levels at the abutments and provide access for kayakers and watercraft during high flows. Ramps at each end may be required, depending on the final height chosen. The alignment avoids the removal of large trees; however, willow management will be needed on the northern abutment.

General Findings

Several factors apply equally to each site including the following.

- Climate change effects for estimating flood levels
 - Advice from NECMA has been used in the assumption of flood levels. In particular that the climate change affected 1:100 year ARI is roughly equivalent to a 300 – 500mm increase in flood height or the 1:200 year ARI
 - 1:100 year ARI and 1:200 year ARI flood levels are taken from the GHD report "Albury City to Greater Hume Murray River Flood Study" March 2012.
- Cultural Heritage investigations will be required at each site. We understand that this will be commissioned by PAW.
- Native Title investigations may also be required to be investigated.
- Crown Land boundaries are generally poorly defined across most of Australia and particularly so where the boundary is constrained by the southern bank of the Murray River which is also the state boundary with NSW. This report relies upon the digital definition of the boundaries between Crown Land, freehold land and the NSW/VIC border maintained by DELWP (VicMAP data). In some cases, it would be prudent to undertake a title survey to re-establish the location and extent of the Crown Land and freehold land boundaries as this may affect the optimum location of any bridge.

Table 1 - Summary of design considerations

ASSESSMENT CRITERIA	1. Flanagan's Ck West	2. Flanagan's Ck East	3. Kiewa River	4. Ryan's Ck West	5. Ryan's Ck East	6. Brown's Is. East
Purpose	Pedestrian bridge	Pedestrian bridge	Pedestrian bridge	Pedestrian bridge	Pedestrian bridge	Pedestrian and vehicular bridge for internal farm access
Structural Design	Single span steel web truss	Suspension bridge (50m main span with ~20m back stays TBC)	Suspension bridge (65m main span with ~20m back stays TBC)	Multi-span steel web truss (20m individual spans on driven steel piles).	Multi-span steel web truss (20m individual spans on driven steel piles) + additional 10m single span truss bridge over localised depression	tbc
Bridge Deck Level	Design for full immersion, debris loading to AS5100 to avoid the need for extensive ramps at each abutment, or optionally – 500mm above	Design for flood immunity due to inability of structure to resist hydraulic loading. Positive camber main span to be set above 0.05% AEP (1:2000 ARI)	Design for flood immunity due to inability of structure to resist hydraulic loading. Positive camber main span to be set above 0.05% AEP (1:2000 ARI)	Designed for inundation, debris loading to AS5100, decking above RL155.0. Also consideration of access for kayakers and	Designed for inundation, debris loading to AS5100, deck height at – RL157.0 to best match existing ground level and provide access for kayakers and	

ASSESSMENT CRITERIA	1. Flanagan's Ck West	2. Flanagan's Ck East	3. Kiewa River	4. Ryan's Ck West	5. Ryan's Ck East	6. Brown's Is. East
Waterway	1:200 ARI flood level (rough approximation of future climate change effects above traditional 1:100 criterion)	Bridge soffit above top of bank	Bridge soffit above top of bank	Bridge soffit at level of top of bank. In-stream piles occupy <2% of cross-sectional area.	Bridge soffit above top of bank. In-stream piles occupy <2% of cross-sectional area.	Bridge soffit above top of bank. In-stream piles occupy <2% of cross-sectional area.
Road/Track Approaches	Track at natural surface level with approach ramps onto bridge	Track at natural surface level with approach ramps onto bridge	Track at natural surface level with approach ramps onto bridge	Track at natural surface level with approach ramps onto bridge	Track at natural surface level with approach ramps onto bridge	Track at natural surface level with approach ramps onto bridge
Number of Spans	Single	Single (suspension)	Single (suspension)	6-span (4 piers located within normal in-stream flow)	5-span (3 piers located within normal in-stream flow)	

ASSESSMENT CRITERIA	1. Flanagan's Ck West	2. Flanagan's Ck East	3. Kiewa River	4. Ryan's Ck West	5. Ryan's Ck East	6. Brown's Is. East
Bridge Abutments	Concrete headstock on a driven pile/pier on embankments	Tower footing supported on driven piles with concrete pile cap on top of bank	Tower footing supported on driven piles with concrete pile cap on top of bank	Bridge supported on driven piles (2 per crosshead)	Bridge supported on driven piles (2 per crosshead)	
Batter Protection	Rock armouring or other measures (driven timber piles) to protect remaining bank on peninsula	Rock beaching around tower pile caps	Rock beaching around tower pile caps	Rock beaching around abutments	Rock beaching around abutments	
Fish Passage	Bridge soffit at least 1.0m above base flow level of stream	Bridge soffit at least 1.0m above base flow level of stream	Bridge soffit at least 1.0m above base flow level of stream	Bridge soffit at least 1.0m above base flow level of stream	Bridge soffit at least 1.0m above base flow level of stream	
Local Drainage	Mesh decking	Mesh decking	Mesh decking	Mesh decking	Mesh decking	
Fencing and Bridge Railing	AS2156.2 compliant (Type A or B probably)	AS2156.2 compliant (Type A or B probably)	AS2156.2 compliant (Type A or B probably)	AS2156.2 compliant (Type A or B probably)	AS2156.2 compliant (Type A or B probably)	AS5100 compliant
Management of exotic vegetation	n/a	Willows on southern abutment to be trimmed and killed	n/a	Willows on northern abutment to be trimmed and killed with root	Willows on northern abutment to be trimmed and killed with root	

ASSESSMENT CRITERIA	1. Flanagan's Ck West	2. Flanagan's Ck East	3. Kiewa River	4. Ryan's Ck West	5. Ryan's Ck East	6. Brown's Is. East
			with root mass retained to stabilise bank		mass retained to stabilise bank	mass retained to stabilise bank
Management of native vegetation	Avoids the removal of large trees. Bridge alignment falls within the tree protection zone (15m of the trunk) of 6-7 large Eucalypts; an arborist assessment may be required to determine the potential impact on the integrity of the root zone. Less than 0.5 ha of understorey vegetation will need to be removed along with some	Avoids the removal of large trees. Bridge alignment falls within the tree protection zone (15m of the trunk) of 1 large Eucalypt on the southern abutment; an arborist assessment may be required to determine the potential impact on the integrity of the root zone. Less than 0.5 ha of understorey vegetation will need to be removed along with some	Avoids the removal of large trees. Bridge alignment falls within the tree protection zone (15m of the trunk) of 2 large Eucalypts; an arborist assessment may be required to determine the potential impact on the integrity of the root zone. Less than 0.5 ha of understorey vegetation will need to be removed along with some	Avoids the removal of large trees. Less than 0.5 ha of native vegetation will need to be removed, including trimming or removal of existing Acacias on southern abutment	Avoids the removal of large trees. Less than 0.5 ha of understorey vegetation will need to be removed on southern embankment	Avoids the removal of large trees. Less than 0.5 ha of understorey vegetation will need to be removed on southern and northern embankment

ASSESSMENT CRITERIA	1. Flanagan's Ck West	2. Flanagan's Ck East	3. Kiewa River	4. Ryan's Ck West	5. Ryan's Ck East	6. Brown's Is. East
	trimming of tree branches.	some understorey vegetation	southern abutments			
Management of cultural heritage	Requires aboriginal cultural heritage due diligence assessment	Requires aboriginal cultural heritage due diligence assessment	Requires aboriginal cultural heritage due diligence assessment	Requires aboriginal cultural heritage due diligence assessment	Requires aboriginal cultural heritage due diligence assessment	Requires aboriginal cultural heritage due diligence assessment
Native Title	Requires Native Title assessment	Requires Native Title assessment	Requires Native Title assessment	Requires Native Title assessment	Requires Native Title assessment	Requires Native Title assessment
Land Use / Crown boundaries	Bridge located within Crown Land parcel as defined by VicMAP PLM25. Limited scope for variation to alignment within Crown Land parcel.	Bridge located within Crown Land parcel as defined by VicMAP PLM25.	Bridge located within Crown Land parcel as defined by VicMAP PLM25.	Bridge could be located within Crown Land parcel as defined by VicMAP PLM25.	Bridge located within Crown Land parcel as defined by VicMAP PLM25. Limited scope for variation within Crown Land parcel.	Bridge located within Crown Land parcel as defined by VicMAP PLM25. There is Limited scope for within the Crown Land parcel. Suggest liaising with the freehold landowner to avoid native vegetation impacts.

Engineering Cost Estimates

Individual, detailed cost estimates are presented in the following pages. A summary of costs for each structure is shown below.

BRIDGE NO.	BRIDGE NAME	TOTAL CONSTRUCTION COST ESTIMATE ¹	TOTAL CONSTRUCTION COST ESTIMATE WITH CONTINGENCY ²
1	FLANAGANS CK WEST	\$222,596	\$338,829
2	FLANAGANS CK EAST	\$699,163	\$899,407
3	KIEWA RIVER	\$1,236,635	\$1,236,635
4	RYANS CK WEST	\$492,879	\$686,464
5	RYANS CK EAST	\$538,718	\$703,887
Total		\$3,189,990	\$3,865,222

¹ Includes all construction related components including contractor's margin but excludes client-side project management, engineering designs, vegetation offsets and other non-construction related costs

² Includes all construction and non-construction related costs to scope, design and construct the bridge

NEW FENCED AREA INCLOSURE
FUTURE WALKING TRACK CORRIDOR

100 YEAR ARI (1% AEP)
FLOOD LEVEL = 153.0m AHD

200 YEAR ARI (0.5% AEP)
FLOOD LEVEL = 153.8m AHD

MURRAY COUNTRY LINE

PROPOSED 50m SINGLE SPAN
STEEL TRUSS PEDESTRIAN
BRIDGE WITH FLAP LIGHT MASTS
DECKING, SHROUD SPRUTT TO BE
MIN. 50mm ALBURY DNAP,
RE. 153.8m AHD

MURRAY PENINSULA
SEPARATING FLAMAKGANS
CREEK AND WOODGANGA CREEK

MURRAY PENINSULA
SEPARATING FLAMAKGANS
CREEK AND WOODGANGA CREEK

CONCEPT DESIGN NOTES

1. 100 YEAR ARI FLOOD LEVEL IN THIS VICINITY IS 153.8m AHD. REFERENCE - ALBURY CITY TO GREATER HUME MURRAY RIVER FLOOD STUDY, MARCH 2012, CH2.
2. THE INCREASE IN THE INAKEP FLOOD HEIGHTS DUE TO THE EFFECTS OF CLIMATE CHANGE HAS BEEN ASSUMED TO BE THE EQUIVALENT OF THE 0.5% AEP (1 IN 200 ARI) WHICH IS 153.8m AHD IN THIS VICINITY.
3. BRIDGE COULD EITHER BE DESIGNED SO THAT THE SPANNING LENGTH IS 340mm AND FOR 100 YEAR ARI = 153.8m OR ALTERNATIVELY, DESIGNED FOR INAKAEP TO ELIMINATE THE REQUIREMENT FOR SIGNIFICANT RAMPS AT EACH END.
4. A NARROW PENINSULA FORMS THE BANKS OF WOODGANGA CREEK AND FLAMAKGANS CREEK AT THE CONFLUENCE. EROSION OVER TIME HAS REDUCED THE AVAILABLE LAND ON WHICH TO CONSTRUCT A BRIDGE ABUTMENT.
5. TO IMPROVE THE LONG TERM VIABILITY OF ANY STABLE TURF FOUND ON THE NARROW PENINSULA, DEEP DRIVEN PILES ARE RECOMMENDED TO SUPPORT THE ABUTMENT'S ROCK BREAKAWAY OR OTHER BANK PROTECTION MEASURES SHOULD BE INSTALLED TO PROTECT THE REMAINING BANK.
6. BRIDGE HAS BEEN SITED TO AVOID THE REMOVAL OF LARGE TREES BUT THE ALIGNMENT FALLS WITH ONE OF THE TRUNKS OF 6-7 LARGE EUCALYPTS. AN ARBOREST ASSESSMENT IS RECOMMENDED TO DETERMINE THE IMPACT ON THE INTEGRITY OF THE ROAD ZONE.

WATER IN FLAMAKGANS CREEK
AT TIME OF SURVEY = 153.43

INSTALL MIN DINAH ROCK BREAKAWAY

OPTIONAL APPROX. RAMPS EACH END:
TOP GALLEY, LOWER LEVEL, BASE
SECTION TO BE USED FOR RAMPS TO
MINIMIZE GROUND WORKS IF USE. DIMINISH
PILE AND SITE. REFER TO CS

PROPOSED PEDESTRIAN BRIDGE - GENERAL ARRANGEMENT

12^o Consulting

Section	Location	Notes
1	Proposed Albury Yeadong	1. Site 2. HYDRAULIC 3. HYDRAULIC 4. HYDRAULIC 5. HYDRAULIC
2		
3		

Section	Location	Notes
1	Proposed Albury Yeadong	1. Site 2. HYDRAULIC 3. HYDRAULIC 4. HYDRAULIC 5. HYDRAULIC



12^o Consulting

PROPOSED PEDESTRIAN BRIDGE STUDY | PARKLANDS ALBURY WODONGA

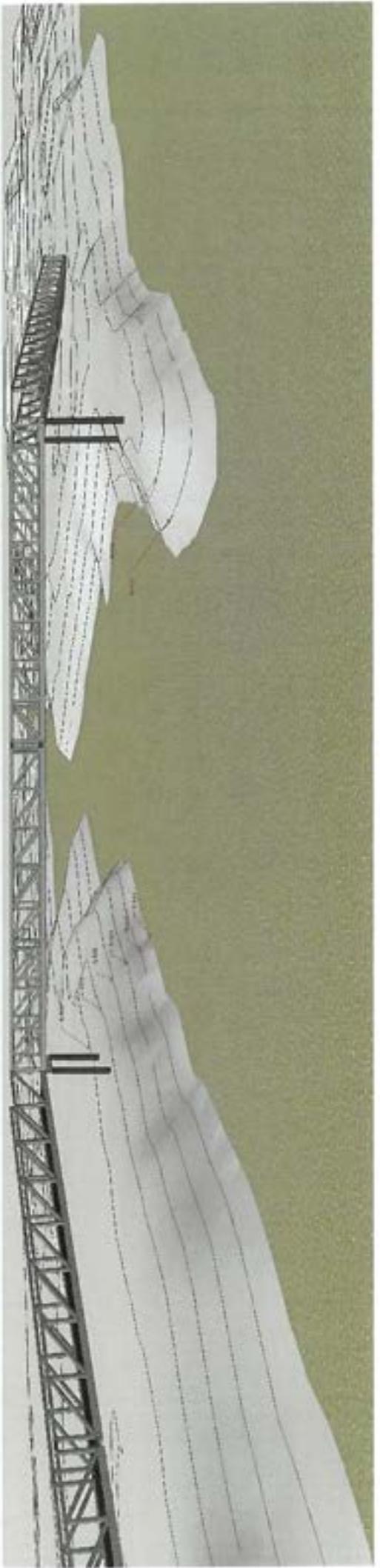
ARTIST'S IMPRESSION RENDER

12° Consulting



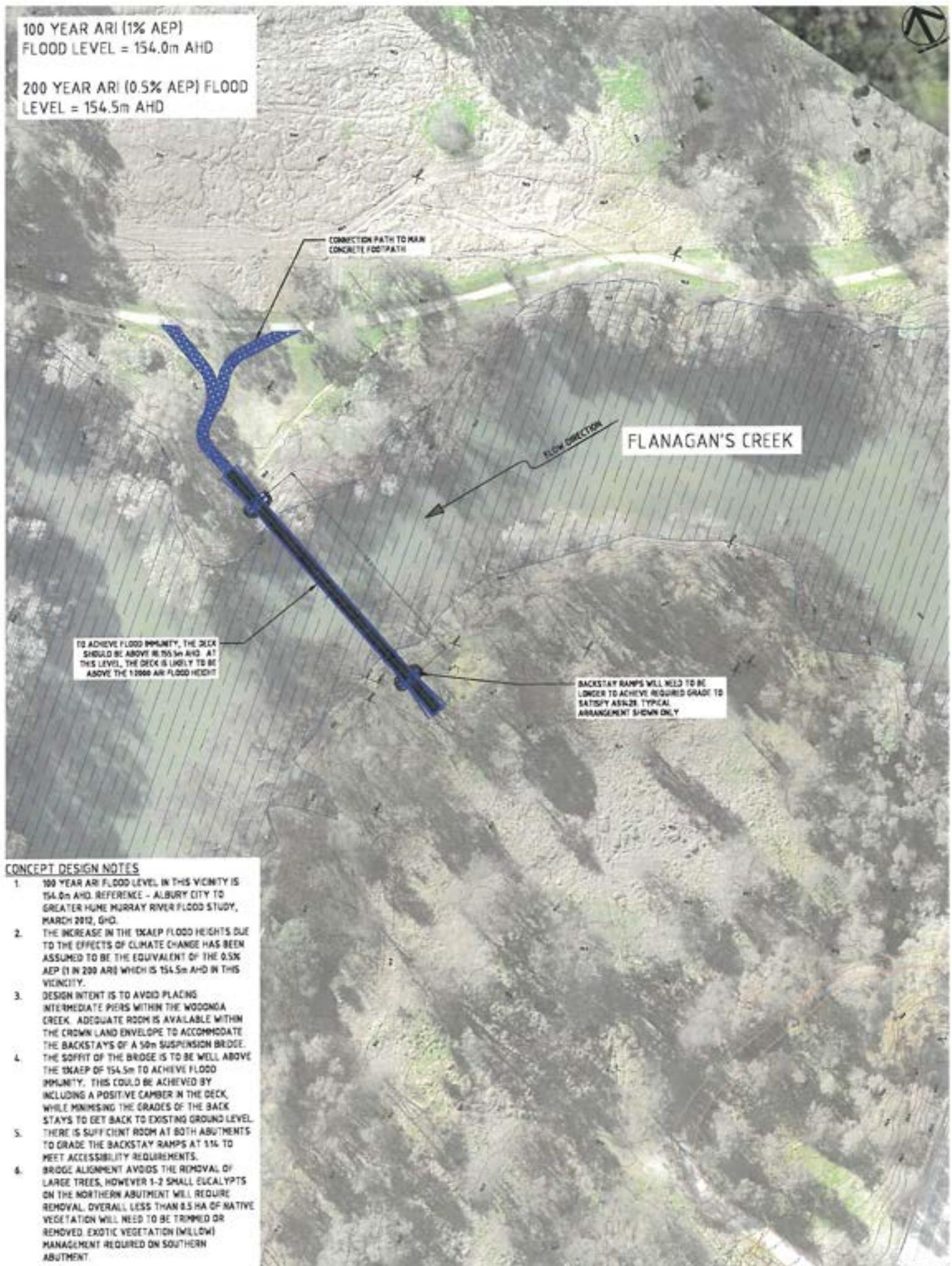
PARKLANDS
ALBURY
WOODNSA

HOOT BRIDGE FEASIBILITY STUDY



100 YEAR ARI [1% AEP]
FLOOD LEVEL = 154.0m AHD

200 YEAR ARI (0.5% AEP) FLOOD
LEVEL = 154.5m AHD



CONCEPT DESIGN NOTES

1. 100 YEAR ARI FLOOD LEVEL IN THIS VICINITY IS 154.0m AHD. REFERENCE - ALBURY CITY TO GREATER HUME MURRAY RIVER FLOOD STUDY, MARCH 2012, GHQ.
 2. THE INCREASE IN THE 100AEP FLOOD HEIGHTS DUE TO THE EFFECTS OF CLIMATE CHANGE HAS BEEN ASSUMED TO BE THE EQUIVALENT OF THE 0.5% AEP (1 IN 200 ARI) WHICH IS 154.5m AHD IN THIS VICINITY.
 3. DESIGN INTENT IS TO AVOID PLACING INTERMEDIATE PIERS WITHIN THE WOODNDA CREEK. ADEQUATE ROOM IS AVAILABLE WITHIN THE CROWN LAND ENVELOPE TO ACCOMMODATE THE BACKSTAYS OF A 50m SUSPENSION BRIDGE.
 4. THE SPANNING HEIGHT OF THE BRIDGE IS TO BE WELL ABOVE THE 100AEP OF 154.5m TO ACHIEVE FLOOD IMMUNITY. THIS COULD BE ACHIEVED BY INCLUDING A POSITIVE CAMBER IN THE DECK, WHILE MINIMISING THE GRADES OF THE BACK STAYS TO GET BACK TO EXISTING GROUND LEVEL.
 5. THERE IS SUFFICIENT ROOM AT BOTH ABUTMENTS TO GRADE THE BACKSTAY RAMPS AT 1:16 TO MEET ACCESSIBILITY REQUIREMENTS.
 6. BRIDGE ALIGNMENT AVOIDS THE REMOVAL OF LARGE TREES, HOWEVER 1-2 SMALL EUCALYPTS ON THE NORTHERN ABUTMENT WILL REQUIRE REMOVAL. OVERALL LESS THAN 0.5 HA OF NATIVE VEGETATION WILL NEED TO BE TRIMMED OR REMOVED. EXOTIC VEGETATION (MILLOW) MANAGEMENT REQUIRED ON SOUTHERN ABUTMENT.

ARTIST'S IMPRESSION RENDERING

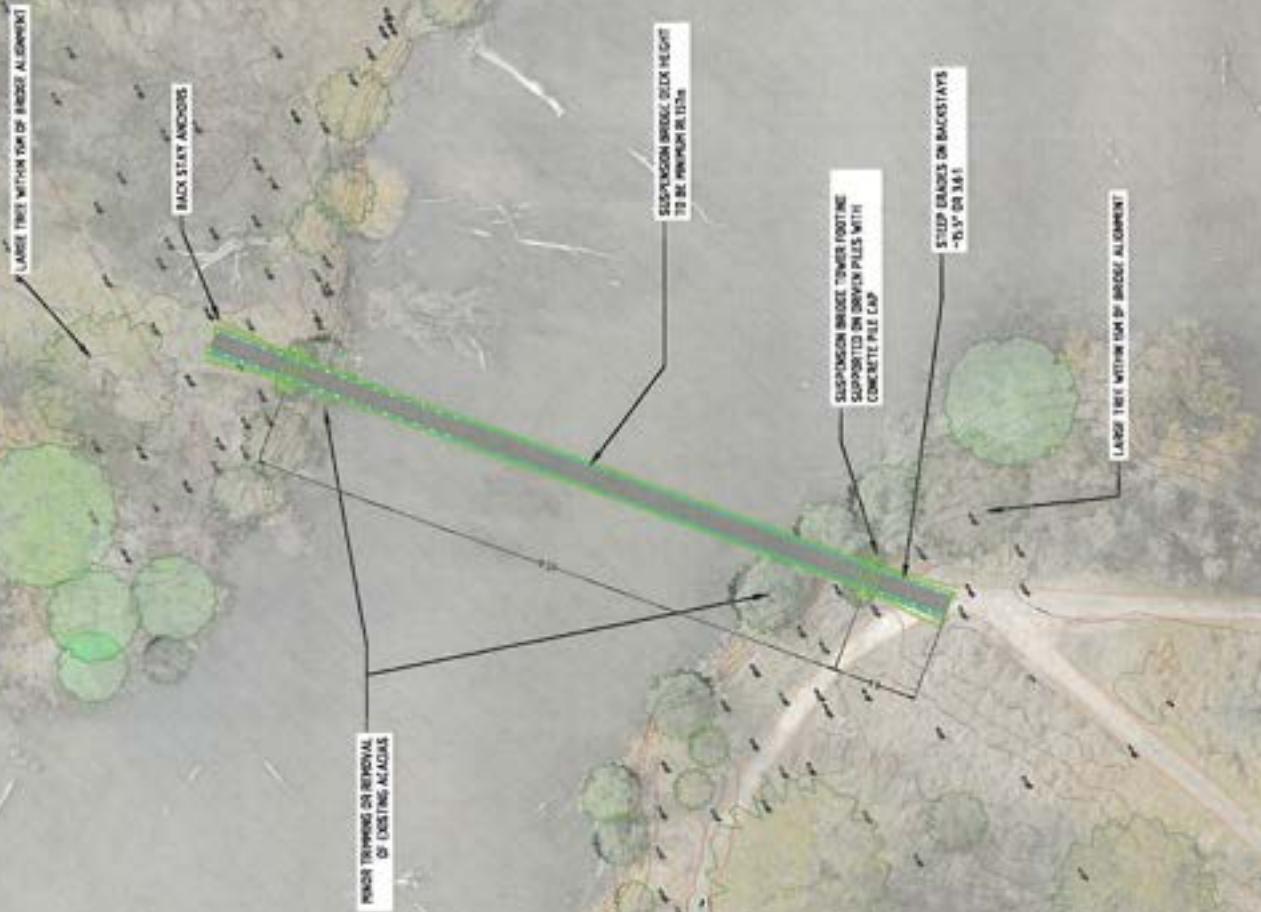
12^o Consulting

PROPOSED BRIDGE FEASIBILITY STUDY | PARCLANDS AL BERRY WOODONGALA

ITEM	DESCRIPTION
1	BRIDGE OVER RIVER BANK
2	STRUCTURE SUPPORTING THE BRIDGE
3	STRUCTURE SUPPORTING THE BRIDGE



100 YEAR ARI (1% AEP)
FLOOD LEVEL = 155.9m AHD



CONCEPT DESIGN NOTES

1. 100 YEAR ARI FLOOD LEVEL IN THIS VICINITY IS 156.9m AND REFERENCE ALBURY CITY TO GREATER HUME MURRAY RIVER FLOOD STUDY, MARCH 2010, GRID.
2. THE INCREASE IN THE INLAND FLOOD HEIGHTS DUE TO THE EFFECTS OF CLIMATE CHANGE HAS BEEN ASSUMED TO BE THE EQUIVALENT OF THE 0.5% AEP IT IN 2090 ARI WHICH IS 156.5m AND IN THIS VICINITY.
3. DESIGN INTENT IS TO AVOID PLACING INTERMEDIATE PIERS WITHIN THE KIAMA RIVER.
4. APPROPRIATE ROOM IS AVAILABLE WITHIN THE CROWN LAND ENVELOPE TO ACCOMMODATE THE BACKSTAYS OF A SUSPENSION BRIDGE.
5. DESIGN OF THE BRIDGE MUST BE DESIGNED TO BE FLOOD IMPANE IF ABOVE 156.9m ARI ESTIMATED TO BE ABOVE RL 157.3m WHICH IS APPROXIMATELY 3.0m ABOVE EXISTING LEVELS AT THE ABUTMENTS. THIS COULD BE ACHIEVED BY INCORPORATING A POSITIVE CAMBER IN THE DECK, WHILE KINNISHING THE GRADES OF THE BACK STAYS TO GET BACK TO EXISTING GROUND LEVEL.
6. THE BACKSTAY RAMPS ARE LIKELY TO EXCEED 1% GRADE.
7. BRIDGE ALIGNMENT AVOIDS LARGE TREES BUT FALLS WITHIN 15m OF 2 LARGE EUCALYPTUS. AN ARBORESCENCE ASSESSMENT IS RECOMMENDED TO DETERMINE THE POTENTIAL IMPACT ON THE INTEGRITY OF THE ROOT ZONE OF THESE TREES. LESS THAN 0.5 HA OF NATIVE VEGETATION WILL NEED TO BE REMOVED FOR ACACIAS AND UNDERSTOREY VEGETATION.

PROPOSED PEDESTRIAN BRIDGE – GENERAL ARRANGEMENT

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HOAT BRIDGE FEASIBILITY STUDY PARKLANDS ALBURY WODONGA

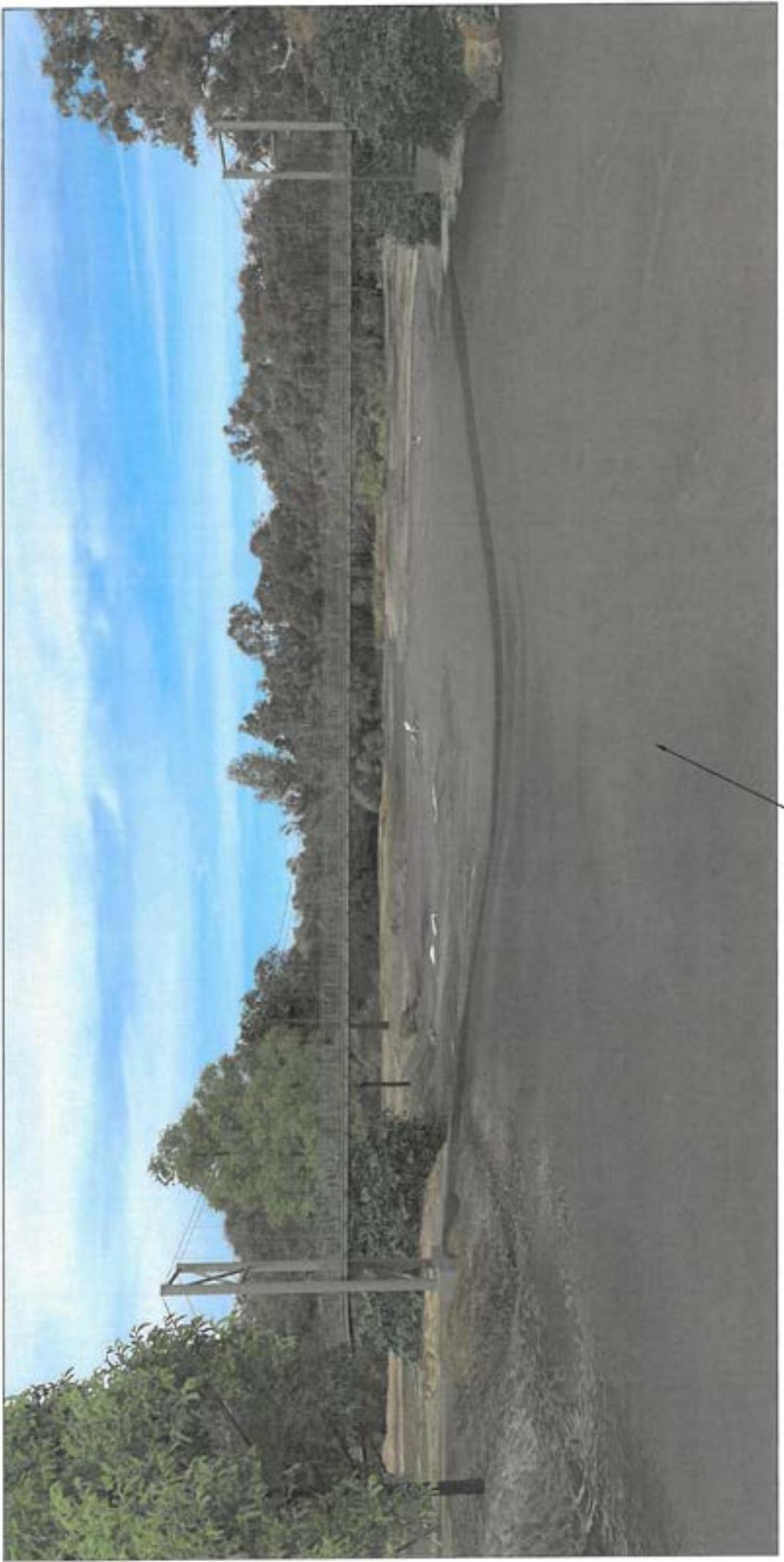
MAP 100000

0

SCALE 1:50000

0

<p



KIEWA RIVER (LOOKING SOUTHEAST, UPSTREAM)

ARTIST'S IMPRESSION RENDER

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PARKLANDS ALBURY WODONGA

HABITAT FEASIBILITY STUDY

PROPOSED
WATERFALL, 60 METRE SPANNING BRIDGE

ARTIST'S
IMPRESSION

SCALE 1:1000

C
0

100 YEAR ARI (1% AEP)
FLOOD LEVEL = 156.8m AHD
200 YEAR ARI (0.5% AEP)
FLOOD LEVEL = 157.9m AHD
NATIVE VEGETATION - RYANS CREEK WEST
ILLUSTRATED AS SHOWN

CONCEPT DESIGN NOTES

1. NO YEAR ARI FLOOD LEVEL IN THIS VENUE IS 156.8m AND, KEY DATES - ALBURY CITY ID GREATER HUME MURRAY RIVER FLOOD STUDY, MARCH 2012, SHD.
2. THE INCREASE IN THE RYANS CREEK FLOOD HEIGHTS DUE TO THE EFFECTS OF CLIMATE CHANGE HAS BEEN ASSUMED TO BE THE EQUIVALENT OF THE 0.5% AEP IN 200 AND WHICH IS 157.9m AND IN THIS VENUE.
3. DESIGN INTENT IS TO CONSTRUCT A MID-Span, LOW LEVEL PEDESTRIAN BRIDGE SUPPORTED ON DRIVEN PILES OR PERI CRADLE AND ACROSS THE MOUTH OF RYANS CREEK.
4. THE MURRAY RIVER TO THE WEST CARRIES THE MAJORITY OF THE FLOW DURING NORMAL HIGH DISCHARGE FROM THE HUME WEIR, WITH RYANS CREEK TAKING A MUCH LOWER FLOW DRADE DUE TO A WEIR AT THE EASTERN END.
5. WHILE IT WOULD BE TECHNICALLY POSSIBLE TO DESIGN THE BRIDGE ABOVE THE WEIR, THIS WOULD PLACE THE BRIDGE AROUND 1m ABOVE THE EXISTING GROUND LEVEL AT THE NORTHERN ABUTMENT AND ABOUT 15m ABOVE THE SOUTHERN ABUTMENT.
6. THE PROPOSED BRIDGE SHOULD BE DESIGNED FOR INUNDATION AT THE 1% AEP. THE BRIDGE SHOULD BE CONSTRUCTED ABOVE RL 156.8m WHICH WOULD BEST MATCH EXISTING GROUND LEVELS AT THE ABUTMENTS AND ALLOW RIVER WATERCRAFT USERS TO PASS UNDER THE BRIDGE DURING NORMAL FLOW CONDITIONS.
7. TOTAL CROSS SECTIONAL AREA OF PILES IN THE AREA UNDER THE BRIDGE
8. IN-PIPE ALIGNMENT AVOIDS LARGE TREES, LESS THAN 0.5 HA OF NATIVE VEGETATION ON THE SOUTHERN ABUTMENT WILL NEED TO BE REMOVED, INCLUDING 4-5 SMALL EUCALYPTUS AND ACACIAES ECT. VEGETATION WILL BE LEFT ON THE NORTHERN ABUTMENT.
9. SOME ENRICHMENT ONTO FREEHOLD LAND IS LIKELY AT THE SOUTHERN ABUTMENT GET TO ACHIEVE THE BEST ALIGNMENT.

RYANS CREEK

FLOW DIRECTION

FLOW DIRECTION

MURRAY RIVER

RAMP TO ELEVATED SECTION OF PIKEOLA
DISTANT LENGTH TO BE CONFIRMED

6.0m INDIVIDUAL OPEN WEB TRUSS
BRIDGE SECTION - 20m LENGTH

SOUTHERN ABUTMENT LOCATION POTENTIALLY
LOCATED ON FREEHOLD LAND TO AVOID NATIVE
VEGETATION REMOVAL. CONSULTATION WITH
LANDOWNER MAY BE REQUIRED.

SOUTHERN ABUTMENT TO
MATCH EXISTING GROUND
LEVEL - RL 156.8 APPROX

SUGGESTED DECK RL TO
BE AT LEAST 15m

PROPOSED PEDESTRIAN BRIDGE - GENERAL ARRANGEMENT

12° Consulting

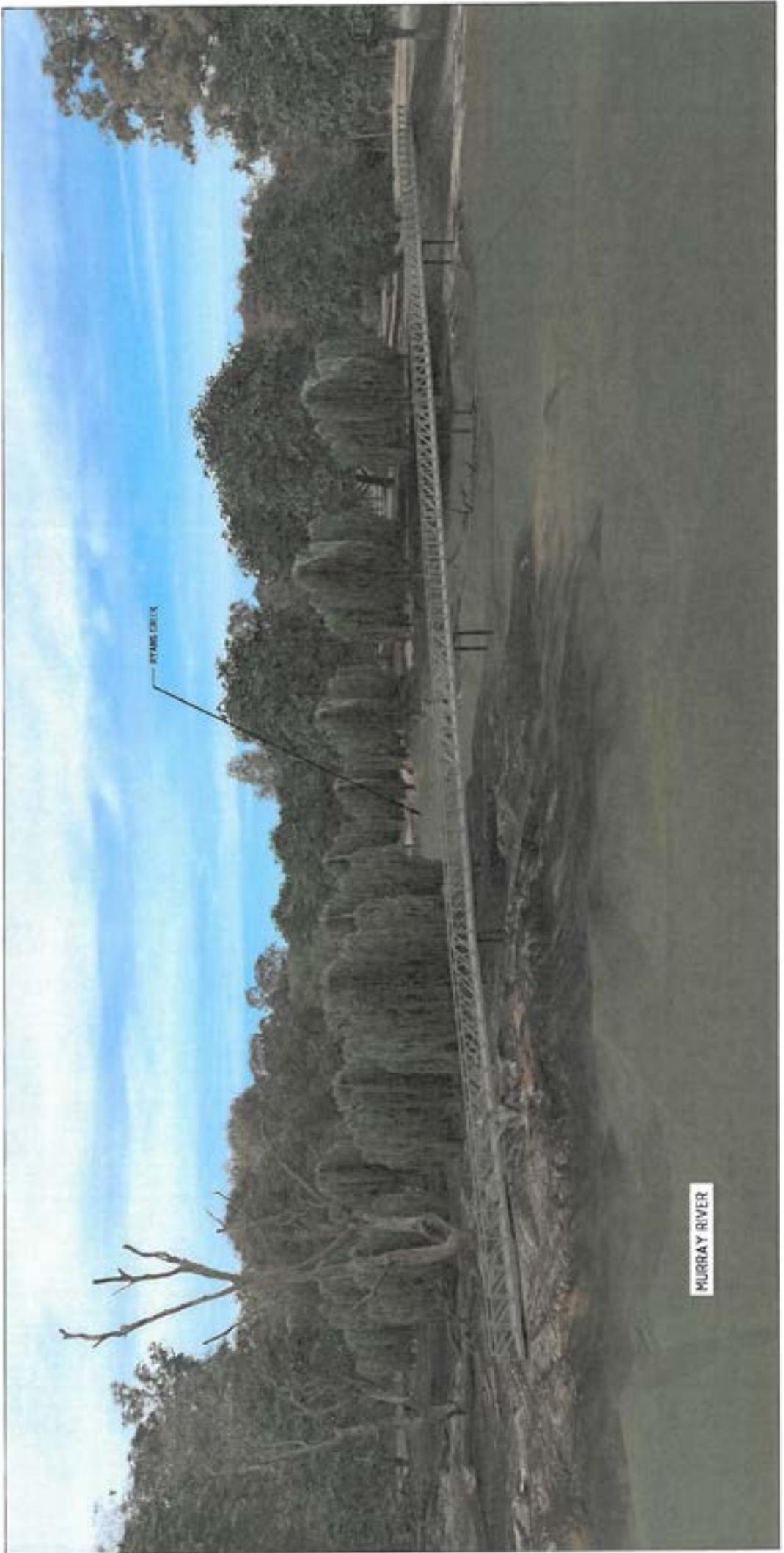


PROJECT NUMBER: 12000000000000000000
PROJECT NAME: RYANS CREEK WEST

MAP NUMBER: 12000000000000000000
MAP NAME: RYANS CREEK WEST

SCALE: 1:5000

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ARTIST'S IMPRESSION RENDER



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Great Bridge Feasibility Study | RYANS CREEK WEST

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PROPOSED PEDESTRIAN BRIDGE - GENERAL ARRANGEMENT

100 YEAR ARI (1% AEP)
FLOOD LEVEL = 158.1m AHD

200 YEAR ARI (0.5% AEP)
FLOOD LEVEL = 158.3m AHD

SEE ADDITIONAL TRANSITION
LINES IN MAP THAT MEETED
HERE TO MAINTAIN CLEARANCE ABOVE
THE 0.5% AEP LEVEL OF 158.3m

CONCEPT DESIGN NOTES

1. THE 0.5% AEP (1 IN 100 ARI) FLOOD LEVEL IN THIS VICINITY IS 158.1m AHD. REFERENCE - ALBURY CITY TO GREATER MURRAY RIVER FLOOD STUDY, MARCH 2002, GIO.
2. THE INCREASE IN THE TRAPP FLOOD HEIGHTS DUE TO THE EFFECTS OF CLIMATE CHANGE HAS BEEN ASSUMED TO BE THE EQUIVALENT OF THE 0.5% AEP (1 IN 200 ARI) WHICH IS 158.3m AHD IN THIS VICINITY.
3. DESIGN INTENT - DUE TO LIMITED AREA AVAILABLE AT THE SOUTHERN END OF THE FARM TRACKS AND FENCING, A SUSPENSION BRIDGE WITH A TOTAL SPANNING LENGTH OF 12.67m AND TO BEST MATCH EXISTING BRIDGE LEVELS AND PROVIDE ACCESS FOR KAYAKERS AND WATERSKIERS DURING HIGH FLUMES.
4. HEADSTOCK IS CONSIDERED THE MOST PRACTICAL OPTION. THE STRUCTURE SHOULD BE DESIGNED FOR FULL EXISTING GROUND LEVEL AT THE ABUTMENT.
5. TOTAL CROSS SECTIONAL AREA OF PIERS IN THE WATERWAY ~2% OF TOTAL CROSS SECTIONAL AREA UNDER THE BRIDGE.
6. BRIDGE ALIGNMENT AVOIDS THE REMOVAL OF LARGE TREES, LESS THAN 8.5 HA OF JUNGLE/TROPICAL VEGETATION WILL NEED TO BE REMOVED. EXOTIC TREE (MILKWOOD) HABITACUNT WILL BE REQUIRED, PROBABLY ON NORTH EAST ABUTMENT.

PROPOSED 5 SPAN STEEL
TRUSS BRIDGE SUPPORTED ON
DRIVEN STEEL PILES

ADDITIONAL SINGLE SPAN 8m
STEEL TRUSS BRIDGE OVER
TOTAL BED DEPRESSION

DECK HEIGHT AT 12.67m AHD TO
BEST MATCH EXISTING BRIDGE
LEVELS AND PROVIDE ACCESS FOR
KAYAKERS AND WATERSKIERS
DURING HIGH FLUMES

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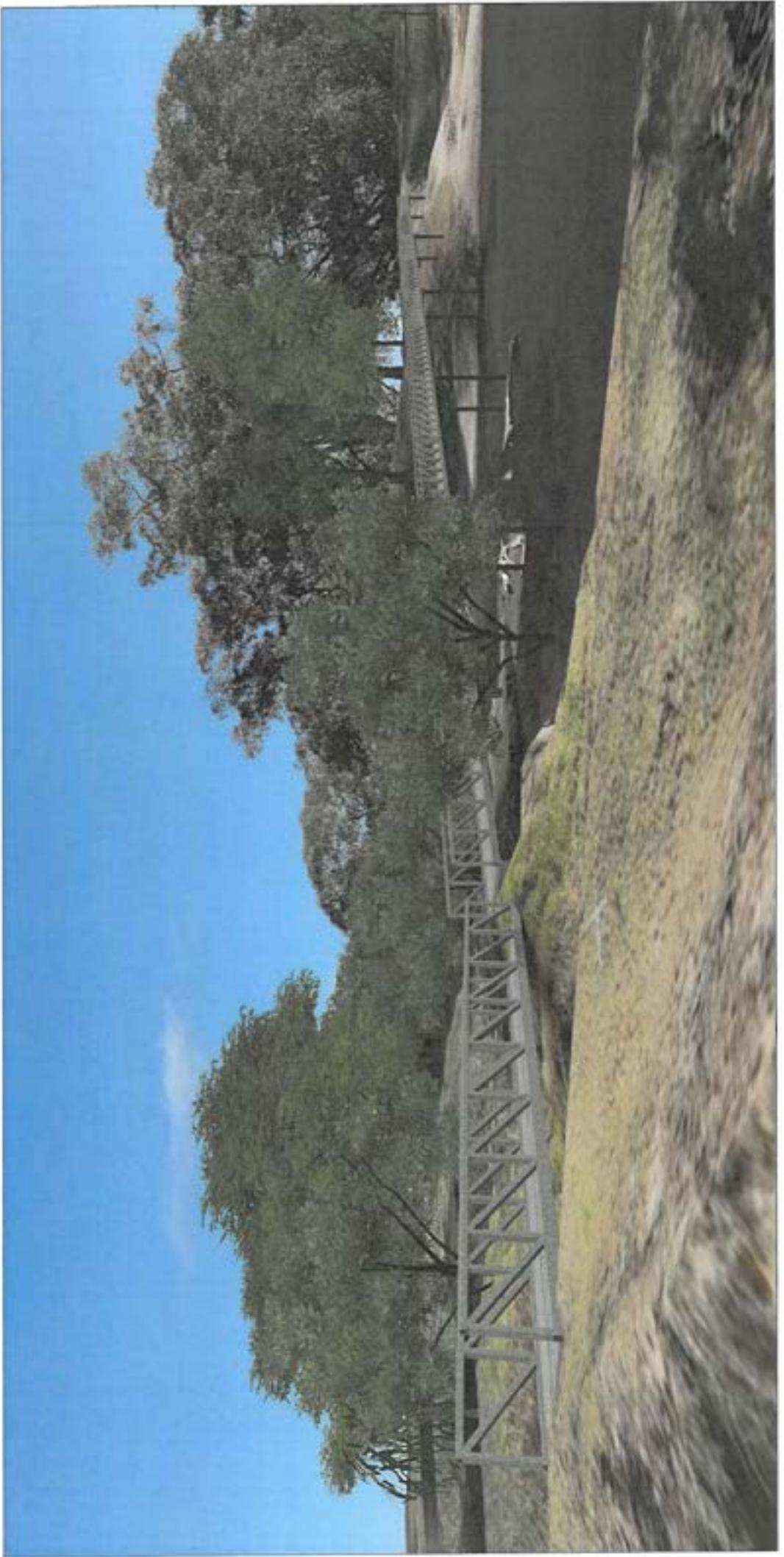
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PROPOSED PEDESTRIAN BRIDGE - GENERAL ARRANGEMENT

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WHAT BRIDGE FEASIBILITY STUDY	PARKLANDS ALBURY WOODS A			