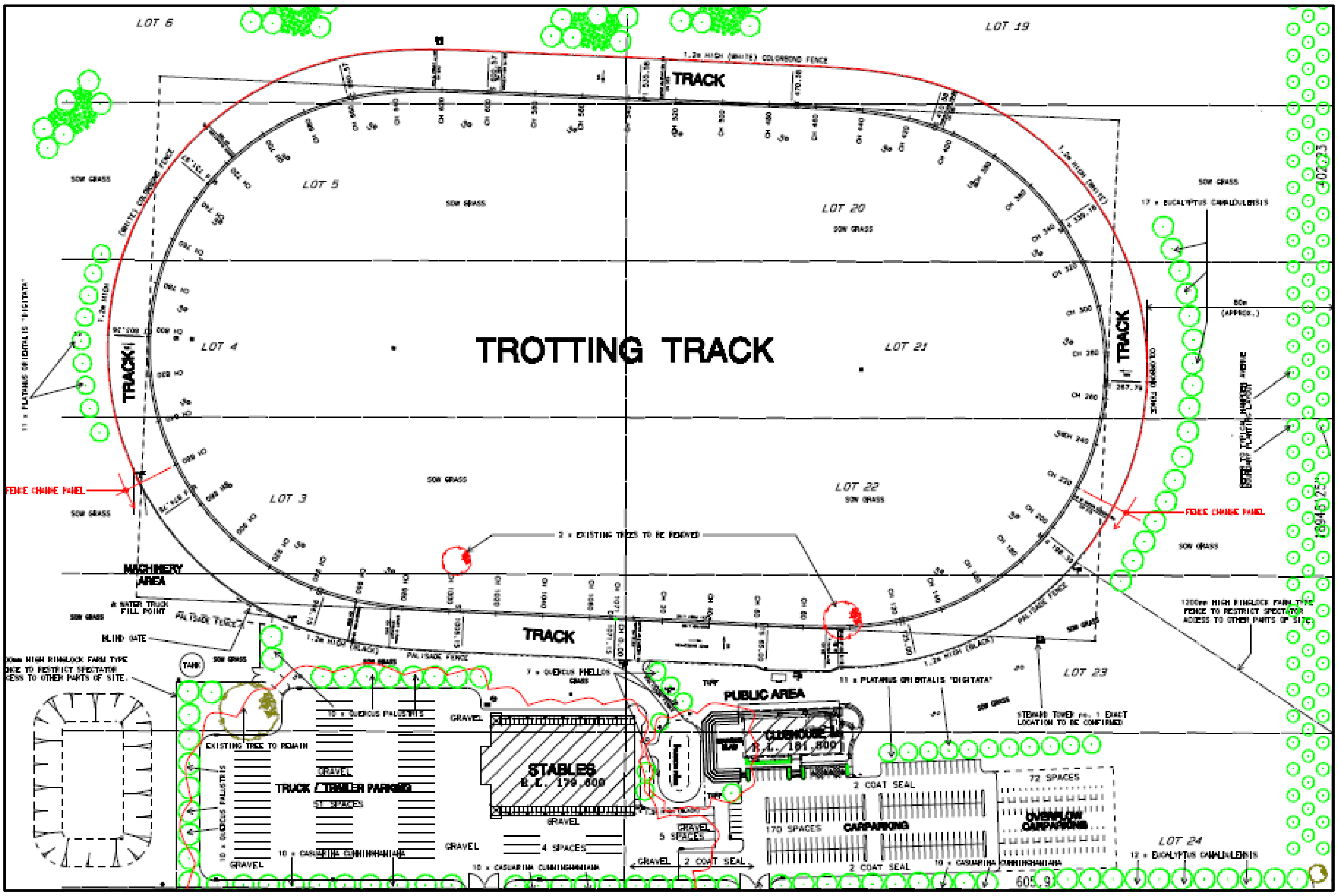
HARNESS RACING NSW

FLOOD IMPACT ASSESSMENT FOR PROPOSED HARNESS RACING TRACK AT NORTH WAGGA WAGGA

FINAL



AUGUST 2017

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Project Flood Impact Assessment for Proposed Harness Racing Track at North Wagga Wagga	**Project Number** **113024-04**
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Date 18 August 2017	**Verified by**

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1	Draft	HRNSW	14-08-2017
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FLOOD IMPACT ASSESSMENT FOR PROPOSED HARNESS RACING TRACK AT NORTH WAGGA WAGGA

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LIST OF ACRONYMS

AEP	Annual Exceedance Probability
ARI	Average Recurrence Interval
ALS	Airborne Laser Scanning
ARR	Australian Rainfall and Runoff
BOM	Bureau of Meteorology
DECC	Department of Environment and Climate Change (now OEH)
DNR	Department of Natural Resources (now OEH)
DRM	Direct Rainfall Method
DTM	Digital Terrain Model
GIS	Geographic Information System
GPS	Global Positioning System
IFD	Intensity, Frequency and Duration (Rainfall)
mAHD	meters above Australian Height Datum
OEH	Office of Environment and Heritage
PMF	Probable Maximum Flood
SRMT	Shuttle Radar Mission Topography
TUFLOW	One-dimensional (1D) and two-dimensional (2D) flood and tide simulation software (hydraulic model)
WBNM	Watershed Bounded Network Model (hydrologic model)

1. INTRODUCTION

WMAwater were engaged by Harness Racing NSW (HRNSW) to provide a flood impact assessment for the proposed construction of a Harness Racing Track and associated amenities and facilities at Cooramin Street, Cartwrights Hill. This report details the process undertaken to determine the hydraulic impacts of such works on both riverine and local catchment flooding for the 10%, 5%, 2% and 1% AEP events.

2. BACKGROUND

HRNSW is proposing the construction of a new Harness Racing Track and associated amenities and facilities on an undeveloped parcel of land bounded by Hampden Avenue, Cooramin Street and Wright Street in Cartwrights Hill. This area has been zoned as Rural Primary Production (RU1) as per Wagga Wagga City Council (WWCC) LEP 2010. The proposed development involves the construction of a new harness racing track, trotting track and associated infrastructure including (but not limited to):

- Track, trailer and car parking;
- Stables;
- A clubhouse;
- Fencing; and
- A detention basin.

The area where development is to take place is flood prone in the 5-year (20% AEP) riverine event, with a peak flood depth of 0.61 m along the southern boundary and flooding across most of the proposed site extent (see Figure 1). As such a flood impact assessment is required to accompany the development application (DA.). The area is impacted by both riverine flooding from the Murrumbidgee River and local catchment flooding from the Duke's Creek catchment. A hydraulic assessment of the proposed development will be undertaken utilising hydraulic models of both flood mechanisms to determine the impacts it will have on riverine and local catchment flooding behaviour.

WMAwater have previously undertaken a flood impact assessment for the proposed harness racing track construction in July 2013, May 2014 and September 2015. Those assessments dealt only with the impact of the proposed development on riverine flooding and not local catchment flooding. Additionally, the previous work assumed that the Wagga Wagga Main City Levee was in its upgraded state. Construction is due to commence as this report is being prepared. Water NSW have requested that the impacts be considered with the Main City Levee in its current state.

3. METHODOLOGY

3.1. Model Overview

3.1.1. Riverine Flood Model

The Murrumbidgee River TUFLOW 1D/2D hydraulic model developed by WMAwater (2017) has been utilised in carrying out the riverine flood impact assessment. The model extends from approximately 5 km upstream of Oura to 9 km downstream of Malebo Gap, giving a total river reach of approximately 63 km. This is the model version currently being used as part of the Wagga Wagga Riverine Floodplain Risk Management Study.

The model is defined by a 20 m by 20 m finite difference grid. The model's ground elevation has been informed by ALS data recorded in 2008 by Fugro Spatial Systems Pty Ltd for the entire Murrumbidgee River floodplain. River bathymetry survey was undertaken by a qualified hydrosurvey firm who produced a dataset of cross-sections which were utilised to create a DEM of the riverbed.

Design flows have been developed via Flood Frequency Analysis (FFA). The FFA was undertaken as part of the Wagga Wagga Detailed Flood Model Revision (2014) and used an annual maximum series obtained for the Hampden Bridge gauge at Wagga Wagga (No. 410001.) Calibration and validation of the hydraulic model has been carried out utilising flood intelligence information collected for the 2010 and 2012 flood events.

The riverine hydraulic model setup is shown on Figure 2.

3.1.2. Local Catchment Flood Model

The Wagga Wagga Overland Flow TUFLOW 1D/2D hydraulic model developed by WMAwater (2015) has been utilised in carrying out the local catchment flood impact assessment. The model provides detailed Major Overland Flow design flood information for an area of approximately 270 km^2. The model includes the North Wagga model domain which covers the Duke's Creek catchment.

The model is defined by a 5 m by 5 m finite difference grid. Flows were determined from AR&R 1987 design storms. Calibration and validation of the hydraulic model has been carried out utilising flood intelligence information collected for the February and December 2010 flood events.

The local catchment hydraulic model setup is shown on Figure 3.

3.2. Model Modifications

Design level information for the proposed racetrack and associated amenities have been provided by McKinnon design (Proposed Wagga Harness Racing Club Facility, 20/3/2017 see Appendix A). The information can be summarised as follows:

- **Existing Ground Level Survey:** Detailed survey of the existing lots has been provided for lot DP 2655. This can be seen in Figure 4.
- **Detailed Design Survey:** Detailed survey of the proposed track design and surrounding area has been provided.
- **Public Stand:** Extent and position information for the proposed Public Stand.
- **Stables:** Extent and position information for the proposed stables.
- **Fencing:** Detailed design information for the proposed track fencing.

Figure 5 shows design plans and levels for the proposed racetrack and infrastructure. Detailed design drawings are also included as Appendix A.

Existing Ground Levels at the site, detailed design survey and infrastructure information have been incorporated into the hydraulic model as following:

- Existing Ground Level Survey was incorporated into both the existing and proposed riverine and local catchment flood models as a 3D tin, as it was considered to be a more accurate representation of ground levels in the area than the ALS data used in the existing models;
- Detailed Design Survey for the developed case was incorporated into the proposed riverine and local catchment flood models as a 3D tin;
- The public stand and stables were incorporated into the proposed riverine and local catchment flood models as 2D terrain modifiers set at 181.8 mAHD and 179.6 mAHD respectively based on the design height of the buildings;
- The fencing was incorporated into the proposed riverine and local catchment flood models as a 2D flow constriction in order to impede flow onto the track. A detailed description of the fencing set-up is included as Appendix B.

3.3. Design Runs

3.3.1. Riverine Flood Model Design Runs

The riverine flood model was re-run with the existing ground level survey incorporated for the 20%, 10%, 5%, 2% and 1% AEP design events. The model was then modified to include the detailed design survey and associated amenities described above and the proposed case was run for the 10%, 5%, 2% and 1% AEP design events. Peak riverine flood level, velocity and hazard impacts are discussed in Section 4.1 below.

3.3.2. Local catchment Flood Model Design Runs

The local catchment flood model was re-run with the existing ground level survey incorporated for the 10%, 5%, 2% and 1% AEP design events. The model was then modified to include the detailed design survey and associated amenities described above and the proposed case was run for the 10%, 5%, 2% and 1% AEP design events. In both the existing and design cases a downstream boundary condition independent of riverine flooding (i.e. it was assumed there was no coincident local catchment and riverine flooding) was utilised.

Peak local catchment flood level, velocity and hazard impacts are discussed in Section 4.2 below.

4. RESULTS

4.1. Riverine Flood Impacts

Results for Riverine Flooding are presented in Figure 6 to Figure 17.

4.1.1. Peak Flood Level Impact

In the 10%, 5%, 2% and 1% AEP flood events the proposed racetrack and infrastructure cause a maximum peak flood level increase of 0.02 m in open areas adjacent to the racetrack precinct (Figure 6 to Figure 9). Peak flood level decreases are also seen in the rarer events at Horsehoe Road with a peak decrease of 0.16 m shown in the 2% AEP event.

4.1.2. Peak Flood Velocity Impact

In the 10% AEP flood event minimal change in peak flood velocity is observed outside the racetrack precinct (Figure 10). Isolated changes can be observed between -0.25 to 0.25 m/s. In the 5%, 2% and 1% AEP events increases in peak flood velocity of up to and above 0.5 m/s can be seen along Cooramin Road to the south (Figure 10 to Figure 12) as flows from the west are newly diverted around the proposed track.

4.1.3. Peak Flood Hazard Impact

For the range of design events investigated current provisional hydraulic hazard at the racetrack precinct and adjacent properties is identified as High Hazard. Figure 14 to Figure 17 show the change in provisional hydraulic hazard after proposed racetrack works. Modelling results indicate change in provisional hydraulic hazard from High to Low generally localised at the racetrack perimeter as a result of the change in flood depth due to filling as a result of the proposed development. This change occurs in all design events except for the 1% AEP. Isolated patches of hazard increase are located to the north-east of the proposed track for all design events.

4.2. Local Catchment Flood Impacts

Results for Local Catchment Flooding are presented in Figure 18 to Figure 29

4.2.1. Peak Flood Level Impact

Increases to local catchment peak flood levels are observed for the range of design events investigated, with impacts scaled through the rarer events. In the 10% AEP event (Figure 18), peak flood levels are increased to the west of the proposed site and in the basin area to the south west (along with newly flooded areas within the basin.) This behaviour is also observed in the 5%, 2% and 1% AEP events (Figure 19 to Figure 21) with a peak increase of 0.17 m in the 1% event within the basin area. The proposed construction also causes decreases in flood levels to the south of the site up to 0.3 m in the 1% event.

4.2.2. Peak Flood Velocity Impact

Peak flood velocities are increased to the west and south-west of the proposed development up to 0.1 m/s across all design events (Figure 22 to Figure 25.) The largest changes to peak flood velocity are observed at the northern and southern boundaries of the proposed development. In the 1% AEP event increases in peak flood velocity of up to and above 0.5 m/s in isolated locations can be seen along Cooramin Road to the south of the proposed racetrack.

4.2.3. Peak Flood Hazard Impact

For the range of design events investigated current provisional hydraulic hazard at the racetrack precinct and adjacent properties is identified as Low hazard. Figure 26 to Figure 29 show the change in provisional hydraulic hazard after proposed racetrack works. Modelling results indicate isolated change in provisional hydraulic hazard from Low to High to the west and south-west of the proposed racetrack across all design events. Minor isolated increases are observed in the 10% and 5% AEP Events, with larger increases (localised mostly within the basin to the south-west) observed in the 2% and 1% AEP Events.

4.3. Flood Warning Time and Rate of Rise

4.3.1. Riverine

Murrumbidgee River flooding at Wagga Wagga primarily originates in the upper areas of the Murrumbidgee River catchment with releases from Burrinjuck and Blowering dams. Rainfall downstream of Burrinjuck Dam generally provides a relatively modest contribution to flow. The Erringoarrah stream gauge is the next gauge upstream of Hampden Bridge. It provides Wagga Wagga with sufficient warning time during flood events for evacuation purposes. The last flood in 2012, which was estimated to be a 3% AEP event, took approximately 21 hours to travel from Erringoarrah to Wagga Wagga. Note that flood travel time is indirectly correlated to flood size (i.e. the larger the flood, the shorter the time it takes the flood wave to arrive).

For design events, current travel time of flooding from Oura to North Wagga are as following:

- 10% AEP: 24 h
- 5% AEP: 21 h
- 2% AEP: 15 h
- 1% AEP: 12 h

Modelling results indicate the construction of the racetrack will not affect flood warning time.

The rate of rise describes the average increase in water level, in meters per hour, at a given location (see Figure 5). Current rate of rise values within the racetrack precinct are presented below:

- 10% AEP: 0.17 m/h
- 5% AEP: 0.14 m/h
- 2% AEP: 0.12 m/h
- 1% AEP: 0.17 m/h

Modelling results indicate that construction of the racetrack will not affect rate of rise of riverine floodwaters.

4.3.2. Local Catchment

Local Catchment flooding into Dukes Creek originates from multiple areas North of Wagga Wagga: from Boorooma directly to the north and Bomen to the north-east. Local catchment flooding is primarily driven by rainfall in the local catchments as opposed to riverine flooding and subsequently has a much shorter response time. In all design events, the proposed site has a relatively short first flooded time of around 45 minutes and is completely inundated within 3 hours. Modelling results indicate the construction of the racetrack will not affect flood warning time.

The rate of rise describes the average increase in water level, in meters per hour, at a given location (see Figure 5). Current rate of rise values within the racetrack precinct are presented below:

- 10% AEP: 0.09 m/h
- 5% AEP: 0.08 m/h
- 2% AEP: 0.05 m/h

- 1% AEP: 0.07 m/h

Modelling results indicate that construction of the racetrack will affect rate of rise of floodwaters at the site, particularly in rarer events. Estimated rate of rise values following construction of the racetrack are shown below.

- 10% AEP: 0.15 m/h
- 5% AEP: 0.15 m/h
- 2% AEP: 0.19 m/h
- 1% AEP: 0.37 m/h

4.4. Flood Evacuation Consideration

Flood evacuation considerations for both riverine and local catchment flooding of the proposed site are discussed below.

4.4.1. Riverine Flooding

In all events above the 10% AEP, the proposed track will be inundated by riverine flooding with depths well above 1 m. The proposed track acts as a low flood island in such events, with the track initially surrounded by water and then overtopped at a later stage. In the 10% AEP event, Cooramin Street is cut at 24 hours after the Hampden Gauge level exceeds 9.25m with both Wright Street and Hampden Avenue cut by 27 hours. In the 1% AEP event, all 3 roads are cut by 15 hours after the Hampden Gauge level exceeds 9.75m. These roads remain cut for at least 30 hours.

Long flood warning times are available for riverine flooding of the track (24 hours for a 10% AEP event through to 12 hours for a 1% AEP event) and there is a large amount of flood free land present to the north of the proposed site that is suitable for evacuation. Appropriate operational planning at the site would be required during a flood event.

Road access to the Horseshoe Road Motor Village Caravan Park is available via Hampden Street for the duration of the riverine 1% AEP flood event.

4.4.2. Local Catchment Flooding

The short inundation time of the proposed track site means that there is little flood warning time for potential evacuation. In the 1% AEP event, access to the site from both Cooramin Street and Wright Street is cut by 90 minutes into the flood, and although Hampden Avenue remains relatively flood free vehicle access and evacuation to the north may not be possible. However, the proposed track is not expected to be overtopped in any event up to and including the 1% AEP event.

Road access to the Horseshoe Road Motor Village Caravan Park is cut during the local catchment 1% AEP event by 90 minutes into the flood.

5. CONCLUSIONS

WMAwater were engaged by Harness Racing NSW (HRNSW) to provide a flood impact assessment for the proposed construction of a Harness Racing Track and associated amenities and facilities at Cooramin Street, Cartwrights Hill. As per the request of WaterNSW, the assessment comprised individual riverine and local-catchment flood impact assessments and included updates to previous assumptions regarding the design of the track and site, and the height of the Wagga Wagga Main City Levee.

The assessment of riverine flood impacts found that the inclusion of the proposed race track infrastructure (including stable complex, clubhouse and fencing) does not significantly alter flood impacts previously reported with a max increase of 0.02 m in adjacent open areas to the south of the track.

The assessment of local-catchment flood impacts found that the construction of the proposed race track and infrastructure (including stable complex, clubhouse and fencing) will cause increases to peak flood levels outside of the proposed site area, although the majority of this impact is localised in the detention basin to the south-west of the proposed site which has a max increase of 0.17 m.

6. REFERENCES

1. WMAwater
   Wagga Wagga Revised Murrumbidgee River Floodplain Risk Management Study and Plan (*Draft – Stage 3)*
   Wagga Wagga City Council, July 2017

2. WMAwater
   Wagga Wagga Major Overland Flow – Model Update Report
   Wagga Wagga City Council, November 2015

Figures

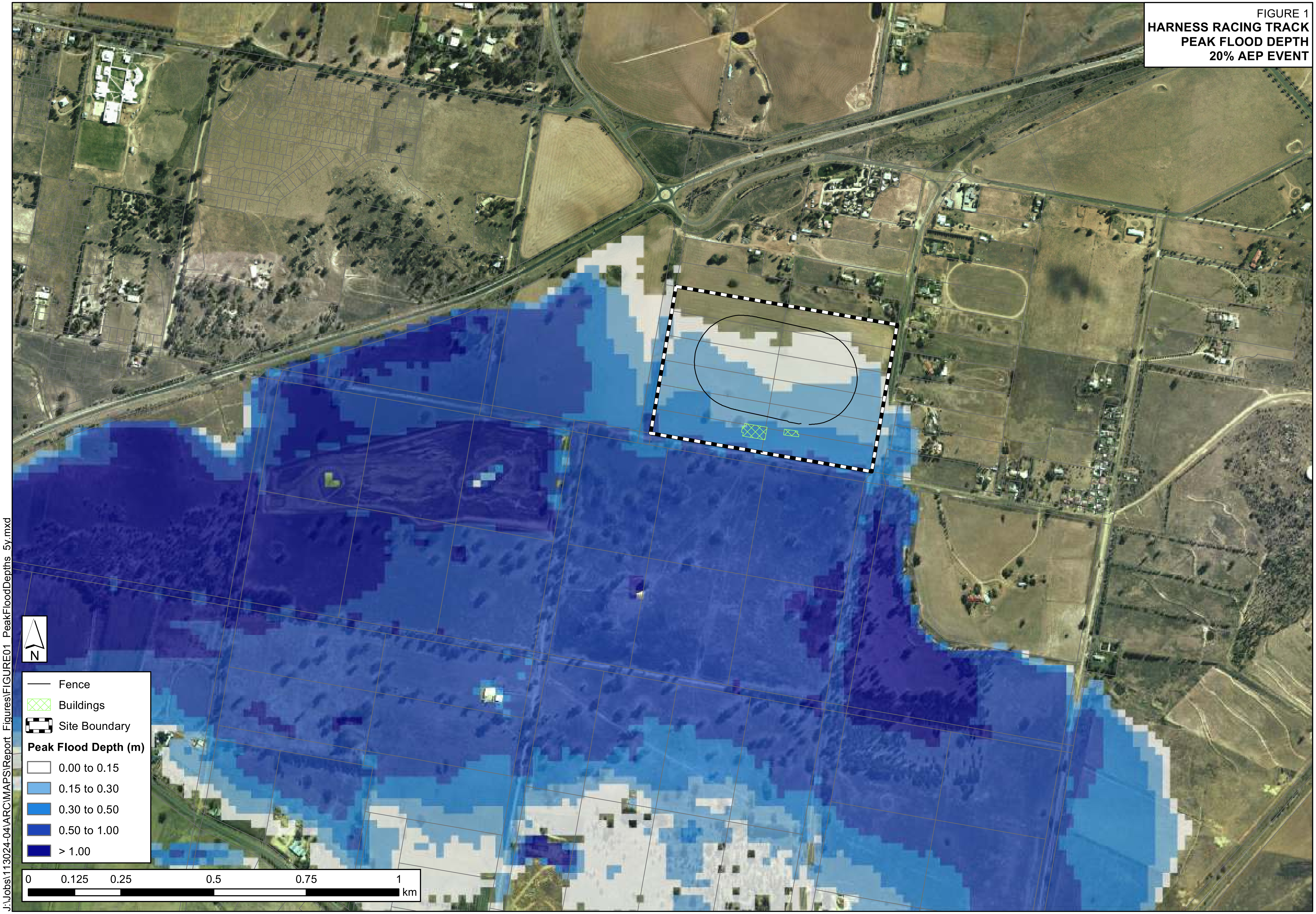
FIGURE 1
HARNESS RACING TRACK
PEAK FLOOD DEPTH
20% AEP EVENT
N
Fence
Buildings
Site Boundary
Peak Flood Depth (m)
0.00 to 0.15
0.15 to 0.30
0.30 to 0.50
0.50 to 1.00
> 1.00
0 0.125 0.25 0.5 0.75 1 km
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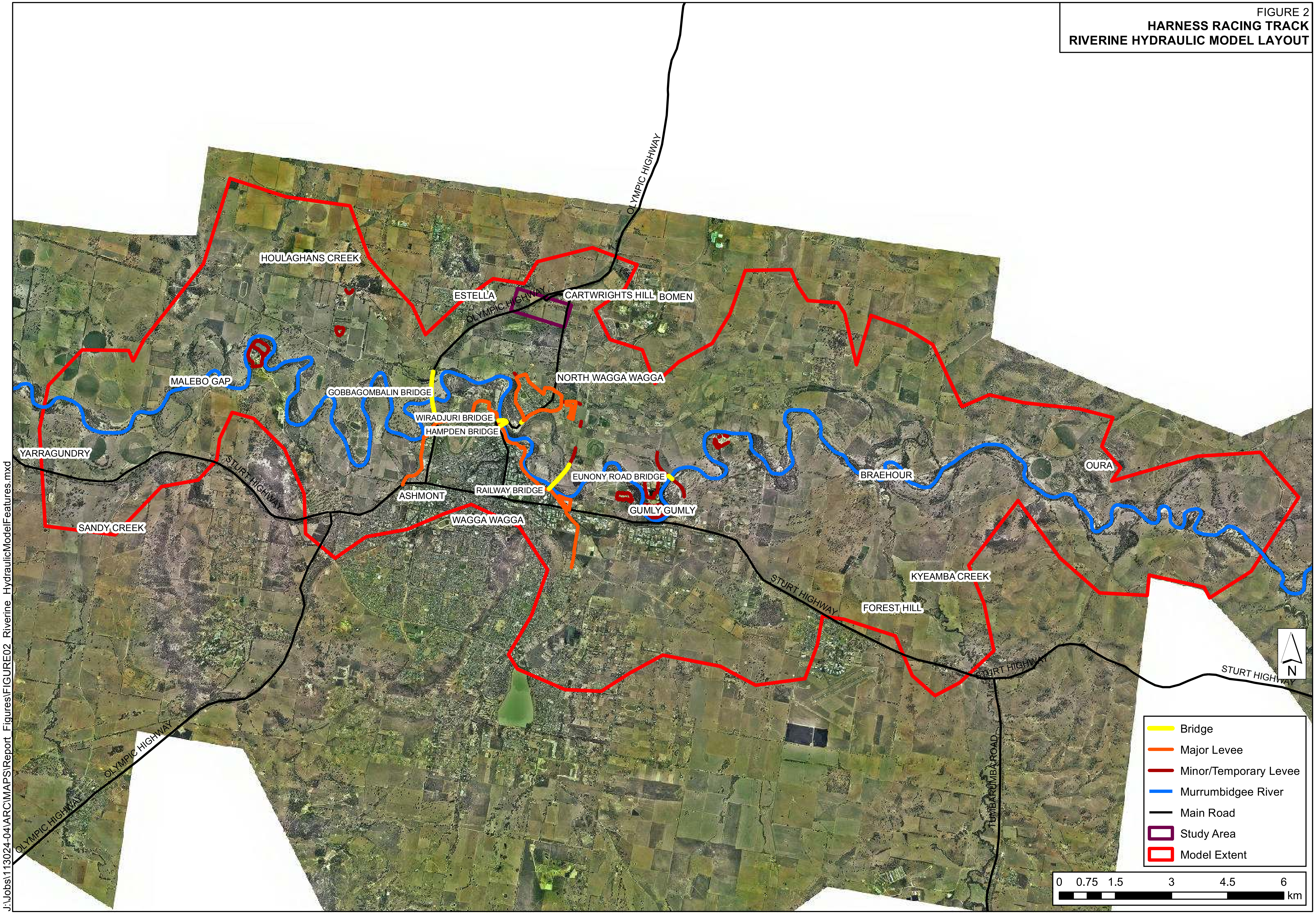
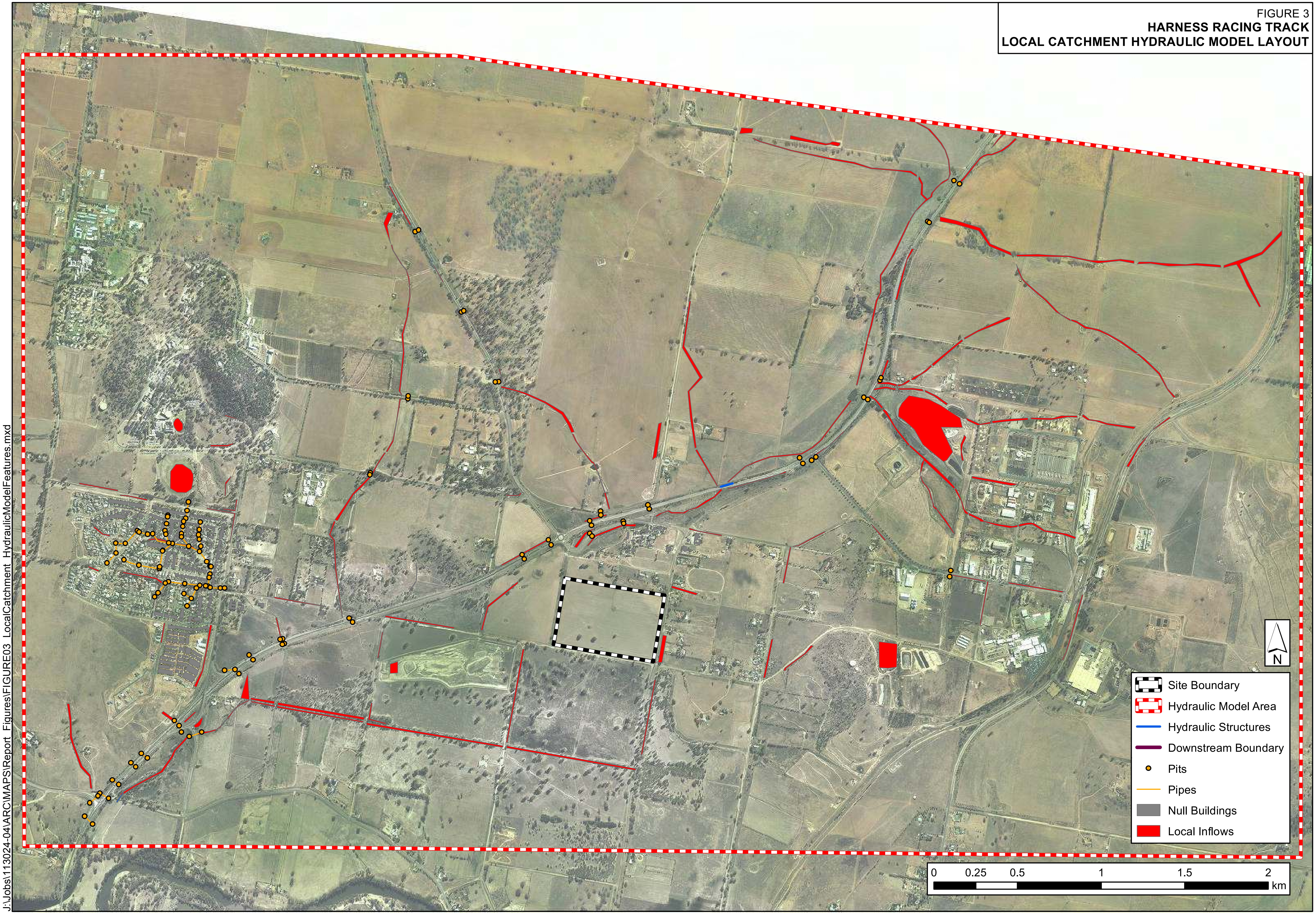
FIGURE 2
HARNESS RACING TRACK
RIVERINE HYDRAULIC MODEL LAYOUT



J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE02_Riverine_HydraulicModelFeatures.mxd

FIGURE 3
HARNESS RACING TRACK
LOCAL CATCHMENT HYDRAULIC MODEL LAYOUT



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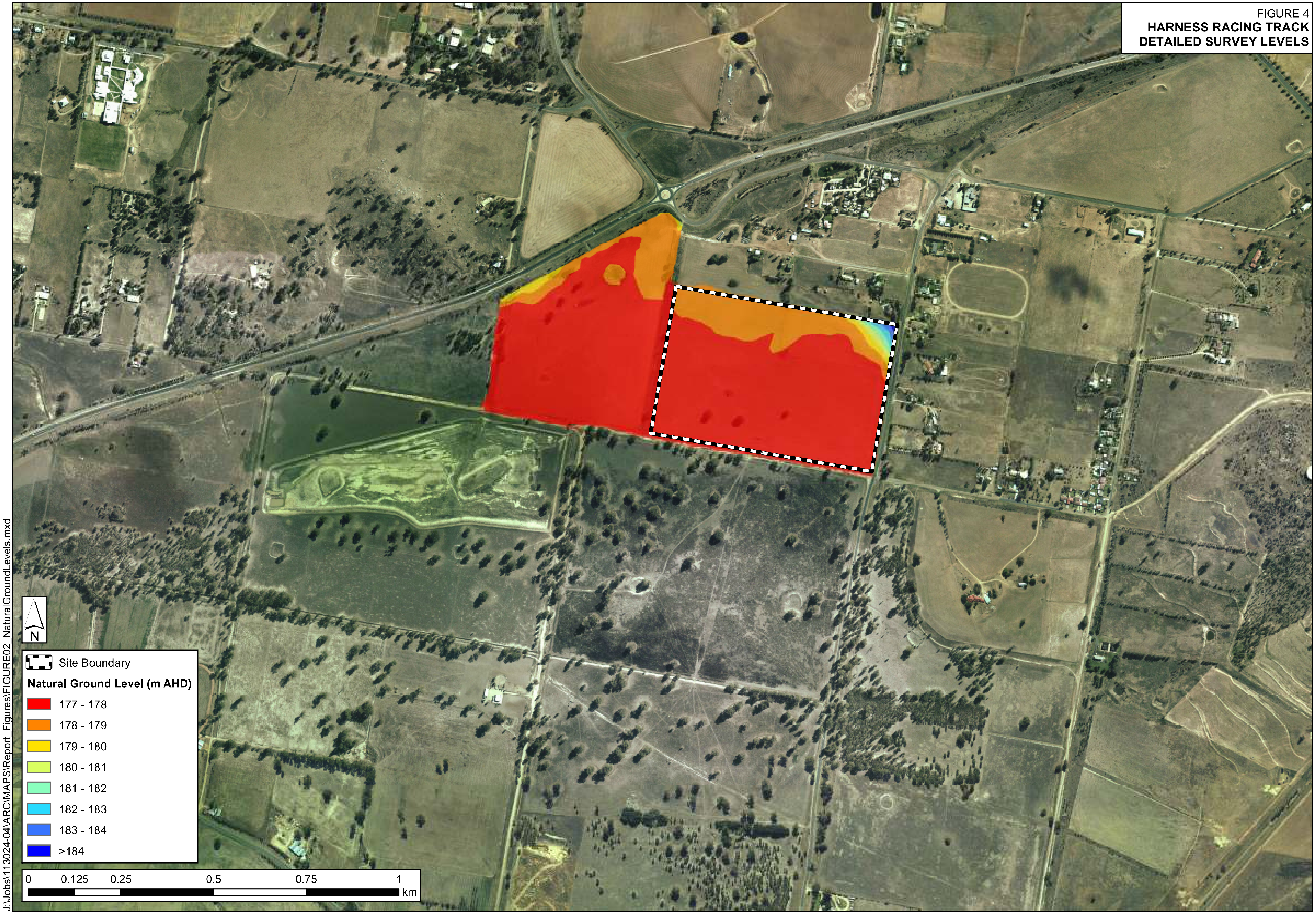


FIGURE 4
HARNESS RACING TRACK
DETAILED SURVEY LEVELS
N
Site Boundary
Natural Ground Level (m AHD)
177 - 178
178 - 179
179 - 180
180 - 181
181 - 182
182 - 183
183 - 184
>184
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE02_NaturalGroundLevels.mxd

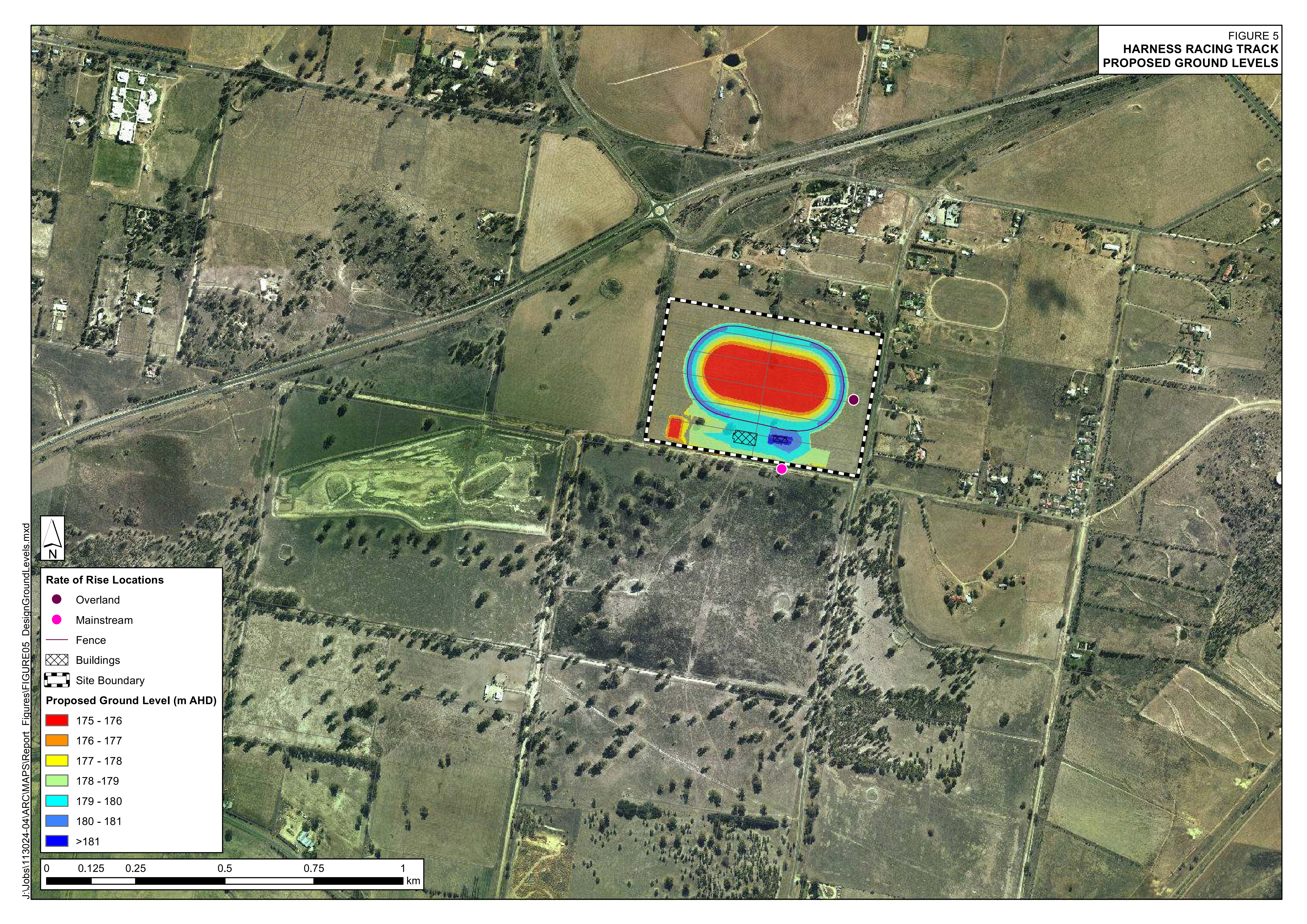


FIGURE 5
HARNESS RACING TRACK
PROPOSED GROUND LEVELS
N
Rate of Rise Locations
Overland
Mainstream
Fence
Buildings
Site Boundary
Proposed Ground Level (m AHD)
175 - 176
176 - 177
177 - 178
178 -179
179 - 180
180 - 181
>181
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARCMAPS\Report_Figures\FIGURE05_DesignGroundLevels.mxd

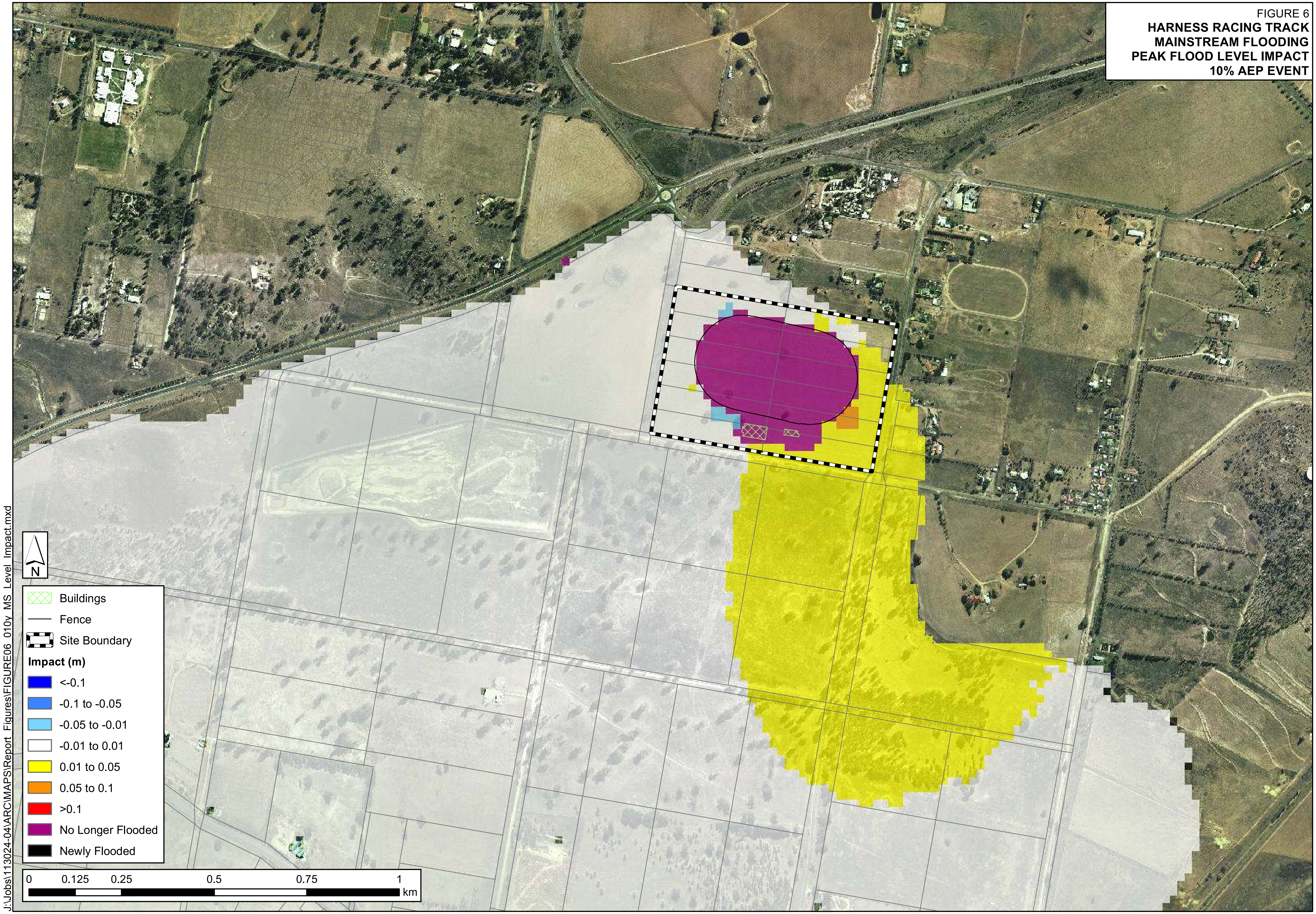


FIGURE 6
HARNESS RACING TRACK
MAINSTREAM FLOODING
PEAK FLOOD LEVEL IMPACT
10% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m)
<-0.1
-0.1 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.1
>0.1
No Longer Flooded
Newly Flooded
0 0.125 0.25 0.5 0.75 1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE06_010y_MS_Level_Impact.mxd

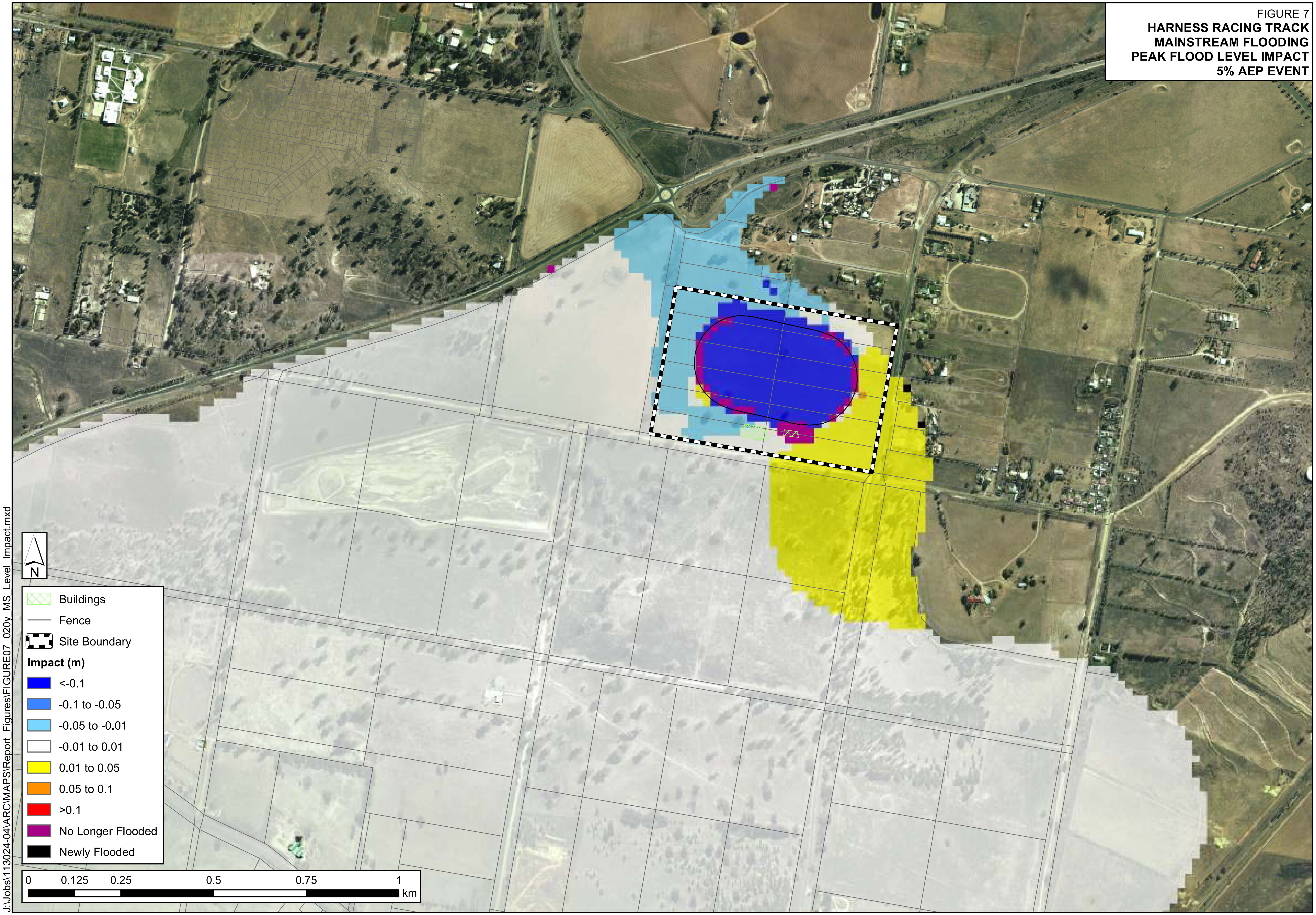


FIGURE 7
HARNESS RACING TRACK
MAINSTREAM FLOODING
PEAK FLOOD LEVEL IMPACT
5% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m)
<-0.1
-0.1 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.1
>0.1
No Longer Flooded
Newly Flooded
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE07_020y_MS_Level_Impact.mxd

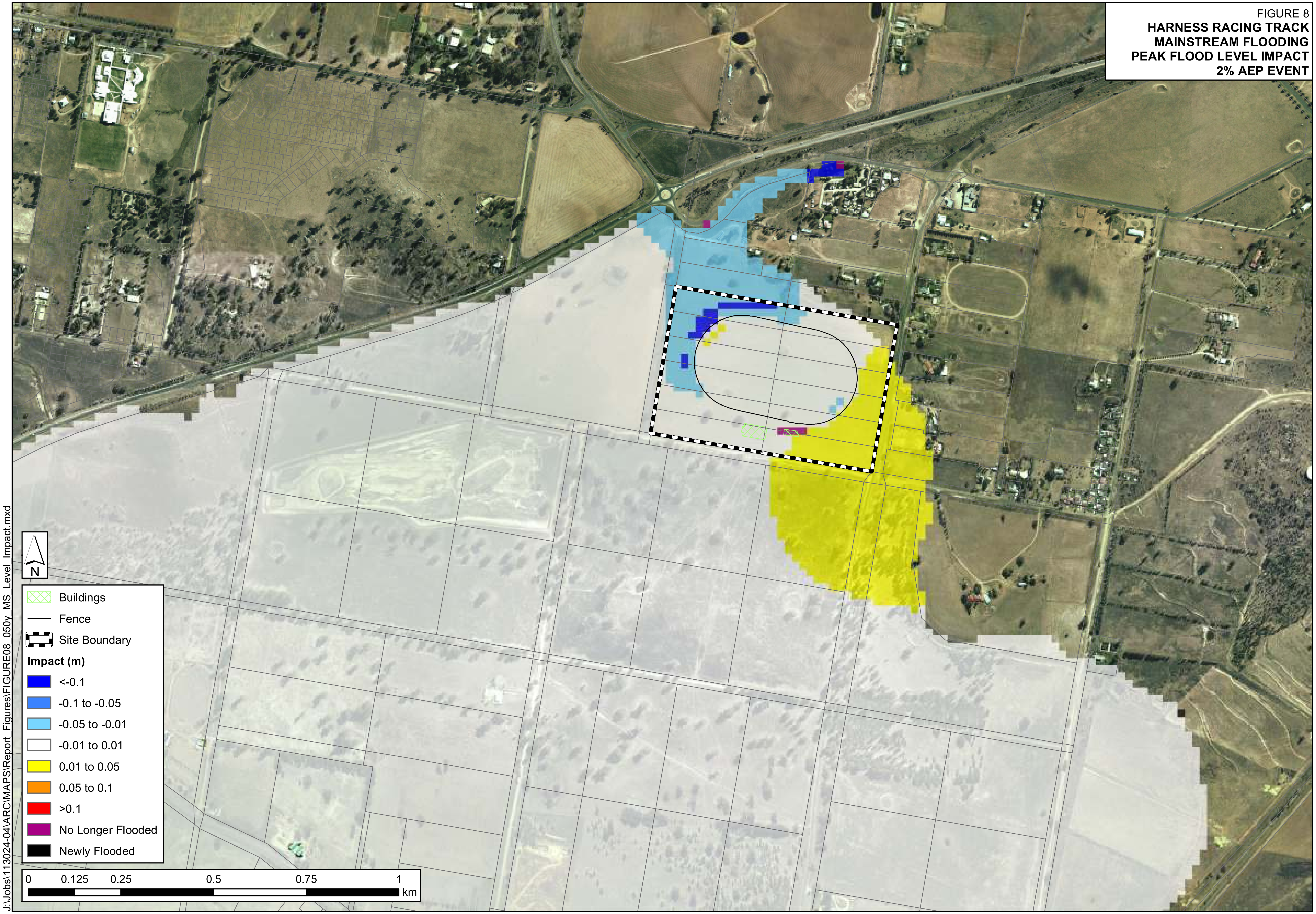


FIGURE 8
HARNESS RACING TRACK
MAINSTREAM FLOODING
PEAK FLOOD LEVEL IMPACT
2% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m)
<-0.1
-0.1 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.1
>0.1
No Longer Flooded
Newly Flooded
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE08_050y_MS_Level_Impact.mxd

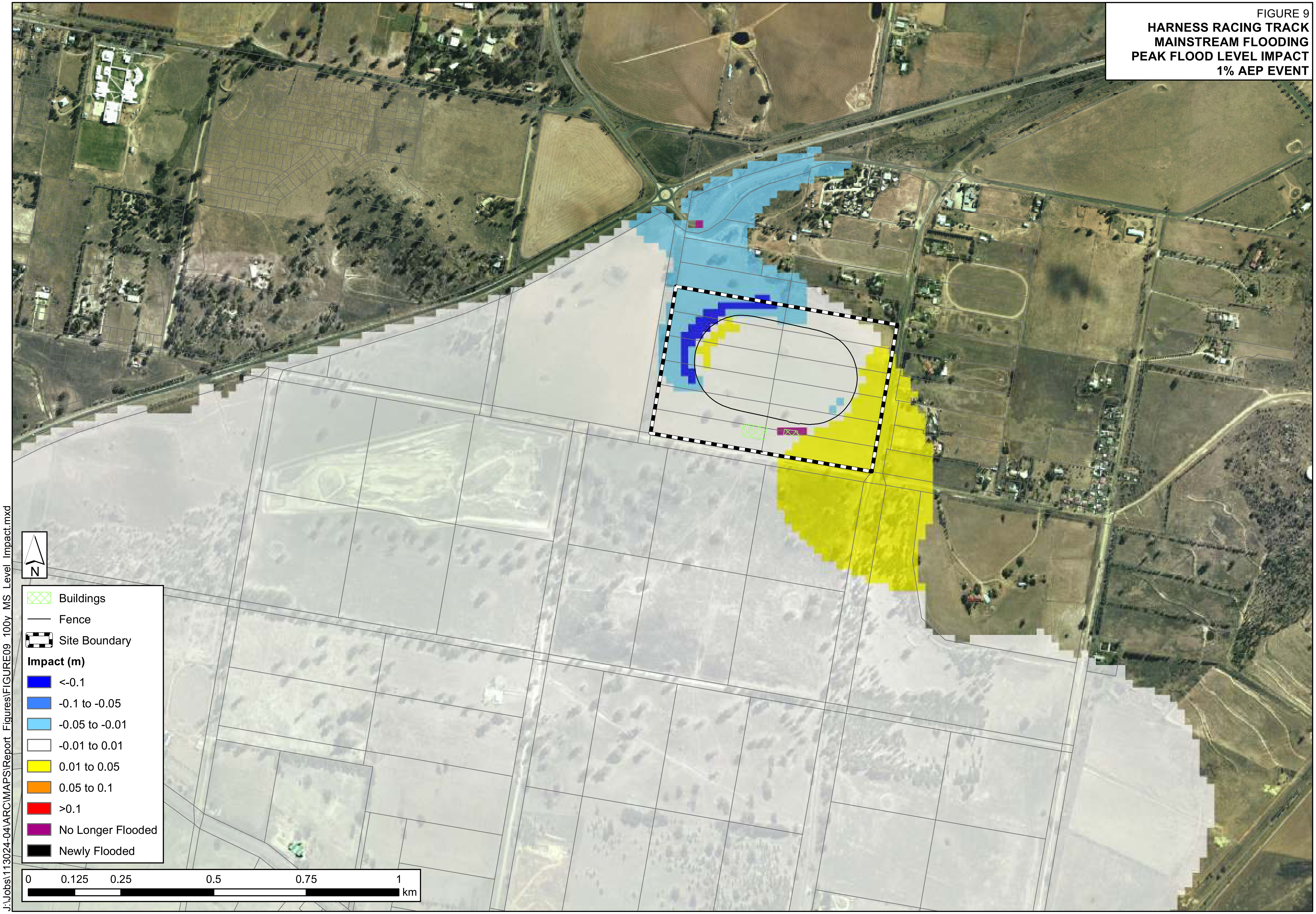


FIGURE 9
HARNESS RACING TRACK
MAINSTREAM FLOODING
PEAK FLOOD LEVEL IMPACT
1% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m)
<-0.1
-0.1 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.1
>0.1
No Longer Flooded
Newly Flooded
0 0.125 0.25 0.5 0.75 1 km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE09_100y_MS_Level_Impact.mxd

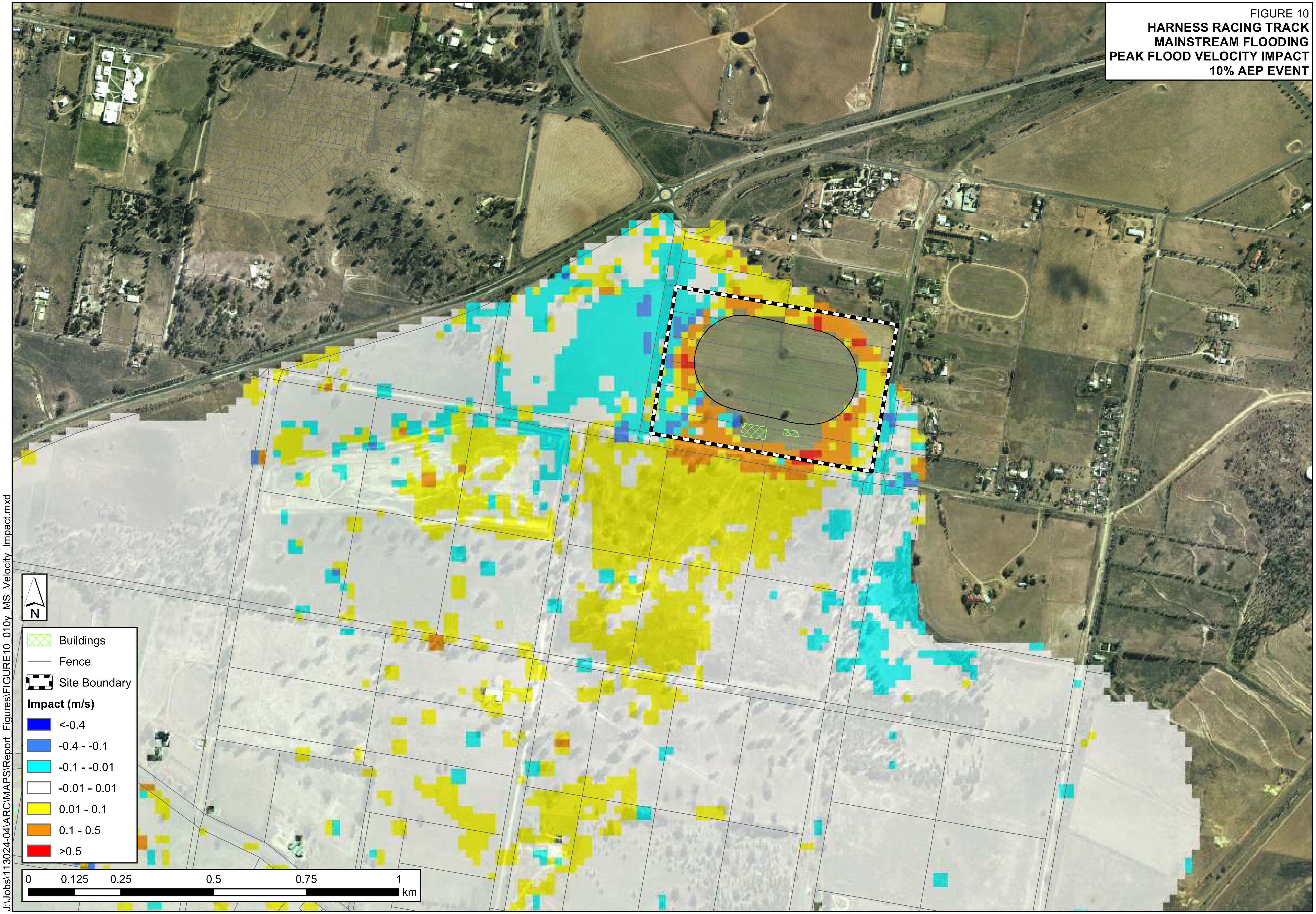
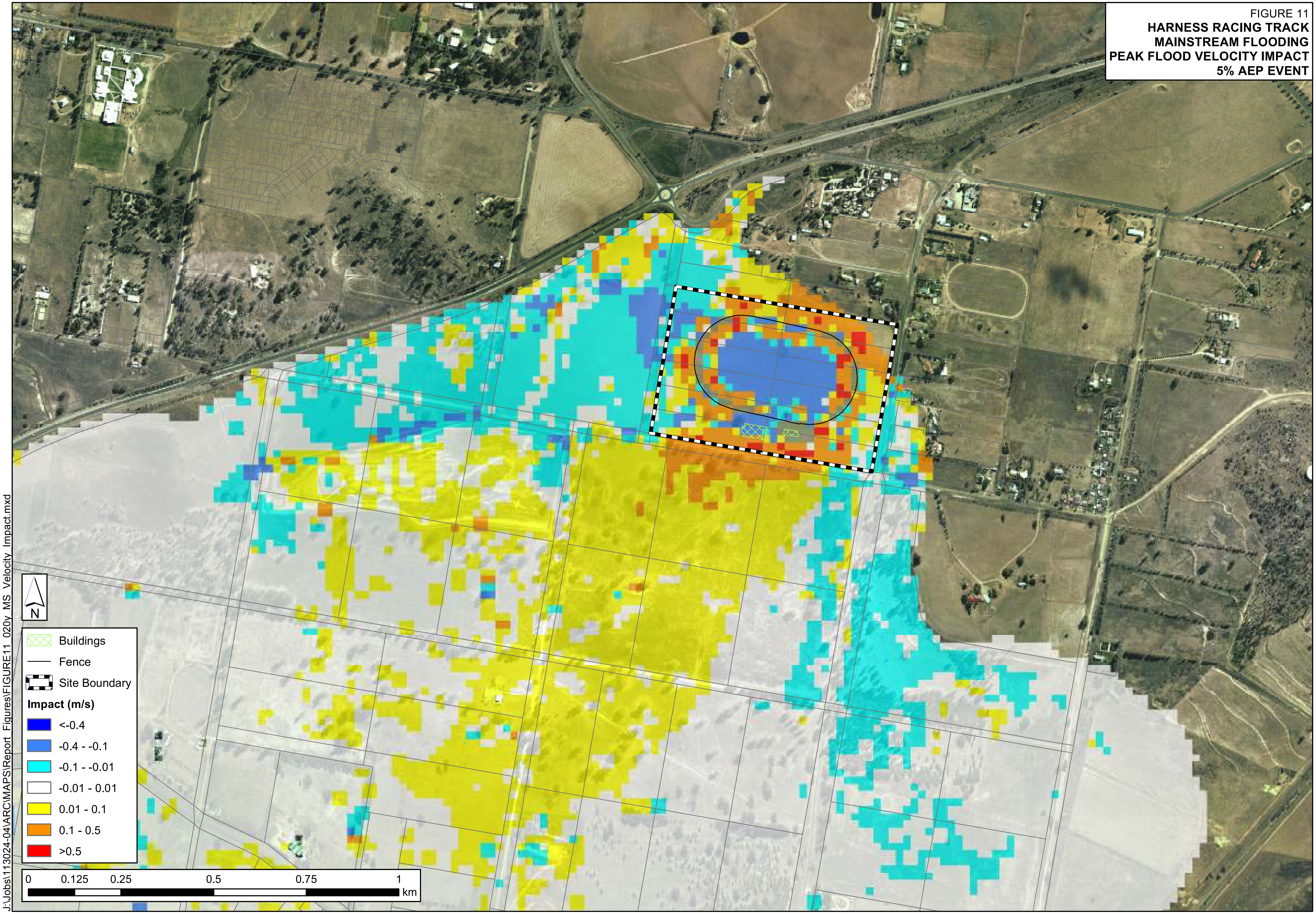


FIGURE 10
HARNESS RACING TRACK
MAINSTREAM FLOODING
PEAK FLOOD VELOCITY IMPACT
10% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m/s)
<-0.4
-0.4 - -0.1
-0.1 - -0.01
-0.01 - 0.01
0.01 - 0.1
0.1 - 0.5
>0.5
0
0.125
0.25
0.5
0.75
1
km
J:Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE10_010y_MS_Velocity_Impact.mxd

FIGURE 11
HARNESS RACING TRACK
MAINSTREAM FLOODING
PEAK FLOOD VELOCITY IMPACT
5% AEP EVENT



J:\Jobs\113024-04\ARC\MAPS\Report Figures\FIGURE11 020y MS Velocity Impact.mxd

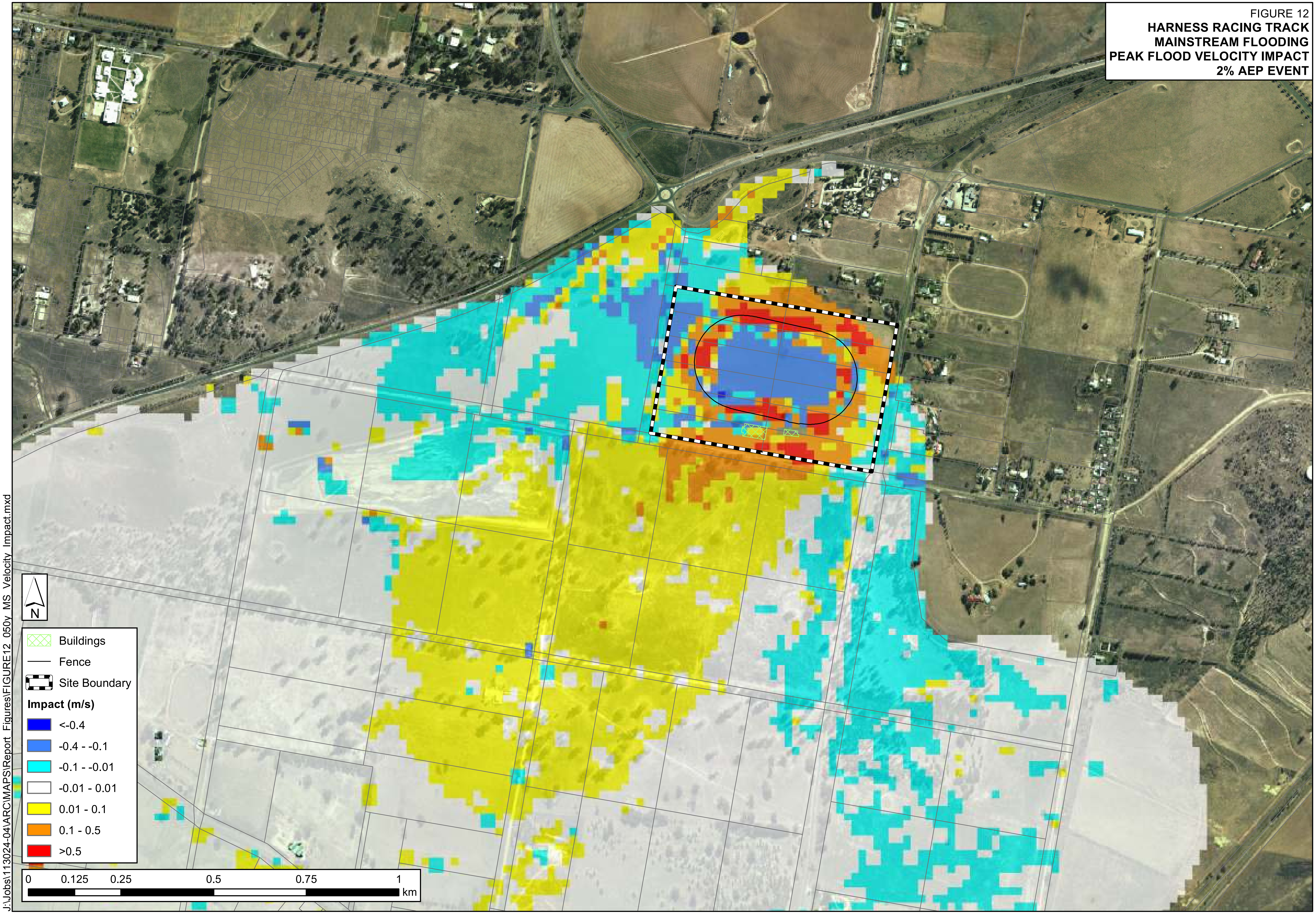


FIGURE 12
HARNESS RACING TRACK
MAINSTREAM FLOODING
PEAK FLOOD VELOCITY IMPACT
2% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m/s)
<-0.4
-0.4 - -0.1
-0.1 - -0.01
-0.01 - 0.01
0.01 - 0.1
0.1 - 0.5
>0.5
0
0.125
0.25
0.5
0.75
1
km
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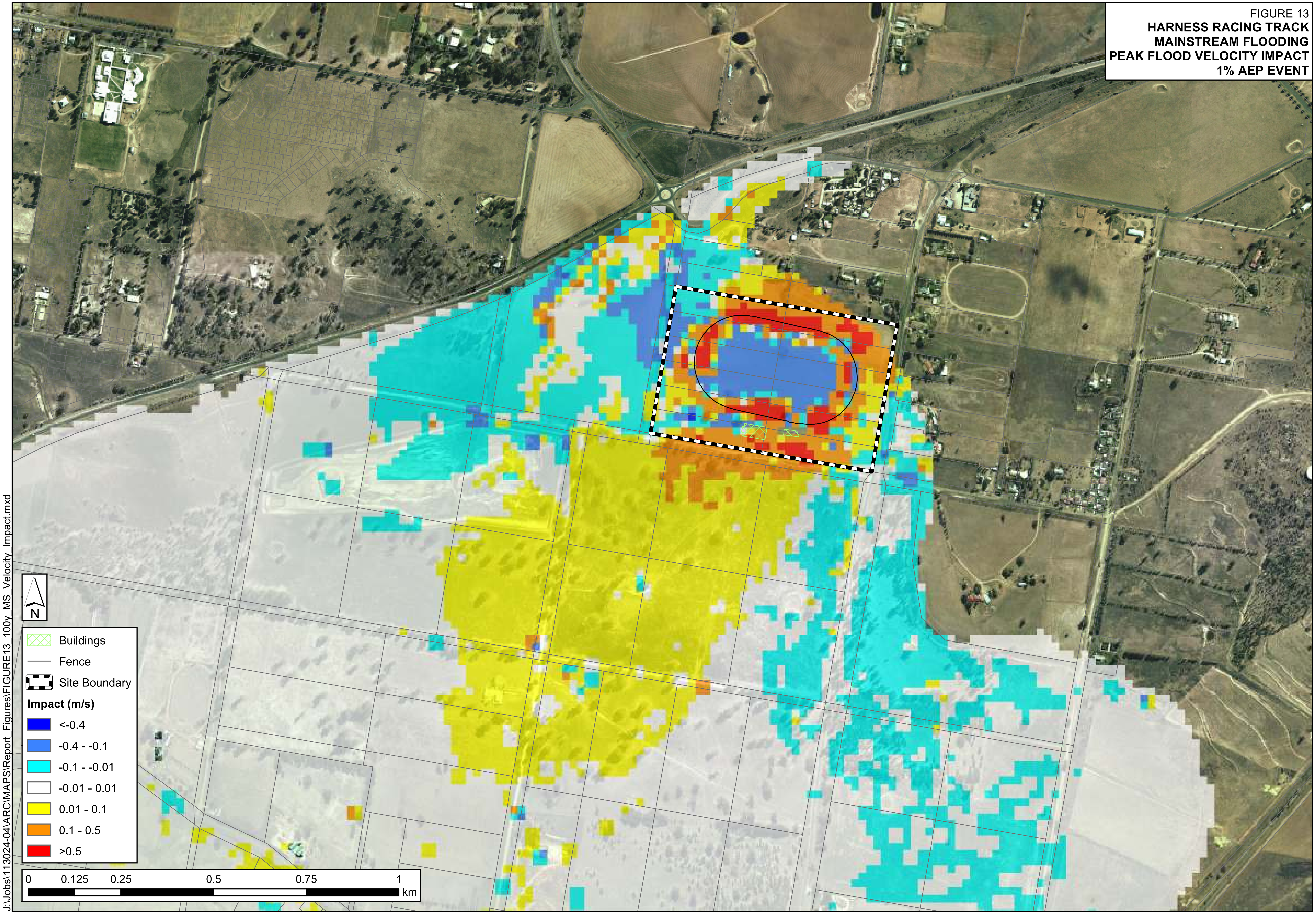


FIGURE 13
HARNESS RACING TRACK
MAINSTREAM FLOODING
PEAK FLOOD VELOCITY IMPACT
1% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m/s)
<-0.4
-0.4 - -0.1
-0.1 - -0.01
-0.01 - 0.01
0.01 - 0.1
0.1 - 0.5
>0.5
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE13_100y_MS_Velocity_Impact.mxd

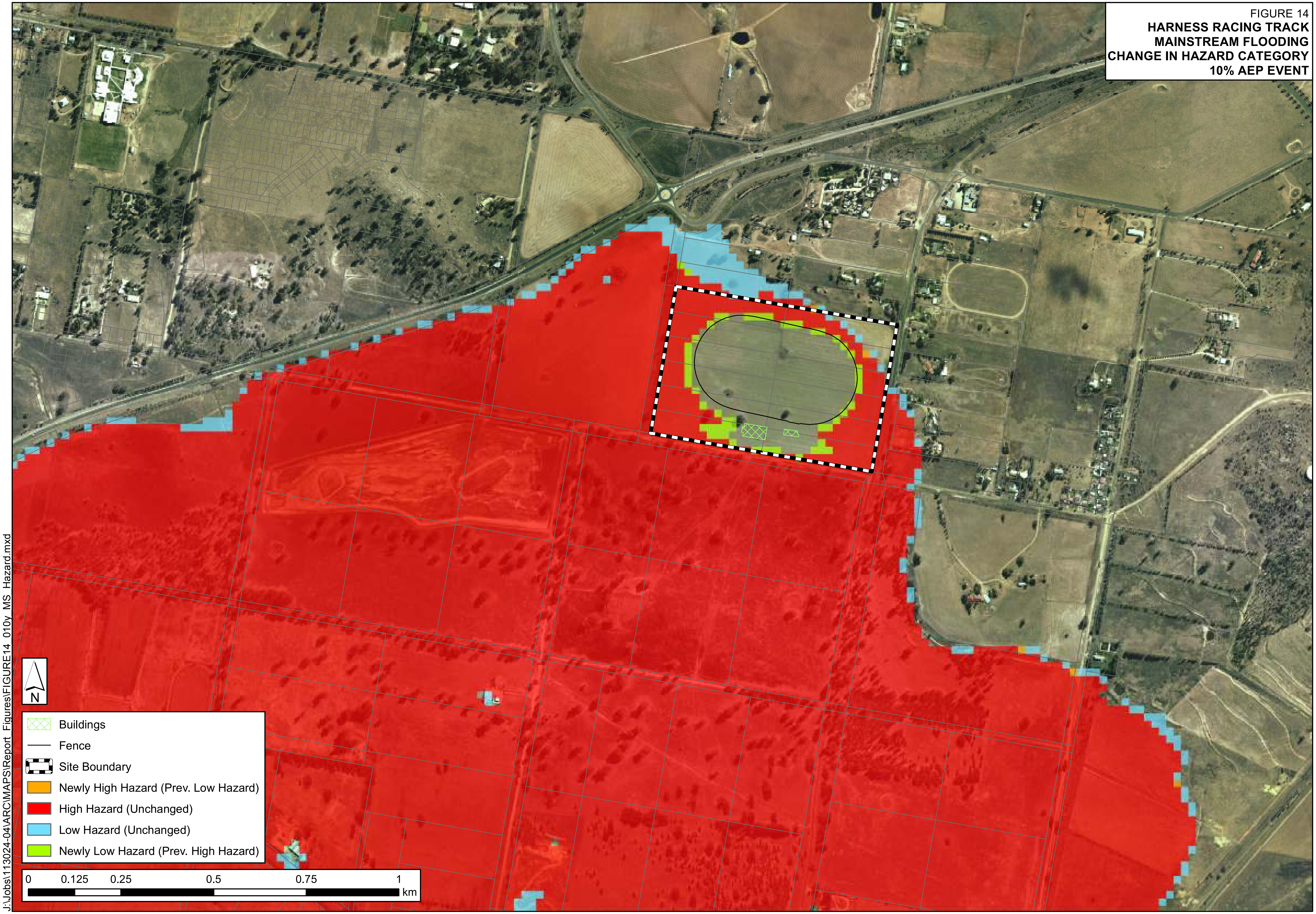
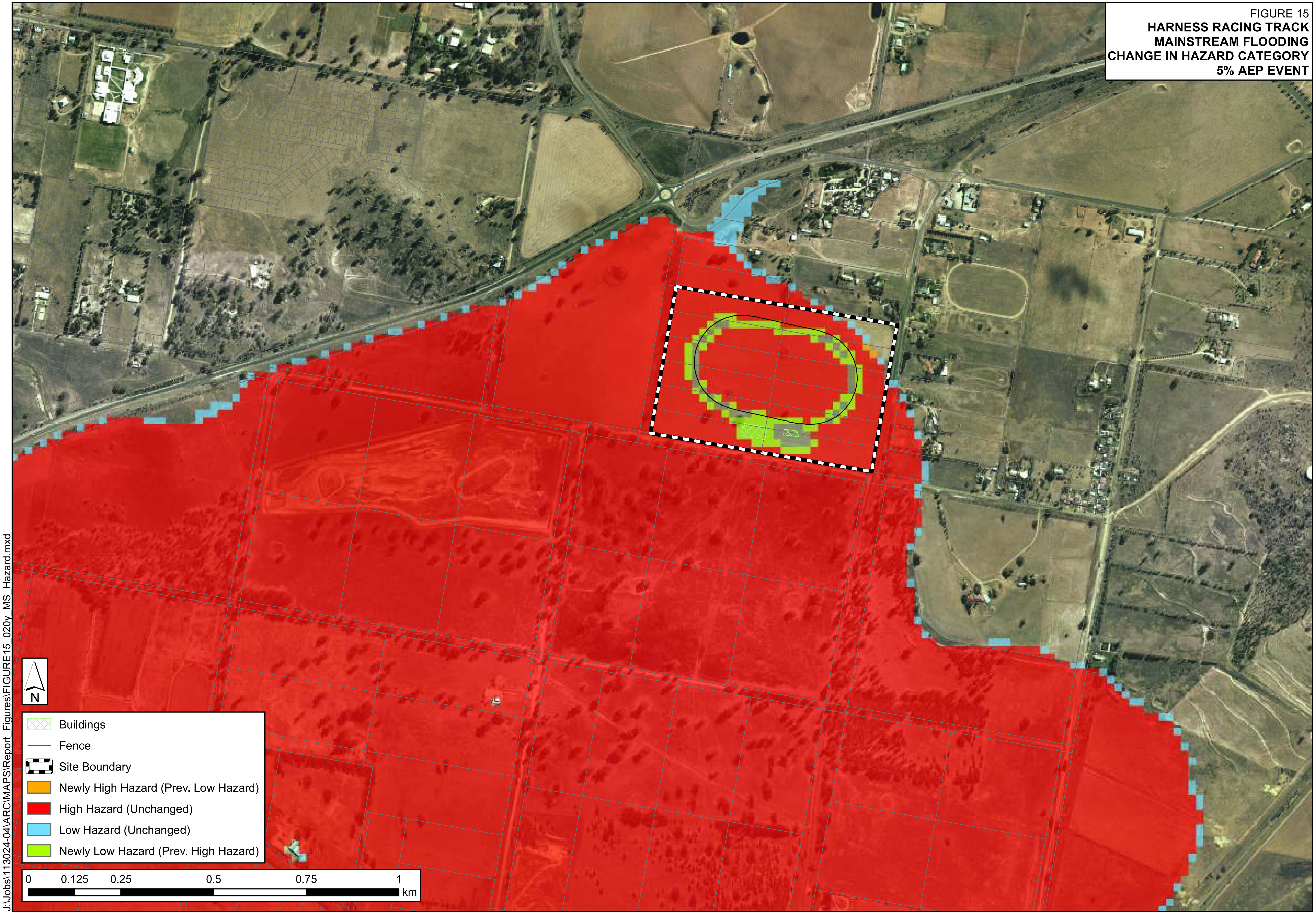


FIGURE 14
HARNESS RACING TRACK
MAINSTREAM FLOODING
CHANGE IN HAZARD CATEGORY
10% AEP EVENT
N
Buildings
Fence
Site Boundary
Newly High Hazard (Prev. Low Hazard)
High Hazard (Unchanged)
Low Hazard (Unchanged)
Newly Low Hazard (Prev. High Hazard)
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE14_010y_MS_Hazard.mxd



J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE15_020y_MS_Hazard.mxd

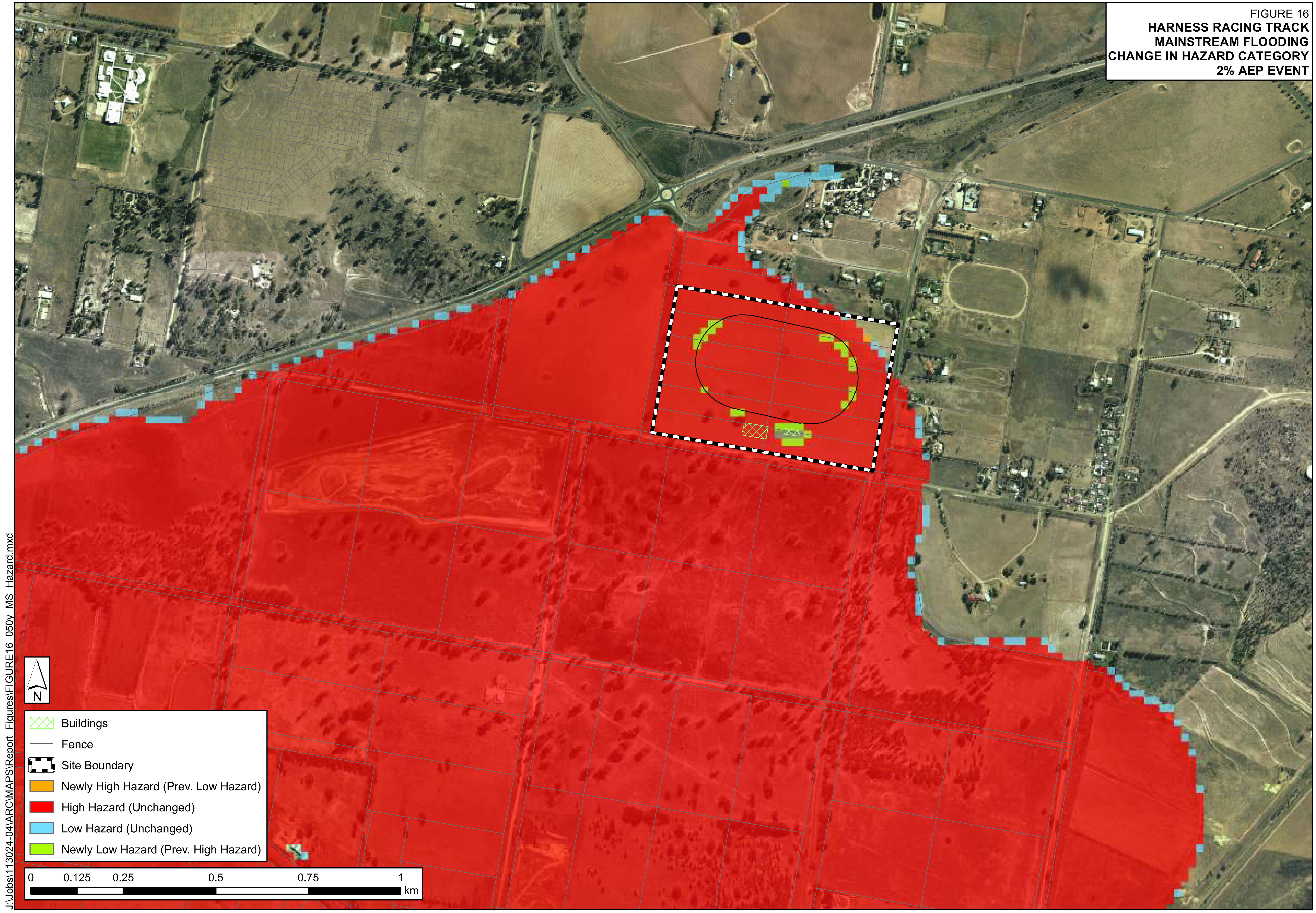


FIGURE 16
HARNESS RACING TRACK
MAINSTREAM FLOODING
CHANGE IN HAZARD CATEGORY
2% AEP EVENT
N
Buildings
Fence
Site Boundary
Newly High Hazard (Prev. Low Hazard)
High Hazard (Unchanged)
Low Hazard (Unchanged)
Newly Low Hazard (Prev. High Hazard)
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE16_050y_MS_Hazard.mxd

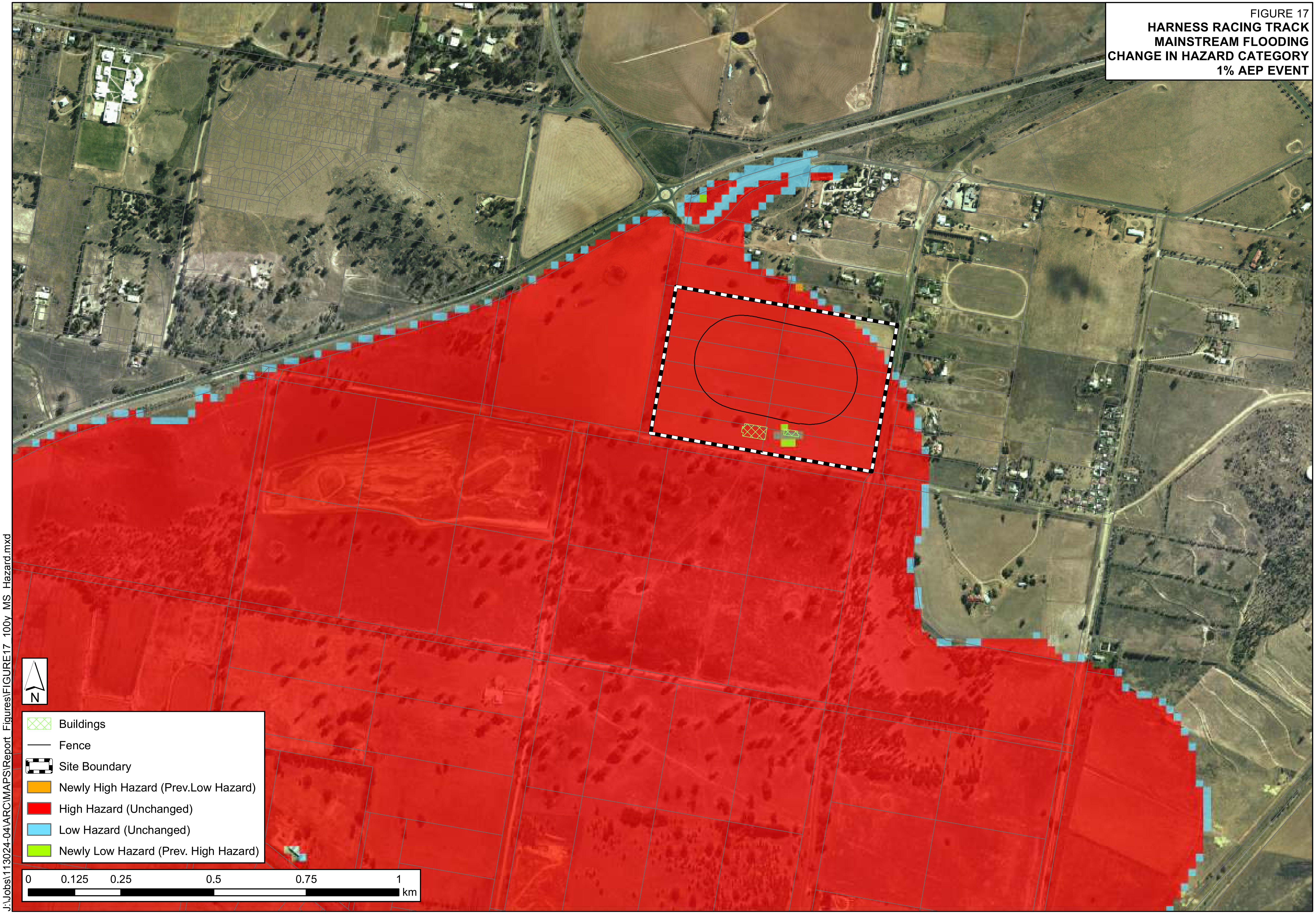


FIGURE 17
HARNESS RACING TRACK
MAINSTREAM FLOODING
CHANGE IN HAZARD CATEGORY
1% AEP EVENT

J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE17_100y_MS_Hazard.mxd

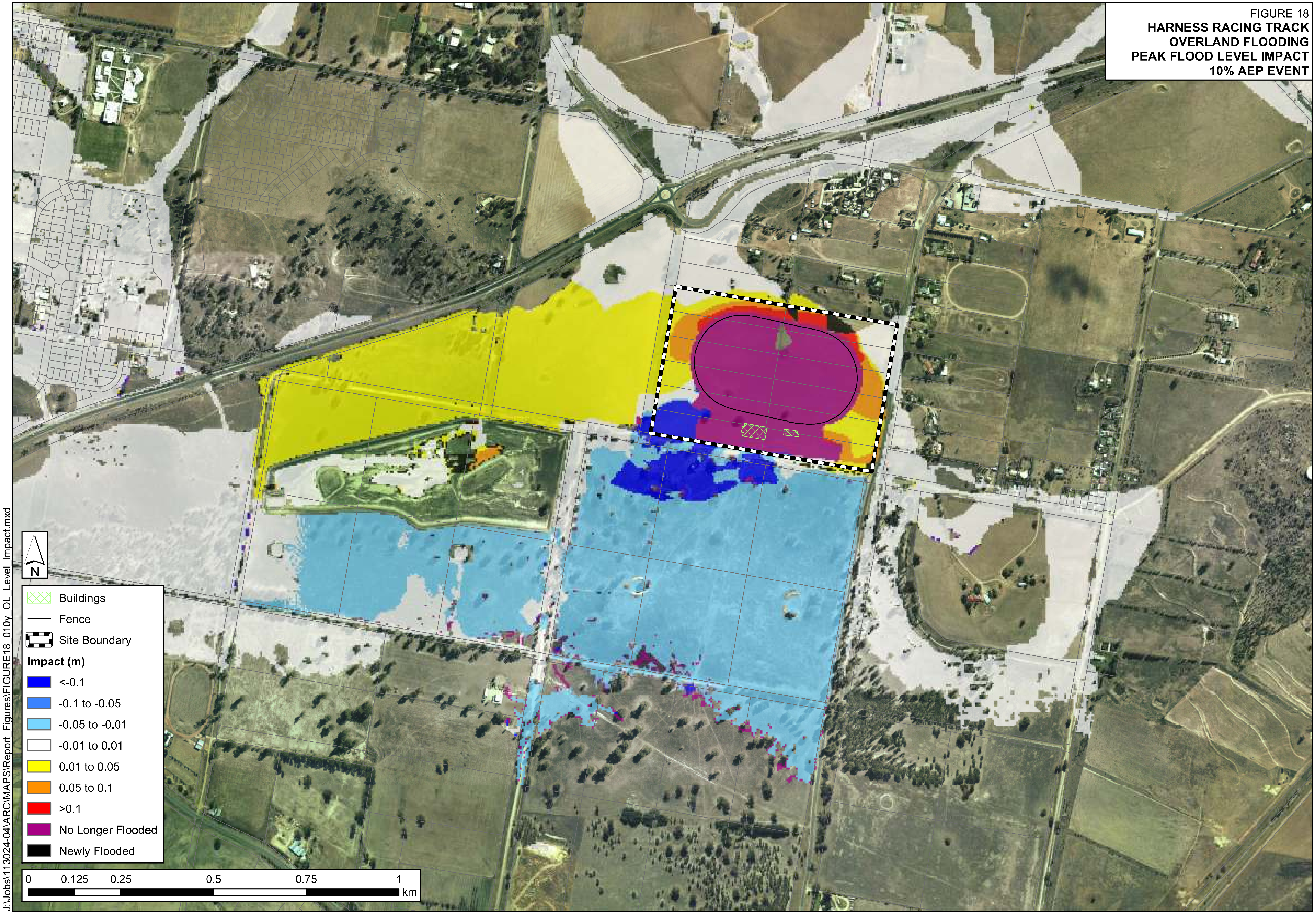


FIGURE 18
HARNESS RACING TRACK
OVERLAND FLOODING
PEAK FLOOD LEVEL IMPACT
10% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m)
<-0.1
-0.1 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.1
>0.1
No Longer Flooded
Newly Flooded
0
0.125
0.25
0.5
0.75
1
km
J:Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE18_010y_OL_Level_Impact.mxd

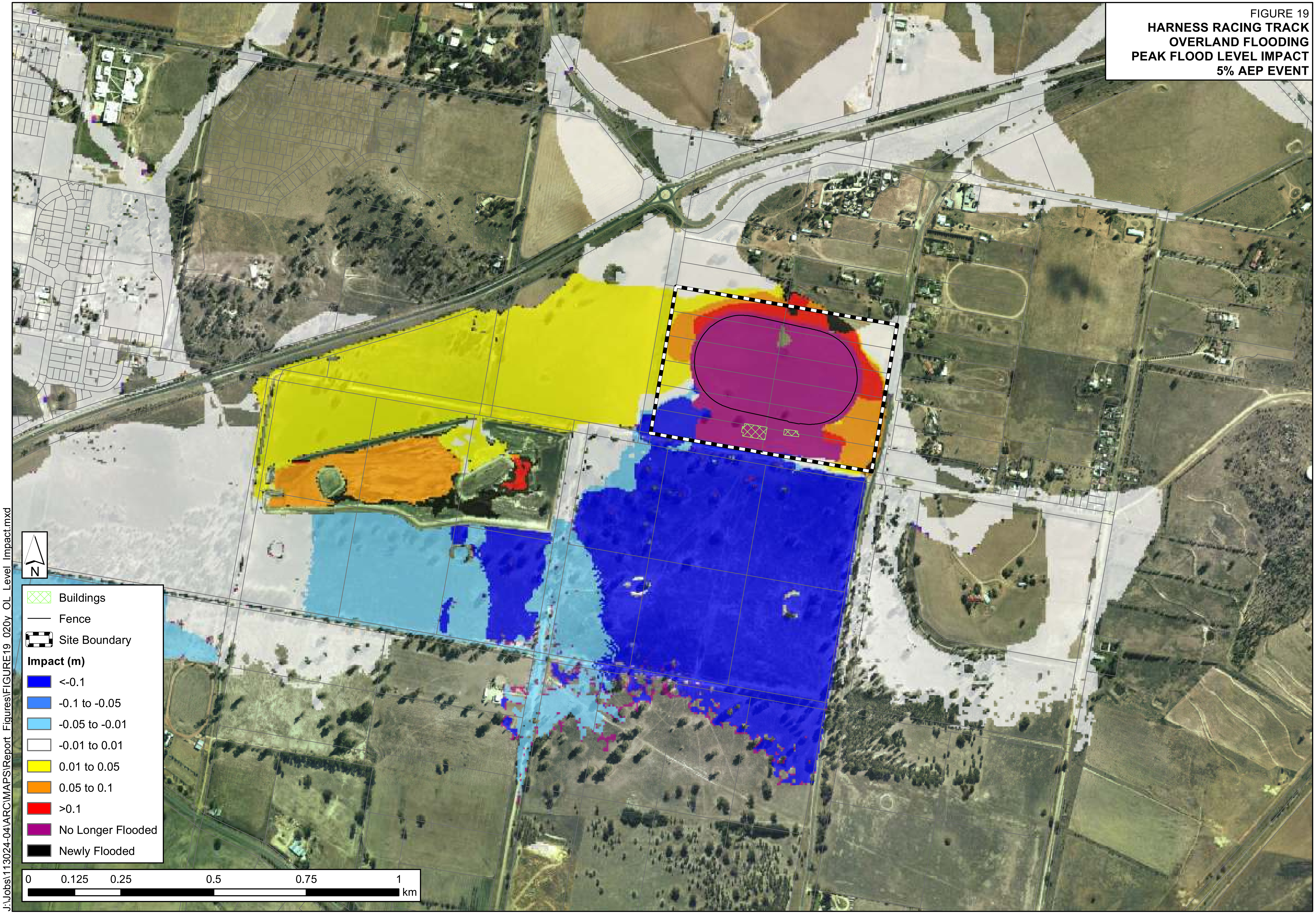


FIGURE 19
HARNESS RACING TRACK
OVERLAND FLOODING
PEAK FLOOD LEVEL IMPACT
5% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m)
<-0.1
-0.1 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.1
>0.1
No Longer Flooded
Newly Flooded
0 0.125 0.25 0.5 0.75 1 km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE19_020y_OL_Level_Impact.mxd

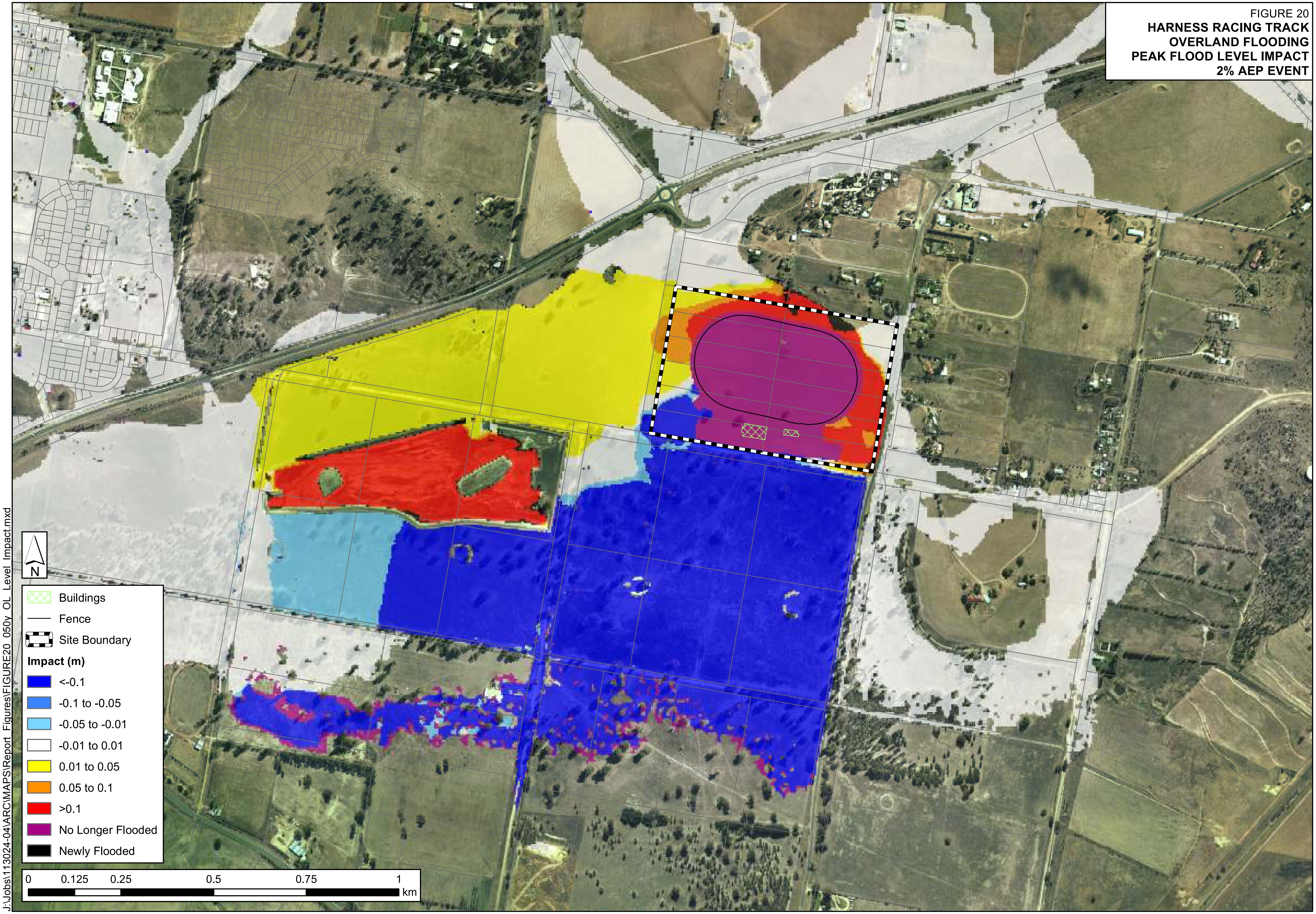


FIGURE 20
HARNESS RACING TRACK
OVERLAND FLOODING
PEAK FLOOD LEVEL IMPACT
2% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m)
<-0.1
-0.1 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.1
>0.1
No Longer Flooded
Newly Flooded
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE20_050y_OL_Level_Impact.mxd

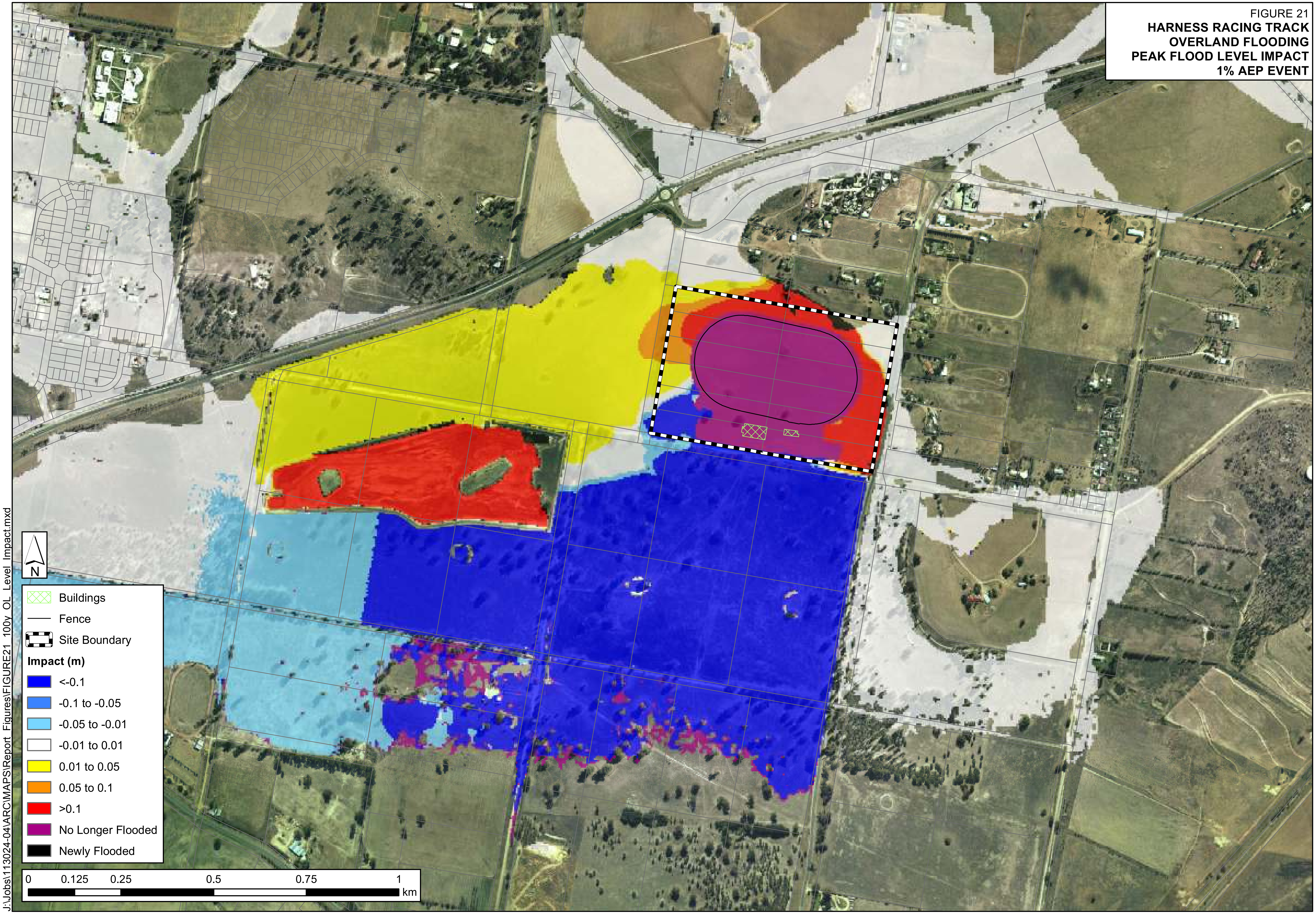
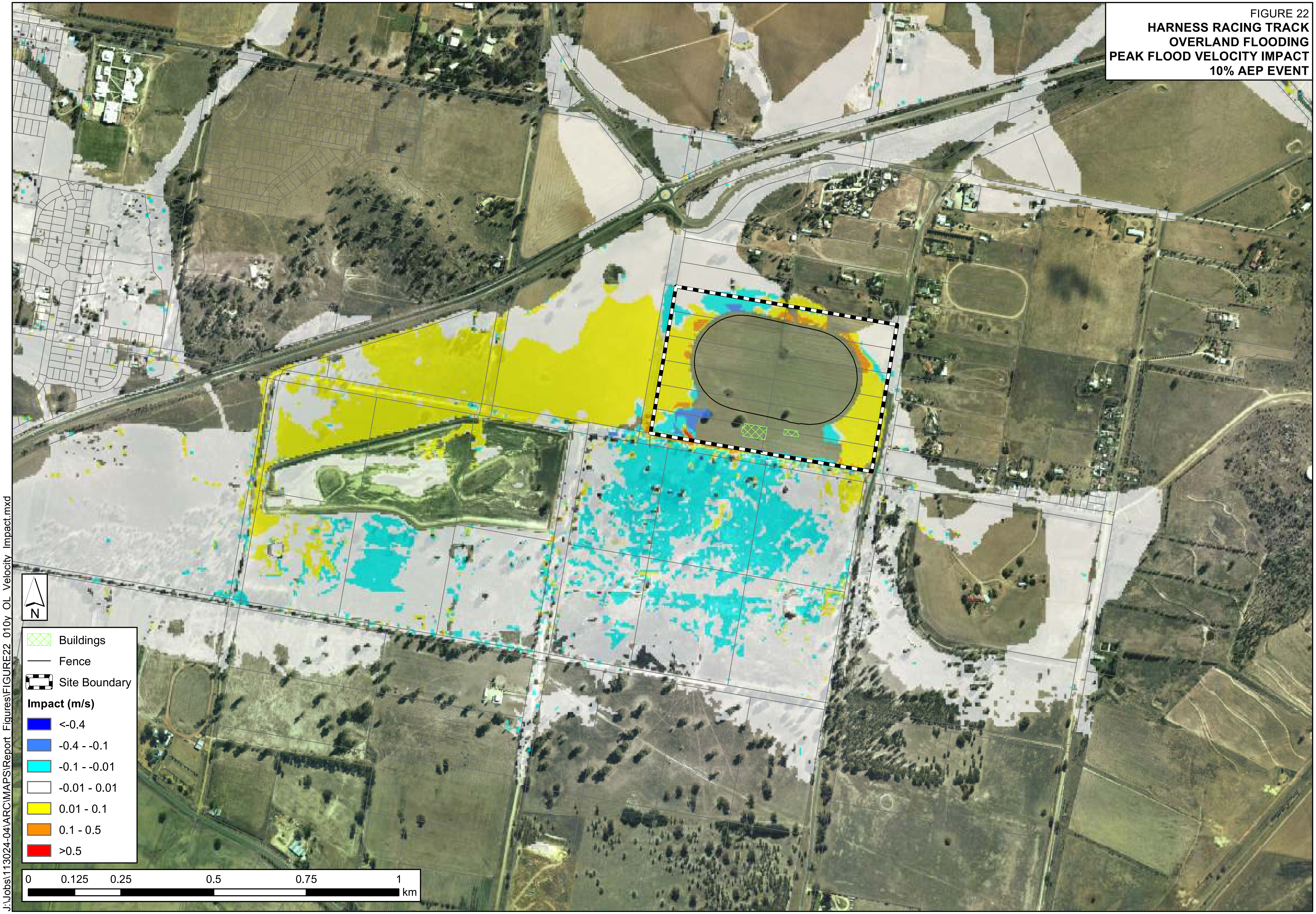


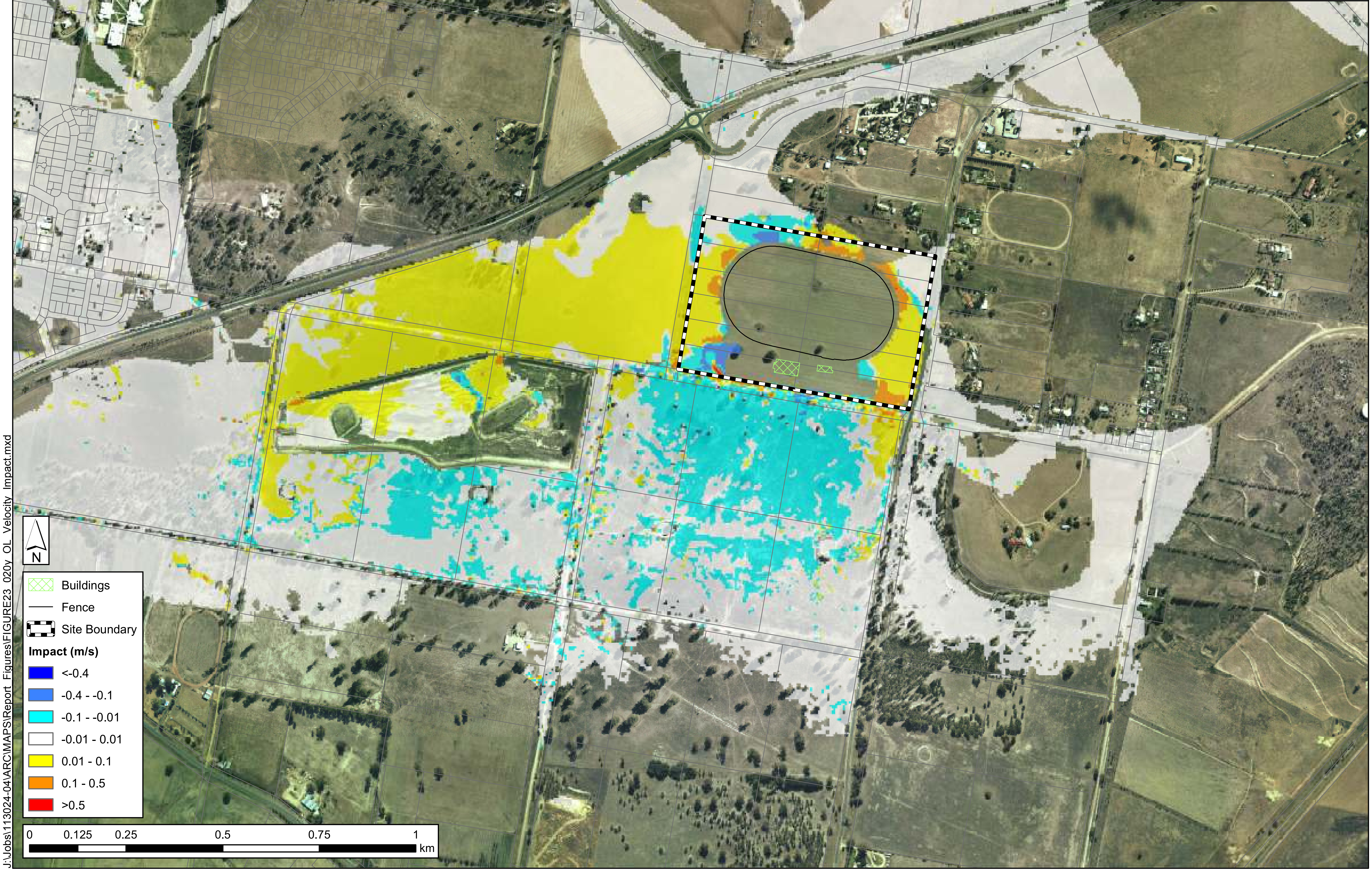
FIGURE 21
HARNESS RACING TRACK
OVERLAND FLOODING
PEAK FLOOD LEVEL IMPACT
1% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m)
<-0.1
-0.1 to -0.05
-0.05 to -0.01
-0.01 to 0.01
0.01 to 0.05
0.05 to 0.1
>0.1
No Longer Flooded
Newly Flooded
0
0.125
0.25
0.5
0.75
1
km
J:Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE21_100y_OL_Level_Impact.mxd

FIGURE 22
HARNESS RACING TRACK
OVERLAND FLOODING
PEAK FLOOD VELOCITY IMPACT
10% AEP EVENT

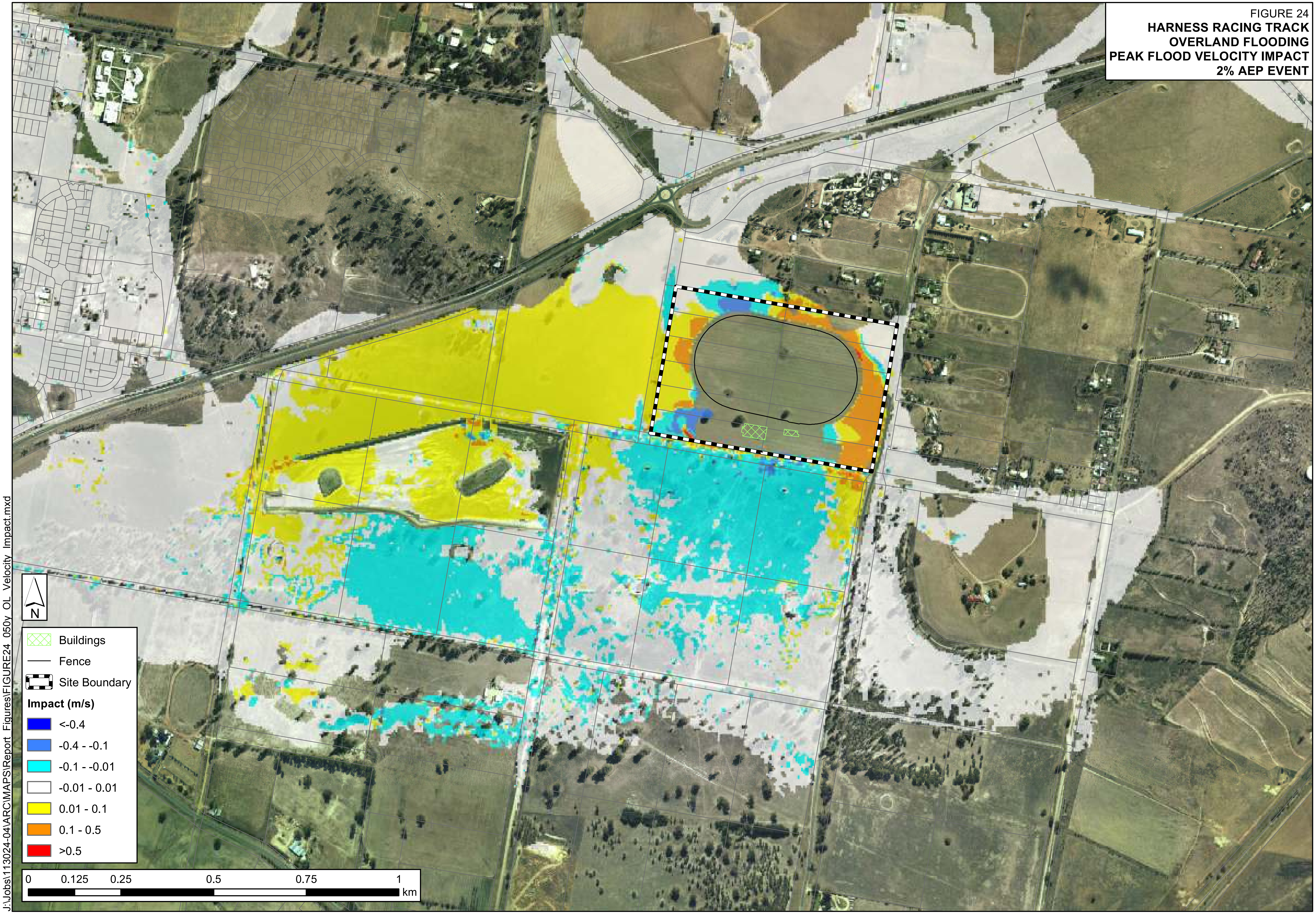


J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE22_010y_OL_Velocity_Impact.mxd

FIGURE 23
HARNESS RACING TRACK OVERLAND FLOODING PEAK FLOOD VELOCITY IMPACT 5% AEP EVENT



J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE23_020y_OL_Velocity_Impact.mxd



J:Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE24_050y_OL_Velocity_Impact.mxd

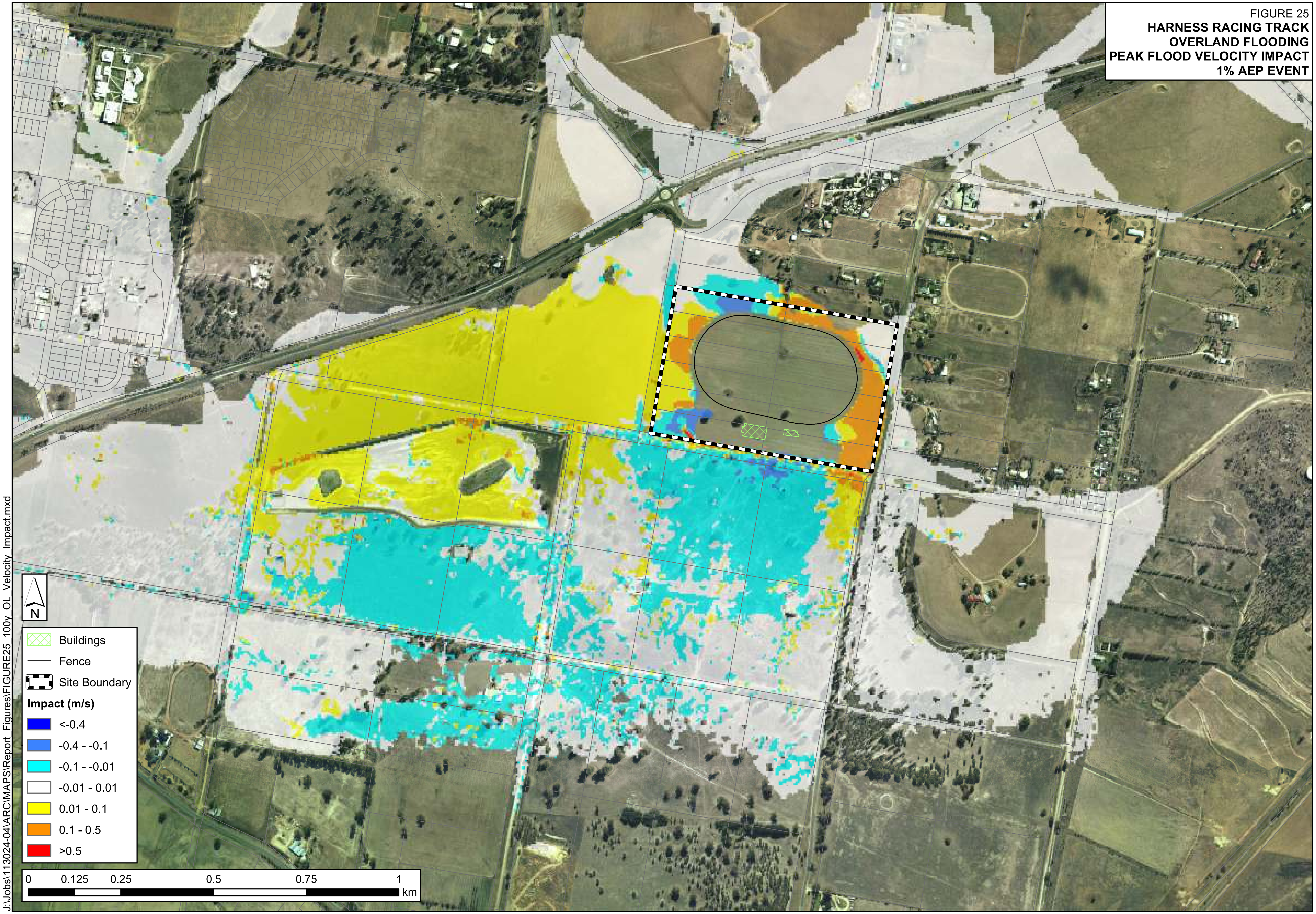
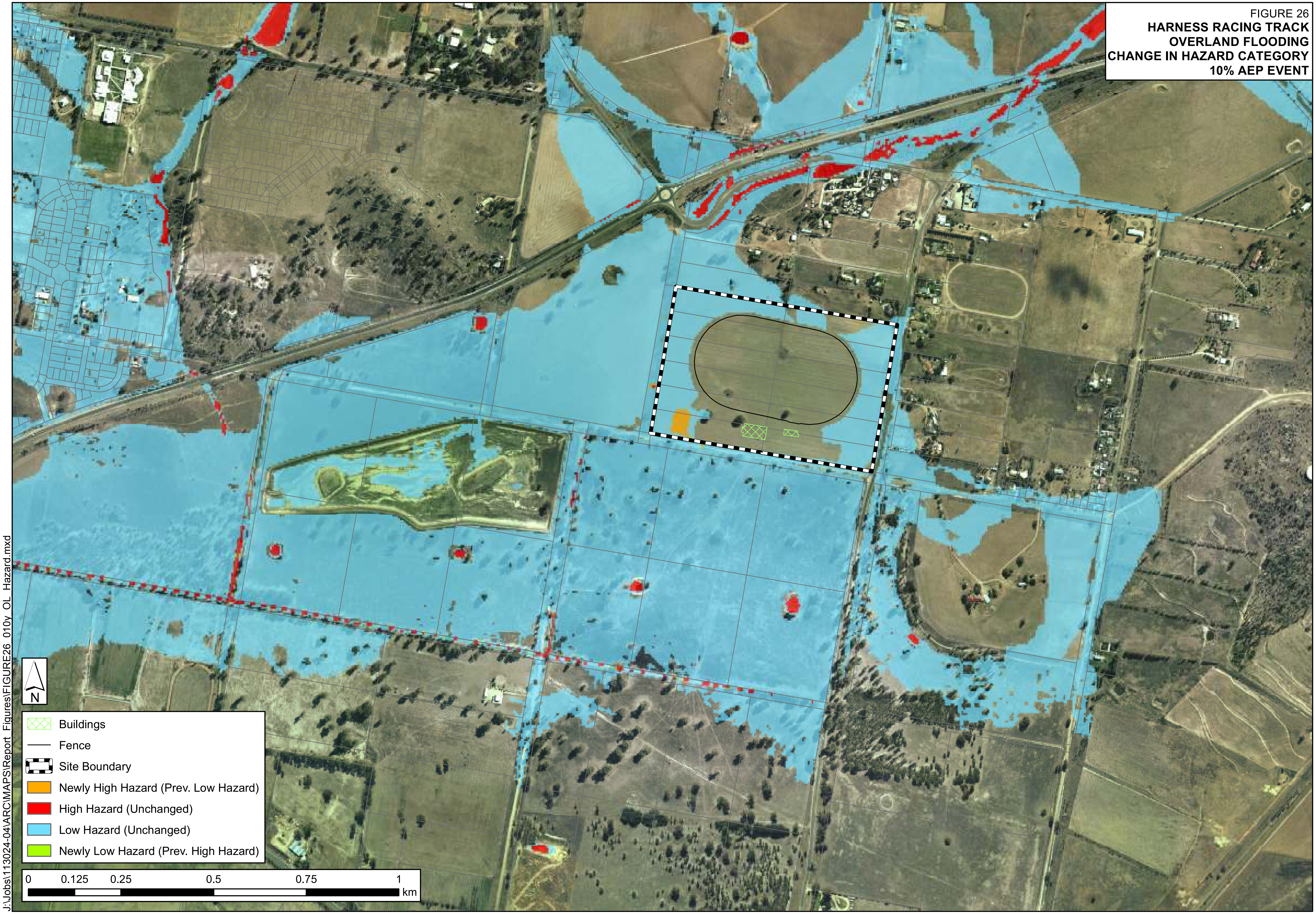
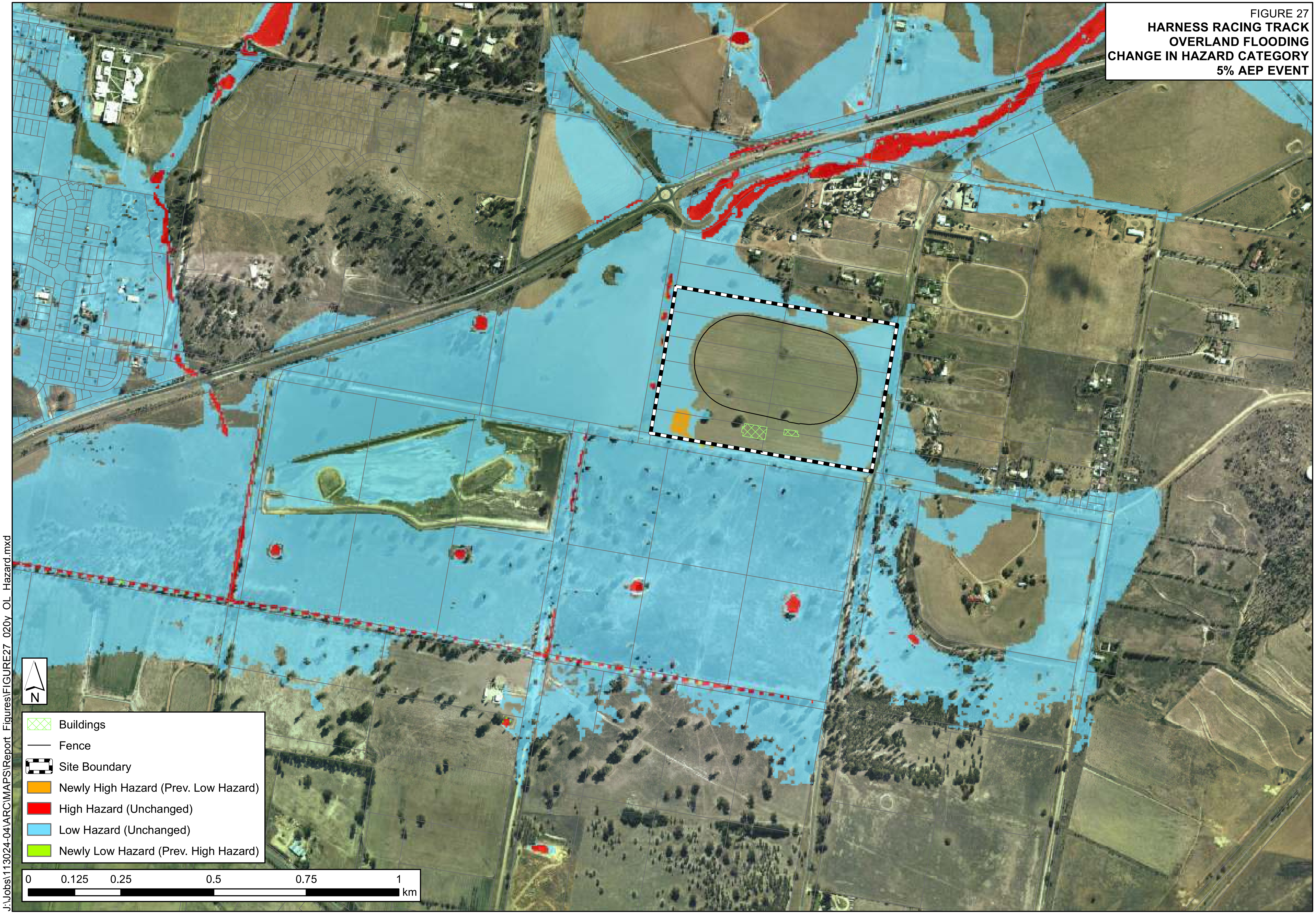


FIGURE 25
HARNESS RACING TRACK
OVERLAND FLOODING
PEAK FLOOD VELOCITY IMPACT
1% AEP EVENT
N
Buildings
Fence
Site Boundary
Impact (m/s)
<-0.4
-0.4 - -0.1
-0.1 - -0.01
-0.01 - 0.01
0.01 - 0.1
0.1 - 0.5
>0.5
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE25_100y_OL_Velocity_Impact.mxd

FIGURE 26
HARNESS RACING TRACK OVERLAND FLOODING CHANGE IN HAZARD CATEGORY 10% AEP EVENT



J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE26_010y_OL_Hazard.mxd



J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE27_020y_OL_Hazard.mxd

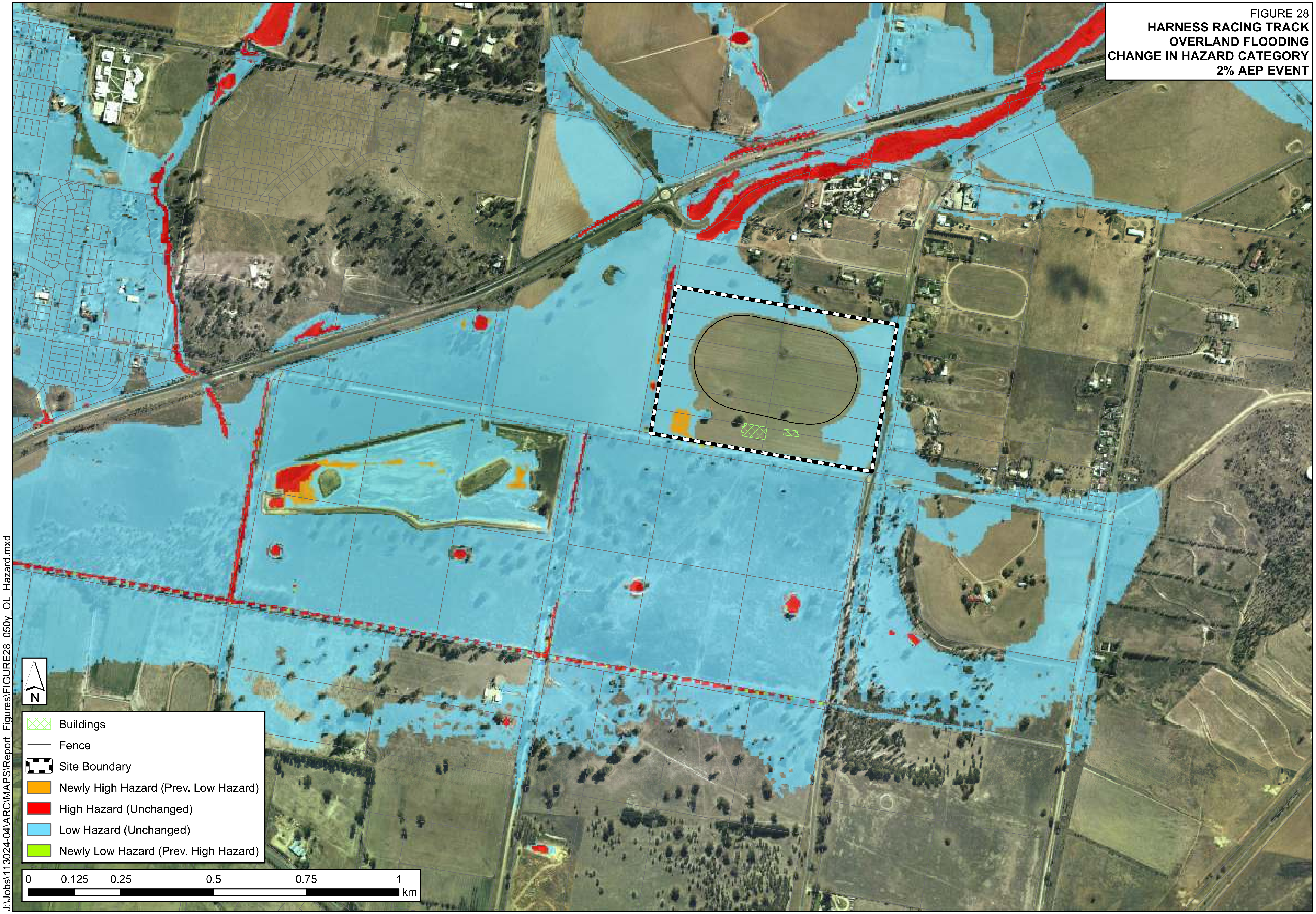


FIGURE 28
HARNESS RACING TRACK
OVERLAND FLOODING
CHANGE IN HAZARD CATEGORY
2% AEP EVENT
N
Buildings
Fence
Site Boundary
Newly High Hazard (Prev. Low Hazard)
High Hazard (Unchanged)
Low Hazard (Unchanged)
Newly Low Hazard (Prev. High Hazard)
0
0.125
0.25
0.5
0.75
1
km
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE28_050y_OL_Hazard.mxd

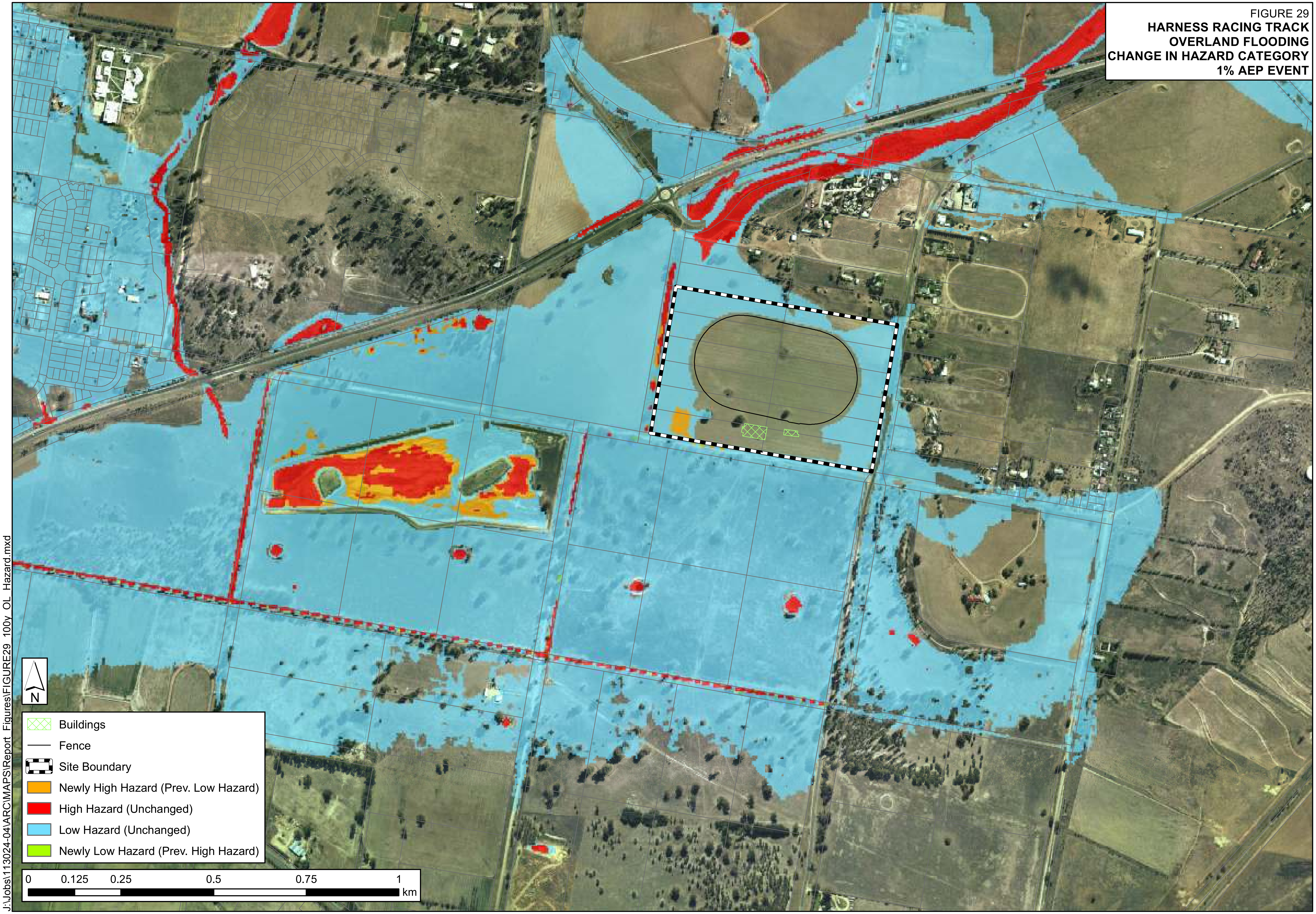
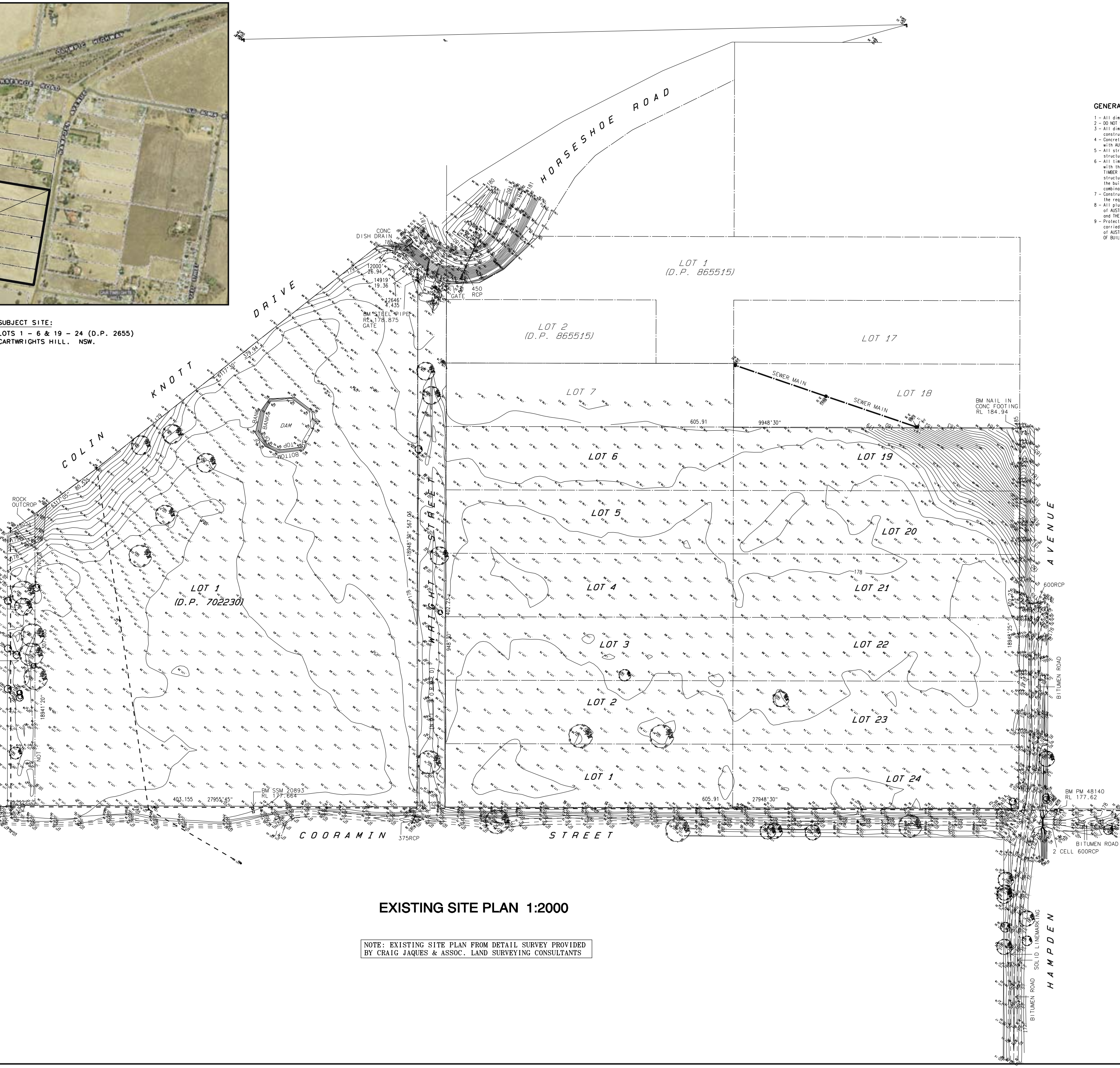


FIGURE 29
HARNESS RACING TRACK
OVERLAND FLOODING
CHANGE IN HAZARD CATEGORY
1% AEP EVENT
Buildings
Fence
Site Boundary
Newly High Hazard (Prev. Low Hazard)
High Hazard (Unchanged)
Low Hazard (Unchanged)
Newly Low Hazard (Prev. High Hazard)
0
0.125
0.25
0.5
0.75
1
km
N
J:\Jobs\113024-04\ARC\MAPS\Report_Figures\FIGURE29_100y_OL_Hazard.mxd

Appendix A

SITE LOCALITY - NTS.

SUBJECT SITE:
LOTS 1 - 6 & 19 - 24 (D.P. 2655)
CARTWRIGHTS HILL. NSW.



EXISTING SITE PLAN 1:2000

NOTE: EXISTING SITE PLAN FROM DETAIL SURVEY PROVIDED BY CRAIG JAQUES & ASSOC. LAND SURVEYING CONSULTANTS

GENERAL NOTES:

1 - All dimension shown in millimeters unless noted otherwise.
2 - DO NOT SCALE from drawing. If in doubt ask.
3 - All dimension and levels are to be confirmed on site prior to construction.
4 - Concrete slab & footings to be designed in accordance with AUSTRALIA STANDARD 2870.
5 - All structural elements to be designed by a practicing structural engineer.
6 - All timber used in the building shall be strictly in accordance with the provisions of AUSTRALIAN STANDARD 1684, NATIONAL TIMBER FRAMING CODE, unless a certificate from a practicing structural engineer is submitted to council certifying that the building has been designed to withstand the most adverse combination of loads to which it will be subjected.
7 - Construction of any stairways and balustrades shall comply with the requirements of the BUILDING CODE OF AUSTRALIA.
8 - All plumbing and drainage work is to comply with the requirements of AUSTRALIAN STANDARD 3500-NATIONAL PLUMBING AND DRAINAGE CODE and THE NEW SOUTH WALES CODE OF PRACTICE PLUMBING AND DRAINAGE.
9 - Protection of the building from attack by termites is to be carried out in accordance with the provisions of THE BUILDING CODE of AUSTRALIA and or AUSTRALIAN STANDARD 3660.1 PROTECTION OF BUILDINGS FROM SUBTERRANEAN TERMITES.

Harness Racing
NEW SOUTH WALES

no.	description	date
A	ISSUED FOR CONSTRUCTION	20/03/2017

amendments

project:
PROPOSED WAGGA HARNESS RACING CLUB FACILITY,
AT LOTS 1-6 & 19-24 (DP 2655)
COORAMIN STREET & HAMPDEN AV.
CARTWRIGHTS HILL. N.S.W.

client:
HARNESS RACING N.S.W.

title:
EXISTING SITE PLAN.

scale: AS NOTED
drawn: C.McK/L.B.
date: MARCH.2016

162 KITE STREET,
PO BOX 1929 P 02 6363 1780
ORANGE NSW 2800 F 02 6362 8257
mckinnon design

job no: 13073
drg no: G2
issue: C

LANDSCAPING SPECIFICATION:

ALL GARDEN BEDS TO BE EDGED WITH BRICK, HARDWOOD OR CONCRETE EDGING TO PROVIDE MOWING STRIPS.

LAWN AREAS TO BE TURFED OR SOWN. (AS INDICATED)

THESE AREAS TO BE PROPERLY PREPARED WITH 150mm MIN. TOPSOIL DEPTH.

TURFING : (TURF)

OBTAIN TURF FROM A SPECIALIST LOCAL GROWER OF CULTIVATED TURF. TURF TO BE LAID, FERTILISED & WATERED AS SPECIFIED BY SUPPLIER. INSTALL WATERING SYSTEM TO ENSURE PROPER WATERING WITH ECONOMICAL WATER USAGE. IRRIGATION TO TURFED AREA ONLY.

SOWING : (GRASS)

PROVIDE LAWN SEED MIXTURE SUITABLE FOR LOCAL CLIMATE. SOW SEED AS RECOMMENDED BY SUPPLIER. WATER & FERTILISE IN AN APPROVED MANNER. ENSURE WATER UP UNTIL ESTABLISHED.

GARDEN BEDS :

GARDEN BEDS TO BE FILLED WITH 200mm MIN. OF GOOD QUALITY TOPSOIL. PROIR TO INSTALLATION OF TOPSOIL, GROUND TO BE RIPPED TO MIN.DEPTH OF 300mm.
SPECIFIED PLANTS AND GROUND COVERS TO BE PLANTED IN GARDEN BEDS. BEDS TO BE MULCHED WITH GOOD QUALITY SHREDDED MULCH. INSTALL SUBSURFACE WATERING SYSTEM FOR MINIMAL WATER USAGE.

SELECTED EDGING TO GARDEN BEDS

MULCH :

MULCH APPLIED TO GARDEN BEDS TO BE MIN.DEPTH OF 85mm. MULCH TO BE OF GOOD QUALITY ORGANIC MATERIAL.

TREE & PLANT PLANTING :

EXCAVATE PLANT HOLES LARGE ENOUGH TO ACCEPT ROOT BALLS & 0.1m3 OF BACKFILLING WITH TOPSOIL.
THOROUGHLY WATER THE PLANTS BEFORE & IMMEDIATELY AFTER PLANTING AND AS REQUIRED TO MAINTAIN GROWTH GROWTH RATES FREE OF STRESS.
USE SUITABLE PLANT FERTILISER AROUND PLANTS AT TIME OF PLANTING.

STAKING OF PLANTS & TREES :

INSTALL HARDWOOD STAKES DRIVEN INTO THE GROUND AT LEAST 1/3 THEIR LENGTH. AVOID ROOT DAMAGE DURING INSTALLATION.

STAKE SIZES:
FOR PLANTS ⩾ 2.5m HIGH : THREE 50 x 50 x 2.4m STAKES PER PLANT
FOR PLANTS 1– 2.5m HIGH : TWO 50 x 50 x 1.8m STAKES PER PLANT
FOR PLANTS < 1.0m HIGH : ONE 38 x 38 x 1.2m STAKES PER PLANT

TIE PLANTS TO STAKES WITH APPROVED TIES DESIGNED NOT TO DAMAGE PLANT OR TREE.

COMPLETION :

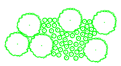
THROUGHOUT THE PLANTING & ESTABLISHMENT PERIOD, CARRY OUT MAINTAINENCE WORK INCLUDING WATERING, MOWING, RUBBISH REMOVAL, FERTILISING, PEST & DISEASE CONTROL, RE-SEEDING, RE-TURFING, STAKING & TYING, CULTIVATING, PRUNING, REINSTATEMENT OF MULCH, TOP DRESSING & KEEPING SITE NEAT & TIDY.
CONTINUE TO REPLACE FAILED, DAMAGED OR STOLEN PLANTS.

NO.	BOTANICAL NAME	COMMON NAME	CONTAINER SIZE
83	ACACIA DECORA	WESTERN GOLDEN WATTLE	TUBE
44	ACACIA PARADOXA	KANGAROO THORN	TUBE
74	ACACIA VERNICIFLUA	VARNISH WATTLE	TUBE
38	BURSARIA SPINOSA	BLACKTHORN	TUBE
98	CALYTRIX TETRAGONA	FRINGE MYRTLE	TUBE
35	CASUARINA CUNNINGHAMIANA	RIVER SHE OAK	TUBE
77	DODONAEA VISCOSA SSP. CUNEATA	HOP BUSH	TUBE
39	EUCALYPTUS BLAKELYI	BLAKELY'S RED GUM	TUBE
73	EUCALYPTUS CAMALDULENSIS	RED RIVER GUM	TUBE
39	EUCALYPTUS MELLIODORA	YELLOW BOX	TUBE
15	GREVILLEA ROSMARINIFOLIA	ROSEMARY GREVILLEA	TUBE
94	PHILOTHECA MYOPOROIDES	ERIOSTEMON	TUBE
20	PLATANUS ORIENTALIS 'DIGITATA'	CUT- LEAF PLAN TREE	300
12	QUERCUS PALUSTRIS	PIN OAK	300
15	QUERCUS PHELLOS	WILLOW OAK	300

– PROPOSED NEW TREE

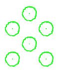
– EXISTING TREE

– EXISTING TREE TO BE REMOVED



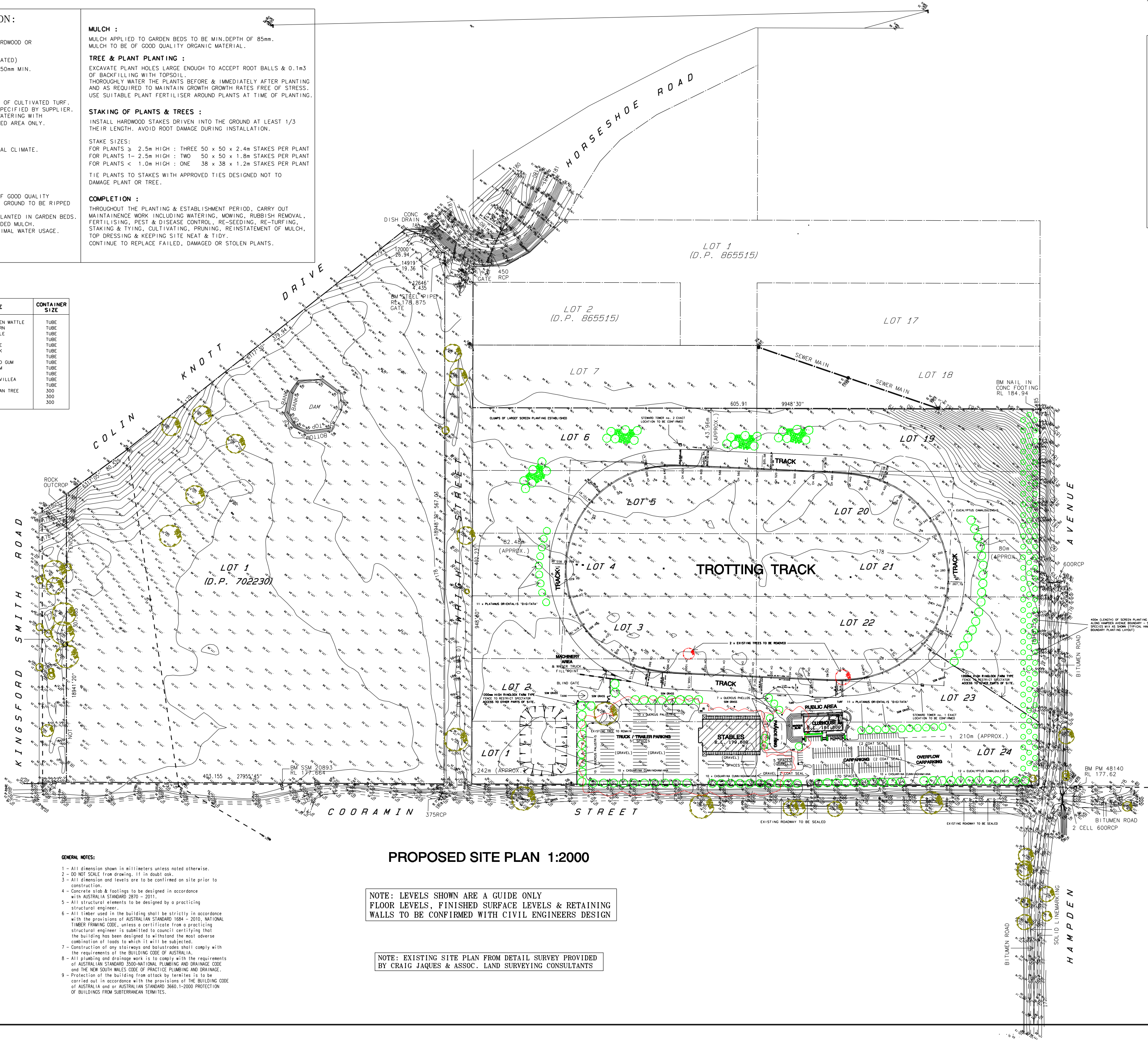
TYPICAL TREE/SHRUB COPSE LAYOUT NOT TO SCALE

PLANTING OF COPSES OF TREE/SHRUB SPECIES (SETOUT AT 3.5 x 4m CENTRES). PLANT SHRUB SPECIES (S) IN GROUPS OF 3 TO 5 OF EACH SPECIES, ARRANGED RANDOMLY.
SPECIES:
6 x ACACIA DECORA (S)
6 x ACACIA VERNICIFLUA (S)
1 x CASUARINA CUNNINGHAMIANA
12 x CALYTRIX TETRAGONA (S)
12 x DODONAEA VISCOSA SSP. CUNEATA (S)
3 x EUCALYPTUS CAMALDULENSIS
2 x EUCALYPTUS MELLIODORA
12 x PHILOTHECA MYOPOROIDES (S)



TYPICAL HAMPDEN AVENUE BOUNDARY PLANTING LAYOUT NOT TO SCALE

SCREEN PLANTING OF TREE/SHRUB SPECIES (SETOUT AT 3.5 x 4m CENTRES). PLANT IN GROUPS OF 3 TO 5 OF EACH SPECIES, ARRANGED RANDOMLY.
SPECIES:
44 x ACACIA DECORA
44 x ACACIA PARADOXA
44 x ACACIA VERNICIFLUA
38 x BURSARIA SPINOSA
38 x CALYTRIX TETRAGONA
17 x DODONAEA VISCOSA SSP. CUNEATA
29 x EUCALYPTUS BLAKELYI
29 x EUCALYPTUS CAMALDULENSIS
29 x EUCALYPTUS MELLIODORA
15 x GREVILLEA ROSMARINIFOLIA
15 x PHILOTHECA MYOPOROIDES



PROPOSED SITE PLAN 1:2000

NOTE: LEVELS SHOWN ARE A GUIDE ONLY FLOOR LEVELS, FINISHED SURFACE LEVELS & RETAINING WALLS TO BE CONFIRMED WITH CIVIL ENGINEERS DESIGN

NOTE: EXISTING SITE PLAN FROM DETAIL SURVEY PROVIDED BY CRAIG JAQUES & ASSOC. LAND SURVEYING CONSULTANTS

GENERAL NOTES:

1 – All dimension shown in millimeters unless noted otherwise.
2 – DO NOT SCALE from drawing. If in doubt ask.
3 – All dimension and levels are to be confirmed on site prior to construction.
4 – Concrete slab & footings to be designed in accordance with AUSTRALIA STANDARD 2870 – 2011.
5 – All structural elements to be designed by a practicing structural engineer.
6 – All timber used in the building shall be strictly in accordance with the provisions of AUSTRALIAN STANDARD 1684 – 2010, NATIONAL TIMBER FRAMING CODE, unless a certificate from a practicing structural engineer is submitted to council certifying that the building has been designed to withstand the most adverse combination of loads to which it will be subjected.
7 – Construction of any stairways and balustrades shall comply with the requirements of the BUILDING CODE OF AUSTRALIA.
8 – All plumbing and drainage work is to comply with the requirements of AUSTRALIAN STANDARD 3500-NATIONAL PLUMBING AND DRAINAGE CODE and THE NEW SOUTH WALES CODE OF PRACTICE PLUMBING AND DRAINAGE.
9 – Protection of the building from attack by termites is to be carried out in accordance with the provisions of THE BUILDING CODE of AUSTRALIA and or AUSTRALIAN STANDARD 3660.1-2000 PROTECTION OF BUILDINGS FROM SUBTERRANEAN TERMITES.

SITE CALCULATIONS:

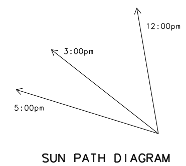
PROPOSED WAGGA HARNESS RACING PROPOSAL, AT LOT'S 1-6 & LOT'S 19-24 (D.P. 2655) COORAMIN STREET & HAMPDEN AVENUE, CARTWRIGHTS HILL. N.S.W.

SITE AREA
LOT'S 1-6 & LOT'S 19-24 = 24.1612 ha

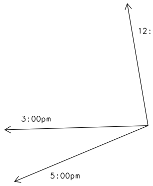
PROPOSED STABLES AREA = 2256.9m2
PROPOSED CLUB BUILDING AREA = 850.2m2
TOTAL BUILDING AREA = 3107.1m2

NOTES:

1-FLOOR LEVELS, STORMWATER & SEWAGE DESIGN BY CIVIL ENGINEER.
2-FLOOR LEVELS ARE A GUIDE ONLY & TO BE CONFIRMED BY CIVIL ENGINEER.
3-BOUNDARIES ARE TO BE CONFIRMED BY SURVEY.



SUN PATH DIAGRAM 21st JUNE.



SUN PATH DIAGRAM 22nd DECEMBER.

Harness Racing NEW SOUTH WALES

no.	description	date
C	ISSUED FOR CONSTRUCTION	20/03/17
B	GENERALLY AMENDED	13/03/17
A	PROPOSED LANDSCAPING AMENDED	06/09/16
	amendments	

project:
PROPOSED WAGGA HARNESS RACING CLUB FACILITY, AT LOTS 1-6 & 19-24 (DP 2655) COORAMIN STREET & HAMPDEN AV. CARTWRIGHTS HILL. N.S.W.

client:
HARNESS RACING N.S.W.

title:
PROPOSED SITE PLAN.

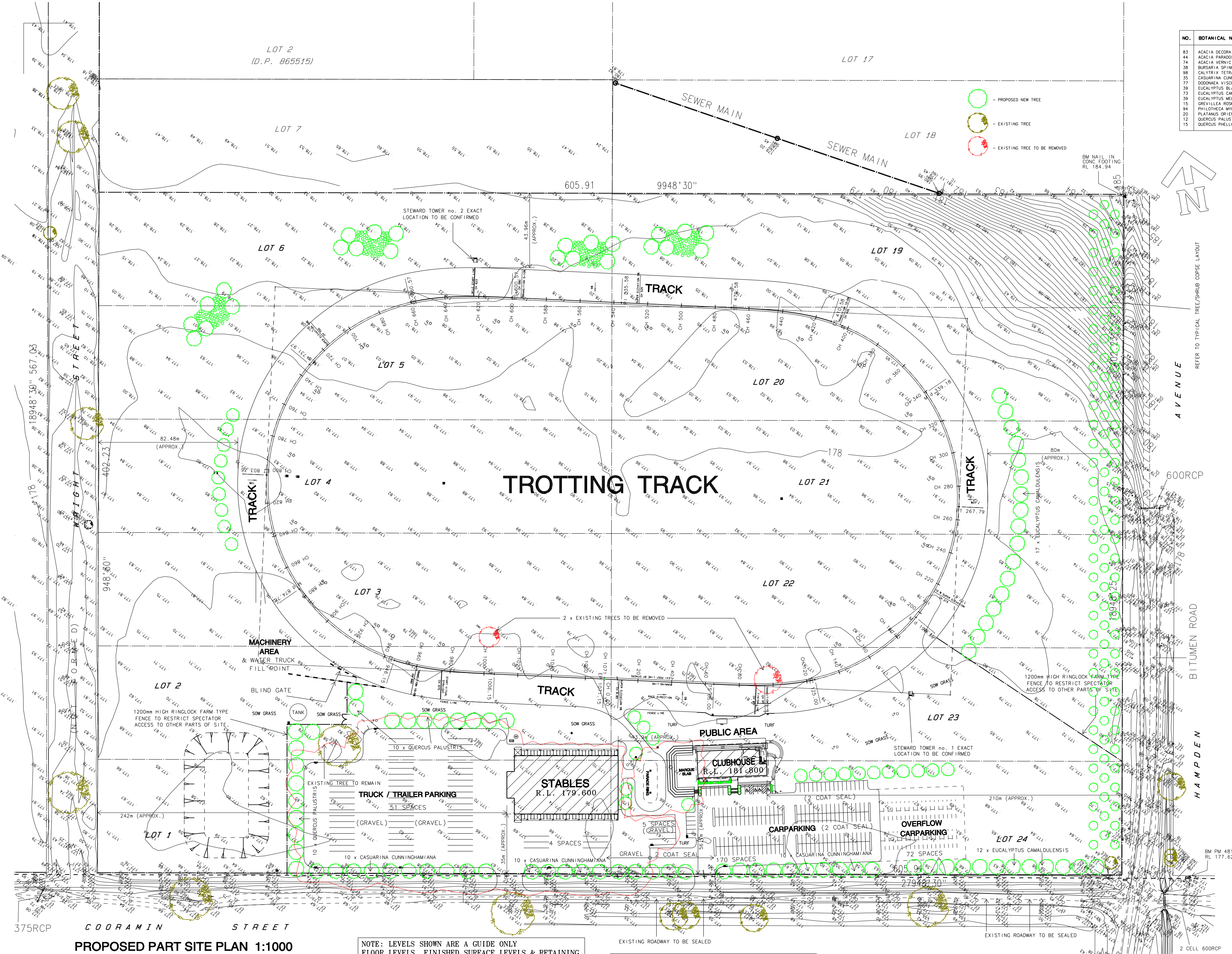
scale: AS NOTED

drawn: C.McK/L.B. date: MARCH.2016

162 KITE STREET,
PO BOX 1929 P 02 6363 1780
ORANGE NSW 2800 F 02 6362 8257

mckinnon design

job no: 13073
drg no: G3
issue: C



NO.	BOTANICAL NAME	COMMON NAME	CONTAINER SIZE
83	ACACIA DECORA	WESTERN GOLDEN WATTLE	TUBE
44	ACACIA PARADOXA	KANGAROO THORN	TUBE
74	ACACIA VERNICIFLUA	VARNISH WATTLE	TUBE
38	BURSARIA SPINOSA	BLACKTHORN	TUBE
98	CALYTRIX TETRAGONA	FRINGE MYRTLE	TUBE
35	CASUARINA CUNNINGHAMIANA	RIVER SHE OAK	TUBE
77	DODONAEA VISCOSA SSP. CUNEATA	HOP BUSH	TUBE
39	EUCALYPTUS BLAKELYI	BLAKELY'S RED GUM	TUBE
73	EUCALYPTUS CAMALDULENSIS	RED RIVER GUM	TUBE
39	EUCALYPTUS MELLIODORA	YELLOW BOX	TUBE
15	GREVILLEA ROSMARINIFOLIA	ROSEMARY GREVILLEA	TUBE
94	PHILOTHECA MYOPOROIDES	ERIOSTEMON	TUBE
20	PLATANUS ORIENTALIS 'DIGITATA'	CUT- LEAF PLAN TREE	300
12	QUERCUS PALUSTRIS	PIN OAK	300
15	QUERCUS PHELLOS	WILLOW OAK	300

- PROPOSED NEW TREE
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

SITE CALCULATIONS:

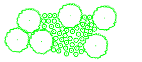
PROPOSED WAGGA HARNESS RACING PROPOSAL,
AT LOT'S 1-6 & LOT'S 19-24 (D.P. 2655)
COORAMIN STREET & HAMPDEN AVENUE,
CARTWRIGHTS HILL. N.S.W.

SITE AREA
LOT'S 1-6 & LOT'S 19-24 = 24.1612 ha

PROPOSED STABLES AREA = 2256.5m2
PROPOSED CLUB BUILDING AREA = 850.2m2
TOTAL BUILDING AREA = 3107.1m2

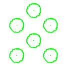
NOTES:

1-FLOOR LEVELS, STORMWATER & SEWAGE DESIGN BY CIVIL ENGINEER.
2-FLOOR LEVELS ARE A GUIDE ONLY & TO BE CONFIRMED BY CIVIL ENGINEER.
3-BOUNDARIES ARE TO BE CONFIRMED BY SURVEY.



TYPICAL TREE/SHRUB COPSE LAYOUT NOT TO SCALE

PLANTING OF COPSES OF TREE/SHRUB SPECIES (SETOUT AT 3.5 x 4m CENTRES). PLANT SHRUB SPECIES (S) IN GROUPS OF 3 TO 5 OF EACH SPECIES, ARRANGED RANDOMLY.
SPECIES:
6 x ACACIA DECORA (S)
6 x ACACIA VERNICIFLUA (S)
1 x CASUARINA CUNNINGHAMIANA
12 x CALYTRIX TETRAGONA (S)
12 x DODONAEA VISCOSA SSP. CUNEATA (S)
3 x EUCALYPTUS CAMALDULENSIS
2 x EUCALYPTUS MELLIODORA
12 x PHILOTHECA MYOPOROIDES (S)



TYPICAL HAMPDEN AVENUE BOUNDARY PLANTING LAYOUT NOT TO SCALE

SCREEN PLANTING OF TREE/SHRUB SPECIES (SETOUT AT 3.5 x 4m CENTRES). PLANT IN GROUPS OF 3 TO 5 OF EACH SPECIES, ARRANGED RANDOMLY.
SPECIES:
44 x ACACIA DECORA
44 x ACACIA PARADOXA
44 x ACACIA VERNICIFLUA
38 x BURSARIA SPINOSA
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29 x EUCALYPTUS MELLIODORA
15 x GREVILLEA ROSMARINIFOLIA
15 x PHILOTHECA MYOPOROIDES

Harness Racing
NEW SOUTH WALES

no.	description	date
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A	LANDSCAPING AMENDED	06/09/2016
	amendments	

project:
PROPOSED WAGGA HARNESS RACING CLUB FACILITY,
AT LOTS 1-6 & 19-24 (DP 2655)
COORAMIN STREET & HAMPDEN AV.
CARTWRIGHTS HILL. N.S.W.

client:
HARNESS RACING N.S.W.

title:
PROPOSED PART SITE PLAN.

scale: AS NOTED
drawn: C.McK/L.B. date: MARCH.2016

162 KITE STREET,
PO BOX 1929 P 02 6363 1780
ORANGE NSW 2800 F 02 6362 8257
mckinnon design

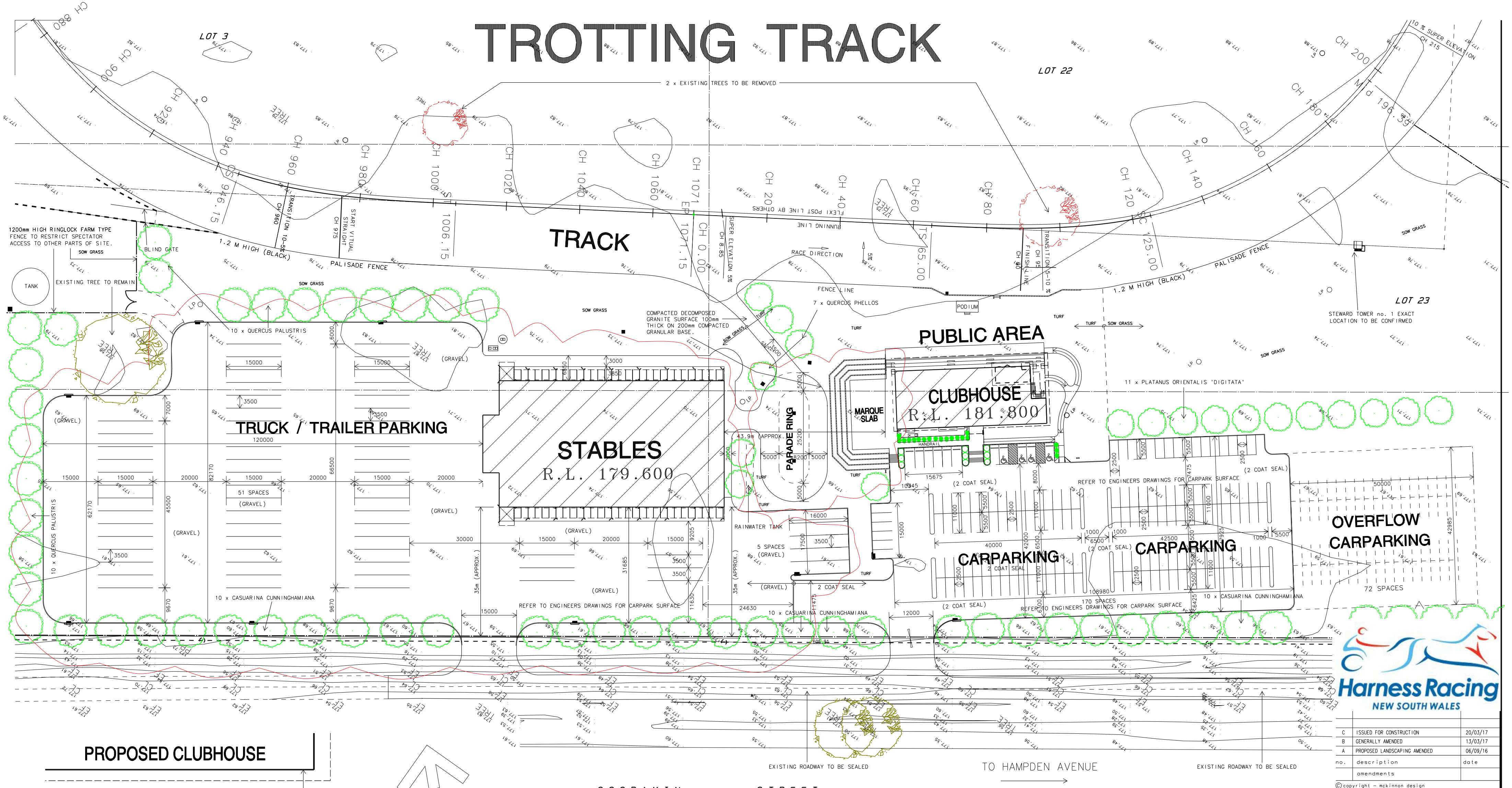
job no: 13073
drg no: G4
issue: C

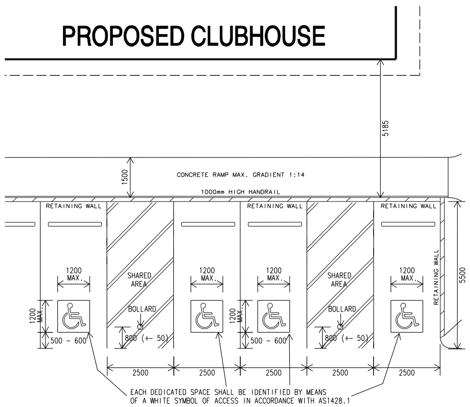
PROPOSED PART SITE PLAN 1:1000

NOTE: LEVELS SHOWN ARE A GUIDE ONLY
FLOOR LEVELS, FINISHED SURFACE LEVELS & RETAINING
WALLS TO BE CONFIRMED WITH CIVIL ENGINEERS DESIGN

NOTE: EXISTING SITE PLAN FROM DETAIL SURVEY PROVIDED
BY CRAIG JAQUES & ASSOC. LAND SURVEYING CONSULTANTS

$\Box_o$ - DENOTES APPROX. LOCATION OF LIGHT POSTS. REFER TO ENGINEERS DETAILS





ACCESSIBLE CARPARK DETAIL 1:100

PROPOSED PART SITE PLAN 1:500

LP ○ - DENOTES APPROX. LOCATION OF LIGHT POSTS, REFER TO ENGINEERS DETAILS

NOTE: LEVELS SHOWN ARE A GUIDE ONLY
FLOOR LEVELS, FINISHED SURFACE LEVELS & RETAINING WALLS TO BE CONFIRMED WITH CIVIL ENGINEERS DESIGN

NOTE: EXISTING SITE PLAN FROM DETAIL SURVEY PROVIDED BY CRAIG JAQUES & ASSOC. LAND SURVEYING CONSULTANTS

- PROPOSED NEW TREE
- EXISTING TREE
- EXISTING TREE TO BE REMOVED

LANDSCAPING SPECIFICATION:

ALL GARDEN BEDS TO BE EDGED WITH BRICK, HARDWOOD OR CONCRETE EDGING TO PROVIDE MOWING STRIPS.

LAWN AREAS TO BE TURFED OR SOWN. (AS INDICATED)

THESE AREAS TO BE PROPERLY PREPARED WITH 150mm MIN. TOPSOIL DEPTH.

TURFING : (TURF)

OBTAIN TURF FROM A SPECIALIST LOCAL GROWER OF CULTIVATED TURF. TURF TO BE LAID, FERTILISED & WATERED AS SPECIFIED BY SUPPLIER. INSTALL WATERING SYSTEM TO ENSURE PROPER WATERING WITH ECONOMICAL WATER USAGE. IRRIGATION TO TURFED AREA ONLY.

SOWING : (GRASS)

PROVIDE LAWN SEED MIXTURE SUITABLE FOR LOCAL CLIMATE. SOW SEED AS RECOMMENDED BY SUPPLIER. WATER & FERTILISE IN AN APPROVED MANNER. ENSURE WATER UP UNTIL ESTABLISHED.

GARDEN BEDS :

GARDEN BEDS TO BE FILLED WITH 200mm MIN. OF GOOD QUALITY TOPSOIL. PROIR TO INSTALLATION OF TOPSOIL, GROUND TO BE RIPPED TO MIN.DEPTH OF 300mm.
SPECIFIED PLANTS AND GROUND COVERS TO BE PLANTED IN GARDEN BEDS.
BEDS TO BE MULCHED WITH GOOD QUALITY SHREDDED MULCH.
INSTALL SUBSURFACE WATERING SYSTEM FOR MINIMAL WATER USAGE.

SELECTED EDGING TO GARDEN BEDS

MULCH :

MULCH APPLIED TO GARDEN BEDS TO BE MIN.DEPTH OF 85mm.
MULCH TO BE OF GOOD QUALITY ORGANIC MATERIAL.

TREE & PLANT PLANTING :

EXCAVATE PLANT HOLES LARGE ENOUGH TO ACCEPT ROOT BALLS & 0.1m3 OF BACKFILLING WITH TOPSOIL.
THOROUGHLY WATER THE PLANTS BEFORE & IMMEDIATELY AFTER PLANTING AND AS REQUIRED TO MAINTAIN GROWTH GROWTH RATES FREE OF STRESS.
USE SUITABLE PLANT FERTILISER AROUND PLANTS AT TIME OF PLANTING.

STAKING OF PLANTS & TREES :

INSTALL HARDWOOD STAKES DRIVEN INTO THE GROUND AT LEAST 1/3 THEIR LENGTH. AVOID ROOT DAMAGE DURING INSTALLATION.

STAKE SIZES:
FOR PLANTS ≥ 2.5m HIGH : THREE 50 x 50 x 2.4m STAKES PER PLANT
FOR PLANTS 1– 2.5m HIGH : TWO 50 x 50 x 1.8m STAKES PER PLANT
FOR PLANTS < 1.0m HIGH : ONE 38 x 38 x 1.2m STAKES PER PLANT

TIE PLANTS TO STAKES WITH APPROVED TIES DESIGNED NOT TO DAMAGE PLANT OR TREE.

COMPLETION :

THROUGHOUT THE PLANTING & ESTABLISHMENT PERIOD, CARRY OUT MAINTAINENCE WORK INCLUDING WATERING, MOWING, RUBBISH REMOVAL, FERTILISING, PEST & DISEASE CONTROL, RE-SEEDING, RE-TURFING, STAKING & TYING, CULTIVATING, PRUNING, REINSTATEMENT OF MULCH, TOP DRESSING & KEEPING SITE NEAT & TIDY.
CONTINUE TO REPLACE FAILED, DAMAGED OR STOLEN PLANTS.

no.	description	date
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A	PROPOSED LANDSCAPING AMENDED	06/09/16

amendments

project:
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AT LOTS 1-6 & 19-24 (DP 2655)
COORAMIN STREET & HAMPDEN AV.
CARTWRIGHTS HILL. N.S.W.

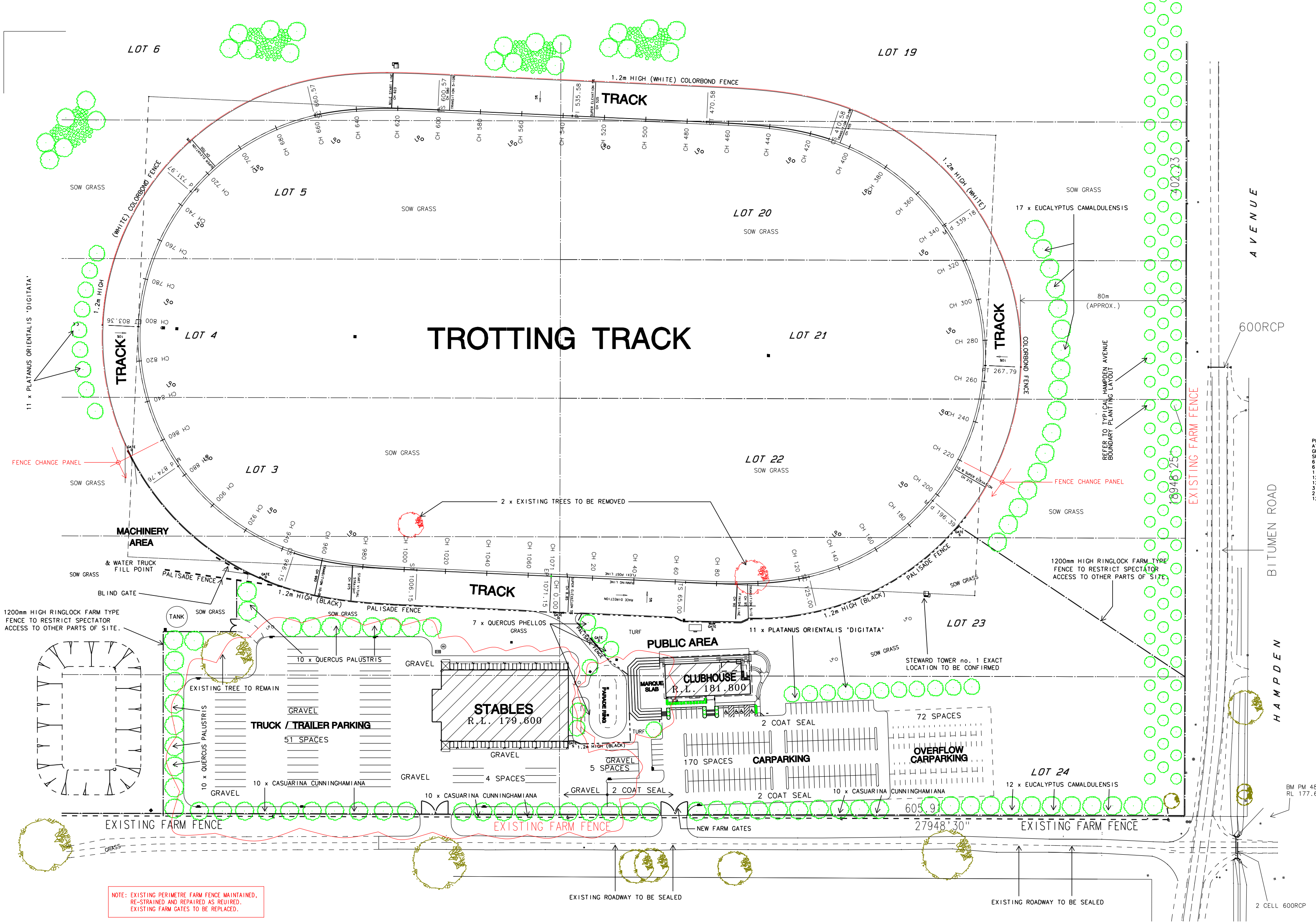
client:
HARNESS RACING N.S.W.

title:
PROPOSED PART SITE PLAN.

scale: AS NOTED
drawn: C.McK/L.B. date: MARCH.2016

162 KITE STREET,
PO BOX 1929 P 02 6363 1780
ORANGE NSW 2800 F 02 6362 8257
mckinnon design

job no: 13073
drg no: G5
issue: C



FENCE PLAN 1:1000

LPo – DENOTES APPROX. LOCATION OF LIGHT POSTS, REFER TO ENGINEERS DETAILS

NO.	BOTANICAL NAME	COMMON NAME	CONTAINER SIZE
83	ACACIA DECORA	WESTERN GOLDEN WATTLE	TUBE
44	ACACIA PARADOXA	KANGAROO THORN	TUBE
74	ACACIA VERNICIFLUA	VARNISH WATTLE	TUBE
38	BURSARIA SPINOSA	BLACKTHORN	TUBE
98	CALYTRIX TETRAGONA	FRINGE MYRTLE	TUBE
35	CASUARINA CUNNINGHAMIANA	RIVER SHE OAK	TUBE
77	DODONAEA VISCOSA SSP. CUNEATA	HOP BUSH	TUBE
39	EUCALYPTUS BLAKELYI	BLAKELY'S RED GUM	TUBE
73	EUCALYPTUS CAMALDULENSIS	RED RIVER GUM	TUBE
39	EUCALYPTUS MELLIODORA	YELLOW BOX	TUBE
15	GREVILLEA ROSMARINIFOLIA	ROSEMARY GREVILLEA	TUBE
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12	QUERCUS PALUSTRIS	PIN OAK	300
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– PROPOSED NEW TREE
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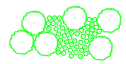

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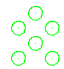

TYPICAL HAMPDEN AVENUE BOUNDARY PLANTING LAYOUT NOT TO SCALE

SCREEN PLANTING OF TREE/SHRUB SPECIES (SETOUT AT 3.5 x 4m CENTRES). PLANT IN GROUPS OF 3 TO 5 OF EACH SPECIES, ARRANGED RANDOMLY.
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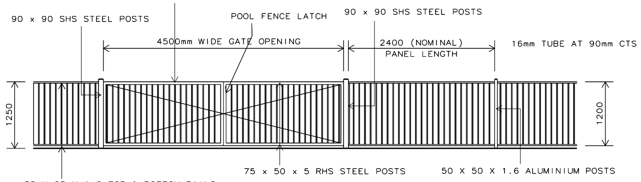
29 x EUCALYPTUS CAMALDULENSIS
29 x EUCALYPTUS MELLIODORA
15 x GREVILLEA ROSMARINIFOLIA
15 x PHILOTHECA MYOPOROIDES

GENERAL NOTES:

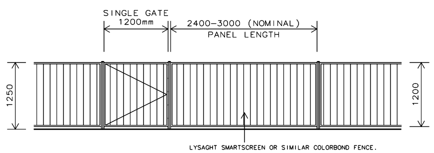
1 – All dimension shown in millimeters unless noted otherwise.
2 – DO NOT SCALE from drawing. If in doubt ask.
3 – All dimension and levels are to be confirmed on site prior to construction.
4 – Concrete slab & footings to be designed in accordance with AUSTRALIA STANDARD 2870.
5 – All structural elements to be designed by a practicing structural engineer.
6 – All timber used in the building shall be strictly in accordance with the provisions of AUSTRALIAN STANDARD 1684, NATIONAL TIMBER FRAMING CODE, unless a certificate from a practicing structural engineer is submitted to council certifying that the building has been designed to withstand the most adverse combination of loads to which it will be subjected.
7 – Construction of any stairways and balustrades shall comply with the requirements of the BUILDING CODE OF AUSTRALIA.
8 – All plumbing and drainage work is to comply with the requirements of AUSTRALIAN STANDARD 3500-NATIONAL PLUMBING AND DRAINAGE CODE and THE NEW SOUTH WALES CODE OF PRACTICE PLUMBING AND DRAINAGE.
9 – Protection of the building from attack by termites is to be carried out in accordance with the provisions of THE BUILDING CODE of AUSTRALIA and or AUSTRALIAN STANDARD 3660.1 PROTECTION OF BUILDINGS FROM SUBTERRANEAN TERMITES.

NOTE: 4500mm WIDE GATE TO HAVE 90 X 90 SHS STEEL POSTS
2 x GATES FRAMED WITH 75 X 50 X 5 RHS WITH 16mm TUBE
SPACED AT 90MM TO MATCH FENCE.
POWDER COAT GATES AND POSTS TOP MATCH FENCE.



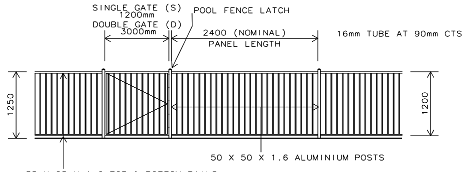
FLAT TOP PALISADE FENCING DETAIL 1:50

FINISH – BLACK POWDERCOAT COLORBOND



COLORBOND STEEL FENCE DETAIL 1:50

FINISH – WHITE COLORBOND
SHOWN ON PLAN –



FLAT TOP PALISADE FENCING DETAIL 1:50

FINISH – BLACK POWDERCOAT COLORBOND

Harness Racing NEW SOUTH WALES

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CARTWRIGHTS HILL. N.S.W.

client:
HARNESS RACING N.S.W.

title:
LANDSCAPING & FENCE PLAN.

scale: AS NOTED
drawn: C.McK/L.B. date: MARCH.2016

162 KITE STREET,
PO BOX 1929 P 02 6363 1780
ORANGE NSW 2800 F 02 6362 8257
mckinnon design

job no: 13073
drg no: G6
issue: C

Appendix B

APPENDIX B

Design drawings for the proposed Harness Racing Track (Appendix A, Drawing G6) identifies the proposed fencing to be utilised around the track. The drawings identify two types of fencing to be used:

- Palisade fencing around along the south side of the track; and
- Colorbond Steel fencing around the remainder of the track.

The location of both the palisade fencing (yellow) and the Colorbond Steel fencing (red) are shown in Image 1 below.

Image 1: Location of Fencing

The design of these fences have a different blockage effect on the flow of flood waters. The proposed palisade fence is a semi-open design that is roughly 80% clear. The proposed colorbond steel fence is a solid fence design which is 100% blocked, although there is a small gap underneath the fence which allows some water to flow through.

Both fences have been modelled for this assessment as constrictions. The proposed palisade fence has been modelled as having a constant 1.2 m height with a constant blockage factor of 20%. The colorbond fence has been modelled with a bottom gap (of 0.1 m) that is unblocked before a constant 1.2 m height that is fully blocked. This is shown in Image 2 below.

Image 2: Colorbond Fence Blockage