Light Horse Interchange Business Hub [SSD 9667]- Flood Assessment

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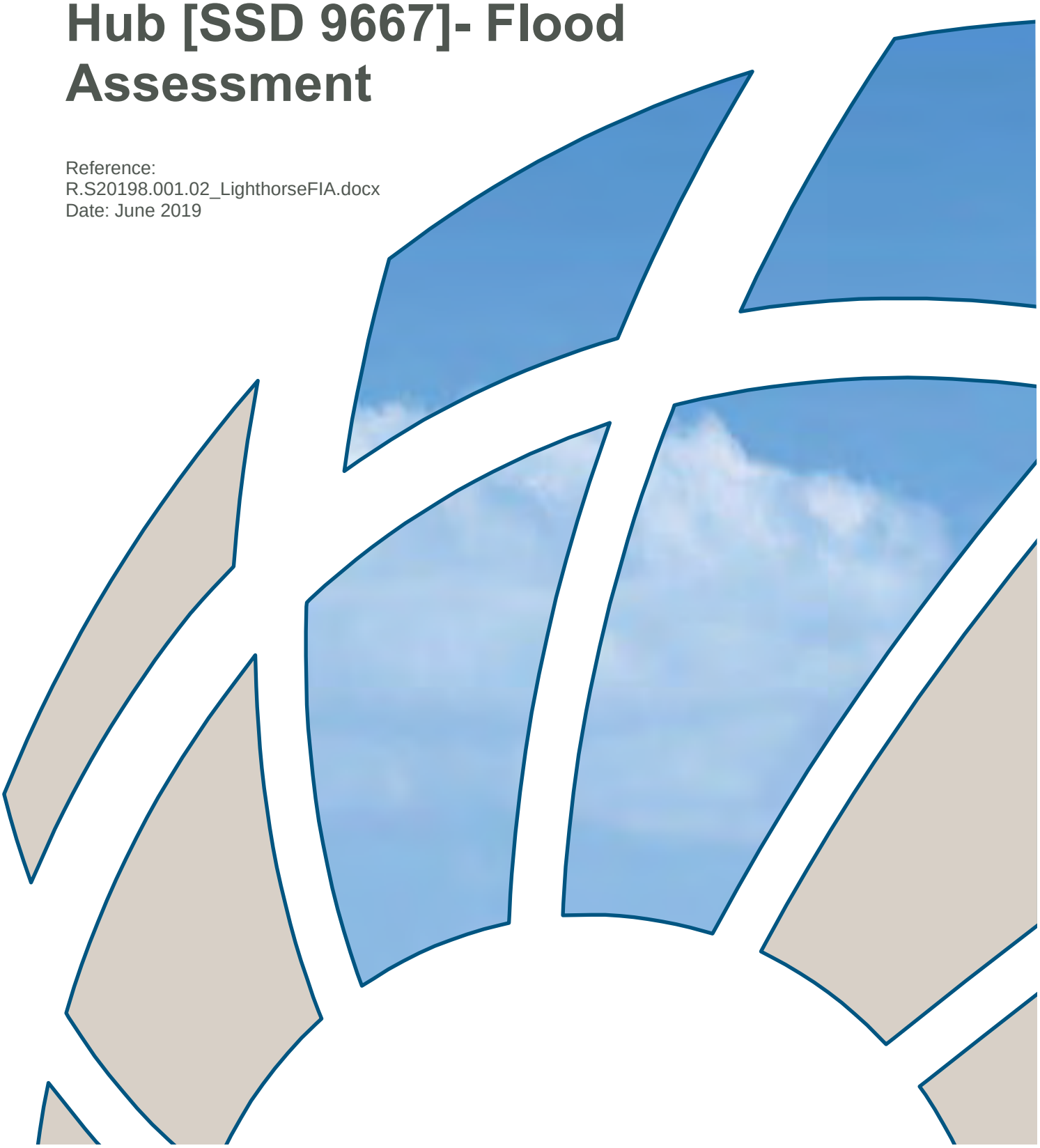
Date: June 2019



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Synopsis: Flood Impact Assessment for Proposed Light Horse Interchange Business Hub

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1 Introduction

This Flood Assessment Report has been commissioned by Western Sydney Parklands Trust to support preparation of an Environmental Impact Statement (EIS) for the proposed Light Horse Interchange Business Hub (referred herein as the Site).

The Site incorporates:

- Part of Lot 10 DP 1061237 (165 Wallgrove Road, Eastern Creek); and
- Part of Lot 5 DP 804051 (475 Ferrers Road, Eastern Creek).

The proposed development incorporates:

- a concept proposal for the staged redevelopment of the Site as an industrial business hub with approximately 157,000 sqm of industrial and light industrial floorspace and 8,000 sqm ancillary office floorspace
- detailed proposal for the first stage of development which will include demolition works, bulk earthworks, installation of infrastructure and subdivision of the Site.

General layout/configuration of the proposed development is included in Appendix A.

The objectives of the flood assessment are to respond to the Secretary's Environmental Assessment Requirements (SEARs SSD9667) incorporating:

- *a comprehensive assessment of the impact of flooding on the development for the full range of flood events up to the probable maximum flood. This assessment should address any relevant provisions of the NSW Floodplain Development Manual (2005) including the potential effects of climate change, sea level rise and an increase in rainfall intensity*
- *consideration of current flooding behaviour and impacts, including on flood detention areas, how flood behaviour and impacts will change due to the proposal and how these changes will be mitigated*
- *assessment of the impact of the development on flood behaviour (i.e., levels, velocities and duration of flooding) and on adjacent, downstream and upstream areas*
- *detail an emergency response plan for the site, which includes consideration of a flood-free access to or from the development site in extreme flood events.*

1.1 Site Location

The Site is located in Eastern Creek immediately south of the M4 Western Motorway and east of the Westlink M7 Motorway as shown in Figure 1-1 and located within the Blacktown Local Government Area (LGA). Neighbouring development includes industrial estates to the west and south-west off Wallgrove Road and to the north-east off the Great Western Highway. The Sydney Motorsport Park is adjacent the eastern boundary of the Site.

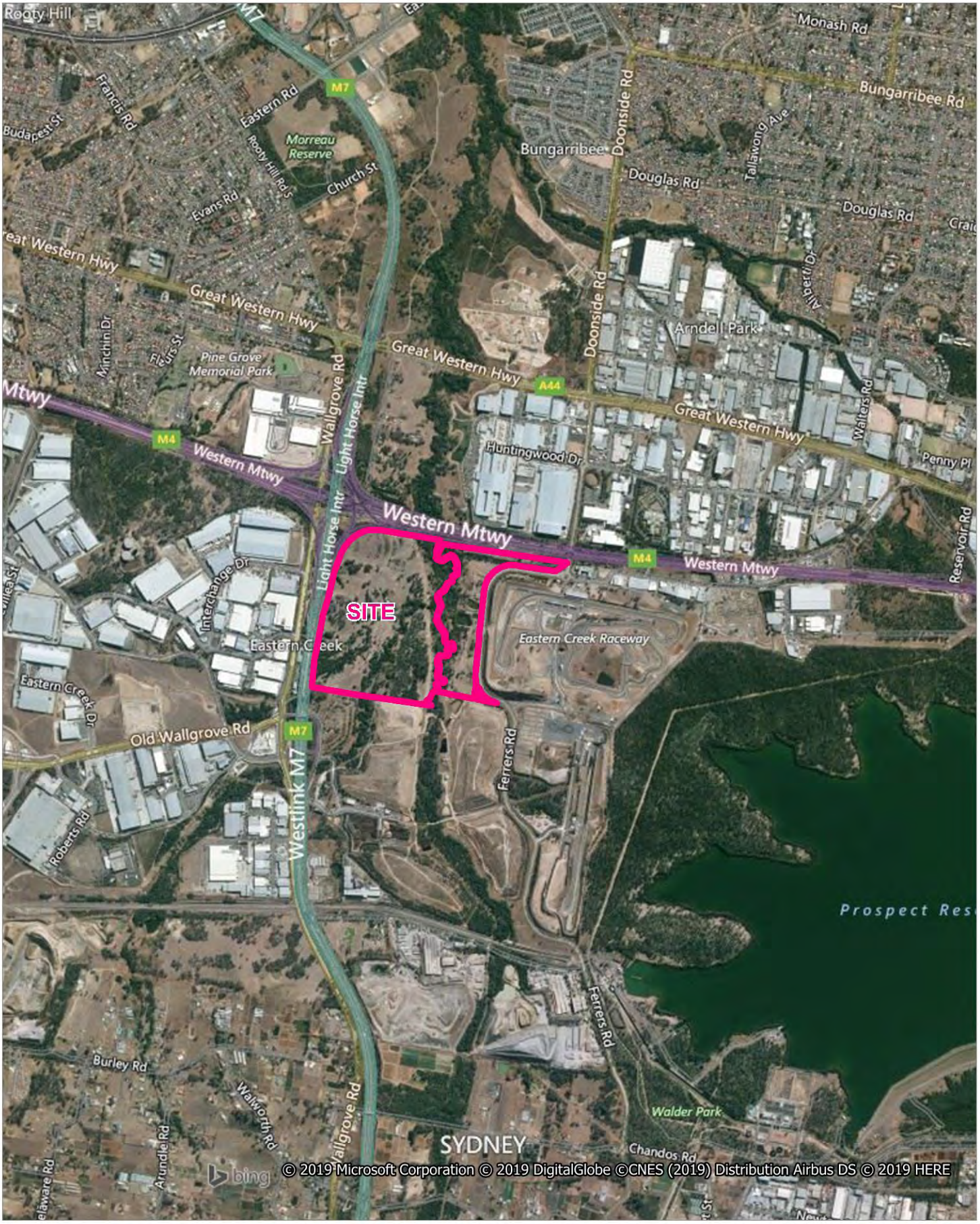
The Site is located within the floodplain of Eastern Creek, with the main creek alignment itself dissecting the Site. Eastern Creek to the M4 Western Motorway has a catchment area of

approximately 25 km^2. This area includes the tributary catchments of Reedy Creek and Eskdale Creek. Figure 1-2 shows the extent of the upstream catchment and topography.

1.2 Existing Flood Information

The Site is located in a known floodplain area of Eastern Creek. Blacktown City Council (Council) provides indicative existing flood inundation extents through its Flood Risk Precinct mapping (http://maps.blacktown.nsw.gov.au/) as shown in Figure 1-3. The Flood Risk Precincts are defined as:

- The **High Flood Risk Precinct** is the land subject to a high hydraulic hazard in a 100 year flood event and/or subject to potential evacuation difficulties during a flood
- The **Medium Flood Risk Precinct** is the land below the 100 year flood level subject to a low hydraulic hazard
- The **Low Flood Risk Precinct** is all land within the floodplain, ie within the extent of the Probable Maximum Flood (PMF) but not identified as either a high flood risk or medium flood risk precinct. Therefore the Low Flood Risk Precinct is all the land between the 100 year and the PMF flood extents



Title:
Site Locality

Figure: **1-1**

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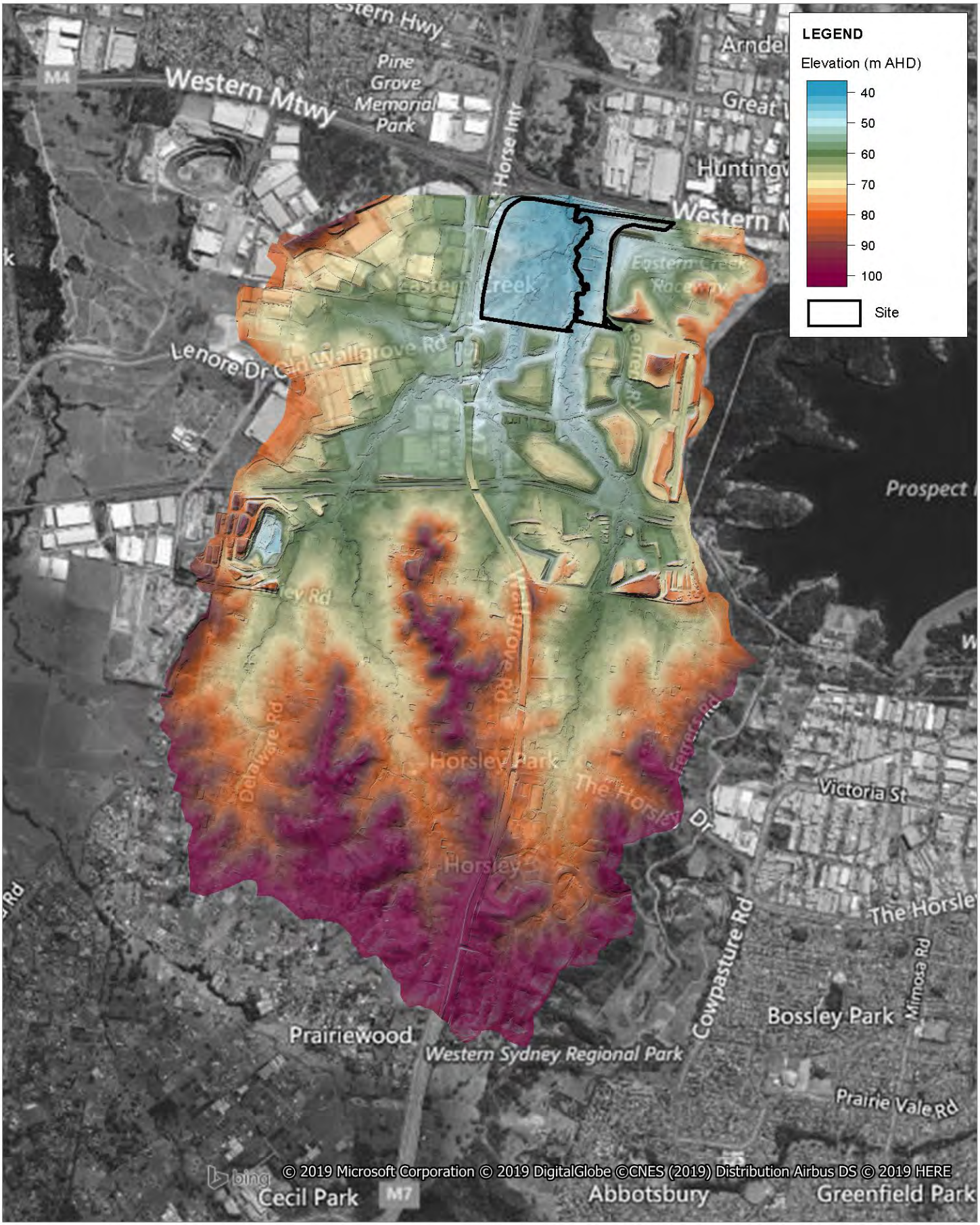

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Eastern Creek Catchment

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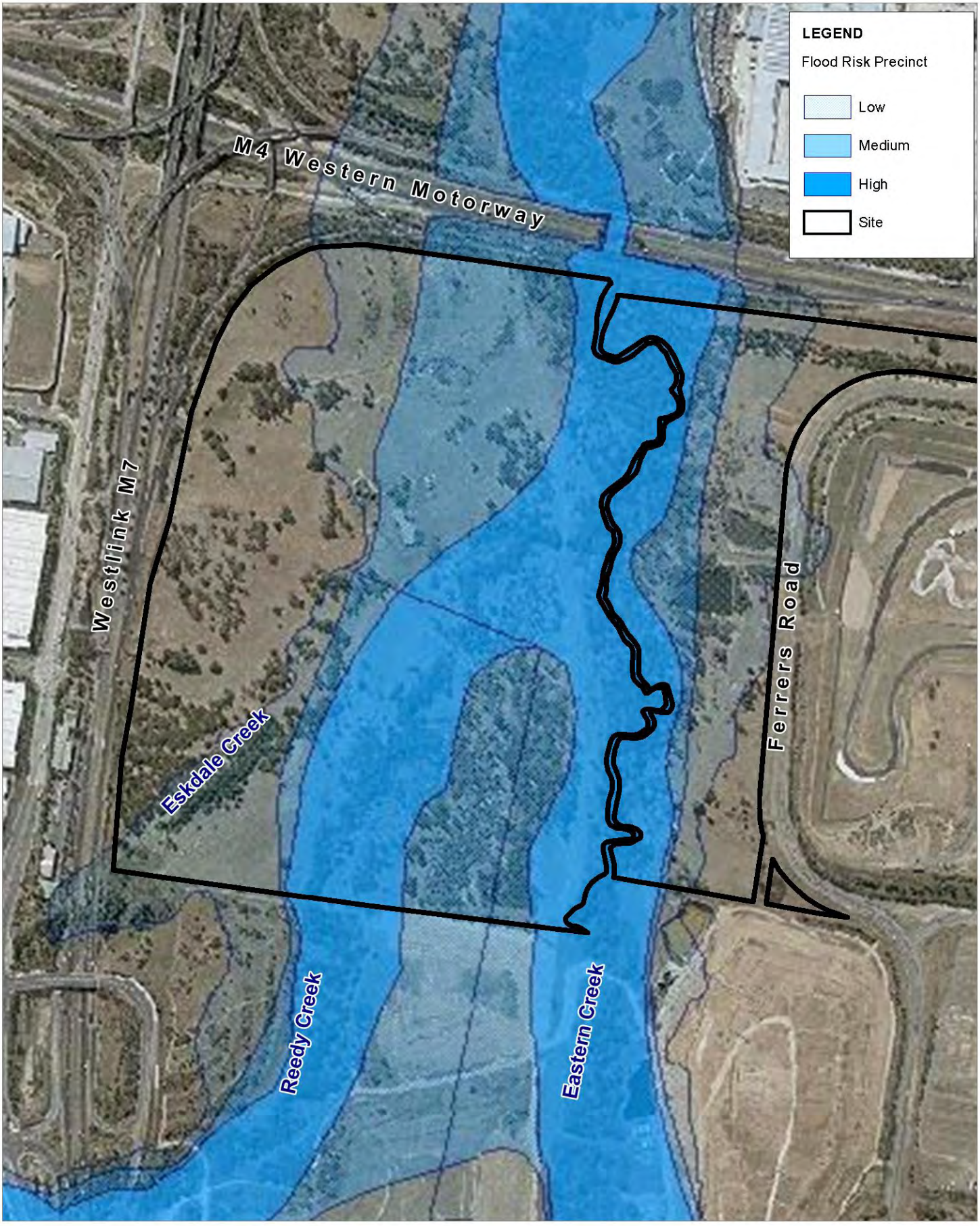

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Flood Risk Precincts (Blacktown City Council)

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2 Design Flood Conditions

A primary objective of the Flood Assessment is to define the existing flood behaviour within the study area through the establishment of appropriate numerical models. The models are then utilised to assess the relative impact on existing flood behaviour of potential development associated with the proposed development.

For this study a TUFLOW two-dimensional (2D) hydraulic model of the study area (comprising the local reaches of Eastern Creek and relevant tributaries) has been developed. The model provides a detailed representation of local flow behaviour at the development site and adjacent property within the floodplain. The following sections provide further detail on the model development.

2.1 Blacktown City Council Data

It is understood that Council has undertaken a flood study of Eastern Creek encompassing the Site area. However, the flood study and supporting models are not available for use in the current assessment.

Council has provided design inflow information for the 1% Annual Exceedance Probability (AEP) for the local catchments of the Site. This information is included in Appendix B.

2.2 Hydraulic Model Development

2.2.1 General Configuration

Extent and Layout

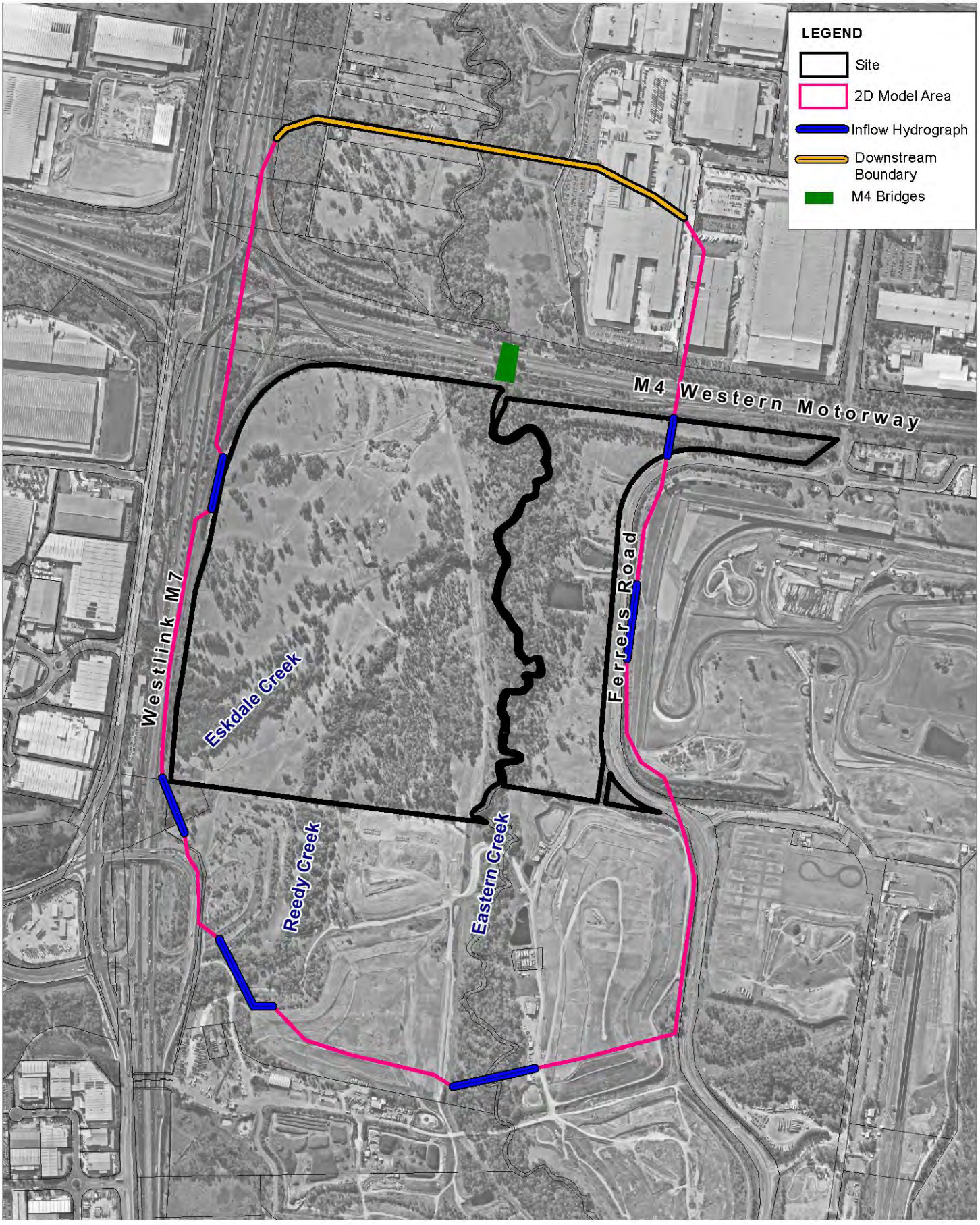
The adopted extent of the hydraulic model is shown in Figure 2-3 and extends approximately 0.6km upstream of the Site (incorporating the main tributary inflows of Eastern Creek, Reedy Creek and Eskdale Creek).

The upstream model boundary extents coincides with the key tributary inflow locations provided Council as noted in Section 2.1. The downstream model boundary is located approximately 0.5km downstream of the M4 Western Motorway.

Topography

Detailed ground survey by Boxall Surveyors was provided for the assessments. The extent of survey is shown in Appendix C. A digital elevation model (DEM) was derived from the ground survey points. The local survey was supplemented with LiDAR data from NSW Government Spatial Services, covering the Penrith region that's was captured in 2011.

The topography of the local area incorporating the Site is therefore represented by a high-resolution DEM as shown in Figure 1-3 provides. The ground surface elevation for the TUFLOW model is sampled directly from the DEM. A TUFLOW 2D domain resolution of 2m was adopted for the study area. It should be noted that TUFLOW samples elevation points at cell centres, mid-sides and corners, so a 2m cell size results in elevations being sampled from the underlying DEM every 1m. This resolution provides the detail required for accurate representation of the catchment topography and waterway alignments.



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TUFLOW Model Configuration

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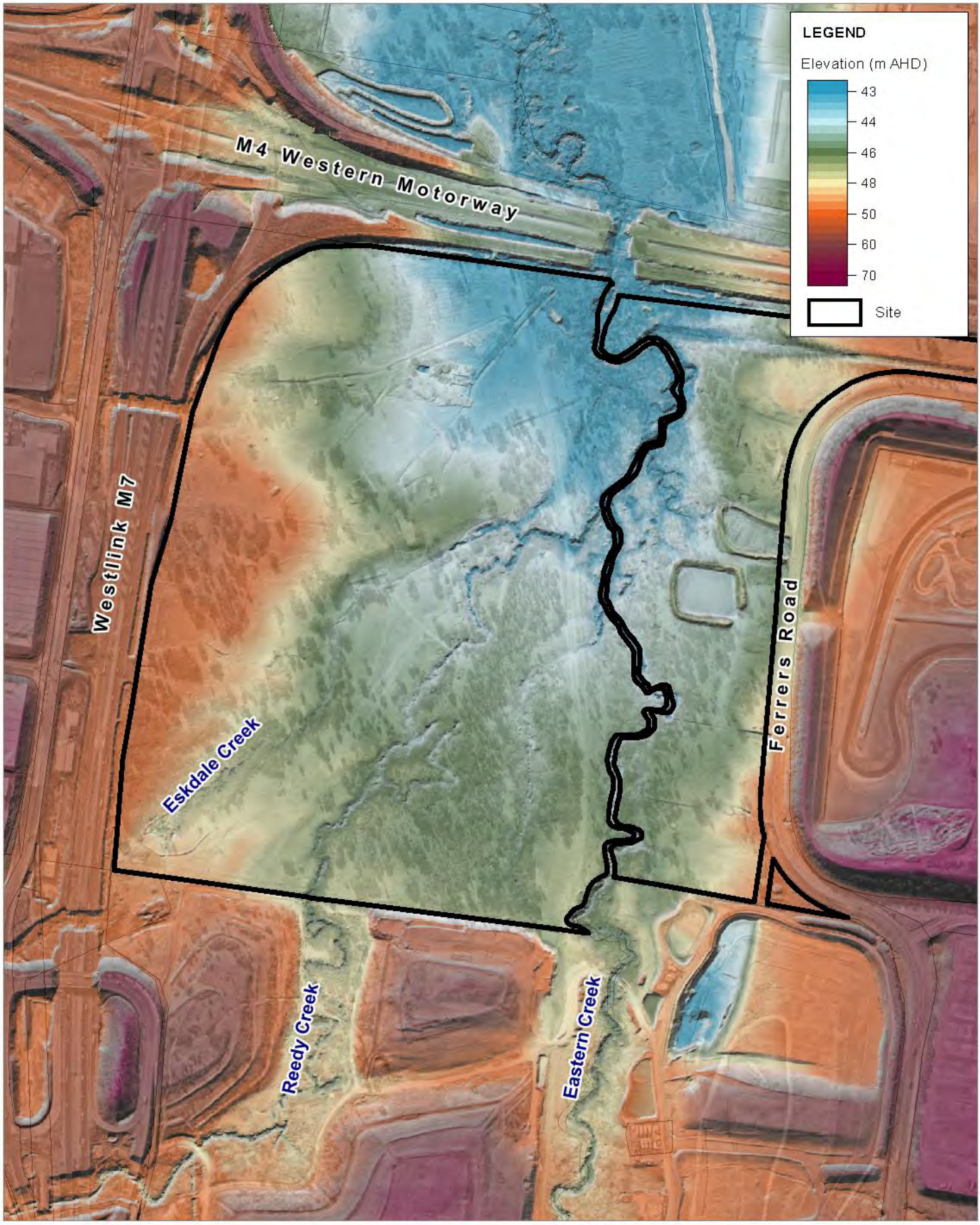

Title:
Local Topography

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Structures

The M4 Western Motorway embankment associated bridge structures over the Eastern Creek alignment represent the key hydraulic structures for representation in the model. The elevated road embankments and bridge approaches are intrinsically represented in the high-resolution model DEM. The waterway openings are represented as layered flow constrictions within the 2-D model domain, incorporating the influence of the bridge deck and pier arrangements.

Hydraulic Roughness

The development of the TUFLOW model requires the assignment of different hydraulic roughness zones. These zones are delineated from aerial photography and cadastral data identifying different land-uses (e.g. vegetated floodplain, cleared land, roads, etc.) for modelling the variation in flow resistance.

The roughness values (Manning's 'n') adopted in the hydraulic model for various land surface types are summarised in Table 2-1.

Table 2-1 Adopted Hydraulic Roughness Coefficients

Land Use / Surface Type	Manning's 'n' Value
Creek channel	0.060
Cleared floodplain	0.050
Riparian corridors / dense vegetation	0.090
Roads / impervious areas	0.020
Water body/dams	0.025

Boundary Conditions

The model boundary conditions for catchment flooding were derived as follows:

- Local catchment Inflows- the rainfall runoff hydrographs at major sub-catchment inflow points and along the modelled reach of Eastern Creek and tributary waterways.
- Downstream Boundary – an open flow boundary is applied at the downstream model limit on Eastern Creek. The boundary is located a sufficient distance downstream of the proposed development areas such that it has no influence on existing or post-development model results for the study area.

2.3 Design Flows

As noted in Section 2.1, BMT were provided with 1% AEP inflow hydrograph information for the study area derived from Council's XP-Rafts base model for Eastern Creek. To enable consistency with existing Council flood mapping, the design inflows from Council base model has been applied in the current assessment.

Figure 2-3 shows the 1% AEP inflow hydrographs for the main catchment inflows of Eastern Creek, Reedy Creek and Eskdale Creek to the study area. Other smaller sub catchment inflows within the study area (as per Appendix B) were also incorporated into the modelled design inflow conditions.

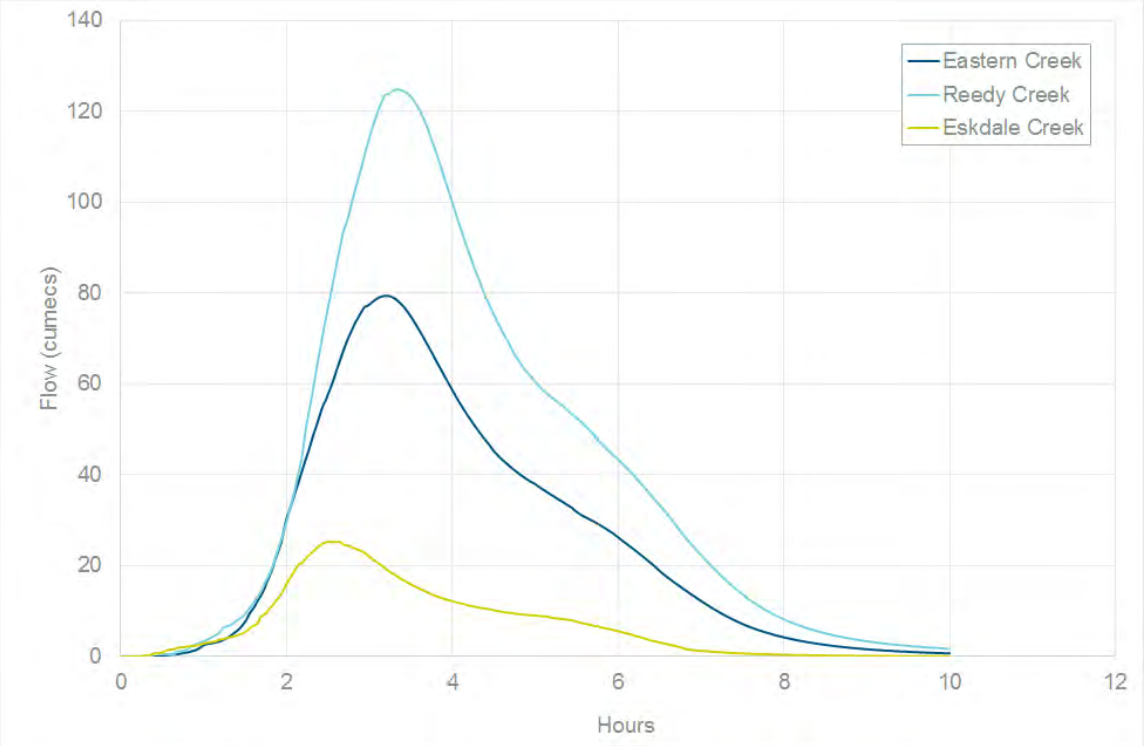


Figure 2-3 Design 1% AEP Inflows

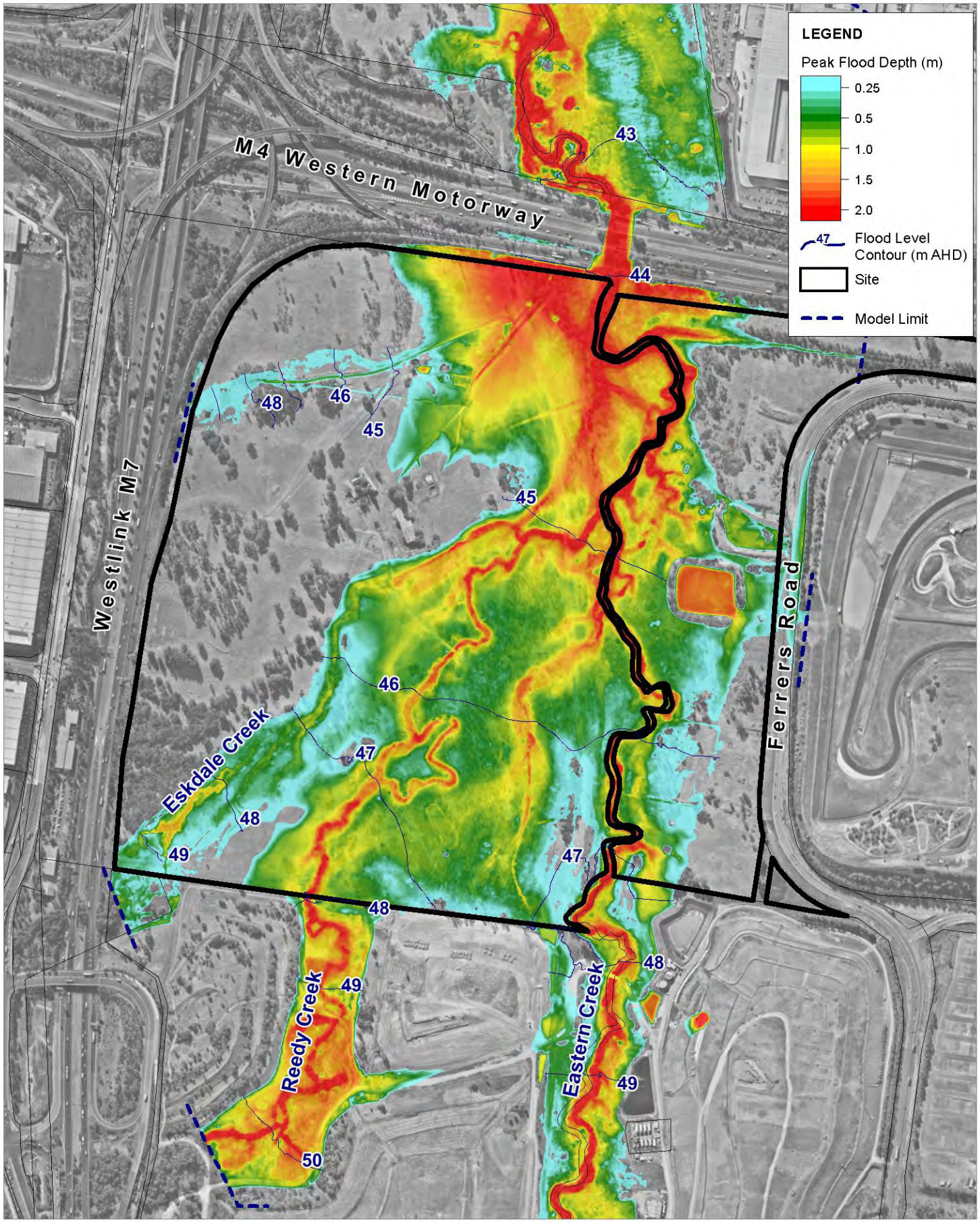
The Probable Maximum Flood or Extreme Flood Event is generally considered in flood risk assessments from an emergency management perspective. Corresponding design flows from Council's existing studies were not provided for the current assessment. In lieu of this information, an Extreme Event condition has been simulated on inflows derived from three times the magnitude of the 1% AEP design flows (3 x 1% AEP).

2.4 Design Flood Results

The simulated peak flood depths and inundation extents in the vicinity of the proposed development are shown in Figure 2-4 and Figure 2-5 for existing local catchment 1% AEP and Extreme Event design flood events respectively.

Flows from each of the principal tributaries of Eastern Creek, Reedy Creek and Eskdale Creek combine within the Site to provide for extensive area of flood inundation. It is evident that the existing M4 Western Motorway embankment provides a significant control on the flood behaviour with flood water backing up behind the elevated embankment. Conveyance of flood flow downstream of the M4 Western Motorway in the 1% AEP event is restricted to the waterway openings of the bridges. No overtopping of the M4 Western Motorway occurs at the 1% AEP design level.

The general pattern of flooding for the Extreme Event is similar to the 1% AEP condition albeit with greater depths and extents of inundation. The floodplain inundation is still contained largely on Site between the Westlink M7 and Ferrers Road.



Title:

1% AEP Existing Design Flood Conditions

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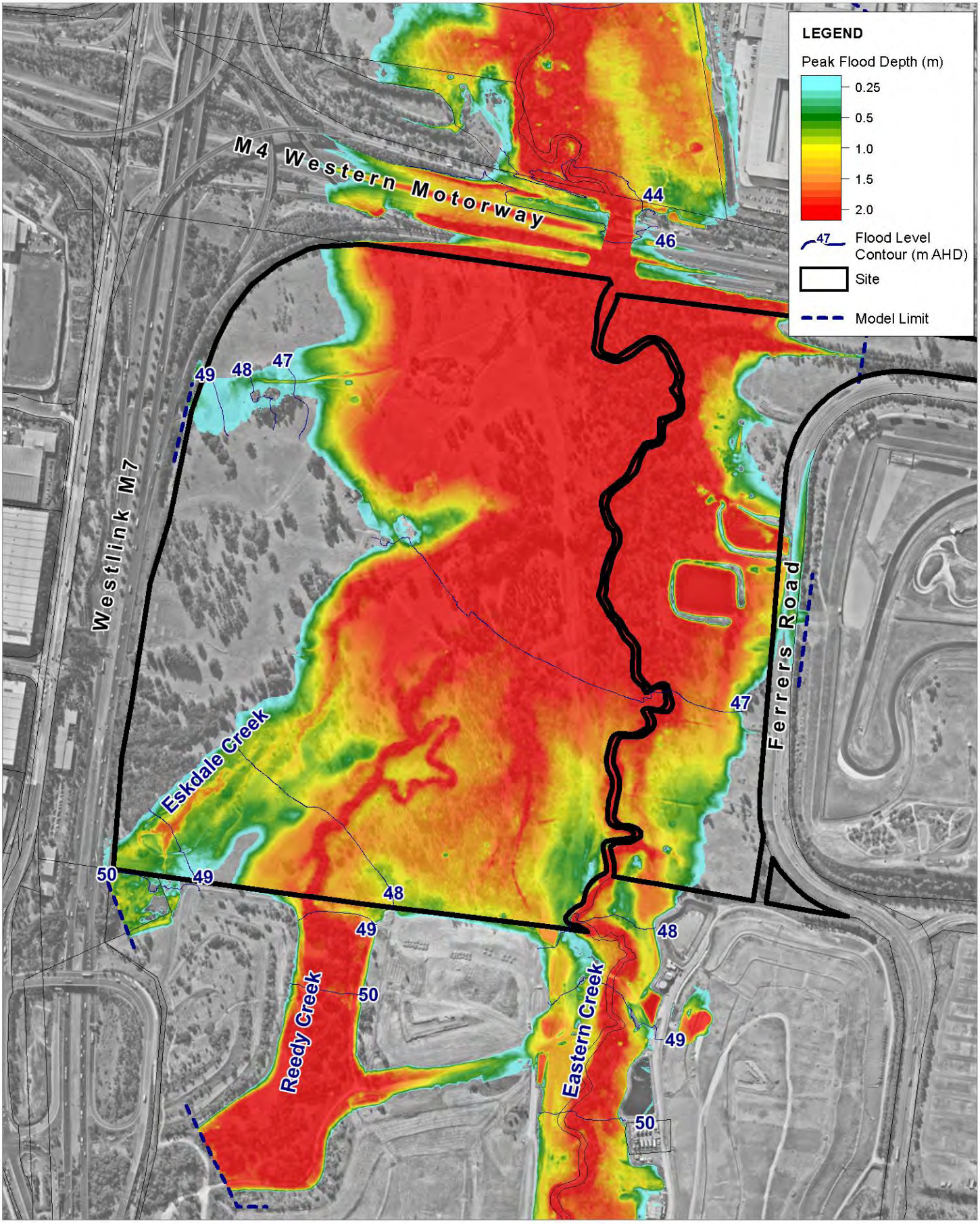

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Extreme Event Existing Design Flood Conditions

Figure: 2-5

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Under the extreme event condition, the M4 Western Motorway is overtopped, with significant depths of inundation over the road carriageways.

2.5 Flood Hazard Categories

The Flood Hazard Guideline 7-3 of the Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR, 2017) represents the current industry best practice with regards to defining flood hazard. The guideline considers a holistic approach to consider flood hazards to people, vehicles and structures. It recommends a composite six-tiered hazard classification, reproduced in Figure 2-6. The six hazard classifications are summarised in Table 2-2.

The flood hazard level is determined on the basis of the predicted flood depth and velocity. This is conveniently done through the analysis of flood model results. A high flood depth will cause a hazardous situation while a low depth may only cause an inconvenience. High flood velocities are dangerous and may cause structural damage while low velocities generally have no major threat.

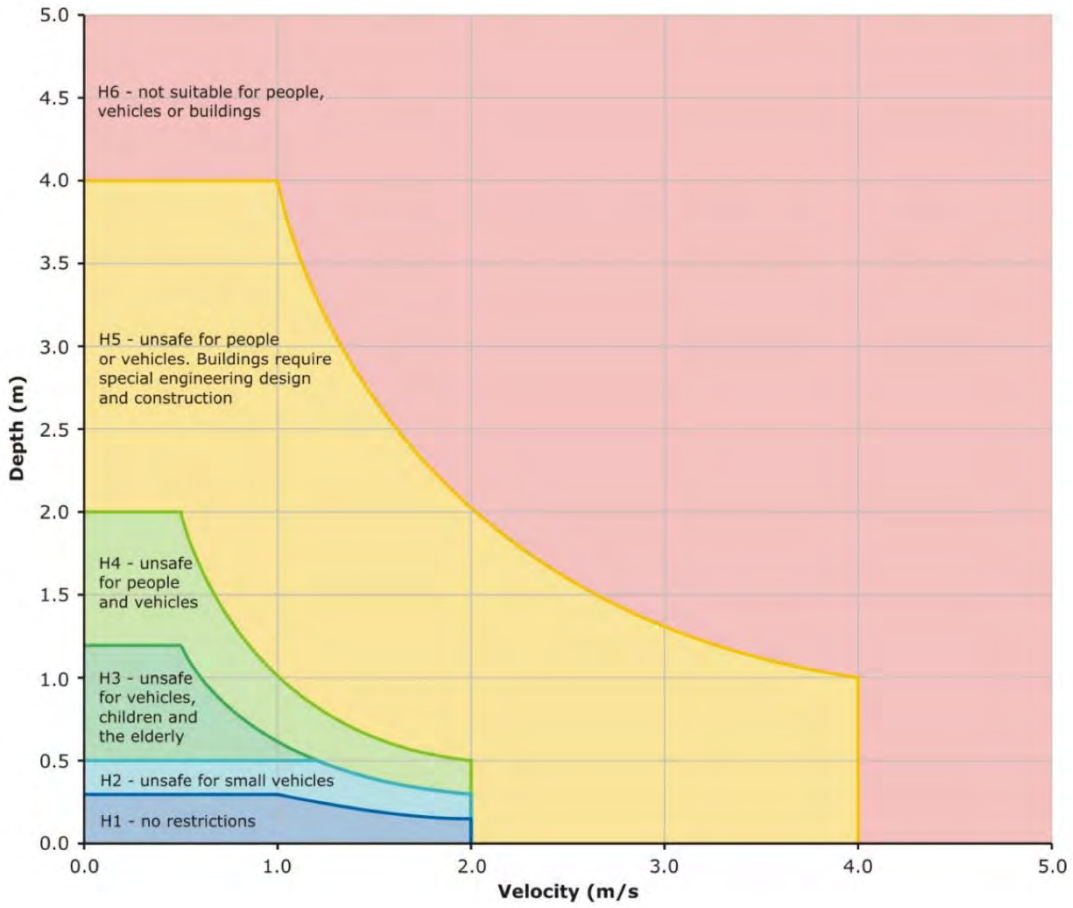
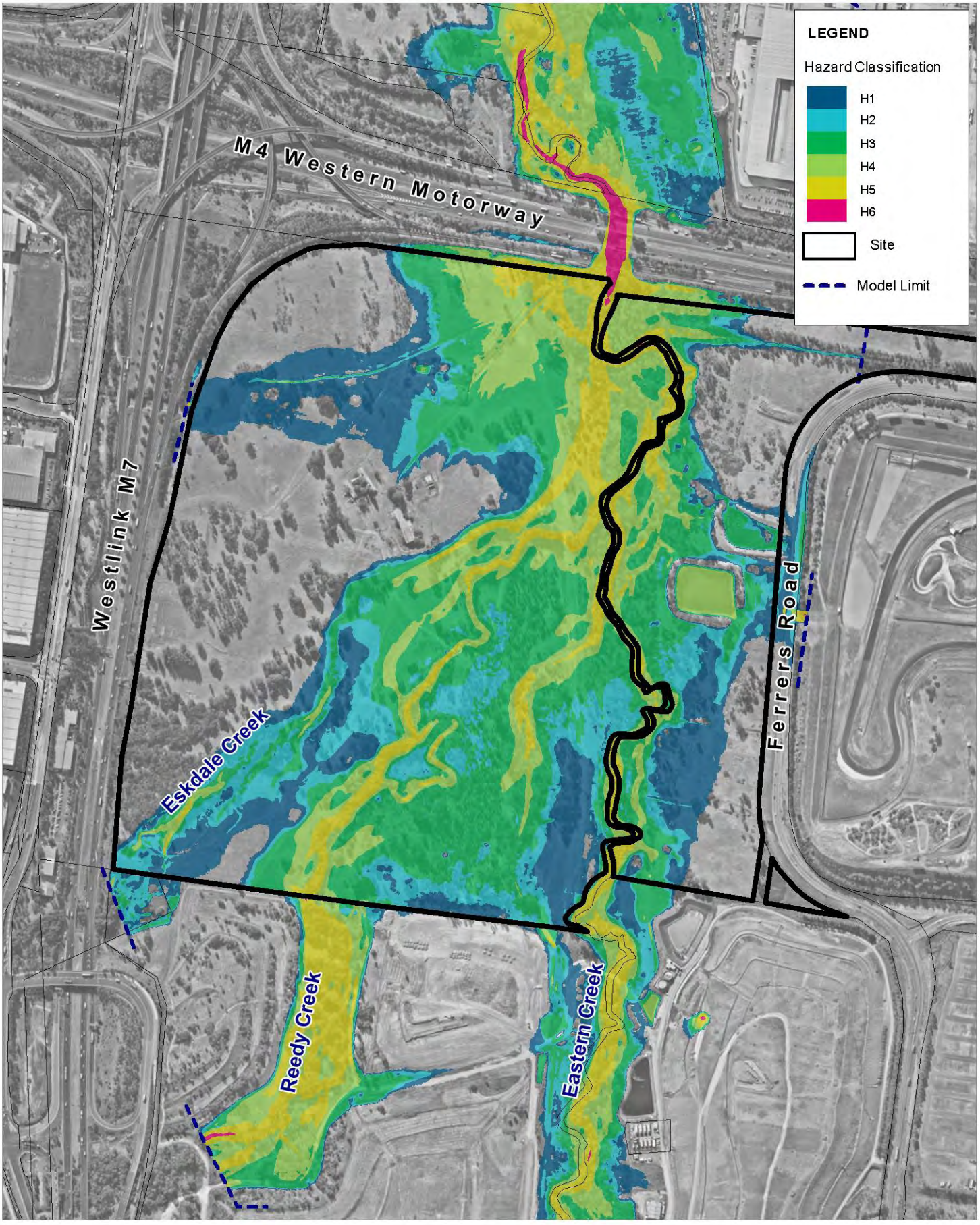


Figure 2-6 Combined Flood Hazard Curves – Vulnerability Thresholds

Table 2-2 Combined Flood Hazard Curves – Vulnerability Thresholds

Hazard Classification	Description
H1	Relatively benign flow conditions. No vulnerability constraints.
H2	Unsafe for small vehicles.
H3	Unsafe for all vehicles, children and the elderly.
H4	Unsafe for all people and vehicles.
H5	Unsafe for all people and all vehicles. Buildings require special engineering design and construction.
H6	Unconditionally dangerous. Not suitable for any type of development or evacuation access. All building types considered vulnerable to failure.

Flood hazard mapping for the simulated 1% AEP and Extreme Event design condition is shown in Figure 2-7 and Figure 2-8.



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1% AEP Event Flood Hazard Existing Conditions

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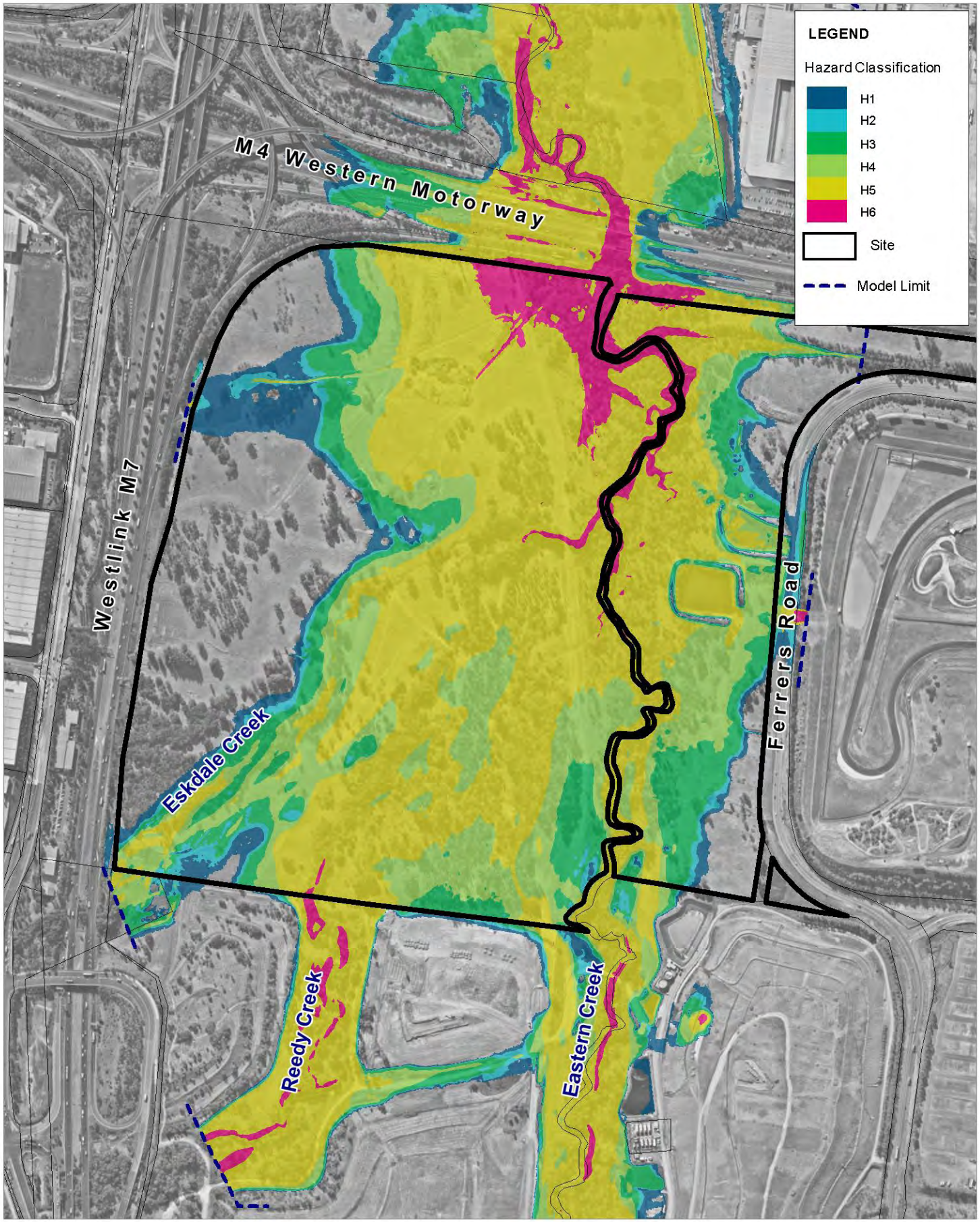

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Extreme Event Flood Hazard Existing Conditions

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3 Proposed Development

3.1 Development Description

The general arrangement for the proposed development (included in Appendix A) provides for bulk earthworks, installation of infrastructure and subdivision of the Site. The proposed finished ground levels provided by Henry and Hymas (refer: 3D DESIGN TIN 07_03_2019.12daz) and layout for the Site is presented in Figure 3-1.

The principal components of the proposed development with respect to development within the existing floodplain can be summarised as:

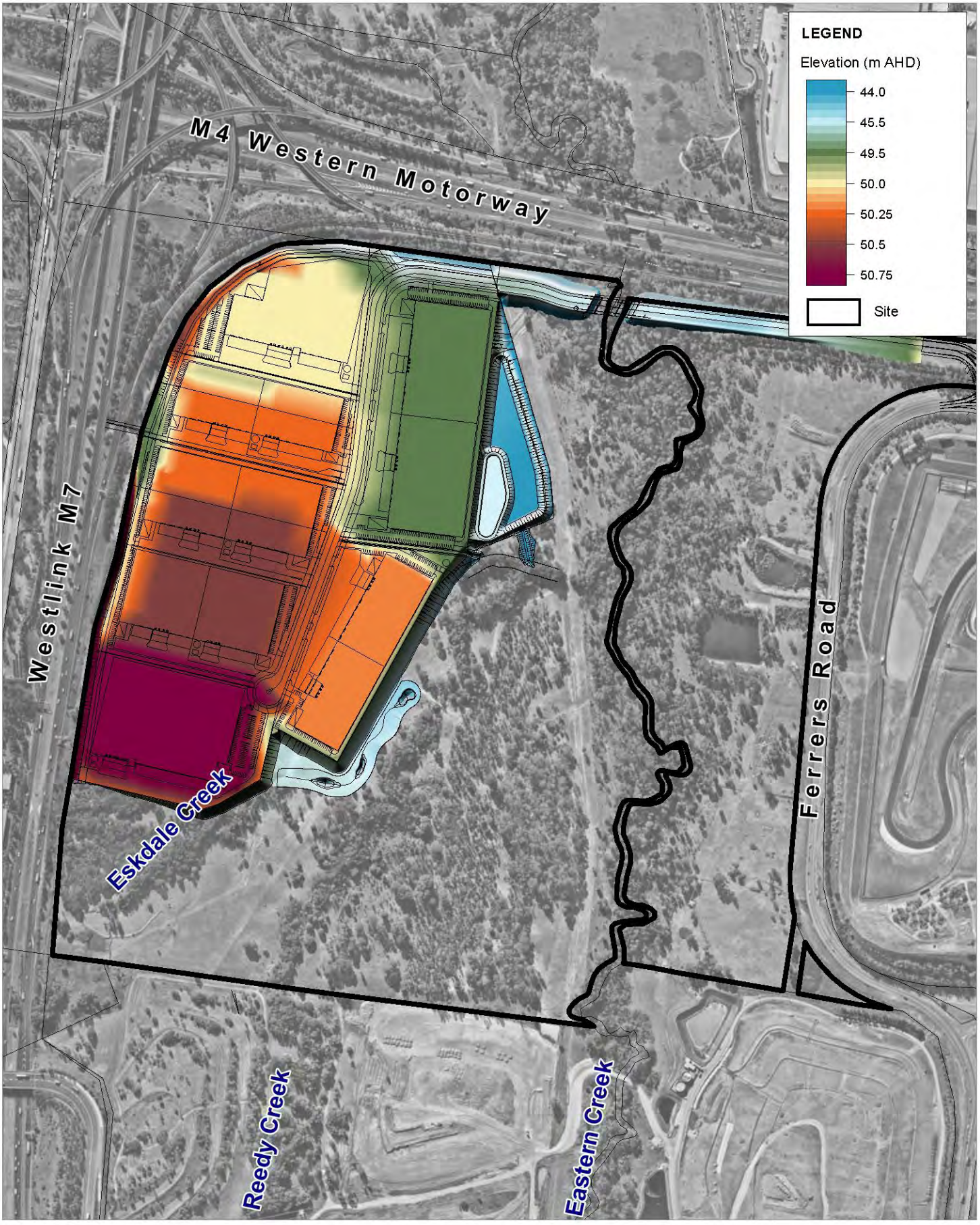
- Fill platform for development lots – a bulk earthworks platform is provided for the proposed development lots, elevated above the existing floodplain to provide the minimum flood immunity for future development.
- Access road and bridge – access road linking the development lots for Ferrers Road including new bridge structure over Eastern Creek. The access road is designed to provide a minimum 1% AEP flood immunity.
- Eskdale Creek diversion – the fill footprint encroaches on the existing alignment of Eskdale Creek. The development proposal incorporates a realignment of the low flow channel of Eskdale Creek.
- Detention Basins – stormwater detention basins to manage local runoff from the proposed development are included in the development design.

Each of the above elements of the design proposal are incorporated in the design DEM for the development as shown in Figure 3-1.

The relative impact of the proposed development has been considered in terms of potential changes to existing flood behaviour. The proposed works include filling within existing flood inundation extents and accordingly would be expected to modify existing flood conditions. In determining relative impacts of the proposed development there is potential for:

- An increase in catchment runoff due to an increase in impervious surfaces;
- Increase in flood levels through impedance of overland flow paths and loss of temporary flood storage;
- Redistribution of flow and changes to peak flood velocities arising from cut and fill works on the floodplain; and
- Concentration of discharges and subsequent impact on downstream areas.

The increase in catchment runoff due to an increase in impervious surfaces is addressed in the stormwater management design. With respect to the flood assessment, the detention basin incorporated in the stormwater management design forms part of the development footprint and finished levels as shown in Figure 3-1.



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Proposed Finished Surface Levels and Layout

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3.2 Post-Development Flood Conditions

The models developed to establish existing flood conditions have been modified to represent post-development floodplain conditions and assess relative impacts. The DEM of proposed finished ground levels and lot layout for the proposed development was incorporated into the TUFLOW hydraulic model for simulation of representative post-development flood conditions.

The simulated post-development peak flood depths and inundation extents for the 1% AEP and Extreme Flood design events are shown in Figure 3-2 and Figure 3-3 respectively. The following observations are made with respect to flood risk for the proposed development:

- Flood inundation of the proposed development extent on the Site is limited. The design levels of the proposed bulk earthworks platform provides for flood immunity for all lots up to the Extreme Flood magnitude. Only the detention basins at the eastern perimeter of the fill platform are subject to inundation at the Extreme Event level. The detention basins have flood immunity at the design 1% AEP flood level.
- The access road between Ferrers Road and the development lots traverses Eastern Creek and has 1% AEP design flood immunity. The access road is inundated to significant depth at the Extreme Flood level (as per the existing M4 Western Motorway)

In general, the post-development design flood conditions provide for limited direct flood risk to the proposed development on the Site.

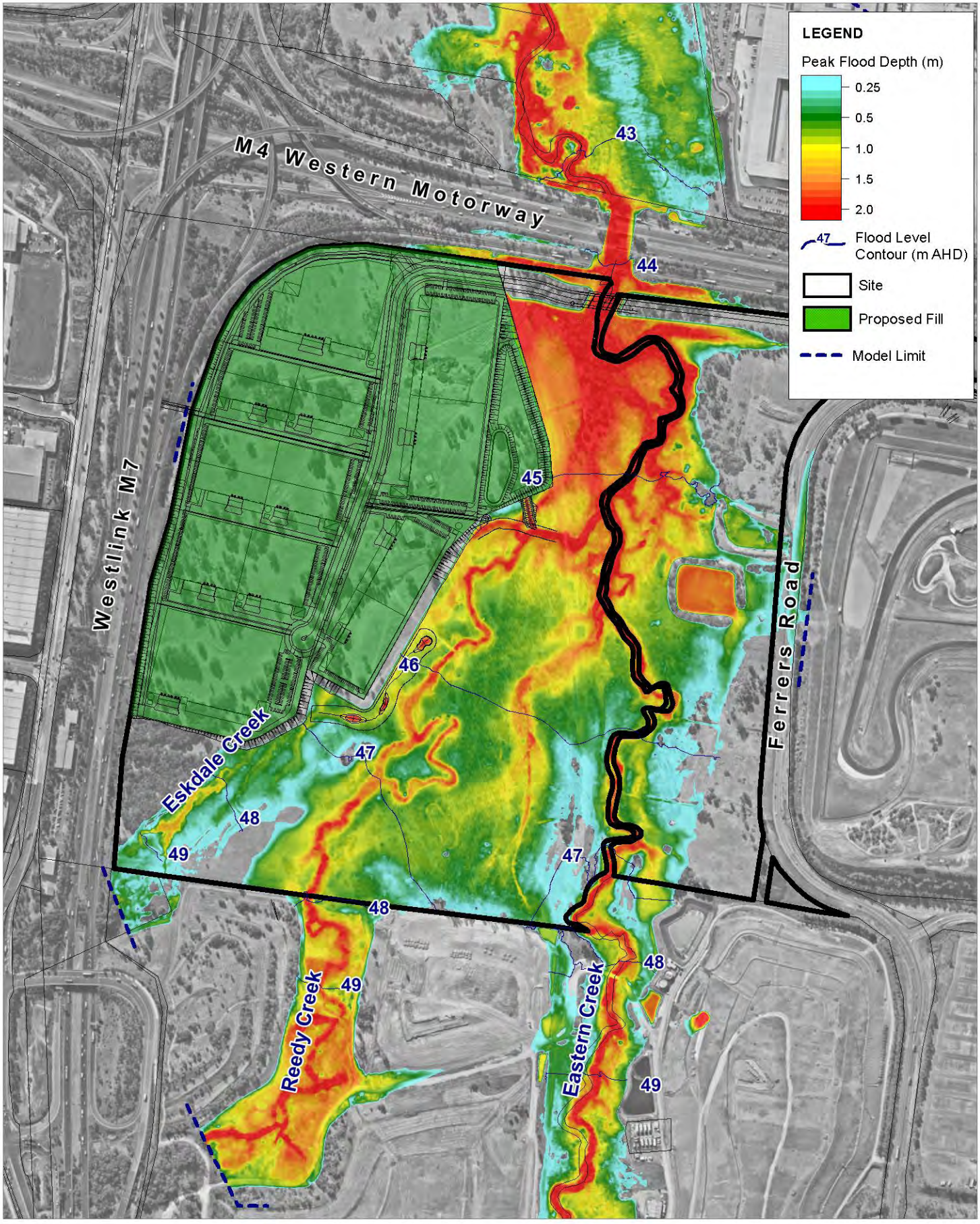
3.3 Flood Impacts

Flood impacts for the proposed development compared to existing flood conditions are presented in Figure 3-4 to Figure 3-7 as below:

- 1% AEP Change in Peak Flood Level (Figure 3-4)
- Extreme Event Change in Peak Flood Level (Figure 3-5)
- 1% AEP Change in Peak Flood Velocity (Figure 3-6)
- Extreme Event Change in Peak Flood Velocity (Figure 3-7)

The proposed development provides for increases in peak flood level immediately upstream of the proposed access road of the order 0.4 to 0.5m. These peak flood level increases arise largely as a function of narrowing the effective floodplain width due to the encroachment of the fill platform. As shown in Figure 3-4 for the 1% AEP event, the increases in flood level reduce moving upstream from the access road. Larger increases in flood level are then noted again where the proposed fill footprint encroaches upon the existing alignment of Eskdale Creek. This provides for a local redistribution of flow and corresponding increases in peak flood level.

Significantly, there are no increases in peak flood levels to neighbouring property. All of the peak flood level impact is maintained within the Site boundary. There are no increases in peak flood level upstream or downstream of the Site due to the proposed development.



Title:

Post-Development Design Flood Conditions 1% AEP Event

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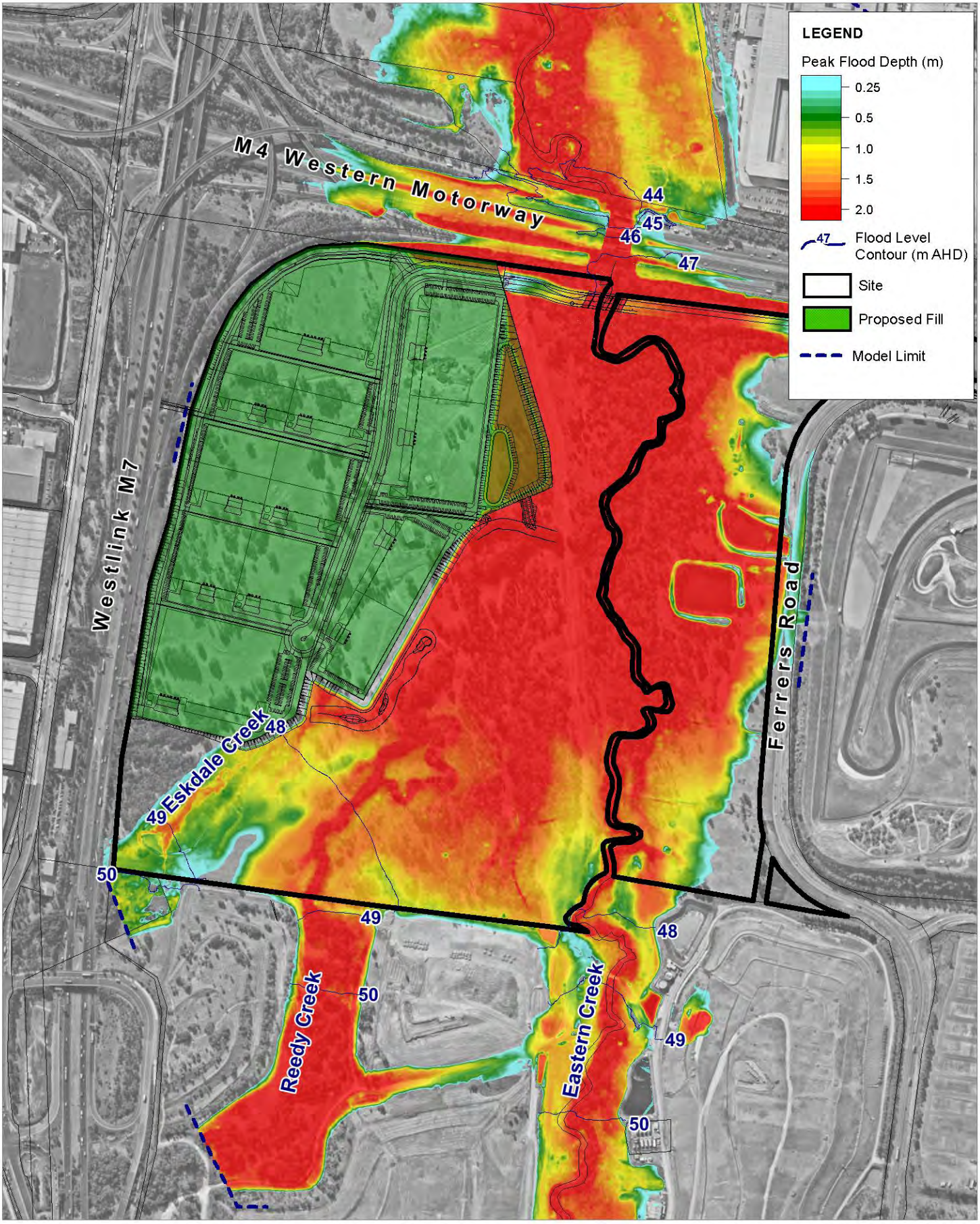

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Post-Development Design Flood Conditions Extreme Event

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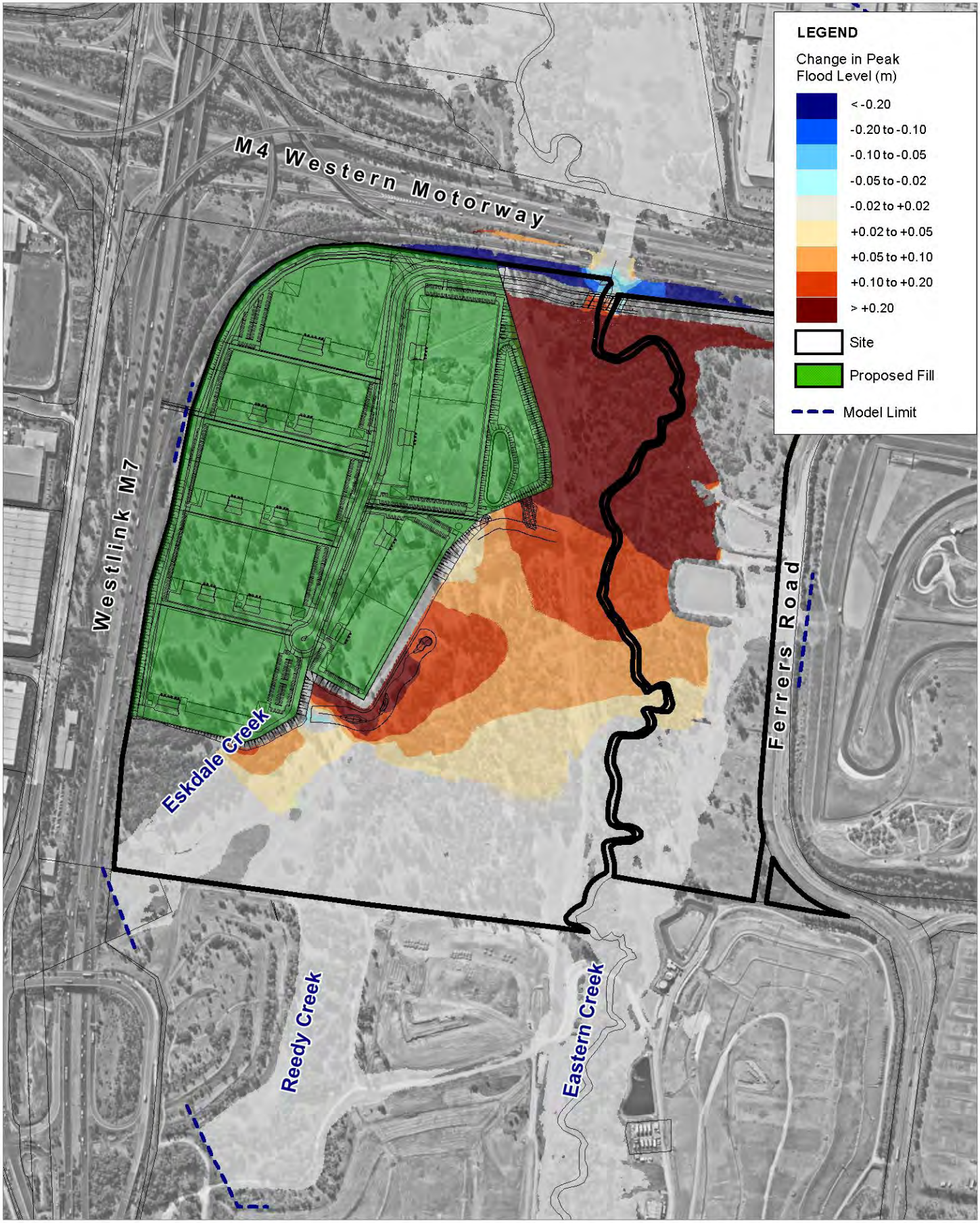

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Change in Peak Flood Level 1% AEP Event

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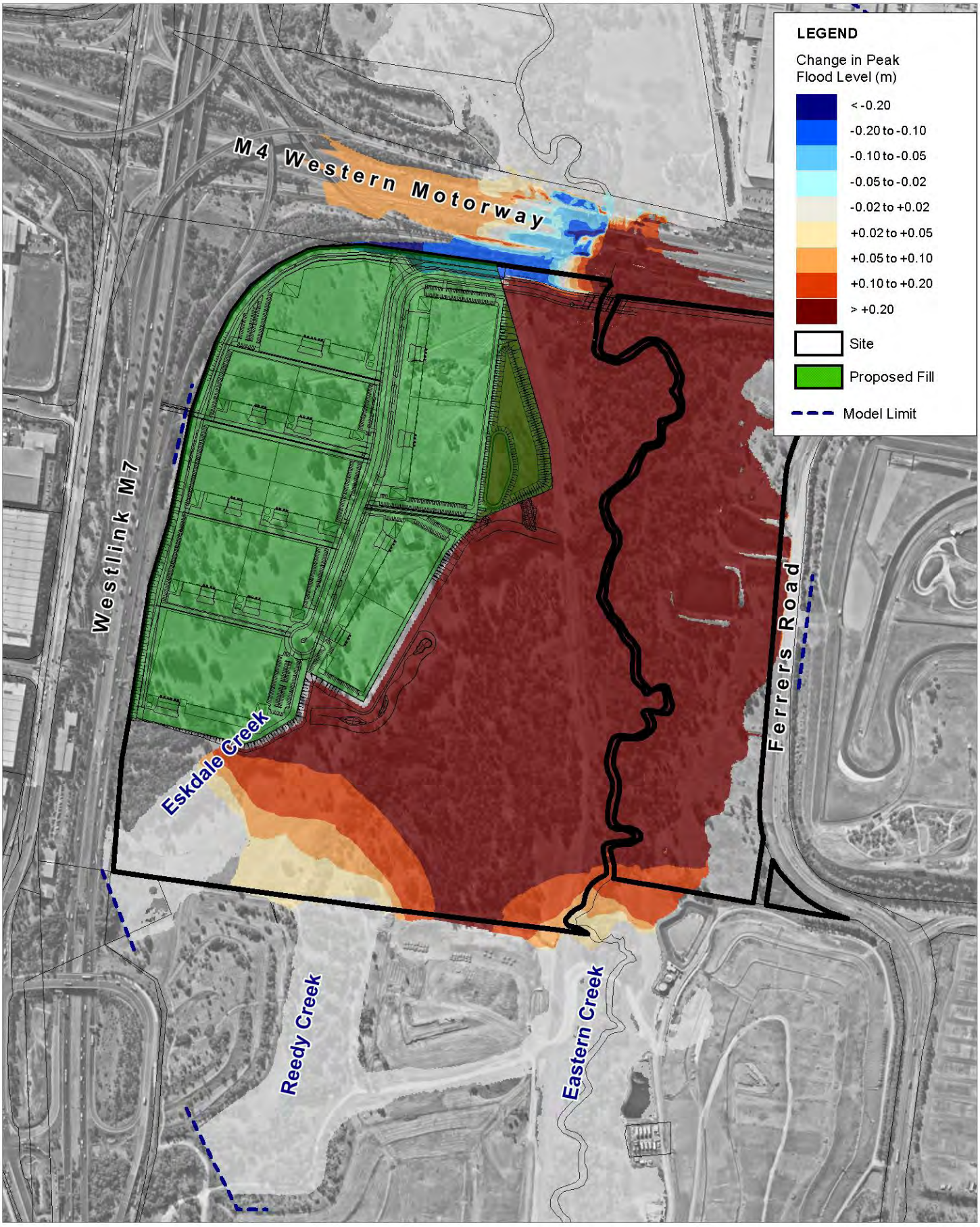

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Change in Peak Flood Level Extreme Event

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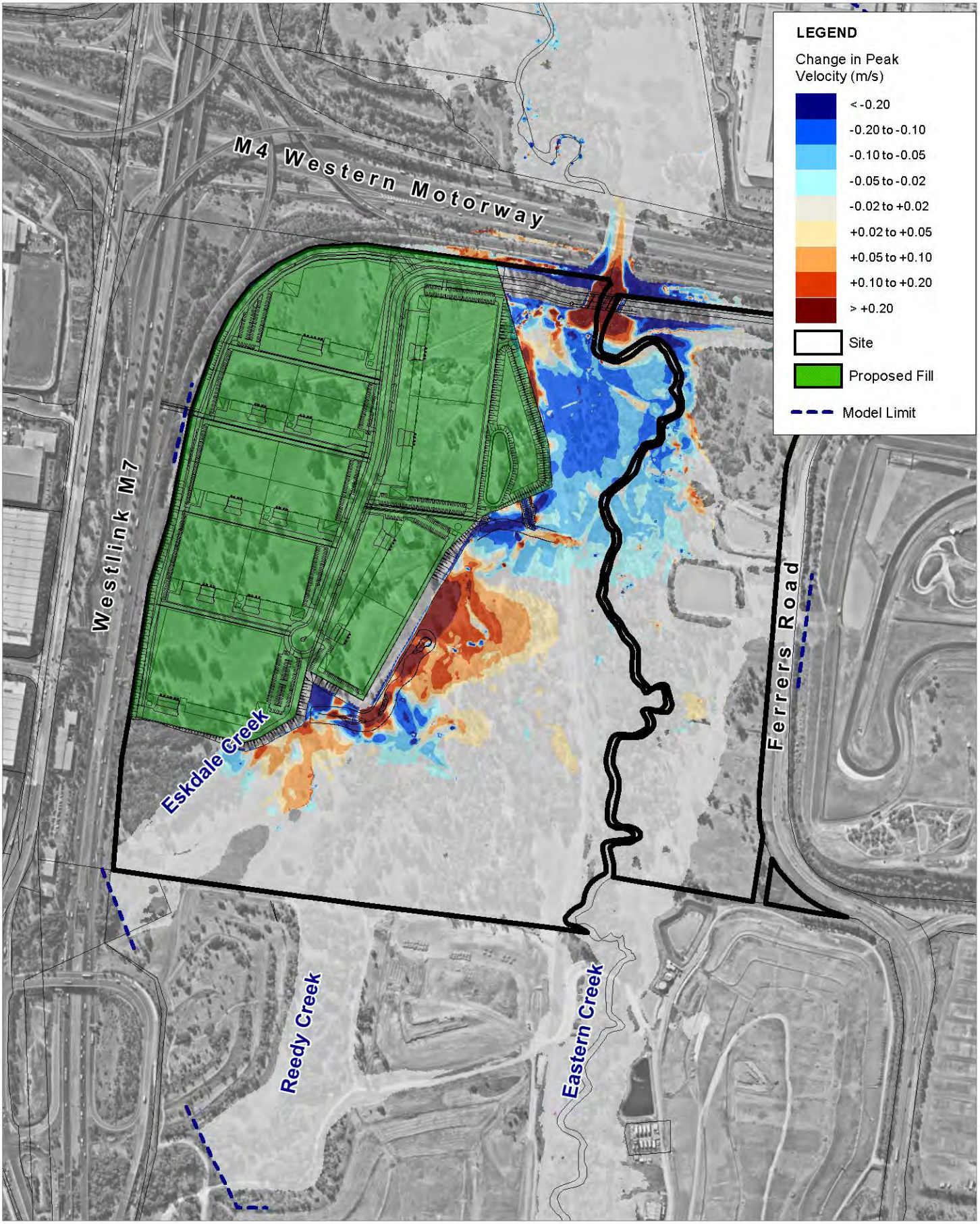

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Change in Peak Flood Velocity 1% AEP Event

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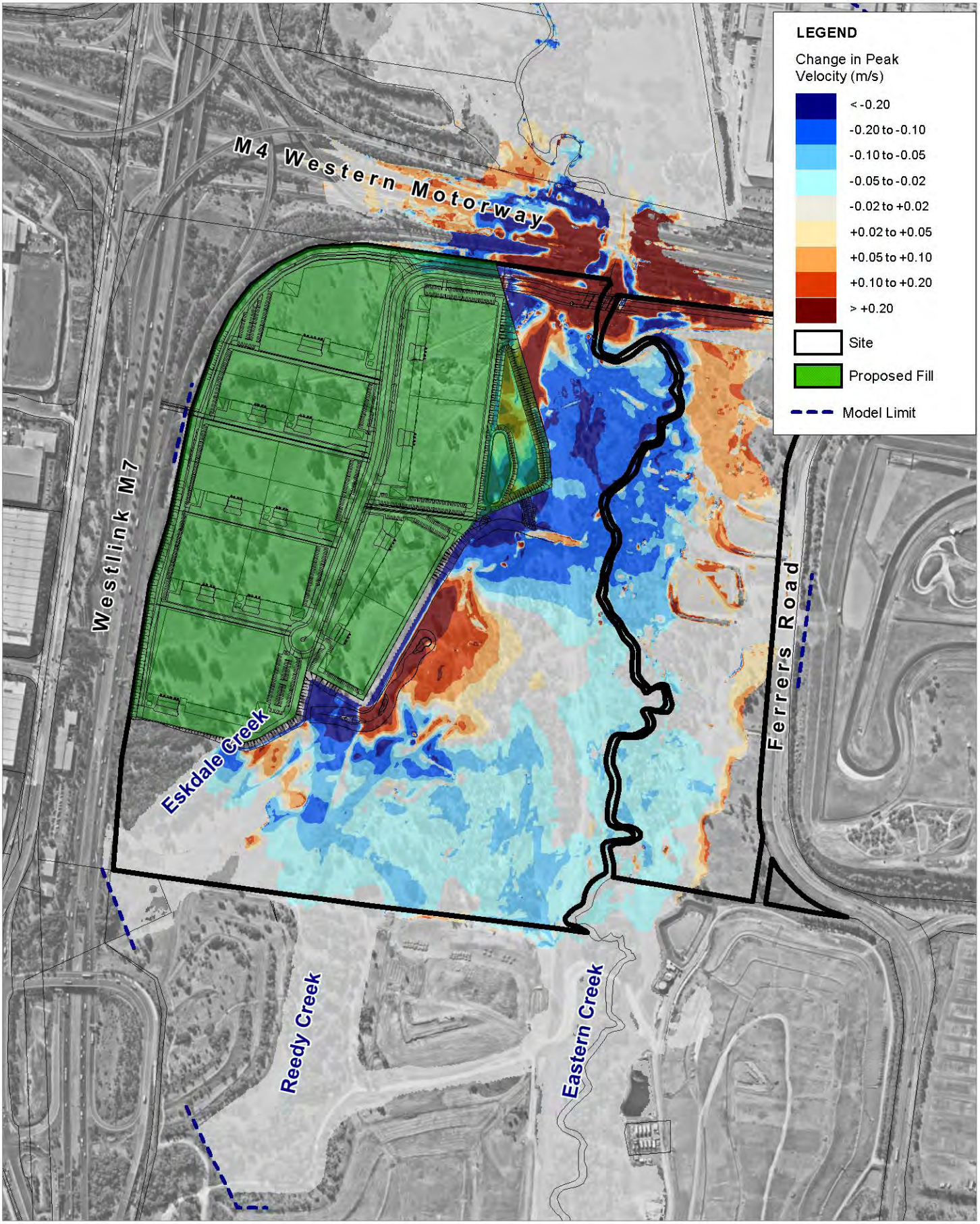


Title:

Change in Peak Flood Velocity Extreme Event

Figure: 3-7

Rev: A

N

0 125 250m

Approx. Scale

BMT

www.bmt.org

Filepath: V:\PROJECTS\S20391_Lighthorse_Interchange_Business_Hub_FIA\MI\Workspaces\DRG_1-3_HAfflux_1%AEP_nomitigation.WOR

Under the Extreme Flood condition, increases in peak flood level extend across the entire Site from approximately 0.5m upstream of the access road to 0.2m at the southern Site boundary. Similar to the 1% AEP condition, these impacts are driven by the encroachment of the fill footprint on the flow carrying capacity of the floodplain.

With the exception of an area of increased flood level across the M4 Western Motorway corridor, the peak flood level impacts are generally limited to within the Site boundary with no significant impacts on neighbouring property upstream or downstream of the Site.

The increases in peak flood level across the M4 Western Motorway is due to a change in the flow distribution across the road corridor. The proposed access road vertical alignment changes the relative flow between the right and left side of the Eastern Creek spilling through the road corridor.

Whilst there are relative increases in peak flood level for the Extreme Event within the M4 Western Motorway corridor, it is important to recognise that under existing conditions there is still significant depth of flow over the road. Figure 2-8 provided the flood hazard mapping for the Extreme Event under existing conditions showing an extended width of the M4 Western Motorway subject to the highest hazard classes (H5 and H6). Accordingly, under existing conditions the road would be un-trafficable such that the increase in peak flood level from the proposed development does not compromise the road as an existing flood access route.

The general changes in peak flood velocity can be summarised as:

- Increases in velocity through the new bridge opening within the access road
- Increases in velocity with the redistribution flow at the Eskdale Creek realignment
- Decreases in velocity across broader floodplain area associated with higher peak flood level (backwater influence).

All of the velocity changes correspond to local changes in the flow distribution and have no broader impacts to property upstream or downstream of the Site. Higher velocities are noted for the Extreme Event across the M4 Western Motorway associated with the change in flow distribution discussed above.

3.3.1 Potential Mitigation Options

With the exception of the impacts for the Extreme Event on the M4 Western Motorway corridor, the flood impacts of the proposed development are generally contained within the Site boundary, with the majority of the existing Site occupied by the Eastern Creek floodplain.

Loss in temporary flood storage due to the development fill offset by the increase in peak flood level within the remainder of the Site. Accordingly, there is no change to peak flows and corresponding peak flood levels downstream of the Site.

With no off-site impacts, there is potentially no requirement for additional flood mitigation measures and accordingly have not been considered in detail in this assessment.

4 Flood Emergency Management

Major development in the floodplain typically requires consideration of flood emergency management procedures and response.

The post-development flood mapping indicates that all of the developments lots remains flood free up to and including the Extreme Event flood level. Accordingly, risk to life is effectively managed in providing areas of flood free refuge.

Flood-free access to or from the development Site is available up to and including extreme flood events, via:

- The access road linking the development lots to Ferrers Road across the Eastern Creek floodplain has a minimum 1% AEP flood immunity (flood immunity of access road estimated at approximately 0.2% AEP/500yr ARI).
- The service road at the western boundary of the Site linking through to Wallgrove Road remains flood free at the Extreme Event level and is available as an alternative emergency flood access road when the main access road is compromised.

Notwithstanding the low flood risk for the development area, Site based emergency management plans can be developed to incorporate flood warning and emergency response opportunities. This may be simply to include flooding considerations in the development of individual business/occupant emergency management plans that address other site risks such as fire etc. The management action may be as simple as acknowledgement of the alternative access route should the main access be cut by floodwater (only for rare events in excess of 1% AEP). Other flood monitoring/warning actions can be linked to existing services from BoM and SES.

Given the low flood risk of the broader estate, there is no requirement for any estate specific flood warning system or response plan.

5 Conclusions

This report has presented a flood assessment for the proposed Light Horse Interchange Business Hub development, incorporating:

- Part of Lot 10 DP 1061237 (165 Wallgrove Road, Eastern Creek); and
- Part of Lot 5 DP 804051 (475 Ferrers Road, Eastern Creek).

The assessment has included detailed modelling of the local reaches of the Eastern Creek floodplain to establish existing design flood conditions. The establishment of design flood conditions largely serves two objectives:

- Ensuring appropriate development design to achieve desired flood immunity standard; and
- Establishing baseline conditions for the quantification of potential impacts due to changes to the existing flooding regimes and to assess the potential impact of the proposed development.

The key outcomes of flood assessment with consideration of the suitability of the proposed development with respect to flooding constraints are summarised below:

- Flood Planning Levels – the flood planning level (FPL) is derived from the peak 1% AEP flood level from local catchment flooding, plus a 0.5 m freeboard allowance. This provides the minimum habitable floor levels for the proposed development. The proposed finish levels of the development provide all lots with flood immunity up to the Extreme Event (i.e. no inundation)
- Flood Impacts – the flood impact assessment has indicated localised changes to peak flood level and velocity distributions as a result of the encroachment of the proposed development landform into the existing flood inundation extent. Impacts are typically confined to within the Site boundaries with no significant impacts on adjacent and upstream/downstream property.
- Flood Risk Management – all of the proposed development lots are located outside of the Extreme Event flood extent. The development access road provides a minimum 1% AEP flood immunity (up to 0.2% AEP immunity). The service road at the western boundary of the Site linking through to Wallgrove Road provides an alternative emergency flood access route which is flood free up to the Extreme Event.

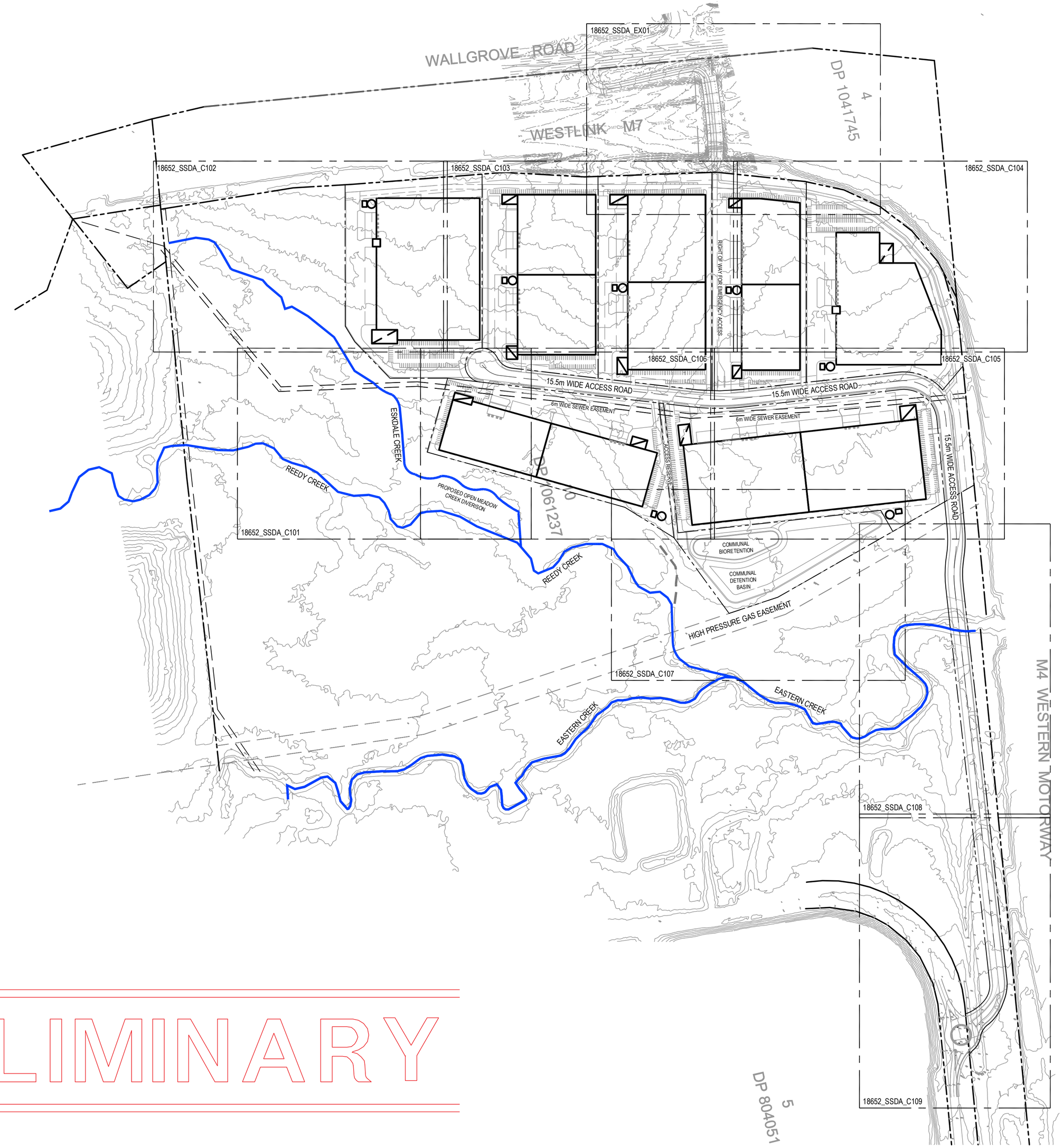
6 References

Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR, 2017)

Dowdy, A. et al. (2015) East Coast Cluster Report, Climate Change in Australia Projections for Australia's Natural Resource Management Regions: Cluster Reports, eds. Ekström, M. et al., CSIRO and Bureau of Meteorology, Australia.

NSW Government (2005) Floodplain Development Manual

Appendix A Proposed Development Layout



PRELIMINARY

0 50 100 150 200 250 300m
60 40 20
SCALE 1:3000

GENERAL ARRANGEMENT PLAN

SCALE 1:3000

PRELIMINARY

SURVEY INFORMATION
SURVEYED BY .....
DATUM: .....
ORIGIN OF LEVELS: .....

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	PRELIMINARY	IK	NW	26.03.2019					

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Project
LIGHT HORSE INTERCHANGE BUSINESS HUB
FERRER ROAD, EASTERN CREEK, NSW

Title
GENERAL ARRANGEMENT PLAN

Drawn	Designed	Date
M.Stimova	L.Caha	FEB 2019
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:3000

Drawing number
18652_SSDA_C100

Revision
01

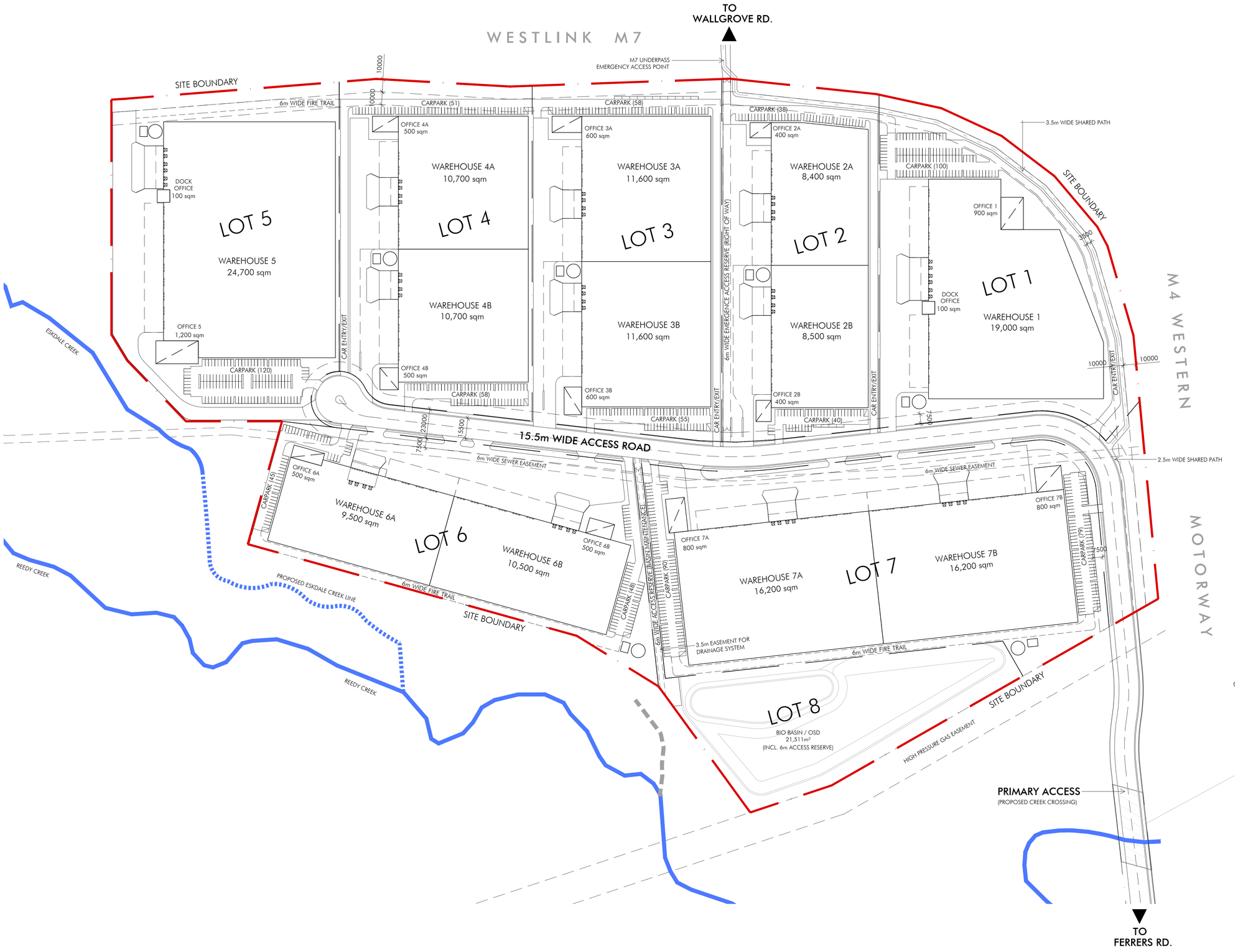
PRELIMINARY

DEVELOPMENT DATA

OVERALL SITE AREA	336,287m²
LOT 8 (RESIDUAL) - ESTATE BIO-BASIN/OSD	21,511m²
ACCESS ROAD RESERVE	21,137m²
TOTAL DEVELOPABLE AREA (LOT 1 TO 7)	293,639m²
TOTAL BUILDING AREA	165,500m²
FLOOR SPACE RATIO	56.4%

DEVELOPABLE LOT	W/H AREA	OFFICE AREA	TOTAL
LOT 1 SITE AREA (41,270m²)	19,000	1,000	20,000
LOT 2 SITE AREA (34,141m²)	16,900	800	17,700
LOT 3 SITE AREA (41,112m²)	23,200	1,200	24,400
LOT 4 SITE AREA (38,686m²)	21,400	1,000	22,400
LOT 5 SITE AREA (44,193m²)	24,700	1,300	26,000
LOT 6 SITE AREA (38,406m²)	20,000	1,000	21,000
LOT 7 SITE AREA (55,831m²)	32,400	1,600	34,000
TOTAL	157,600	7,900	165,500

CARPARK PROVISIONS	
TOTAL CARPARK REQUIRED RMS - Warehouse: 1 space/300sqm Office: 1 space/40sqm	723 spaces
TOTAL CARPARK PROVIDED	782 spaces



Client

NSW GOVERNMENT Western Sydney Parklands Trust

Lighthorse Interchange Business Hub
Eastern Creek NSW

Concept Masterplan

1:3000@ A3 or 1:1500@A1

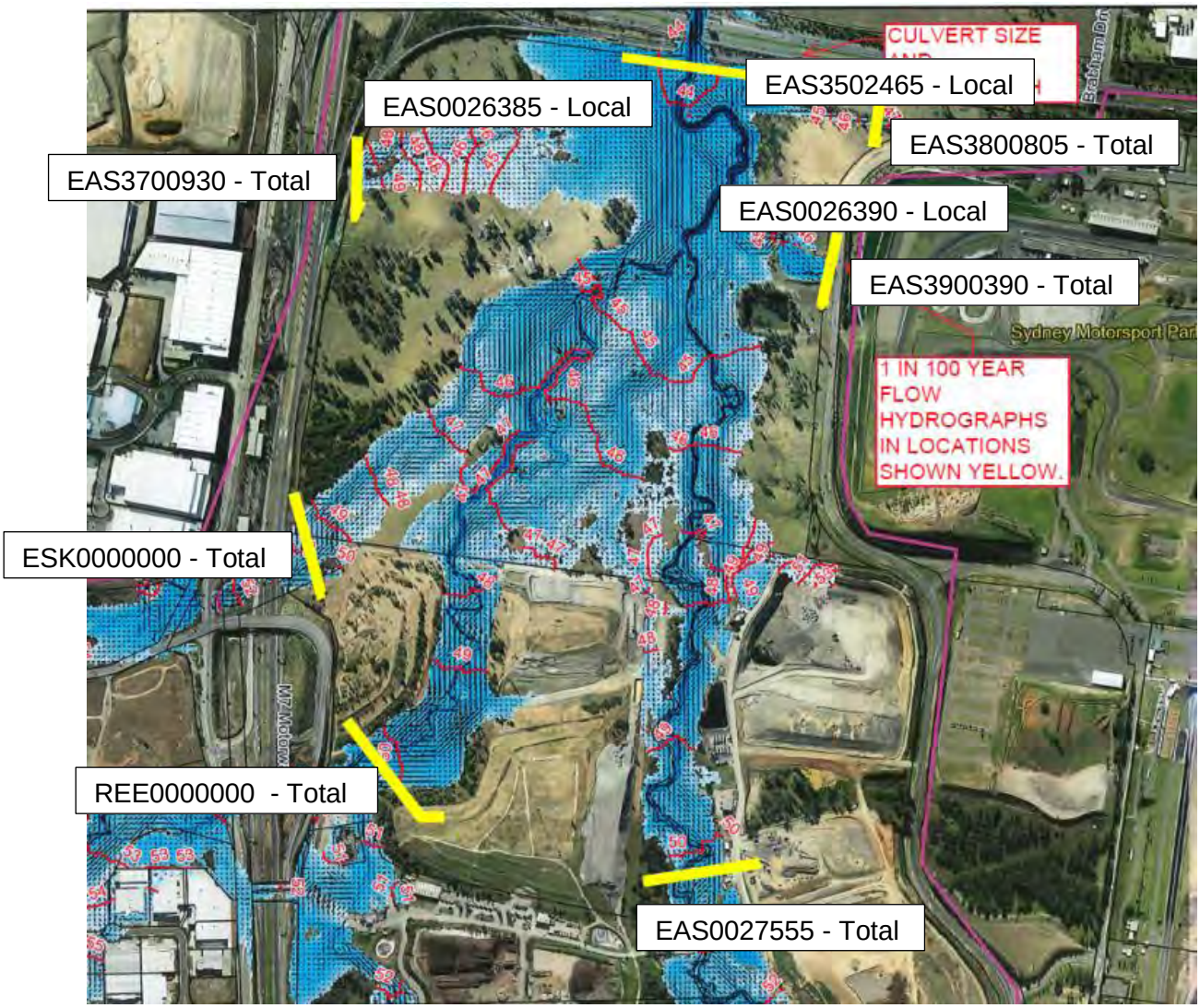
DATE March, 2019 **SKETCH NUMBER** 10935_SK018

nettletontribe

Mar 15, 2019 - 9:30am N:\10935-Lighthorse Interchange\2 AutoCAD_Sketch\10935_SK018.dwg

Appendix B Council Flood Information

EAS0026380 – Total D/S of M4



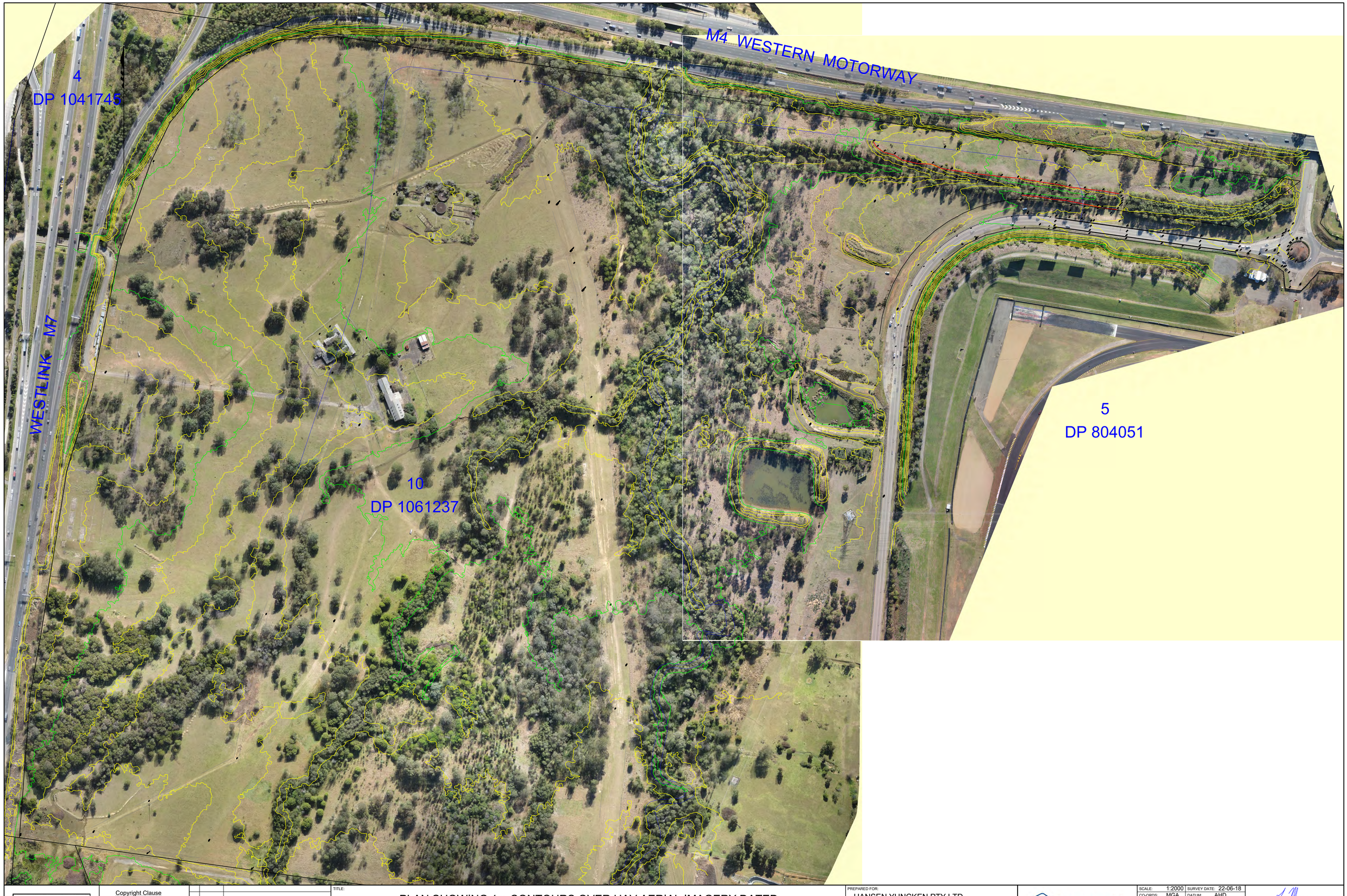
Hydrographs shown as “Total” are the total upstream hydrograph at the yellow locations.

Hydrographs shown as “Local” are the local hydrographs for the areas inside (D/S) the yellow locations.

EAS0026380 is the total D/S of the M4 and is the total of the other hydrographs shown.

All hydrographs are from Council’s XP-Rafts base model for Eastern Creek.

Appendix C Ground Survey Extent



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Rev.	DATE	REVISION DETAILS
A	13-07-2018	ORIGINAL ISSUE

TITLE:

PLAN SHOWING 1m CONTOURS OVER UAV AERIAL IMAGERY DATED 2 AUGUST 2017 (WEST SIDE) AND 22 JUNE 2018 (EAST SIDE) TOGETHER WITH GROUND SURVEYED DATA

PREPARED FOR:
HANSEN YUNCKEN PTY LTD

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165 WALLGROVE ROAD
EASTERN CREEK

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PO Box 519 Sutherland NSW 1499 | Suite 8/49-51 Eton Street
02 9521 5737 | www.boxallsurveyors.com.au | ACN 114 644 058
Liability limited by a scheme approved under Professional Standards Legislation

SCALE:	1:2000	SURVEY DATE:	22-06-18
CO-ORDS:	MGA	DATUM:	AHD
ORIGIN OF LEVELS:	GPS RTK		
SURVEY:	SL + MA	DRAWN:	SM
CHECKED:	SM	DATE:	13-07-18
APPROVED:	SM	DATE:	13-07-18
JOB REF:	10568	SHEET	1 OF 1 SHEETS

SCOTT MURRAY
REGISTERED SURVEYOR

DRAWING No.: 10568-003
REVISION: A
A1

Ground Survey Extent

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