CONSTRUCTION FLOOD AND EMERGENCY RESPONSE PLAN

Moorebank Precinct East Stage 2 - SSD 7628

Moorebank Intermodal Precinct – Precinct East Stage 2

SSD 7628

Construction Flood and Emergency Response Plan

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Acronyms and Definitions

Acronym / Term	Meaning
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
BoM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
CoC	Conditions of Consent
Contractor's CM	Contractor's Construction Manager
Contractor's EM	Contractor's Environmental Manager
Contractor's WM	Contractor's Works package Manager
CSWMP	Construction Soil and Water Management Plan
Development, the	Stage 2 of the MPE Concept Approval (MP 10_0193) approved as the MPE Stage 2 Development (SSD 7628) as consolidated. It involves the construction and operation of warehousing and distribution facilities on the MPE Site and upgrades to approximately 1.5 kilometres of Moorebank Avenue.
Development site	The subject of the MPE Stage 2 EIS, the part of the MPE Site which includes all areas to be disturbed by the Development (including the operational area and construction area).
DP&E	Department of Planning and Environment (now DPHI)
DPHI	Department of Planning, Housing and Infrastructure
EIS	Environmental Impact Statement
Environmental Incident	A set of circumstances resulting in harm, or potential harm, to the environment. Environmental incidents include pollution incidents and environmental emergencies. Environmental incidents may arise from natural (e.g. storm, wind or bushfire) or human factors.
EP&A Act	Environmental Planning and Assessment Act 1979
EPA	NSW Environment Protection Authority
EPL	Environment Protection Licence
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999
ER	Environmental Representative
ESR	the Developer
EWEMP	Early Works Environmental Management Plan

Acronym / Term	Meaning
FCMMs	Final Compilation of Mitigation Measures
FERP	Flood Emergency Response Plan
ICAM	Incident Cause Analysis Method
MARW	Moorebank Avenue Realignment Works
MPE	Moorebank Precinct East
MPE Stage 2 EIS	Moorebank Precinct East Stage 2 Proposal – Environmental Impact Statement publicly exhibited between 13 December 2016 and 24 February 2017.
MPW	Moorebank Precinct West
Non-compliance	An occurrence, set of circumstances, or development that results in a non-compliance or is non-compliant with Development Consent SSD 7628 Conditions of Consent or EPBC Act Approval or EPBC Act Approval (EPBC 2011/6229) Conditions of Approval but is not an incident
Non-conformance	Observations or actions that are not in strict accordance with the CEMP and the aspect specific sub-plan
OEH	Office of Environment and Heritage
PMF	Probable Maximum Flood
Pollution Incident	A set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of any noise (POEO Act).
RL	Reduced levels
RtS	Response to Submissions
SES	State Emergency Service
SSD	State significant development

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1. Background

Approval for the construction and operation of Stage 2 of the Moorebank Precinct East (MPE) Development, operated by ESR Australia & NZ (formerly LOGOS), which comprises the second stage of development under the MPE Concept Approval (MP10_0193) was received 31 January 2018 (State significant development (SSD) 7628)), as consolidated.

This Flood Emergency and Response Management Plan (FERP) has been developed to manage flood impacts during the construction phase of the MPE Stage 2 Development (hereafter, 'the Development').

Within this plan, a strategy has been established to demonstrate the construction contractor's approach to the management of flooding impacts during construction of the Development. This FERP addresses the relevant requirements of the Development approvals, including the Environmental Impact Statement (EIS), Response to Submissions (RtS) and Minister's Conditions of Consent (CoCs), and all applicable guidelines and standards specific to the management of flood and emergency response during construction of the Development.

1.1. Development Ownership

In 2022, LOGOS joined the ESR group of companies and since August 2024, the LOGOS and ESR operations have been integrated to now operate under the name ESR Australia & NZ (ESR). The applicant/ approval holder entity remains unchanged at this stage until further notice and references to LOGOS and LOGOS authored documents and/or plans may continue and remains relevant where LOGOS and ESR are used interchangeably.

1.2. Introduction

The MPE Site, including the Development site, is located approximately 27km south-west of the Sydney Central Business District and approximately 26km west of Port Botany and includes the former Defence National Storage and Distribution Centre site. The MPE Site is situated within the Liverpool Local Government Area, in Sydney's south-west subregion, approximately 2.5km from the Liverpool City Centre.

The MPE Development involves the development of an intermodal facility including warehouse and distribution facilities, freight village (ancillary site and operational services), stormwater, landscaping, servicing and associated works on the eastern side of Moorebank Avenue, Moorebank.

Stage 2 of the Development involves the construction and operation of warehousing and distribution facilities on the MPE Site and upgrades to approximately 2.1 km of Moorebank Avenue.

Key components of the Development include:

- Earthworks including the importation of 600,000m^3 of fill and vegetation clearing
- Importation, stockpiling and placement of up to 250,000m^3 of suitable spoil (separate to the 600,000m^3 of imported clean general fill permitted for bulk earthworks)
- Approximately 300,000m^2 gross floor area of warehousing and ancillary offices
- Warehouse fit-out

- Freight village, 8000m^2 gross floor area of ancillary retail, commercial and light industrial land uses
- Internal road network and hardstand across the site
- Ancillary supporting infrastructure within the site, including:
  - Stormwater, drainage and flooding infrastructure
  - Utilities relocation/installation
  - Fencing, signage, lighting, remediation and landscaping
- Moorebank Avenue upgrade including:
  - Raising by about two metres and some widening
  - Embankments and tie-ins to existing Moorebank Avenue road levels
  - Signalling and intersection works
- Intersection upgrades along Moorebank Avenue including:
  - Moorebank Avenue/MPE Stage 2 access
  - Moorebank Avenue/MPE Stage 1 northern access
  - Moorebank Avenue/MPE Stage 2 central access
  - MPW Southern Access/MPE Stage 2 southern emergency access.

The location of the Development site is shown in Figure 1-1.

Moorebank Avenue Realignment Works (MARW) was approved by the NSW Minister for Planning on 14 October 2021 as State Significant Infrastructure (SSI-10053) (Infrastructure Approval) under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). It is also a controlled action under Section 130(1) and 133(1) of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and was approved by the Minister for the Environment on 7 December 2021 (EPBC Approval 2020-8839).

The footprint of MARW, which generally runs along the northern and eastern boundary of the MPE Site, interfaces and encroaches on the MPE Site. In order to allow for progression of construction works for MARW (in particular, the northern carriageway), some early preparatory works are required that are located within the MPE Site (where the project boundaries overlap). These works are undertaken under the MPE CEMP, with the MARW CEMP not being relevant to these works.

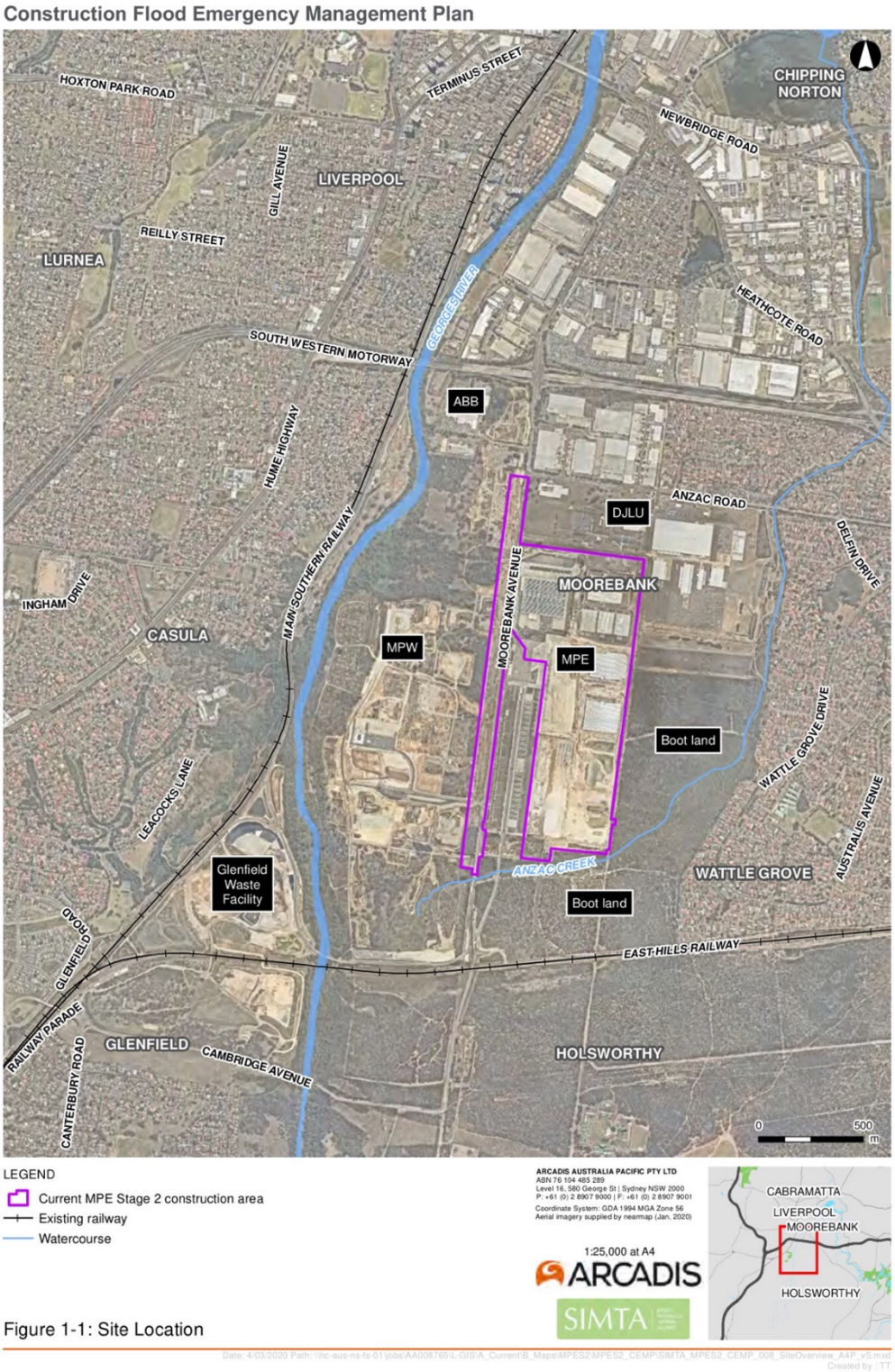

Figure 1-1: Site Location

Figure 1-1 Site Location

1.3. Development Consent

The Development was assessed by the Department of Planning and Environment (DP&E) under Part 4.1 (now Division 4.7 as of 1 March 2018) of the EP&A Act as SSD. The Planning Assessment Commission (PAC) granted approval for the Development on 31 January 2018 and is subject to the Minister's CoCs (SSD 7628) as consolidated. The Development has been subsequently modified. The Development, including its potential impacts, consultation and proposed mitigation and management, is documented in the following suite of documents:

- SSD consent SSD 7628, as consolidated
- SSD partial consent (subdivision) SSD 7628, as consolidated
- Moorebank Precinct East – Stage 2 – Environmental Impact Statement (Arcadis Australia Pacific Pty Limited, December 2016)
- Moorebank Precinct East – Stage 2 – Response to Submissions (Arcadis Australia Pacific Pty Limited, July 2017)
- MPE *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval (No. 2011/6229) granted on March 2014
- MPW EPBC Act Approval (No. 2011/6086) granted on September 2016 (for Moorebank Avenue Upgrade Works only).

1.4. Development Delivery Phases

The Development construction period is anticipated to be up to five years, which is generally divided into three works phases.

The terminology for the Development phases were developed from the EIS and RtS documentation in response to the language of the CoCs and the need to stage the delivery of the environmental management documentation required by the CoCs. Current terminology, and the equivalent terminology from the CoC and RtS are included in Table 1-1.

Table 1-1 Development Delivery Phase Terminology

Development Delivery Phase	CoC A18 Phase Equivalent	MPE Stage 2 RtS Works Period Equivalent
Early Works	Early works Fill importation (to 60,000m^3)	Works Period A: Pre-construction Works Period B: Site preparation
Northwest Priority Area	Early Works Fill importation (to 60,000m^3) Construction (to the extent described in Table 1 of the DP&E Approval Letter for Northwest Priority Works, dated 29 March 2018	Works Period A: Pre-construction Works Period B: Site preparation Works Period E: Bulk earthworks (to the extent described in Table 1 of the DP&E Approval Letter for Northwest Priority Works, dated 29 March 2018)
Construction Phase A	Fill importation Construction	Works Period B: Site preparation

Development Delivery Phase	CoC A18 Phase Equivalent	MPE Stage 2 RtS Works Period Equivalent
		Works Period E: Bulk earthworks, drainage and utilities Works Period F: Construction and internal fit out of warehousing Works Period G: Miscellaneous construction works
Construction Phase B	Fill importation Construction	Works Period C: Construction of Moorebank Avenue Diversion Road Works Period D: Pavement and intersection works along Moorebank Avenue Works Period E: Bulk earthworks, drainage and utilities

Additional detail of the Development delivery phases is included in the CEMP.

1.5. Purpose and Application

This FERP has been developed for the construction period of the Development to address the CoCs and the FCMMs. This plan defines how impacts of flooding are to be managed during construction of the Development.

This plan provides methods to measure and reduce the impact to soils, water quality, and water quantity by the contractor during construction, including all sub-contractor and consultant partners.

The specific requirements of the CoCs for compilation of the FERP, as identified in the CoCs and FCMMs are identified in the Compliance Matrices (Appendix A).

The most recent, approved version of this plan is to be implemented to manage Development activities for the duration of construction. This FERP will be superseded by an operational FERP to be implemented once construction is complete and operations commence.

1.6. Objectives and Targets

Objectives and targets for the management of emergency flood response are outlined in Table 1-2.

Table 1-2 Objectives and Targets

Objective	Target	Timeframe	Accountability
To effectively implement Flood Emergency Response Plan during flood event	No death or injury to personnel during flood event	Throughout construction	Contractor's WM
	Zero non-conformance against the requirements of the FERP	Throughout construction	Contractor's WM

2. Environmental Management

2.1. Legal and Other Requirements

Table 2-1 details the legislation, planning instruments and guidelines considered during development of this plan.

Table 2-1 Legislation, Planning Instruments and Guidelines

Legislation	Description	Relevance to this FERP
Environmental Planning and Assessment Act 1979	This Act establishes a system of environmental planning and assessment of development proposals for the State.	The Minister's Conditions of Approval and other obligations associated with approval documentation are incorporated into this plan.
Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)	The main purpose of this Act is to provide for the protection of the environment especially those aspects that are of national environmental importance and to promote ecological sustainable development. The Act binds the Crown. Do not take, use, keep or interfere with "nationally significant" cultural and natural resources, protected wildlife and protected plants without Approval.	The Development as a whole is a controlled action under the EPBC Act with controlling provisions related mainly to the Rail connection.
Fisheries Management Act 1994	This Act is applicable to all waters within the state including private and public waters. The Act is most relevant in respect to maintaining water quality and ensuring no polluted water from site works enters streams, creeks and waterways	Water discharging from the Development site must not pollute the adjacent streams or watercourses
Protection of the Environment Operations Act 1997	The objectives of this Act relate to the protection of the environment through pollution prevention and cleaner production among others	Relevant requirements of the Act, including duties to report pollution incidents and have been incorporated into incident response procedures, included within the CEMP.

Guidelines that have specific requirements relating to Flood Emergency Response include:

- NSW Government's Floodplain Development Manual, DIPNR 2005
- Stormwater and Flooding Report, MPE Stage 2 EIS, Arcadis, 2017
- Anzac Creek Floodplain Risk Management Study and Plan for Liverpool City Council, BMT WBM Pty Ltd, May 2008
- New South Wales State Disaster Plan (DISPLAN 2010), State Emergency Management Committee, 2010

- Flood Emergency Response Planning Classification of Communities, Floodplain Risk Management Guideline, OEH 2007
- Australian Emergency Manuals Series, Manual 20: Flood Preparedness, Commonwealth of Australia 2009
- Australian Emergency Manuals Series, Manual 21: Flood Warning,
- Commonwealth of Australia 2009
- Australian Emergency Manuals Series, Manual 22: Flood Response, Commonwealth of Australia 2009
- NSW State Flood Plan (March 2018)
- Anzac-Creek-Study-2009 Liverpool Council.

2.2. Development Consent Compliance Matrices

Development consent compliance matrices are included in Appendix A.

2.3. Roles and Responsibilities

Roles and responsibilities associated with this FERP are presented in Table 2-2.

Table 2-2 Roles and Responsibilities

Role	Responsibilities
Contractor's Works package Manager **(Contractor's WM)**	• Include environmental considerations into all aspects of Development planning • Attend audit meetings and action results of any audit findings • Allocate Development resources to handle environmental issues • Oversee the implementation of the FERP • Endorse the FERP • Appoint / nominate and provide support for the Contractor's EM • Report to senior management and the Principal's Representative on the performance of the system and environmental breaches • Undergo induction and training in flood emergency response • Take action to resolve environmental non-conformances and incidents • Sign off on all environment and sustainability inspections • Include environmental requirements in contracts with suppliers and sub-contractors, where appropriate • Report environmental incidents to the Principal's Representative • Authorise expenditure to implement environmental management requirements within limits of authority as defined in the Principal's Representatives Development requirements • Undertake Incident Cause Analysis Method (ICAM) investigations • Review audit corrective actions and take action as necessary to close out of issues • Be contactable 24 hours a day

Role	Responsibilities
	• Direct works to be performed in a more environmentally responsible manner that reduces impacts or stop works if there is a risk of environmental harm.
Contractor's Construction Manger (Contractor's CM)	• Communicating with all personnel and sub-contractors regarding compliance and conformance with the CEMP and site specific environmental issues / EWMS • Undergo induction and training in flood emergency response as directed by management • Identifying resources required for implementation of this FERP • Organise and manage site plant, labour and temporary materials • Coordinating the implementation and maintenance of site environmental controls and provide support for the Contractor's EM • Report all environmental incidents in accordance with incident reporting protocol • Undertake ICAM investigations • Take actions to resolve non-conformances and incidents • Be contactable 24 hours a day • Direct works to be performed in a more environmentally responsible manner that reduces impacts or stop works if there is a risk of environmental harm • Oversee the implementation of all flood management initiatives • Monitor weather forecasts and conditions for potential flooding and notify relevant site personnel
Contractor's Environmental Manager (Contractor's EM)	• Assist and guide the respective workers to meet their environmental responsibilities • Check and monitor the implementation of this FERP, including completion of weekly inspection checklists • Monitor the rectification / reinstatement of site controls • Direct works to be performed in a more environmentally responsible manner that reduces impacts or stop works if there is a risk of environmental harm • Cooperate and participate in audits and action results of any audit findings • Manage review and continual improvement of this FERP • Inspecting and reporting on compliance and conformance • Monitor weather forecasts and conditions for potential flooding
Site Supervisors	• Implement environmental controls on-site • Present and participate in toolbox talks and meetings relating to flood emergency response • Train staff in their obligations under the EWMS • Meet environmental reporting requirements of the Development • Undergo induction and training for flood emergency response as directed by management

Role	Responsibilities
	• Direct works to be performed in a more environmentally responsible manner that reduces impacts or stop works if there is a risk of environmental harm • Assist the Contractor's CM in implementing this Plan • Monitor weather forecasts and conditions for potential flooding
All Personnel	• Understand and implement mitigation protocols as required in the FERP (as per Section 3.4) and any other required measures during construction • Undertake relevant training to implement the requirements of this FERP • Take all reasonable and feasible steps to comply with the requirements of this FERP.

2.4. Training

Training is to be undertaken in accordance with Section 2.8 of the CEMP. The Construction Contractor is to provide all employees with suitable environmental induction / training (relevant to this FERP).

As a minimum the induction is to include the following:

- Location of the emergency access point and evacuation route
- Location of the emergency assembly point
- Existence and requirements of this FERP
- Roles and responsibilities for flood emergency response, as listed in Section 3.4.2
- Toolbox meetings will also be undertaken, as and when required (e.g. prior to predicted heavy rainfall, after flood events).

Competency training will be provided by the Contractor as required and may include a certification, vocational qualification or a competency assessment.

Records of all training are to be filed in accordance with the document control system outlined in Section 2.8 of the CEMP.

3. Implementation

State Emergency Service (SES) guidelines regarding flood emergency response for business operations are provided within the online Emergency Business Continuity Plan (http://www.sesemergencyplan.com.au/business/) and include:

- Description of local flood behaviour specific to the site
- Description of triggers and actions to take in the event of a flood
- Evacuation plan to be followed in the event of a flood (if required) (including evacuation point, triggers for evacuation and how to manage particular evacuees)
- List of actions to be completed to prepare for a flood event (including who is responsible for actioning each item and how often each action should be reviewed)
- List of actions to be followed when a flood event is imminent/occurring
- List of emergency contacts in case of a flood emergency
- List of actions to be followed during the recovery phase of a flood event.

This section of the FERP seeks to address the above requirements relating to specific information regarding the nature of flooding at the site and includes:

- Description of local flood behaviour including design flood event mapping
- Evacuation considerations
- List of key flood safety measures.

3.1. Existing Environment

The Development is located within a small urbanised catchment. The topography is relatively flat, with reduced levels (RLs) typically ranging between 14 and 16 metres Australian Height Datum (m AHD). Along the eastern site boundary, the land rises from about RL 14 m AHD at each end to a localised peak of RL 22 m AHD about midway along the length. There are three internal catchments within the MPE Site and a number of small external catchments that discharge into the site. The site catchments are shown in Figure 3-1.

There are three existing stormwater culvert outlets from the site. Two outlets discharge eastward to Anzac Creek and cross under the Greenhills Road formation via pipes and headwalls (Outlets A and B). Stormwater to these two culvert outlets is conveyed through the site via drainage pits and pipe to onsite detention basins (OSD), OSD 1 (Outlet A) and OSD 2 (Outlet B).

On the western portion of the site water from both the site and the eastern side of Moorebank Avenue is conveyed via pit and pipe to temporary lined swales which run within the site parallel to Moorebank Avenue. These channel flows discharge via a box culvert under Moorebank Avenue (Outlet C) which leads to the Georges River.

The following information is based on results from the flood model developed for the MPE Stage 2 EIS.

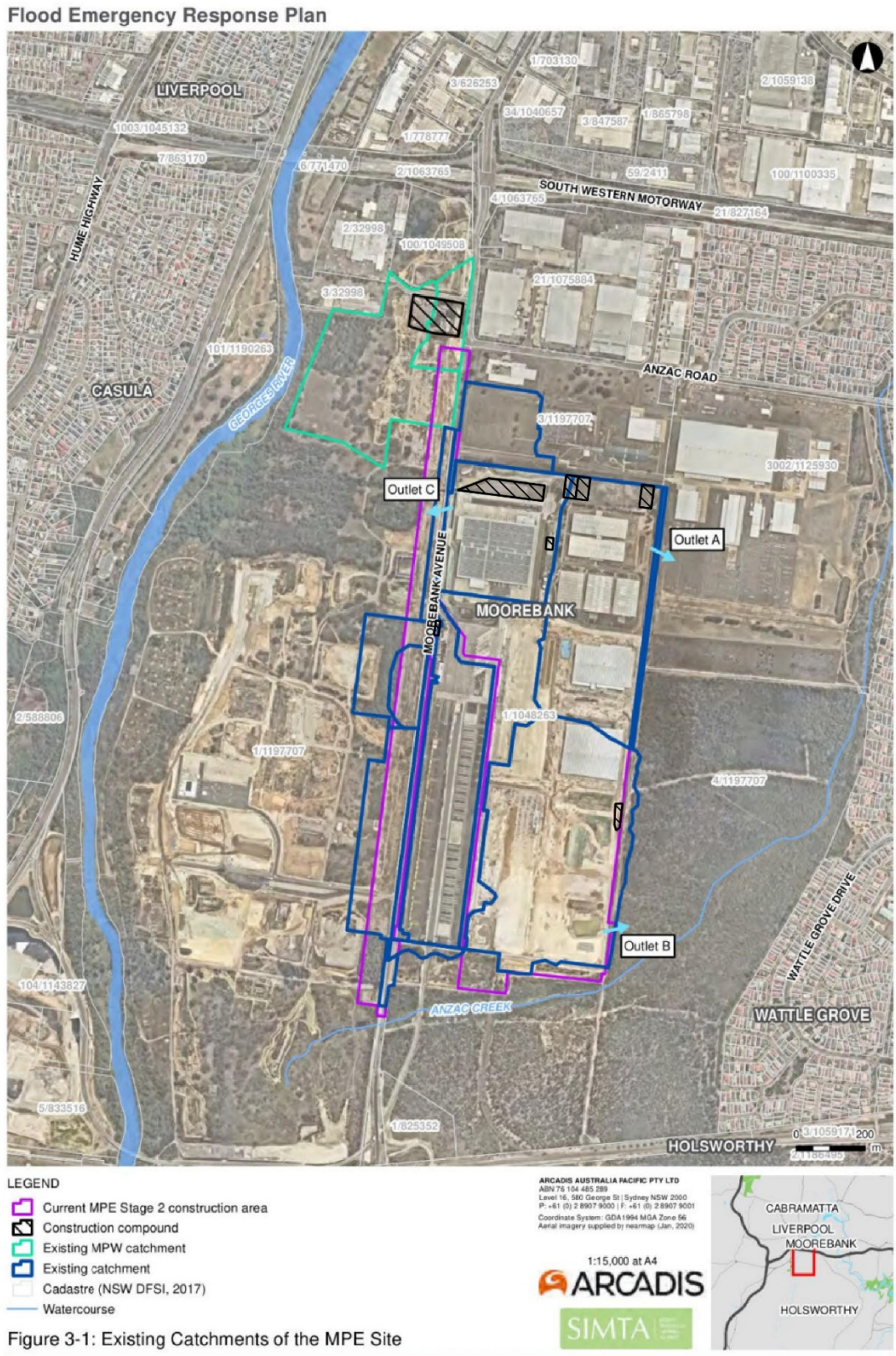

Figure 3-1: Existing Catchments of the MPE Site

Figure 3-1 Existing Catchments of the MPE Site

3.1.1. Predicted Flood Levels and Flood Risk

The Development site is located within upper catchment areas and, as recognised in the NSW Floodplain Management Manual (April 2005, Section L6.2) and there would be little if any available warning time for people to undertake action and/or evacuate the site prior to the site becoming isolated. The nature of flooding that would isolate the Development site is essentially overland flow or flash flooding; it is expected that a quick rate of floodwater rise will occur due to the small upstream catchment size. The peak flood level in both the modelled 1% Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) events is reached in less than an hour of the onset of flood producing rainfall (based on the modelled critical flood conditions as presented in Appendix P of the EIS). The period of flood inundation to the site is also expected to be of a similar order. Overall, the level of flood risk at the MPE Stage 2 site is relatively minor, with potentially hazardous conditions principally confined to the minor gully alignment along the southern boundary.

The OEH Floodplain Risk Management Guideline – Flood Emergency Response Planning Classification of Communities (2007) was developed in conjunction with the SES to assist in the prioritisation and requirements of emergency response assistance of communities during a flood event. It details the requirements of each classification in terms of potential resupply, rescue and evacuation. According to the Guideline, the Development site is classified as a “High Flood Island” as the Development site will become temporarily isolated during flood events which cause flooding to Moorebank Avenue and the Development site includes enough land higher than the limit of flooding (i.e. above the PMF) to cope with the number of people in the area.

This classification implies that evacuation of the Development site is required, together with resupply and potential rescue operations and that it will not be possible to provide adequate support during the period of isolation. However, while this response is relevant to long duration mainstream flood conditions where isolation could be of a long duration, the urban nature of the Development site catchment means that flood levels leading to isolation of the Development site will occur and dissipate within a short period of time. Due to the short duration (i.e. approximately one hour), ‘flashy’ nature of flooding at the Development site and the extensive areas of flood-free land above the PMF, the most appropriate emergency response for the MPE Stage 2 site is in line with the “Not Flood Affected” classification. This is because required responses of the “High Flood Island” classification would not be possible within the expected timeframe of an extreme flood event and resupply of the site will not be required during the short period of isolation.

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. It classifies the floodplain into six distinct hazard zones (H1 to H6) as shown in Figure 3-1, based on thresholds of flood depth, velocity and depth-velocity product. The adopted thresholds identify when modelled flood conditions would present a risk to people, vehicles and building constructions. A description of each hazard threshold is provided in Table 3-1.

Flood hazard mapping, undertaken for the MPE Stage 2 EIS (Appendix P), has been produced from the flood model outputs provided to BMT by Arcadis. The areas of inundation and flood hazard mapping during the construction are shown in Figure 3-4 (1% AEP) and Figure 3-5 (PMF).

It is noted from the flood hazard mapping that the majority of the Development is not affected by flooding during the 1% AEP design event. Additionally, the areas which are inundated are contained in specific areas on site and have predominately low flood hazard categories. This area (associated with Outlet B) has been filled and raised by approximately 1500mm. However, during the PMF event, higher flood hazard categories are experienced.

Under the modelled PMF condition the construction phase (or existing) flood behaviour affects a small area on the north-eastern corner of the MPE Site and the length of Moorebank Avenue bordering the western boundary of the site. These are also affected during the 1% AEP. The southern section of the Development experiences flooding with flood hazard reaching category 3 under the PMF event. This indicates that the area is unsafe for vehicles, children and the elderly. It is noted that the only vehicle access to the Development is the main entrance on Moorebank Avenue. The 100% ARI flood is depicted in Figure 3-2 Flood Level and Depth under existing conditions - 100 year ARI.

Figure 3-2 Flood Level and Depth under existing conditions - 100 year ARI

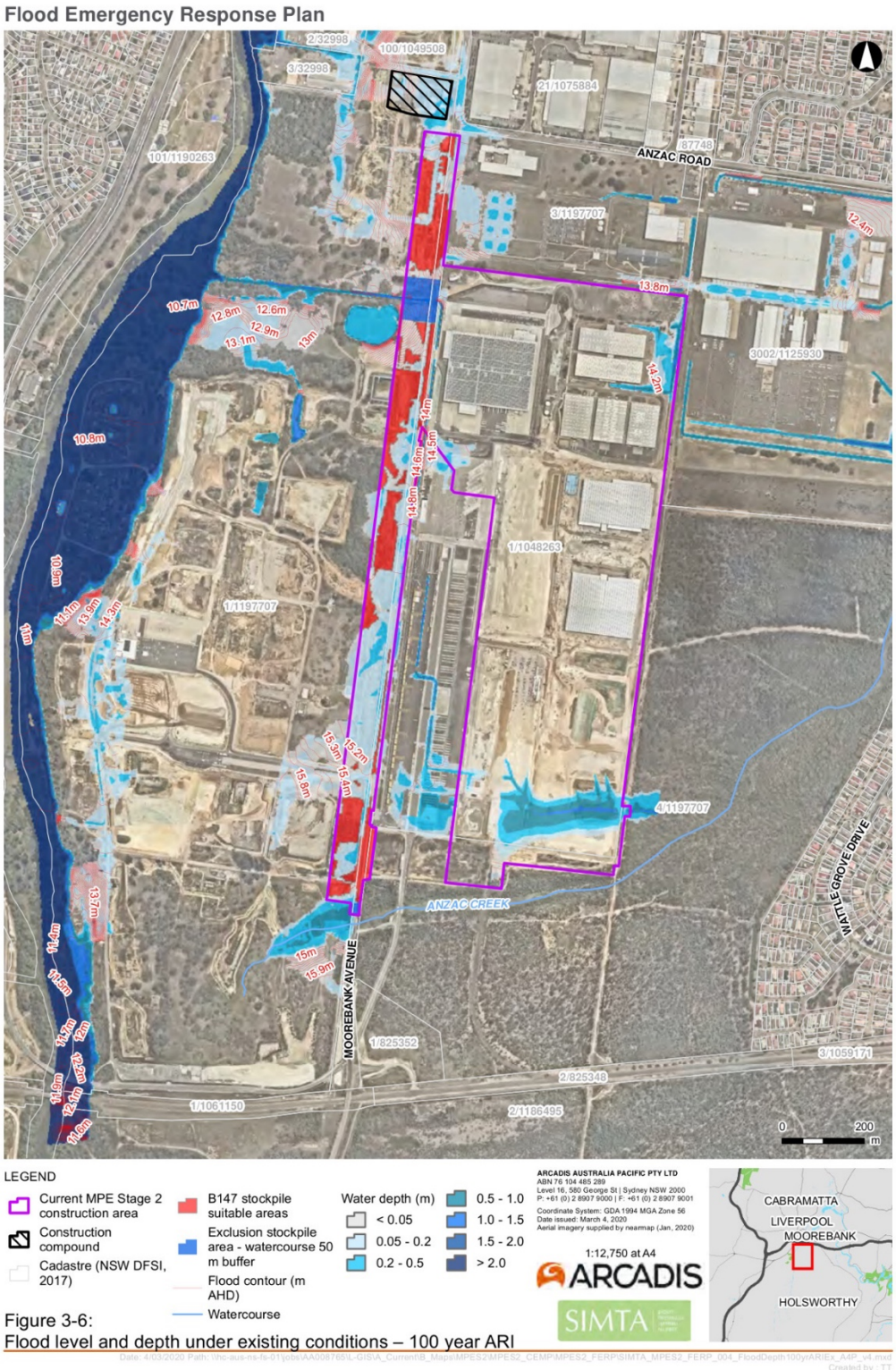

Figure 3-6:
Flood level and depth under existing conditions – 100 year ARI

Table 3-1 Flood Hazard Classification 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 vehicles. Buildings require engineering design and construction.
H6	Unconditionally dangerous. Not suitable for any type of development or evacuation access. All building types considered vulnerable to failure.

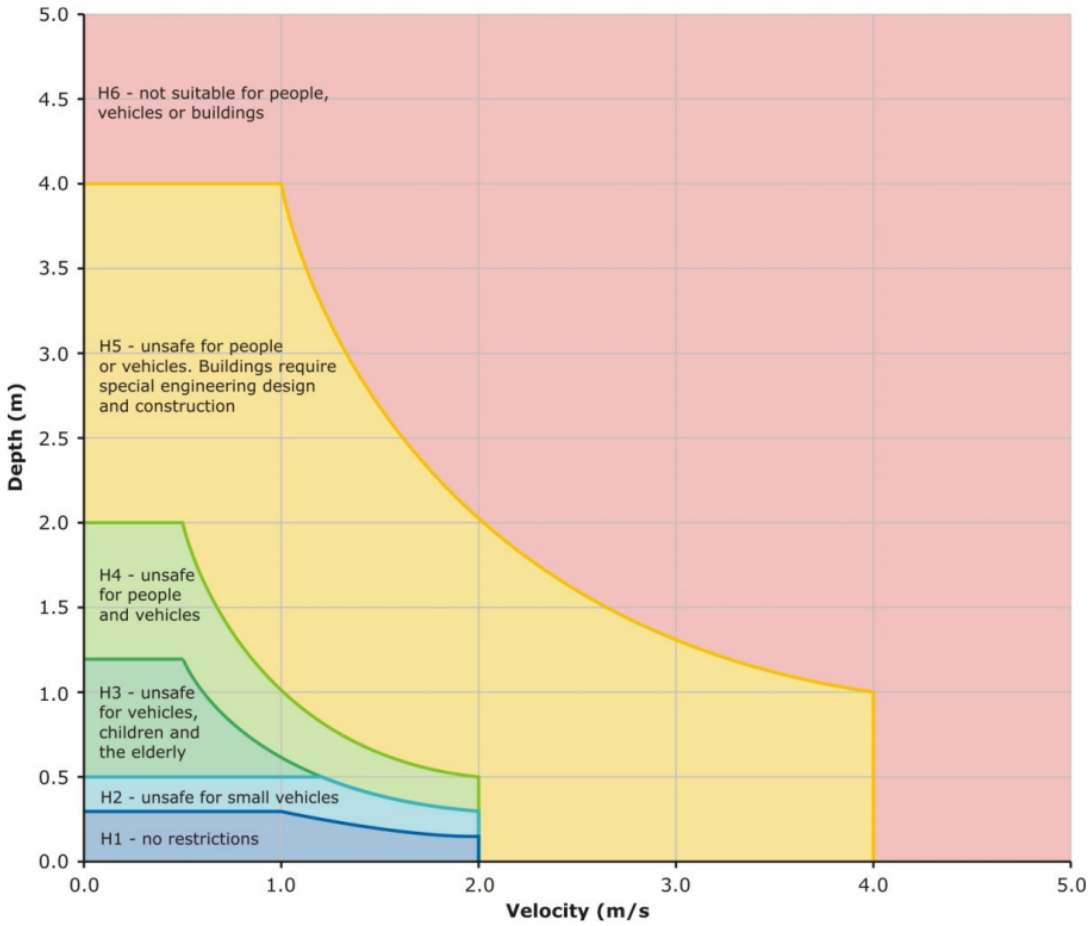

Figure 3-3 Flood Hazard Curves

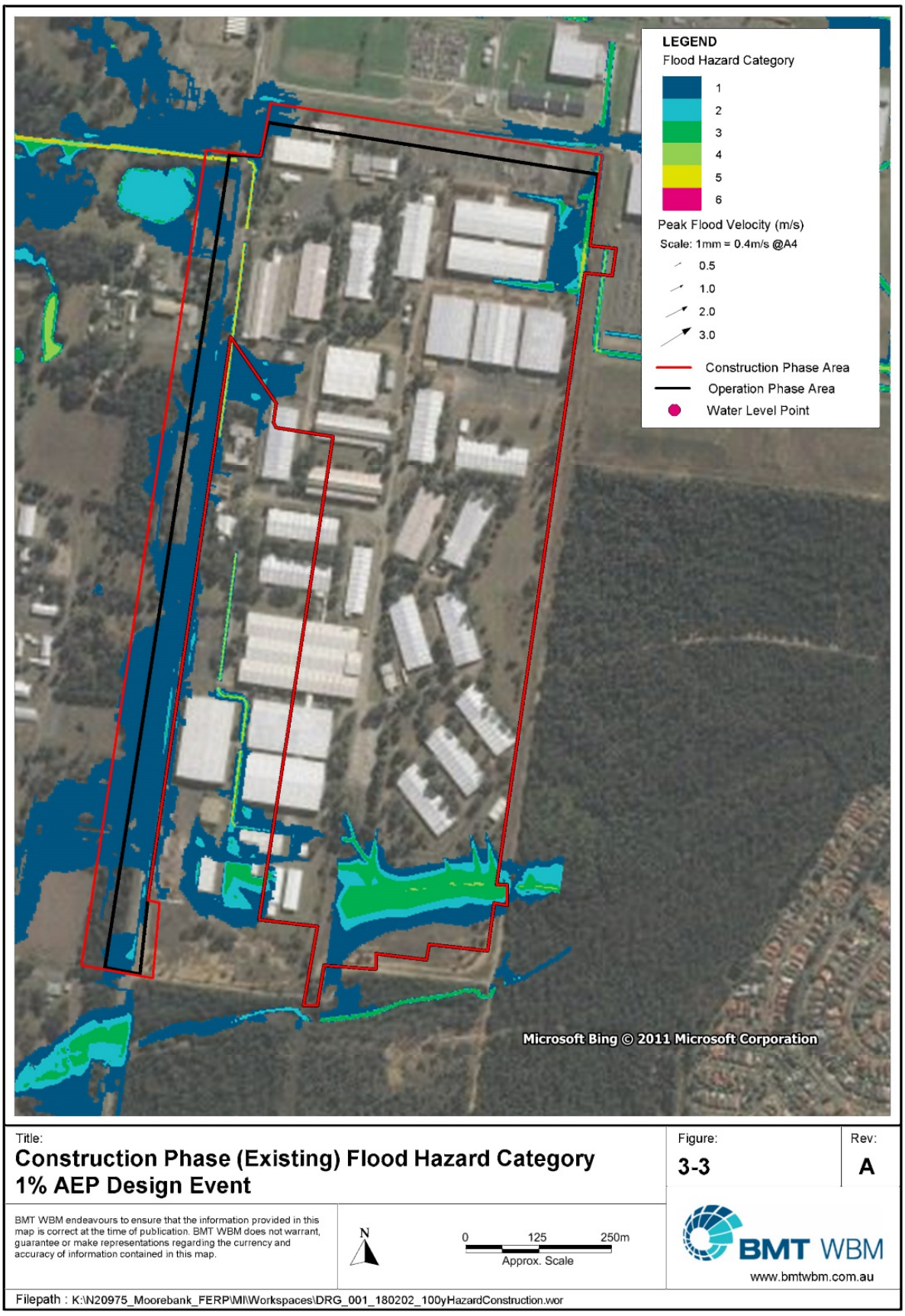

Figure 3-4 Construction Phase (Existing) Flood Hazard Category – 1% AEP Design Event

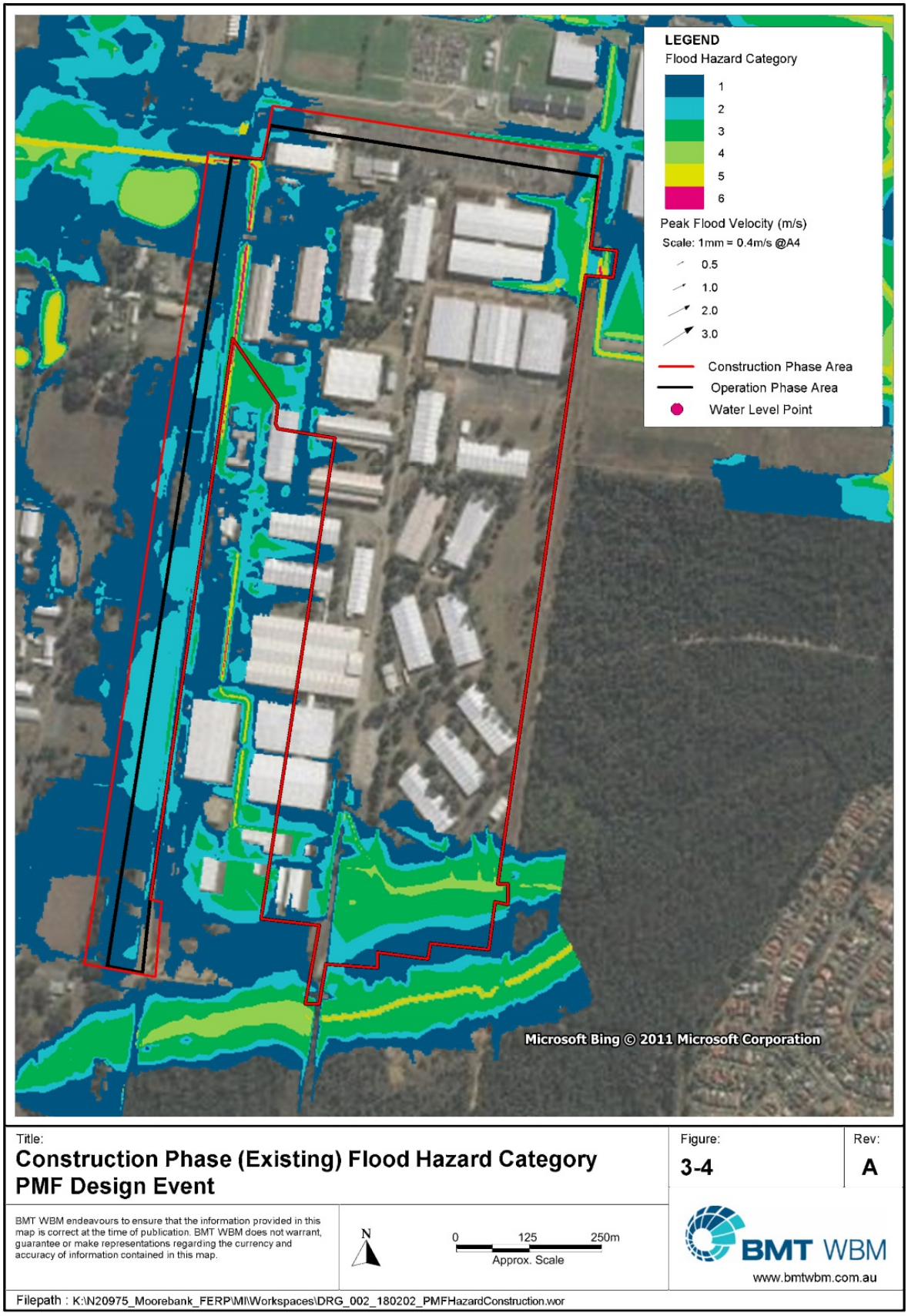

Figure 3-5 Construction Phase (Existing) Flood Hazard Category – PMF Design Event

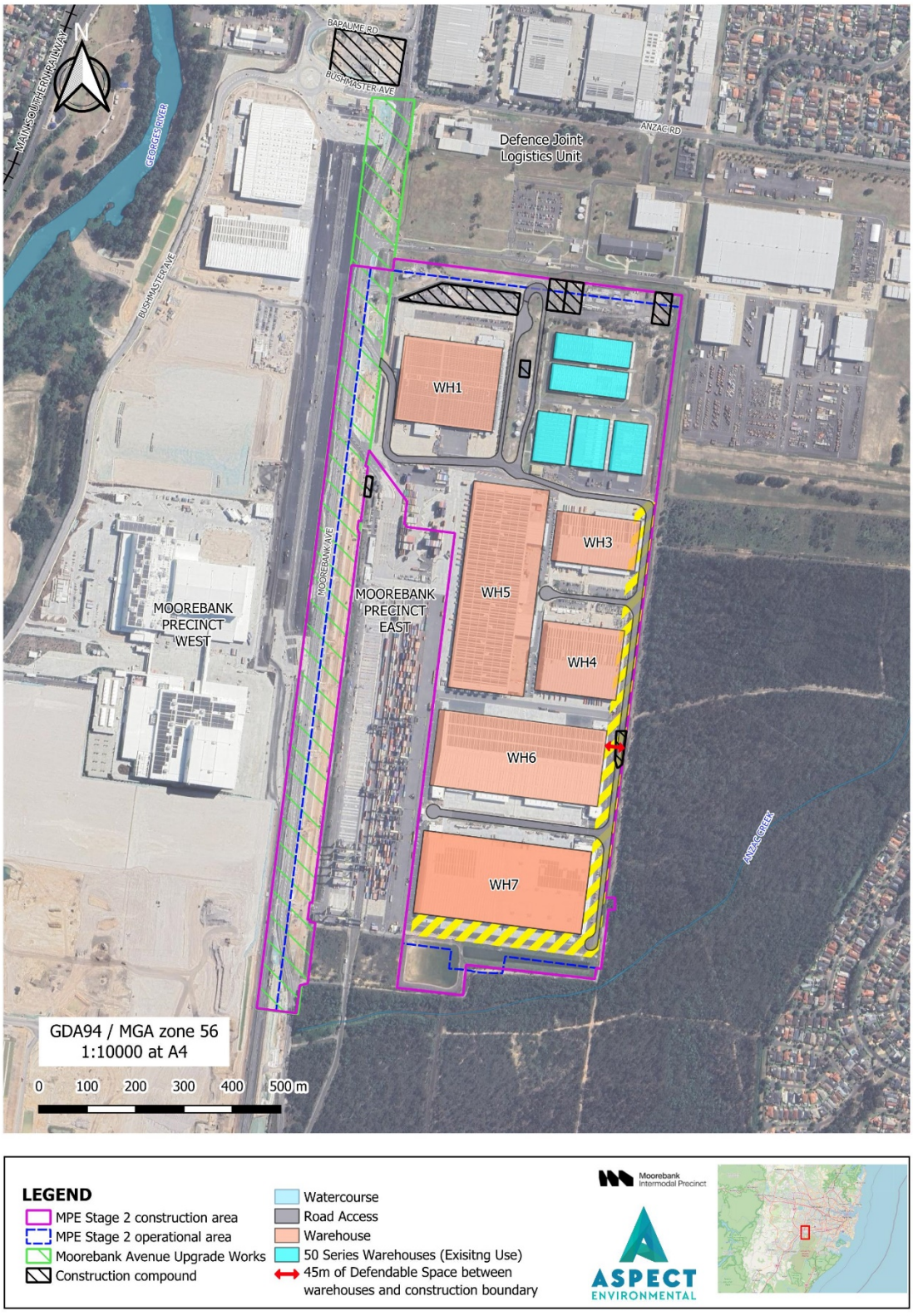

Figure 3-6 Emergency Access Point and Flood Emergency Assembly Area

3.2. Aspects, Impacts and Risks

The key aspects and impacts for the Development are outlined in Table 3-3. Risk rankings for each aspect have been assigned in accordance with Table 3-2.

Table 3-2 Risk Analysis Categories

Likelihood	Consequence				
	1 – Not significant	2 – Minor	3 – Moderate	4 – Major	5 – Severe
A – Almost certain	Moderate	Moderate	High	Very High	Very High
B – Likely	Low	Moderate	High	Very High	Very High
C – Possible	Low	Low	Moderate	High	High
D – Improbable	Low	Low	Low	Moderate	Moderate
E - Rare	Low	Low	Low	Low	Moderate

Table 3-3 Aspects, Impacts and Risks Related to Flooding

Aspects	Impacts	Risk
Altered surface water flow conditions due to earthworks	Localised flooding of site including excavations Diversion of water flows into sediment controls Restricted access to work areas Safety issues related to standing water	Low (2C)
Extreme rainfall	Overland flows from the local catchment (potentially influenced by backwater flood condition of Anzac Creek) causing flooding of site	Low (2E)

3.3. Cumulative Impacts

Assessment of potential cumulative stormwater and flooding impacts was undertaken as part of the preparation of the EIS (Refer to Section 19 of the EIS).

The assessment concluded that the cumulative impacts to stormwater and flooding are negligible, as it is unlikely that the Development would significantly alter overall erosion and sedimentation, as the site is located on already developed land. The Development is also required to maintain flooding and stormwater controls during construction and operation in accordance with local, State and Federal Regulations.

Management measures (see Section 3.4) are to be implemented prior to, during and after construction to minimise any impacts to the safety and wellbeing of any personnel on the

Development site. Appropriate implementation of these controls reduces the risk of stormwater and flooding impacts during construction of the Development.

3.4. Management Measures

3.4.1. Pre-Flood Actions

The following actions are to be undertaken as preventative measures to prepare for flooding on site:

- Daily monitoring of weather forecasts, using the Bureau of Meteorology (BoM)
- Training in flood emergency response to be provided to key personnel including Site Supervisors, Contractor's WM, and Contractor's CM
- Siting of construction compounds and stockpile areas outside the PMF inundation extent, as shown in Figure 3-5 (note that this does not apply to PMF inundation extents where final site levels have been achieved as per detailed design).

Flood response operations are to begin on receipt of BoM advice, or when other evidence leads to an expectation of flooding.

To minimise any potential impacts to construction staff, construction during periods of heavy rainfall can be stopped with staff to be located within flood-free areas of the site.

3.4.1.1. Flood Warning Time

Based on the DRAINS model in Appendix P of the EIS, for the existing conditions within the Development site, the design critical duration for 100-year average recurrence intervals (ARIs) are around 25 minutes and the PMF event is 15 to 30 minutes. Therefore, short duration, high intensity rainfall events could potentially produce significant flood flows in the area, resulting in a limited flood response time (approximately 10 minutes). As such, there would likely be an inadequate warning time to react before flooding of the Development site occurs.

3.4.2. Emergency Flood Response

The key principles of emergency flood response, according to the NSW State Flood Plan (March 2018) include the following:

1. Protection and preservation of human life (including the lives of responders and the community) is the highest priority
2. Evacuation is the primary response strategy for people impacted by flood.

Due to short response times, the most effective, realistic and safe emergency response option is:

1. Personnel to shelter in place at the emergency assembly point as depicted in Figure 3-6.
2. All personnel to remain on site until notified by the Contractor's WM and not attempt to enter or drive through any flood waters
3. Notification – Contractor's EM, CM or PM to notify the Principal's Representative. Regulator notification and incident management to be undertaken in accordance with the CEMP in Section 2.8.
4. Evacuate site from emergency assembly area once access roads are trafficable via the emergency access point depicted in Figure 3-6.

Flooding at the Development site is derived from small local catchments and as such, flooding would occur coincidentally with the flood-producing rainfall. Given the intensity of rainfall during an extreme event (>400 mm/h) it would not be possible to safely evacuate the Development site due to a severe restriction in visibility. Also, flood conditions within the local road network would be more hazardous than those on the Development site, which is predominantly flood free. Therefore, the shelter in place approach is the only practical response to flooding at the Development site and has been recommended as the appropriate emergency flood response.

It is expected that hazardous conditions would subside quickly in line with the short storm durations. There are no specific requirements for the on-site refuge facilities other than to be free from flooding at the PMF event. Standard provisions such as a first aid would be sufficient as it is not expected that the duration of flood inundation to the Development site would require prolonged periods of refuge.

Table 3-4 outlines flood emergency response measures that are to be instigated before, during and after flooding events occur to ensure the safety of site personnel.

Table 3-4 Flood Emergency Response Procedure

Response item	Action	Procedures	Responsibility	Timeframe
Monitor	Daily weather (intense heavy rainfall) / precipitation forecast monitoring	Monitor Bureau of Meteorology (BOM).	Contractor's EM Site Supervisor	Daily
BOM warning for flooding, or flash flooding)	Increase level of alert	Notify all Site Supervisors of warning. Monitor Bureau of Meteorology (BOM) website. Notify Principal's Representative	Contractor's EM	As required
ACTIVATION Occurrence of localised intense rainfall with associated observation of rising water levels on-site or adjacent waterways.	Mobilise site personnel to designated emergency assembly area or evacuation assembly area. Close site to external visitors Where it is safe to do so: • Mobile construction equipment, excess material, skips and hazardous substances will be removed from the flood prone area to areas of higher ground. • Power will be turned off until such a time that it	Immediately notify all personnel of the activation of flood emergency response plan. External notification in accordance with the CEMP Section 2.8.3	Site Supervisor Contractor's CM Contractor's WM	In less than 1 hour of localised intense rainfall with associated observation of rising water levels on-site or adjacent waterway

Response item	Action	Procedures	Responsibility	Timeframe
	is deemed safe to turn it back on • Site toilets and septic tanks to be pumped out into tankers • Loose materials to be moved out of flood prone area or secured • Emergency erosion and sediment controls will be implemented. This may include temporary bunds to divert water around key areas such as stockpiles and reduce risk to surrounding properties which might otherwise be affected Evacuate site once given the all clear from the Contractor's WM.			
Post-storm	Conduct safety walk through to determine whether or not it is safe to return to work and restore / repair flood damage in accordance with Section 4.1 below.	Restore erosion and sediment control devices as per the relevant Erosion and Sediment Control Plan.	Contractor's EM Contractor's CM Site Supervisor Contractor's WM Contractor's Safety Manager Electrician	Following end of flood alert

During flood emergency response, the following must also be undertaken by the Contractor's EM, Site Supervisors and Contractor's CM:

- Monitor the BoM website for warnings, ABC radio broadcasts, local emergency services social media pages, and local news outlets
- Follow all advice and instructions given by emergency services
- Ensure all occupants on-site are informed of the shelter in place approach and not to attempt evacuation from site until it is safe to do so.

3.4.3. Post- flood Responses

Following flooding of the site, the initial response is to determine whether or not it is safe to return to work. A safety walk through is to be conducted by the Contractor's EM, Contractor's CM, Site Supervisor, Contractor's WM, Contractor's Safety Manager Contractor, and electrician. The team is to assess the following:

- Likelihood of flood damage to access roads

- Determine whether flood waters have receded
- The electrician must check any inundated or water affected power boxes and electrical equipment. The power is to remain off until assessed by the electrician.

Once it is deemed safe to return to work, the following is be undertaken:

- Any equipment, materials or debris moved by the flood water should be returned to correct area, or disposed of in accordance with the Construction and Demolition Waste Management Plan (CDWMP) if damaged beyond repair/use
- Check stockpiles for erosion or losses. Restore erosion and sediment control devices as per the Construction Soil and Water Management Plan (CSWMP)
- Temporary onsite structures or partly constructed structures should be checked for erosion or other water damage prior to entering them or continuing work
- Check portable wastewater systems on site and schedule maintenance/servicing
- Determine whether any water held in excavations can be pumped to sediment basins/holding tanks for treatment prior to discharge. Undertake water testing/sampling in line with the CSWMP.

If conditions on the Development site are deemed not to be safe to return to work, then site personnel should remain within the shelter of the onsite refuge. However, in the event that conditions are expected to remain unsafe for an extended period of time, then the conditions of the road access into the Development site should be assessed. Once the road access can be safely used, then site personnel would be able to leave site if required.

4. Monitoring and Review

4.1. Monitoring

Daily site inspections are to be undertaken by the Site Supervisor (or delegate) and documented. Any maintenance of controls is to be recorded in site diaries during active site works. The Contractor's EM is to monitor the BoM daily to determine any potential upcoming flood risk.

Monitoring under this plan is to be undertaken by the Contractor's EM during weekly inspections of the Development activities to monitor compliance and conformance with the requirements of the CoCs and this plan. Weekly inspections are to focus on the following key issues:

- Storage of materials
- Erosion and sediment controls.

Weekly inspections are also to occur prior to Rostered Day Off, weekends and other times where the site will be closed or inactive for an extended period.

In addition, the implementation and record keeping of monitoring initiatives listed below will allow the Contractor's EM to determine compliance and conformance with the CoCs, and enable demonstration of good environmental best practice.

Environmental inspection checklists are to be used to verify compliance, conformance and effectiveness of controls. Items that require action are to be documented during environmental inspection and notified to the Site Supervisor. The Site Supervisor is responsible for providing appropriate resources in terms of labour, plant and equipment or other resource to enable the items to be rectified in the nominated timeframes.

4.2. Auditing and Reporting

Auditing and reporting is to be undertaken in accordance with the CEMP in Section 4.3.

4.3. Review and Improvement

Review and improvement of this plan is to be undertaken in accordance with the CoCs and Section 4 of the CEMP. Continuous improvement of flood emergency procedures will be achieved by the ongoing evaluation of environmental management performance and effectiveness of this plan.

A copy of the updated plan and changes is to be distributed to all relevant stakeholders in accordance with the approved document control procedure.

4.4. Notification

Relevant statutory and regulatory authorities are to be notified in the event of a flood as necessary and in accordance with Section 2.9 of the CEMP.

Environmental emergencies and incidents are to be handled by the Construction Contractor in accordance with the Section 2.9 of the CEMP.

4.5. Non-compliances, Non-conformances and Actions

It is the responsibility of all site personnel to report non-conformances and statutory non-compliances to the Site Supervisor and/or the Contractor's EM.

Non-compliances, non-conformances and corrective and preventative actions are to be managed in accordance with Section 4.4 of the CEMP.

4.6. Complaints Handling

Complaints handling is to be undertaken in accordance with Section 2.7.3 of the CEMP and the Construction Community Communication Strategy (CCCS).

5. References

AIDR (2017), Australian Disaster Resilience Handbook 7 Managing the Floodplain: A guide to Best Practice in Flood Risk Management in Australia, Guideline 7-3: Flood Hazard.

Arcadis (2016), Moorebank Precinct East – Stage 2 – Environmental Impact Statement.

Arcadis (2017), Moorebank Precinct East – Stage 2 – Response to Submissions.

Hyder Consulting (2013), Transitional Part 3A Concept Plan Application: Flood Study: Impact Assessment Report, prepared for Sydney Intermodal Terminal Alliance.

OEH (2007), Floodplain Risk Management Guideline – Flood Emergency Response Planning Classification of Communities.

APPENDIX A DEVELOPMENT CONSENT COMPLIANCE MATRICES

The Development is being delivered under Part 4, Division 4.1 (now Division 4.7 as of 1 March 2018) of the EP&A Act. The CoCs include requirements to be addressed in this plan and delivered during the Development. These requirements and how they are addressed along with division of responsibilities is provided in Table A-1.

Table A-1 Conditions of Consent

CoC	Requirement	Plan Section	How Addressed
A1	In addition to meeting the specific performance measures and criteria established under this consent all reasonable measures must be implemented to prevent, and if prevention is not reasonable, minimise, any harm to the environment that may result from the construction and operation of the development, and any rehabilitation required under this consent.	This plan Aspect-specific sub-plans	Section 3 of this FERP identifies the management measures to be implemented to prevent and minimise environmental harm. Section 4 sets out the processes for monitoring and reviewing the effectiveness of these management measures. Opportunities to further minimise environmental harm are to be identified through the ongoing evaluation of environmental management performance and effectiveness of this plan.
A2	The development may only be carried out: (a) in compliance with the conditions of this consent; (b) in accordance with all written directions of the Secretary in relation to this consent; (c) in accordance with the EIS, Submissions Report and MPE Stage 2 (SSD-7628) – Consolidated assessment clarification responses and updated Biodiversity Assessment Report; (d) in accordance with all Modification Assessments (if any); (e) in accordance with the amended development layout to be submitted for the Secretary's approval as part of this consent; and (f) in accordance with the management and mitigation measures at APPENDIX B of this consent.	This plan	This FERP has been developed to comply with the CoCs, written directions of the Secretary, amended development layout and management and mitigation measures included in the RtS Report.
A20	All licences, permits, approvals and consents as required by law must be obtained and maintained as required for the development. No condition of this consent removes the obligation for the Applicant to obtain, renew or	CEMP	All applicable licences, permits and approvals are to be obtained as required. Approvals, permits and licences required for the Development are discussed in the CEMP.

CoC	Requirement	Plan Section	How Addressed
	comply with such licences, permits, approvals and consents.		An Environmental Protection Licence (EPL) (No. 21054) was issued by the EPA on 4 June 2018. The licence applies to the Moorebank Precinct areas identified in condition A2.2. Scheduled activities include crushing, grinding or separating, and contaminated soil treatment. The licence enables the importation of material classified under a Resource Recovery Order where the onsite use (approved land use) is consistent with the applicable Resource Recovery Exemption.
B1	The Applicant must: (a) prepare each plan, program and other documents in consultation with the specified stakeholders; (b) not commence each phase of the project until the plans, programs and other documents required under this consent are approved by or, where not required to be approved, submitted to the Secretary specified within the timeframes; and (c) implement the most recent version of the required plans and programs approved by the Secretary for the duration of the development	N/A	No consultation requirements were required for the FERP. Construction did not commence until the FERP was submitted to the satisfaction of the Secretary. Section 1.5 confirms that the most recent version of the FERP is to be implemented for the duration of construction.
B52	Before the commencement of construction, the Applicant must prepare a **Flood Emergency Response Plan** to the satisfaction of the Secretary. The Plan must form part of the CEMP and OEMP required by conditions C1 and C3 and must:	Section 1.5	Section 1.5
	(a) be prepared by a suitably qualified and experienced person(s) whose appointment has been endorsed by the Secretary;	Cover page Appendix A	This FERP was developed by Daniel Williams. See front page for qualifications and details and Appendix A for the Secretary's endorsement.

CoC	Requirement	Plan Section	How Addressed
	(b) address the provisions of the *Floodplain Risk Management Guideline* (OEH, 2007) (as may be updated or replaced from time to time);	This plan	This plan was developed in line with the principals detailed within the Floodplain Development Manual and Flood Emergency Response Planning Classification of Communities, Floodplain Risk Management Guideline, OEH 2007.
	(c) include details of: • the flood emergency responses for both construction and operation phases of the development;	Section 3.4.2	The management measures describe actions to be taken pre, during and post flood during construction. Operational requirements are to be included within the Operational Environmental Management Plan and a Flood Emergency Response Plan, to be developed for operations
B52 *(cont…)*	• predicted flood levels	Section 3.1.1 Figure 3-6	The 1% AEP and PMF are described in Section 3.1.1 with 100% ARI shown in Figure 3-2.
	• flood warning time and flood notification	Section 3.4	Flood warning response times are outlined in Section 3.4.1.1 Flood notification is detailed in Section 3.4.2.
	• assembly points and evacuation routes	Figure 3-5	Shows the emergency assembly points and evacuation route
	• evacuation and refuge protocols	Section 3.4.2	Describes the process to be undertaken during flood response, i.e. to mobilise all personnel to the emergency assembly point
	• awareness training for employees and contractors	Section 2.4	Describes the appropriate content for inclusion into the Development induction for to be attended by all staff.
B53	The Applicant must:	Section 1.5	Construction works did not commence until the FERP was approved by the Secretary.

CoC	Requirement	Plan Section	How Addressed
	(a) not commence construction until the Flood Emergency Response Plan required by condition B52 is approved by the Secretary; and		
	(b) implement the most recent version of the Flood Emergency Response Plan approved by the Secretary for the duration of the development.	Section 1.5	Section 1.5 indicates that the most recent version of the FERP as approved by the Secretary is to be implemented.
C7	The Applicant must ensure that the environmental management plans required under this consent are prepared in accordance with any relevant guidelines, and include: (a) detailed baseline data;	Section 3.1	Section 3.1 details the existing environment
	(b) a description of: (i) the relevant statutory requirements (including any relevant approval, licence or lease conditions); (ii) any relevant limits or performance measures/criteria; and (iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	Section 1.3 Section 2.1 Section 1.6	(i) Section 1.3 provides information on the approvals required for the Development. Section 2.1 lists the legal and other requirements for the Development. (ii) (iii) Section 1.6 details the objectives and performance measures.
	(c) a description of the management measures to be implemented to comply with the relevant statutory requirements, limits or performance measures/criteria;	Section 3	Section 3 stipulates the management measures for flood emergency response.
	(d) a program to monitor and report on the:	Section 4.1 Section 4.3	(i) Program on monitoring and reporting of impacts and environmental performance is discussed under Section 4.1.

CoC	Requirement	Plan Section	How Addressed
	(i) impacts and environmental performance of the development; and (ii) effectiveness of any management measures (see (c) above);		(ii) Section 4.3 states ongoing evaluation on performance and effectiveness to be undertaken against policies, objectives and targets.
	(e) a contingency plan to manage any unpredicted impacts and their consequences	This plan	The flood assessment demonstrates that the site is unlikely to be exposed to long-term flooding and any flooding would be an abnormal situation. The measures outlined within this plan are therefore considered as to be used as contingency in the event of flooding.
	(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	Section 4.3	Improvement measures are discussed under Section 4.3 through ongoing evaluation and effectiveness of the program.
	(g) a protocol for managing and reporting any: (i) incidents and non-compliances; (ii) complaints; (iii) non-compliances with statutory requirements; and	See CEMP	Detailed within the CEMP
	(h) a protocol for periodic review of the plan.	Section 4.3	Detailed within Section 4.3

The Final Compilation of Mitigation Measures (FCMMs) were prepared as part of the MPE Stage 2 Response to Submissions Report (Arcadis 2017). A list of the FCMMs as relevant to the Development and how they have been compiled within this plan are provided in Table A-2.

Table A-2 Final Compilation of Mitigation Measures

FCMM	Requirement	Document Reference
0B	The Construction Environmental Management Plan (CEMP), or equivalent, for the Amended Proposal would be based on the PCEMP (Appendix G of the EIS), and include the following preliminary management plans: Flood Emergency Response and Evacuation Plan	This document
5C	A Flood Emergency Response and Evacuation Plan, or equivalent, would be prepared and implemented for the construction phase of the Amended Proposal to allow work sites to be safely evacuated and secured in advance of flooding occurring at the amended construction area.	This document

There are no Concept Plan Conditions of Approval (MP10_0193), Revised Statement of Commitments, Commonwealth Approvals or Commonwealth Mitigation Measures related to the Flood Emergency Response Plan (FERP).

It is noted that the Floodplain Development Manual and Flood Emergency Response Planning Classification of Communities, Floodplain Risk Management Guideline, OEH 2007 does not contain specific requirements for the preparation of flood emergency response plans.

APPENDIX B EVIDENCE OF ENDORSEMENT OF AUTHOR OF FERP

NSW GOVERNMENT | Planning & Environment

Mr [redacted]
Development Director
Qube Property Management Services
Level 25, 45 Clarence Street
SYDNEY NSW 2000

Our ref: DOC18/67992

Dear [redacted]

Subject: Moorebank Intermodal Terminal Precinct East -Stage 2 (SSD 7628) – Endorsement of persons to prepare the Flood Emergency Response Plan under condition B52(a)

Thank you for your email of 6 March 2018, nominating [redacted] and [redacted] of BMT WBM Pty Ltd to prepare the Flood Emergency Response Plan (FERP), for endorsement of the Secretary as required under condition B52(a).

The Department notes the information in the Curriculum Vitae provided for the nominated persons, including details of qualifications and relevant projects undertaken such as flood studies, flood impact assessment and emergency response planning. I consider that the nominated persons are suitably qualified and have the collective experience required to prepare the FERP.

Therefore I endorse the appointment of [redacted] to prepare the FERP, in accordance with condition B52(a).

If you have any queries about this matter, please contact [redacted] Team Leader – Infrastructure Management on Ph.9274 6454 or at [redacted]

Yours sincerely

[redacted]

Director – Infrastructure Management
As delegate of the Secretary