

Appendix B9 Construction Flood Management Sub-plan

M12 Motorway West

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Document Control

The Project Director is responsible for ensuring that this plan is reviewed and approved. The Project Director is responsible for updating this plan to reflect changes to construction, legal and other requirements, as required.

Amendments

Any revisions or amendments must be approved by the Project Director and/or client before being distributed / implemented.

Revision Details

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Document Review

Position	Name	Signature	Date
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Acronyms and Abbreviations

Abbreviation	Expanded text
AEP	Annual exceedance probability (AEP) represents the probability of a flood event occurring or being exceeded in any one year.
ARI	Average Recurrence Interval
ARSR	Amendment Report to the Submissions Report
AWS	Automatic Weather Station
BOM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
CFMP	Construction Flood Management Plan (this plan)
CoA	Condition of Approval
Construction	Includes all activities required to construct the CSSI as described in the documents listed in Condition A1, including commissioning trials of equipment and temporary use of any part of the CSSI, but excluding Low Impact Work which is carried out to complete prior to the approval of the CEMP, works approved under a Site Establishment Management Plan, demolition of acquired residential houses, structures and sheds, and works specified in Appendix B and approved under an environmental management plan(s) in accordance with Condition A24.
CPBGG JV	CPB Georgiou Joint Venture
CSSI	Critical State Significant Infrastructure
CSEP	Community and Stakeholder Engagement Plan
CSWMP	Construction Soil and Water Management Plan
CWRMP	Construction Waste and Resources Management Plan
DAWE	Former Commonwealth Department of Agriculture, Water and the Environment (now Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW))
DCCEEW	Commonwealth Department of Climate Change, Energy, Environment and Water
DPE	NSW Department of Planning and Environment (formerly DPIE)
DPIE	Former NSW Department of Planning, Industry and Environment (now DPE)
EES	Environment, Energy and Science (a group within DPIE)
EIS	Environmental Impact Statement
EMS	Environmental Management System
Environmental Assessment Documentation	Collective reference to the M12 EIS (Oct 2019), Submissions Report (Oct 2020), Amendment Report (Oct 2020), Amendment Report – Submissions Report (Dec 2020), Biodiversity M12 West and Central Consistency Assessments, Sydney Water Crossings Consistency Assessment, Design Boundary Changes Consistency Assessment, Minor Consistency Assessment and supplementary reports as detailed in NSW CoA A1.
EPA	NSW Environmental Protection Agency
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>

Abbreviation	Expanded text
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
EPL	Environmental Protection Licence
ERSED	Erosion and Sediment Control
ESM	Transport for NSW Environment and Sustainability Manager
ESR	Environmental Site Representative (CPBGG JV)
EWMS	Environmental Work Method Statement
Hold Point	A point beyond which a work process must not proceed without express written authorisation from Transport for New South Wales
OCEMP	Overarching Construction Environmental Management Plan
OCS	Overarching Communication Strategy
PIRMP	Pollution Incident Response Management Plan
Primary CoA/REMM	CoA or REMM that is specific to the development of this Plan
Project, the	M12 Motorway
QA	Quality Assurance
REMM	Revised Environmental Management Measure as provided in the Amendment Report
SEARs	Secretary's Environmental Assessment Requirements
Secondary CoA/REMM	CoA or REMM that is related to, but not specific to, the development of this Plan
SEMP	Site Establishment Management Plan
SES	State Emergency Services
TfNSW	Transport for New South Wales
Waterways	Refers to all areas of land submerged by water, permanently or intermittently, and include both artificial and natural bodies of water. It includes wetlands, creeks, floodplains, and dry river beds
WSIA	Western Sydney International Airport

1 Introduction

1.1 Context

This Construction Flood Management Sub-plan (CFMP or Plan) forms part of the Construction Environmental Management Plan (CEMP) for the M12 Motorway (the Project).

An Overarching Construction Environmental Management Plan (OCEMP) and overarching CFMP has been prepared by TfNSW to address the requirements of the NSW Conditions of Approval (CoA), the Revised Environmental Management Measures (REMMs) listed in the M12 Motorway Environmental Impact Statement (EIS) as amended by M12 Amendment Report, Transport for New South Wales (TfNSW) specifications and all applicable legislation.

This CFMP has been prepared by CPBGG JV for the West stage of the M12 Motorway Project to address the relevant requirements of the OCEMP, all relevant TfNSW specifications, Environmental Protection Licence (EPL) (#21595) conditions and legislation.

1.2 Background and Project Description

TfNSW is planning to construct and operate the M12 Motorway to provide direct access between the Western Sydney International Airport (WSIA) at Badgerys Creek and Sydney's motorway network. The M12 Motorway would run between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham for about 16 kilometres and is expected to be opened to traffic prior to opening of WSIA.

The CPB Contractors and Georgiou Group Joint Venture (CPBGG JV) has been awarded the M12 West stage (construct only contract) – between The Northern Road, Luddenham and about 250 metres east of Badgerys Creek.

The Project is subject to an approval under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as Critical State Significant Infrastructure (CSSI). The Project is also a controlled action under Section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), requiring a separate approval from the Australian Minister for the Environment.

An EIS was prepared to describe and assess the Project and recommend management measures to address impacts. As part of EIS development, a Flooding Assessment Report was prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW DPIE and the Commonwealth EIS Guidelines issued by the Commonwealth Department of the Water, Agriculture and Environment (DAWE). The Flooding Assessment Report was included in the EIS as Appendix L.

Further assessment of flooding impacts was undertaken subsequent to exhibition of the EIS and incorporated into the Amendment Report. The additional assessment considered the impacts on flooding due to amendment and refinements in the Project design, including changes in the Project footprint and ancillary facilities. A Flooding supplementary technical memorandum was included in the Amendment Report as Appendix H. REMMs were provided within the Amendment Report. Where applicable, the REMMs from the Amendment Report have been included in this CFMP.

Section 1.3 of the CEMP provides a detailed project description.

TfNSW developed a Construction Flood Management Sub-plan as part of the Overarching Construction Environmental Management Plan (OCEMP) for the M12 Motorway Project. The OCEMP has been approved by the Planning Secretary in accordance with NSW CoA C3 on 21/12/2021.

1.3 Scope of the Plan

Flooding may occur through the Site especially in and around waterways. This flooding may be accompanied by high flow velocities and/or deep water, constituting a hazard to personnel and equipment. The scope of this CFMP is to describe how the CPBGG JV will minimise environmental impacts resulting from flooding of the Project site during construction.

Operational flood impacts and operation measures do not fall within the scope of this CFMP and are therefore not included within the processes contained within the CFMP.

1.4 Environmental Management Systems Overview

The Environmental Management System (EMS) for the Project is described in Section 1.5 of the CEMP. The CEMP identifies reasonable and feasible measures to reduce the environmental impact of the Project.

This CFMP forms part of the environmental management framework for the Project, as described in Section 1.5 of the CEMP.

Management measures identified in this CFMP may also be incorporated into site or activity specific Environmental Work Method Statements (EWMS). EWMS incorporate appropriate mitigation measures and controls and identify key procedures to be used concurrently with the EWMS.

Environmental Work Method Statements (EWMS) detail a specific construction methodology and environmental mitigation and management measures for a high-risk activity or area. Examples include;

- Working over water or adjacent to/in Environmental Conservation Zone.
- Working adjacent to/in Environmental Conservation Zone.
- sourcing and management of construction water
- dewatering, including across Site boundaries

EWMS will be prepared by the Environmental Site Representative (ESR) and reviewed by the TfNSW Environmental and Sustainability Manager (ESM) (or delegate) and independent Environmental Representative (ER) prior to the commencement of the construction activities to which they apply. Construction personnel undertaking a task governed by a EWMS will undertake the activity in accordance with the mitigation and management measures identified in the EWMS.

Used together, the CEMP, strategies, procedures and EWMS form management guides that clearly identify required environmental management actions for reference by TfNSW and CPBGG JV.

The review and document control processes for this CFMP are described in Section 3.11, 3.12 and 3.13 of the CEMP. TfNSW will review this management plan to confirm consistency with the requirements of this OCEMP and specifications.

1.4.1 CFMP Preparation, Endorsement and Approval

This CEMP sub plan has been developed in accordance with the OCEMP, the CPBGG JV EMS and the Project EPL (#21595) and will be approved by the CPBGG JV Project Director and Environmental Site Representative (ESR) prior to submission to TfNSW.

The CEMP and Sub-Plans will go through a review and update process as described in section 3.1 of TfNSW Specification G36 to ensure the CEMP and associated documents have been developed in accordance with the OCEMP. TfNSW will provide the CEMP to the ER for approval.

A hold point shall be submitted in accordance with G36 Section 3.1 - Preparation and submission of CEMP. TfNSW shall consider the documents prior to authorising the release of the Hold Point. TfNSW may request additional information for inclusion in the CEMP before authorising the release of the Hold Point.

1.4.2 Interactions with Other Management Plans

This Plan has the following interrelationships with other management plans and documents:

- The Construction Soil and Water Management Plan (CSWMP) in Appendix B8 of the CEMP addresses the erosion and sedimentation impacts associated with construction activities
- The Site Establishment Management Plans (SEMP) in Appendix B10 of the CEMP provides details on the environmental controls to be installed at each ancillary worksite.
- The Pollution Incident Response Management Plan (PIRMP) in Appendix A9 of the CEMP.
- The Projects Emergency Response Plan provides details on the required actions in the event of an emergency situation.
- The Workplace Health and Safety Plan (WHSP) provides details on all health and safety requirements for the Project.

1.5 Consultation

1.5.1 Consultation for Preparation of the CFMP

This CFMP has been written in accordance with the TfNSW overarching CFMP and no external consultation was required for this plans development.

1.5.2 Ongoing Consultation during Construction

Consultation between CPBGG JV, TfNSW and its stakeholders, the community and relevant agencies will be undertaken during the construction of the Project as required. The process for the consultation will be documented in the Overarching Communication Strategy (OCS) and Community and Stakeholder Engagement Plan (CSEP).

In accordance with NSW CoA E16, measures identified in the State Infrastructure Approval aimed at minimising the impact of the Project on flood behaviour will be incorporated into the detailed design of the Project. The incorporation of these measures will be reviewed and endorsed by a suitably qualified and experienced person in consultation with directly affected landowners, NSW Environment, Energy and Science group (EES), DPI Water, DPI Fisheries, Infrastructure NSW and relevant councils. This includes measures related to construction and temporary design. Instances may arise whereby NSW CoA E17 (d), (e) and (g) may not be able to be achieved. In such instances agreement with the affected landowner will be sought by TfNSW and CPBGG JV. Where agreement cannot be reached, TfNSW will refer the matter to a suitably qualified and experienced independent person to advise and assist in determining the impact and relevant mitigation measures..

Ongoing consultation related to flood related impacts will include consultation with, but not be limited to emergency services such as the NSW State Emergency Service (SES) and NSW Police.

Key organisations identified in this CFMP are listed in Table 1-1.

Table 1-1: List of key organisations

Organisation	Responsibility
NSW State Emergency Service	Flood planning and intelligence, dissemination of flood warnings, evacuations, and emergency help in a flood event.
Bureau of Meteorology (BoM)	Flood forecasting, dissemination of flood warning, provision of real time river and rain data.
Councils (eg. Penrith and Liverpool City)	Flood intelligence and planning through flood studies and floodplain risk management studies and plans.
NSW Police	Coordination of resources or services in response to a flood emergency, respond to time critical emergency situations.

2 Purpose and Objectives

2.1 Purpose

The purpose of this CFMP is to describe flood related impacts will be managed during construction of the Project.

2.2 Objectives

The key objective of the CFMP is to ensure that impacts to the local community and the built environment from flooding are minimised.

To aid in achieving this objective all CoA, REMMs and licence/permit requirements relevant to flooding are described, scheduled and assigned responsibility as outlined in:

- The Environmental Assessment Documentation
- NSW CoA granted to the Project on 23 April 2021
- TfNSW Quality Assurance (QA) Specifications
- All relevant legislation and other requirements described in Section 3.1 of this Plan

2.3 Target

Targets for the management of flood related impacts during the Project are to:

- Achieve full compliance with relevant legislative requirements and the NSW CoA and environmental management measures
- Follow correct procedures for monitoring, preparation and evacuation of construction areas prior to a flood event
- Minimise and manage construction impacts on flooding avoid significant impacts to people and property
- Ensure training is provided in the form of inductions and toolboxes to all Project personnel on flood risks, protection measures and evacuation procedures before they begin work on site.

3 Environmental Requirements

3.1 Relevant Legislation and Guidelines

3.1.1 Legislation and Regulatory Requirements

Legislation relevant to flooding includes:

- *State Emergency and Rescue Management Act 1989*
- *State Emergency Service Act 1989*

Legislation relevant to flood management also includes the *Environmental Planning and Assessment Act 1979* (EP&A Act), under which the Infrastructure Approval was granted. Relevant provisions of the EP&A Act are explained in the register of legal and other requirements included in Appendix A1 of the CEMP.

3.1.2 Guidelines

The main guidelines, specifications and policy documents relevant to this CFMP include:

- Australia Rainfall and Runoff – A Guide to Flood Estimation, Commonwealth of Australia (Geoscience Australia), 2019
- Floodplain Development Manual (OEH, 2005)
- Floodplain Risk Management Guidelines (DPIE, 2020)
- Managing Urban Stormwater, Soils and Construction, Volume 1 4th Edition, March 2004 (Landcom 2004) and Managing Urban Stormwater, Volume 2D – Main Road Construction (DECC 2008)
- New South Wales State Emergency Management Plan (EMPLAN) (Office of Emergency Management, 2012)
- New South Wales State Flood Plan (a sub-plan of EMPLAN) (State Emergency Management Committee, 2015)
- New South Wales State Emergency Management Plan – Evacuation Management Guidelines (SEMC Evacuation Working Group, 2014)
- TfNSW Erosion and Sedimentation Management Procedure (Roads and Traffic Authority 2009)
- TfNSW QA Specification G36 – Environmental Protection (Management System)
- TfNSW QA Specification G38 – Soil and Water Management
- TfNSW Technical Guideline: Temporary Stormwater Drainage for Road Construction (TfNSW 2011)
- TfNSW Stockpile Management Guideline (TfNSW 2011)
- Penrith City Council LGA, South Creek Floodplain Risk Management Study and Plan (Penrith City Council, 2019)
- Liverpool City Council LGA, Austral Floodplain Risk Management Study & Plan (Liverpool City Council, 2003)
- Fairfield City Council LGA, Rural Area Flood Study (BMT WBM, 2013)

3.2 Minister's Conditions of Approval

It is noted that there are no Primary NSW CoA relevant to the development of this CFMP. Secondary CoA relevant to this Plan have been listed in Appendix C.

3.3 Revised Environmental Management Measures

The primary REMMs relevant to the development of this CFMP are listed in Table 3-1 below. A cross reference is also included to indicate where the REMM is addressed in this CFMP or other project management documents.

Table 3-1: Primary REMMs

ID	Measure/requirement	Timing	Document Reference
F03	A flood management plan will be prepared as part of the CEMP for the project and will detail the processes for flood preparedness, materials management, weather monitoring, site management and flood incident management. The flood management plan will be developed in accordance with:	Prior to construction	This CFMP Section 6.1 Section 6.2 Section 6.3 Section 6.4 Table 6-1 Section 7.4
	<ul style="list-style-type: none"> Managing Urban Stormwater, Soils and Construction, Volume 1 4th Edition, March 2004 (Landcom 2004) and Managing Urban Stormwater, Volume 2D – Main Road Construction (DECC 2008) 		Section 3.1.2 Table 6-1 (FL12, FL15, FL16, FL18, FL21, FL23, FL24, FL25) Appendix A
	<ul style="list-style-type: none"> TfNSW Erosion and Sedimentation Management Procedure (Roads and Traffic Authority 2009) 		Section 3.1.2 Table 6-1 (FL01, FL02, FL12, FL15, FL16, FL18, FL21, FL23, FL24, FL25) Appendix A
	<ul style="list-style-type: none"> TfNSW Technical Guideline: Temporary Stormwater Drainage for Road Construction (TfNSW 2011) 		Section 3.1.2 Table 6-1 (FL01, FL06, FL12, FL15, FL16, FL19, FL20, FL21, FL24) Appendix A
	<ul style="list-style-type: none"> TfNSW Stockpile Management Guideline (TfNSW 2011) 		Section 3.1.2 Section 6.1 Table 6-1 (FL11) Appendix A

3.4 TfNSW QA Specifications

The TfNSW QA Specifications set out the minimum requirements for the detailed outcomes in terms of quality or performance expected in the finished product for construction projects and are relevant to various construction activities on work sites to minimise impacts to the environment.

The specifications set out environmental protection requirements, including Hold Points that must be complied with by CPBGG JV during construction of the Project. A Hold Point is a point beyond which a work process must not proceed without express written authorisation from TfNSW.

The relevant TfNSW QA Specifications for the development of this CFMP are:

- TfNSW G36 – Environmental Protection
- TfNSW G38 – Soil and Water Management.

Refer to CPBGG JV CEMP Table 3-6 for Environmental Hold points (G36, G38 and G40).

4 Existing Environment

4.1 Catchment and Waterways

The M12 Motorway Project is located primarily within the South Creek sub-catchment of the Hawkesbury-Nepean catchment, within the Lower Nepean River Management Zone. Within the South Creek catchment, the West stage of the Project intersects Cosgroves Creek, Badgerys Creek, and South Creek. These creeks generally flow to the north, into South Creek which then flow north to join the Hawkesbury River at Windsor. An overview is provided in Figure 4-1.

The South Creek catchment was extensively modified and disturbed due to increasing urbanisation and associated land clearing for agriculture and rural land uses. The Hawkesbury River is the ultimate downstream receiving environment and is located about 29 kilometres from the Project at the closest point. The catchment is derived from Wianamatta Group Shales and characterised by meandering streams.

4.2 Topography

The topography of the Project area may be characterised as;

- Rolling hills terrain
- Flat to gently undulating terrain
- Creek channels/alluvial floodplain terrain, which dissects the flat to gently undulating terrain.

Within the rolling hills terrain, the topography typically comprises rounded hills with slopes of five to 20 degrees.

The topography of the flat to gently undulating terrain in the construction footprint typically comprises gentle rises and undulations with broad rounded crests with slopes of zero to five degrees. The flat to gently undulating terrain type is dissected by the Creek channel/alluvial floodplain terrain type by meandering creeks; Badgerys Creek, Cosgroves Creek, and South Creek, with each creek flowing to the north

The topography of the alluvial floodplains next to the creeks comprises low slopes of around zero (0) to two (2) degrees, which extend from the creek channels out to a maximum distance of about 500 metres.

4.3 Rainfall and Climate

The average yearly rainfall in the vicinity of the Project, based on data collected at the Badgerys Creek Automatic Weather Station (AWS) and averaged from 2014 to 2018, is 680.9 mm. The wettest month is February, with an average rainfall of 98.5 mm, while the driest month is July with an average of 23.6 mm (BOM, 2018).

Average maximum temperatures at the Badgerys Creek AWS, averaged from 2014 to 2018 are lowest in June at 21.2°C and highest in January at 41.2°C. Average minimum temperatures were lowest in July at 13.7°C, and highest in December at 21.1°C (BOM, 2018).

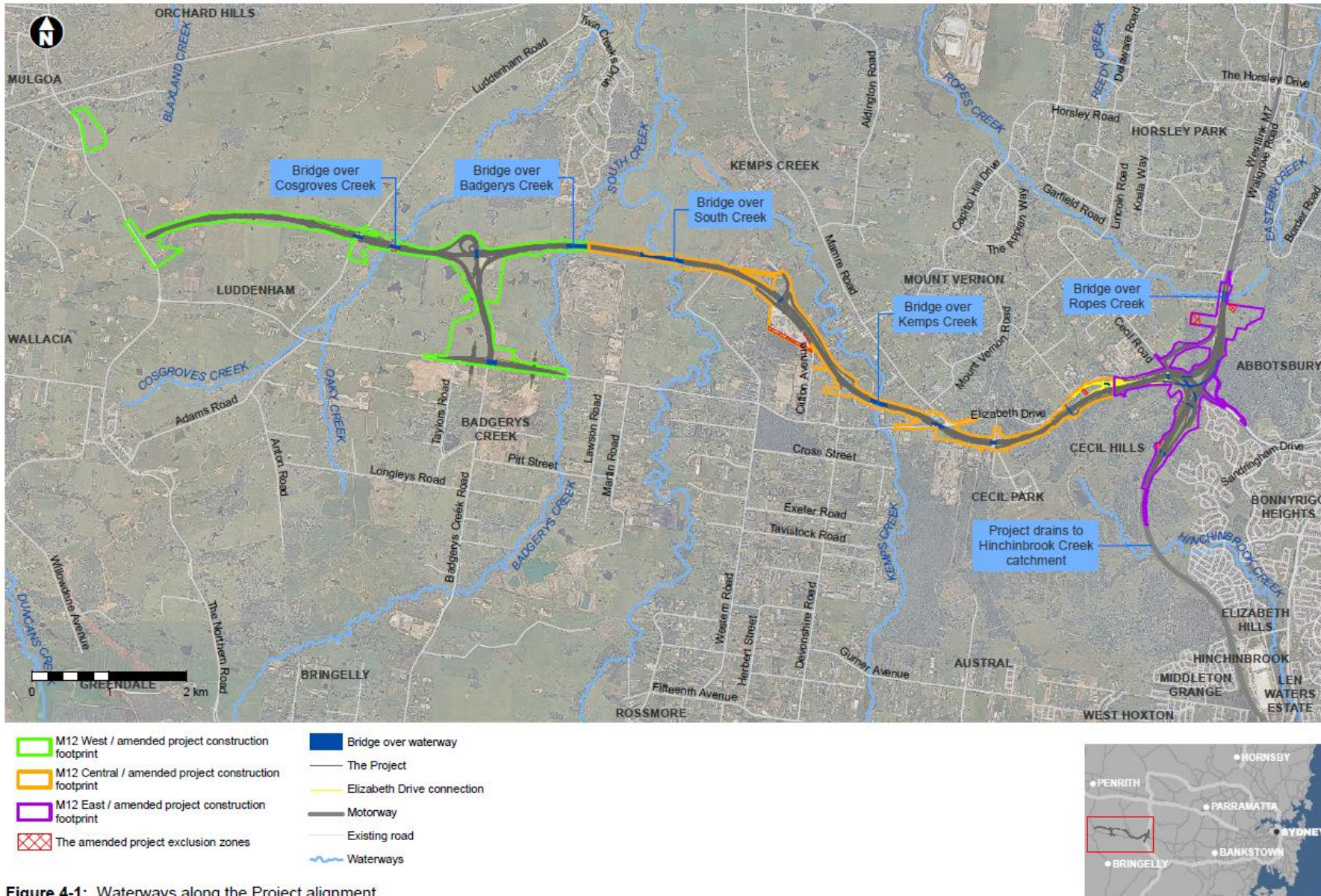
4.4 Summary of Existing Flood Behaviour

Flood modelling was carried out to assess the existing flood conditions during stormwater events (TfNSW M12 Motorway EIS, 2018). Table 4-1 provides an overview of the flood behaviour associated with major waterways for the Project. Flood extent mapping is provided in Appendix B.

Table 4-1: Existing flood conditions for the M12 West Motorway during the 100-year Average Recurrence Interval (ARI) flood event

Catchment	Flood conditions during the 100-year ARI flood event
Luddenham Road valley	<p>The Luddenham Road valley is small compared to the catchments of the other waterways. Peak flows tend to occur with short duration, high intensity storms rather than the long duration, saturating storms that produce peak flows in the main waterways.</p> <p>The main flow-path along the valley floor contains numerous farm dams that intercept and capture runoff. If these dams become full during a storm, the dams overflow, and excess runoff bypasses them to their side. Luddenham Road is not raised far above the valley floor so would be susceptible to regular flooding.</p>

Catchment	Flood conditions during the 100-year ARI flood event
	The peak runoff during the 100-year ARI event is 10 cubic metres per second along a flow-path about 90 metres wide.
Cosgroves Creek	Cosgroves Creek has a peak 100-year ARI runoff of 80 cubic metres per second along a flow-path about 120 metres wide.
Badgerys Creek	Badgerys Creek has a peak 100-year ARI runoff of 130 cubic metres per second along a flow-path about 170 metres wide. The project crosses this floodplain at a substantial angle. The effective floodplain is about 300 metres wide as it crosses the operational footprint.
South Creek	South Creek has a peak 100-year ARI runoff of 490 cubic metres per second along a flow-path about 500 metres wide. The low-flow channel of the creek crosses under the operational footprint at an angle and runs virtually parallel for several hundred metres. During a 100 year ARI flood the creek fills the wider floodplain and flows almost perpendicular to the project.



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Created by: GC | QA by: RB

Figure 4-1: Waterways along the Project (Green section is West stage)

5 Environmental Aspects and Impacts

5.1 Construction Activities

Key construction activities that have the potential to affect the existing flood conditions include:

- Earthworks: the fill associated with the construction of the motorway embankments will cause flow constriction / blockages and loss of storage
- Stockpiling and ancillary facilities: platforms and stockpiles, may affect flow paths and reduce floodplain storage
- Temporary creek crossing: the crossings present a minor obstruction to the creek flow (i.e. the crossing will become overwhelmed by much deeper and wider flows).

Additionally, partial or complete infilling of farm dams will be required for the construction of the Project. During construction, these dams would need to be dewatered and there will be permanent loss of floodplain storage associated with the changes to the dam footprints.

5.1.1 Ancillary Facilities

To support the construction of the Project, construction ancillary facilities will be required as identified in the Environmental Assessment Documentation. The majority of the construction ancillary facilities are located outside of the major floodplains to avoid and minimise impacts from earthworks on flow behaviour in the floodplains. The inclusion of any temporary fill within the floodplain, such as platforms and stockpiles, could affect flow paths and reduce floodplain storage.

Prior to establishment of these construction ancillary facilities, CPBGG JV will prepare a SEMP that will detail how the site establishment of the construction ancillary facilities will be carried out to meet the performance outcomes in relation to flooding outlined in the Environmental Assessment Documentation as per the requirements of NSW CoA A16.

Additional construction ancillary facilities may be established not assessed in the Environmental Assessment Documentation if the establishment and use of the facility will be in accordance with the flood impacts identified in the assessment and approval of the Project as per the requirements of NSW CoA A15. Any minor ancillary facilities will need to be assessed by the ER to have minor environmental impact with respect to waste management, soil, water and flooding as outlined in NSW CoA A20.

5.2 Impacts

Potential impacts from flooding depend on the nature, extent and magnitude of construction activities, the magnitude of the storm event and the natural environment. These impacts have the potential to affect flood resilience and may include:

- Increases in the rate of flow in the receiving drainage lines could result in scour and channel erosion, as well as a possible widening of the watercourse through a process of bank erosion
- Partial or total blockage of transverse drainage and temporary creek crossings by debris could result in floodwater surcharging onto the road and /or adversely affecting private property
- Surface water contamination if chemical storage areas are breached and hazardous chemicals migrate offsite
- Restricted access to ancillary construction areas and construction areas
- Safety risks associated with high flow velocities and/or deep water, constituting a hazard to personnel and equipment
- Inundation and damage to construction plant and equipment
- Increased runoff and sedimentation, especially if erosion and sediment controls (ERSED) are damaged.

Works on waterfront land will be undertaken in accordance with the CSWMP to minimise the potential for soil and erosion impacts.

Construction works such as road closures and traffic diversions may also have the potential to impact on flood evacuation routes. Discussion of flood emergency response is provided in Section 6.2.

6 Environmental mitigation and management measures

Management actions prescribed by this CFMP aim to minimise flooding impacts and are summarised in Table 6-1 and discussed below.

6.1 Pre-Flood Actions

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

- Daily monitoring of weather forecasts on the BOM website for storm events, heavy rainfall or flooding and flood warnings and alerts on the SES website.
- Training in flood emergency response will be provided to key personnel including CPBGG JV Superintendent and Foreman / Site Supervisor
- Earthworks activities e.g. placement of fill, that may affect existing drainage systems during construction will be planned and carried out so that existing hydraulic capacity of these systems is maintained where practicable
- Pre-rainfall inspections which include the following tasks:
 - Minimise obstructions within flood prone areas, including stockpiles
 - Relocate waste containers, loose materials, temporary stockpiles chemicals and dangerous goods above flood prone areas
 - Temporary stabilisation of exposed soils adjacent to waterways in flood prone areas
 - Identify plant and equipment that can be moved to higher ground
 - Inspect/repair erosion and sediment controls in accordance with the CSWMP.
- Conduct Flood Preparation Checklist (Appendix A)

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

6.2 Flood Emergency Response

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

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

If localised heavy rainfall occurs with associated observation of rising water level on-site or adjacent waterway, site personnel will be directed to follow the CPBGG JV Emergency Response Plan.

The response to incidents within the road will be managed in accordance with the memorandum of understanding between TfNSW and the NSW Police Service, NSW Rural Fire Service, NSW Fire Brigade and other emergency services.

During the flood event, the following will be undertaken:

- Continue to monitor the BoM website / app 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 incident response procedures (i.e. evacuation routes, assembly areas)
- Implementation of the flood mitigation measures as detailed in Table 6-1.

6.3 Post-flood emergency response

Following flooding of the site, the initial response will be to determine whether or not it is safe to return to work. A safety walk through will be conducted to assess the following:

- Likelihood of flood damage to access roads and construction works
- Determine whether flood waters have receded

- Power boxes and electrical equipment that have been inundated or water affected. The power is to remain off until assessed by the electrician.

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

- Any equipment, materials or debris moved by the flood water will be returned to correct area, or disposed of in accordance with the Construction Waste and Resources Management Plan (CWRMP) if damaged beyond repair/use
- Check stockpiles for erosion or losses. Restore erosion and sediment control devices as per the CSWMP
- Temporary onsite structures or partly constructed structures should be checked for erosion or other water damage prior to entering them or continuing work
- 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.
- clearing away of debris, sedimentation and blockage of uncompleted and temporary flood mitigation structures, as well as repairs required due to failures from overtopping of any temporary or partially constructed embankments and damage to partially constructed scour protection.

CPBGG JV will instruct flood emergency responses in accordance with the Emergency Response Plan.

6.4 Temporary works flood modelling

To ensure proposed temporary works comply with requirements outlined in NSW CoA E17, TfNSW will run three modelling scenarios for CPBGG JV's proposed temporary works. CPBGG JV will provide TfNSW with a 3D model of any temporary works following design of these temporary works. These temporary works may include piling platforms in the creek lines, waterway crossings, and stockpile locations. Work adjacent to creek lines that generally maintain the same grade of the existing ground will not need to be modelled for temporary works as flood levels will not be impacted.

The impact on flooding characteristics must be limited in areas outside the project boundary during any flood event up to and including the 1% AEP flood event, to the following:

- a) a maximum increase in inundation time of one hour;
- b) a maximum increase of 10 mm in above-floor inundation to habitable rooms where floor levels are currently exceeded;
- c) no above-floor inundation of habitable rooms which are currently not inundated;
- d) a maximum increase of 50 mm in inundation of land zoned as residential, industrial or commercial;
- e) a maximum increase of 100 mm in inundation of land zoned as rural, primary production environment zone or public recreation;
- f) no significant increase in the flood hazard or risk to life; and
- g) Maximum relative increase in velocity of 10%, where the resulting velocity is greater than 1.0 m/s, unless adequate scour protection measures are implemented and/or the velocity increases do not exacerbate erosion as demonstrated through site-specific risk of scour or geomorphological assessments.

Results of this modelling will inform whether changes are required to the temporary works to comply with the above or specific flood mitigation measures can be applied. Where additional flood mitigation measures are required this plan will be reviewed and updated. Instances may arise whereby NSW CoA E17 (d), (e) and (g) may not be able to be achieved. In such instances agreement with the affected landowner will be sought by TfNSW and CPBGG JV. Where agreement cannot be reached, TfNSW will refer the matter to a suitably qualified and experienced independent person to advise and assist in determining the impact and relevant mitigation measures. The flood modelling report for the temporary works at both Cosgroves Creek and Badgerys Creek has been completed and confirmed the proposed temporary works design complies with CoA E17.

Table 6-1: Flood management and mitigation measures

ID	Management Measure	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
FL01	Any works that will impact on waterways including construction of temporary diversion and works that reduce drainage capacity, will be planned to be undertaken in drier months where possible and minimum of two weeks dry weather to enable controls to be established. The months between May – September are considered the drier months for the project area. The construction program is to be reviewed to maximise works within waterways occurring during the drier months wherever possible.	Prior to construction, and during construction	Project Director	Best practice	Program Monitoring records
FL02	The siting of ancillary facilities will be chosen such that they do not worsen the existing flood characteristics of the area	Prior to construction	Superintendent / Foreman / Site Supervisor	Best practice	Site Establishment Management Plan
FL03	All construction personnel will be provided with information/training regarding the importance of flood warning and evacuation requirements	Prior to construction, and during construction	Health and Safety Manager	Best practice	Training Records
FL04	Minimise the extent of obstructions within the 20 year ARI flood extents as far as practicable at all times during construction. See Fig 8-1, 8-2 of Appendix B – Flood extent maps	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor	Best practice	Weekly inspections Pre-Rainfall Inspection Appendix B – Flood extent maps
FL05	Remove construction infrastructure and equipment from the 20 ARI flood level in the event of a forecast flood to minimise both the risk of damage to infrastructure /equipment and the risk of flood impacts on properties. If the SES flood alert on the SES website forecasts a flood >20 year ARI flood then relocate all construction infrastructure and equipment above the 100 year ARI flood level. See Appendix B – Flood extent maps	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor	Best practice	Pre-Rainfall Inspection Appendix B – Flood extent maps
FL06	Activities that may affect existing drainage systems during construction will be carried out so that existing hydraulic capacity of these systems is maintained where practicable.	During construction	Superintendent / Foreman / Site Supervisor	REMM F08	Weekly inspections
FL07	Monitor Bureau of Meteorology forecast for heavy rainfall events in order to allow sufficient time to vacate and prepare the site prior to the commencement of heavy rainfall and flood events.	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor / Environmental Site Representative / Health and Safety Manager	Best practice	Pre-starts
FL08	Monitor Bureau of Meteorology flood warnings for the Hawkesbury-Nepean catchment	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor /	Best practice	Pre-starts

ID	Management Measure	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
			Environmental Site Representative / Health and Safety Manager		
FL09	Relocate waste containers, chemicals and dangerous goods above the 20 ARI flood level in the event of a forecast flood. If the SES flood alert on the SES website forecasts a flood >20 year ARI flood then relocate all construction infrastructure and equipment above the 100 year ARI flood level. See Appendix B – Flood extent maps.	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor	Blue Book (Landcom 2004) Section 6.2	Pre-Rainfall Inspection
FL10	Locate plant and equipment above the 20 ARI flood level in the event of a forecast flood. If the SES flood alert on the SES website forecasts a flood >20 year ARI flood then relocate all construction infrastructure and equipment above the 100 year ARI flood level. See Appendix B – Flood extent maps	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor	Best practice	Pre-Rainfall Inspection
FL11	Stockpile areas and storage of chemicals, fuels and lubricants will be located above the 20 year flood level. See Fig 8-1, 8-2 of Appendix B – Flood extent maps	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor	Best practice	Pre-Rainfall Inspection Appendix B – Flood extent maps
FL12	Inspect/repair erosion and sediment controls in accordance with the CSWMP	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor	CSWMP	Pre-Rainfall Inspection
FL13	Upon determination of heavy rainfall event, advise staff and workers to prepare for a potential flood event and follow flood procedures for evacuation	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor / Health and Safety Manager	Best practice	Pre-start Pre-Rainfall Inspection Verbal
FL14	The response to incidents within the road will be managed in accordance with the memorandum of understanding between TfNSW and the NSW Police Service, NSW Rural Fire Service, NSW Fire Brigade and other emergency services.	Prior to construction, and during construction	Health and Safety Manager	REMM HS03	Emergency response management plan
FL15	Conduct safe walk through to determine whether or not it is safe to return to work.	Prior to construction, and during construction	Superintendent / Foreman / Site Supervisor / Health and Safety Manager	Best practice	Safety Inspection
FL16	Review and restore erosion and sediment control devices as per the Construction Soil and Water Management Plan.	Prior to construction, and during construction	Foreman / Site Supervisor / Environmental Site Representative	Best practice	Post-Rainfall Inspection

ID	Management Measure	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
FL17	Any equipment, materials or debris moved by the flood water will be returned to correct area, or disposed of in accordance with the Construction Waste Management Plan if damaged beyond repair/use	Prior to construction, and during construction	Foreman / Site Supervisor /	Best practice	Construction Waste Management Plan
FL18	Dewater site water in accordance with CSWMP - App D Dewatering Management Plan	Prior to construction, and during construction	Foreman / Site Supervisor / Environmental Site Representative	Best practice	Dewatering Records
FL19	Temporary works can also impact on stormwater behaviour with potential consequences for surrounding properties. Design and undertake all temporary works to comply with TfNSW G38 "Flood Management". Assess any temporary works to ensure no adverse impacts in accordance with the requirements of the environmental approvals for the project.	Prior to construction, and during construction	Foreman / Site Supervisor / Environmental Site Representative	TfNSW G38 spec	Temporary works design
FL20	To ensure that proposed temporary works comply with the requirements outlined in NSW CoA E17, TfNSW will run three modelling scenarios for the CPBGG JV's proposed temporary works. The CPBGG JV will need to provide TfNSW with a 3D model of any temporary earthwork extents for TfNSW to run the model. The findings of this modelling will inform the stage specific CFMP	Prior to construction, and during construction	Foreman / Site Supervisor / Environmental Site Representative	TfNSW G38 spec	Modelling Report
FL21	The design of temporary waterway crossings, stream diversions, drainage swales and depressions must be carried out by a suitably qualified and experienced professional in consultation with DPI Fisheries.	Prior to construction, and during construction	Foreman / Site Supervisor / Environmental Site Representative	TfNSW G38 spec	Temporary works design PESCPs
FL22	Make good any damage to partially constructed works or temporary works caused by the flood event following passage of a flood event. This includes clearing away of debris, sedimentation and blockage of uncompleted and temporary flood mitigation structures, as well as repairs required due to failures from overtopping of any temporary or partially constructed embankments and damage to partially constructed scour protection.	during construction	Foreman / Site Supervisor / Environmental Site Representative	TfNSW G38 spec	Post flood Inspection
FL23	Take all measures necessary to protect the water quality of the waterways during flood events. This includes protecting disturbed ground adjacent to waterways in flood prone areas from erosion and relocating all materials that could cause harm onto higher ground and away from flood prone areas.	during construction	Foreman / Site Supervisor / Environmental Site Representative	TfNSW G38 spec	Pre flood inspection
FL24	Temporary erosion and sediment controls and stormwater structures are to be constructed to the design ARI events detailed in TfNSW Annexure G38/E	Prior to construction, and during construction	Foreman / Site Supervisor / Environmental Site Representative	TfNSW G38 spec	Temporary works design PESCPs
FL25	When constructing sediment basins / traps embankment compaction testing must occur in accordance with TfNSW Annexure G38/L	Prior to construction, and during construction	Foreman / Site Supervisor /	TfNSW G38 spec	Inspection test plans (ITPs)



ID	Management Measure	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
			Environmental Site Representative		

7 Compliance Management

7.1 Roles and Responsibilities

The Project organisational structure and overall roles and environmental responsibilities are outlined in Section 3.3.1 of the CEMP. Specific responsibilities for the implementation of flood management are detailed in Table 6-1 of this CFMP.

7.2 Training

All site personnel (including sub-contractors) will undergo site induction training that include details of this CFMP and the flood preparation, warning and evacuation requirements prior to construction commencing.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in flood management or those undertaking an activity with a high risk of environmental impact. This will include testing the flood emergency response / evacuation in accordance the Emergency Response Plan at nominated intervals throughout the construction period.

Daily pre-start meetings conducted by the Superintendent will inform the site workforce of any environmental issues relevant to flooding that could potentially be impacted by, or impact on, the day's activities.

7.3 Communication

TfNSW has prepared an OCS in accordance with the requirements of NSW CoA B1 and B2 to document the approach to stakeholder and community communications for the Project. The OCS identifies opportunities and tools for providing information and consulting with the community and stakeholders during the construction of the Project. CPBGG JV will support the delivery of the OCS through the implementation of the Community and Stakeholder Engagement Plan (CSEP).

In the event a flood warning is received it will be communicated to the workforce in accordance with the project emergency response plan and relevant stakeholders notified.

Flood management information will be communicated to the community and stakeholders in accordance with the principles and procedures outlined in the OCS. CPBGG JV will provide timely, accurate, relevant and accessible information, with provision for feedback through a complaints line during construction.

7.4 Inspections and Monitoring

Inspection and monitoring requirements relevant to flooding are summarised in Table 7-1.

Table 7-1: Inspections and monitoring relevant to flooding

Inspection / monitoring	Frequency	Responsibility	Document Reference
Review BoM forecast and the SES website for heavy rainfall events (e.g. >80mm in 24 hours) and flood warnings for the Hawkesbury-Nepean catchment Maintain daily rainfall records in millimetres	Daily	Superintendent / Foreman / Site Supervisor / Environmental Site Representative	Section 6.1
Weekly environmental inspection. This includes inspection of; <ul style="list-style-type: none"> check dams and sediment fences stormwater entry points such as pits and inlets Rectify any stormwater blockages immediately. Clear sediment from behind check dams and sediment fences on a regular basis.	Weekly	Superintendent / Foreman / Site Supervisor / Environmental Site Representative	CEMP Section 3.9.1

Inspection / monitoring	Frequency	Responsibility	Document Reference
<p>Pre-flood inspection</p> <ul style="list-style-type: none"> Minimise obstructions within flood prone areas identify plant and equipment that can be moved to higher ground inspect/repair erosion and sediment controls in accordance with the CSWMP Relocate waste containers, chemicals and dangerous goods above flood prone areas Conduct Flood Preparation Checklist (Appendix A) 	Prior to heavy rainfall	Superintendent / Foreman / Site Supervisor / Environmental Site Representative	Appendix A – Flood Preparation Checklist (App A) Section 6.1 CEMP Section 3.9.1
<p>Post-flood inspection</p> <ul style="list-style-type: none"> Conduct safe walk through to determine whether or not it is safe to return to work. Identification of erosion and sediment controls which require maintenance/repair in accordance with the CSWMP. 	Following flood event	Superintendent / Foreman / Site Supervisor / Safety Representative	Section 6.3

Requirements and responsibilities in relation to monitoring and inspections are documented in Section 3.3.1, 3.9 and Appendix A8 of the CEMP.

7.5 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this CFMP, CoA and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in Section 3.9 of the CEMP.

7.6 Reporting and Identified Records

Should an environmental incident occur as a result of flooding on the Project site, it will be reported in accordance with the M12 Environmental Incident Reporting Procedure provided in Appendix A7 of the CEMP. A Memorandum of Understanding (MoU) exists between TfNSW and NSW Police Service, NSW Rural Fire Service, NSW Fire Brigade and other emergency services for response to incidents within the road network.

Pollution incidents associated with flood events will be managed in accordance with the Pollution Incident Response Management (PIRMP) which is a part of the CEMP (Appendix A9). Reporting requirements under the PIRMP include immediate notification to the EPA, NSW Health, Fire and Rescue NSW, WorkCover NSW and the relevant local Council.

CPBGG JV will maintain accurate records substantiating all construction activities associated with the Project, including measures taken to implement this CFMP.

Key identified records relevant to this CFMP as specified by TfNSW specifications are identified in Table 7-2.

Table 7-2: Identified Records

Requirement	Description	Document Reference
TfNSW QA G38	Register of inspection and maintenance measures	Section 7.5
TfNSW QA G38	Dewatering records	CSWMP App D
TfNSW QA G36	Records of emergency responses	PIRMP, ERP, HSMP
TfNSW QA G36	Records of spill prevention measures and responses	PIRMP
TfNSW QA G36	Waste records of Emergency Response - Waste Management Register	CWRP

8 Review and Improvement

8.1 Continuous Improvement

Continuous improvement of this CFMP will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance
- Determine the cause or causes of non-conformances and deficiencies
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies
- Verify the effectiveness of the corrective and preventative actions
- Document any changes in procedures resulting from process improvement
- Make comparisons with objectives and targets.

The project environmental risks are identified and included in the risk register and appropriate mitigation measures will be implemented throughout the construction of the Project as part of the continuous improvement process. The process for ongoing risk identification and management during construction is outlined in Section 3.2.1 of the CEMP.

8.2 CFMP update and amendment

The processes described in Section 3.10, 3.12 and 3.13 of the CEMP may result in the need to update or revise this CFMP. This will occur as needed.

Any revisions to the CFMP will be in accordance with the process outlined in Section 3.13 of the CEMP.

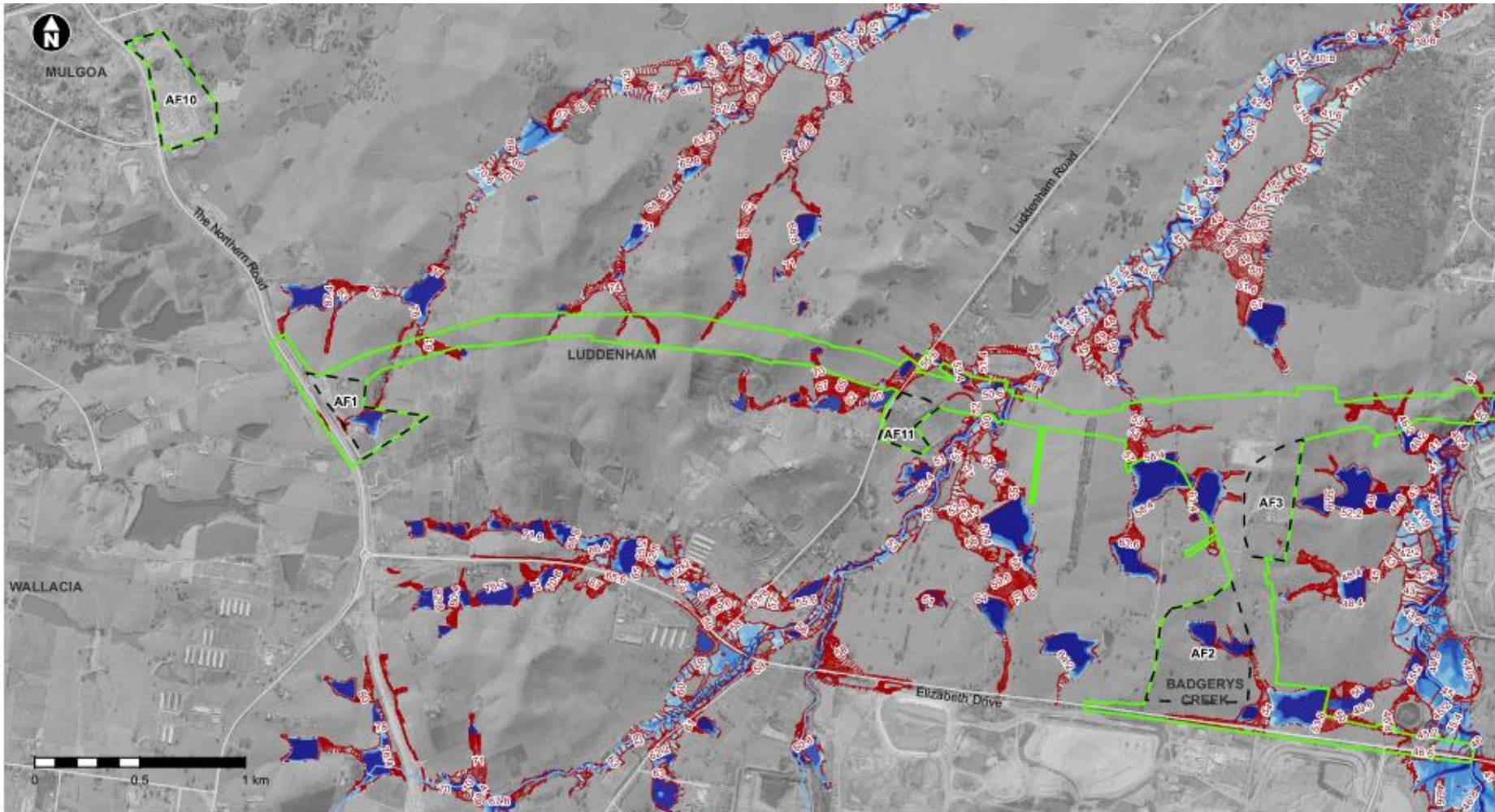
A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure – refer to Section 3.1 of the CEMP.

Appendix A – Flood Preparation Checklist

The following activities should be carried out prior to a Flood Event and signed off as complete by the Project Manager or authorised delegate. It should be noted that a “Flood Watch” can be issued without an actual flood occurring. Therefore, consideration of the actions listed below and the timeframe for securing the work site and moving plant and equipment will be decided by the Project Director and Superintendent on a case-by-case basis depending on the most current information available and advice received from SES.

#	Action	Yes / No	Comments
1	Secure objects that are likely to float and cause damage.		
2	Ensure construction equipment (or excess materials) are removed from the flood prone areas especially around the creek areas		
3	Relocate waste containers, chemicals and dangerous goods to above the 1/20 ARI flood level		
4	Ensure effective erosion control in the form of ground cover is in place especially at culvert worksites		
5	Locate plant and equipment on high ground when flooding is expected.		
6	Amenities wastewater is transported offsite by a licensed operator to a licensed disposal facility.		
7	Where minor flooding occurs in the works area set up temporary diversion or pumping of low flows around the works area		
8	Turn off electricity, secure generators and secure gas cylinders.		
9	All stockpiles to be above the 1 in 20 year flood level.		

Appendix B – Existing conditions flood extent maps



Project construction boundary (CA for West and Central, Oct 2021; ARSR for East, Dec 2020)
 M12 West
 Ancillary facility

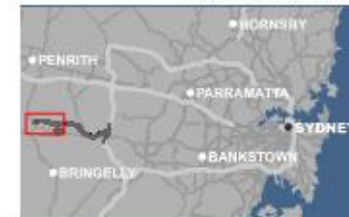
Existing road
 Waterways
 0.2m Flood Height Contour (m AHD)

Flood Depth (m)
 < 0.2
 0.2 - 0.5
 0.5 - 1.0
 1.0 - 1.5
 1.5 - 2.0
 > 2.0

Imagery: Aerialphotos August 2020

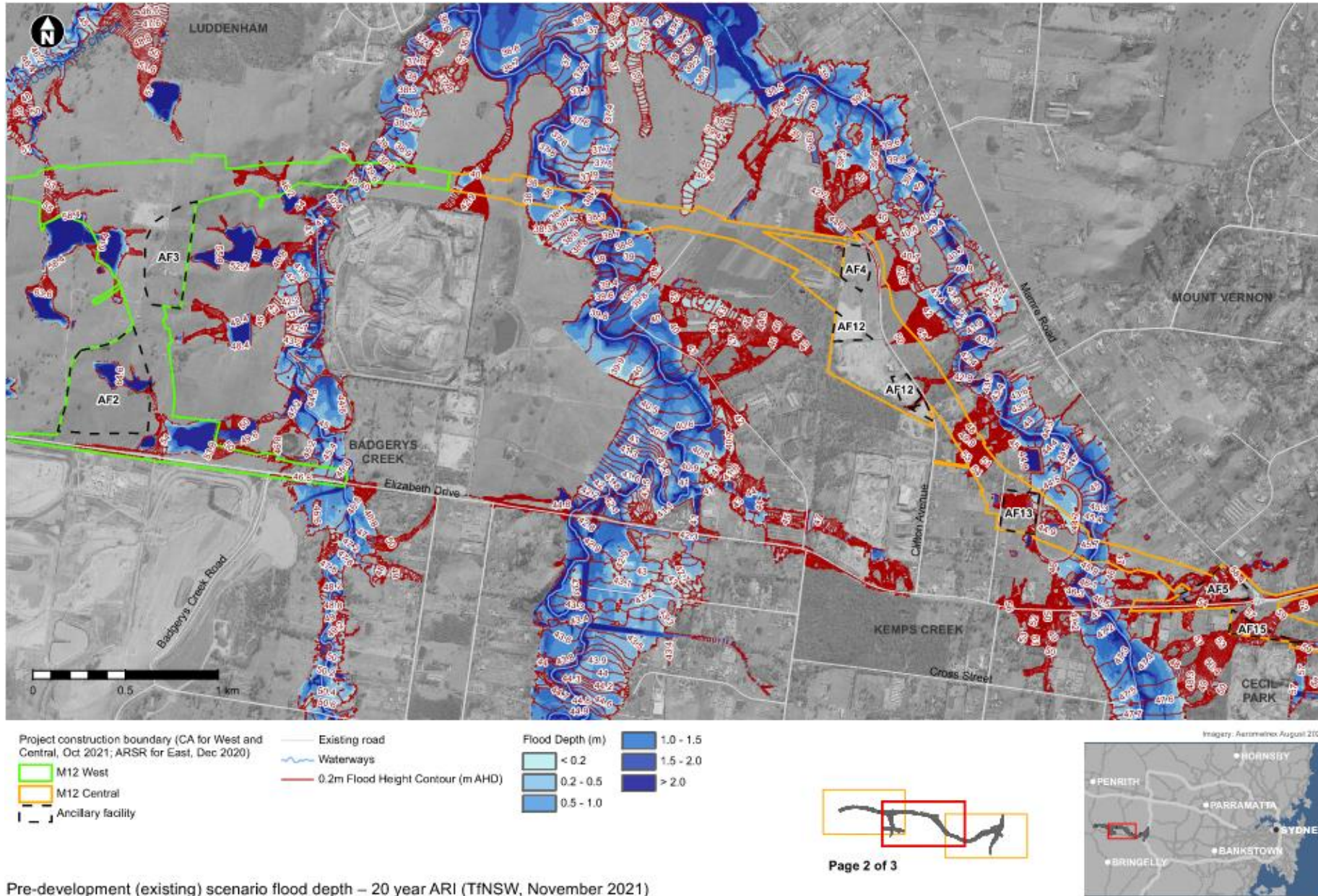


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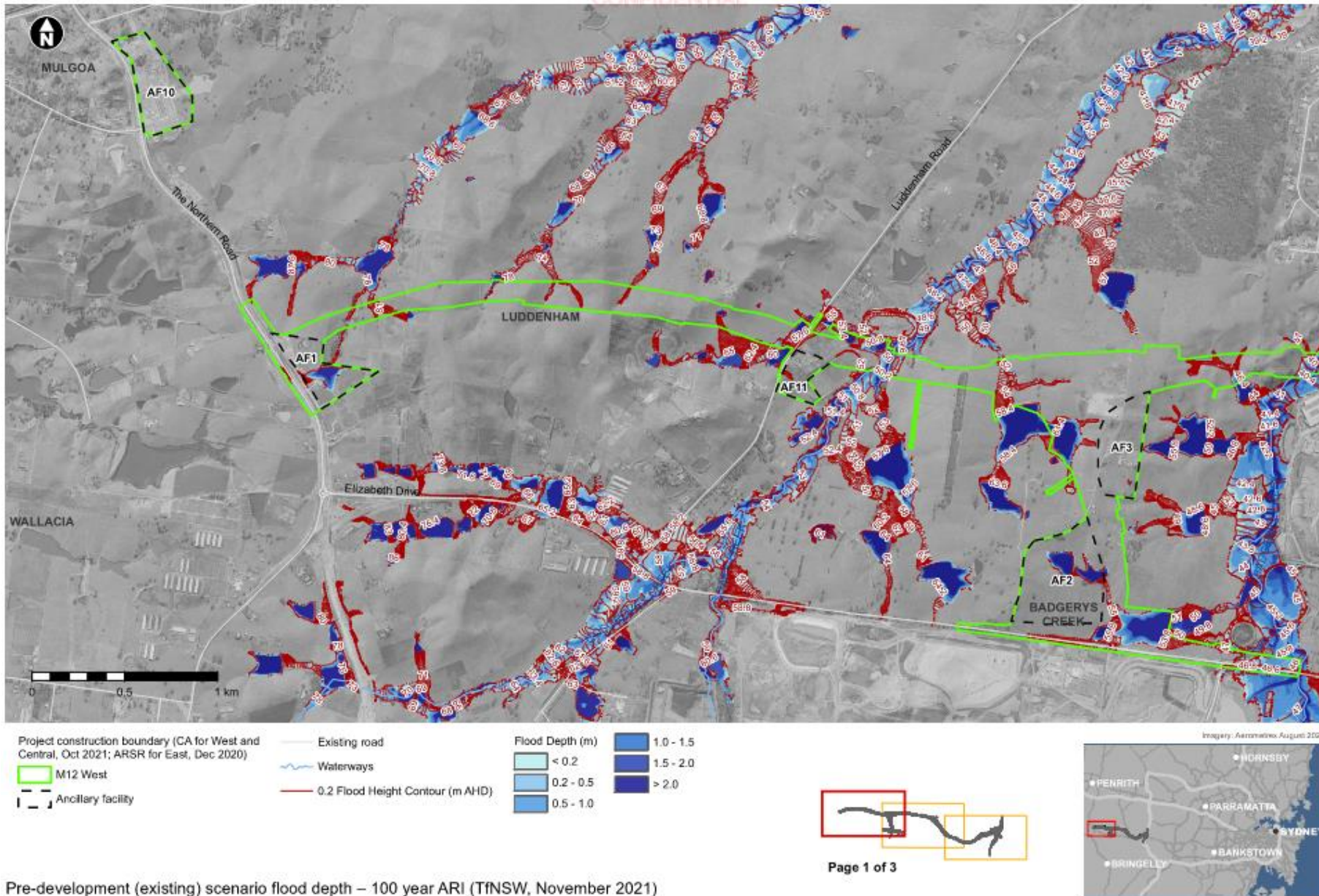
Pre-development (existing) scenario flood depth – 20 year ARI (TfNSW, November 2021)

Figure 8-1: Existing conditions during a 20 year ARI flood event



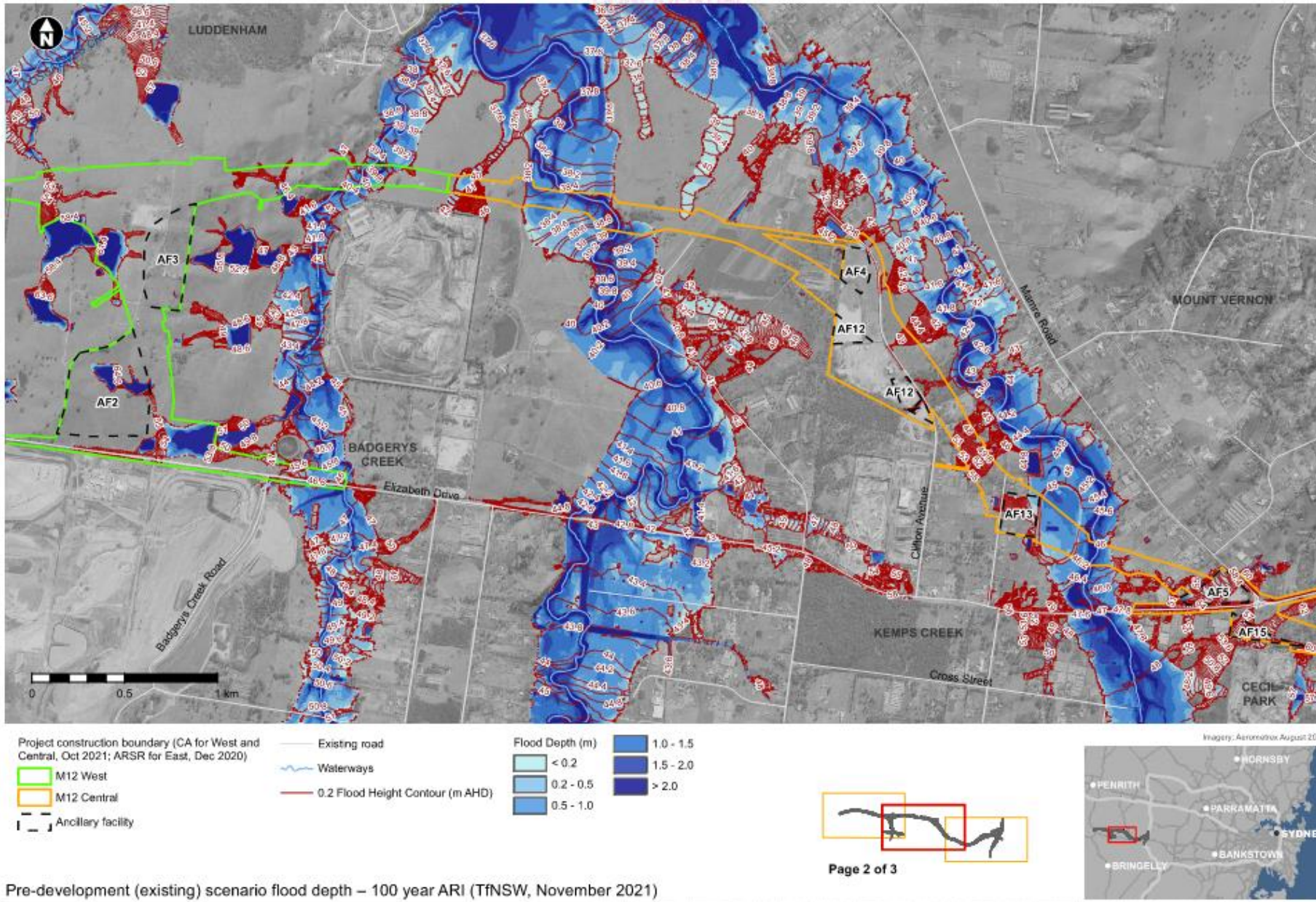
Pre-development (existing) scenario flood depth – 20 year ARI (TfNSW, November 2021)

Figure 8-2: Existing conditions during a 20 year ARI flood event



Pre-development (existing) scenario flood depth – 100 year ARI (TfNSW, November 2021)

Figure 8-3: Existing conditions during a 100 year ARI flood event



Pre-development (existing) scenario flood depth – 100 year ARI (TfNSW, November 2021)

Figure 8-4: Existing conditions during a 100 year ARI flood event

Appendix C – Secondary CoA, REMMs

CoAs

CoA No.	Condition Requirements	Document Reference
A20	<p>Lunch sheds, office sheds, portable toilet facilities, and the like, can be established and used where they have been assessed in the documents listed in Condition A1 or satisfy the following criteria:</p> <p>iii) minor environmental impact with respect to waste management, soil, water and flooding</p>	Section 5.1.1
E17	<p>Unless otherwise agreed by the Planning Secretary, the CSSI must be designed and constructed to limit impacts on flooding characteristics in areas outside the project boundary during any flood event up to and including the 1% AEP flood event, to the following:</p> <p>(a) a maximum increase in inundation time of one hour;</p> <p>(b) a maximum increase of 10 mm in above-floor inundation to habitable rooms where floor levels are currently exceeded;</p> <p>(c) no above-floor inundation of habitable rooms which are currently not inundated;</p> <p>(d) a maximum increase of 50 mm in inundation of land zoned as residential, industrial or commercial;</p> <p>(e) a maximum increase of 100 mm in inundation of land zoned as rural, primary production, environment zone or public recreation;</p> <p>(f) no significant increase in the flood hazard or risk to life; and</p> <p>(g) maximum relative increase in velocity of 10%, where the resulting velocity is greater than 1.0 m/s, unless adequate scour protection measures are implemented and/or the velocity increases do not exacerbate erosion as demonstrated through site-specific risk of scour or geomorphological assessments.</p> <p>Where the Proponent cannot meet the requirements set out in clauses (d), (e) and (g) alternative flood levels or mitigation measures may be agreed to with the affected landowner.</p> <p>In the event that the Proponent and the affected landowner cannot agree on the measures to mitigate the impact as described in clauses (d), (e) and (g), the Proponent must engage a suitably qualified and experienced independent person to advise and assist in determining the impact and relevant mitigation measures.</p>	<p>Section 1.5.2</p> <p>Section 6.4</p> <p>Table 6-1</p>

REMMs

ID	Revised environmental management measure	Timing	Document Reference
F08	Activities that may affect existing drainage systems during construction will be carried out so that existing hydraulic capacity of these systems is maintained where practicable.	Construction	Section 6.1 Section 6.2 Section 6.3 Section 6.4 Table 6-1 Section 7.4
HS03	An incident response management plan will be developed and implemented. The response to incidents within the road will be managed in accordance with the memorandum of understanding between TfNSW and the NSW Police Service, NSW Rural Fire Service, NSW Fire Brigade and other emergency services.	Prior to construction	Emergency Response Plan (ERP)